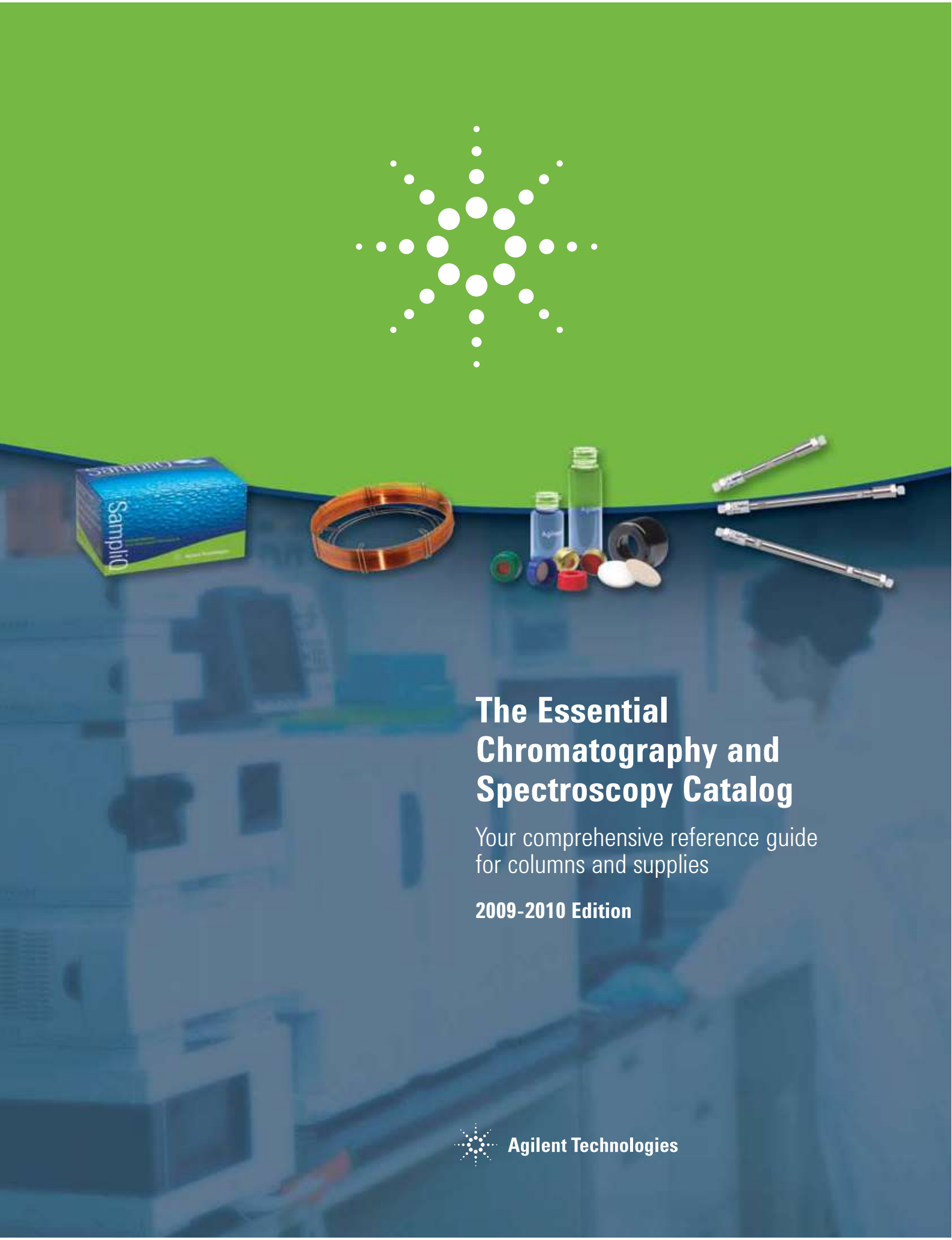


The Essential Chromatography and Spectroscopy Catalog

Your comprehensive reference guide for columns and supplies

2009-2010 Edition

Agilent Technologies







Dear Valued Customer,

At Agilent, the most important part of our business is doing whatever it takes to earn your business.

With that in mind, I'm pleased to present you with the 2009-2010 edition of Agilent's *Essential Chromatography and Spectroscopy Catalog*.

Inside, you'll find everything you need to ensure maximum instrument performance and reproducible results – including compatibility charts, application notes, maintenance schedules, and much more.

And remember, when you buy columns and supplies from Agilent, you get more than just products. You also get over 40 years of GC, LC, and MS experience. In other words, whenever you need us, we'll be there.

If you have any questions, or would like to place an order, you can contact your local Agilent office or Authorized Distributor using the information on pages 23-29 of your catalog. And please feel free to contact me directly with any comments or suggestions you may have.

As always, thank you for the opportunity to become your partner in chromatography.

Sincerely,

Helen Stimson

Helen Stimson
Vice President and General Manager
Columns and Supplies Division
helen_stimson@agilent.com
302-633-8437

P.S. Our customers tell us that their budget challenges have never been greater. So we've made it easy to find valuable discounts on Agilent columns, supplies, and more. For details, visit **www.agilent.com/chem/specialoffers**.

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Information in this document is subject to change without notice. Agilent Technologies reserves the right to correct any printing errors in this catalog. Application information in this catalog is for investigational use only and is not intended to be a complete laboratory diagnostic procedure or method. The performance characteristics of the procedures have not been fully established. The choice of methodology and procedures remains the responsibility of the user and not of Agilent Technologies.



Agilent 7890A Series GC

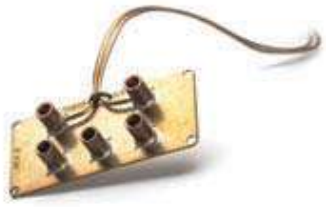
Enhanced capabilities. Expanded possibilities.

Running more samples, faster, at the lowest possible cost. Generating reliable, more precise data. The Agilent 7890A Series GC platform can help you achieve all these goals and more.

With its full range of inlets, detectors, and data systems, and Agilent's reputation for performance and reliability, Agilent's 7890A Series GC represents the next generation of gas chromatography. Features include:

- Agilent Capillary Flow Technology, combined with enhanced user-friendly interfaces, makes a range of new chromatographic capabilities easier to set-up and operate.
- Faster cool-down, along with shorter post-run times with backflush, promote higher sample throughput. Faster oven ramps are available for GC/MS users.
- New Nitrogen Phosphorous Detector (NPD) with Blos bead offers superior lifetime and operational stability with sensitivity and selectivity that is similar for nitrogen and superior for phosphorous containing compounds.
- Fast and easy split/splitless inlet maintenance – minimizes your downtime.
- Electronic pneumatics controls (EPC) feature a micro-machined injection-molded design for greater reliability. Also, additional EPC channels are available to facilitate complex analyses.
- Real-time monitoring and diagnostics software – Agilent Lab Advisor Software allows you to monitor your Agilent 7890A GCs and Agilent 1200 Series LC systems from your office to ensure high quality chromatographic results. This software also notifies you when and how to perform system maintenance.

And of course, the Agilent 7890A Series GC is backed by over 40 years of Agilent innovation, leadership, and chromatography expertise.



Capillary Flow Technology – Solve Challenging Application Problems Easily

Agilent Capillary Flow Technology allows you to easily make reliable, leak-free, in-oven capillary connections that can stand up to the temperature extremes of a modern GC. Backflush – available with any of the following purged capillary flow devices – can significantly shorten cycle times, reduce the need for column and detector maintenance, and provide better data quality.

- Deans Switch (heart-cutting) provides higher chromatographic resolution
- Splitters allow the column effluent to be diverted to multiple detectors – including MS – for more information from a single run
- QuickSwap for GC/MS lets you change or maintain columns without venting
- Flow modulator allows GC x GC without the need for expensive cryogen cooling

See the GC and GC/MS chapter for Agilent J&W Columns designed specifically for GC x GC applications.



Agilent LTM Rapid Heating/Cooling for GC

- Rapid temperature programming rates of up to 1800°C/min can be set (achievable or practical rates depend on column mass, configuration and column void times).
- Fast cooling times – less than one minute for some configurations – aid rapid analytical cycle times.
- Uses the same 6890/7890 GC injectors, detectors, and fused silica capillary columns (up to 30 m in length) with little change to your existing methods. Agilent's Method Translation Software will make method changes easy to accomplish.
- Very good retention time repeatability, comparable to conventional GC.

Agilent now offers a comprehensive line of Agilent J&W LTM Column Modules for the Agilent LTM Rapid Heating/Cooling system.

Turn to pages 308–332.

Agilent's Industry-Leading Samplers



7683B Automatic Liquid Sampler

Delivers unsurpassed productivity, flexibility and confidence.



CTC PAL Sample Injectors

Automate sample preparation and increase your productivity.

- Choose our versatile CombiPAL sample injector for liquid injection, headspace, and solid-phase microextraction techniques.
- Choose our economical GC PAL platform (liquid injections only) for large-volume injections, multiple vial sizes, and extended vial capacity.



G1888 Headspace Sampler

Lets you automatically introduce volatile compounds from virtually any sample matrix directly into a GC or GC/MS – without analyte degradation or loss.



Thermal Desorption

Allows you to introduce volatile and semi-volatile compounds from a wide range of sample matrices, directly into a GC or GC/MS. Markes Series 2 TD platform consists of the UNITY 2, UltrA 2, Air Server 2, and CIA8 products allowing analysis of single tubes, real-time air samples, and canisters with options for automated analysis.

Look inside the General Chromatography and GC and GC/MS chapters for all of the sampler supplies you need.

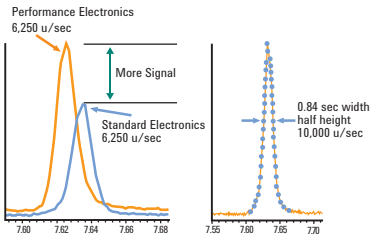


The Agilent 5975C Series MSD with the New Triple-Axis Detector

Proven performance, superior productivity – and maximum confidence in your results

Over 30 years of innovation and leadership have led to a total GC/MS solution for your lab. Better MS resolution, the industry's lowest mass deviation, superior sensitivity in all ionization modes and unquestioned spectral integrity establish a solid foundation of consistent quality for all of your GC/MS applications.

- Inert ion source – now programmable up to 350˚C – delivers enhanced response for active compounds and late eluters
- True hyperbolic quadrupole – maximum transmission and resolution
- Thermally stable quartz quadrupole – the proprietary quadrupole can be heated up to 200°C for long-term mass axis stability
- The Triple-Axis Detector with the triple-channel electron multiplier increases signal and reduces neutral noise for even lower detection limits
- 0.10 u mass axis stability over 48 hours – ensures longer lasting tune and calibration stability
- Auto CI – automatic EPC reagent gas adjustment and CI tuning
- Electron impact (EI) ionization standard with CI ion source – obtain EI and CI spectra from the same source
- Fast SIM – dwell time as short as 1 ms
- 1050 u mass range – extends application space for high mass compounds
- Ammonia specification for PCI/NCI – unique to the industry
- SemiQuant capability – easy and fast estimation of amount of unknown compounds



Fast electronics enhance full scan and SIM performance

Agilent's 5975C Series GC/MSD includes performance electronics to maximize signal transmission for faster GC/MS in full scan, Selected Ion Monitoring (SIM) and Synchronous SIM/Scan modes.

- Scan rates up to 12,500 u/s – compatible with fast full scan GC/MS
- Run Synchronous SIM/Scan without compromising performance
- More data points per peak – for better peak integration



QuickSwap – enhanced productivity and performance through Capillary Flow Technology

- Fast column removal or replacement without the need to cool and vent the MSD
- Risk-free inlet and column maintenance by preventing air from entering the MSD
- Short analysis times and increased sample throughput by removal of high molecular weight compounds using backflushing mode

	California Department of Food and Agriculture (CDFA)	Deconvolution Reporting Software (DRS)
Number of pesticide hits	37	Same 37 plus 99 additional
Number of false positives	1	0
Time required to process	8 hours	32 minutes

Extend the qualitative and quantitative power of your MSD with Deconvolution Reporting Software (DRS)

NIST AMDIS (Automated Mass Spectral Deconvolution and Identification Software) is now fully integrated with ChemStation QEdit and reporting. It is easier than ever to extract trace analytes from complex matrices and deconvolute coeluting peaks for high quality library searches against Retention Time Locked databases and the NIST library.



Updated MSD ChemStation software extends your qualitative and quantitative analysis capabilities

- Gain Normalized Autotune and Methods – optimized and consistent performance from instrument to instrument
- Synchronous SIM/Scan and AutoSIM – automatically convert any full scan method to a high sensitivity method
- Enhanced Data Analysis Plus – select from a set of qualitative analysis tools
- MSD Security ChemStation – address the security, integrity and traceability mandated by FDA's 21 CFR Part 11

Maximize your performance by combining the Agilent 5975C Series MSD with Agilent columns and supplies, including new Ultra Inert columns and MS certified liners.

Expanded Portfolio of Columns and Supplies for GC/MS



Maximize your performance by combining the Agilent 5975C Series MSD with Agilent columns and supplies, including new Agilent J&W Ultra Inert columns, QuickSwap interface restrictors, and MS certified liners. See the GC and GC/MS chapter for GC/MS columns and supplies.



Agilent 1120 Compact LC

Is your lab looking for better, more reproducible results for all your standard HPLC analyses, run after run and day after day? Are you looking for an affordable, high quality solution that maximizes uptime, minimizes maintenance and provides the highest return on your investment?

Here's some good news: the 1120 Compact LC from Agilent.

Now any lab can take advantage of Agilent's unmatched combination of advanced instrumentation, versatile software and application-matched columns and supplies. This robust new LC solution is designed to optimize performance, while minimizing complexity. And because it's from Agilent, it gives you the proven quality and performance you expect from the industry leader, in your choice of five easy to own, integrated, "all-in-one" configurations.



1120 Compact LC

Ideal for small- to medium-sized labs using standard HPLC for routine analysis

- Easy to learn and use – for all users
- Extraordinary results in a system optimized for everyday productivity
- Industry-leading quality and long-life Agilent reliability
- Five standard configurations to fit your LC workflow
- A complete, integrated software solution, scalable from a single user to a whole enterprise
- Agilent columns and supplies for an extra measure of reliability and confidence
- Agilent's customer-enabled service and support features for maximized uptime

For more information about the Agilent 1120 Compact LC, visit www.agilent.com/chem/1120.

Agilent Supplies for Your 1120 Compact LC



Maximize your performance by using Agilent parts and supplies specifically designed to work seamlessly with the new 1120 Compact LC.

Turn to page 547.



Agilent 1200 Series LC Systems and Modules

Whatever your priority, speed, resolution or sensitivity, the flexible, modular design of the 1200 Series ensures configurations ideally suited to meet your application requirements.

The Agilent 1200 Series represents the next generation of HPLC instrumentation, designed for even greater robustness and reliability, together with enhanced performance.

The Agilent 1200 Series offers scalable solutions from the broadest LC portfolio available, from conventional HPLC to ultra-fast Rapid Resolution LC (RRLC), and from preparative LC to automated method development.



1200 Series Rapid Resolution LC System

Highest speed and resolution with uncompromised data quality

- Up to 60 percent more resolution and up to 20 times faster compared to conventional LC
- Flow rates up to 5 mL/min provide universal applicability
- Full, uncompromised compatibility with existing methods
- Ideally suited for use with ZORBAX Rapid Resolution HT 1.8 µm columns
- Throughput of 2000 samples per day



1200 Series Isocratic LC System

The LC workhorse for demanding QA/QC applications

- Entry-level system for world-class LC technology
- Easy and fast maintenance
- Flow rates up to 10 mL/min for a wide range of column dimensions and applications
- Upgrade options from isocratic up to automated quaternary LC system



1200 Series Quaternary LC System

For routine method development and high-throughput gradient applications

- Greatest flexibility for multi-solvent gradients by accessing up to 4 solvents
- Flow rates up to 10 mL/min support narrow bore, standard and semi-preparative applications
- Wide selection of autosamplers for full flexibility in injection volumes and sample containers



1200 Series Binary LC System

For research, high-throughput and fast applications

- High pressure gradient mixing for superior gradient performance even at lower flow rates
- Optimized delay volumes for fast chromatography
- Flow rates from 0.05 to 5 mL/min provides ideal support for narrow and standard bore applications



1200 Series Method Development Solution

For highest flexibility based on an unmatched combination of advanced LC instrumentation, columns, and application-specific software

- More than 50 LC modules for different detection modes and different budgets
- Automated switching between up to eight columns and up to 15 different solvent pairs
- Up to 288 different test conditions for binary gradient separation
- No need to disconnect columns or exchange solvent bottles



1200 Series Capillary LC System

Enter the world of low flow applications

- Up to 500 times more sensitive compared to conventional LC
- Typical flow rates 1-100 µL/min, extendable up to 2.5 mL/min
- Advanced diode array detection from 190-950 nm



1200 Series Nanoflow LC System

Unsurpassed nanoflow performance and stability

- Up to 3500 time more sensitive compared to conventional LC
- Typical flow rates 0.1-1 µL/min, extendable up to 2.5 mL/min
- Compatibility with third-party MS platforms



1200 Series HPLC-Chip/MS System

For reliable high sensitivity nanospray LC/MS

- Up to 3500 times more sensitive compared to conventional LC
- No peak dispersion for uncompromised chromatographic performance
- Sample preparation and separation columns, connection capillaries, fittings, and nanospray emitter integrated directly on the polymer chip



1200 Series Purification Systems

Dedicated preparative solutions for a range of sample quantities and flow rates, optimized for highest recovery and purity, throughput and productivity

- Analytical scale covering flow rates up to 10 mL/min
- Preparative scale covering flow rates up to 100 mL/min
- Automated delay volume calibration
- Integrated safety features
- Software solutions for different user needs
- Smart fraction collection based on time, peak and mass, or both



1200 Series Micro Collection/Spotting System

For collection of micro fractions in different well-plate formats and for combining chromatography with the power of MALDI MS by direct spotting on MALDI targets

- Active flow control for exceptional flow stability
- Flexibility of collection in well-plates, Eppendorf tubes and MALDI targets
- Liquid control for highest reproducible collection of small volumes
- Fraction cooling prevent evaporation and thermal decomposition

For more information about Agilent 1200 Series systems and modules, visit www.agilent.com/chem/1200.

Extensive LC Column and Supplies Portfolio



Maximize your performance by combining the new Agilent 1200 Series system with Agilent ZORBAX LC columns and LC supplies. Designed with the same attention to detail, quality and superior performance you have come to expect from Agilent instruments, you can count on Agilent columns and supplies to deliver the high quality results you need. See the LC and LC/MS chapter for new 1200 parts, supplies, and columns.



The Agilent 6000 Series LC/MS Systems – Performance, Productivity and Reliability

If you're looking for more sensitive target compound analysis and better identification of unknowns, take a close look at Agilent's comprehensive LC/MS portfolio. With a 37-year track record of relentless innovation and groundbreaking contributions to MS technology, we deliver everything you expect from a mass spectrometry leader.

Combined with Agilent's industry leading analytical HPLC and RRLC systems, our single quadrupole, ion trap, triple quadrupole, TOF and Q-TOF LC/MS solutions combine world-class performance with legendary reliability and ease-of-use.



Agilent 6100 Series Single Quadrupole LC/MS

From routine QC to research level applications, Agilent 6100 series single quadrupole LC/MS systems offer industry leading data quality in an easy-to-use, space saving benchtop package.

- Faster acquisition speeds to take full advantage of high-throughput separations such as RRLC
- Ultra-fast ion polarity switching (up to 20 spectra/second) provides maximum information from a single injection
- Faster injection-to-injection cycle time lets you run more sample per hour



Agilent 6220 Accurate-Mass TOF LC/MS

Combined with True Hi-Def TOF technology, the 6220 Accurate-Mass TOF LC/MS delivers unmatched speed and performance in a compact benchtop instrument for confirming synthetic compounds, profiling biomarkers, identifying impurities, screening for pesticides or characterizing intact proteins.

- Sub-1 ppm typical mass accuracy improves confidence and reduces false positives
- Data acquisition rates up to 40 spectra per second assure maximum data quality and compatability with fast chromatography
- Up to five orders of in-spectrum dynamic range reveal trace-level targets even in the presence of vastly more abundant compounds
- Low pictogram on-column sensitivity finds impurities or biomarkers at extremely low concentrations
- Exceptionally accurate intact protein MW determination allow rapid QC of recombinant therapeutics



Agilent 6300 Series Ion Trap LC/MS

Available in a range of configurations tailored to your lab's analysis needs, Agilent 6300 series ion trap system delivers sensitive, data-dependant MS/MS that makes structural confirmation and sample identification faster and easier.

- 10x greater ion storage capacity and 2x faster scan speeds enhance compound identification in complex samples
- Automated, data-dependent MS/MS and MSn maximize the amount of high-quality data from a single run, increasing the number of compounds identified
- Optional electron transfer dissociation (ETD) improves peptide fragmentation and allows PTMs such as phosphorylation to be more easily identified and located



Agilent 6400 Series Triple Quadrupole LC/MS

Industry-leading sensitivity, productivity and value with the workhorse 6410 system or the break-through 6460 LC/MS system. The new 6460, with Agilent Jet Stream Thermal Gradient Focusing technology achieves dramatic sensitivity gains and is the first triple quad to break the femtogram detection barrier for analysis of pharmaceutical drug candidates, trace-level contaminants or food contaminants, metabolites and biomarkers.

- Femtogram sensitivity – regardless of application. Maximized ion generation and transmission across a broad mass range ensure low limits of detection and quantitation for the widest range of sample types
- Fast, sensitive MRMs. An innovative collision cell design enables the analysis of large multi-analyte panels, such as pesticides in food or targeted protein quantitation
- Automated method development and optimization software selects the best possible conditions to maximize sensitivity for each compound

Comprehensive LC/MS Supplies Portfolio



Improve your performance by using Agilent parts and supplies designed specifically for Agilent 6000 Series LC Systems. Agilent offers a full portfolio of LC/MS supplies, including chemicals, vacuum accessories, tubing, fittings, source supplies, and the new, convenient preventive maintenance kit.

Turn to page 550.



Agilent 6500 Series Accurate Mass Q-TOF LC/MS

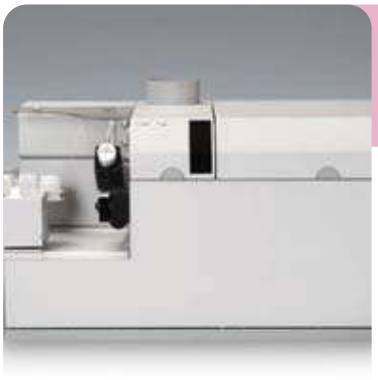
Using the power of True Hi-Def TOF technology, the 6500 series Accurate-Mass Q-TOF's delivers unsurpassed mass accuracy in both MS and MS/MS for unambiguous structural elucidation and target identification.

- 1-2 ppm MS and 2-4 ppm MS/MS mass accuracy increases confidence in small molecule ID and reduces false positive rates in protein database searches
- Superior attomole-to-low femtomole sensitivity helps you identify even very low-abundance compounds
- Spectral acquisition rates of up to 20 MS or 10 MS/MS spectra per second let you take advantage of the LC throughput gain of Agilent RRLC and HPLC-Chip separations
- Broad mass range of 25-20,000 m/z enables detection of small molecules, peptides or intact proteins

Relentless innovations for highest performance

The 6000 Series gains strengths from its sharing of both proven components, relentless innovation and ground-breaking contributions with MS technology. The new 6530 Accurate-Mass Q-TOF gets its outstanding mass accuracy, resolution and dynamic range from True Hi-Def TOF technology, also an integral part of the 6220 Accurate-Mass TOF LC/MS.

New innovations such as the Agilent Jet Stream Thermal Focusing technology bring new 5 to 10-fold sensitivity gains. This technology improves ion generation resulting in higher MS signal intensities and improved signal-to-noise ratios. The Agilent Jet Stream is available exclusively on the 6460 Triple Quadrupole LC/MS and the 6530 Accurate-Mass Q-TOF LC/MS to provide exceptional ESI-MS sensitivity at conventional LC flow rates.



Make the Change to ICP-MS with Agilent

ICP-MS is widely acknowledged as the premier technique for trace metals analysis. Agilent's 7500 Series delivers the highest level of performance, while retaining ease of use, flexibility, and reliability through automation and excellence in design. With second generation Octopole Reaction System (ORS) technology and the widest range of sampling accessories, backed by the finest applications and service support, the 7500 Series leads the way in ICP-MS. The 7500 Series is comprised of two different models to suit different application requirements.



Agilent 7500cx – Simpler, Faster, More Accurate

The 7500cx introduces a completely new concept in ICP-MS: interference-free analysis, under a single set of operating conditions.

- Universal helium mode for reliable, predictable removal matrix interferences
- Easy setup – no "cookbooks," no complex optimizations
- Enhanced productivity – no gas mode switching within the run



Agilent 7500cs – The Ultimate Semiconductor Analyzer

ORS technology extends the scope of ICP-MS for seminconductor applications.

- Ultra high sensitivity for the ultimate in detection power, featuring the ORS for removal of matrix interferences in the toughest semiconductor sample types
- Unmatched cool plasma performance with Agilent's ShieldTorch interface ensures complete flexibility for all applications
- Sample introduction system and interface designed for semiconductor use; full exhaust duct for cleanroom use

Extensive ICP-MS Supplies Portfolio



Maximize your performance by combining the new Agilent 7500 Series system with Agilent ICP-MS parts and supplies. Designed with the same attention to detail, quality and superior performance you have come to expect from Agilent instruments, you can count on Agilent supplies to deliver the high quality results you need. See the ICP-MS chapter for 7500 parts and supplies.



A Leader in Automation for Life Science Applications

Agilent has joined with Velocity11 to provide a comprehensive suite of workflow solutions for automated sample preparation to customers in the pharmaceutical, biotech and academic research markets. Together, we are committed to providing you with complete solutions that solve your problems and dramatically enhance your productivity.

Bravo Liquid Handling Platform

The Bravo Liquid Handling Platform is the fastest and most versatile small footprint liquid handling system available, capable of dispensing from 100 nL to 200 µL in 96, 384, and 1536 well formats or to a column, row or single well of any of these plate types. Its space-saving nine plate-position footprint can fit inside a standard laminar flow hood, enabling automated liquid handling for cell-based assays or hazardous reagent handling.

- Performs in a laminar flow hood
- Pipetting range of 100 nL to 200 µL
- Serial dilutions with standard pipette heads
- Interchangeable pipette heads are swappable in minutes
- User configurable positions for filtration, temperature control, shaking and more



PlateLoc Thermal Plate Sealer

The PlateLoc Thermal Plate Sealer has distinguished itself as the premier thermal sealer through its speed, small footprint, ease of use and dependability. The PlateLoc design team overcame the challenges of sealing a wide range of microplates by developing a versatile instrument that automatically accommodates deepwell, assay, PCR, and compound storage plates. Standalone mode operation enables full control of sealing time and temperature through the PlateLoc's touch screen, and the PlateLoc is ideal for robotic integration, featuring an extended-travel plate stage, RS-232 serial port and an ActiveX control.

- Touch screen interface for fast and easy manual operation
- Automatically adjusting to accommodate a wide range of microplates and tube racks, the PlateLoc can handle all of your sealing needs
- High precision, with sealing temperature control of ±2°C and advanced seal slitting control, seal integrity will be the same for every plate
- Fast machine cycle times, and no required cool down periods mean you will spend your time sealing plates, not waiting
- With the industry's smallest instrument footprint and numerous proven integrations, the PlateLoc is an ideal choice for system integrators



BioCel Automation Systems

Through innovative design, the BioCel Automation Systems deliver the functionality of much larger systems in an efficient package optimized for speed and flexibility. With industry-leading engineering, Velocity11 delivers fully-integrated automated solutions to fit your research requirements in high-throughput screening, cell based assays, plate based cell maintenance, compound management, and genomics applications.

- Compact footprint, saving valuable lab space
- Expand capacity and functionality in the future; just add another BioCel
- Increased flexibility and capacity with under-table incubators or plate carousels
- QuickDock docking tables available to easily swap devices or use instruments offline
- Inert, Class 100, and humidity controlled environments available
- Event-driven controller ensures highest instrument utilization and maximum system productivity



BenchCel Microplate Handling Platform

Masterpiece of form, function, and flexibility in laboratory automation. The BenchCel Platform is an integrated benchtop robot and microplate storage solution that delivers the speed and precision of a full-sized automation platform. The BenchCel Platform features a highspeed plate shuttle that accesses integrated microplate stacks and peripheral instruments. This customizable, modular design provides the flexibility and scalability required to meet the needs of the most diverse laboratory environments.

- Automated plate delivery for up to four peripheral instruments
- Handle a range of labware including PCR plates, deepwell plates, lidded plates, and tipboxes
- Manage simple to complex applications with the leading automation control software with scheduler
- Choose from two, four or six stack models for storage up to 300 microplates

For more information, visit www.velocity11.com



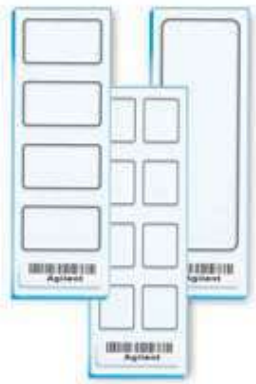
Agilent's New DNA Microarray Scanner with SureScan High Resolution Technology

Agilent's new DNA Microarray Scanner with SureScan High-Resolution technology is the key component of microarray-based applications in which increased coverage of the genome is a necessity. Whether performing gene expression studies, aCGH, miRNA profiling, or other novel applications, Agilent's scanning technology is responsible for providing the highest quality data.

Workflow Solutions

A fully integrated system of hardware, sample processing kits, microarrays and data analysis software.

- Gene Expression – Explore gene transcription on a genome-wide basis across a variety of model systems
- Comparative Genomic Hybridization – Conduct high-resolution, genome-wide profiling of DNA copy number changes from most sample types, including FFPE tissue
- MicroRNA – Profile miRNAs and explore the role played in gene regulation with the most robust experimental protocols and frequent array design updates
- Chromatin Immunoprecipitation – Elucidate the role that protein-DNA interactions play in processes such as transcription, replication, modification and repair
- DNA Methylation – Create high-resolution, genome-wide methylation profiles and gain insight into mammalian DNA methylation and gene regulation



Agilent Microarrays

The Agilent microarray lies at the center of an integrated research platform designed to provide you with the dynamic tools you need to perform research on your own terms. Agilent's microarrays utilize SurePrint inkjet technology, which produces highly reproducible 60-mer oligo probes directly on glass slides, resulting in the highest sensitivity and 6X the signal-to-noise ratio than other microarrays. With this level of performance, you can work with complex mixtures, analyze degraded samples, and detect subtle yet significant biological changes with confidence.

Agilent Custom Microarray Options

Control the design of your own custom microarrays with our free online application tool, eArray. Whether you upload your own probe content, use our algorithms for design, or search our comprehensive databases for validated content, eArray provides the easiest method of designing custom microarrays at no charge.

To order custom arrays online, visit www.agilent.com/chem/earray



Stratagene Real-time PCR Solutions from Agilent

With the addition of Stratagene real-time PCR solutions, Agilent offers the most comprehensive workflow solution for gene expression analysis.

Stratagene Mx3005P System

The Mx3005P system provides researchers the flexibility to utilize virtually all fluorescent dyes and real-time PCR chemistries available. The uniform 96-well thermal system and 5-color precision optical system provide maximum sensitivity with a wide linear dynamic range of detection for accurate quantification of both high and low abundance targets. The MxPro graphical user interface software provides simple operation and rapid data analysis with the flexibility to customize algorithms and export data in multiple formats.

- Optical filters are optimized to minimize signal contamination to provide accurate fluorescent discrimination and the most accurate multiplex detection
- Supports a wide range of applications, including: gene expression, confirmation of microarray data, micro RNA analysis, pathogen identification, DNA methylation assays, and ChiP analysis

Brilliant II QPCR and QRT-PCR Reagents

The Brilliant II portfolio offers a wide selection of high-performance reagents for sensitive, rapid, and reproducible results on the Mx3005P system and other real-time PCR platforms.

- Kits designed for the Mx3005P system and other real-time PCR systems, options with reference dye included in master mix and new fast cycling formulation

miRNA Analysis with Real-time PCR

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General Chromatography Supplies

Confidently analyze your most challenging compounds and increase the productivity of your lab.







With Agilent chromatography supplies and accessories, the difference is in the details – and it has been that way for over 40 years.

All Agilent products are engineered or selected by our instrument design teams, manufactured to demanding specifications, and tested under stringent conditions. This painstaking care – registered to ISO-9001 – ensures that every part will perform at optimal levels.

Most recently, we have applied our chromatography, application, and standards expertise toward new innovations such as:

- An expanded line of Agilent Certified Vials – the only vials that ensure seamless operation with Agilent instruments, so your most complex runs proceed smoothly.
- New gas management supplies – including the Renewable Gas Purification System, Precision Gas Flow Meter, Gas Leak Detector, and Low Gas Alarm System.

On the following pages, you can explore these new products in detail. You will also find descriptions and specifications for other essential supplies, such as caps, septa, syringes, fittings and tools.



Vials, Caps and Septa

Prevent unexpected sequence problems with Agilent Certified Vials, Caps and Septa

Don't let the least expensive part of the sequence become the biggest cause of failed analysis. Agilent's certified vials are manufactured with the same high-quality design, technical expertise, and exacting specifications that go into every Agilent instrument. Every order of certified vials, caps, and septa comes with a test certificate confirming product specifications. Certified products are available for screw top, crimp top, snap top and headspace.

Tips & Tools

For the up-to-date information on Agilent Certified Vials, Caps and Septa, visit **www.agilent.com/chem/vials**.

Statements on the Certified Vial Certificate

- Compatible with Agilent autosamplers
- Made from first hydrolytical class, borosilicate glass type 1
- Manufactured in a ISO 9001 certified environment
- 100% automated computerized video imaging to test critical dimensions, including vial finish, outer diameter, body OD, and length
- Packed in a clean environment and with packaging especially designed to reduce contamination
- Compliant with requirements of U.S. and European Pharmacopoeia

Certified Caps and Septa

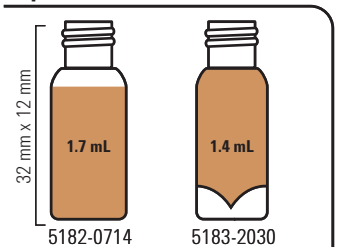
- Designed and fabricated for proper sealing and trouble-free operation with Agilent instruments
- Manufacturing SOPs monitored stringently for consistent quality and full traceability
- Chromatographic test on silicone septa for purity to eliminate outliers and sample errors

Eliminate the problems typical of uncertified vials

Common problems with uncertified, non-Agilent vials	Effects	Benefits of Agilent Certified Vials and Caps
Inconsistency with vial bottom thickness	• Sample draw inconsistency • Damaged needle	Consistent and valid relative standard deviation (RSD) values
Autosampler sequence interruption	• Mishandled or dropped vials • Loss of precious sample	Confidence in unattended operation
Undetected improper seal	• Sample loss/evaporation • Possible sample contamination	Proper sealing for accurate results
Dislodged or misaligned septa	• Sample loss • Sample contamination	Accurate results
Ghost peaks	• Contamination by cap septa	Chromatographic purity test that eliminates outliers and analysis errors

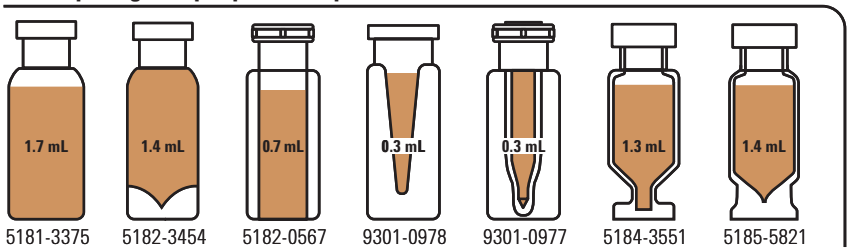
Agilent Vial Identification Chart and Actual Fill Volumes

Wide Opening Screw Top Vials: Septum Diameter 9 mm



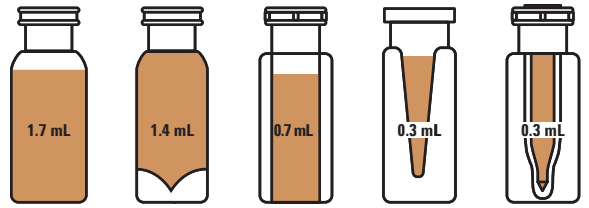
5182-0714 5183-2030

Wide Opening Crimp Top Vials: Septum Diameter 11 mm



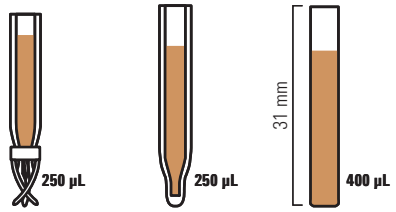
5181-3375 5182-3454 5182-0567 9301-0978 9301-0977 5184-3551 5185-5821

Wide Opening Snap Top Vials



5182-0544 5183-4510 5182-0567 9301-0978 9301-0977

Inserts for 2 mL, 12 x 32 mm Wide Opening Vials



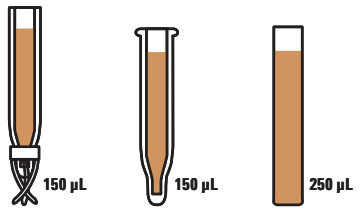
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Narrow Opening Screw Top Vials



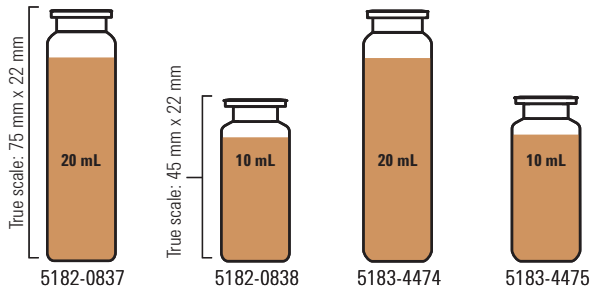
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Inserts for 2 mL, 12 x 32 mm Narrow Opening Screw Top Vials



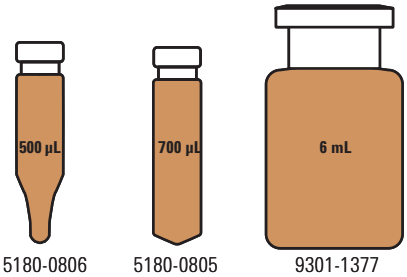
5183-4428 5183-2089 5183-2090

Headspace Crimp Top Vials: Flat and Rounded Bottom



5182-0837 5182-0838 5183-4474 5183-4475

Vials for Agilent LC Instruments



5180-0806 5180-0805 9301-1377



Autosampler Compatibility Chart

Autosampler	Model
Agilent Technologies	All Models except CE, that cannot be pressurized
Beckman	501, 507
Dynatech	42 Vial Tray, LC 2000
Finnigan	A200S
Fisons	AS 800
Gilson	231-401, 232-402, 201/202, 221/222, Aspec
Hewlett-Packard	All Models except CE
Hitachi	AS-2000, AS-4000
L.E.A.P.	A200S, CTC PAL
LDC	Marathon, Promis
Perkin-Elmer	4900, Integral 4000, Autosystem GC, ISS 100/ISS 200, LC 600 42-Tray
Spark	Marathon/Promis, SPH 125
Spectra-Physics	SpectraSystem, 8875/8880
Varian	8100/8200, 8035/9095, 8000, Marathon, Vista
Waters	2690, Alliance Systems

Septum Selection Guide

Septum Material	Compatible with	Incompatible with	Resealability	Max. Temperature
Rubber (Natural or Butyl)	ACN, acetone, DMF, alcohols, diethylamine, DMSO, phenols	Chlorinated solvents, aromatics, hydrocarbons, carbon disulfide	Excellent	< 100°C
PTFE/Natural or Butyl Rubber	PTFE resistance until punctured, then septa or liner will have compatibility of rubber		Good	< 100°C
Silicone/Silicone Rubber	Alcohol, acetone, ether, DMF, DMSO	ACN, THF, benzene chloroform, pyridine, toluene, hexane, heptane	Excellent	< 200°C
PTFE/Silicone, PTFE/Silicone/PTFE	PTFE resistance until punctured, then septa will have compatibility of silicone		Average	< 200°C
VITON	Chlorinated solvents, benzene, toluene, alcohols, hexane, heptane	DMF, DMSO, ACN, THF, pyridine, dioxane, methanol, acetone	Good	< 260°C



Screw Top Vials, Caps, Septa and Packs

Combine the excellent autosampler handling of a crimp cap profile with the ease of a screw cap. The screw caps and precision fit septa give a secure seal with microvolume inserts.

- 2 mL, 12 x 32 mm
- 40% larger opening than standard narrow opening vials
- Unique thread design for consistently secure seal
- Precision-formed neck for optimal robotic arm handling
- Rigorous quality assurance for dimensional consistency from lot to lot
- Optional ceramic write-on spot with fill marks
- Select from several compatible microvolume inserts



Screw top vials with fixed inserts



6 mL screw top vials

Screw Top Vials

Description	Unit	Part No.
Certified 2 mL Wide Opening Screw Top Glass Vials		
Clear	100/pk	5182-0714
Clear, write-on spot	100/pk	5182-0715
Amber	100/pk	5188-6535
Amber, write-on spot	100/pk	5182-0716
Clear	1000/cs*	5183-2067
Clear, write-on spot	1000/cs*	5183-2068
Amber	1000/cs*	5188-6536
Amber, write-on spot	1000/cs*	5183-2069
2 mL Deactivated Wide Opening Screw Top Glass Vials		
Clear, silanized	100/pk	5183-2070
Clear, write-on spot, silanized	100/pk	5183-2071
Amber, write-on spot, silanized	100/pk	5183-2072
Screw Top Vials with Fixed Inserts		
Clear	100/pk	5188-6591
Amber	100/pk	5188-6592
6 mL Screw Top Vials		
Clear, 16 mm cap size	100/pk	9301-1377
Clear, extreme high recovery, 16 mm cap size	30/pk	5188-2757
Clear, 5 mL high recovery	30/pk	5188-5369

*Case includes 10 packs of 100 vials

Tips & Tools

6 mL high recovery screw top vials are recommended for G2258 Dual Loop and G1367 Well Plate Autosamplers only. 5 mL high recovery screw top vials can be used with all autosamplers.



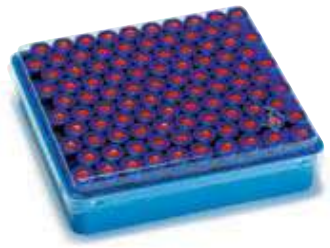
Screw caps with septa



6 mL screw top vial, septa, and caps

Screw Caps and Septa

Description	Unit	Part No.
Certified Polypropylene Screw Caps with Integrated Septa		
Blue, PTFE/red silicone septa	100/pk	5182-0717
	500/pk	5185-5820
Green, PTFE/red silicone septa	100/pk	5182-0718
	500/pk	5185-5829
Red, PTFE/red silicone septa	100/pk	5182-0719
Black, PTFE/red silicone septa	100/pk	5185-5838
Blue, PTFE/white silicone septa	100/pk	5182-0720
	500/pk	5185-5863
Green, PTFE/white silicone septa	100/pk	5182-0721
	500/pk	5185-5864
Red, PTFE/white silicone septa	100/pk	5182-0722
Blue, PTFE/silicone/PTFE septa	100/pk	5182-0723
	500/pk	5185-5862
Green, PTFE/silicone/PTFE septa	100/pk	5182-0724
	500/pk	5185-5861
Red, PTFE/silicone/PTFE septa	100/pk	5182-0725
Blue, pre-slit PTFE/silicone septa	100/pk	5183-2076
	500/pk	5185-5865
Green, pre-slit PTFE/silicone septa	100/pk	5183-2077
Red, pre-slit PTFE/silicone septa	100/pk	5183-2078
Polypropylene Screw Caps with Bonded Septa		
Blue polypropylene cap, bonded PTFE/silicone septa	100/pk	5185-5823
Blue polypropylene cap, bonded pre-slit PTFE/silicone septa	100/pk	5185-5824
Polypropylene Screw Caps (no septa)		
Blue, open top	100/pk	5182-0728
Green, open top	100/pk	5182-0727
Red, open top	100/pk	5182-0726
Blue PTFE-lined solid top (for storage)	100/pk	5183-2075
Septa for Wide Opening Screw Caps		
Ivory, PTFE/red silicone	100/pk	5182-0731
Red, PTFE/white silicone/red PTFE	100/pk	5182-0729
Blue, pre-slit PTFE/white silicone	100/pk	5183-2074
Red, PTFE/white silicone	100/pk	5182-0730
Screw Caps and Septa for 6 mL Vials		
Screw caps, 16 mm	100/pk	9301-1379
PTFE/silicone septa, 16 mm	100/pk	9301-1378
PTFE/silicone septa, pre-slit, 16 mm	100/pk	5188-2758



Preassembled vial pack

Pre-Assembled, 2 mL Wide Opening Screw Top Glass Vial Convenience Packs

Pre-assembled packs come ready to use with the cap and septum of your choice attached to the vial. A time/labor-saving product for use on your Agilent Autosampler or any rotating tray automatic sampler. Note: Review the Septum Selection Guide to choose the septum best suited for your application.

Pre-Assembled, 2 mL Wide Opening Screw Top Glass Vial Convenience Packs

Description	Unit	Part No.
Clear vials, blue screw caps, PTFE/red silicone septa	100/pk	5182-0553
Clear vials with write-on spot, blue screw caps, PTFE/red silicone septa	100/pk	5182-0864
Amber vials with write-on spot, green screw caps, PTFE/red silicone septa	100/pk	5182-0554
Clear vials, blue screw caps, PTFE/silicone/PTFE septa	100/pk	5182-0555
Clear vials with write-on spot, blue screw caps, PTFE/silicone/PTFE septa	100/pk	5182-0866
Amber vials with write-on spot, green screw caps, PTFE/silicone/PTFE septa	100/pk	5182-0556
Clear vials, blue screw caps, PTFE/silicone septa	100/pk	5182-0557
Clear vials with write-on spot, blue screw caps, PTFE/silicone septa	100/pk	5182-0865
Amber vials with write-on spot, green screw caps, PTFE/silicone septa	100/pk	5182-0558
Clear vials, blue screw caps, pre-slit blue PTFE silicone septa	100/pk	5183-2082
Clear vials with write-on spot, blue screw caps, pre-slit blue PTFE silicone septa	100/pk	5183-2083





Crimp Top Vials and Caps

The wide opening crimp cap provides a larger target area for improved autosampler needle accuracy. Select from four cap colors and a variety of septa. Whatever your crimp top vial needs, Agilent has what you are looking for.

- 2 mL, 12 x 32 mm
- Tightly controlled crown for improved crimping
- Precision-formed neck for improved autosampler handling
- 40% larger opening than standard narrow opening vials
- Rigorous quality assurance provides dimensional consistency from lot to lot
- Optional ceramic write-on spot with fill marks



Certified crimp top vials



Crimp top vials with fixed inserts

Crimp Top Vials

Description	Unit	Part No.
Certified 2 mL Wide Opening Crimp Top Glass Vials		
Clear	100/pk	5181-3375
Clear, write-on spot	100/pk	5182-0543
Amber, write-on spot	100/pk	5181-3376
Clear	1000/cs*	5183-4491
Clear, write-on spot	1000/cs*	5183-4492
Amber, write-on spot	1000/cs*	5183-4493
2 mL Deactivated Wide Opening Crimp Top Glass Vials		
Clear, silanized	100/pk	5183-4494
Clear, write-on spot, silanized	100/pk	5183-4495
Amber, write-on spot, silanized	100/pk	5183-4496
Crimp Top Vials with Fixed Inserts		
Clear	100/pk	9301-1388
Amber	100/pk	5188-6572
6 mL Crimp Top Vials		
Clear, 20 mm cap size	100/pk	9301-1419

*Case includes 10 packs of 100 vials



Magnetic crimp caps for CTC, 5188-5386

Crimp Caps with 11 mm Septa

Description	Unit	Part No.
Certified Crimp Caps		
Silver aluminum, clear PTFE/red rubber septa	100/pk	5181-1210
Blue aluminum, clear PTFE/red rubber septa	100/pk	5181-1215
Green aluminum, clear PTFE/red rubber septa	100/pk	5181-1216
Red aluminum, clear PTFE/red rubber septa	100/pk	5181-1217
Silver aluminum, PTFE/silicone/PTFE septa	100/pk	5181-1211
Silver aluminum, PTFE/silicone septa	100/pk	5182-0552
Silver aluminum, PTFE/red rubber septa	500/pk	5061-3370
Silver aluminum, clear PTFE/red rubber septa	1000/pk	5183-4498
Silver aluminum, PTFE/silicone/PTFE septa	1000/pk	5183-4499
Silver aluminum, PTFE/silicone septa	1000/pk	5183-4500
Crimp Caps		
Silver aluminum, black Viton septa	100/pk	5181-1212
Silver aluminum, thin PTFE septa	100/pk	5182-0871
Magnetic crimp caps for CTC Autosampler	100/pk	5188-5386
Crimp caps with thin membrane septa	25/pk	5062-3582





Snap Top Vials and Caps

Snap top vials and caps are the simple, efficient way to a secure seal without crimping. It's as easy as push-on, pull-off. Agilent's consistently secure seal outperforms the loose fit of other snap caps. Crimp caps can also be used with wide opening snap top vials. Snap cap vials cannot be pressurized.

- 2 mL, 12 x 32 mm
- Use with any 11 mm snap or crimp cap
- Provides a total seal around the entire circumference of the vial crown
- 40% larger opening than standard narrow opening vials
- Precision-formed neck improves autosampler handling
- Optional ceramic write-on spot
- Uniformly flat bottom ensures compatibility with inserts



Snap top vials with fixed inserts

Snap Top Vials

Description	Unit	Part No.
2 mL Wide Opening Snap Top Glass Vials		
Clear	100/pk	5182-0544
Clear, write-on spot	100/pk	5182-0546
Amber, write-on spot	100/pk	5182-0545
Clear	1000/cs*	5183-4504
Clear, write-on spot	1000/cs*	5183-4505
Amber, write-on spot	1000/cs*	5183-4506
2 mL Deactivated Wide Opening Snap Top Glass Vials		
Clear, silanized	100/pk	5183-4507
Clear, write-on spot, silanized	100/pk	5183-4508
Amber, write-on spot, silanized	100/pk	5183-4509
Snap Top Vials with Fixed Inserts		
Clear	100/pk	5188-6593
Amber	100/pk	5188-6594

*Case includes 10 packs of 100 vials



Snap caps with septa

Snap Top Caps and Septa

Description	Unit	Part No.
Clear polyethylene cap, clear PTFE/red silicone septa	100/pk	5182-0550
Blue polyethylene cap, clear PTFE/red silicone septa	100/pk	5182-3458
Green polyethylene cap, clear PTFE/red silicone septa	100/pk	5182-3457
Red polyethylene cap, clear PTFE/red silicone septa	100/pk	5182-3459
Polyethylene cap, clear PTFE/red silicone septa	500/pk	5182-0564
Clear polyethylene cap, PTFE/silicone/PTFE septa	100/pk	5182-0566
Snap cap, blue polyethylene, PTFE/silicone septa	100/pk	5182-0541
Clear polyethylene cap, pre-slit PTFE/silicone septa	100/pk	5183-4511
Clear polyethylene cap, solid polyethylene membrane septa	100/pk	5182-0542
Clear polyethylene cap, PTFE septa	100/pk	5182-0540

Tips & Tools

More information is a click away. We have a variety of educational primers, application notes, maintenance guides, and literature available from Agilent for free. To learn more, visit **www.agilent.com/chem/OnlineLibrary**.





Convenience Vial and Cap Packs

Convenience packs are an easy way to get 500 of each component using one part number. Packed in our six drawer reusable blue plastic cabinet, 500 vials and caps with septa installed are kept handy and dust-free. Note: Review the Septum Selection Guide to choose the septum best suited for your application.

Convenience Vial and Cap Packs

Vials	Caps	Unit	Part No.
Certified Screw Top Vial Convenience Packs			
Clear	Blue screw caps, PTFE/red rubber septa	500/pk	5182-0732
Clear with write-on spot	Blue screw caps, PTFE/red rubber septa	500/pk	5182-0867
Amber with write-on spot	Green screw caps, PTFE/red rubber septa	500/pk	5182-0733
Clear	Blue screw caps, PTFE/silicone/PTFE septa	500/pk	5182-0736
Clear with write-on spot	Blue screw caps, PTFE/silicone/PTFE septa	500/pk	5182-0869
Amber with write-on spot	Green screw caps, PTFE/silicone/PTFE septa	500/pk	5182-0737
Clear	Blue screw caps, PTFE/silicone septa	500/pk	5182-0734
Clear with write-on spot	Blue screw caps, PTFE/silicone septa	500/pk	5182-0868
Amber with write-on spot	Green screw caps, PTFE/silicone septa	500/pk	5182-0735
Clear	Blue screw caps, pre-slit PTFE/silicone septa	500/pk	5183-2079
Clear with write-on spot	Blue screw caps, pre-slit PTFE/silicone septa	500/pk	5183-2080
Amber with write-on spot	Green screw caps, pre-slit PTFE/silicone septa	500/pk	5183-2081
Clear	Blue screw caps, pre-slit PTFE/silicone septa	500/pk	5067-0205
Clear	Blue screw caps, bonded, pre-slit PTFE/silicone septa	500/pk	5040-4649
Certified Crimp Top Vial Convenience Packs			
Clear	Silver aluminum crimp caps, PTFE/red rubber septa	500/pk	5181-3400
Amber with write-on spot	Silver aluminum crimp caps, PTFE/red rubber septa	500/pk	5181-8801
Snap Top Vial Convenience Packs			
Clear	Clear polypropylene snap caps, PTFE/red rubber septa	500/pk	5182-0547
Amber, with write-on spot	Clear polypropylene snap caps, PTFE/red rubber septa	500/pk	5182-0548



Polypropylene Crimp/Snap Top Vials

Wide Opening Polypropylene Crimp/Snap Top Vials

Wide opening 12 x 32 mm vials are manufactured from virgin polypropylene, meeting the requirements of 21 CFR 177.1520. Polypropylene is chemically resistant and the material of choice for pH sensitive samples, sodium or heavy metals analysis. Polypropylene vials are translucent and can be used with crimp or snap caps.

Wide Opening Polypropylene Crimp/Snap Top Vials

Description	Unit	Part No.
1 mL	100/pk	5182-0567
300 µL	100/pk	5188-2788
250 µL	1000/pk	9301-0978

Wide Opening Glass/Plastic Crimp/Snap Top Vials

Our 12 x 32 mm wide opening vials are most popular for economical and effective microsampling. Its polypropylene body has a glass flanged insert molded to the inside, so the sample comes in contact only with the 100 µL high quality glass insert and the septum. Use with crimp or snap caps.

Wide Opening Glass/Plastic Crimp/Snap Top Vials

Description	Unit	Part No.
100 µL	100/pk	9301-0977





High and Extreme Recovery Vials

High Recovery Glass Vials

Wide opening, 1.5 mL vials with 30 µL reservoir are for sample concentration and injection without transferring to microvolume inserts.

Extreme Recovery Vials

- Uniform internal surface without any ridges to hold back sample
- Wider neck opening for easy pipetting
- Increased sample volume capacity versus standard inserts
- Low residual volume for smaller volume injections without using the inserts
- Safe to use with Vortex for sample concentration

Tips & Tools

6 mL high recovery screw top vials are recommended for G2258 Dual Loop and G1367 Well Plate Autosamplers only. 5 mL high recovery screw top vials can be used with all autosamplers.

High and Extreme Recovery Vials

Description	Unit	Part No.
1.5 mL Wide Opening Screw Top High Recovery Glass Vials		
Clear	100/pk	5183-2030
Amber	100/pk	5183-2073
1.5 mL Wide Opening Crimp Top High Recovery Glass Vials		
Clear	100/pk	5182-3454
Clear, silanized	100/pk	5183-4497
1.5 mL Wide Opening Snap Top High Recovery Glass Vials		
Clear	100/pk	5183-4510
1.5 mL Crimp Top Extreme Recovery Vials		
Clear	100/pk	5185-5821
5 and 6 mL High Recovery Vials		
Clear, 6 mL extreme high recovery screw top vials	30/pk	5188-2757
Clear, 5 mL high recovery screw top vials	30/pk	5188-5369



Micro-V Vials

- Wide opening, 1.5 mL vials with low residual volume
- Made from first hydrolytical class, glass Type 1
- Standard 12 x 32 mm dimension
- Compatible with standard closures
- Lower cost alternative to high recovery vials

Micro-V Vials

Description	Unit	Part No.
Screw Top Micro-V Glass Vials		
Clear	100/pk	5184-3550
Amber	100/pk	5184-3554
Crimp Top Micro-V Glass Vials		
Clear	100/pk	5184-3551
Amber	100/pk	5184-3555
Snap Top Micro-V Glass Vials		
Clear	100/pk	5184-3552
Amber	100/pk	5184-3556





Vials with Fixed Inserts

- Standard 12 x 32 mm dimension
- Better alternative than vials with inserts
- Low residual volume, ideal for small sample volumes
- Compatible with standard closures
- Easy handling

Vials with Fixed Inserts

Description	Unit	Part No.
Screw Top Vials with Fixed Inserts		
Clear	100/pk	5188-6591
Amber	100/pk	5188-6592
Crimp Top Vials with Fixed Inserts		
Clear	100/pk	9301-1388
Amber	100/pk	5188-6572
Snap Top Vials with Fixed Inserts		
Clear	100/pk	5188-6593
Amber	100/pk	5188-6594





8-425 Screw Top Vials, Caps, Septa and Inserts

The original, smaller opening vials with an 8-425 thread size screw cap are available with black caps and a variety of septa to meet the needs of your application.

- 8-425 thread design
- Original, narrow neck size



8-425 screw top vials

8-425 Screw Top Vials

Description	Unit	Part No.
2 mL 8-425 Screw Top Glass Vials		
Clear	100/pk	5183-4428
Amber	100/pk	5183-4429
Clear, PTFE-lined storage cap	100/pk	5183-4518
2 mL Deactivated 8-425 Screw Top Glass Vials		
Clear, silanized	100/pk	5183-4432
Amber, silanized	100/pk	5183-4433

8-425 Screw Caps and Septa

Description	Unit	Part No.
8-425 Screw Caps with Septa		
Black, red PTFE/white silicone septa	100/pk	5183-4442
8-425 Screw Caps (no septa)		
Black	100/pk	5183-4438
Septa for 8-425 Screw Caps		
Red PTFE/white silicone/red PTFE, 8 mm	100/pk	5183-4436
Red PTFE/white silicone, 8 mm	100/pk	5183-4437
PTFE coated Butyl rubber septa	500/pk	9301-1130



Microvolume Inserts

To meet your microsampling needs, Agilent has a variety of microvolume inserts with capacities and designs that can transform our vials from full-capacity to limited volume with one simple step.

Microvolume Inserts

Description	Unit	Part No.
Microvolume Inserts for Wide Opening Vials		
Conical Inserts with Polymer Feet		
250 µL glass inserts with polymer feet and mandrel interior	100/pk	5181-1270
250 µL deactivated glass inserts with polymer feet and mandrel interior	100/pk	5181-8872
250 µL polypropylene inserts with polymer feet	100/pk	5182-0549
Conical Glass Inserts		
250 µL pulled-point glass inserts	100/pk	5183-2085
Flat Bottom Inserts		
400 µL glass flat bottom inserts	500/pk	5181-3377
400 µL deactivated glass flat bottom inserts	500/pk	5183-2086
400 µL polypropylene flat bottom inserts	500/pk	5183-2087
Narrow neck inserts	500/pk	9301-1387
Microvolume Inserts for 2 mL, 8-425 Screw Top Vials		
Conical Inserts with Polymer Feet		
250 µL glass inserts with polymer feet	100/pk	5183-2088
Conical Glass Inserts		
250 µL pulled-point interior glass inserts	100/pk	5183-2089
Flat Bottom Inserts		
250 µL glass flat bottom inserts	100/pk	5183-2090



4 mL Screw Top Vials, Caps and Septa

4 mL, 15 x 45 mm screw top glass vials are designed to fit the autosampler tray (G2880A) used with the Agilent 6850 and can be used as sample or wash vials. Vials with fill marks are also appropriate as wash or waste vials in 7673 and 7683 autosamplers. These vials can also be used in the Perkin-Elmer Autosystem GC; Waters 48-position tray autosampler; and Shimadzu AOC-14/1400, LC-10A, and SIL-2AS. Use the 13 x 425 caps with septa as sample vials and with diffusion caps for wash vials. These vials can also be used as storage vials.

- 4 mL, 15 x 45 mm
- Precision formed screw threads (13 x 425) for consistently secure seal
- Custom fit for 7673, 7683 and 6850 autosamplers
- Can be used as wash, waste or storage vials



4 mL screw top vials

4 mL Screw Top Vials

Description	Unit	Part No.
Clear	100/pk	5183-4448
Amber	100/pk	5183-4450

Caps and Septa for 4 mL Screw Top Vials

Description	Unit	Part No.
Black 13 x 425 caps, PTFE/silicone septa	100/pk	5183-4464
Black 13 x 425 open top screw caps	100/pk	5183-4461
Diffusion inserts used with black open top screw caps	12/pk	07673-40180
PTFE/natural rubber septa	144/pk	9301-1031
Red PTFE/white silicone	100/pk	5183-4460
White virgin PTFE septa	1000/pk	5183-4459

4 mL Screw Top Convenience Packs

Description	Unit	Part No.
Clear screw top wash vials with screw caps (no septa)	144/pk	9301-0723
4 mL wash vials with fill markings and caps	25/pk	5182-0551



LC Vials, Caps and Septa

Agilent Technologies offers a variety of vials for Agilent's LC instruments. Choose from small volume vials, 2 mL, and 6 mL vials.

Agilent minivials are designed to allow for reproducible injections of minute quantities, making your limited sample applications more effective and more accurate. Our microvials provide limited volumes for microsampling and the 6 mL capacity vial allows for larger sample injections.

Tips & Tools

6 mL high recovery screw top vials are recommended for G2258 Dual Loop and G1367 Well Plate Autosamplers only. 5 mL high recovery screw top vials can be used with all autosamplers.

6 mL Vials, Caps and Septa for 1100/1200 Series Autosampler

Description	Unit	Part No.
Clear screw vial, 16 mm cap size	100/pk	9301-1377
Clear, 6 mL extreme high recovery screw top vials	30/pk	5188-2757
Clear, 5 mL high recovery screw top vials	30/pk	5188-5369
Screw caps, 16 mm	100/pk	9301-1379
PTFE/silicone septa, 16 mm	100/pk	9301-1378
PTFE/silicone septa, pre-slit, 16 mm	100/pk	5188-2758
Clear crimp vial, 20 mm cap size	100/pk	9301-1419
Crimp caps, PTFE/silicone septa, 20 mm	100/pk	9301-1425



Headspace Vials, Caps, Septa and Kits

These beveled neck vials are available in both 10 mL and 20 mL capacities, flat or rounded bottom. The 20 mm crimp caps provide a consistently secure seal. You can save when you purchase a "pack" quantity – with vial, cap and septa packaged together in a single container.

- Choice of crimp or screw top vials
- Beveled top for maximum secure seal
- Two neck lengths available
- Choice of a pressure safety release cap at 45 psi
- Available in flat or rounded bottom designs



Certified headspace crimp top vials

Headspace Vials

Description	Unit	Part No.
Certified Flat Bottom Headspace Crimp Top Glass Vials		
20 mL, clear, 23 x 75 mm	100/pk	5182-0837
10 mL, clear, 23 x 46 mm	100/pk	5182-0838
20 mL, amber, 23 x 75 mm	100/pk	5067-0226
10 mL, amber, 23 x 46 mm	100/pk	5067-0227
Certified Rounded Bottom Headspace Crimp Top Glass Vials		
20 mL, clear, 23 x 75 mm	100/pk	5183-4474
10 mL, clear, 23 x 46 mm	100/pk	5183-4475
Certified Headspace Screw Top Vials for G1888A Autosampler and CTC CombiPAL*		
20 mL, clear, 23 x 75 mm	100/pk	5188-2753
10 mL, clear, 23 x 46 mm	100/pk	5188-5392
20 mL, amber, 23 x 75 mm	100/pk	5188-6537
10 mL, amber, 23 x 46 mm	100/pk	5188-6538
UltraClean 18 mm screw caps with septa for headspace vials	100/pk	5188-2759

*Not for use with 7694 Sampler





Aluminum crimp caps, 5183-4477

Headspace Caps and Septa

Description	Specifications	Unit	Part No.
Certified 20 mm Headspace Crimp Caps with Septa			
Silver aluminum, PTFE/silicone septa	-60°C to 180°C	100/pk	5183-4477
Silver aluminum, safety feature, PTFE/silicone septa	-60°C to 180°C	100/pk	5183-4478
Silver aluminum, molded PTFE/butyl septa	-40°C to 125°C	100/pk	5183-4479
Certified Ultra Clean 18 mm Screw Top Caps with Septa			
Silver, 1.5 mm PTFE/silicone septa (top white, bottom blue)	to 100 °C	100/pk	5188-2759
20 mm Headspace Crimp Caps with Septa			
Silver aluminum, safety feature, molded PTFE/butyl septa	-40°C to 125°C	100/pk	5183-4480
20 mm Headspace Crimp Caps (no septa)			
Silver aluminum, one piece		100/pk	9301-0721
Silver aluminum, one piece, safety feature		100/pk	9301-0718
20 mm Headspace Septa			
Gray PTFE/black butyl molded	-40°C to 125°C	100/pk	9301-0976
Tan PTFE/white silicone	-60°C to 180°C	100/pk	9301-0719



Headspace vial convenience kit

Headspace Vial Convenience Kits

Description	Specifications	Unit	Part No.
20 mL Headspace crimp top, flat bottom vials, silver aluminum one-piece crimp caps with safety feature, molded gray PTFE/black butyl septa	< 125°C	100/pk	5182-0839
20 mL Headspace crimp top, flat bottom vials, silver aluminum one-piece crimp caps with safety feature, PTFE/white silicone septa	< 180°C	100/pk	5182-0840



General Purpose Sample and Storage Vials

With four vial capacities available in clear or amber glass, Agilent vials are ideal for sampling or storage. Our PTFE-lined storage caps offer broad chemical resistance – the ultimate in glass closures. The polypropylene screw caps with PTFE/silicone septa are extra clean to eliminate sample contamination.

General Purpose Sample and Storage Vials

Description	Unit	Part No.
Clear Glass Sample Vials with PTFE Lined Storage Caps		
4 mL, 15 x 45 vials with 13-425 caps	100/pk	5183-4519
12 mL, 19 x 65 vials with 15-425 caps	200/pk	5183-4521
22 mL, 23 x 85 vials with 20-400 caps	200/pk	5183-4523
40 mL, 28 x 95 vials with 24-400 caps	100/pk	5183-4524
Amber Glass Sample Vials with PTFE Lined Storage Caps		
4 mL, 15 x 45 vials with 13-425 caps	100/pk	5183-4526
12 mL, 19 x 65 vials with 15-425 caps	200/pk	5183-4528
40 mL, 28 x 95 vials with 24-400 caps	100/pk	5183-4530
Clear Glass Sample Vials with Caps and Septa		
4 mL, 15 x 45 vials with 13-425 caps	100/pk	5183-4532
12 mL, 19 x 65 vials with 15-425 caps	200/pk	5183-4534
22 mL, 23 x 85 vials with 20-400 caps	200/pk	5183-4536
40 mL, 28 x 95 vials with 24-400 caps	100/pk	5183-4537



Electronic crimper

Electronic Crimpers and Decappers

Whenever large amounts of crimp vials need to be crimped or decapped, the electronic crimper or decapper is the right tool. It reduces stress and repetitive motion injury associated with manual plier-style crimpers and decappers. Agilent's newly-designed crimper offers easy, hand-held pushbutton operation and provides the following advantages:

- Stronger and sturdier crimping and decapping
- Consistent seals
- Shorter recharging time and a larger number of battery charges
- Better clearance and more flexibility thanks to improved crimp jaws
- Individual test certificates

Electronic Crimpers and Decappers

Description	Part No.
11 mm Electronic Crimper with 4.8v rechargeable battery pack and charger	5062-0207
20 mm Electronic Crimper with 4.8v rechargeable battery pack and charger	5062-0208
11 mm Electronic Decapper with 4.8v rechargeable battery pack and charger	5062-0209
20 mm Electronic Decapper with 4.8v rechargeable battery pack and charger	5062-0210
4.8v nickel metal hydride replacement battery	5188-6565





Manual crimper and decapper

Manual Crimpers and Decappers

Use with all 8, 11 and 20 mm crimp top vials and crimp caps.

Manual Crimpers and Decappers

Description	Part No.
Manual crimper, 8 mm	8710-1643
Manual decapper, 8 mm	5181-8827
Manual crimper, 11 mm	8710-0979
Manual decapper, 11 mm	5181-1213
Manual crimper, 20 mm	9301-0720
Manual decapper, 20 mm	5181-1214

Crimping System and Heads

Description	Part No.
Holder without crimp head, to be mounted	5062-2495
Crimp head, 11 mm	5001-3755
Crimp head, 20 mm	5001-3756
Decapper head, 11 mm	5001-3758
Decapper head, 20 mm	5001-3759



Micro vial tray, 5061-3349

Vial Racks

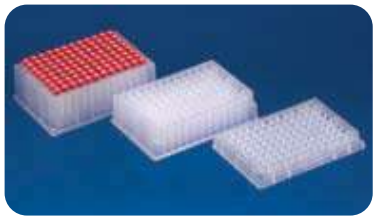
Description	Part No.
Rack for 8 mm, 100 and 300 µL minivials, solid plexiglass	5061-3349
Rack for 12 mm, 2 mL vials, 5/pk	9301-0722
Vial storage container	5182-0575



Vial rack, 9301-0722



Vial storage container, 5182-0575



Well plate racks



Vial plate, G2255-68700



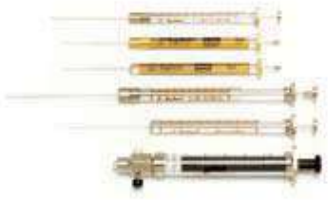
Vial plate, 5022-6539

Well Plates and Vial Plates

Well Plates and Vial Plates

Description	Unit	Part No.
Well Plates		
96 well plates, 0.5 mL, polypropylene	120/pk	5042-1385
96 well plates, 0.5 mL, polypropylene	10/pk	5042-1386
96 deep well plates, 1 mL, polypropylene	50/pk	5042-6454
Closing mats for 96 well plates, silicone	50/pk	5042-1389
96 well plates, 150 µL, conical, polypropylene	25/pk	5042-8502
384 well plates, 90 µL, polypropylene	30/pk	5042-1388
384 well plates, max 45 µL, skirted	25/pk	5188-5375
96 deep well collection plates with glass inserts, caps, and septa, pre-assembled, 0.35 mL		5065-4402
Glass inserts, 350 µL	1000/pk	5188-5321
Caps/septa for glass inserts	1000/pk	5188-5322
Vial Plates for 1100/1200 Series Autosamplers and Fraction Collectors		
Vial plate for 54 x 2 mL vials	6/pk	G2255-68700
Tray for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL		5022-6538
Vial plate for 15 x 6 mL vials		5022-6539
Plate for 24 tubes with 18 mm diameter		5042-8544





Syringes

With a broad selection of syringes for manual and auto injectors, Agilent has what you need for accurate and effective sampling.

Typical Needle Gauge Dimensions

	OD		ID	
Gauge	**mm**	**inches**	**mm**	**inches**
22	0.71	0.028	0.41	0.016
23s	0.635	0.025	0.11	0.0045
25	0.5	0.02	0.2	0.008
26s	0.47	0.0184	0.11	0.0045

Needle and Point Styles

Needle gauge, length, and point styles are referenced in syringe listings as gauge/length in mm/point style (e.g., 26s/42/HP).

Needle Styles

Fixed Needle Syringe: The epoxy-cemented, stainless steel needle is centered in the syringe barrel at the depth of the zero graduation mark. Do not heat above 50°C.

Removable Needle Syringe: Removable needle allows use of various point styles. The threaded hub connection and Teflon sealing ferrule can be tightened to compensate for wear.

Point Styles



HP Point Style

HP Point Style: This proprietary design yields optimal performance and reliability and reduces coring by parting, not cutting, the septum.



Point Style 2

Point Style 2: A standard, general purpose point style. Needle has a 20° bevel.



Point Style 3

Point Style 3: For manual LC injectors. The needle has a 90° bevel, ideal for a volume displacement syringe.



Point Style 5/Side Hole

Side Hole Point Style 5: Syringe needle has a side hole for sample filling and dispensing.



AS Point Style

AS Point Style: For use in autosamplers; also referred to as Cone Style.



Autosampler Syringes

With a broad selection of syringes for auto injection, Agilent has what you need for accurate and effective sampling. Agilent delivers even more value in every autosampler syringe.

- Lot numbers printed directly on the barrel with a corresponding Certificate of Conformance ensuring certified performance to all specifications
- Illuminating backing strip, for effortless viewing of the volume scale, which is easily discernible from imitators
- Environmentally friendly packaging, an improved design that reduces waste
- Individually sealed packaging, for contaminant-free use right out of the box

Tapered Needle, 23-26s Gauge Autosampler Syringes

Use one needle and get the benefits of two. The upper portion of the tapered needle offers the strength of a 23 gauge, while the lower portion at 26s gauge allows for use with split/splitless or on-column injections with 0.53 mm ID columns. All standard plungers are stainless steel.

Volume (µL)	Description	Unit	Needle	Part No.
5	Tapered, fixed		23-26s/42/HP	5181-1273
	Tapered, fixed	6/pk	23-26s/42/HP	5181-8810
	Tapered, removable		23-26s/42/HP	5182-0835
	Replacement needle for 5 µl syringe	3/pk	23-26s/42/HP	5182-0832
10	Tapered, fixed		23-26s/42/HP	5181-1267
	Tapered, fixed	6/pk	23-26s/42/HP	5181-3360
	Tapered, removable		23-26s/42/HP	5181-3321
	Replacement needle for 10 µl syringe	3/pk	23-26s/42/HP	5181-3319
	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5181-3354
	Tapered, fixed, PTFE-tipped plunger	6/pk	23-26s/42/HP	5181-3361
	Replacement plunger with PTFE tip for fixed needle 10 µl syringe			5181-3365
	Tapered, removable		23-26s/42/HP	5181-3356
	Replacement plunger with PTFE tip for removable needle 10 µl syringe			5181-3358
50	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5183-0314
100	Tapered, fixed, PTFE-tipped plunger		23-26s/42/HP	5183-2042

Tips & Tools

For the latest information on Agilent's Automatic Sampler Syringes – including new product releases to improve productivity – visit **www.agilent.com/chem/syringes**

Straight Needle, 23 and 26s Gauge Autosampler Syringes

Volume (µL)	Description	Unit	Needle	Part No.
0.5	Cone-tipped, 23 gauge		23/42/HP	5188-5246
1	Cone-tipped, 23 gauge		23/42/HP	5188-5247
5	Straight, fixed, 26 gauge		26s/42/HP	9301-0891
	Straight, fixed, 26 gauge	6/pk	26s/42/HP	5183-4728
	Straight, fixed, 23 gauge		23/42/HP	9301-0892
	Straight, fixed, 23 gauge	6/pk	23/42/HP	5182-0875
	Straight, removable, 23 gauge		23/42/HP	5182-0834
	Replacement needle for 5 µl syringe	3/pk	23/42/HP	5182-0830
10	Straight, fixed, 26 gauge		26s/42/HP	9301-0714
	Straight, fixed, 26 gauge	6/pk	26s/42/HP	5183-4729
	Straight, fixed, 23 gauge		23/42/HP	9301-0713
	Straight, fixed, 23 gauge	6/pk	23/42/HP	9301-0725
	Straight, fixed, PTFE-tipped plunger		23/42/HP	5181-8809
	Straight, fixed, PTFE-tipped plunger	6/pk	23/42/HP	5183-4730
	Replacement plunger for 10 µl fixed needle syringe			5181-8808
	Straight, removable, 23 gauge		23/42/HP	5181-8806
	Straight, removable, PTFE-tipped plunger		23/42/HP	5181-8813
	Replacement needle for 10 µl syringe	3/pk	23/42/HP	5181-8811
	Replacement plunger with PTFE tip for removable needle 10 µl syringe			5181-3358
25	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-0316
50	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-0318
100	Straight, fixed, PTFE-tipped plunger		23/42/HP	5183-2058





Removable needle

7673/7683 On-Column Autosampler Syringes

Agilent Technologies 7673/7683 on-column syringes with needle diameters for columns ranging from 0.25 mm to 0.53 mm. Specifically designed for the 7673/7683 Autosampler.

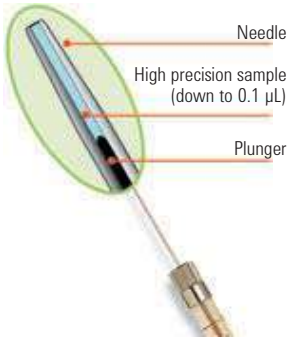
Volume (µL)	Description	Unit	Part No.
5	Removable needle, barrel only		5182-0836
	Stainless steel needle for 0.53 mm column	3/pk	5182-0832
	Stainless steel needle for 0.32 mm column	3/pk	5182-0831
	Stainless steel needle for 0.25 mm column	3/pk	5182-0833
	Plunger button	10/pk	5181-8866

HP 7670/71/72 Autosampler Syringes

This syringe has a long needle and regular plunger button for compatibility with HP 7670/71/72 autosamplers. Available with a fixed or removable needle.

Volume (µL)	Description	Needle	Part No.
1	Straight, removable	23/56/2	5182-9622
10	Straight, fixed	23/50/HP	5182-9734
	Straight, removable	23/50/HP	5182-9626
	Straight, fixed, PTFE-tipped plunger	23/50/HP	5182-9799





Manual Syringes

Manual, Low Volume, Plunger-in-Needle Syringes

Removable needle syringes with capacities from 0.5 µL to 5.0 µL. The plunger is in the needle and the sample is contained within the needle.

Volume (µL)	Description	Needle	Part No.
0.5	Removable	23/70/HP	5182-9651
1	Removable	26/70/HP	5182-9605
	Replacement needle/plunger for 1.0 µl syringe	26/70/HP	5182-9635
	Removable	23/70/HP	5182-9627
	Replacement needle/plunger for 1.0 µl syringe	23/70/HP	5182-9712
5	Removable	23/70/HP	5182-9623
	Replacement needle/plunger for 5 µl syringe	23/70/HP	5182-9683



10 µl fixed needle



25-500 µL fixed needle

Manual, Regular Plunger Syringes

Volume (µL)	Description	Needle	Part No.
10	Fixed, with plunger protection	26/50/2	5182-3499
	Fixed, 10/pk	26/50/2	5182-3428
25	Fixed	25/50/2	5182-9625
50	Fixed	25/50/2	5182-9636
100	Fixed	25/50/2	5182-9615
250	Fixed	25/50/2	5182-9640
500	Fixed	25/50/2	5182-9641



Fixed needle

Manual Syringes with PTFE-Tipped Plungers (Gas-Tight)

Available with a fixed needle, these syringes are for general purpose injections.
With gas-tight construction, they are ideal for sampling gases and volatile materials.

Volume	Description	Needle	Part No.
10 µL	Fixed, PTFE-tipped plunger	26/50/2	5182-9606
	Replacement plunger with PTFE tip for 10 µl syringe		5182-9621
25 µL	Fixed, PTFE-tipped plunger	25/50/2	5182-9629
50 µL	Fixed, PTFE-tipped plunger	25/50/2	5182-9612
100 µL	Fixed, PTFE-tipped plunger	25/50/2	5182-9610
250 µL	Fixed, PTFE-tipped plunger	25/50/2	5182-9608
500 µL	Fixed, PTFE-tipped plunger	25/50/2	5182-9609
1 mL	Fixed, PTFE-tipped plunger	23/50/2	5182-9604
	Replacement plunger with PTFE tip for 1.0 ml syringe		5182-9661
2.5 mL	Fixed, PTFE-tipped plunger	23/50/2	5182-9642
	Replacement plunger with PTFE tip for 2.5 ml syringe		5182-9671
5 mL	Fixed, PTFE-tipped plunger	23/50/2	5182-9638
10 mL	Fixed, PTFE-tipped plunger	23/50/2	5182-9643
	Replacement plunger with PTFE tip for 10 ml syringe		5182-9709



SuperfleX Syringe

Manual SuperfleX Plunger Syringes (not available in Japan)

The super elastic alloy plunger, together with the plunger protection guide and button reinforcement, ensure precise and smooth injections. The plunger is flexible and returns to its original shape after injection.

Volume (µL)	Description	Needle	Part No.
5	Removable, SuperfleX syringe	26s/50/2	5182-3498
10	Fixed, SuperfleX syringe, 6/pk	26s/50/2	5182-3495
	Fixed, SuperfleX syringe	26s/50/2	5182-3496



On-column syringe

Manual On-Column Syringes

Ideal for manual on-column injections. Depending on column diameter, choose either fused silica or durable stainless steel.

Volume (µL)	Description	Unit	Needle	Part No.
10	Removable, stainless steel		0.23 mm/10 cm	5182-9633
	Replacement needle for 10 µl syringe	3/pk	0.23 mm/10 cm	5182-9645
	Removable, fused silica (barrel only)			9301-0658
	Fused silica needle for 10 µl syringe	6/pk	0.18 mm/11.5 cm	19091-63000
	Replacement PTFE ferrule for P/N 9301-0658			0100-1389



Push pull



Push button

Gas-Tight Syringes with Luer Lock Valve Fitting

Offer pressure tight sample containment up to 100 psi for liquid and gas samples.

Volume (mL)	Description	Part No.
1	Gas-tight syringe, push-pull luer lock valve	5183-4549
2.5	Gas-tight syringe, push-pull luer lock valve	5183-4550
5	Gas-tight syringe, push-button luer lock valve	5183-4551
10	Gas-tight syringe, push-button luer lock valve	5183-4552
25	Gas-tight syringe, push-button luer lock valve	5183-4553
50	Gas-tight syringe, push-button luer lock valve	5183-4554



PTFE luer lock

Gas-Tight Syringes with Luer Lock Fitting

With the PTFE luer lock syringe your sample comes in contact with glass and PTFE reducing the risk of contamination. Use with syringe filters and for pump priming in LC applications.

Volume (mL)	Description	Part No.
1	Gas-tight syringe, PTFE luer lock	5182-9710
	Replacement plunger with PTFE tip for 1.0 mL syringe	5182-9661
2.5	Gas-tight syringe, PTFE luer lock	5182-9711
	Replacement plunger with PTFE tip for 2.5 mL syringe	5182-9671
5	Gas-tight syringe, PTFE luer lock	5182-9630
10	Gas-tight syringe, PTFE luer lock	5182-9620
	Replacement plunger with PTFE tip for 10 mL syringe	5182-9709
25	Gas-tight syringe, PTFE luer lock	5182-9639



Luer lock needle

Luer Lock Needles

Description	Unit	Needle	Part No.
Needle, luer lock	5/pk	23/50/2	5183-4606
Needle, luer lock	2/pk	23/50/5	5183-4613
Needle, luer lock	2/pk	23/51/3	5183-4614



Fixed needle

Syringes for Manual Injection Valves

Use with a variety of liquid chromatographs including the Rheodyne, Altex, and Valco sampling valves. The blunt-tip point style (3) prevents tearing of the LC injector valve needle seats.

Volume (µL)	Description	Needle	Part No.
10	Fixed	22/51/3	5182-9644
25	Fixed	22/51/3	5182-9628
50	Fixed	22/51/3	5182-9619
100	Fixed	22/51/3	5182-9613
250	Fixed	22/51/3	5182-9624
500	Fixed	22/51/3	5182-9658
500	Removable	22/50/3	5183-4547
25-500	Replacement needles for 500 µL removable needle syringe	22/50/3	5183-4548

CTC Analytics PAL Autosampler Supplies

To better serve Agilent instrument users who choose CTC Analytics' autosamplers for high-throughput and flexible sample introduction, Agilent has partnered with CTC to provide a fully integrated system, including CTC approved consumables.

Agilent's portfolio includes a variety of vials, caps, syringes, and well plates compatible with the CTC Analytics HTC PAL, GC PAL, and CombiPAL systems.



CombiPAL and GC PAL Liquid Injection Vials and Caps

These micro and 2 mL vials and caps are designed to work seamlessly with CombiPAL and GC PAL magnetic needle guides and bar code readers.

CombiPAL and GC PAL Liquid Injection Vials and Caps

Description	Unit	Part No.
2 mL vials		
Crimp top vial, wide opening, clear	100/pk	5181-3375
Crimp top vial, wide opening, amber, write-on spot	100/pk	5181-3376
Crimp top vial, wide opening, clear, write-on spot	1000/cs	5183-4492
Crimp top vial, wide opening, amber, write-on spot	1000/cs	5183-4493
Screw top vial, wide opening, clear	100/pk	5182-0714
Crimp/snap top vial, wide opening, clear	100/pk	5182-0544
2 mL caps		
Crimp cap, 11 mm magnetic	100/pk	5188-5386
Screw cap, PTFE/white silicone septa	100/pk	5182-0720
Snap cap, blue polyethylene, PTFE/silicone septa	100/pk	5182-0541
Micro vials		
Crimp top vial, 0.8 mL, amber glass, flat bottom	1000/pk	5183-4487
Crimp top vial, 0.1 mL, clear, tapered	500/pk	5180-0844
Crimp top vial, 0.3 mL, clear, round	500/pk	5180-0841
Crimp top vial, 0.7 mL, amber, round	500/pk	5180-0805
Crimp top vial, 0.5 mL, amber, conical	500/pk	5180-0806
Micro caps		
Crimp caps with PTFE/silicone septa	500/pk	5180-0842





Fixed needle, G6500-80116



Fixed needle, G6500-80120

CombiPAL and GC PAL Liquid Injection Syringes

A key feature of CTC's GC PAL and CombiPAL is the ability to inject a wide range of sample volumes, up to 500 µL for LVI applications. The following fixed needle, 26 gauge needles are recommended by CTC to sustain high reproducibility and accuracy.

CombiPAL and GC PAL Liquid Injection Syringes

Volume (µL)	Description	Unit	Gauge	Needle	Part No.
1.2	Fixed needle		26	26/51/AS	G6500-80113
5	Fixed needle		26	26/51/AS	G6500-80114
10	Fixed needle		26	26/51/2	G6500-80115
			26	26/51/AS	G6500-80116
	Fixed needle, Merlin & PTV		23	23S/51/AS	5188-6596
	Replacement plunger	10/pk			G4200-80103
25	Fixed needle		26	26/51/AS	G6500-80117
	Replacement plunger	10/pk			G4200-80104
100	Fixed needle		26	26/51/AS	G6500-80118
	Replacement plunger	10/pk			G4200-80105
250	Fixed needle		26	26/51/AS	G6500-80119
	Replacement plunger	10/pk			G4200-80102
500	Fixed needle		26	26/51/AS	G6500-80120
	Replacement plunger				G4200-80106







Fixed needle, G6500-80109

CombiPAL Headspace Supplies

Our fixed-needle headspace syringes feature a sideport needle for gas flushing, in conformance with strict CTC standards. Use with Agilent's Merlin Microseal to minimize instrument downtime – and to prevent lost or compromised data caused by septum leaks and liner contamination.

CombiPAL Headspace Syringes

Volume (mL)	Description	Gauge	Part No.
1	Fixed needle	23	G6500-80107
	Replacement plunger		G4200-80101
2.5	Fixed needle	23	G6500-80109
	Replacement plunger		G4200-80107
5	Fixed needle	23	G6500-80111
	Replacement plunger		G4200-80108

CTC recommends screw top vials and caps for the tightest seal and the most reproducible headspace results, and the precision-thread vials and caps listed are an excellent choice for dependability and ease of use. They are ideal for applications in the environmental, food and beverage, industrial hygiene, drug analysis, and clinical chemistry industries.

CombiPAL Headspace Supplies

Description	Part No.
10 mL, screw top clear vial, 100/pk	5188-5392
20 mL, screw top clear vial, 100/pk	5188-2753
10 mL, screw top amber vial, 100/pk	5188-6538
20 mL, screw top amber vial, 100/pk	5188-6537
UltraClean 18 mm magnetic screw cap with silicone/PTFE septa, 100/pk	5188-2759
Liner, inlet for SPME, deactivated	5188-6471



HTS and HTC PAL Liquid Injection Vials and Caps

HTS and HTC PAL high-throughput LC injection systems are configured to cope with today's high-throughput LC/MS demands. And Agilent brings you a wide choice of well plates, vials, and caps that are engineered to work with these injectors, providing the flexibility you need.

HTS and HTC PAL Liquid Injection Vials and Caps

Description	Unit	Part No.
2 mL vials		
Screw top vial, wide opening, Clear	100/pk	5182-0714
Screw top vial, polypropylene, with 0.2 mL integrated glass insert	100/pk	5188-5390
Crimp top vial, wide opening, clear	100/pk	5181-3375
Crimp/snap top vial, Clear, write-on spot	100/pk	5182-0546
2 mL caps		
Screw cap, PTFE/white silicone septa	100/pk	5182-0720
Screw cap, pre-slit PTFE/silicone septa	100/pk	5183-2076
Crimp cap, Silver aluminum, PTFE/silicone septa	100/pk	5182-0552
Snap cap, blue polyethylene, PTFE/silicone septa	100/pk	5182-0541
Micro vials		
Crimp top vial, 0.8 mL, amber glass, flat bottom	1000/pk	5183-4487
Crimp top vial, 0.1 mL, clear, tapered	500/pk	5180-0844
Crimp top vial, 0.3 mL, clear, round	500/pk	5180-0841
Crimp top vial, 0.7 mL, amber, round	500/pk	5180-0805
Crimp top vial, 0.5 mL, amber, conical	500/pk	5180-0806
Micro caps		
Crimp caps with PTFE/silicone septa	500/pk	5180-0842

HTS and HTC PAL Liquid Injection Syringes

Designed specifically for CTC autosamplers, these X-type syringes feature zero carryover and a long-lasting plunger for applications that demand precision and productivity. They are strongly recommended for high-throughput applications.

Agilent offers a wide selection of fixed needle, 22-gauge, Pointstyle 3 syringes to accommodate a variety of applications.



X-type fixed needle, G4200-80118



Replacement plunger, G4200-80111

HTS and HTC PAL Liquid Injection Syringes

Volume (µL)	Description	Unit	Gauge	Needle	Part No.
25	X-type Fixed Needle		22	22S/51/3	G4200-80117
	Replacement plunger for X-type syringe	3/pk			G4200-80112
50	X-type Fixed Needle		22	22/51/3	5188-6485
	Replacement plunger for X-type syringe	3/pk			5188-5395
100	X-type Fixed Needle, fast aspiration and eject		22	22/51/3	G4200-80118
	X-type Fixed Needle, low dead volume		22	22S/51/3	G4200-80119
	Replacement plunger for X-type syringe	3/pk			G4200-80111
10	Fixed Needle		22	22S/51/3	G4200-80113
	Replacement plunger	10/pk			G4200-80103
25	Fixed Needle		22	22S/51/3	G4200-80114
	Replacement plunger	10/pk			G4200-80104
100	Fixed Needle		22	22/51/3	G4200-80115
	Fixed Needle		22	22S/51/3	G4200-80116
	Replacement plunger	10/pk			G4200-80105
250	Fixed Needle		22	22/51/3	G6500-80102
	Replacement plunger	10/pk			G4200-80102
500	Fixed Needle		22	22/51/3	G6500-80103
	Replacement plunger				G4200-80106
1000	Fixed Needle		22	22/51/3	G6500-80104
	Replacement plunger				G4200-80101
2500	Fixed Needle		22	22/51/3	G6500-80105
	Replacement plunger				G4200-80107
5000	Fixed Needle		22	22/51/3	G6500-80106
	Replacement plunger				G4200-80108



Stainless steel loop, 5188-6486



2 µL PEEK loop, 5188-6469



10 µL PEEK loop, 5188-6467

HTS and HTC PAL Liquid Injection Valve Supplies

Whether your HTS or HTC PAL autosampler uses the Agilent proprietary Rheodyne high-pressure 600-bar injection valve or Valco Cheminert injection valves, Agilent can help you find a sample loop to meet your most challenging applications – including:

- Rheodyne 600 bar injection valve loops, which include high-pressure Swagelok fittings.
- Cheminert metal loops, which feature two 1/16 in. stainless steel nuts and two stainless steel ferrules.
- Cheminert PEEK loops, which include two PEEK nuts and two PEEK ferrules.

HTS and HTC PAL Liquid Injection Valve Loops and Needle Seals

Description	Part No.
Rheodyne 600 bar Valve Supplies	
Stainless Steel Loops: Supplied with Swagelok fittings required for high pressure	
5 µL	5188-6486
10 µL	5188-6487
20 µL	5188-6488
50 µL	5188-6489
100 µL	5188-6490
Stator, Rheodyne 600 bar	
RheBuild Kit, 600 bar, includes Rotor Seal and 3/32 hex wrench	
Needle Seals, Rheodyne valve, 600 bar, 10/pk	
Cheminert Valve Supplies	
PEEK Loops: Include two PEEK nuts and two PEEK ferrules	
2 µL	5188-6469
5 µL	5188-6470
10 µL	5188-6467
20 µL	5188-6468
Metal Loops: Include two 1/16 in. stainless steel nuts and two stainless steel ferrules	
2 µL	5188-6457
10 µL	5188-6458
50 µL	5188-6460
100 µL	5188-6461
250 µL	5188-6462
500 µL	5188-6463
1000 µL	5188-6464
2000 µL	5188-6465
5000 µL	5188-6466
PEEK Needle Seal, Valco, 22 gauge, 10/pk	5188-6476
Teflon Needle Seal, Valco, 22 gauge, 10/pk	5188-6477



Sample tray, G6500-80101



Well plate foil cutter, 5188-6479

CTC Autosampler General Supplies

For your convenience, Agilent offers a selection of replacement sampling trays, well plates and sampling accessories for CTC autosamplers.

Description	Part No.
Sample tray, 200 vials, 0.7 or 1 mL	G6500-80100
Sample tray, 98 2 mL or 78 1 mL vials	G6500-80101
Sample tray, 32 10 or 20 mL vials	G6500-80121
Sample tray, 54 2 mL vials, for PAL deep well stack	G6500-80122
96 Well plates, 0.5 mL, polypropylene	5042-1386
96 Deep well plates, 1 mL, polypropylene	5042-6454
384 Well plates, 90 µL, polypropylene	5042-1388
Closing mats for 96 well plates, silicone	5042-1389
Well plate foil cutter, max 22 gauge needle	5188-6479





Gas Purification

Impure gases can cause installation delays, premature instrument failure, and flawed results. Purification is one of the most important steps you can take to optimize your system performance.

Agilent Technologies brings the highest performance and largest variety of gas purifiers to gas chromatographers. We manufacture purifiers in a variety of sizes and configurations, to remove oxygen, moisture, and hydrocarbons. Our product line contains in-line gas purifiers including refillable, indicating, S-shaped, and metal body types. In-line gas purifiers are made to remove specific contaminants. We also carry gas purification systems with removable cartridges. Please refer to the following Gas Purifier Selection Guide to determine which gas purifiers you should use.

Carrier Gas Purification

The Carrier Gas Purification illustration shows the most common gas purification configurations used in gas chromatography.

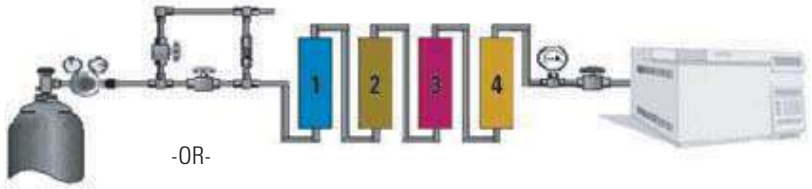
Regardless of which purification system is employed, proper installation and maintenance is required to achieve optimal performance from the purification system(s). A purifier that is not maintained will eventually expire and become ineffective, or worse, a source of contamination.

Helpful Hints for Purification Success

- Determine desired purity level
- Keep number of fittings in gas line to a minimum
- Install purifiers in a convenient location close to the GC
- Use purifier log books to determine maintenance and cartridge replacement schedules
- Use indicating traps closest to the GC so you can determine when to change the traps that are upstream

Carrier Gas Purification

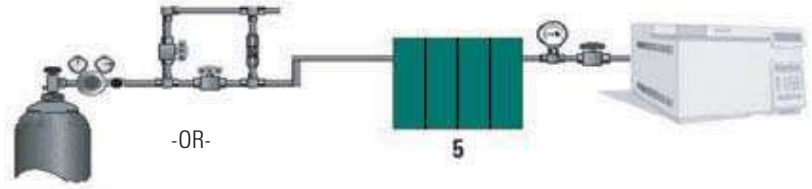
In-Line Gas Purifiers



-OR-

Gas supply

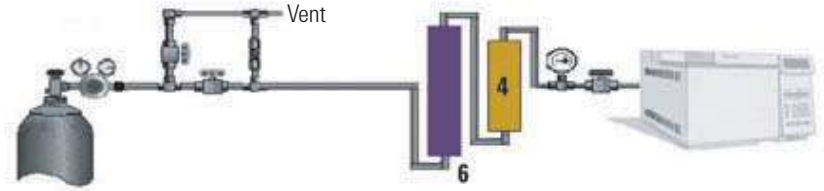
Gas Purification System



-OR-

Gas supply

Combination Trap



Gas supply = cylinder, in-house line, or gas generator



Regulator = brass dual stage regulator

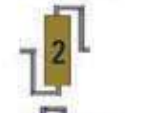
Detector Gas Purification



FID make-up, air, and H_2



ECD make-up



ELCD reaction gas



MS carrier gas

Key

- 1 = Moisture Trap
- 2 = Hydrocarbon Trap
- 3 = Oxygen Trap
- 4 = Indicating Oxygen Trap
- 5 = Gas Purification System
- 6 = Combination Trap for moisture, oxygen, and hydrocarbon removal

Gas Purifier Selection Guide

Contaminant	Description	Series	Unique Features	Refillable	Page No.
Purification Systems					
Multiple	Renewable Gas Purification System	G3440	Recyclable high-capacity system filters moisture, oxygen and hydrocarbons in a small, single-cartridge unit, featuring quick changes and easy-to-read dual indicators.	Yes	76
	Quick Change + Point of Operation Panel		1, 2, 3, or 4 position cartridge system with quick change (QC) connections and unique valves to change cartridges without interrupting gas flow to the instrument	No	77
	Super-Clean Gas Filter System		1, 2, 3, or 4 position modular, quick-connect cartridge system with visible indicators	No	78–79
	High Capacity Gas Purification System	5182/5183	Cartridges only. System has been discontinued and replaced by Renewable Purification System.	No	80



Gas Purifier Selection Guide

Contaminant	Description	Series	Unique Features	Refillable	Page No.
In Line Purifiers					
Moisture (H_2O)	Economy Indicating Moisture Traps	MT, MT-D, MT-S	Economical plastic "Lexan" body for durability	Yes	82–83
	Glass Indicating Moisture Traps	GMT, LGMT	Glass body for no moisture diffusion	Yes	84
	S-Traps		Can be reconditioned in GC oven	No	85
	Big Moisture Traps	BMT	Ultra-high capacity for moisture	Yes	85
	Refills for Moisture Traps	MT, MT-D, MT-S GMT, LGMT, BMT	Makes gas purification more economical		82–85
Oxygen (O_2)	Indicating Oxygen Traps	IOT, LIOT	Glass construction with plastic safety shield	No	86
	Oxygen Traps	OT1	Economical non-indicating oxygen trap	No	86
	Big Oxygen Traps	BOT	Ultra-high capacity for oxygen	No	87
Hydrocarbons (HCs)	Hydrocarbon Traps	HT	Economical trap for hydrocarbons	Yes	87
	Big Hydrocarbon Traps	BHT	Ultra-high capacity for hydrocarbons	Yes	88
	S-Traps		Can be reconditioned in GC oven	No	88
	Capillary Grade Hydrocarbon Traps	HT3	High surface area adsorbent, purged with high purity helium	Yes	88–89
	Refills for Hydrocarbon Traps	HT, BHT, HT3	Makes gas purification more economical		87–89
Combination Traps	Oxygen/Moisture Trap	OT3	Bi-functional trap, leak-free one-piece design	No	90
	Hydrocarbon/Moisture Trap	HMT	Bi-functional trap, leak-free one-piece design	Yes	91
	Big Universal Trap	RMS	Gas-specific (for purifying He, N_2, or H_2), ultra-high capacity, removes H_20, 0_2, HCs, CO, and CO_2, recommended for GC and GC/MS gas supplies	No	92–93
	Refill for Hydrocarbon/Moisture Trap	HMT	Makes gas purification more economical		91
Other Purifiers					
Organics	Split Vent Trap	RDT	Cartridge design with durable cartridge holder and replacement cartridges	No	93



Renewable gas purification system (left) and recycled cartridge (right)

Gas Purification Systems

NEW! Renewable Gas Purification System

The Renewable Gas Purification System from Agilent not only traps large quantities of contaminants and lasts a long time, but it is also recyclable. With average use, you'll only have to purchase a replacement cartridge once per year or after approximately 20 cylinders' worth of purification. When you need a replacement, you have the option to purchase a new or recycled cartridge. Recycled cartridges are refilled and certified to the full specification of the new cartridges.

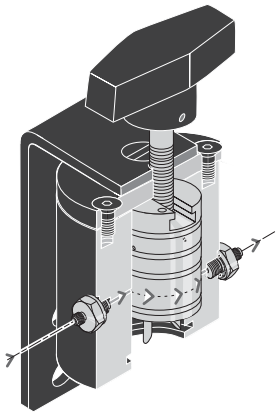
- Agilent's highest capacity and most economical purification system
- All cartridges are environmentally friendly and reduce waste
- High capacity – 850cc or more Oxygen filtration, 12g H_2O, and approximately 8g hydrocarbon filtration per cartridge – in a compact footprint
- Improves 99.995% gas purity to 99.9995% purity
- Dual indicators make it easy to see the purification results
- Labeling displays indicator color and shape for accurate reading
- Simple twist on/off knob and guide rod make cartridge changes quick and easy
- One Renewable Purifier system can support up to four GC systems
- Designed with efficiency, safety, and environmental responsibility in mind
- All replacement cartridges include return packaging and instructions

Renewable Gas Purification System

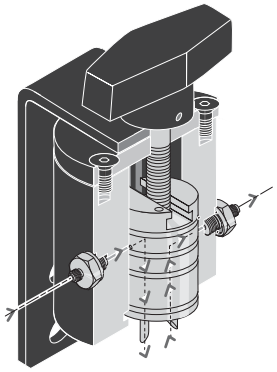
Description	Part No.
Renewable gas purifier system startup kit Includes one G3440-80007 base, one G3440-60003 renewable gas purifier cartridge, wall or bench mount hardware, and instruction manual.	G3440-60004
Renewable gas purifier cartridge, new	G3440-60003
Renewable gas purifier recycled cartridge	G3440-69003
Renewable gas purifier system, base only	G3440-80007
Return packaging set For return of G3440-60003 or G3440-69003 Renewable Gas Purification cartridge when original packaging is lost or damaged	5190-1414

Tips & Tools

For more information about the Renewable Gas Purification System, visit **www.agilent.com/chem/renewable**.



a



b

(Figures a and b. The "plus" valve (a) features a closed gas path when changing cartridges. When placed in the down position (b), the "plus" valve shifts gas through the cartridge)

QC+ Point of Operation Panels

The QC+ Point of Operation Panel contains purifier cartridges that can be quickly changed (that's the QC). The cartridges are removed from the panel without interruption of gas flow to the system (that's the +), drastically minimizing costly instrument downtime (and that's a real +).

Filter cartridges are of all metal or glass construction, eliminating infusion and resultant signal noise associated with filters constructed from plastics. Cartridges are quickly installed via a simple knurled retaining nut. No wrenches are needed! As many as four cartridges can be replaced in a matter of seconds, and because there is low dead volume, a minimal amount of gas system purge is required after installation.

Each QC+ filter head is equipped with an internal flow valve. This valve serves two functions. In the "down" position, gas is passed through adsorbent filter cartridges for purification (Figure 1b). In the "up" position, the gas is diverted through the filter head. With the valve up (Figure 1a), the filter cartridge can then be easily replaced with a fresh cartridge. But, because the gas continues to flow through the bypass valve, the need to shut down instruments is eliminated while the filter cartridges are removed. QC+ is the only GC purification system with this revolutionary "flow through/bypass" feature.

The QC+ system has a unique D-shaped cartridge top that is self-aligning into the matching slotted filter head, assuring trouble-free installations.

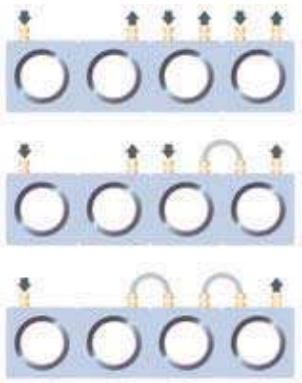
QC+ systems are available in 3- and 4-head panel configurations, available exclusively with 1/8 in. Swagelok fittings. QC+ panels can be wall mounted or used "freestanding." Oxygen, water, hydrocarbons and other organics are reduced to low part per billion levels.

QC+ Point of Operation Panels

Description	Fitting (in.)	Part No.
3-Head		
Oxygen, moisture, hydrocarbon	1/8	RTC-P
Moisture, oxygen, indicating oxygen	1/8	RTC-I-P
4-Head		
Oxygen, indicating oxygen, hydrocarbon, moisture	1/8	RQC-P

Replacement Cartridges

Description	Capacity	Efficiency	Part No.
High capacity oxygen	396 mg	< 15 ppb	GC-1
High capacity moisture	15 g	< 9 ppb	GC-2
Indicating moisture	7 g	< 9 ppb	GC-2-I
Hydrocarbon	8 g	< 30 ppb	GC-3
Indicating oxygen	40 mg	< 2 ppb	GC-4
Replacement O-ring set			R2D2-ORINGS



Gas filter base plate design



Super Clean Gas Purification system

Super Clean Gas Purification Systems

Super Clean gas filter systems are designed to provide the utmost in convenience and contamination reduction. The system is tested for leak-tightness and the glass and metal construction of the cartridges eliminates diffusion of contaminants into the gas stream. During cartridge replacement, check valves close off the system to the atmosphere, further minimizing the entry of contaminants.

Filter systems are available in several configurations, including 3 and 4 cartridge systems for GCs equipped with Flame Ionization Detectors (FIDs). Additionally, baseplates are available for 2, 3, or 4 filters, allowing the user to design a gas filter system for any application. Unit is ready to connect with 1/8 in. tubing. Maximum pressure is 150 psi (11 bar).

- Triple filter cartridge for carrier gas purification with a single cartridge
- Fuel gas filter for removal of hydrocarbons and moisture from FID fuel gases
- The filter's gas flow path is made from high quality glass and stainless steel
- Filters can be changed easily, without tools
- Base plate design allows customization for your gas filtration needs
- Indicating action tells when to replace cartridges

Specifications	
Max pressure	150 psi (11 bar)
Dimensions	33 cm x 31 cm x 11 cm – 4 filter system
Weight	8 kg
Purity Level	< 0.1 ppm at max flow rate of 2 L/min (max pressure 10 bar)

Super Clean Gas Purification Systems

Description	Part No.
FID Gas Purification System: Dedicated three position system for purifying all gases used in an FID-equipped GC. Includes the triple filter cartridge for carrier gas, and two fuel gas filter cartridges for both hydrogen and zero air.	5182-9703
Carrier Gas Purification System: Single position system for GC/MS, ECD and NPD detectors. Includes the triple filter cartridge.	5182-9704
Super Clean Gas Purification System: Includes four position baseplate manifold with four filter cartridges: oxygen, moisture (both with indicator), and two hydrocarbon cartridges.	5182-0816
FID Fuel Gas Purification System: Two position system dedicated to purifying the incoming hydrogen and zero grade air directly at your FID-equipped GC.	5183-4774
GC/MS assembly for He (gas specific), 1 filter/base plate, triple cartridge (O_2/Moisture/Charcoal)	5188-6475
Wall mount bracket for Super Clean Gas Purification System	5182-0821
O-ring kit 8/pk, 4 each of 2 sizes	5182-3423



Triple filter cartridge, 5182-9705

Super Clean Replacement Filter Cartridges

Description	Part No.
Triple filter cartridge: A single carrier gas filter now with hydrocarbon, moisture, and oxygen trapping capability. Includes moisture and oxygen indicator so you know exactly when to replace the cartridge.	5182-9705
Fuel Gas Filter Cartridge: Combination hydrocarbon and moisture trap with moisture indicator. Insures the highest quality hydrogen and zero air for your FID.	5183-4771
Moisture filter cartridge with indicator	5182-0817
Oxygen filter cartridge with indicator	5182-0818
Hydrocarbon filter cartridge	5182-0820
Filter cartridge bundle of 4: Oxygen, moisture, and 2 hydrocarbon	5183-4770
FID filter cartridge bundle: Includes one Triple Filter Cartridge and two Fuel Gas Filter Cartridges	5183-4769
GC-filter, triple, gas specific for He (O_2/Moisture/Charcoal) for GC/MS	5188-6474

Super Clean Baseplates

Design your own gas purification system – use Agilent's Super Clean Baseplates and filter cartridges to design a customized gas solution specific to your application needs.

Description	Part No.
Single position baseplate/manifold	5182-0815
2 position baseplate/manifold	5182-9706
3 position baseplate/manifold	5182-9707
4 position baseplate/manifold	5182-9713

High Capacity Gas Purification Replacement Cartridges

The High Capacity Gas Purification system has been discontinued and replaced by the Renewable Gas Purification System. Replacement cartridges for the High Capacity Gas Purification system are still available.



High capacity gas purification replacement cartridge

High Capacity Gas Purification Replacement Cartridges

Description	Part No.
Replaceable Cartridge Kit	
Replacement cartridge kit for three cartridge system (H_2O/hydrocarbon, oxygen and indicating O_2)	5182-9780
Detector-Specific Purifiers	
FID Purifier, 1/8 in. fittings Includes two hydrocarbon/moisture cartridges with separate connections for air and hydrogen lines	5182-9793
Individual Cartridge Filters and Replacement Cartridges	
Moisture/hydrocarbon replacement cartridge	5182-9777
Oxygen replacement cartridge	5182-9778
Indicating oxygen replacement cartridge	5182-9779
Moisture only replacement cartridge	5182-9792
Hydrocarbon only replacement cartridge	5182-9791
Triple combination replacement cartridge for single cartridge system	5183-4600

Gas Traps

The purpose of gas traps is to remove detrimental impurities from the carrier and detector gases. Combination traps are available which remove moisture, oxygen and/or organics with a single trap. The effectiveness of the traps depends on the initial quality of the gas.

Constant exposure of capillary columns to oxygen and moisture, especially at high temperatures, results in rapid and severe column damage. The use of oxygen and moisture traps for the carrier gas may extend column life and protect the instrument. Any moisture or oxygen introduced into the gas stream due to a leak will be removed by the trap until it expires.

Oxygen Removal

Type of Trap	Removal Capacity (mg)	Performance (ppb)
OT3 series	600.0	15
IOT series	30.0	2
LIOT series	100.0	1
OT3 + IOT	630.0	2
GC-1	396.0	5
GC-4	40.0	2
RBC series	436.0	2
RQC series	436.0	2
BOT series	3400.0	1



Refillable moisture trap MT120

Moisture Traps

Economy Indicating Refillable Moisture Traps

Agilent Indicating Moisture Traps are designed to remove water, oil, and organics from gases employed in, but not limited to, gas chromatography. Refillable moisture traps are constructed from Lexan brand polycarbonate tubing. Lightweight, chemically resistant and of superior strength when compared to traps manufactured from acrylic, Agilent Indicating Moisture Traps have become the chromatographer's choice for water adsorption from GC gases.

- Available in three refillable sizes and three different packings
- Both inlet and outlet connectors are equipped with stainless steel frits to prevent particulates from entering the gas stream
- Mixed packing bed makes improper installation impossible
- Easily refillable
- Tested to 125 psi (helium)

Molecular Sieve 13X and Indicating 4A (MT Series)

The preferred adsorbent for GC gas drying. Blue indicating sieve turns buff at 20% relative humidity.

Molecular Sieve 13X and Indicating 4A (MT Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H_2O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	21.6	20	MT120-2	MT120-4
Refillable Moisture Trap	200	36.0	18	MT200-2	MT200-4
Refillable Moisture Trap	400	72.0	14	MT400-2	MT400-4
Refills and Mounting Clips					
Adsorbent refill (1 pint) for MT series				MSR-1	MSR-1
Mounting clip for 120 and 200 cc traps				MC-1	MC-1
Universal mounting clip for 400 cc traps				UMC-4	UMC-4

Molecular Sieve 5A and Indicating Drierite (MT-D Series)

High moisture capacity and simultaneously removes hydrogen sulfide and oil. Indicating Drierite changes dramatically from bright blue to pink as the gas stream approaches 40% relative humidity.

Molecular Sieve 5A and Indicating Drierite (MT-D Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H_2O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	21.6	22	MT120-2-D	MT120-4-D
Refillable Moisture Trap	200	36.0	20	MT200-2-D	MT200-4-D
Refillable Moisture Trap	400	72.0	16	MT400-2-D	MT400-4-D
Refills and Mounting Clips					
Adsorbent Refill (1 pint) for MT-D Series				MSR-2	MSR-2
Mounting clip for 120 and 200 cc traps				MC-1	MC-1
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Refillable Moisture trap MT400

Silica Gel, Grade 40, and Indicating Silica Gel, Grade 48 (MT-S Series)

Highest moisture capacity adsorbent. Adsorbs as much as 40% of its weight in water. High affinity for hydrocarbons. Blue indicating gel turns from a deep blue to pale pink at 40% relative humidity.

Silica Gel, Grade 40, and Indicating Silica Gel, Grade 48 (MT-S Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H_2O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Refillable Moisture Trap	120	31.5	40	MT120-2-S	MT120-4-S
Refillable Moisture Trap	200	52.5	39	MT200-2-S	MT200-4-S
Refillable Moisture Trap	400	105.0	39	MT400-2-S	MT400-4-S
Refills and Mounting Clips					
Adsorbent Refill (1 pint) for MT-S series				SGR	SGR
Mounting clip for 120 and 200 cc traps				MC-1	MC-1
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Glass indicating moisture trap



Refillable glass moisture trap

Glass Indicating Moisture Traps (GMT and LGMT Series)

Ideal for GC/MS Systems, Electron Capture Detectors, and Electrolytic Conductivity Detectors

- Molecular Sieve 13X and a band of Indicating Molecular Sieve 4Å
- Available in 70 cc, 100 cc and 250 cc sizes
- Heavy wall borosilicate glass tube – no moisture diffusion
- Refillable

The 100 cc unit will treat 10 standard "A" cylinders with up to 30 ppm water or 16.3 grams to less than 10 ppb. Molecular sieves differ from all other commercially available adsorbents, as they have an extremely high adsorption capacity for water and polar compounds even at relatively low concentrations. The color change takes place in the middle of the trap bed, giving ample warning. In addition to the inherent qualities of the sieve material, we treat the bed material under high vacuum and heat to ensure maximum scrubbing efficiency and capacity.

Glass Indicating Moisture Traps (GMT and LGMT Series)

Description	Size (cc)	Removal Capacity (g)	Max. Effluent H_2O Concentration (ppb)	1/8 in. Part No.	1/4 in. Part No.
Glass Indicating Moisture Trap	70	11.4	7	GMT-2GC-HP	GMT-4GC-HP
Glass Indicating Moisture Trap	100	16.3	6	GMT-2-HP	GMT-4-HP
Glass Indicating Moisture Trap	250	40.09	6	LGMT-2-HP	LGMT-4-HP
Refills and Mounting Clips					
Molecular Sieve Refill for GMT and LGMT series				GMSR	GMSR
Mounting clip for 70 and 100 cc traps				UMC-3	UMC-3
Universal mounting clip for 400 cc traps				UMC-4	UMC-4



Moisture S-trap

Moisture Removal S-Traps

- Contains Molecular Sieve 5Å, 45/60 mesh
- Can be reconditioned

Moisture Removal S-Traps

Description	Part No.
Moisture S-trap, preconditioned, 1/8 in. fittings*	5060-9084
Moisture S-trap, unconditioned, 1/8 in. fittings	5060-9077

*Traps can be reconditioned by heating at a minimum of 350°C, with flow for 6 hours



Big moisture trap

Big Moisture Traps (BMT Series)

- Capacity: 130 grams H_2O
- Pressure: Up to 250 psig
- Efficiency: reduction of H_2O to less than 5 ppb
- 750 cubic centimeter gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One piece of heavy-walled aluminum tube. This one-piece design eliminates potential leaks.
- Equipped with sintered stainless steel frits to prevent particulate contamination
- Refillable

Big Moisture Traps (BMT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Moisture Trap	750	BMT-2	BMT-4
Refills and Mounting Clips			
Refill for Big Moisture Trap (enough for 2 refills)		BMSR-1	BMSR-1
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2

Oxygen Traps

Indicating Oxygen Traps

- Reduces oxygen to less than 1 ppb
- Environmentally safe
- Available in two sizes, standard and large – three times the capacity

This trap actually removes the oxygen rather than converting it to another form of contamination.

Oxygen and a wide range of oxides react with the activated bed material to form a manganese oxide. This reaction results in a progressive and dramatic color change, from light green in the adsorbent's active state to deep brown as oxygen saturation occurs. The Indicating Oxygen Trap is designed to be used in conjunction with any of our high capacity, non-indicating oxygen traps. When properly installed downstream from the non-indicating trap, the Indicating Oxygen Trap provides a visual indication of oxygen breakthrough BEFORE contamination reaches sensitive system components.

Unlike adsorbent materials utilized in competitive products, our indicating media can be exposed to air and water in virtually any quantity without resulting in an exothermic reaction. The spent product is nontoxic, nonhazardous, nonflammable, and nonreactive. The high impact Lexan shield prevents "lab catastrophes" if the trap is exposed to pressure beyond its stated pressure limit. Safe for land-fill refuse.



Economy non-indicating oxygen trap

Indicating Oxygen Traps

Description	Size (cc)	Removal Capacity (g)	1/8 in. Part No.	1/4 in. Part No.
Indicating Oxygen Traps (IOT and LIOT Series)				
Indicating Oxygen Trap	30	50 cm^3	IOT-2-HP	IOT-4-HP
Large Indicating Oxygen Trap	150	120 cm^3	LIOT-2	LIOT-4
Economy Non-Indicating Oxygen Traps (OT1 Series)				
Oxygen Trap	70		OT1-2	OT1-4
Trap Mounting Clips				
Mounting clip for IOT traps			UMC-2	UMC-2
Mounting clip for LIOT traps			UMC-3	UMC-3
Mounting clip for OT1 traps			MC-1	MC-1



Big oxygen trap

Big Oxygen Traps (BOT Series)

- Capacity: 3 liters O_2 or 3,200 mg
- Pressure: Up to 250 psig
- Efficiency: reduction of O_2 to less than 1 ppb
- 750 cubic centimeter gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One piece of heavy-walled aluminum tube. This one-piece design eliminates potential leaks
- Equipped with sintered stainless steel frits to prevent particulate contamination

Big Oxygen Traps (BOT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Oxygen Trap	750	BOT-2	BOT-4
Trap Mounting Clips			
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2



Big hydrocarbon trap

Hydrocarbon Traps

Hydrocarbon Traps (HT Series)

Our Hydrocarbon Traps offer you flexibility: refill your trap and remove extremely low levels of hydrocarbons.

- Remove organics from carrier gases, air and hydrogen
- High capacity – 200 cc of filtering media
- Impregnated carbon filter media
- Mounting Panel
- Refillable

Hydrocarbon Traps (HT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Hydrocarbon Trap	200	HT200-2	HT200-4
Refills and Mounting Clips			
Adsorbent Refill (1 pint), 2 recharges for Hydrocarbon Trap		ACR	ACR
Mounting clip for HT200 Series		MC-1	MC-1

Big Hydrocarbon Traps (BHT Series)

- Capacity: 80 grams of medium to heavy molecular weight hydrocarbons
- Pressure: Up to 250 psig
- Efficiency: reduction of C4 hydrocarbons to less than 15 ppb
- 750 cubic centimeter gas purifiers
- Ideal for bulk purification applications or where several instruments are plumbed from a single gas source
- One piece of heavy-walled aluminum tube. This one-piece design eliminates potential leaks.
- Equipped with sintered stainless steel frits to prevent particulate contamination
- Refillable

Big Hydrocarbon Traps (BHT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Big Hydrocarbon Trap	750	BHT-2	BHT-4
Refills and Mounting Clips			
Refill for Big Hydrocarbon Trap (enough for two refills)		BACR	BACR
Big Mounting Clip, 2/pk		UMC-5-2	UMC-5-2



Hydrocarbon S-trap

Hydrocarbon Removal S-Traps

- Filled with 40/60 mesh activated charcoal
- Can be reconditioned

Hydrocarbon Removal S-Traps

Description	Part No.
Hydrocarbon S-Trap, 1/8 in. fittings, used for trapping organics from gases*	5060-9096

*This trap can be reconditioned by heating at a minimum of 350°C, with flow for 6 hours

Capillary Grade Hydrocarbon Traps (HT3 Series)

- Extremely high surface area, coconut shell-based, activated carbon
- 100 cc of filtering media
- Purged with ultra-high purity helium
- Refillable

Capillary Grade Hydrocarbon Traps (HT3 Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Capillary Grade Hydrocarbon Trap	100	HT3-2	HT3-4
Refills and Mounting Clips			
Adsorbent Refill (1 pint), 3 recharges for Capillary Grade Hydrocarbon Trap		ACR	ACR
Mounting clip for HT3 Series		MC-1	MC-1

Ability of Activated Carbon to Remove Substances from Gases Using Hydrocarbon Traps

Compound	Efficiency	Compound	Efficiency
acetone	excellent	dissolved oils	excellent
hypochlorous acid	excellent	nitrobenzenes	excellent
alcohol	excellent	nitrotoluene	excellent
amines	very good	ethyl acetate	excellent
inorganic acids	none	ethyl alcohol	excellent
ammonia	poor	organic acids	excellent
iodine	excellent	ethyl chloride	excellent
amyl acetate	excellent	oxalic acid	excellent
isopropyl acetate	excellent	ethyl ether	excellent
amyl alcohol	excellent	ozone	excellent
isopropyl alcohol	excellent	flouride	poor
benzene	excellent	phenol	excellent
ketones	excellent	formaldehyde	poor
butyl acetate	excellent	potassium permanganate	excellent
butyl alcohol	excellent	propyl acetate	excellent
lactic acids	excellent	glycol	excellent
by-products-organic	very good	propyl alcohol	excellent
lysol	excellent	propyl chloride	excellent
calcium hypochlorite	excellent	hydrogen bromide	satisfactory
mercaptans	excellent	hydrogen chloride	poor
carbon dioxide	none	sodium hypochlorite	excellent
methyl acetate	excellent	hydrogen flouride	none
chlorobenzene	excellent	solvents	excellent
methyl alcohol	excellent	hydrogen iodide	satisfactory
chlorine	excellent	sulfuric acid	satisfactory
methyl bromide	excellent	hydrogen selenide	satisfactory
chlorophenol	excellent	hydrogen sulfide	satisfactory
methyl chloride	excellent	toluene	excellent
chlorophyl	excellent	trichloroethylene	excellent
methyl ethyl ketone	excellent	xylene	excellent
cresol	excellent		

Combination Traps

Oxygen/Moisture Traps

Recommended Applications

- Electron Capture Detectors, oxygen/water removal effectively prevents detector degradation from contamination
- GC/MS

Oxygen/moisture adsorbents team up to give you two functionalities in the same trap. Unlike some oxygen/moisture traps, these traps are disposable.

Consider the safety, performance, and cost advantages of the Agilent capillary grade oxygen/moisture traps (OT3) when comparing to heated, catalytic traps.

- Optimized for maximum surface area and capacity
- Leak-free, one-piece design – (tested to 2000 psi)
- Bed material treated with ultra-high purity helium
- Filter design: prevents channeling, promotes efficient scrubbing

Using OT3 with your MSD can improve sensitivity and selectivity.

M/Z Ratio*	18/28	32/28	32/40
Without Agilent OT3 Trap	0.098	0.266	11.08
With Agilent OT3 Trap	0.005	0.0118	0.247

*Contribution of inherent instrument background removed. Analysis by California Analytica Laboratories, Inc. Sacramento, California

In addition to inert gases (nitrogen, helium, argon and krypton), the Agilent OT3 Trap treats streams of hydrogen, alkanes, alkenes, aliphatic hydrocarbon gases, low boiling aromatics, carbon dioxide, carbon monoxide, and argon-methane.

How does it work?

The Agilent OT3 Trap contains a highly active, metal-containing, scrubbing material in an inert, aluminum body.



Agilent OT3 trap

Oxygen/Moisture Traps (OT3 Series)

Description	Capacity	Efficiency	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
OT3 Trap	500 mL O_2 2 g H_2O	< 15 ppb	100	OT3-2	OT3-4
Trap Mounting Clips					
Mounting clip				MC-1	MC-1



Hydrocarbon Moisture trap

Hydrocarbon/Moisture Traps

Our hydrocarbon/moisture traps offer you flexibility: refill your trap and remove extremely low levels of both moisture and hydrocarbons.

- Replace most mixed bed traps supplied by GC manufacturers
- Mounting panel
- Refillable

Hydrocarbon/Moisture Traps (HMT Series)

Description	Size (cc)	1/8 in. Part No.	1/4 in. Part No.
Hydrocarbon/Moisture Trap	200	HMT200-2	HMT200-4
Refills and Mounting Clips			
Adsorbant Refill (1 pint), 2 recharges for Hydrocarbon/Moisture Trap		HCRMS	HCRMS
Mounting clip		MC-1	MC-1

Combination Traps for Chemical Ionization MS

Description	Fitting (in.)	Part No.
Chemical Ionization for MS*	1/8	G1999-80410

*Isobutane or methane applications only



Big universal trap

Big Universal Traps

Big Universal Traps utilize a layered, multi-adsorbent bed packing of the most effective, highest capacity adsorbent materials available today for the removal of oxygen, moisture, hydrocarbons, carbon dioxide and carbon monoxide from helium gas streams. The volume of the various adsorbent materials in the Big Universal Trap was developed through rigorous testing and evaluation in order to assure that breakthrough of the five major contaminant groups occurs as simultaneously as possible as each material achieves complete saturation.

One Big Universal Trap unit will easily purify the contents of thirteen "K" size cylinders of 99.997% purity helium to a cumulative level of 100 parts per billion of O_2, H_2O, CO_2, CO and hydrocarbons at a flow rate of up to 8 liters/minute. All tube fittings are Swagelok brand stainless steel, fitted with 40 micron stainless steel frits for particulate control. Maximum pressure is 500 psi.

Big Universal Traps are more economical than other purifiers. They cost only slightly more than competitive products, but offer nearly three times the capacity.

Big Universal Traps are ideal for any GC or GC/MS application where helium is employed and assurance of purity is essential. Combining the contents of three individual in-line traps into a single unit reduces the number of potential leaks and the possibility of aspirating contaminants into the gas stream. A single purifier also simplifies installation and replacement.

Tips & Tools

Big universal traps have nearly three times the capacity of other purifiers.

Capacity Data

High Purity Helium-99.997%		Removal Capacity
O_2	< 5 ppm	1.07 L
THC*	< 1 ppm	20 g
H_2O	< 5 ppm	46 g

*Total Hydrocarbons, analysis limited to three contaminate groups

Effluent Concentration			
Research Grade Helium-99.9999%			
Impurities	< 1 ppm	H_2O	< 0.2 ppm
N_2	< 0.5 ppm	H_2	< 0.2 ppm
O_2	< 0.5 ppm	Ar	< 0.1 ppm
THC*	< 0.1 ppm	Ne	< 0.5 ppm
$CO+CO_2$	< 0.1 ppm		

*Total Hydrocarbons, analysis limited to three contaminate groups

Big Universal Traps (RMS Series)

Description	1/8 in. Part No.	1/4 in. Part No.
Hydrogen	RMSHY-2	RMSHY-4
Helium (Ar/Me)	RMSH-2	RMSH-4
Nitrogen	RMSN-2	RMSN-4
Trap Mounting Clips		
Big Mounting Clip, 2/pk	UMC-5-2	UMC-5-2



Split vent trap and cartridges, RDT-1020

Universal/External Split Vent Trap

- Protects lab from contaminants released by split injection systems
- Stops environmental pollution by trapping and eliminating a broad range of contaminants
- Easy to change
- Comes with three packs of replacement cartridges

Universal/External Split Vent Trap

Description	Part No.
Universal/external split vent trap with 3 cartridges, 1/8 in. Swagelock fitting	RDT-1020
Replacement cartridges, 3/pk	RDT-1023

Tips & Tools

Remember to replace split vent cartridge every six months.



Precision gas flow meter, 5067-0223

Flow Meters

NEW! Precision Gas Flow Meter

Agilent's Precision Gas Flow Meter is the ultimate gas flow meter for chromatography applications. This hand-held flow meter incorporates industry leading performance and features a highly accurate and reliable package. The inherent stability of the rugged, solid state components allows us to provide the longest calibration interval on the market, all traceable to NIST standards.

- Highly accurate and reliable measurement of common carrier and fuel gases used in GC, including nitrogen, air, carbon dioxide, hydrogen, helium, and argon/methane
- Two year guaranteed calibration period traceable to NIST standards
- Measures flow based on gas viscosity properties with an accuracy of ± 0.8% of reading + 0.2% of full scale
- Flow rate range from 5-500 mL/min
- Displays mass flow, volumetric flow, temperature, and pressure readings simultaneously
- Can be plumbed inline

Precision Gas Flow Meter

Description	Part No.
Precision gas flow meter	5067-0223



ADM flow meters

ADM Flow Meters

Want to use the simplest flow meter for gas chromatographic analysis? ADM flow meters allow most gas measurements with the touch of only one button – turn it on, and the instrument provides continuous, hands-free flow readings. You can measure column, detector, and carrier gas flows without any adjustments. ADM flow meters are ideal for measuring gas streams with a changing gas composition. For example, if you measure the gas flow from a digestion system, concentration changes in methane, carbon dioxide, and oxygen will not affect accuracy.

All ADM flow meters are battery powered and field portable. Agilent calibrates each instrument to 5-point, NIST-traceable standards to ensure the highest available accuracy. The ADM family measures flow volumetrically, so you don't have to make any adjustments when changing from one gas to another.

If you need rapid, real-time measurements of a gas stream, ADM flow meters are perfect for you. These flow meters are designed for basic gas chromatography laboratories.



ADM 1000

ADM 1000

- Accuracy ± 3%
- Operating temperature range – 0 to 45ºC for the instrument, -70 to 135ºC for the tubing
- Calibration – traceable to NIST primary standards
- Real time, split ratio measurement
- CE mark certified
- Measures flow rates from 0.5 to 1000 mL/min
- Split ratios – compare the ratio from one gas measurement to another (i.e., injection port split ratios)



ADM 2000

ADM 2000

In addition to the features of the ADM 1000, the ADM 2000 includes:

- Mass flow measurements – measure flow rate, independent of atmospheric pressure and temperature (calculated)
- Data output through RS-232 port
- 9V battery and AC power adapter (120 or 220 VAC)

ADM Flow Meters

Description	Flow Rate (mL/min) Low	High	Gases Measured*	Accuracy (%)	Power Supply	RS-232 Data Output	Part No.
ADM 1000**	0.5	1000	All	± 3	9V Battery	None	220-1170
ADM 2000**	0.5	1000	All	± 3	Battery or 120V AC	Yes	220-1171-U
ADM 2000E**	0.5	1000	All	± 3	AC Adapter, 220V	Yes	220-1171-E
Carrying Case for ADM							907-0056

*± 3% or ± 0.2 mL/min, whichever is greater with a flow rate of 0.5 - 1,000 mL/min

**Non-corrosive gases only



Gas leak detector, G3388A

NEW! Gas Leak Detector

Gas leaks can cause detector noise and baseline instability, shorten column life and waste expensive carrier gas. Liquid leak detectors, although inexpensive, can contaminate your system. Agilent's G3388A electronic leak detector is an easy way to quickly identify leaks in your system and prevent system downtime.

- Detects thermal conductivity differences
- Fast detection – 1 second
- Audible and visual alerts
- Minimum detection limit – 0.01 mL/min. hydrogen and helium
- Lightweight – only 310 grams
- Small – roughly 2.5 in. x 1.5 in. x 5.75 in
- Rechargeable NiMH battery with over 5 hours of life
- Agilent sourced and approved power supply
- One year warranty from Agilent

Gas Leak Detector

Description	Part No.
Handheld electronic gas leak detector	G3388A
Replacement filter tip	5067-0218
Replacement battery	5067-0219
Replacement power supply	5067-0220

Tips & Tools

For more information about the Gas Leak Detector, visit **www.agilent.com/chem/leakdetector**.



Low Gas Alarm System, 2.0 and 2.5 in.

NEW! Low Gas Alarm System

Available early 2009

- Protects loss of valuable sample and sample prep time
- Ensures uptime by identifying low gas level
- Eliminates gas-related surprises

The Low Gas Alarm System is a safe, reliable, and economical tool that audibly and visually alerts the operator when a gas cylinder's pressure reaches a user-defined level. The system attaches to the existing regulator gauge and senses the needle as it reaches the predetermined alert level. The system indicates low pressure regardless of cylinder size, gas contained or regulator used. The Low Gas Alarm System is available in standalone or wireless versions. It fits 2.0 and 2.5 inch regulator gauges.

Tips & Tools

For additional product information and to view a demo visit **www.agilent.com/chem/lowgas**.

Standalone

- Safe, non-invasive design eliminates hazards such as high voltage and high pressure
- Uses a low voltage, low current battery
- Easy to install and maintain; attaches to existing regulator gauge

Wireless

The wireless Low Gas Alarm System features all of the benefits of the standalone version plus:

- Uses wireless chip to communicate gas level to the Laboratory Network Controller (LNC)
- Features unique identifier so LNC can display individual status for each system
- Alerts user to alarm state with audible and visual indicators on LNC or pop-up software



Low Gas Alarm System with LNC



Laboratory network controller, G3387A

Low Gas Alarm System

Description	2.0 in.	2.5 in.
Standalone	G7311A	G3377A
Wireless*	G3374A	G3378A
Wireless with LNC*	G3376A	G3379A

*Due to regulatory requirements, the wireless Low Gas Alarm System may not be available in all countries. Please contact your local Agilent sales office or Authorized Distributor for details.

Laboratory Network Controller (LNC)

Description	Part No.
Laboratory network controller	G3387A



Brass body regulator

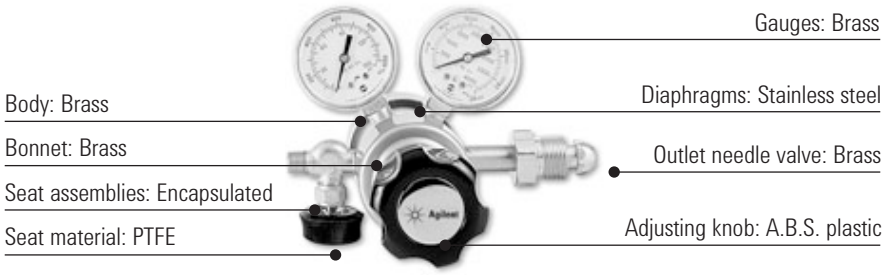
Gas Cylinder Regulators, U.S. Only

To plumb your system properly, select one of Agilent's economical brass regulators and the proper gas purification devices from our newly expanded product offering. These regulators and our broad spectrum of in-line filters, combination traps, and gas purification systems are an excellent combination to plumb your systems. Our new gas purification selection guide and diagrams will help you determine which products can be used with the regulators below.

Brass Body, Dual Stainless Steel Diaphragms

Specifications	
Max inlet pressure	3000 psig
Operating temperature range	-40°F to 165°F
Inlet-outlet port	1/4 in., MNPT
Outlet valve	1/4 in., MNPT 2 1/2 in. dual scale gauges CGA-346, 350, 340, 580, 590 Internal self-reseating relief valve
Delivery pressures	1 to 125 psig
Weight	5.6 lbs

Materials of Construction



Brass Body, Dual Stainless Steel Diaphragms, 1/8 in., U.S. Only*

Description	Part No.
CGA 346, 125 psig max (8.6 bar), Air	5183-4641
CGA 350, 125 psig max (8.6 bar), H_2, Ar/Me	5183-4642
CGA 540, 125 psig max (8.6 bar), O_2	5183-4643
CGA 580, 125 psig max (8.6 bar), He, Ar, N_2	5183-4644
CGA 590, 125 psig max (8.6 bar), Air	5183-4645

*For 1/4 in. tubing, purchase a 1/4 in. adapter, U.S. only

Connectors (Swagelok to Female NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass (included with brass regulators)	1/ea	0100-0118
1/4 in. (A) x 1/4 in. (B) connector, brass*	1/ea	0100-0119

*Required for plumbing 1/4 in. tubing to regulators

Tubing - Precleaned

Description	Part No.
Copper tubing, 1/8 in., 50 ft	5180-4196
Copper tubing, 1/8 in., 12 ft	5021-7107
Teflon tape, industrial roll	0460-1266



Spectra-link tubing connecting system on a two stage regulator

Spectra-Link Flexible Tubing

- Stainless steel: no outgassing or permeation through polymeric materials
- Quick Connection: prevents air from entering gas lines during tank changeover
- Tested: each system has leak rates lower than $1x10^{-5}$ cc/sec

Description	Part No.
Spectra-Link with 1/8 in. fittings and 36 in. line	SL-8
Spectra-Link with 1/4 in. fittings and 36 in. line	SL-4



Cylinder wall bracket, 5183-1941

Cylinder wall bracket

Description	Part No.
Cylinder wall bracket with strap & chain (cylinder size up to 14 in., 35 cm)	5183-1941

Tips & Tools

Don't forget, we have special offers throughout the year.
To learn more, visit **www.agilent.com/chem/specialoffers**.



Fittings kit, 5180-4161

GC Installation Kits

Agilent Installation Kits for GC are designed to provide you with the essential items necessary for a successful installation while providing a substantial cost savings over individual purchases.

GC Installation Kit with Tools (no gas purifiers)

Description	Unit	Part No.
GC Installation Kit with Tools (no gas purifiers)		19199M
Snoop, 8 oz (236 mL) bottle		9300-0311
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Copper tubing, 1/8 in., 50 ft, precleaned		5180-4196
1/8 in. tee, brass	2/pk	5180-4160
Tube cutter, 1/8 to 5/8 in. od tubing		8710-1709
1/8 in. cap, brass	6/pk	5180-4121
Nut driver, 7 mm		8710-1217
Screwdriver, Torx T10		5182-3466
Screwdriver, Torx T 20		5182-3465
Open end wrench, 1/4 and 5/16 in.		8710-0510
Open end wrench, 7/16 and 9/16 in.		8710-0803
Open end wrench, 7/16 and 3/8 in.		8710-0972
Wrench, 1/2 and 7/16 in.		8710-0806

GC Installation Kit with Gas Purifiers (no tools)

Description	Unit	Part No.
GC Installation Kit with Gas Purifiers (no tools)		19199C
Snoop, 8 oz (236 mL) bottle		9300-0311
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Copper tubing, 1/8 in., 50 ft		5180-4196
1/8 in. tee, brass	2/pk	5180-4160
1/8 in. cap, brass	6/pk	5180-4121
Universal/external split vent trap with 3 cartridges		RDT-1020
Precision tubing cutter		5190-1442
Renewable gas purifier system startup kit		G3440-60004

GC Basic Installation Kit

Description	Part No.
GC Basic Installation Kit Includes copper tubing, column nuts, two moisture traps, and five wrenches	5182-3453

Fittings



Brass nut and ferrule set, 5080-8750

Nuts, Front and Back Ferrule Sets

Description	Unit	Part No.
1/16 in. stainless steel nut and ferrule set	10/pk	5180-4149
1/8 in. brass nut and ferrule set	20/pk	5080-8750
1/8 in. stainless steel nut and ferrule set	20/pk	5080-8751
1/4 in. brass nut and ferrule set	20/pk	5080-8752
1/4 in. stainless steel nut and ferrule set	20/pk	5080-8753

Nuts

Description	Unit	Part No.
1/16 in. nut, stainless steel	10/pk	5180-4102
1/8 in. nut, brass	10/pk	5180-4103
1/4 in. nut, brass	10/pk	5180-4105



Stainless steel front ferrules, 5180-4108

Front Ferrules

Description	Unit	Part No.
1/16 in. front ferrule, stainless steel	10/pk	5180-4108
1/16 in. front ferrule, stainless steel, Valco one piece	10/pk	5181-1292
1/8 in. front ferrule, brass	10/pk	5180-4109
1/4 in. front ferrule, brass	10/pk	5180-4111

Back Ferrules

Description	Unit	Part No.
1/16 in. back ferrule, stainless steel	10/pk	5180-4114
1/8 in. back ferrule, brass	10/pk	5180-4115
1/4 in. back ferrule, brass	10/pk	5180-4117

Caps

Description	Unit	Part No.
1/8 in. cap, brass	6/pk	5180-4121
1/4 in. cap, brass	6/pk	5180-4120



Brass adapter, 0100-0420



Stainless steel blanking nut, 01080-83202



Stainless steel tee, 0100-0542



Brass cross, 0100-0161

Plugs

Description	Unit	Part No.
1/8 in. plug, brass	6/pk	5180-4124
1/4 in. plug, brass	6/pk	5180-4125

Blanking Nut, Adapter, Hose Connector

Description	Unit	Part No.
1/16 in. blanking nut, stainless steel		01080-83202
1/8 in. x 1/8 in. adapter, brass	1/ea	0100-0420
1/16 in. hose connector, brass	10/pk	5180-4148

Tees

Description	Unit	Part No.
1/16 in. tee, stainless steel	1/ea	0100-0782
1/8 in. tee, brass	2/pk	5180-4160
1/8 in. tee, stainless steel	1/ea	0100-0542
1/4 in. tee, brass	2/pk	5180-4129
1/6 in. tee, low dead volume, stainless steel	1/ea	0100-0969

Crosses

Description	Unit	Part No.
1/8 in. cross, brass	1/ea	0100-0161
1/4 in. cross, brass	1/ea	0100-0985

Elbows

Description	Unit	Part No.
1/8 in. elbow, brass	1/ea	0100-0091



Stainless steel union, 0100-0124



Brass union, 0100-1316



Connector (Swagelok-style to male NPT), 5180-4143



Connector (Swagelok-style to female NPT), 0100-0118

Unions

Description	Unit	Part No.
1/16 in. union, stainless steel	1/ea	0100-0124
1/16 in. union, brass	1/ea	0100-1316
1/8 in. union, brass	2/pk	5180-4127
1/8 in. union, stainless steel	1/ea	0100-0126
1/4 in. union, brass	2/pk	5180-4128
1/4 in. union, stainless steel	1/ea	0100-0128

Zero Dead Volume Unions

Description	Unit	Part No.
1/16 in. union, zero dead volume, stainless steel	1/ea	0100-0900

Bulkhead Unions

Description	Unit	Part No.
1/8 in. bulkhead union, stainless steel	1/ea	0100-0132
1/8 in. bulkhead union, brass	1/ea	0100-0133

Connectors (Swagelok to Male NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass	2/pk	5180-4143
1/4 in. (A) x 1/4 in. (B) connector, brass	2/pk	5180-4145

Connectors (Swagelok to Female NPT)

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) connector, brass	1/ea	0100-0118
1/4 in. (A) x 1/4 in. (B) connector, brass*	1/ea	0100-0119

*Required for plumbing 1/4 in. tubing to regulators



Reducing union, 0100-0241



Reducing union, 0100-0121

Reducing Unions

Description	Unit	Part No.
1/16 x 1/8 in. reducing union, brass	2/pk	5180-4130
1/16 x 1/8 in. reducing union, stainless steel	1/ea	0100-0241
1/8 x 1/4 in. reducing union, brass	2/pk	5180-4131
1/8 x 1/4 in. reducing union, stainless steel	1/ea	0100-0121

Reducers

Description	Unit	Part No.
1/8 in. (A) x 1/4 in. (B) reducer, brass	2/pk	5180-4135
1/4 in. (A) x 1/8 in. (B) reducer, brass	2/pk	5180-4134

Fittings Kit

Description	Unit	Part No.
Fittings Kit: Includes items below		5180-4161
1/8 in. nut, brass	10/pk	5180-4103
1/4 in. nut, brass	10/pk	5180-4105
1/8 in. front ferrule, brass	10/pk	5180-4109
1/4 in. front ferrule, brass	10/pk	5180-4111
1/8 in. back ferrule, brass	10/pk	5180-4115
1/4 in. back ferrule, brass	10/pk	5180-4117
1/4 in. cap, brass	6/pk	5180-4120
1/8 in. cap, brass	6/pk	5180-4121
1/8 in. plug, brass	6/pk	5180-4124
1/4 in. plug, brass	6/pk	5180-4125
1/8 in. union, brass	2/pk	5180-4127
1/4 in. union, brass	2/pk	5180-4128
1/8 in. tee, brass	2/pk	5180-4160
1/4 in. tee, brass	2/pk	5180-4129
1/8 x 1/4 in. reducing union, brass	2/pk	5180-4131
1/4 in. (A) x 1/8 in. (B) reducer, brass	2/pk	5180-4134
1/8 in. (A) x 1/4 in. (B) reducer, brass	2/pk	5180-4135



General laboratory tool kit, 5180-4162

Tools

General Laboratory Tool Kit

The General laboratory tool kit includes the following items

- Toolbox
- Flashlight
- 8 in. bastard file
- 6 in. adjustable wrench
- 12 in. adjustable wrench for use with regulator
- No. 1 pt, 3 in. Pozidriv shaft, fits no. 2-4 screws
- No. 2 pt, 4 in. Pozidriv shaft, fits no. 5-10 screws
- Flathead screwdriver, 2 in. steel shaft, 1/8 in. blade
- Flathead screwdriver, 4 in. steel shaft, 1/4 in. blade
- Hex key set, 1.5, 2, 2.5, 3, 4, 5, and 6 mm keys
- 6 in. long jaw needle nose pliers with side cutters
- Three open-end wrenches (1/4 in. x 5/16 in., 1/2 in. x 9/16 in., 7/16 in. x 3/8 in.)
- Snoop-liquid leak detector
- Teflon tape

Description	Part No.
General laboratory tool kit	5180-4162

Wrenches

Description	Part No.
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Open end wrench, 7/16 and 9/16 in.	8710-0803
Open end wrench, 7/16 and 3/8 in.	8710-0972
Adjustable wrench, 12 in., for use with regulators	8710-1712
Open end wrench, 9/16 and 5/8 in.	8720-0010
Open end wrench, 1/2 and 9/16 in.	8720-0025
Open end wrench, 14 mm	8710-1924
Open end wrench, 12/12 mm, 116 mm long	8710-1841
Open end wrench, 4 mm	8710-1534

Screwdrivers

Description	Part No.
Screwdriver, 3 in. Pozidriv shaft No. 1 pt	8710-0899
Screwdriver, 4 in. Pozidriv shaft No. 2 pt	8710-0900
Screwdriver, Torx T10	5182-3466
Screwdriver, Torx T20	5182-3465

Pliers and Tweezers

Description	Part No.
Needle nose pliers, pointed serrated jaws	8710-0004
Tweezers, 4 3/4 in. long	8710-0007
Truarc pliers	8710-0018

Tube Cutters and Replacement Blades

Description	Unit	Part No.
Hi-duty tube cutter, 1/8 - 1 1/8 in. OD tubing		8710-1707
Hi-duty tube cutter blades	5/pk	8710-1708
Tube cutter, 1/8 to 5/8 in. OD tubing		8710-1709
Tube cutter blades	5/pk	8710-1710
Plastic tubing cutter		8710-1930
Blades for plastic tubing cutter	5/pk	8710-1931

Hex Keys

Description	Part No.
Hex key set: 1.5, 2, 2.5, 3, 4, and 5 mm keys, 1090A (5880/90A)	8710-0641
Hex key, 4 mm, 15 cm long T-handle	8710-2392
Hex key, 3 mm, 12 cm long straight handle	8710-2411
Hex key, 2.5 mm, 15 cm long straight handle	8710-2412
Hex key, 1.5 mm, 10 cm long straight handle	8710-2393
Hex key, 9/64 in., 15 cm long, T-handle	8710-2394
Hex key, 4.0 mm, 10 cm long straight handle	5965-0027
Hex key, 2.5 mm, 10 cm long straight handle	5965-0028
Tool Kit Hex Keys, Rheotool* Includes 3 hex keys, 4 mm, 1.5 mm, and 9/64 in., with straight or T-handle plus Rheotool.	5064-8211

*The tools are recommended for easier repair and maintenance for the LC modules.



Hex Keys, 5064-8211

GC Column Accessories



Column installation kit, 430-2000

Capillary Column Installation Kit

The Capillary Column Installation Kit contains:

- Diamond-tipped pencil
- 20x magnifier
- Ferrule removal tool
- Septum removal tool
- Refillable 2 oz. bottle of Snoop

Description	Part No.
Capillary Column Installation Kit with diamond-tipped cutting pencil	430-2000



Column rinse kit, 430-3000

Capillary Column Rinse Kit

This kit makes solvent rinsing easy! Solvent rinsing removes many contaminants that accumulate in columns. The contaminants are removed by passing solvents through the column. Only bonded and cross-linked phase columns should be rinsed, or permanent damage to the column will result.

Description	Part No.
Capillary Column Rinse Kit	430-3000



Fused silica tubing cutters

Fused Silica Tubing Cutters

We offer a conveniently designed, pencil-shaped tool and a ceramic wafer that allow you to make clean and easy cuts in fused silica, glass and aluminum-clad capillary columns.

Description	Part No.
Diamond-tipped column cutting pencil	420-1000
Ceramic wafer column cutter, 4/pk	5181-8836
Column cutter with rotating diamond blade	5183-4620
Replacement diamond blade (for 5183-4620)	5183-4621



Column cutting tool, 5183-4620

Column Baskets and Hangers

Description	Part No.
13 cm, 5 in. basket for 6850 capillary columns	19091-80060
Column hanger for 5 in. basket	G2630-80800
Column hanger clip kit for 7 in. basket	G1530-61580
Column hanger for 6890, 5890, 5880A	1460-1914



Capillary and Megabore ferrule tools

Miscellaneous Tools

Ferrule Tools

Remove ferrules stuck inside fittings. Screw the stainless steel ferrule tool into the ferrule and pull it out. Use the smaller capillary ferrule tool for capillary column ferrules (0.32 mm ID column and smaller). The megabore ferrule tool is used for megabore ferrules. The liner tool can be used to remove polyimide and tubing from inside a megabore liner. The column ferrule installation tool positions a ferrule onto a capillary column for proper installation.

Description	Part No.
Capillary ferrule tool	RFT-2500
Megabore ferrule tool	RFT-5300
Column ferrule installation tool	19251-80680
MS Interface Column Installation Tool	G1099-20030



Column ferrule installation tool, 19251-80680

20x Magnifier

Examine column ends for proper cuts. Jagged, rough, or nonperpendicular cuts negatively affect chromatographic performance.

Description	Part No.
20x Magnifier	430-1020



Magnifier, mirror, microprobes

Microprobes

Hardened stainless steel probes remove septum and ferrule pieces stuck in fittings. Five different styles give you all of the angles necessary for getting into those hard-to-reach places.

Description	Part No.
Microprobes	RMP-5005

Mirror

Inspect injection ports, the inside of fittings, and other hard-to-reach places.

Description	Part No.
Mirror	707-0027



Snoop

Snoop

Leak test most pressurized gas systems. We recommend that leak detecting solutions be used with care where there is any possibility of the fluid being aspirated into gas flow streams supplying the column or detector. This squeezable bottle comes with a "Snooper Tube" extendable up to 12 inches (30 cm). Electronic leak detectors are preferred. In their absence, a volatile nonreactive solvent like isopropanol may be used. Use caution to avoid aspiration of materials such as Snoop into the column.

Description	Part No.
Snoop, 8 oz (236 ml) bottle	9300-0311
Snoop, 1 gallon bottle	460-1002



Injection port cleaning kit, 480-0003

Injection Port Cleaning Kit

If changing the liner and trimming the column does not remove contamination from your injection port, you probably need to clean and flush your injection port. Three stainless steel brushes and a scraper are the ideal tools for removing sample residue and septum particles. The stainless steel brushes have diameters of 5 mm, 1/4 in. and 3/8 in.

Description	Part No.
Injection Port Cleaning Kit	480-0003



Septum tool with knurled handle, 450-1000

Miscellaneous Injection Port Tools

Description	Part No.
Septum tool, knurled handle	450-1000
Ferrule removal tool	440-1000
Capillary inlet cleaning wires, 5/pk	5180-4153
Cotton swabs, 100/pk	5080-5400



Capillary inlet cleaning wires, 5180-4153



FID cleaning kit, 9301-0985

FID Cleaning Kit

This easy-to-use maintenance kit improves sensitivity, reduces noise, and decreases detector spiking.

Description	Part No.
FID cleaning kit	9301-0985

12-Piece File Set

This file set scores glass, removes burrs from metal tubing, and cleans threads. This 12-piece file set covers all the laboratory filing needs. The files are 5 1/2 in. long.

Description	Part No.
12-Piece File Set	RSF-1200



GC Buddy Junior, 5183-4789

Combination GC Tools

Description	Part No.
GC Buddy multi-purpose lab tool	5182-9765
GC Buddy Junior multi-purpose lab tool	5183-4789

Chemical Standards

When performing chemical analyses, you can't afford to settle for anything less than the highest standards. That is why Agilent standards are the perfect solution for you. Every Agilent standard must meet the uncompromising parameters of our ISO-9001 registered quality system. Our quality system means the strictest quality control of incoming raw materials, the meticulous validation of analyte concentrations, homogeneity and stability.

You can find chemical standards throughout the catalog. Use the reference chart below to find the chemical standards to best fit your needs.

Chemical Standards

Type	Page No.
GC Qualitative Standards	203
Gas Analyzer Standards and Accessories	204
GC/MS Test and Performance Samples	217
Agilent J&W GC Column Test Standards	335
LC and LC/MS Standards	546
GPC-SEC Calibration Standards	670
Amino Acid Standards	678–679
MARS LC Column Reagent Starter Kit	712
MARS Spin Cartridge Reagent Starter Kit	715
CE Standards & Reagents	809–810
ICP-MS Standards	834–835
UV-Vis Standards & Reagents	845



Integrators, Integrator Supplies and Cables

At Agilent Technologies, our goal is to provide high quality columns and supplies for your instrumentation. In between our rigorous designing, manufacturing and testing, we have also taken the time to listen. We understand that your laboratory needs encompass far more than simply columns and supplies. Which is why we offer our established line of integrators, data handling supplies and cables.

Information generation and its presentation has never been more important. Agilent understands that data handling supplies are indeed also laboratory supplies. So it is essential that you never run out of them at a crucial moment. We provide a means to purchase ink cartridges and integrator supplies just as conveniently as you can order our other laboratory products.



Ink cartridge, 5181-1220

Integrator Cartridges and Printheads

Description	Part No.
Ink cartridge, Agilent 3397A, 3396 Series III, 3396A and B, 3395, 3394	5181-1220
Printhead for 3388A and 5880A	19350-60540

Integrator Paper and Supplies

Paper and Supplies for the Agilent 3397A, 3396 Series II, and 3396A/B/95/94

Description	Unit	Part No.
Z-fold paper, sequentially numbered, 8.5 x 11 in., 500 sheets/pk, Inkjet	5/pk	5062-3561
Perforated paper, 8.5 x 11 in. rolls, Inkjet	4/pk	5181-1219
Perforated paper, sequentially numbered, 8.5 x 11 in. rolls, Inkjet	4/pk	5183-2009
Perforated paper, A4 size rolls, Inkjet	4/pk	5181-1255
Replacement paper roll rod		03394-20500
Replacement paper roll brackets	2/pk	03396-40050

Thermal Paper for the Agilent 338X/5830/3370

Description	Unit	Part No.
Z-fold paper, black print, 8.5 in. wide	8 pk/box	9270-0658

Thermal Paper for the Agilent 3390/92/93

Description	Unit	Part No.
Thermal printing paper, blue print, 4.5 in. wide	4 rolls/pk	5080-8800

Integrators and Accessories

3396 Series III Integrator with BASIC programming

- BASIC programming
- Reintegration/replot
- Negative peak integration
- Industry standard RS-232 communications port
- Offers 256 kb RAM
- Multiple-level calibration
- Instrument Control (INET)

Description	Part No.
3396 Series III Integrator with BASIC programming	3396C
GC Dual-channel Appak-Series III, 5890 and 6890 GC control software for the 3396 Series III Integrator*	G2101A
Integrator Starter Kit Includes 8.0 MB data storage card, Z-fold paper stand, Z-fold paper (500 sheets), and three ink cartridges	G2100A
Integrator Data Storage card, 16 MB	G2105A

*Requires Agilent 5890 GC communications board, option 552 or accessory 19242B

Cables

3396 Series III Cable Sets

Description	Part No.
Series III Integrator General Purpose cables, signal/remote cable pair includes 35900-60630 and 03396-61031	G2108A
INET interface for integrators, provides INET communications and dual-channel output, includes 1 INET cable	G1553A

Cables to Connect 3397A or 3396/95 Series III Integrator

	Cable Type		
Instrument	**Analog**	**Remote**	**Sample**
6890 Series GC (non-INET)	G1530-60570	03396-61010	
5890 GC (non-INET)	35900-60610	03394-60560	
1100/1200 Series LC	35900-60750	03396-61010	03396-60560
General Purpose	35900-60630	03394-60540	

Cables to Connect 3394/95A and 3396A/B Integrator

	Cable Type	
Instrument	**Analog**	**Remote**
6890 Series GC	G1530-60570	
	03396-61020	03396-61010
5890 GC	35900-60610	03394-60560
General Purpose	35900-60630	
	35900-60900	35900-60920

HPIB and GPIB Cables

Description	**Part No.**
PCI GPIB Card for Win95/98/NT (82350A/B)	G1680-63715
HPIB Cable 2 m (10833B)	10833B-2310
General Purpose Cable GPIO-Open End	G1103-61611
HPIB Cable, 8 m (10833G)	10833G-2310
Cable, 6890 to PC 9F/9F RS232	G1530-60600
Crossover Ethertwist Cable, 10 ft	5183-4649
Adapter, extends GPIB connector (10834A)	10834A-2310

Instrument Interface Cables

Description	**Part No.**
Signal cable, general purpose analog output cable assembly, spade lugs/6 pins	G1530-60560
External event control, cable, 8 pins/spade lugs	G1530-60590
Remote start cable for general use with lug	35900-60670
6890 to PC via RS 232-C, 9 female/25 male user card cable	G1530-60610
General purpose binary-coded decimals cable with spade lugs	G1530-60630
Automatic liquid sampler; remote start/stop cable, 2 m 9 male/9 female	G1530-60930
HPIL cable, 5 m	82167-60003
Remote Y Cable, G1512/5890A to 3396C	G1512-60530
Remote Cable to 5890	35900-60700

Sample Preparation

SampliQ Solid Phase Extraction (SPE) 118-138
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Sample Preparation

Improve the quality of your samples, so you can improve the quality of your results.



Effective sample preparation can make the difference between a definitive measurement and a record of impurity-driven interferences.

That is why Agilent sample preparation products are manufactured to strict ISO-9001 standards to make sure they deliver the quality and performance you expect from the leading manufacturer of instruments, columns, and supplies.

And now, we have expanded our sample preparation portfolio with:

- Agilent SampliQ SPE Products that let you clean and concentrate samples in complex matrices such as foods, soils, and biological specimens.
- Sample filtration supplies that clarify samples for further analysis, and prevent particulate matter from jeopardizing your results.

On the following pages, we will show you how to choose the right cartridges, manifold accessories, syringe filters, and other sample prep supplies – all backed by 40 years of Agilent chromatography expertise.

Agilent SampliQ Solid Phase Extraction (SPE)

We are pleased to present Agilent SampliQ, a comprehensive line of SPE products. SampliQ features a wide selection of polymer, silica, and other sorbents – like carbon and Florisil PR – in formats ranging from multiple cartridge sizes to 96 well plates. SampliQ products are manufactured using the same rigorous practices as our HPLC column packing – to guarantee the quality and reproducibility you've come to expect from Agilent. SampliQ also includes a full line of accessories to meet all of your SPE needs.

- Polymer Technologies – Feature high retention, outstanding recovery and excellent reproducibility across a wide range of solvents and solutions
- Silica-Based – Available in reversed (non-polar), normal (polar) and ion exchange phases with trifunctional bonding to provide more stability
- Other Phases – Florisil PR, aluminas and carbon phases address specialty applications. Additionally, specialty mixed-mode sorbent beds provide dual retention mechanisms unmatched by single sorbents
- Bulk and QuEChERS – Plentiful selection of bulk sorbents to pack your own cartridges, as well as QuEChERS products



For more in-depth information about SampliQ products, request the complete SampliQ brochure using publication number 5989-9334EN, or visit **www.agilent.com/chem/SampliQ**.

Move more quickly toward the method that is right for your analysis.

This flowchart helps you choose the right SampliQ polymer, silica, or other sorbent cartridges for routine applications that call for consistent results with higher sample volumes and lower detection limits.

Selection of Agilent SampliQ SPE Mode and Phase

Organic Sample MW < 2000

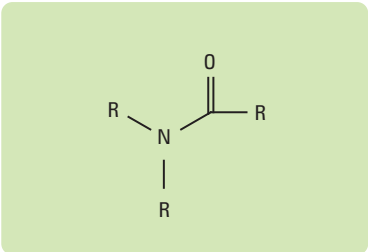
Solubility	Water-soluble					Organic solvent-soluble		
Molecular Character	Ionic		Non-ionic (ion-paired)			Soluble in polar solvent: MeOH (methanol), ACN (acetonitrile), THF (tetrahydrofuran)	Soluble in moderately polar solvent: Et OAc (Ethyl Acetate), CH_2Cl_2 (methylene chloride), Et_2O (diethyl ether)	Soluble in non-polar solvent: C5 (n-pentane), C6 (n-hexane) and iC8 (iso-octane)
Stationary Phase	Cationic	Anionic	Polar	Moderately Polar	Non-polar	Polar	Moderately Polar	Non-polar
Mode	CEX Cation Exchange	AEX Anion Exchange	n-BPC Normal Bonded Phase Chromatography	LSC Liquid-Solid Chromatography	RPC Reversed Phase Chromatography	n-BPC Normal Bonded Phase Chromatography	LSC Liquid-Solid Chromatography	RPC Reversed Phase Chromatography
Phases: Polymeric	**SCX Strong Cation Exchange**	**SAX Strong Anion Exchange**			**OPT, DVB, PS-DVB**			**OPT, DVB, PS-DVB**
Phases: Silica-based	**Si-SCX, C8/Si-SCX (mixed mode)**	**Si-SAX, Amino (WAX)**	**Cyano, Diol, Amino**	**Silica**	**C18, C18EC, C8, C2, Phenyl**	**Cyano, Diol, Amino**	**Silica**	**C18, C18EC, C8, C2, Phenyl**
Phases: Non Silica-based				**Florisil PR, Alumina A, Alumina B, Alumina N, Carbon**			**Florisil PR, Alumina A, Alumina B, Alumina N, Carbon**	
Phases: Specialty	**EVIDEX for drugs of abuse testing**							

Agilent SampliQ Polymer Technologies

The polymeric sorbents used for all Agilent SampliQ SPE cartridges significantly reduce matrix interferences, resulting in improved analytical sensitivity and data quality. Agilent SampliQ polymer sorbents and cartridges also offer these key advantages:

- High retention, outstanding recovery, and excellent reproducibility
- High sorbent robustness: if cartridges accidentally go dry during the SPE process, you will not risk losing analytes and/or reproducibility
- No leaking bonded phases or other leachables that can contaminate your valuable extracts
- Compatibility with most organic solvents and aqueous solutions over a pH range of 0 to 14
- Spherical particles and narrow size distribution, which ensure reproducible flow characteristics
- Improved detection limits and reduced resin volumes
- Unlike silica-based sorbents, there are no residual silanol groups which can affect the recovery of basic compounds





Polyamide chemistry

SampliQ OPT

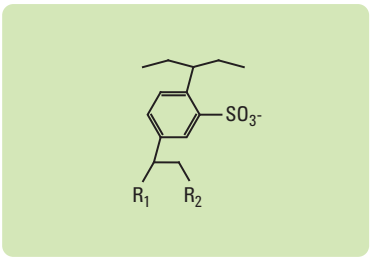
Agilent SampliQ Optimized Polymer Technology (OPT) cartridges are appropriate for a broad range of samples, including weak acids, neutrals, and weak bases. SampliQ OPT utilizes a novel polyamide chemistry (patent pending) that makes OPT cartridges compatible with water and most organic solvents, as well as acidic and basic solvents with a pH level of 0 to 14. This resin technology also exhibits retention for both polar and non-polar compounds, based on its combined hydrophilic and lipophilic characteristics.

Unlike silica-based phases, OPT cartridges yield the same exacting results if they inadvertently dry out during the conditioning stage.

SampliQ OPT

Description	Unit	Part No.
30 mg, 1 mL	100/pk	5982-3013
60 mg, 3 mL	50/pk	5982-3036
150 mg, 6 mL	30/pk	5982-3067
96 well plate, 10 mg		5982-3096





Sulfonic acid-modified divinyl benzene polymer

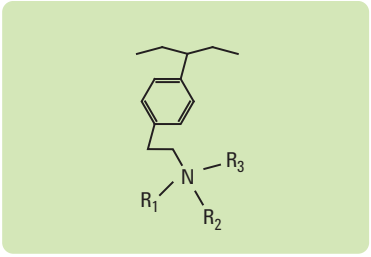
SampliQ SCX

Agilent's mixed-mode SampliQ Strong Cation Exchange (SCX) polymeric resin is a sulfonic acid-modified divinyl benzene polymer with both ion exchange and reverse phase retention properties. As a result, the SampliQ SCX resin exhibits excellent retention for both basic and neutral compounds over a wide range of hydrophilicity (log P). The resin is also resistant to a wide variety of solvents, is stable in pH ranges from 0 to 14, and is water-wettable.

SampliQ SCX

Description	Unit	Part No.
30 mg, 1 mL	100/pk	5982-3213
60 mg, 3 mL	50/pk	5982-3236
150 mg, 6 mL	30/pk	5982-3267





Tertiary amine-modified divinyl benzene polymer

SampliQ SAX

The Agilent SampliQ Strong Anion Exchange (SAX) polymeric resin is a mixed-mode, tertiary amine-modified divinyl benzene polymer that displays both anion exchange and reversed phase behavior. As a result, the SampliQ SAX resin exhibits excellent retention for both acidic and neutral compounds over a wide range of hydrophilicity (log P).

In addition, the SampliQ SAX resin is inert to a wide variety of solvents, is water-wettable, and is stable in pH ranges from 0 to 14.

SampliQ SAX

Description	Unit	Part No.
30 mg, 1 mL	100/pk	5982-3313
60 mg, 3 mL	50/pk	5982-3336
150 mg, 6 mL	30/pk	5982-3367



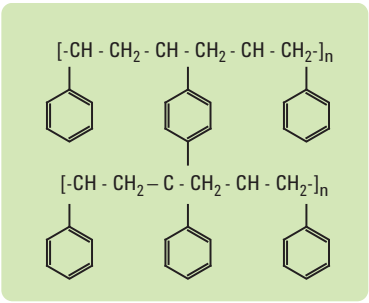
SampliQ DVB

SampliQ DVB SPE cartridges contain a high-purity, 100% divinylbenzene resin that delivers greater sample capacity and is more retentive than either C18 silica or PS-DVB resin for neutral compounds. Its strong hydrophobic character promotes superior binding for non-polar analytes and hydrophobic compounds. Furthermore, its narrow particle size distribution improves packing reproducibility, reduces shrinking and swelling, homogenizes flow characteristics, and increases method precision.

The SampliQ DVB resin is compatible with most solvents used in SPE, giving you more flexibility to develop washing and elution conditions. It can also withstand pH values from 0 to 14, allowing you to optimize SPE method development over a wide range of solvent conditions.

SampliQ DVB

Description	Unit	Part No.
30 mg, 1 mL	100/pk	5982-3113
60 mg, 3 mL	50/pk	5982-3136
150 mg, 6 mL	30/pk	5982-3167



Polystyrene-divinylbenzene

SampliQ PS-DVB

SampliQ PS-DVB is a highly cross-linked polystyrene-divinylbenzene (PS-DVB) copolymer. With its high surface area (600 m^2/g) and high capacity, it is ideal for the extraction of polar analytes that are not adequately retained on a C18 or C8 sorbent. The nonselective characteristic of this sorbent is useful for screening applications where a broad range of analytes is to be extracted.

The particle size (75 - 160 µm) makes it ideal for the rapid flow of a large volume of aqueous environmental sample. The cartridge design has been optimized for phenol, which typically has low and irreproducible recoveries.

SampliQ PS-DVB

Description	Unit	Part No.
500 mg, 6 mL	30/pk	5982-3465
1000 mg, 6 mL	30/pk	5982-3460



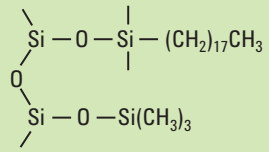
Agilent SampliQ Silica SPE

Silica-based SPE products have been used for many years, and continue to be used reliably in many methods. All SampliQ silica-based products have an average particle size of 45 µm and nominal pore diameter of 60Å. These particles reduce pressure drop, increase flow reproducibility and, in some cases, allow replacement of vacuum manifolds with gravity-driven flow.

SampliQ's Silica SPE have trifunctional bonding, which provides more stability over monomeric bonding.

Agilent SampliQ Reversed Phase (Non-Polar) Silica SPE

Reversed phase sorbents are non-polar, and will be used to retain (extract) non-polar analytes. For reversed phase sorbents, retention decreases as the solvent becomes more non-polar.



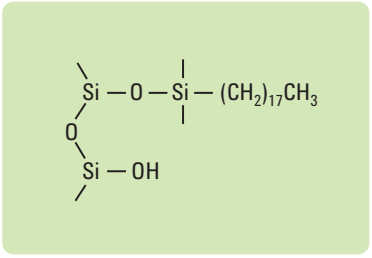
Structure of C18 silane and trimethyl silyl endcapping group, covalently bonded to the surface of a silica particle

SampliQ C18EC

SampliQ C18EC products are based on bonded, endcapped, reversed-phase octadecylsilane (ODS) silica gel particles. The non-polar sorbent is endcapped (EC), reducing polar secondary interactions associated with surface silanol groups. Non-polar analytes should be more strongly retained compared with non-endcapped SampliQ C18 products. SampliQ C18EC has a 25% carbon loading.

SampliQ C18EC

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1311
200 mg, 3 mL	50/pk	5982-1332
500 mg, 3 mL	50/pk	5982-1335
1000 mg, 6 mL	30/pk	5982-1360
500 mg, 6 mL	30/pk	5982-1365
Bulk	25 g bottle	5982-1382



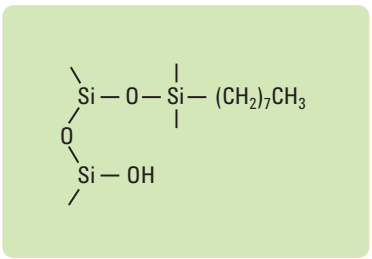
Structure of octadecylsilane (C18) covalently bonded to the surface of silica particle

SampliQ C18

SampliQ C18 ODS products are based on bonded, reversed phase (octadecylsilane), irregular, silica gel (silica) particles. This non-polar, non-endcapped sorbent provides additional polar interactions associated with the surface silanol groups. It also enhances retention of basic compounds compared with the corresponding endcapped sorbent. It is recommended as a general purpose SPE phase for both polar and non-polar analytes. SampliQ C18 has a 24% carbon loading.

SampliQ C18

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1111
200 mg, 3 mL	50/pk	5982-1132
500 mg, 3 mL	50/pk	5982-1135
500 mg, 6 mL	30/pk	5982-1165
1000 mg, 6 mL	30/pk	5982-1160
Bulk	25 g bottle	5982-1182



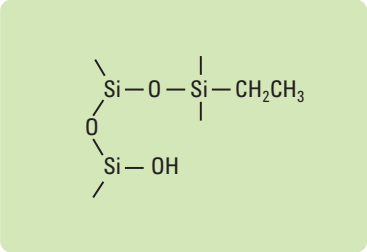
Structure of octyl (C8) silane, covalently bonded to the surface of a silica particle

SampliQ C8 Octyl

SampliQ C8 Octyl products are based on bonded, reversed phase (octylsilane), irregular, silica gel (silica) particles. This non-polar, non-endcapped sorbent is recommended as a general purpose SPE phase for non-polar analytes. For basic analytes, octyl sorbents often can increase the extraction efficiency and enhance their purity.

SampliQ C8 Octyl

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1011
200 mg, 3 mL	50/pk	5982-1032
500 mg, 3 mL	50/pk	5982-1035
500 mg, 6 mL	30/pk	5982-1065
Bulk	25 g bottle	5982-1082



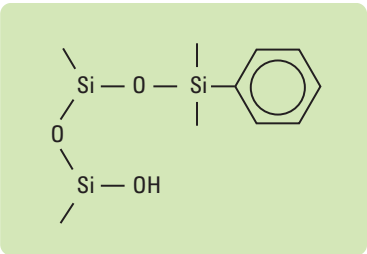
Structure of ethyl (C2) silane, covalently bonded to the surface of a silica particle

SampliQ C2 Ethyl

SampliQ C2 Ethyl SPE products are manufactured using a trifunctional silane bonded to irregular, silica gel (silica) particles. They are not endcapped, allowing additional polar interactions with surface silanol groups. The short chain ethyl group provides less retention than the longer C8 and C18 chains, where retention is primarily based on non-polar interactions. The stronger interactions of this phase with basic and polar analytes can provide additional extraction selectivity.

SampliQ C2 Ethyl

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1411
200 mg, 3 mL	50/pk	5982-1432
500 mg, 3 mL	50/pk	5982-1435
500 mg, 6 mL	30/pk	5982-1465
1000 mg, 6 mL	30/pk	5982-1460



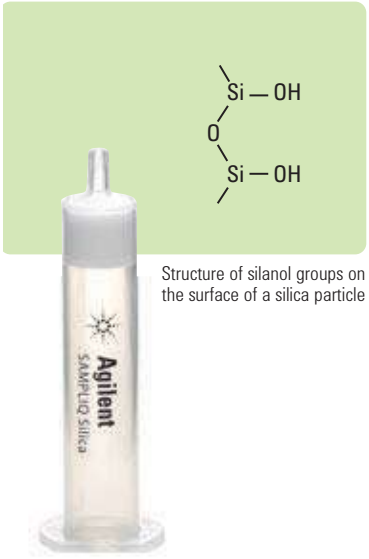
Structure of phenyl silane, covalently bonded to the surface of a silica particle

SampliQ Phenyl

SampliQ Phenyl SPE products are based on bonded, reversed phase (phenyl) irregular silica gel (silica) particles. This phase exhibits additional polar secondary interactions (pi-pi), which can enhance retention of basic compounds. It exhibits a different selectivity compared with the octadecyl and octyl phases when both aromatic and non-aromatic compounds are being extracted.

SampliQ Phenyl

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1511
200 mg, 3 mL	50/pk	5982-1532
500 mg, 3 mL	50/pk	5982-1535
Bulk	25 g bottle	5982-1582



Structure of silanol groups on the surface of a silica particle

Agilent SampliQ Normal Phase (Polar) Silica SPE

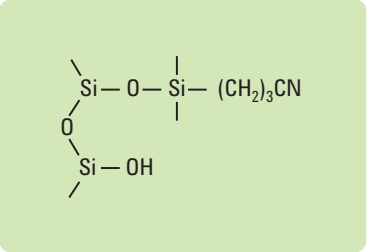
Normal phase sorbents are polar and used to retain (extract) polar analytes. For normal phase sorbents, retention decreases as the solvent becomes more polar.

SampliQ Silica

SampliQ Silica SPE products are based on unbonded, activated irregular silica gel (silica) particles. The primary interaction available is polar (e.g. hydrogen bonding). The silanol groups are ionizable, so it can be used as a weak cation exchanger at intermediate pH values.

SampliQ Silica

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-2211
200 mg, 3 mL	50/pk	5982-2232
500 mg, 3 mL	50/pk	5982-2235
500 mg, 6 mL	30/pk	5982-2265
1000 mg, 6 mL	30/pk	5982-2260
Bulk	25 g bottle	5982-2282



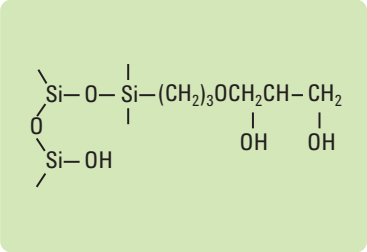
Structure of cyanopropylsilane (CN), covalently bonded to the surface of a silica particle

SampliQ Cyano (CN)

SampliQ Cyano (CN) SPE products are based on irregular, silica gel (silica) particles. This polar, bonded sorbent can exhibit both polar and non-polar interactions. It can be used as a non-polar sorbent for extraction of both polar and non-polar molecules from aqueous samples, and for extraction of polar molecules from relatively non-polar solvents.

SampliQ Cyano (CN)

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1711
500 mg, 6 mL	30/pk	5982-1765
1000 mg, 6 mL	30/pk	5982-1760



Structure of diol silane, covalently bonded to the surface of a silica particle

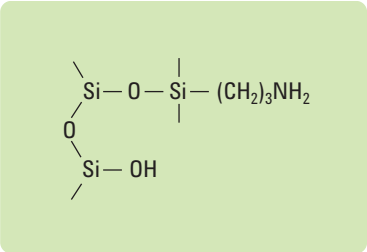
SampliQ Diol

SampliQ Diol SPE products are based on irregular, silica gel (silica) particles. This polar, bonded sorbent can exhibit both polar and weak non-polar interactions, depending on the cartridge preparation and sample matrix. While, with appropriate cartridge conditioning, it can be used as a non-polar sorbent to extract relatively non-polar molecules from aqueous samples, it is more frequently used to extract polar molecules from relatively non-polar solvents using hydrogen bonding interactions.

SampliQ Diol

Description	Unit	Part No.
500 mg, 3 mL	50/pk	5982-1635





Structure of aminopropyl (NH_2) silane, covalently bonded to the surface of a silica particle

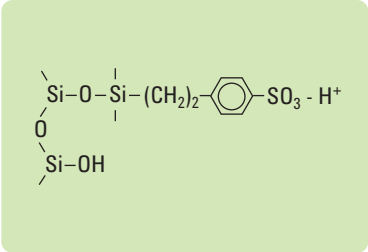
SampliQ Amino (NH_2)

SampliQ Amino (NH_2) SPE products are based on irregular, silica gel (silica) particles. This dual purpose sorbent can act either as a polar phase or weak anion exchanger. When conditioned with a non-polar solvent, e.g., hexane, it can hydrogen bond with any molecule containing -OH, -NH, or -SH functional groups. In an aqueous environment with pH 7.8 or less, it can function as a weak anion exchanger.

SampliQ Amino (NH_2)

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1811
200 mg, 3 mL	50/pk	5982-1832
500 mg, 3 mL	50/pk	5982-1835
500 mg, 6 mL	30/pk	5982-1865
1000 mg, 6 mL	30/pk	5982-1860
Amino bulk sorbent	25 g bottle	5982-1882





Structure of SCX silane, covalently bonded to the surface of a silica particle

Agilent SampliQ Ion Exchange Silica SPE

Ion exchange phases are more dependent on pH, ionic strength, and counter-ion strength than on solvent strength. These phases depend on ionic interactions as the primary retention mechanism.

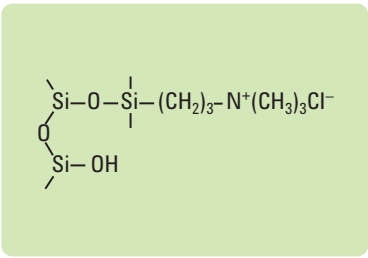
SampliQ Si-SCX (Silica Strong Cation Exchange)

SampliQ Si-SCX SPE products are based on irregular silica gel (silica) particles. These strong cation exchange sorbents are used to extract positively charged basic compounds. This benzene-sulphonic acid-based sorbent has significant non-polar secondary interactions, with nominal capacity 0.3 meq/g.

SampliQ Si-SCX (Silica Strong Cation Exchange)

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-2111
200 mg, 3 mL	50/pk	5982-2132
500 mg, 3 mL	50/pk	5982-2135
500 mg, 6 mL	30/pk	5982-2165
1000 mg, 6 mL	30/pk	5982-2160





Structure of SAX silane, covalently bonded to the surface of a silica particle

SampliQ Si-SAX (Silica Strong Anion Exchange)

SampliQ Si-SAX SPE products are based on irregular, silica gel (silica) particles. This strong anion exchanger is used to extract compounds capable of carrying a negative charge from both aqueous and non-aqueous solutions. They are ideally suited to the extraction of weak acids at pHs above their pKa. The nominal capacity is 0.6 meq/g.

SampliQ Si-SAX (Silica Strong Anion Exchange)

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-2011
200 mg, 3 mL	50/pk	5982-2032
500 mg, 3 mL	50/pk	5982-2035
500 mg, 6 mL	30/pk	5982-2065
1000 mg, 6 mL	30/pk	5982-2060
Bulk	25 g bottle	5982-2082

Additional Agilent SampliQ SPE Phases



The following SPE phases have varying degrees of polarity and surface acidity or basicity. They are primarily used to retain polar analytes. For these phases, solvent retention generally decreases as the solvent becomes more polar.

SampliQ Florisil PR

SampliQ Florisil PR is a selective synthetic magnesia-silica adsorbent, specially processed to give consistent results when used for column cleanup and separation of chlorinated pesticide residues prior to identification and measurement of the pesticide by gas, thin layer, or paper chromatography.

SampliQ Florisil PR

Description	Unit	Part No.
200 mg, 3 mL	50/pk	5982-4332
500 mg, 3 mL	50/pk	5982-4335
500 mg, 6 mL	30/pk	5982-4365
1000 mg, 6 mL	30/pk	5982-4360
Bulk	25 g bottle	5982-4382

SampliQ Alumina A (acidic)

SampliQ Alumina A sorbents, with 50-200 µm particle size, can adsorb molecules by interaction with the aluminum metal center, hydrogen bonding with the surface hydroxyl groups, or ion exchange if the surface carries a charge. Acid washing results in a surface with decreased capacity for basic compounds.

SampliQ Alumina A

Description	Unit	Part No.
500 mg, 3 mL	50/pk	5982-4035
1000 mg, 6 mL	30/pk	5982-4060
Bulk	25 g bottle	5982-4082



SampliQ Alumina B (basic)

SampliQ Alumina B sorbents, with 50-200 µm particle size, can adsorb molecules by interaction with the aluminum metal center, hydrogen bonding with the surface hydroxyl groups, or ion exchange if the surface carries a charge. Washing with a basic solution results in a net negative charge, allowing retention of certain compounds as cations on the surface or by specific interaction with the center.

SampliQ Alumina B

Description	Unit	Part No.
500 mg, 3 mL	50/pk	5982-4135
1000 mg, 6 mL	30/pk	5982-4160
Bulk	25 g bottle	5982-4182

SampliQ Alumina N (neutral)

SampliQ Alumina N sorbents, with 50-200 µm particle size, can adsorb molecules by interaction with the aluminum metal center, hydrogen bonding with the surface hydroxyl groups, or by ion exchange if the surface carries a charge. The neutralized surface allows interaction with compounds whose heteroatoms are electronegative (e.g., N, O, P, S) or with an electron-rich, highly aromatic structure.

SampliQ Alumina N

Description	Unit	Part No.
500 mg, 3 mL	50/pk	5982-4235
1000 mg, 6 mL	30/pk	5982-4260
Bulk	25 g bottle	5982-4282

SampliQ Carbon

SampliQ Carbon (graphitized) sorbents exhibit high affinity for organic polar and non-polar compounds from both non-polar and polar matrices, when used in reversed phase conditions. Because carbon is non-porous, it allows for rapid processing, and the adsorption does not require analyte dispersion into solid phase pores.

SampliQ Carbon

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-4411
250 mg, 3 mL	50/pk	5982-4432
500 mg, 6 mL	30/pk	5982-4465
Bulk	25 g bottle	5982-4482

SampliQ C8/Si-SCX Mixed Mode

The use of mixed-mode stationary phases is widely accepted for the extraction of basic drugs from biological fluids. SampliQ Mixed-Mode Reversed-Phase SPE products consist of an alkyl phase (C8) and a strong cation exchange phase (Si-SCX) in an optimized ratio that provides a dual retention mechanism. The C8 functionality interacts with the hydrophobic portions of an analyte while the Si-SCX functionality interacts with the protonated amine portion. The strong analyte interactions allow the use of more rigorous washing conditions to eliminate co-extractables that might interfere with UV detection or cause ion suppression effects in LC-MS. The SampliQ Mixed-Mode phase is manufactured with trifunctional silanes allowing for maximum stability and low leachability. The phase is non-endcapped which gives some added interaction between residual silanols and polar analytes helping to provide added retention characteristics.

SampliQ C8/Si-SCX Mixed Mode

Description	Unit	Part No.
100 mg, 1 mL	100/pk	5982-1911
200 mg, 3 mL	50/pk	5982-1932
500 mg, 3 mL	50/pk	5982-1935
500 mg, 6 mL	30/pk	5982-1965
1000 mg, 6 mL	30/pk	5982-1960



Agilent SampliQ Specialty SPE

Evidex SPE Cartridges

Effective sample preparation is an important step in building compelling evidence in drugs-of-abuse cases. The Evidex SPE cartridge – suitable for all necessary methods – supports the kind of reliable, accurate separation that you need.

- Cartridge designed for SAMHSA (Substance Abuse and Mental Health Services Administration) drug classes: Amphetamine/Methamphetamine, PCP (angel dust), Benzoylecgonine (cocaine), Codeine/Morphine, THC-COOH (marijuana)
- Accurate, reproducible results (<5% RSD)
- Forgiving of minor errors of volumes and concentrations of reagents
- Tested to ensure lot-to-lot reproducibility, high recovery, and clean extracts with low background
- Proprietary mixed phase bonding chemistry

Evidex SPE Cartridges

Description	Unit	Part No.
200 mg, 3 mL	50/pk	5982-2332
400 mg, 6 mL	30/pk	5982-2364

Drugs of Abuse GC Columns

- Specially configured and tested for drugs-of-abuse confirmation
- Test mix includes caffeine, gluthethimides, lidocaine, phenobarbital, EDDP, methaqualone, methadone, cocaine, desipramine, carbamazepine
- DB-5ms EVDX: Equivalent to (5%-Phenyl)-methylpolysiloxane

Drugs of Abuse GC Columns

Description	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-5ms EVDX	0.20	25	0.33	-60 to 325/350	128-8522



Agilent SampliQ Bulk Sorbents

SampliQ sorbents are available in bulk, along with a selection of reservoirs and frits, for those who wish to pack their own SPE cartridges or to perform "flash" chromatography.

SampliQ Bulk Sorbents

Description	Unit	Part No.
C18EC	25 g bottle	5982-1382
C18	25 g bottle	5982-1182
C8 Octyl	25 g bottle	5982-1082
Phenyl	25 g bottle	5982-1582
Si-SAX	25 g bottle	5982-2082
Silica	25 g bottle	5982-2282
Amino (NH_2)	25 g bottle	5982-1882
Florisil PR	25 g bottle	5982-4382
Alumina A (acidic)	25 g bottle	5982-4082
Alumina B (basic)	25 g bottle	5982-4182
Alumina N (neutral)	25 g bottle	5982-4282
Carbon	25 g bottle	5982-4482

QuEChERS

These sorbents are available for use with the QuEChERS method, specifically for analyzing pesticide residues in fruits and vegetables. The method was developed by Steven J. Lehotay, a chemist with the US Department of Agriculture, and Michelangelo Anastassiades, from the CVUA laboratory in Stuttgart, Germany. QuEChERS is an acronym for "**Qu**ick, **E**asy, **Ch**eap, **E**ffective, **R**ugged and **S**afe." Information about the method can be found at **www.quechers.com**.

QuEChERS

Description	Unit	Part No.
Magnesium Sulfate	100 g bottle	5982-8082
PSA (Primary Secondary Amine)	25 g bottle	5982-8382
Carbon	25 g bottle	5982-4482
C18 ODS	25 g bottle	5982-1182
Si-SAX	25 g bottle	5982-2082



Agilent SampliQ Empty Reservoirs, Frits and Caps

Empty reservoirs and separate frits are available if you would like to prepare your own solid phase extraction cartridges. By purchasing bulk SPE sorbents, you can pack larger or different weights of sorbent, mixed phases or any combination that you desire. The larger volume reservoirs can be used for low pressure or flash chromatography. Caps on each end will allow for safe transport of your cartridge.

SampliQ Empty Reservoirs, Frits and Caps

Description	Unit	Part No.
Empty SPE Cartridge, 1 mL	50/pk	5982-9301
Empty SPE Cartridge, 3 mL	50/pk	5982-9302
Empty SPE Cartridge, 6 mL	50/pk	5982-9303
Empty SPE Cartridge, 35 mL	50/pk	5982-9304
Empty SPE Cartridge, 70 mL	50/pk	5982-9305
SPE Frits, 1 mL	100/pk	5982-9306
SPE Frits, 3 mL	100/pk	5982-9307
SPE Frits, 6 mL	100/pk	5982-9308
SPE Frits, 35 mL	100/pk	5982-9309
SPE Frits, 70 mL	100/pk	5982-9310
SPE caps, 1 mL	100/pk	5185-5791
SPE caps, 3 mL	100/pk	5185-5792
SPE caps, 6 mL	100/pk	5185-5793
Luer caps (fit all cartridge sizes)	100/pk	5185-5795

You need 2 frits to pack one cartridge.

Manifolds and Accessories

Agilent manifolds and accessories complement the quality of SampliQ sorbents. Flexible configurations and availability as complete assemblies or individual components mean that the user has the necessary capability at any stage from method development to high-throughput operation.

Vacuum Manifold Assemblies

Description	Part No.
12-port vacuum extraction manifold assembly Includes rack for 16 x 100 mm tubes	5982-9110
20-port vacuum extraction manifold assembly Includes rack for 16 x 100 mm tubes	5982-9120

Replacement Parts for Vacuum Manifolds

Description	Part No.
Common Parts	
Manifold ball ring/vacuum quick release	5982-9106
Manifold exit valve replacement kit	5982-9107
Manifold vacuum gauge assembly with valve	5982-9108
12-Port Vacuum Manifolds	
White cover for 12-port manifold	5982-9111
Sealing gasket for 12-port manifold	5982-9112
Glass chamber for 12-port manifold	5982-9113
12-port rack for 13 x 75 mm tubes	5982-9114
12-port rack for 13 x 100 mm tubes	5982-9115
12-port rack for 16 x 75 mm tubes	5982-9116
12-port rack for 16 x 100 mm tubes	5982-9117
20-Port Vacuum Manifolds	
White cover for 20-port manifold	5982-9121
Sealing gasket for 20-port manifold	5982-9122
Glass chamber for 20-port manifold	5982-9123
20-port rack for 13 x 75 mm tubes	5982-9124
20-port rack for 13 x 100 mm tubes	5982-9125
20-port rack for 16 x 75 mm tubes	5982-9126
20-port rack for 16 x 100 mm tubes	5982-9127



20-Port Vacuum Manifold Assembly, 5982-9120

Parts and Disposables for Cartridge Manifolds

A full selection of adapters allows stacking cartridges for multi-step separation of or use of flexible cartridges on 12- or 20-port manifolds.

Parts and Disposables for Cartridge Manifolds

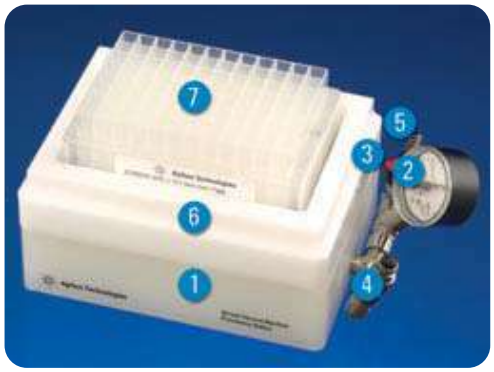
Description	Unit	Part No.
Manifold disposable needle tip	20/pk	5982-9100
Manifold stainless steel needle with polypropylene coating	20/pk	5982-9101
Manifold short valve stopcock	20/pk	5982-9102
Manifold long valve stopcock	20/pk	5982-9103
Manifold male luer plugs	25/pk	5982-9104
Manifold needle tip ejector tool		5982-9105
Cartridge stacking adapters	12/pk	5982-9109



Vacuum Manifolds for 96 Well Plates

Vacuum Manifolds for 96 Well Plates

Description	Part No.
Manifold for 96 well plates Includes base, vacuum gauge, needle valve and fixed lid	5185-5776



Vacuum manifolds for 96-well plates are designed to allow both convenient method development and high-throughput operation. The base accommodates fixed format 96-well plates with each well loaded with the same sorbent.

Complete assembly, 5185-5776

Replaceable parts:
1. Base assembly, 5185-5797
2. Vacuum gauge, 5185-5786
3. On/off valve, 5185-5785
4. Needle valve, 5185-5783
5. Vacuum outlet, 5185-5784
6. Lid for fixed well manifold, 5185-5798
7. Fixed 96 well plate, available in various sizes



Collection plate, showing 96-position closing mat, 5042-1389



Base O-ring, 5185-5779



Collection plate spacer in sizes to match the collection plate used

Parts and Disposables for 96 Well Plate Manifolds

Description	Unit	Part No.
Closing mats for 96 well plates, silicone	50/pk	5042-1389
96 well plates, 0.5 mL, polypropylene	120/pk	5042-1385
96 well plates, 0.5 mL, polypropylene	10/pk	5042-1386
96 deep well plates, 1 mL, polypropylene	50/pk	5042-6454
96 well vacuum manifold base assembly Includes base, vacuum gauge and needle valve		5185-5797
Base O-ring for 96 well plate manifold		5185-5779
Collection plate spacer for Agilent 1 mL deep well, 12 mm		5185-5775
Collection plate spacer for microtiter plate and Agilent 0.5 mL shallow well plate, 29 mm		5185-5781
Collection plate spacer for most industry- standard deep well plates, 2 mm		5185-5780
Disposable reservoir tray for 96 well manifold	25/pk	5185-5782
Lid for 96 fixed well vacuum manifold		5185-5798
Lid gasket for 96 well plate manifold		5185-5778
Luer adapters for 96 well flexible cartridge	25/pk	5185-5789
Needle valve for 96 well manifold		5185-5783
On/off valve for 96 well manifold		5185-5785
Vacuum gauge for 96 well manifold		5185-5786
Vacuum outlet (Ni plated) for 96-well manifold		5185-5784



Why Filter Your Samples for HPLC?

- To protect your column against plugging (blockage) from sample particulate matter.
- To protect your injection valve components from possible damage, scratching and increased wear by sample particulate matter.
- To minimize downtime.

Why Purchase Agilent Syringe Filters?

Agilent offers the most popular sizes, porosities and membrane types at attractive pricing. All of our syringe filters are pre-sterilized by gamma irradiation, and our regenerated cellulose filters are batch-tested under HPLC conditions.

Sample Filtration

Various methods of sample filtration can be used to clarify samples that need further analysis or where particulate matter may cause a problem. Agilent provides a range of standard and economy syringe filters conveniently housed in inert polymeric housings for easy use and disposal, as well as the innovative Mini-UniPrep Syringeless Filters from Whatman.

Syringe Filters

Membrane syringe filters are used most often to clarify small-volume sample solutions prior to HPLC and ion chromatography. The membrane filters are contained in an inert polymeric housing. No glue or binders are used in their construction to ensure that no extractables are present. The housing is designed to spread the sample solution over the entire surface of the membrane so that maximum membrane capacity is used. Syringe filters are ready-to-use and are quite convenient. You merely attach the Luer-tipped syringe filled with the sample solution to the housing and push the sample through the pre-cleaned filters.

How to Select the Right Membrane Syringe Filter

Filter types should be selected based on sample volume. All filter inlets are female Luer-compatible, have inert polypropylene or polycarbonate housings and come in three diameters:

- 30 mm filters are designed for larger sample volumes or for solvent filtration and offer increased filtration speed. The holdup volume is less than 50 µL.
- 25 mm econofilters offer a moderately wide cross-sectional area (4.2 cm^2) with a holdup volume of less than 50 µL.
- 13 mm filters are ideal for most applications and offer the best compromise between holdup volume and sample volume. Sample volumes are typically in the 1-10 mL range and the holdup volume is less than 10 µL.

Porosity should be determined by the size of potential particulates in your sample. Finer porosities require more pressure to filter.

Two porosities are available: 0.45 micron pores to remove particles that are detrimental to most columns and 0.20 micron pores to remove the smallest particles.

Membrane Filters

When selecting membrane filters, solvent compatibility is the most important criteria. The following chemical resistance table lists the most popular solvents used in HPLC along with the compatible membrane types.

Chemical Resistance Table for Membrane Filters

Substances	Membrane filters				
	Cellulose nitrate	Cellulose acetate	Regenerated cellulose	Nylon	PTFE
1,4-Dioxane	-	-	+	N/A	0
Acetic acid, 10% & 25%	+	0	+	-	+
Acetone	-	-	+	+	+
Acetonitrile	-	-	+	+	-
Alcohols (i-Propanol, 1-Hexanol, Cyclohexanol)	+	+	+	+	+
Aliphatic hydrocarbons	+	+	+	+	+
Aromatic hydrocarbons	+	+	+	N/A	+
Carboxylic acid	+	+	+	-	+
Cyclohexane	0	0	+	+	+
Diethylether	0	0	+	+	0
Dimethyl formamide	-	-	0	+	+
Dimethyl sulfoxide	-	-	0	N/A	+
Ethanol=<98%	-	+	+	+	+
Ethyl acetate	-	-	+	+	+
Formic acid, 25%	+	0	+	-	+
Hexane	+	+	+	+	+
Hydrochloric acid, 25%	+	-	+	-	+
Methanol	-	+	+	0	+
Nitric acid, 25%	0	0	+	-	+
Phosphoric acid, 45%	0	0	0	0	+
Potassium hydroxide, 1 M	-	-	0	-	+
Salt solutions, aqueous	+	+	+	+	+
Sodium hydroxide, 1 M	-	0	-	-	+
Tetrahydrofuran	-	-	+	+	0
Toluene	+	+	+	+	+
Trichloroacetic acid, 10%	+	-	-	0	+
Trichloroethane	+	0	+	0	+
Xylene	+	+	+	+	+

Code for Table: + = Resistance, 0 = Limited resistance, - = Not resistant, N/A = Not available



Membrane Econofilters, 5185-5830



Regenerated cellulose filters, 5061-3364

Premium Syringe Filters

Agilent Premium Syringe Filters are high quality, ready-to-use, and tested and certified for the absence of UV-absorbing substances at typical HPLC wavelengths with water, methanol and acetonitrile.

Premium Membrane Filters, 100/pk

Description	Diameter (mm)	Pore Size (µm)	Part No.
PTFE with Luer tip	30	0.2	3150-0753
PTFE with Luer tip	30	0.45	3150-0754
PTFE with Luer tip	13	0.45	5185-5836
PTFE with mini tip	13	0.45	5185-5837
Cellulose Acetate with Luer tip	30	0.45	5061-3363

Premium Regenerated Cellulose Membrane Filters, 100/pk

Description	Diameter (mm)	Pore Size (µm)	Part No.
Luer tip	30	0.2	5061-3354
Luer tip	30	0.45	5061-3364
Luer tip	13	0.2	5064-8222
Luer tip	13	0.45	5064-8221
Mini tip	13	0.2	5061-3366
Luer tip	13	0.45	5061-3365

Econofilters

High quality econofilters are shipped in large packs and are ideal for busy labs that need fast, efficient filtration at a reasonable price.

Membrane Econofilters, 200/pk

Description	Diameter (mm)	Pore Size (µm)	Part No.
Regenerated Cellulose	25	0.2	5185-5830
Regenerated Cellulose	25	0.45	5185-5831
Nylon	25	0.2	5185-5832
Nylon	25	0.45	5185-5833
PTFE	25	0.2	5185-5834
PTFE	25	0.45	5185-5835

Pre-Filters (Stand alone)

Pre-filters have a 100% borosilicate glass fiber membrane that is chemically inert and resistant to most solvents. The high surface area of the rigid fiber structure provides outstanding particle retention capacity while maintaining low flow resistance. The GF-53 will retain coarse particles down to approximately 3 µm in diameter and the GF-92 down to approximately 2 µm in diameter. They can be used standalone or in series with a membrane filter.

Pre-Filters (Stand alone), 100/pk

Description	Part No.
Glass fiber (GF-53)*	5042-1393
Glass fiber (GF-92)*	5042-1370

2-in-1 Filters

2-in-1 filters are recommended for difficult-to-filter samples because they have a two-layered filter in a single housing. The coarse, top layer pre-filter removes the larger particulates before getting to the membrane filter, requiring less force to push liquid sample through the filter, thereby providing higher throughput, saving time, sample and money.



2-in-1 Filter

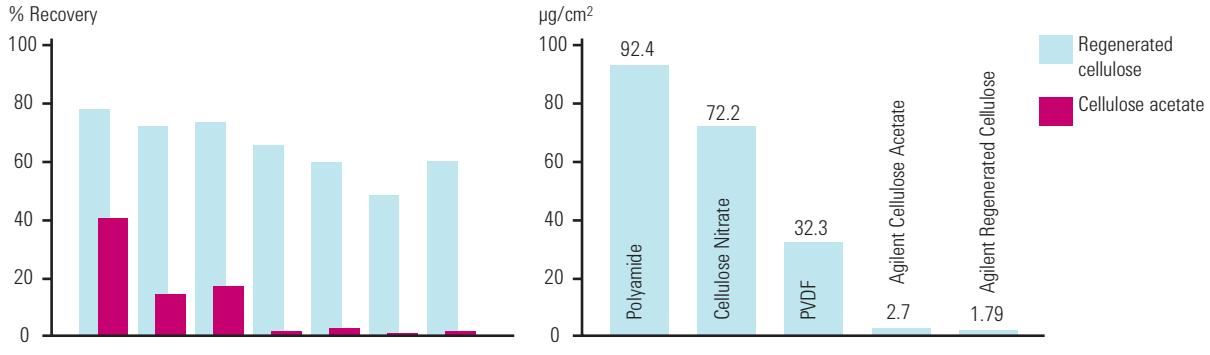
2-in-1 Filters, 100/pk

Description	Diameter (mm)	Pore Size (µm)	Part No.
Glass Fiber/Cellulose Nitrate	30	0.45	5042-1391
Glass Fiber/Regenerated Cellulose	30	0.45	5042-1392

Syringes for Sample Filters, 10/pk

Description	Part No.
Disposable syringes, 20 mL	5062-8534

Recovery of polynuclear aromatic hydrocarbons



- Regenerated cellulose membranes are recommended for general HPLC sample preparation as well as filtration of aqueous biological samples and organic solvents.
- PTFE membranes are compatible with almost all solvents, acids and bases.
- Cellulose nitrate is primarily used for pre-filters.
- Cellulose acetate membranes are not compatible with organic solvents. They are specially recommended for proteins and protein-related samples.



NEW! Mini-UniPrep Syringeless Filters

Agilent is pleased to offer Mini-UniPrep Syringeless Filters from Whatman. The Mini-UniPrep is a pre-assembled, disposable filtration device, ideal for removing particulate matter from samples. This small filter performs the functions of syringe filters, disposable syringes, vials, septa and caps in one small package, and protects your valuable HPLC column from contamination.

- Ideal for samples that undergo demanding HPLC analysis
- Equivalent in size to standard 12 x 32 mm vial, with a filtering capacity of 0.5 mL
- Innovative design reduces costs, materials, time to prepare samples, and is environmentally-responsible
- Compatible with all Agilent 1100 and 1200 Series autosamplers and manual injectors

Tips & Tools

For more information, including chemical compatibilities, visit **www.agilent.com/chem/miniuniprep**.

Mini-UniPrep Syringeless Filters, 100/pk

Description	Part No.
0.45 µm PTFE For aggressive samples	5190-1415
0.45 µm Nylon For aqueous and organic samples, pH 3-10	5190-1416
0.45 µm PP For solvent based samples, low water breakthrough values	5190-1417
0.45 µm regenerated cellulose For aqueous or organic solvents, very low non-specific protein binding membrane	5190-1418
0.20 µm PTFE For aggressive samples	5190-1419
0.20 µm Nylon For aqueous and organic samples, pH 3-10	5190-1420
0.20 µm PP For solvent-based samples, low water breakthrough values	5190-1421
0.20 µm regenerated cellulose For aqueous or organic solvents, very low non-specific protein binding membrane	5190-1422

GC and GC/MS

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GC and GC/MS

For over 40 years, Agilent has broken new ground with innovations in Gas Chromatography.



And now, we continue our tradition of leadership by offering you the industry's broadest selection of GC and GC/MS columns and supplies. We apply our extensive GC experience to all our products to help you minimize costly downtime. All are manufactured to Agilent's exact specifications to provide you the most consistent, high quality results time after time.

Here are some of the Agilent-engineered products you will find inside:

- Agilent exclusive plasma treated non-stick inlet septa and non-stick liner O-rings are made of the best materials, pre-cleaned, conditioned, then individually packaged to give you worry free, consistent sealing, plus reduced maintenance time.
- Agilent MS certified liners deliver the quality and consistency needed for critical applications, especially those using esterification agents for trace level analysis such as toxicology or drugs of abuse applications.
- Agilent J&W GC Columns, including our two newest column families – Ultra Inert and High Efficiency – adhere to our tight specifications for column-to-column reproducibility, quality, and performance.

And remember that when you buy Agilent instruments, columns and supplies you also get unmatched technical support to help maintain optimal system performance.

GC and GC/MS Maintenance Schedule

Item	Typical Schedule	Actions/Comments
Gas Management		
Gas purifiers (carrier gas and detector gas)	Every 6 to 12 months	Replacement schedule is based on capacity and grade of gas. In general, replace non-indicating traps every 6 to 12 months or when indicating traps start to change color. Replace indicating traps when indicating material is starting to change color.
Internal split vent trap	Every 6 months*	Replace to prevent material backing up into EPC control and to avoid costly repair.
External split vent trap	Every 6 months*	Replace to prevent sample analytes from spewing into the laboratory environment.
Flow meter calibration	Every 1 to 2 years	Re-calibrate electronic flow meters – follow recommended schedule for the unit (shown on the calibration certificate).
Sample Introduction and Inlets		
Syringes and/or syringe needles	Every 3 months*	Replace syringe if dirt is noticeable in the syringe, if it cannot be cleaned, if the plunger doesn't slide easily, or if clogged. Replace needle if septa wear is abnormal or the needle becomes clogged.
Inlet liner	Weekly*	Check often. Replace when dirt is visible in the liner or if chromatography is degraded.
Liner O-rings	Monthly*	Replace with every liner change.
Inlet septum	Daily*	Check often. Replace when signs of deterioration are visible (gaping holes, fragments in inlet liner, poor chromatography, low column pressure, etc.)
Inlet hardware	Every 6 months Every year	Check for leaks and clean. Check parts and replace when parts are worn, scratched, or broken.
Inlet gold or stainless steel seal	Monthly*	For highest level of reproducibility, change inlet seal with every liner change, but minimally replace monthly or when scratched, corroded, or if there is build-up of non-volatile sample components.
Columns		
Front-end maintenance	Weekly-monthly*	Remove 1/2 to 1 meter from the front of the column when experiencing chromatographic problems (peak tailing, decreased sensitivity, retention time changes, etc.). Replace inlet liner, septum and clean inlet as necessary. Guard column may be useful for increasing column lifetime.
Solvent rinse	As needed	Perform when chromatography degradation is due to column contamination. Only for bonded and cross-linked phases.
Replacement	As needed	Replace when trimming and/or solvent rinsing no longer return chromatographic performance.
Ferrules	As needed	Replace when changing columns and inlet/detector parts.

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.

GC and GC/MS Maintenance Schedule

Item	Typical Schedule	Actions/Comments
Detectors		
FID/NPD jets and collector	As needed	Clean when deposits are present. Replace when they become scratched, bent, or damaged, or when having difficulty lighting FID or keeping flame lit.
NPD bead	As needed	Replace when signal drifts or there is a dramatic change in sensitivity.
FID	Every 6 months	Measure hydrogen, air, and makeup gas flows.
TCD	As needed	Thermally clean by "baking-out" when a wandering baseline, increased noise, or a change in response is present. Replace when thermal cleaning does not resolve the problem.
ECD	Every 6 months or as needed	Wipe test. Thermally clean by "baking-out" when baseline is noise, or the output value is abnormally high. Replace when thermal cleaning does not resolve the problem.
FPD	Every 6 months or as needed	Measure hydrogen, air, and makeup gas flows. Clean/replace FPD windows and seals when detector sensitivity is reduced.
Mass Selective Detectors		
Tune MSD	As needed	Keep plenty of PFTBS (part number 05971-60571) on hand.
Check the calibration vial	Every 6 months	Vial can be refilled without venting the system.
Replace the foreline pump oil	Every 6 months	Check the fluid weekly. Change when the fluid becomes discolored or every 6 months.
Replace the diffusion pump fluid	Every year or as needed	Check the fluid weekly. Too little fluid will cause the pump to run at a higher temperature, resulting in degradation and loss of high vacuum. Change when the fluid is discolored or contains particulates.
Clean the ion source	As needed	Clean when performance deteriorates, to remove contamination and to restore the electrostatic properties of the ion lens system. Replace scratched parts to maintain optimal performance.

*Schedule is an approximation of average usage requirements. Frequency may vary widely based upon application and sample type.





Inlet Septa

Septa are available for a variety of different applications and have different upper temperature limits. Lower temperature septa are usually softer, seal better, and can withstand more punctures (injections) than their high-temperature counterparts. If septa are used above their recommended temperatures, they can leak or decompose. This causes sample losses, lower column flow, decreased column life and ghosting. To minimize problems:

- Use with the recommended temperature range
- Change regularly
- Install the retainer nut "finger tight"
- Use septum purge when available
- Use autoinjectors
- Use sharp syringe needles

Premium Non-Stick Septa

Agilent premium non-stick inlet septa are designed and manufactured to provide a reliable non-contaminating seal. Our tri-fold blister pack ensures that each septum remains clean and ready to use.

- Proprietary plasma treatment prevents sticking and unnecessary inlet cleaning
- Innovative blister package keeps each septum clean and ready for use
- Center point guides the needle for easy penetration, less coring and longer life
- Precision molding assures accurate fit in the inlet
- Each batch is tested on an Agilent 6890 GC-FID for bleed
- Premium formulations selected for sealing and chromatographic cleanliness
- No need to bake septa before using

Summary of Premium Inlet Septum Characteristics

Septum Type	Bleed	Lifetime	Temperature Limits
Non-Stick BTO (Bleed and Temperature Optimized)	◆◆◆	◆	to 400°C Injection port temp
Non-Stick Long Life	◆	◆◆◆	to 350°C
Non-Stick Advanced Green	◆◆	◆◆	to 350°C

◆◆◆ = best ◆◆ = very good ◆ = good



BTO septa, 5183-4757

Bleed and Temperature Optimized Septa (BTO)

- Extended temperature range, lowest bleed
- Maximum injection port temperature 400°C
- Plasma coating eliminates sticking in the injection port
- Pre-conditioned; ready to use
- Blister packaging for cleanliness and convenience
- Ideal for use with low-bleed, "Mass Spec" capillary columns

Bleed and Temperature Optimized Septa (BTO)

Description	Unit	Part No.
11 mm septa	50/pk	5183-4757
11 mm septa	100/pk	5183-4757-100
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4758

Comparison of Coring, With and Without CenterGuide (30x magnification)



High-Temperature Septa without CenterGuide

Major coring before 100 autoinjections

Agilent BTO Septa with CenterGuide

Very little coring even after 700 autoinjections



Advanced green septa, 5183-4759

Advanced Green Septa

- True long-life, high temperature green septum
- More injections per septum
- Plasma coating eliminates sticking in the injection port
- Maximum injection port temperature 350°C
- High-performance alternative to competitors' "Green" septa
- Blister packaging for cleanliness and convenience

Advanced Green Septa

Description	Unit	Part No.
Advanced Green Septa		
11 mm septa	50/pk	5183-4759
11 mm septa	100/pk	5183-4759-100
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4760



Long-life septa, 5183-4761

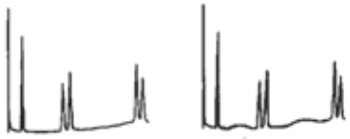
Long-Life Septa

- The preferred septum for autosamplers
- Pre-pierced for extended life and reduced coring
- Ideal for overnight runs
- Up to 400 injections per septum
- Plasma coating eliminates sticking
- Maximum injection port temperature 350°C
- Soft, 45 durometer, easy on autosampler needles
- Blister packaging for cleanliness and convenience

Long-Life Septa

Description	Unit	Part No.
11 mm septa	50/pk	5183-4761
11 mm septa	100/pk	5183-4761-100
5 mm septa through-hole for on-column, in glass jar	50/pk	5183-4762

Septa Troubleshooting

Symptom	Possible Causes	Remedy
Extra Peaks/Humps 	Septum bleed	Turn off injector heater. If extra peaks disappear, use septum specified for higher temperature or analyze at lower inlet temperature.
Baseline Change After Large Peak 	Large leak at septum during injection and for a short time thereafter (common with large diameter needles)	Replace septum and use smaller diameter needles.
Retention Times Prolonged 	Carrier gas leaks at septum or column connection	Check for leaks. Replace septum or tighten connections if necessary.



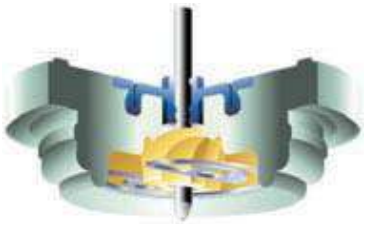
General Purpose Septa

Agilent's General Purpose Septa are made from an enhanced injection-molded silicone rubber material. The septa material, gray in color, is specified to withstand over 200 automatic injections at an injection port temperature of 350°C.

Description	Unit	Part No.
Gray Septa		
11 mm septa	50/pk	5080-8896-50
11 mm septa	100/pk	5080-8894-100
9.5 mm (3/8 in.) septa*	50/pk	5080-8728-50
9.5 mm (3/8 in.) septa*	100/pk	5080-8728-100
5 mm through hole septa for on-column inlets, automatic or manual injections**	25/pk	5181-1260
5 mm septa for high column backpressure, on-column inlets**	25/pk	5181-1261

*for 5700 series and 5830/40 GCs

**5 mm septa are packaged in glass jars



Merlin Microseal

- Low bleed, longer life alternative to standard septa for split/splitless injection
- Has a lifetime of more than 2000 injections, depending on samples and operating conditions
- Greatly reduced instrument downtime for septa changes and injection port liner changes due to septa particulates
- Two distinct sealing mechanisms: double O-ring type seal around the syringe needle and spring assisted duckbill to seal the injection port

Description	Part No.
High Pressure Merlin Microseal	
High pressure Merlin Microseal starter kit Includes microseal septum and nut	5182-3442
Microseal high pressure septum	5182-3444
Microseal high pressure nut	5182-3445
High sample volume septum kit Contains Merlin high pressure Microseal, six 23-gauge syringes, 500 vials and caps	5181-8839
Merlin Microseal Standard Pressure	
Merlin Microseal kit, original low pressure system Includes nut and septum	5181-8816
Merlin Microseal kit, original low pressure system Includes nut and 2 septa	5181-8833
Microseal septum, stainless steel, rubber (30 psi)	5181-8815
Microseal PTFE nut liners, 2/pk	5182-0853
Merlin Microseal manual syringe, 5 µL, 23 gauge	5182-3438
Merlin Microseal manual syringe, 10 µL, 23 gauge	5182-3439
Syringe, 5 µL, 23 gauge	9301-0892
Syringe, standard plunger, 10 µL, 23 gauge	9301-0713



MS certified split liner, 5188-6576

NEW! Agilent MS Certified Liners

Agilent MS Certified Split and Splitless Liners are manufactured and tested to our highest level of scrutiny to assure reproducibility.

We have built years of experience into the MS Certified Liners to provide the quality and consistency needed for critical applications, especially those using esterification agents for trace level analysis such as toxicology or drugs of abuse applications.

- Geometrical dimensions and tolerances of the glass are controlled by Statistical Process Control (SPC) with 100% Go-No-Go check.
- Glass wool is pre-qualified with mass spectrometry, then inserted using a unique manufacturing procedure to improve reproducibility.
- Deactivated MS Certified Liners are treated with Agilent's proven proprietary deactivation process developed to last longer than other commercially available treatment.
- Random samples of MS Certified Liners are tested using both FID and MSD analysis of challenging probes to evaluate acid/base deactivation, response linearity, peak symmetry, and bleed and background noise.
- Each Agilent MS Certified Liner is traceable by the lot codes silk screened on the liner.

Agilent MS Certified Liners

Description	1/pk	5/pk	25/pk
Split Inlet Liners			
Single taper, MS certified liner with restriction to hold glass wool	5188-6576		
Straight, MS certified liner with glass wool	5188-6574	5188-6569	
Splitless Inlet Liners			
Single taper, MS certified liner with glass wool	5188-6568	5188-6567	5188-6566



For in-depth information about maintaining your GC/MS, request "Maintaining Your Agilent GC and GC/MS Systems" from your Agilent Representative (publication number 5989-7612).



Agilent split liner

Agilent Split Liners

Agilent Single Taper Split Liners are made to strict dimension specifications for optimal inlet performance and feature the tightest tolerances for OD, ID, taper, and glass wool placement. For ease of use and reproducibility, the liners have a positioning bead, a restriction to secure the position of the glass wool, and a feature to consistently self-position to the recommended height. The liners also feature Agilent's proprietary deactivation.



Single taper split liner



Straight split liner

Agilent Split Liners

Description	1/pk	5/pk	25/pk
Single Taper Split Liners			
Single taper, glass wool, deactivated, low pressure drop	5183-4647	5183-4701	5183-4702
Single taper, MS certified liner with restriction to hold glass wool	5188-6576		
Single taper, glass wool, deactivated	5183-4711	5183-4712	5183-4713
Straight Split Liners			
Straight, glass wool, non-deactivated	19251-60540	5183-4691	5183-4692
Straight, MS certified liner with glass wool	5188-6574	5188-6569	

Tips & Tools

Agilent recommends part number 5183-4647 as the top split liner choice for:

- Highest run-to-run area reproducibility
- Least discrimination for wide boiling point range samples
- Use with widest range of conditions and sample types
- Easy self-adjusting installation



Agilent splitless liners

Agilent Splitless Liners

Agilent's proprietary deactivation is important for splitless liners because of the longer sample/liner contact time in splitless mode.

When deciding between a liner with or without glass wool, choose a liner without glass wool if your sample contains non-volatiles or analytes within a wide boiling range. For unknown samples, use a liner without glass wool to avoid loss of active or labile compounds. Agilent recommends first trying a liner without glass wool; use glass wool as a second choice.



Single taper splitless liner



Single taper, glass wool splitless liner



Double taper splitless liner

Agilent Splitless Liners

Description	1/pk	5/pk	25/pk
Single taper, deactivated	5181-3316	5183-4695	5183-4696
Single taper, inert	5181-3316i		
Single taper, glass wool, deactivated	5062-3587	5183-4693	5183-4694
Single taper, MS certified liner with glass wool	5188-6568		
Double taper, deactivated	5181-3315	5183-4705	5183-4706
Straight, deactivated, quartz	5181-8818	5183-4703	5183-4704
Straight, non-deactivated, quartz	18740-80220	5183-4707	5183-4708
Straight, non-deactivated	210-3003	210-3003-5	



Direct Connect liners

Direct Connect Liners

Agilent's Direct Connect Liners provide maximum recovery and minimal decomposition of active compounds for methods requiring splitless injection, such as EPA 8270. They are best for relatively clean samples containing active analytes, such as water extracts. The liners directly connect with the column, similar to press-fit connectors, to aid complete transfer of sample onto the column, eliminating the problem of inlet discrimination and further increasing sensitivity.

Direct Connect Liners

Description	Part No.
Single taper, Agilent proprietary deactivation	G1544-80730
Dual taper, Agilent proprietary deactivation	G1544-80700
Single taper, deactivated, inert	G1544-80731



Helix liners

NEW! **Helix Liners**

Helix liners approximate the benefit of glass wool without the activity. The deactivated glass spiral gives surface area without glass wool's active sites to vaporize and mix sample before getting onto the column, and prevents sample from splashing onto the bottom of liner and seal. Helix liners are recommended for slower injection speeds.

Helix Liners

Description	Part No.
Helix open ended, deactivated	5188-5396
Helix double taper, deactivated	5188-5398
Helix single taper, deactivated	5188-5397



Liner O-rings in dial packaging

Liner O-Rings

- Liners are sealed in the inlet with O-rings or graphite seals
- Graphite seals are used when inlet temperatures exceed 350°C
- Fluorocarbon O-ring seals are easier to replace than graphite that deforms and flakes apart

Only Agilent fluorocarbon liner O-rings are:

- Pre-cleaned, then conditioned to eliminate out-gassing of contaminants, especially important for trace, ECD and MSD analyses
- Plasma treated for a non-stick, contaminant-free surface that won't stick to the inlet metal surface creating unnecessary inlet maintenance
- Packaged for convenience and cleanliness in a novel dial package that delivers 1 clean O-ring, ready for use

Liner O-Rings

Description	Unit	Part No.
Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
Graphite O-ring for splitless liner	10/pk	5180-4173
Graphite O-ring for split liner	10/pk	5180-4168
Non-Stick fluorocarbon liner O-ring for Flip Top	10/pk	5188-5366
High Temp PTV inlet liner fluorocarbon O-ring	10/pk	5188-5311



Certified gold inlet seal, 5188-5367

Split/Splitless Inlet Seals

To ensure that you have a consistent and inert surface to properly seal the inlet and prevent sample degradation, Agilent has revolutionized production of the inlet gold seal. Unlike traditional machined seals, the new format Agilent gold inlet seal has a very reproducible smooth surface, eliminating traces of machining grooves that can be the source of minute leaks. With Agilent's proprietary metal injection molding (MIM) manufacturing process, every gold inlet seal provides a high quality, leak free seal so critical for reproducible results.

Our new package keeps the gold seal clean and scratch free. For your added convenience, an inlet washer is provided with each inlet seal.



Gold plated seal kit, 5188-5367

Split/Splitless Inlet Seals

Description	Part No.
Certified gold plated seal kit, includes washer Replacement for 18740-20885	5188-5367
Gold-plated seal with cross*	5182-9652
Stainless steel seal	18740-20880

*Use with total flow rates of greater than 200 mL/min







Vespel/Graphite ferrules, 5181-3323

Capillary Column Ferrules and Nuts

Using the wrong ferrule or a worn-out ferrule to seal your column connection can result in inconsistent and unreliable chromatography. An improper ferrule can cause leaks which allow air and other contaminants to enter the instrument through the column seal, causing major interference with column and detector performance.

For optimum performance, ferrules should be replaced every time the column is replaced and when performing column maintenance.

To minimize problems, follow these general techniques for ferrule installation:

- Don't overtighten – finger tighten the column nut, then use wrench to tighten.
- Maintain cleanliness.
- Bake out ferrules prior to use (Vespel and Vespel/Graphite only).
- Avoid contamination, such as fingerprint oils.
- Inspect used ferrules with magnifier for cracks, chips, or other damage before reusing them.
- Change ferrules when new columns or injector/detector parts are installed.

Tips & Tools

Look for the following signals that indicate ferrule damage:

- Background noise from oxygen diffusing into the system
- Column bleed catalyzed by oxygen
- Sample degradation
- Sample loss
- Increase in detector signal/noise
- Poor retention time reproducibility

Ferrule Selection Recommendations

Ferrule/ Seal Type	Upper Temp. Limit	Usages	Advantages	Limitations
Graphite (100%)	450°C	• General purpose for capillary columns. • Suitable for FID and NPD. • Recommended for high temperature and cool on-column applications.	• Easy to use stable seal. • Higher temperature limit. • Can be removed easily.	• Not for MS or oxygen sensitive detectors. • Soft, easily deformed or destroyed. • Possible system contamination.
Vespel/Graphite (85%/15%)	350°C	• General purpose for capillary columns. • Recommended for MS and oxygen sensitive detectors. • Most reliable leak-free connection.	• Mechanically robust. • Long lifetime.	• Not reusable. • Flows at elevated temperature. • Must re-tighten frequently.
Vespel (100%)	280°C	• Isothermal operation. • Can be reused or removed easily. • Excellent sealing material when making metal or glass connections.	• Mechanically robust. • Long lifetime. • Can be reused or removed easily.	• Leaks after temperature cycle. • Flows at elevated temperature. • Must re-tighten frequently.

Tips & Tools

Agilent LTM technology combines a fused silica capillary column with heating and temperature sensing components wound around it. The design heats and cools the column very efficiently for significantly shorter analytical cycle times.

Turn to pages 308–332.

Ferrules for LTM Rapid Heating/Cooling System

Description	Unit	Part No.
For use with 0.25 - 0.4 mm ID LTM columns	5/pk	5190-1437
For use with 0.4 - 0.5 mm ID LTM columns	5/pk	5190-1438
For use with 0.5 - 0.8 mm ID LTM columns	5/pk	5190-1439





Graphite ferrules, 5080-8853

Capillary Column Ferrules

Ferrule ID (mm)	Column ID (mm)	Unit	Part No.
General Purpose Graphite Ferrules (Short)			
0.5	0.1, 0.2, 0.25, 0.32	10/pk	5080-8853
0.4	0.05, 0.25	10/pk	500-2114
0.8	0.45, 0.53	10/pk	500-2118
1.0	0.53	10/pk	5080-8773
85% Vespel, 15% Graphite Ferrules (Short)			
0.4	0.1, 0.2, 0.25	10/pk	5181-3323
0.5	0.32	10/pk	5062-3514
0.8	0.45, 0.53	10/pk	5062-3512
Preconditioned 85% Vespel, 15% Graphite Ferrules (Long)*			
0.3	0.1	10/pk	5062-3507
0.4	0.1, 0.2, 0.25	10/pk	5062-3508
0.5	0.32	10/pk	5062-3506
0.8	0.53	10/pk	5062-3538
100% Vespel, High Performance Ferrules (Short)**			
0.4	0.1, 0.2, 0.25	10/pk	5181-3322
0.5	0.32	10/pk	5062-3513
0.8	0.45, 0.53	10/pk	5062-3511
Specialty Ferrules, 85% Vespel, 15% Graphite			
Two Hole			
0.4	0.1, 0.2, 0.25	10/pk	5062-3580
0.5	0.32	10/pk	5062-3581
No hole		10/pk	5181-3308
High Temp PTV Inlet, SS/Graphite			
0.4	0.320	10/pk	5188-5315
0.4	0.530	10/pk	5188-5314

*These ferrules are recommended for use with Agilent GC/MS Transferlines with the 05988-20066 MS interface column nut.

**These ferrules are recommended for use in isothermal analysis only.

Tips & Tools

100% Vespel ferrules should only be used for isothermal applications.

SilTite Metal Ferrules

Description	Unit	Part No.
For use with 0.25 mm ID capillary columns	10/pk	5188-5361
For use with 0.32 mm ID capillary columns	10/pk	5188-5362
For use with 1/16 in. od stainless steel tubing Includes 2 column nuts	10/pk	5184-3571
For use with 0.53 mm ID capillary columns	10/pk	5188-5363

Tips & Tools

SilTite ferrules are required for leak-tight seals with the Ultimate Union, Deans Switch, and Effluent Splitter.



Universal column nut, 5181-8830

Column Nuts

Description	Part No.
Short Nuts	
Universal column nut, 1/16 in. hex, 2/pk	5181-8830
Finger tight column nut for 530 µm columns*	5020-8293
Finger tight column nut for 320 µm columns and smaller*	5020-8292
Blanking plug, finger-tight style	5020-8294
6850 column nut, 2/pk	5183-4732
Extended column nut, VI inlet	G3504-20504
High Temp SimDis PTV inlet, 4 mm hex	5188-5312
Long Nuts	
MS interface column nut, female	05988-20066
Column nut for long or long two-hole ferrules	05921-21170
Accessories	
Open end wrench, 1/4 and 5/16 in.	8710-0510

*For use with graphite ferrules only

Straight Ferrules

Description	Unit	Part No.
1/4 in. PTFE	10/pk	0100-1378
1/4 in. Graphite	10/pk	0100-1324
1/8 in. Graphite	10/pk	0100-1325
1/8 in. 85% Vespel/15% Graphite	10/pk	0100-1332
1/16 in. PTFE	10/pk	0100-1375
1/16 in. Graphite	10/pk	0100-1326
1/16 in. VG-2 Vespel, 40% Graphite	10/pk	0100-1379
6.4 mm Vespel		0100-1104
1/4 in. 85% Vespel/15% Graphite	10/pk	0100-1331

Reducing Ferrules

Description	Unit	Part No.
1/8 to 1/16 in. Vespel	10/pk	0100-1342
1/8 to 1/16 in. VG-1 Vespel, 15% Graphite	10/pk	0100-1344
1/16 in. to 0.4 mm VG-2 Vespel, 40% Graphite	10/pk	0100-1381



Ultimate Union

Column Connectors/Splitters

Ultimate Union

The Ultimate Union is part of Agilent's Capillary Flow Technology family, providing extremely low dead volume column connections. Like the QuickSwap, Deans Switch and Purged Effluent Splitter, the Ultimate Union uses special fittings and Siltite ferrules to create an inert, leak free and robust seal that doesn't need re-tightening after temperature cycles.

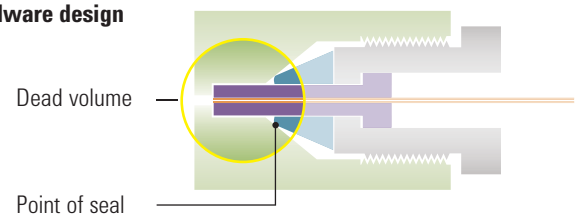
Each Agilent Ultimate Union kit contains:

- 1 Union (your choice of deactivated or non-deactivated)
- 2 Internal nuts
- 1 Swaging nut
- 1 Oven wall clip
- Kits do not include SilTite ferrules. Please order ferrules for your column ID separately. SilTite ferrules include 2 transfer line nuts.

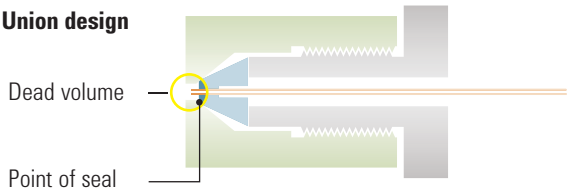
Ultimate Union Kits, Fittings and Ferrules

Description	Part No.
Ultimate union kit, deactivated	G3182-61580
Ultimate union kit, non-deactivated	G3182-61581
Internal nut	G2855-20530
Swaging nut	G2855-20555
SilTite metal ferrules, 0.10-0.25 mm ID capillary columns	5188-5361
SilTite metal ferrules, 0.32 mm ID capillary columns	5188-5362
SilTite metal ferrules, 0.53 mm ID capillary columns	5188-5363

Old hardware design



Ultimate Union design





Glass press-fit connections

Press-fit Capillary Column Connectors

In the past it was necessary to use Press-fit connectors with specific dimensions to connect columns of those dimensions. Modern Press-fit connectors are "laser-milled" to provide highly reproducible taper angles throughout the length of the Press-fit insuring an excellent seal. Now the only choice you have to make is between a Glass Union for standard applications, and Fused Silica Unions or Deactivated Quartz Unions for applications demanding maximum inertness.

Glass and Fused Silica Press-fit Connectors

Description	Unit	Part No.
Glass union, universal, 2-way	25/pk	705-0825
Fused silica union, universal, 2-way	5/pk	705-0905
Fused silica union, universal, 2-way	25/pk	705-0925
Fused silica union, universal, 3-way		705-0903
Polymide sealing resin, 5 grams		500-1200



Quartz splitter

Quartz Press-fit Connectors/Splitters

Description	Unit	Part No.
Quartz column connector, 0.1 to 0.53 mm	5/pk	5181-3395
Deactivated quartz column connector	5/pk	5181-3396
Quartz splitter		5181-3397
Quartz deactivated splitter		5181-3398

Mechanical Capillary Column Connectors

Description	Unit	Part No.
Connector, body and nut		5061-5801
Ferrules for Connectors		
Vespel, 0.2 to 0.53 mm ID tubing	2/pk	5061-5804
Vespel, 0.32 to 0.32 mm ID tubing	2/pk	5061-5805
Vespel, 0.32 to 0.53 mm ID tubing	2/pk	5061-5806
Fused silica, undeactivated 530 µm tubing, 10 m		160-2530-10



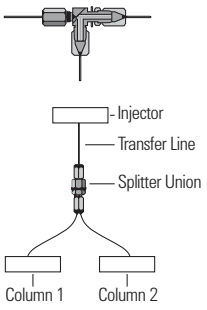
Graphpak connector for Agilent capillary detectors



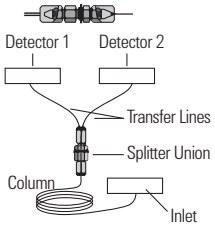
Graphpak divider for simultaneous sampling



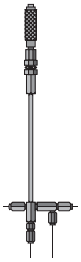
Capillary injection port connector, 5021-7170



Fixed inlet splitter



Fixed Outlet Splitter



Variable outlet splitter, 5181-3393

Graphpak Capillary Column Connectors (2.5 mm)*

Column ID (mm)	Connector ID (mm)	Part No.
Capillary Detector Port Connector		
0.32/0.25	0.4	5021-7166
0.32/0.25	0.7	5021-7164
Capillary Divider for Simultaneous Sampling		
0.32/0.25	0.53	5021-7148
0.53	0.7	5021-7146
Capillary Injection Port Connector		
0.2	0.3	5021-7169
0.32/0.25	0.4	5021-7170
0.53	0.7	5021-7168

*The 2.5 mm Graphpak is not compatible with the Graphpak 2M used for the PTV.

Note: Order ferrules in addition to the connector to fit your column. Ferrules must be ordered separately.

Ferrules for Connectors

Column ID (mm)	ID (mm)	Unit	Part No.
0.2	0.3	10/pk	5021-7136
0.32/0.25	0.4	10/pk	5021-7137
0.53	0.7	10/pk	5021-7134
Graphpak plug ferrule		10/pk	5021-7133
Replacement Graphpak column nut		5/pk	5062-3525

Capillary Column Splitters

Description	Tubing ID (mm)	Part No.
Fixed Inlet Splitter		
	0.22	5181-3390
	0.32	5181-3391
	0.53	5181-3392
Fixed Outlet Splitter		
1:1 ratio splitter	0.22 to 0.22	0101-0594
1:5 ratio splitter	0.22 to 0.15	5181-3389
1:10 ratio splitter	0.21 to 0.11	0101-0595
Two-hole replacement ferrules, 10/pk		
	0.30	5181-3388
	0.4	5062-3580
	0.5	5062-3581
Variable Outlet Splitter		
Variable outlet system Includes metal body and 5 meter 0.22 mm ID transfer line with 0.4 mm 2-hole ferrule		5181-3393



Capillary Flow Technology Supplies

Agilent offers a family of GC accessories based on our proprietary Capillary Flow Technology. These accessories increase system productivity and performance:

- QuickSwap MS Interface provides vent-free removal of columns
- Deans Switch device simplifies the analysis of complex samples
- Purged Effluent Splitter for inert, leak-free column effluent splitting

Fittings, Ferrules and Supplies

For leak-free, low dead volume and inert column connections with capillary flow accessories, such as the Deans Switch or QuickSwap MS Interface, use only Siltite ferrules and specified nuts. For Capillary Flow devices, use deactivated fused silica tubing. Do not use tubing that has been coated with stationary phase.

Fittings, Ferrules and Supplies

Description	Part No.
Internal nut	G2855-20530
Swaging nut	G2855-20555
Column storage fitting	G2855-20590
Fused silica, deactivated, 0.15 mm x 1 m	160-2625-1
Fused silica, deactivated, 0.15 mm x 5 m	160-2625-5
Fused silica, deactivated, 0.15 mm x 10 m	160-2625-10
SilTite metal ferrules, 0.10-0.25 mm ID capillary columns, 10/pk	5188-5361
SilTite metal ferrules, 0.32 mm ID capillary columns, 10/pk	5188-5362
SilTite metal ferrules, 0.53 mm ID capillary columns, 10/pk	5188-5363
Ferrule pre-swaging tool	G2855-60200

Tips & Tools

Agilent's QuickSwap Interface Restrictors can increase the productivity of your Agilent 5975 inert MSD system.

Turn to page 212.



General purpose gas sampling valves



General purpose liquid sampling valves

Valves and Loops

Gas Sampling General Purpose Valves

Description	Part No.
6-port replacement valve WE series, 400 psi, 225°C	5062-9508
6-port replacement valve WE series, Hastelloy C, 400 psi, 225°C	5062-9509
10-port replacement valve WE series, 400 psi, 225°C	5062-9510
10-port replacement valve WE series, Hastelloy C, 400 psi, 225°C	5062-9511
6-port replacement valve WT series, 300 psi, 350°C	0101-0584
10-port replacement valve WT series, 300 psi, 350°C	0101-0585

Liquid Sampling General Purpose Valves

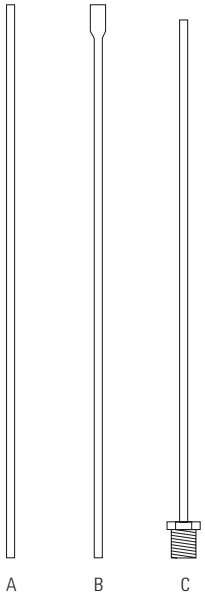
Description	Part No.
0.2 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0636
0.5 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0637
1.0 µL replacement valve UWP series, 1,000 psi, 175°C	0101-0638
0.5 µL replacement valve UW series, 5,000 psi, 75°C	0101-0639

Parts for Interfacing Capillary Columns to W-Series Valves

Description	Part No.
Stainless steel bulkhead ZDV union, for interfacing 530 µm columns with 1/16 in. transfer line	0100-1515
Stainless steel bulkhead ZDV union, for interfacing 320 µm columns with 1/16 in. transfer line	0100-1527
Polymide ferrule, 1/16 in.	0100-1512
Polyimide liner for 530 µm columns	0100-1513
Polyimide liner for 320 µm columns	0100-1514
1/16 in. stainless steel counterbored nut	0100-1511
Installation tool for liners	18900-20850

Valve Supplies

Description	Part No.
1/16 in. stainless steel nut	5181-1291
1/16 in. front ferrule, stainless steel	5181-1292
Straight metering valve, 1/16 in., stainless steel, for LSVs as a sample-out restrictor or as a flow-balancer for 10-100 mL/min	0101-0355
Micrometering valve, for flow balancing gas flows of 2-50 mL/min	0101-0633
Air actuator	19325-60660
Solenoid valve for controlling actuator	05890-61090
Solenoid valve for controlling actuator, for GCs after serial number 3223A43573	05890-61095
Angle metering valve, 1/16 in., stainless steel	0101-0403



Valve Loops for GC (Includes loop, nut and ferrule, 1/16 in.)

Description	Part No.
Sample loop, 0.25 cc	0101-0303
Sample loop, 0.50 cc	0101-0282
Sample loop, 1.00 cc	0101-0299
Sample loop, 2.00 cc	0101-0300
Sample loop, 5.00 cc	0101-0301
Sample loop, 10.00 cc	0101-0302
A. Tube, 1/16 in. stainless steel, 280 mm long	18900-20250
Tube, 1/16 in. stainless steel, 400 mm long	18900-20280
Tube, 1/16 in. stainless steel, 375 mm long	18900-20281
Tube, 1/16 in. stainless steel, 560 mm long	18900-20300
B. Tube, 1/16 in. with 1/8 in. flare, stainless steel, 360 mm long	1530-2163
Tube, 1/16 in. with 1/8 in. flare, stainless steel, 520 mm long	1530-2167
C. Tube, 1/16 in. with 1/8 in. bulkhead fitting, 520 mm long	07675-80050
Tube, nickel, 1/16 in. with 1/8 in. bulkhead fitting, 460 mm long	18900-80255

Replacement Rotors for Gas Sampling Valves

Description	Part No.
6-port replacement rotor WE series, 400 psi, 225°C	5181-7459
10-port replacement rotor WE series, 400 psi, 225°C	5181-7460
6-port replacement rotor WT series, 300 psi, 350°C	1535-4952
10-port replacement rotor WT series, 300 psi, 350°C	1535-4954



Stratum PTC Sample Concentrator

Teledyne Tekmar Purge and Trap Supplies

Glassware for Tekmar Purge and Trap Concentrators

Description	Part No.
5 mL frit sparger (glassware only)	5182-0852
25 mL frit sparger (glassware only)	5182-0851
5 mL fritless sparger (glassware only)	5182-0850
25 mL fritless sparger (glassware only)	5182-0849
5 mL needle sparger (glassware only)	5182-0848
25 mL needle sparger (glassware only)	5182-0847
5 mL frit sparger kit with fittings	5182-0846
25 mL frit sparger kit with fittings	5182-0845
5 mL fritless sparger kit with fittings	5182-0844
25 mL fritless sparger kit with fittings	5182-0796
5 mL needle sparger kit	5182-0795
25 mL needle sparger kit	5182-0794

Traps for Teledyne Tekmar Stratum Purge and Trap Concentrator

Description	Part No.
Trap, BTEX + MTBE	5188-8813
Trap #5,OV-1/Tenax/Silica Gel/Charcoal	5188-8814
Trap #8, Carbopak B/Carbosieve S-III	5188-8815
Trap #9, Proprietary	5188-8816
Trap, Tenax/Silica Gel/Carbosieve S-III	5188-8817
Strat-Trap, Tenax/Silica Gel, #2	5188-8818
Strat-Trap,Tenax/Silica Gel/Charcoal, #3	5188-8819
Trap, VOCARB 3000	5188-8820
Trap, VOCARB 4000	5188-8821
Trap, BTEX	5188-8822

Traps for Teledyne Tekmar Velocity Purge and Trap Concentrator

Description	Part No.
Trap, Vocarb 3000	5188-2795
Trap, Vocarb 4000	5188-2796
Trap, Tenax #1	5188-2790
Trap, Tenax/Silica gel/Charcoal, 12 in. x 1/8 in. #3	5188-2791
Trap, Tenax/Charcoal, 12 in. x 1/8 in. #4	5188-2792
Trap, OV-1/Tenax/Silica gel/Charcoal, 12 in. x 1/8 in. #5	5188-2794
Trap, OV-1/Tenax/Silica gel, 12 in. x 1/8 in. #6	5188-2793
Trap, BTEX	5188-2797



Markes Thermal Desorption system

NEW! Markes Thermal Desorption

Agilent now offers a comprehensive line of supplies for Markes Thermal Desorption (TD) instrumentation. Thermal desorption allows the introduction of volatile and semi-volatile compounds from a wide range of sample matrices, directly into a GC or GC/MS.

Markes Thermal Desorption Supplies

Description	Unit	Part No.
O-rings, Markes 7 mm cold trap seals	10/pk	MKI-U-COV07
O-rings, Markes 6 mm cold trap seals	10/pk	MKI-U-COV06
PTFE filter disks, 5.1 mm Markes TD	10/pk	MKI-U-DISK1
PTFE filter disks, 6.3 mm Markes TD	10/pk	MKI-U-DISK3
Spare general purpose carbon cold trap		MKI-U-T11GPC
Sampling tube, Tenax TA, Markes Unity		MKI-UTD-5105
Quick fit connectors, Markes Unity	10/pk	MKI-C-QSC10
Stainless steel difflok cap, Markes Unity		MKI-MTD-1169
Silcosteel difflok cap, Markes Unity		MKI-MTD-1204
O-ring insertion tool, Markes Unity TDI		MKI-Z-0285
O-ring extraction tool, Markes Unity TDI		MKI-Z-0351
Cold trap alignment tool, Markes Unity		MKI-UTD-5064
Cold trap, air toxics, C2-C14, Unity 2		MKI-U-T3ATX-2S
Cold trap, air toxics, C2-C14, Unity		MKI-U-T3ATX
Cold trap, materials emissions, Unity		MKI-U-T12ME
Cold trap, GP Carbon, C4/5-C30/32, Unity 2		MKI-U-T11GPC-2S
O-rings, 010 Markes Unity	10/pk	MKI-U-COV10
Cold trap, materials emissions, Unity 2		MKI-U-T12ME-2S
Empty stainless steel TD tubes	10/pk	C-TBE10
Tenex stainless steel tubes, preconditioned/capped	10/pk	C-TBP1TC
Empty glass TD tubes	10/pk	C-GT010
PTFE inserts	10/pk	C-PL010
Long term TD tube storage caps	10/pk	C-CF020
Cap-LOK Tool for long term storage caps		C-CPLOK

Markes Thermal Desorption Supplies

Description	Unit	Part No.
Diffusive sampling caps	10/pk	C-DF010
Bio-VOC breath samplers	10/pk	C-BIO10
Disposable card mouth piece for Bio-VOC	10/pk	C-B010M
Tenax TA 34-60 Mesh, 10 g		C-TNXTA
General purpose hydrophobic tubes, stainless steel Preconditioned and capped with 1/4 in. brass storage caps. For pumped sampling n-C_5 to C_{20}.	10/pk	C-HY010C
Tenax/S'carb 'Sulphur' tubes Preconditioned and capped with 1/4 in. brass storage caps. For odor and landfill gas analysis.	10/pk	C-102SSC
Carbograph 1 stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped C_5-C_{14} plus diffusion of BTX.	10/pk	C-TBP1C1C
Carb X stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped/diffusion 1.3-butadiene & benzene.	10/pk	C-TBP1CXC
Air toxics (TO-17) stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps. For pumped sampling VOCs n-C_3 to n-C_{12}.	10/pk	C-AT010C
Universal stainless steel tubes Preconditioned and capped with 1/4 in. brass storage caps.	10/pk	C-UN010C
Glass tubes with 1 cm Tenax For direct liquid injection.	10/pk	C-G1CM10
Glass air toxics (TO-17) tubes Pre-packed with 2 carbon based sorbents preconditioned and capped with 1/4 in. brass storage caps.	10/pk	C-GAT010C
CRS BTX Standards, 1 µg	10/pk	C-BTX1UG

Automatic Liquid Sampler Supplies

Automatic Liquid Sampler Supplies

Description	Unit	Part No.
4 mL wash vial with screw caps	144/pk	9301-0723
Diffusion inserts for 4 mL vials	12/pk	07673-40180
Septa for 4 mL vial	144/pk	9301-1031
4 mL wash vials with fill markings and caps	25/pk	5182-0551
Screw for mounting syringe		07673-20570
Quadrant tray (4 tray sections)		18596-40015
7673 Basic Supply Kit Contains 10 µL syringes (6/ea), 23/26 gauge needles, 4 mL vials with diffusion caps (144/pk), 2 mL automatic sampler vials with screw caps (1,000/pk), GC septa (25/pk), vial racks (5/pk)		07673-60840



Bar code reader labels

Bar Code Reader Labels

Description	Part No.
Labels numbered (1,000/roll)	
1 to 1,000	5958-9450
1,001 to 2,000	5958-9441
2,001 to 3,000	5958-9442
3,001 to 4,000	5958-9443
4,001 to 5,000	5958-9444
5,001 to 6,000	5958-9445
Label applicator	18587-60560

Tips & Tools

For the newest ALS technology and supplies, visit **www.agilent.com/chem/ALSsupplies**.

Headspace Supplies

G1883A Network Headspace Supplies

Description	Part No.
Needles	
Needle, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle for transfer line, 0.25 mm ID, 0.5 mm OD, nickel	301-016-HSP
Needle, headspace transfer line, deactivated 0.7 mm OD	2322590005
Needle for transfer line, 0.4 mm ID, 0.8 mm OD, nickel	301-015-HSP
Needle assembly vial probe, deactivated	232-2790012-EHS
Needle assembly vial probe, nickel	232-2790010-EHS
Fittings	
Union elbow M5	998-0000053-EHS
Transfer line nut	19258-20830
Transfer line ferrule	19258-20870
Union FF 6MB, 5-piece set	325-062-HSP
Union T6 MB, 5-piece set, brass	325-132-HSP
Union T5 MA	325-185-HSP
Valves	
Restrictor, stainless steel	321-002-HSP
Valve, solenoid vent kalrez	3600500001
Valve, solenoid vial pressurization	3600500002
Tubing and Transfer Lines	
Sample loop, 1 mL, deactivated	2321700003
Sample loop, 1 mL, nickel	321-055-HSP
Sample loop, 3 mL, deactivated	2321700004
Sample loop, 3 mL, nickel	321-056-HSP
Oven adaptor for 10 mL vials	301-017-HSP
Tube, needle, 6-port valve, deactivated	301-212-HSP
Tube, needle, 6-port valve, nickel	301-169-HSP
Tube, vent-valve stainless steel	301-170-HSP
Sensor tube, 125 mm PTFE	321-057-HSP
Transfer line, deactivated, 1 m	301-211-HSP
Transfer line, 1 m, nickel	301-152-HSP
Transfer line, 80 cm, nickel	301-011-HSP
Repair, Leak Test, and OQ/PV Supplies	
Strain relief septum nut	301-205-HSP
Headspace leak test kit	G1888-60701
OQ/PV Headspace Sample	5182-9733

Tips & Tools

For a complete selection of headspace vials see page 51



G1888A Headspace unit

G1888A Network Headspace Sampler Supplies

Description	Part No.
Needles	
Needle, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle, headspace transfer line, deactivated 0.7 mm OD	2322590005
Fittings	
Union, zero dead volume, deactivated	2307230001
Bulkhead fitting, stainless steel	2307833901
M6 union, brass	2302533140
Tee, brass	2304533140
M5 union, brass	2302532140
Valves	
Valve, solenoid vent kalrez	3600500001
Valve, solenoid vial pressurization	3600500002
Tubing and Transfer Lines	
Strain relief septum nut	301-205-HSP
Sample probe, deactivated	2322700011
Sample loop, 3 mL, deactivated	2321700004
Tube, probe to 6-port valve, deactivated	1300502506
Tubing, solenoids to 6-port, deactivated	0410105017
Tube, vent deactivated	1300530001
Tube, tee to pressure PCA	1300530010
Repair, Leak Test, and OQ/PV Supplies	
Transfer line, deactivated	0410103101
Tray chain link repair kit	0410205001
Headspace leak test kit	G1888-60701
OQ/PV Headspace Sample	5182-9733



7694 Headspace Sampler Supplies

Description	Part No.
Needles	
Needle, headspace transfer line, deactivated 0.5 mm OD	2322590004
Needle for transfer line, 0.25 mm ID, 0.5 mm OD, nickel	301-016-HSP
Needle, headspace transfer line, deactivated 0.7 mm OD	2322590005
Needle for transfer line, 0.4 mm ID, 0.8 mm OD, nickel	301-015-HSP
Needle assembly vial probe, deactivated	301-220-HSP
Needle assembly (vial probe)	301-013-HSP
Fittings	
Zero dead volume union	325-045-HSP
Transfer line nut	19258-20830
Transfer line ferrule	19258-20870
Union FF 6MB, 5-piece set	325-062-HSP
Union T6 MB, 5-piece set, brass	325-132-HSP
Union T5 MA	325-185-HSP
Valves	
Valve, solenoid vent kalrez	3600500001
Valve, solenoid vial pressurization	3600500002
Tubing and Transfer Lines	
Sample loop, 1 mL, deactivated	2321700003
Sample loop, 1 mL, nickel	321-055-HSP
Sample loop, 3 mL, deactivated	2321700004
Sample loop, 3 mL, nickel	321-056-HSP
Tube, needle, 6-port valve, deactivated	301-212-HSP
Tube, needle, 6-port valve, nickel	301-169-HSP
Tube, vent-valve stainless steel	301-170-HSP
Sensor tube, 125 mm PTFE	321-057-HSP
Restrictor, stainless steel	321-002-HSP
Transfer line, deactivated, 1 m	301-211-HSP
Transfer line, 1 m, nickel	301-152-HSP
Transfer line, 80 cm, nickel	301-011-HSP
Repair, Leak Test, and OQ/PV Supplies	
Strain relief septum nut	301-205-HSP
Oven adaptor for 10 mL vials	301-017-HSP
Tray adaptors for 10 mL vials, 25/pk	300-301-HSP
Headspace leak test kit	G1888-60701
OQ/PV Headspace Sample	5182-9733



7890 Turn Top Inlet System

Convenient new turn top design is built into each 7890 split/splitless inlet, allowing you to change liners in less than 30 seconds without special tools or training.

7890 Turn Top Inlet System

Description	Part No.
Turn top	G3430-40035
Split ring	0510-1306
Certified non-stick fluorocarbon O-ring	5188-5365





Flip Top Inlet Sealing System

Agilent's Flip Top Inlet Sealing System is the faster, smarter way to change inlet liners on Agilent 6890, 6850 and 5890 GC's.

- Cuts liner replacement time to as little as 30 seconds
- Eliminates frustrating searches for special wrenches or tools
- Improves inlet ergonomics – no more handling of heated parts, no more burns or scrapes
- Decreases downtime and increases productivity
- Minimizes exposure to ambient air extending column life
- Installs easily in 15 minutes (customer installable)

Available exclusively from Agilent, the Flip Top has a levered arm that attaches to any 6890/6850/5890 insert weldment and locks to the injection port using an adapter ring screwed onto the inlet. Once installed, the user simply lifts the arm of the Flip Top which releases the insert weldment from the injection port, and allows instant access to the liner. The process is simply reversed to reseal the weldment to the port.

Description	Part No.
Flip Top Inlet Sealing System For 6890, 6850, 5890 only; Not compatible with 7890	5188-2717
Non-Stick fluorocarbon liner O-ring for Flip Top, 10/pk	5188-5366



Flip Top Inlet Sealing System installation kit, 5188-2717



QuickPick Splitless PM Kit, 5188-6497



QuickPick Purged Packed PM Kit, 5188-6498



Split Vent Trap PM Kit, 5188-6495

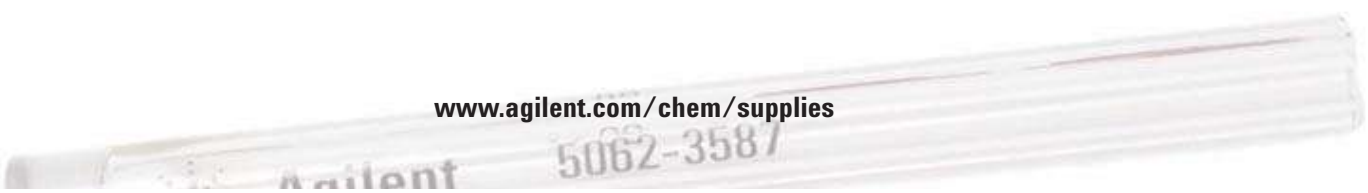
Agilent Inlet Convenience Kits

Convenience kits are an easy way to get all the supplies you need using one part number. Agilent's new PM kits include septa, liners, o-rings, gold seals, and traps.

Agilent Inlet Convenience Kits

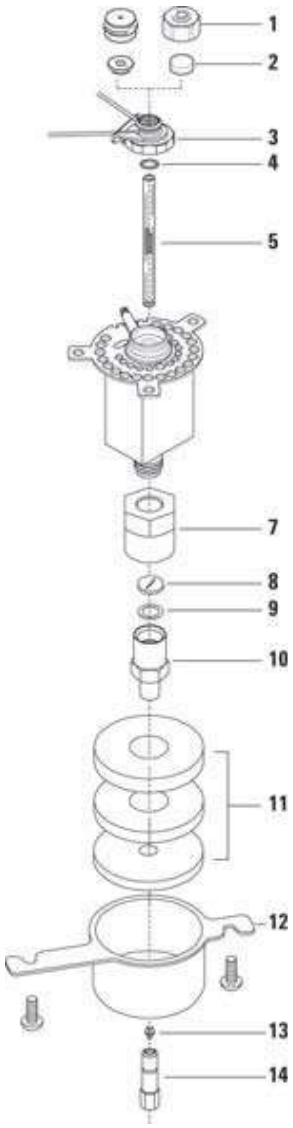
Description	Part No.
QuickPick Split Inlet PM Kit Includes 5 non-stick BTO septa, 1 split liner, 1 non-stick liner O-ring, and inlet gold seal kit	5188-6493
QuickPick Split Vent and Inlet PM Kit Includes 5 non-stick BTO septa, 1 split liner, 1 non-stick liner o-ring, inlet gold seal kit, and split vent trap with 2 O-rings	5188-6496
QuickPick Splitless Inlet PM Kit Includes 5 non-stick BTO septa, 1 splitless liner, 1 non-stick liner O-ring, and inlet gold seal kit	5188-6494
QuickPick Splitless Vent and Inlet PM Kit Includes 5 non-stick BTO septa, 1 splitless liner, 1 non-stick liner o-ring, inlet gold seal kit, and split vent trap with 2 O-rings	5188-6497
QuickPick Purged Packed Inlet PM Kit Includes 5 non-stick BTO septa, 1 O-ring, 1 ferrule, and 1 disposable glass liner	5188-6498
Split vent trap PM kit for Split/Splitless, Volatiles, and PTV Septumless Inlet split vent line Includes 1 cartridge and 2 O-rings	5188-6495





Split/Splitless Inlets

The combined split/splitless inlet is the most popular inlet for capillary column gas chromatography. Because it can be used in either split or splitless mode, it provides a very effective combination that can cover most analysis requirements.



Split/Splitless Inlet assembly

7890/6890/6850 Split/Splitless Inlet Supplies

Item	Description	Unit	Part No.
	QuickPick Split Inlet PM Kit		5188-6493
	QuickPick Split Vent and Inlet PM Kit		5188-6496
	QuickPick Splitless Inlet PM Kit		5188-6494
	QuickPick Splitless Vent and Inlet PM Kit		5188-6497
1	Headspace septum retainer nut		18740-60830
	Septum retainer nut		18740-60835
2	11 mm non-stick BTO septa	50/pk	5183-4757
	For complete offering of premium septa, see pages 148–150		
3	7890 Insert Weldment		
	Top insert assembly, standard		G3452-60730
	Top insert weldment assembly, headspace		G3452-60100
	Top insert, AC gang fitting weldment		G3430-60011
	Top insert assembly, valve		G3480-67585
	6890 Insert Weldment		
	S/SL insert weldment. Used with large charcoal canister type filter, for 6890/6850		G1544-60585
	S/SL insert assembly for G1540A with valved system option. This insert assembly uses the large charcoal canister split vent filter, for 6890/6850		G1580-60585
	Similar to G1544-60575 except carrier lines separated for interface to valved systems of a G1540A instrument		G1580-60575
	Original standard EPC using 1/4 in. split vent filter		G1544-60575
	Similar to G1544-60575 except allowed insertion for 1/4 in. chemical filters to clean carrier gas for ECD operation		G1544-80580
	Insert Weldment Standard manual pneumatics		19251-60575
4	Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
	Graphite O-ring for Split liner	10/pk	5180-4168
	Graphite O-ring for Splitless liner	10/pk	5180-4173
5	Split liner, single taper, low pressure drop, glass wool	1/pk 25/pk	5183-4647 5183-4702
	Splitless liner, single taper	1/pk 25/pk	5181-3316 5183-4696
	For complete offering of liners, see pages 154–156		





Gold plated seal kit, 5188-5367



Reducing nut, 18740-20800

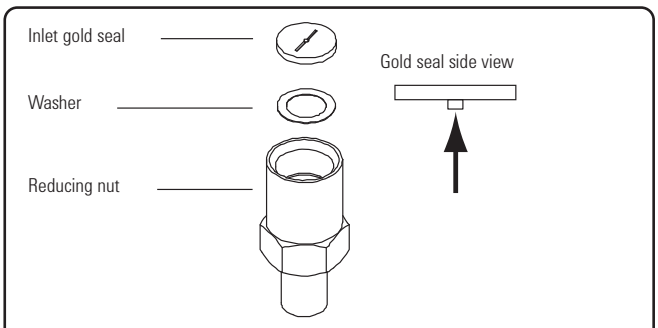
7890/6890/6850 Split/Splitless Inlet Supplies

Item	Description	Unit	Part No.
6	Split vent trap kit		G1544-60610
	Replacement cartridge Includes 2 cartridges and 4 O-rings		G1544-80530
	Split vent trap PM kit Includes 1 cartridge and 2 O-rings		5188-6495
7	Retaining nut		G1544-20590
8	Stainless steel seal		18740-20880
	Certified gold plated seal kit, includes washer[1] Replacement for 18740-20885		5188-5367
	Gold-plated seal with cross[2]		5182-9652
9	Washers, 0.375 OD	12/pk	5061-5869
10	Reducing nut		18740-20800
11	Insulation Kit, 3 pieces		5188-5241
12	Lower insulation cover		19243-00070
13	Ferrules		
14	Universal column nut	2/pk	5181-8830
	6850 column nut	2/pk	5183-4732
	Split/splitless septum nut angled wrench		19251-00100
	Flip Top Inlet Sealing System For 6890, 6850, 5890 only; Not compatible with 7890		5188-2717
	Capillary Inlet Evaluation Sample (Split Mode)		8500-4789
	Capillary Inlet Supplies Kit, Includes:		5181-8838
	Certified gold plated seal kit, includes washer		5188-5367
	Liner, split, straight, glass wool, non-deactivated	4 each*	19251-60540
	Liner, splitless, single-taper, glass wool, deactivated	2 each*	5062-3587
	Certified non-stick fluorocarbon O-ring	10/pk*	5188-5365
	Liner, direct, 2 mm ID, deactivated		5181-8818
	11 mm non-stick BTO septa	50/pk*	5183-4757
	Capillary inlet cleaning wires	5/pk*	5180-4153

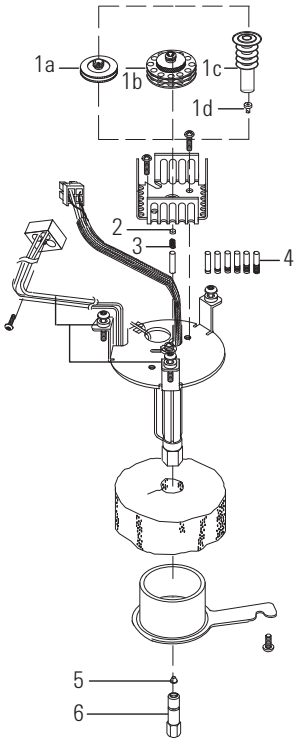
[1]Use with total inlet flow rates of less than 200 mL/min

[2]Use with total flow rates of greater than 200 mL/min

*Quantity when part ordered individually



Gold seal on the split/splitless inlet



Cool On-Column Inlet assembly

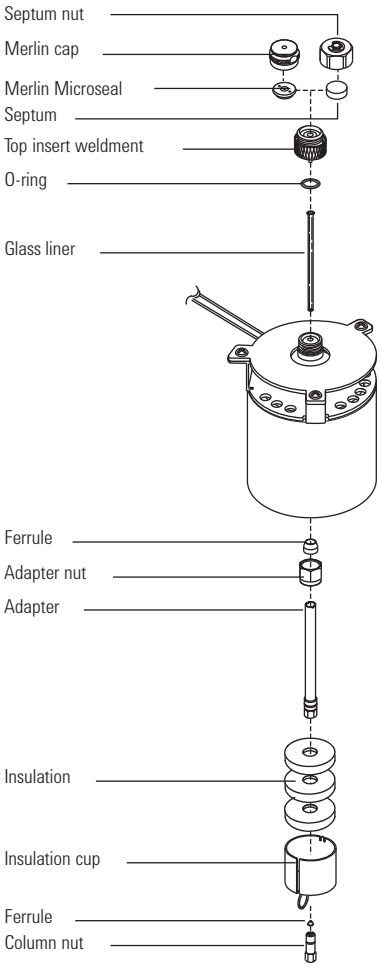
Cool On-Column Inlets

Cool on-column injection is superior in many ways to other sample introduction techniques. Advantages include:

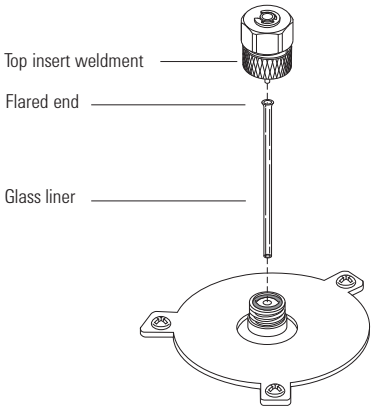
- Elimination of sample discrimination
- Elimination of sample alteration
- Solvent focusing of early eluting solutes
- High analytical precision

7890/6890 Cool On-Column Inlet Supplies

Item	Description	Unit	Part No.
Automatic Injection			
1a	Septum nut base for 320 mm assembly		19245-80521
1b	Septum nut base for 530 mm assembly		G1545-80520
2	Advanced Green Inlet Septa, 5 mm	50/pk	5183-4760
	BTO Inlet Septa , 5 mm	50/pk	5183-4758
Manual Injection			
1c	Cooling tower assembly		19320-80625
1d	Duck bill	10/pk	19245-40050
Fused silica syringe needles		6/pk	19091-63000
On-column syringe, fused silica (barrel only)			9301-0658
Common Supplies			
3	Spring		19245-60760
4	Inserts for capillary columns		
	For 200 µm columns, 1 ring		19245-20510
	For 250 µm columns, 6 rings		19245-20515
	For 320 µm columns, 5 rings		19245-20525
	For 530 µm columns, no rings		19245-20580
	For 530 µm Al clad columns, 4 rings		19245-20780
5	320 µm, 0.5 mm ID graphite ferrule		5080-8853
6	Universal column nut	2/pk	5181-8830



Purged Packed Inlet assembly



Glass Liner on Purged Packed Inlet

Purged Packed Inlets

Packed column analysis is frequently done when high efficiency separations are not needed or when gases are analyzed by gas-solid chromatography. Purged packed inlets are simple in both design and use. Few parameters need to be set, and all carrier gas flow flushes through the inlet into the column in the standard configuration.

7890/6890/6850 Purged Packed Inlet Supplies

Description	Unit	Part No.
QuickPick Purged Packed Inlet PM Kit Includes 5 non-stick BTO septa, 1 O-ring, 1 ferrule, and 1 disposable glass liner		5188-6498
Merlin Microseal		5182-3444
Microseal high pressure nut		5182-3445
Septum retainer nut		18740-60835
11 mm non-stick BTO septa	50/pk	5183-4757
Top insert weldment		19243-80570
O-ring, Fluorocarbon	12/pk	5080-8898
Disposable glass liner, 170 µL internal volume	25/pk	5080-8732
Disposable glass insert, deactivated	5/pk	5181-3382
Ferrule, 1/4 in. Vespel	10/pk	5080-8774
1/4 in. nut, brass	10/pk	5180-4105
530 µm column adapter for use with glass liners		19244-80540
1/8 in. column adapter for use with glass liners		19243-80530
1/4 in. column adapter for use with glass liners		19243-80540
Insulating cup		19234-60720
Universal column nut	2/pk	5181-8830

Nuts and Ferrules for 1/8 in. Packed Columns

Description	Unit	Part No.
1/8 in. stainless steel nut and ferrule set	20/pk	5080-8751
1/8 in. brass nut and ferrule set	20/pk	5080-8750
Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332

Programmed Temperature Vaporizer (PTV) Inlets

PTV inlets combine the benefits of split, splitless and on-column inlets. The sample is usually injected into a cool liner, so syringe needle discrimination does not occur. Then the inlet temperature is increased to vaporize the sample. The user programs vent times and temperature to achieve the equivalent of split or splitless transfer of sample vapors to the column. PTV injection is considered the most universal sample introduction system because of its flexibility.



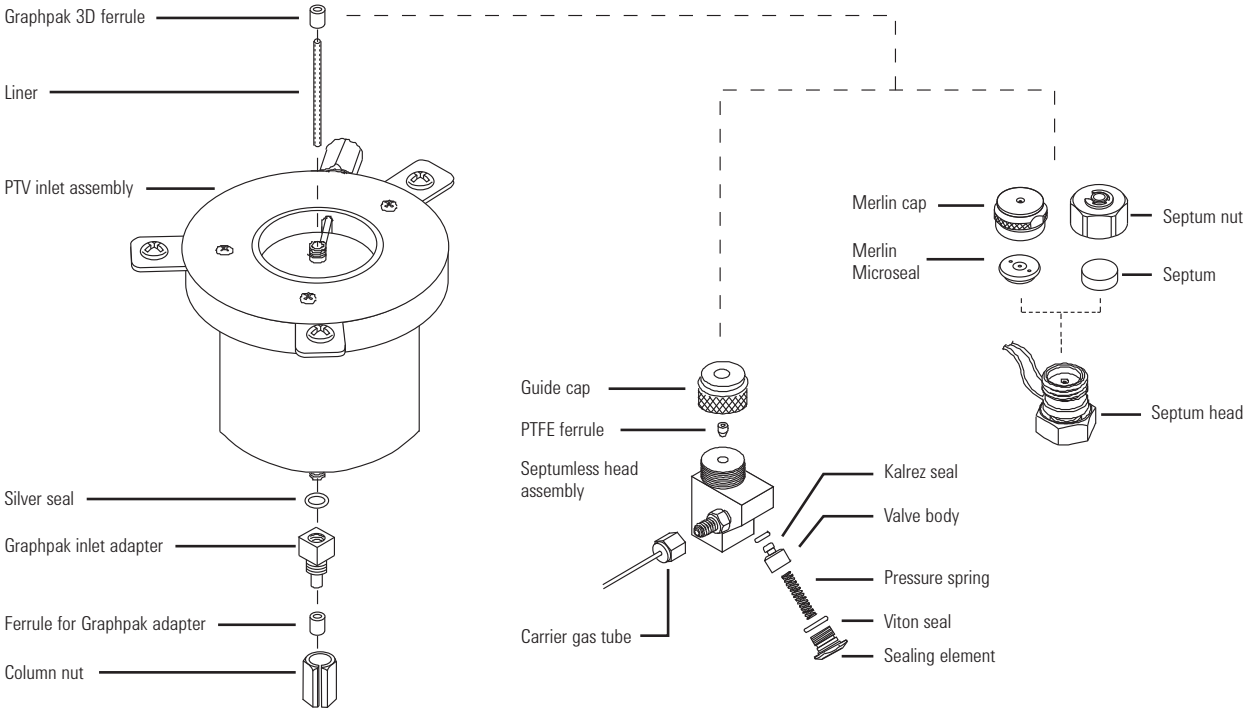
Tips & Tools

For new PTV technology and supplies, visit **www.agilent.com/chem/PTVsupplies**

7890/6890 Septumless PTV Inlet Supplies

Description	Column ID (mm)	Unit	Part No.
Microseal high pressure nut			5182-3445
Merlin Microseal			5182-3444
Septumless head			G2617-60507
Septum head			G2618-80500
Septum retainer nut			18740-60835
PTV inlet assembly			G2617-60506
PTV LCO_2 cooling jacket			G2617-60508
PTV LN_2 cooling jacket			G2619-60501
Silver seal		5/pk	5182-9763
Graphpack 2M inlet adapter	0.20		5182-9754
	0.25-0.33		5182-9761
	0.53		5182-9762
Ferrules for Graphpak 2M inlet	0.20		5182-9756
	0.25		5182-9768
	0.32		5182-9769
	0.53		5182-9770
Replacement Graphpak column nut			5062-3525
PTV insulation block			G2617-20510
PTV Cryo insulator			G2617-60510
Teflon ferrule (needle seal)		10/pk	5182-9748
Kalrez seal			5182-9759
Valve body			5182-9757
Pressure spring			5182-9758
Viton seal		5/pk	5182-9775
Sealing element			5182-9760
CO_2 Cryo inline filter			3150-0602
Service kit for septumless head Contains Kalrez seal, valve body, and pressure spring			5182-9747
Graphpak 3D ferrules		5/pk	5182-9749
Assembly tool for Graphpack 3D ferrules			G2617-80540

Septumless Programmable Temperature Vaporizing (PTV) Inlet assembly

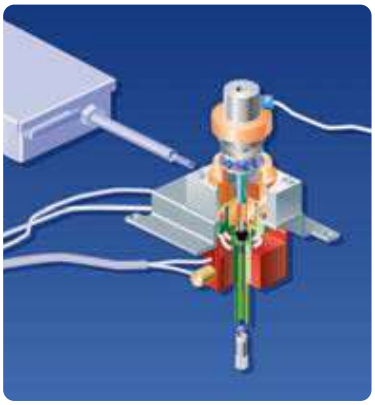


Programmable Temperature Vaporizing (PTV) Liners

Description	ID (mm)	Volume (µL)	Part No.
Liners for Septumless PTV Inlet			
PTV liner, single baffle, glass wool, deactivated	2	180	5183-2038
PTV liner, single baffle, deactivated	2	200	5183-2036
PTV liner, multi baffled, deactivated	1.8	150	5183-2037
Liners for High Temperature PTV Inlet			
PTV liner, high temperature, quartz	3.4	713	5188-5313
PTV liner, high temperature, borosilicate	3.4	668	5188-5356
PTV liner, sintered glass, deactivated	1.5	112	5190-1426

Syringes for Septumless and High Temperature PTV Inlets

Volume (µL)	Description	Needle	Part No.
0.5	Removable	23/70/HP	5182-9651
5	Straight, fixed	23/42/HP	9301-0892
10	Straight, fixed	23/42/HP	9301-0713
50	Straight, fixed, for large volume injections	23/42/HP	5183-0318
100	Straight, fixed, for large volume injections	23/42/HP	5183-2058



Flame Ionization Detector (FID)

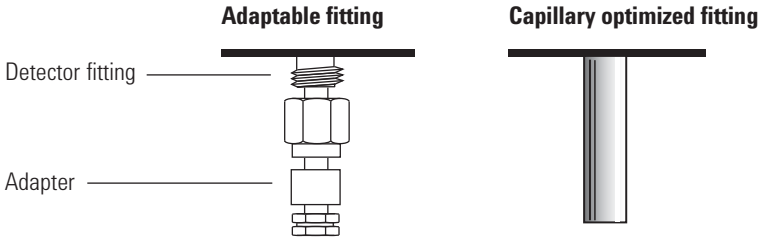
FID Jet Identification and Selection

Before ordering parts for FID maintenance, determine which type of FID is installed on your GC. The FID is available in two versions:

- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

To determine the type of FID installed on your GC, open the oven door and examine the fitting at the base of the detector. Compare to the following diagram.

Hint: Adaptable jets are longer than dedicated capillary jets.

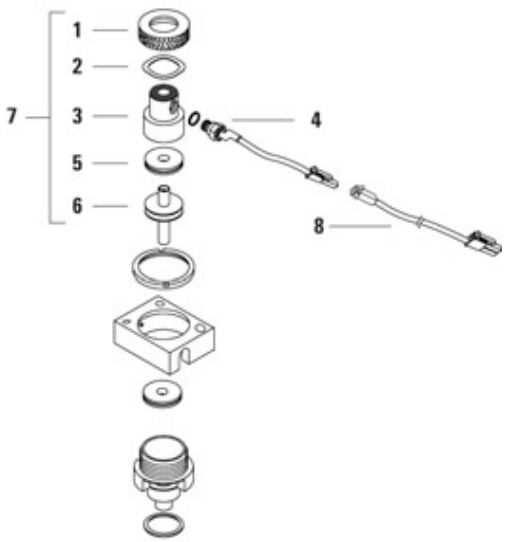


FID Jets

Description	Jet Tip ID	Length (mm)	Part No.
Jets for capillary optimized fittings			
Capillary	0.29 mm (0.011 in.)	48	G1531-80560
Capillary, high temperature Use with simulated distillation	0.47 mm (0.018 in.)	48	G1531-80620
Jets for adaptable fittings			
Capillary	0.29 mm (0.011 in.)	61.5	19244-80560
Capillary, high temperature Use with simulated distillation	0.47 mm (0.018 in.)	61.5	19244-80620
Packed	0.46 mm (0.018 in.)	63.5	18710-20119
Packed, wide-bore Use with high-bleed applications	0.76 mm (0.030 in.)	63.5	18789-80070

7890/6890/6850 Flame Ionization Detector (FID) Supplies

Item	Description	Unit	Part No.
	PTFE chimney (optional)		19231-21050
1	Collector nut		19231-20940
2	Spring washer	10/pk	5181-3311
3	Ignitor castle		19231-20910
	Hastelloy ignitor castle (optional)		19231-21060
4	Ignitor glow plug assembly		19231-60680
5	Collector insulator		G1531-20700
6	Collector body		G1531-20690
	Hastelloy Collector Body		G1531-21090
7	FID collector assembly		G1531-60690
	FID collector cleaning brush	2/pk	8710-1346
	Collector Housing		G1531-20740
	FID retainer nut wrench 5880, 5890, 6890		19301-00150
	1/4 in. nut driver for FID jet, drilled shaft		8710-1561
8	FID ignitor cable for 6890/6850 only		G1531-60680
	FID ignitor cable, 7890A only		G3431-60680
	FID performance evaluation sample kit This sample is used for the HP 5880, 5890 and 6890 with a FID or TCD. Solution of 0.033% C14, C15, and C16 normal alkanes in hexane. Three 0.5 mL ampoules.		18710-60170
	FID MDL test sample for 7890 only 3 x 0.5 mL ampoules. Contains 2.36 mg/L n-Tridecane, 2.36 mg/L n-Tetradecane, 23.6 mg/mL n-Penta- decane, 23.6 mg/mL n-Hexadecane in iso-octane		5188-5372



Flame Ionization Detector (FID) assembly

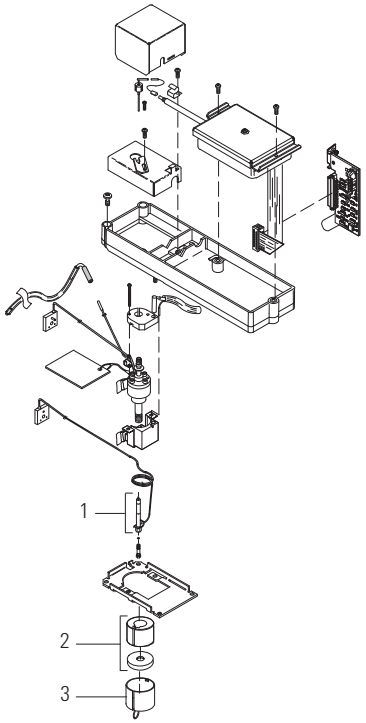


FID cleaning kit, 9301-0985

Flame Ionization Detector (FID) Supplies

Item	Description	Unit	Part No.
	O-rings	12/pk	5080-4978
	FID/NPD adapter for capillary column		19244-80610
	FID/NPD 1/8 in. packed column		19231-80520
	FID/NPD 1/4 in. packed column		19231-80530
	1/4 in. nut driver for FID jet, drilled shaft		8710-1561
	FID collector cleaning brush	2/pk	8710-1346
	FID Supplies Kit, Includes:		5182-3450
	Jet, packed standard 0.018 in. ID tip	3 each	18710-20119
	FID and TCD Sample	2 each	18710-60170
	Ignitor glow plug assembly	2 each	19231-60680
	Jet, 0.011 in. ID tip, capillary adaptable	3 each	19244-80560
	FID flow measuring insert	2 each	19301-60660
	Cleaning wires for 0.03 in. ID jet	5/pk	5180-4150
	Cleaning wire for 0.018 in. ID/530 µm jet	5/pk	5180-4152
	Wire, jet cleaning	5 each	19301-20720
	Capillary inlet cleaning wires	5/pk	5180-4153
	FID cleaning kit		9301-0985





Electron Capture Detector (ECD) assembly

Electron Capture Detector (ECD)

Liner Selection

The only assembly that requires routine maintenance is the glass liner in the makeup gas assembly, especially for the µECD. All sample passes through the indent in the mixing liner of the µECD. The mixing liner should be replaced if there is a significant loss of sensitivity or any time the column is removed/reinstalled in the detector.

7890/6890/6850 Electron Capture Detector (ECD) Supplies

Item	Description	Part No.
1	Standard ECD makeup gas adapter*	G1533-80565
	Micro ECD makeup gas adapter	G2397-80520
	Micro ECD mixing liner, also compatible with standard ECD design	G2397-20540
	ECD makeup gas adapter, 7890A only	G3433-67565
2, 3	Insulating cup	19234-60720
	Gigabore liner for standard ECD, polyamide coating, not compatible with micro ECD	19233-20625
	ECD adapter end cap	19233-20755
	Ferrule, 1/4 in. Vespel	5080-8774
	1/4 in. nut, brass	5180-4105
	Electron Capture Detector Sample	18713-60040
	ECD Test Sample	5183-0379
	Micro ECD wipe test kit	18713-60050

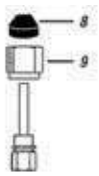
*Includes one each of P/N 19233-20625 and 19233-20755



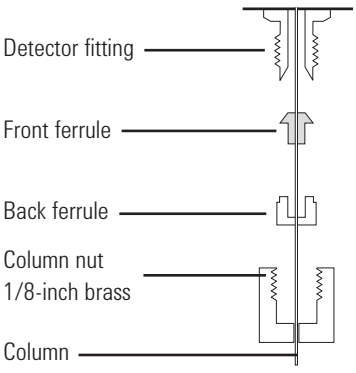
1/8 in. SS packed column



1/4 in. SS packed column



Standard design



Thermal Conductivity Detector (TCD)

The TCD compares the thermal conductivities of two gas flows – pure carrier gas (also called the reference gas) and carrier gas plus sample components (also called column effluent).

7890/6890/6850 Thermal Conductivity Detector (TCD) Supplies

Item	Description	Unit	Part No.
For 1/8 in. SS Packed Column Installation			
1	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
2	1/8 in. nut, brass	10/pk	5180-4103
For 1/4 in. SS Packed Column Installation			
3	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
4	1/8 in. nut, brass	10/pk	5180-4103
5	1/4 in. Packed Column Adapter		G1532-20710
6	Ferrule, 1/4 in. Vespel	10/pk	5080-8774
7	1/4 in. nut, brass	10/pk	5180-4105
For Capillary Column Installation (Standard)			
	TCD Capillary Column Adapter		G1532-80540
8	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
9	1/8 in. nut, brass	10/pk	5180-4103
	Universal column nut	2/pk	5181-8830
	6850 column nut	2/pk	5183-4732
	530 µm, 1.0 mm ID graphite ferrule	10/pk	5080-8773
	320 µm, 0.5 mm ID graphite ferrule	10/pk	5080-8853
	Thermal Conductivity Detector Sample		18711-60060
	FID and TCD Sample		18710-60170

TCD Ferrules

Column ID (mm)	Back Ferrules	Front Ferrules, 10/pk
0.53	5182-3477	5182-9673
0.32	5182-3477	5182-9676
0.25 / 0.2 / 0.1	5182-3477	5182-9677
No hole	5182-3477	5182-9679
TCD Back Ferrule for 1/8in detector fitting 10/pk	5180-4103	

Determining the TCD Electronic Pressure Control (EPC)

If you have a 6890A or 6890A Plus GC, you may have an older design EPC Flow manifold for the TCD. The older design requires removal of sheet metal panels to attached the TCD reference flow gas supply inside the GC. The new "Minifold" design allows TCD reference gas to be connected directly to the back of the GC. Replacement TCD filament block assemblies have different part numbers depending on the EPC design type.

Once you have determined the type of EPC module, decide whether to order a passivated filament block assembly. The passivated assembly is recommended for fatty acid analysis or reactive/acidic samples.

TCD Filament Block Assemblies

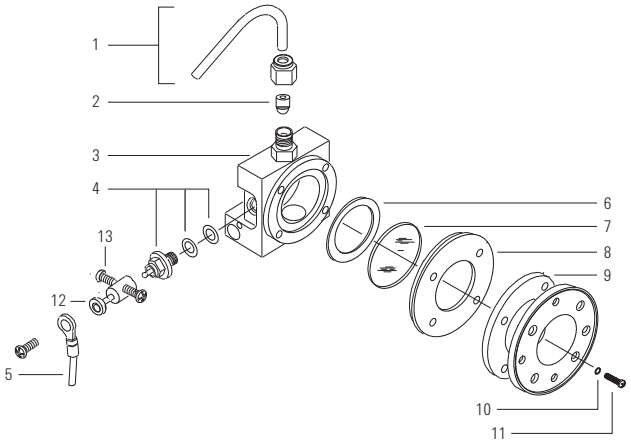
Instrument	Passivated	Applications	Specifications	EPC Design	Part No.
7890A	Yes	Standard TCD Analysis Gases/Hydrocarbons	Filament Block Only Must reuse heater/sensor	Original	G3432-67685
6890	No	Standard TCD Analysis Gases/Hydrocarbons	Filament Block Only Must reuse heater/sensor	Original	G1532-60675
6890	No	Standard TCD Analysis Gases/Hydrocarbons	Filament Block Only Must reuse heater/sensor	Minifold	G1532-60685
6890	Yes	Recommended for Fatty Acid Analysis	Filament Block Only Must reuse heater/sensor	Original	G1532-60690
6890/6850	Yes	Recommended for Fatty Acid Analysis	Filament Block Only Must reuse heater/sensor	Minifold	G1532-60695
6890/6850	No		Complete Detector Assembly Includes detector palette and heater/sensor assembly	Minifold	G2630-61230

Flame Photometric Detector (FPD)

In 2005, Agilent released an improved FPD with minimum detectable levels (MDL) of 3.6 pg/sec for sulfur and 60 fg/sec for phosphorus. This is more than a 5x improvement for sulfur. The updated design is based on a one-piece, deactivated transferline jet assembly and improved optics. Upgrade kits are available.

7890/6890/6850 FPD Ignitor and Heat Shield Assembly

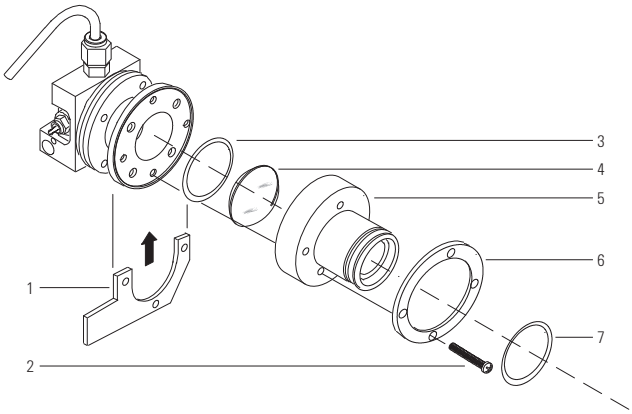
Item	Description	Part No.
1	FPD Exit Tube Assembly	
	Aluminum	19256-60700
	stainless steel	19256-20705
2	Ferrule, 1/4 in. Vespel, 10/pk	5080-8774
3	Emission chamber, single	
	FPD single	19256-80560
	FPD, dual	19256-80600
4	FPD igniter replacement kit Includes items A, B, C	19256-60800
	A. O-ring, size 2-010	
	B. Spacer, ignitor	
	C. Glow plug	
5	Igniter cable assembly	G1535-60600
6	Heat shield gasket, white	19256-80045
7	First heat shield window	19256-80030
8	Heat shield disk	19256-20580
9	Stainless steel coupling	19256-20550
10	Lock washer (4 required)	2190-0584
11	Screw, M3 x 12, T10 (4 required)	0515-1084
12	Collar	19256-20690
13	Screw, M3 x 66 mm, T10	0515-0680
	Flame Photometric Detector Check Out Sample	5188-5953
	Flame Photometric Detector Sample	5188-5245



FPD ignitor and heat shield assembly

FPD Lens Assembly

Item	Description	Part No.
1	Clamp	19256-00090
2	Screw, M3 x 25 (4 required)	0515-0683
3	Window O-ring, inner, 0.926 in. ID, orange	5061-5886
4	Convex lens	1000-1438
5	Lens housing	19256-20900
6	Flange ring	19256-00200
7	Fluorocarbon Elastomer O-ring, brown, 1.239 in. ID	5061-5890



FPD lens assembly

FPD PMT and Bracket Assemblies

Description	Part No.
Chimney back cover	G1535-80520
Heator/sensor assembly	G1535-60610
Transfer line support bracket	19256-00320
Bracket/support	G1535-00010
Sulfur filter, 7890 and late model 6890*	1000-1437
Sulfur filter, blue, early model 6890*	19256-80000
Phosphorus filter, yellow	19256-80010
Filter spacer (used only with sulfur filter)	19256-20910
PMT housing assembly	19256-60510
Dual FPD chimney front	G1535-00030

*Please contact Agilent technical support for assistance in selecting the correct sulfur filter for your 6890 FPD detector.



Nitrogen Phosphorus Detector (NPD)

NEW! NPD Beads

The NPD for the 7890/6890 GC features a ceramic bead selective for nitrogen and phosphorous compounds. Agilent offers three beads:

- Blos bead
- White ceramic bead
- Black ceramic bead

Compared to the white ceramic bead, the new Blos bead provides:

- Superior bead lifetime
- Faster attainment of stable operation at initial start-up, as well as more stable operation throughout bead's lifetime
- Superior sensitivity and selectivity for phosphorous containing compounds
- Similar sensitivity and selectivity for nitrogen containing compounds
- Superior immunity to moisture

The white ceramic bead exhibits some tailing for phosphorous compounds. The black ceramic bead does not exhibit peak tailing and typically has a longer lifetime than the white bead; however, it is less sensitive.

All Agilent NPD beads are preconditioned and come with a proof-of-performance chromatogram. They are also self-aligning for easy installation.

NPD Beads

Description	Part No.
Blos NPD bead assembly	G3434-60805
NPD white ceramic bead assembly	G1534-60570
NPD black ceramic bead assembly	5183-2007

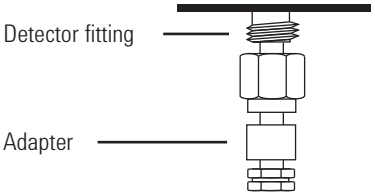
NPD Jet Identification and Selection

Before ordering parts for NPD maintenance, determine which type of NPD is installed on your GC. The NPD is available in two versions:

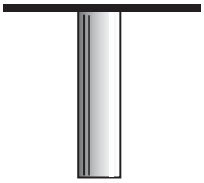
- Dedicated, Capillary Optimized: for capillary columns only
- Adaptable: for packed or capillary columns

Hint: Adaptable jets are longer than dedicated capillary jets.

Adaptable fitting

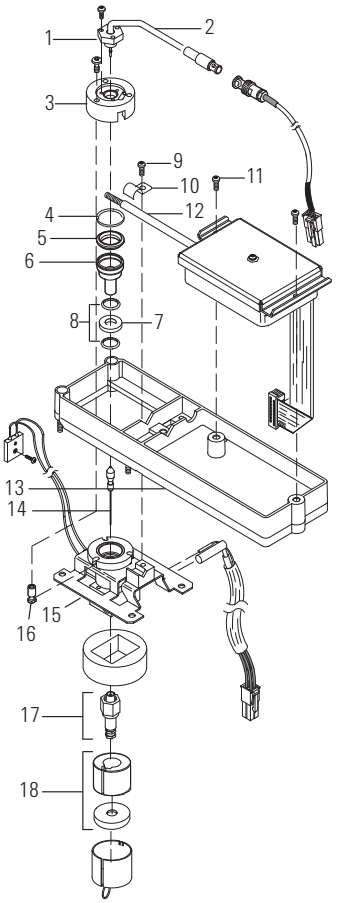


Capillary optimized fitting



NPD Jets

Description	Jet Tip ID	Length (mm)	Part No.
Jets for capillary optimized fittings			
Capillary with extended jet (recommended)	0.29 mm (0.011 in.)	51.5	G1534-80580
Capillary	0.29 mm (0.011 in.)	48	G1531-80560
Capillary, high temperature	0.47 mm (0.018 in.)	48	G1531-80620
Jets for adaptable fittings			
Capillary with extended jet (recommended)	0.29 mm (0.11 inch)	70.5	G1534-80590
Capillary	0.29 mm (0.011 in.)	61.5	19244-80560
Capillary, high temperature	0.47 mm (0.018 in.)	61.5	19244-80620
Packed	0.46 mm (0.018 in.)	63.5	18710-20119



Nitrogen Phosphorus Detector (NPD) assembly

7890/6890/6850 Nitrogen Phosphorus Detector (NPD) Supplies

Item	Description	Part No.
1	Screws, M3 x 0.5, 8 mm (Pozidriv)	0515-0655
2	Blos NPD bead assembly	G3434-60805
	NPD white ceramic bead assembly	G1534-60570
	NPD black ceramic bead assembly	5183-2007
3	Lid weldment	G1534-80510
4	Metal C-ring, top	0905-2580
5	Alumina insulator, upper	G1534-40020
6	Collector funnel	G1534-20530
7	Alumina insulator, lower	G1534-40030
8	Metal C-ring, bottom	0905-1284
9	Screw, M4 x 07, 10 mm	0515-2495
10	J-Clamp	1400-0015
11	Screw, M4 x 07, 10 mm	0515-2495
12	NPD interconnect assembly	G1534-60610
13	Mounting pallet	G1531-40020
14	Jet, 0.011 in./0.29 mm ID tip, capillary dedicated	G1531-80560
	Jet, 0.011 in. ID tip, capillary adaptable	19244-80560
	Jet, packed standard 0.018 in. ID tip	18710-20119
15	Base weldment, Capillary NPD for 6890/6850 only	G1534-80500
	Base weldment, Packed NPD for 6890/6850 only	G1534-80540
	Base weldment, Capillary NPD, 7890A	G3434-67500
	Base weldment, Packed NPD, 7890A	G3434-67540
16	Lid stop	G1534-20590
	NPD Ceramic Insulator Kit Includes items 4, 5, 7, and 8	5182-9722
17	FID/NPD adapter for capillary column	19244-80610
	FID/NPD 1/8 in. packed column	19231-80520
	FID/NPD 1/4 in. packed column	19231-80530
18	Insulating cup	19234-60720
	Ferrule, 1/4 in. Vespel, 10/pk	5080-8774
	530 µm, 1.0 mm ID graphite ferrule, 10/pk	5080-8773
	320 µm, 0.5 mm ID graphite ferrule, 10/pk	5080-8853
	1/4 in. nut, brass, 10/pk	5180-4105
	Universal column nut, 2/pk	5181-8830
	Nitrogen Phosphorus Detector Sample	18789-60060



Nitrogen Chemiluminescence Detector (NCD)

Nitrogen and Sulfur Chemiluminescence Detectors

Nitrogen Chemiluminescence Detector (NCD) Supplies

Description	Part No.
Dual plasma burner accessory kit Includes ferrules, fittings and quartz tube	G6600-60038
PM Kit, DP RV5 oil pump Includes 6 chemical traps for Ozone destruction, 3 oil coalescer elements and 4 (1 Qt) bottles of synthetic oil	G6600-67007
PM Kit, dry piston pump Includes 6 chemical traps for ozone destruction and 2 repair kits for pump	G6600-67008
Replacement oil coalescing filter	G6600-80042
Oil mist filter for RV5 pump	G6600-80043
Replacement oil coalescing filter	G6600-80044
Replacement odor filtration element	G6600-80045
O-ring, 1.3614 in. ID	G6600-80050
O-ring, 1.301 in. ID	G6600-80051
Dual plasma quartz tube	G6600-80063
Mobil 1 synthetic oil	G6600-85001
Oil, Edwards ultragrade for RV3 and RV5 pumps	G6600-85002



Sulfur Chemiluminescence Detector (SCD)

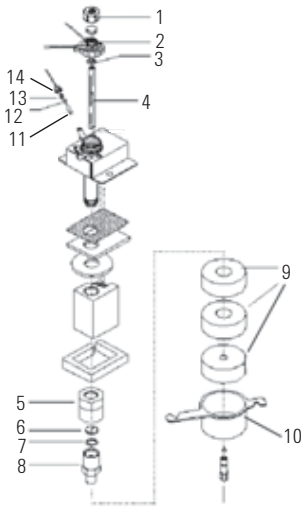
Sulfur Chemiluminescence Detector (SCD) Supplies

Description	Part No.
PM Kit, dry piston pump Includes 6 chemical traps for ozone destruction and 2 repair kits for pump	G6600-67008
Dual plasma burner accessory kit	G6600-60037
Mobil 1 synthetic oil	G6600-85001
Oil mist filter for RV5 pump	G6600-80043
Oil, Edwards ultragrade for RV3 and RV5 pumps	G6600-85002
O-ring, 1.301 in. ID	G6600-80051
Ozone destruction chemical trap	G6600-85000
Replacement oil coalescing filter	G6600-80044
Sulfur Chemiluminescence test sample	G2933-85001
Sulfur trap For carrier H_2 and air gases; one required for each cylinder of gas (3 total)	G2933-85003

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatograher. For more information, visit **www.agilent.com/chem/education**.

5890 Inlet Supplies



Split/Splitless Inlet assembly



Certified gold inlet seal, 5188-5367

Split/Splitless Inlet Supplies

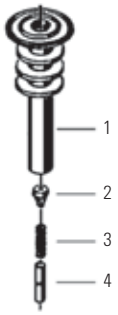
Item	Description	Unit	Part No.
1	Septum retainer nut		18740-60835
	Headspace septum retainer nut		18740-60830
2	Split/splitless insert weldment with tubing		19251-60575
3	Graphite O-ring for split liner	10/pk	5180-4168
	Graphite O-ring for splitless liner	10/pk	5180-4173
	Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
4	Split Liner, glass wool		19251-60540
5	Retaining nut		19251-20620
6	Stainless steel seal		18740-20880
	Certified gold plated seal kit, includes washer Replacement for 18740-20885		5188-5367
	Gold-plated seal with cross		5182-9652
7	Washers, 0.375 OD	12/pk	5061-5869
8	Reducing nut		18740-20800
9	Insulation Kit, 3 pieces		5188-5241
10	Lower insulation cover		19243-00070
For Split/Splitless Inlets Using Electronic Pressure Control			
11	Splitter tube*		19251-80525
12	1/8 in. front ferrule, brass	10/pk	5180-4109
13	1/8 in. back ferrule, brass	10/pk	5180-4115
14	1/8 in. nut, brass	10/pk	5180-4103
Split/splitless septum nut angled wrench			19251-00100
Capillary inlet cleaning wires		5/pk	5180-4153
Capillary Inlet Evaluation Sample (Split Mode)			8500-4789

*Includes 1 each of P/N 5180-4109, 5180-4115, 5180-4103

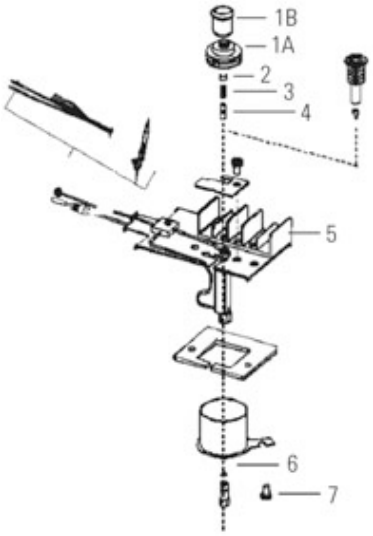
Tips & Tools

Agilent supplies such as inlet liners, septa, gold seals for the 7890 are compatible with the 5890.

Turn to pages 177–178.



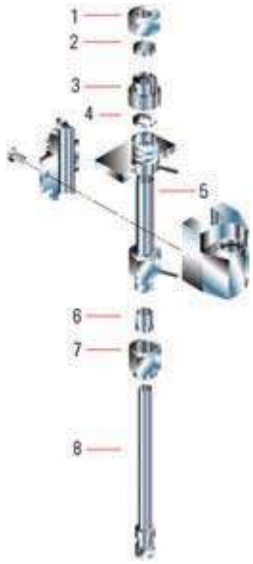
Cool On-Column Inlets for Manual Injection



Cool On-Column Inlet assembly

Cool On-Column Inlet Supplies

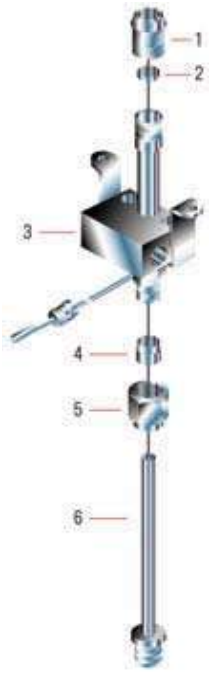
Item	Description	Unit	Part No.
Manual Injection			
1	Cooling tower assembly		19320-80625
2	Duck bill	10/pk	19245-40050
3	Spring		19245-60760
4	Inserts for capillary columns		
	For 530 µm columns, no rings		19245-20580
	For 530 µm Al clad columns, 4 rings		19245-20780
	For 320 µm columns, 5 rings		19245-20525
	For 200 µm columns, 1 ring		19245-20510
Fused silica syringe needles		6/pk	19091-63000
On-column syringe, fused silica (barrel only)			9301-0658
Automatic Injection			
1a	Septum nut		19245-80520
1b	Needle guide		19245-20670
2	Advanced Green Inlet Septa, 5 mm	50/pk	5183-4760
	BTO Inlet Septa , 5 mm	50/pk	5183-4758
3	Spring		19245-60760
4	Inserts for capillary columns		
	For 530 µm columns, no rings		19245-20580
	For 320 µm columns, 5 rings		19245-20525
	For 250 µm columns, 6 rings		19245-20515
Common Supplies			
5	Weldment (refer to instrument manuals)		
6	320 µm, 0.5 mm ID graphite ferrule		5080-8853
7	Universal column nut	2/pk	5181-8830
Column/Retention Gap Installation Supplies			
320 µm Vespel/Graphite ferrule		10/pk	5062-3514
250 µm Vespel/Graphite ferrule		10/pk	5181-3323
320 µm retention gap, one 5 m piece			160-2325-5
Deactivated quartz column connector, fits 0.18-0.53 mm		5/pk	5181-3396



Septum-purged packed column inlet

Packed Column Inlet Supplies

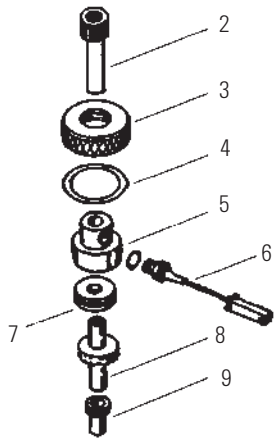
Item	Description	Unit	Part No.
Purged Packed Column Inlet Kit, Includes:			5181-8837
	Ferrule, 1/4 in. Vespel for inserts/glass columns	10/pk	5080-8774
	O-ring, Fluorocarbon	12/pk	5080-8898
	Disposable glass insert, deactivated	5/pk	5181-3382
1	Septum retainer nut		18740-60835
	Headspace septum retainer nut		18740-60830
	Nonpurging septum nut assembly for manual flow control only, not EPC		19243-60570
2	11 mm non-stick BTO septa	50/pk	5183-4757
3	Top insert weldment		19243-80570
4	O-ring, Fluorocarbon	12/pk	5080-8898
5	Weldment (refer to instrument manuals)		
6	Ferrule, 1/4 in. Vespel	10/pk	5080-8774
7	1/4 in. nut, brass	10/pk	5180-4105
8	Adapters		
	1/8 in. column adapter		19243-80510
	1/4 in. column adapter		19243-80520
	530 µm column adapter for use with glass liners		19244-80540
	1/8 in. column adapter for use with glass liners		19243-80530
	1/4 in. column adapter for use with glass liners		19243-80540
Disposable glass liner, 170 µL internal volume		25/pk	5080-8732
Disposable glass insert, deactivated		5/pk	5181-3382



Universal packed column inlet

Universal Packed Column Inlet (non-purged) Supplies

Item	Description	Unit	Part No.
1	Septum retainer nut, nonpurging, for headspace sampling		19243-60505
2	11 mm non-stick BTO septa	50/pk	5183-4757
3	Weldment (refer to instrument manuals)		
4	Ferrule, 1/4 in. Vespel	10/pk	5080-8774
5	1/4 in. nut, brass	10/pk	5180-4105
6	Adapters		
	1/8 in. column adapter		19243-80510
	1/4 in. column adapter		19243-80520
	530 µm column adapter for use with glass liners		19244-80540
	1/8 in. column adapter for use with glass liners		19243-80530
	1/4 in. column adapter for use with glass liners		19243-80540
Septum nut, nonpurging, for headspace sampling, non EPC			19243-60500
Disposable glass insert, deactivated		5/pk	5181-3382
Disposable glass liner, 170 µL internal volume		25/pk	5080-8732



5890 FID

Flame Ionization Detector (FID) Supplies

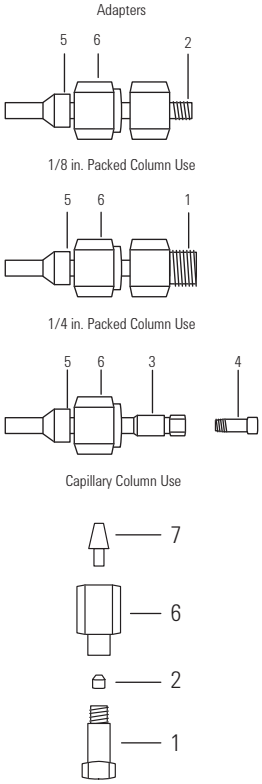
Item	Description	Part No.
1	Collector assembly (contains items 2-9)	19231-60690
2	PTFE chimney (optional)	19231-21050
3	Collector nut	19231-20940
4	Spring washer, 10/pk	5181-3311
5	Ignitor castle	19231-20910
	Hastelloy ignitor castle (optional)	19231-21060
6	Ignitor glow plug assembly	19231-60680
7	Upper collector insulator	19231-20970
8	Collector body	19231-20960
	Hastelloy collector (optional)	19231-21080
9	Lower collector insulator	19231-20950
	Insulating cup	19234-60720
	FID and TCD Sample	18710-60170
	FID supplies kit Includes jet, ignitor, plug, standard and cleaning supplies	5182-3450

FID and NPD Jets

Description	Part No.
0.29 mm (0.011 in.)	19244-80560
Jet, packed standard 0.018 in. ID tip	18710-20119
Jet, Packed wide-bore 0.030 in. ID (for high-bleed applications)	18789-80070
Jet (for simulated distillation)	19244-80620
FID flow measuring insert	19301-60660
O-rings	5080-4978

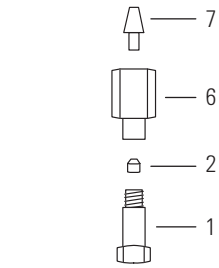
Nitrogen Phosphorus Detector (NPD) Supplies

Description	Part No.
NPD collector (NPD bead)	19234-60540
Recoating kit, sufficient for 10 collectors	5080-8872
Nitrogen Phosphorus Detector Sample	18789-60060



FID and NPD Adapters

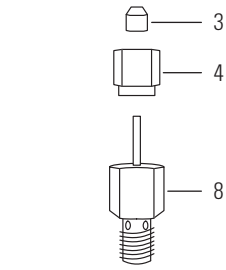
Item	Description	Unit	Part No.
1	FID/NPD 1/4 in. packed column		19231-80530
2	FID/NPD 1/8 in. packed column		19231-80520
3	FID/NPD adapter for capillary column		19244-80610
4	Universal column nut	2/pk	5181-8830
5	Ferrule, 1/4 in. Vespel	10/pk	5080-8774
	530 µm, 1.0 mm ID graphite ferrule	10/pk	5080-8773
	320 µm, 0.5 mm ID graphite ferrule	10/pk	5080-8853
6	1/4 in. nut, brass	10/pk	5180-4105



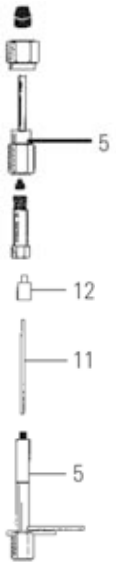
Thermal Conductivity Detector (TCD) Supplies

Thermal Conductivity Detector (TCD) Supplies

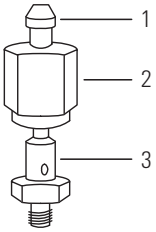
Item	Description	Unit	Part No.
1	Universal column nut	2/pk	5181-8830
2	320 µm, 0.5 mm ID graphite ferrule	10/pk	5080-8853
	530 µm, 1.0 mm ID graphite ferrule	10/pk	5080-8773
3	Vespel/graphite ferrule, 1/8 in.	10/pk	0100-1332
4	1/8 in. nut, brass	10/pk	5180-4103
5	TCD makeup gas adapter		19232-80550
6	TCD column adapter for capillary columns		18740-20960
7	TCD column adapter seal		18740-20950
8	TCD column adapter, 1/8 to 1/4 in. glass		19302-80020
	TCD replacement cartridge		19232-60676
	Thermal Conductivity Detector Sample		18711-60060



Thermal Conductivity Detector (TCD) Supplies



ECD make up gas adapter



ECD packed for 1/4in. Glass columns

Electron Capture Detector (ECD) Supplies

Item	Description	Part No.
1	Ferrule, 1/4 in. Vespel, 10/pk	5080-8774
	85% Vespel/15% Graphite ferrule, 1/4 in.	0100-1331
2	1/4 in. nut, brass, 10/pk	5180-4105
3	ECD column adapter, 1/4 to 1/8 in. metal	19301-80530
5	ECD makeup gas adapter	19233-80565
11	Gigabore liner for standard ECD, polyamide coating	19233-20625
12	Stainless steel cap for ECD makeup gas adapter	19233-20755
	Electron Capture Detector Sample	18713-60040

Flame Photometric Detector (FPD) Supplies

Description	Unit	Part No.
Adapter weldment, capillary		19256-80570
Exit tube		19256-60700
Window O-ring, inner	12/pk	5061-5886
Window O-ring, outer	12/pk	5061-5891
First heat shield window		19256-80030
Window, second heat shield		19256-80060
Ferrule, 1/4 in. Vespel	10/pk	5080-8774
Glow plug		0854-0141
FPD O-ring	12/pk	5061-5867
Certified non-stick fluorocarbon O-ring	10/pk	5188-5365
Liner/ferrule kit		19256-60590
Sulfur filter, blue		19256-80000
Phosphorus filter, yellow		19256-80010
O-ring, greased	12/pk	5080-8846
Fluorocarbon Elastomer O-ring, brown, 0.926 in. ID	12/pk	5061-5889
Fluorocarbon Elastomer O-ring, brown, 1.239 in. ID	12/pk	5061-5890
Flame Photometric Detector (FPD) Sample		19305-60580



Backpressure regulator



Mass flow controller restrictor (old style screw type)

Gas Flow Supplies

Backpressure Regulators

Description	Part No.
0-15 psig backpressure regulator/gauge kit	19246-60620
0-60 psig backpressure regulator/gauge kit	19246-60630
0-15 psig (0-100 kPa)	19246-60560
0-30 psig (0-200 kPa)	19246-60570
0-60 psig (0-400 kPa)	19246-60580
0-100 psig (0-700 kPa)	19246-60690

Pressure Gauges

Description	Part No.
0-15 psig (0-100 kPa)	19246-60526
0-30 psig (0-200 kPa)	19320-60656
0-60 psig (0-400 kPa)	19363-60506
0-100 psig (0-700 kPa)	19361-60566

Mass Flow Controllers

Description	Part No.
Mass flow controller with 20 mL/min restrictor for use with packed column inlets	19362-60565
Mass flow controller with 400 mL/min restrictor for use with capillary inlets	19362-60575

Restrictors - New Style

Description	Color Dot Code	Part No.
0-20 ml/min	Red and Purple	19362-60515
0-60 ml/min	Blue and Purple	19362-60525
0-110 ml/min	Green and Purple	19362-60535
0-400 ml/min	Black and Purple	19362-60545
0-750 ml/min	Yellow and Purple	19362-60555

Restrictors - Old Style

Description	Color Code	Color Dot	Part No.
0-20 ml/min	Red	Silver	19362-60510
0-60 ml/min	Red		19362-60520
0-110 ml/min	Green		19362-60530
0-400 ml/min	Black		19362-60540

Miscellaneous Instrument Parts and Supplies

Description	Part No.
Oven exhaust deflector for 6890	G1530-80650
Oven exhaust deflector for 6850	G2630-60710

GC Standards

GC Qualitative Standards

Description	Part No.
Qualitative Simulated Distallation Standards	
Boiling Point Calibration Sample No. 1	5080-8716
Low Boiling Point Calibration Sample No 220	5080-8768
Boiling Point Calibration Sample No. 320	5080-8769
PolyWax 500, 1 gram, neat	5188-5316
PolyWax 655, 1 gram, neat	5188-5317
Qualitative Petrochemical Standards	
Alcohol in Gasoline Sample	18900-60640
Natural Gas Sample	5080-8756
Transformer Gas Sample	5080-8759
Refinery Gas Sample	5080-8755
Reference Gas Oil No. 1 Batch 2	5060-9086
Miscellaneous Qualitative Standards	
Nickel Catalyst Test Sample	19354-60510
Nickel catalyst refill	5080-8761
MIDI System Calibration Standard	19298-60500
Oral Fluids Analyzer Test Sample	G1540-85010





Regulator, carry case and mix cylinders

Gas Analyzer Standards and Accessories

Description	Part No.
Gas Analyzer Standard Cylinders	
Universal Calibration Mix Cylinders	5184-3541
NGA (Natural Gas Analyzer) Calib Mix Cylinders	5184-3542
RGA (Refinery Gas Analyzer) Calibration Mix Cylinders	5184-3543
Universal/NGA Calibration Mix Cylinder Combo Box*	5184-3544
Universal/RGA Calibration Mix Cylinder Combo Box*	5184-3545
Gas Analyzer Standard Kits	
Universal Calibration Kit**	5184-3546
NGA Calibration Kit**	5184-3547
RGA Calibration Kit**	5184-3548
Accessories	
Regulator for Calibration Mix Cylinders	5184-3539
Gas Sampling Tubing, 1/16 in. stainless steel with fittings	5185-5817
Universal Calibration Mix (1cyl) and Regulator Kit	5185-5806

*Combo boxes contain one box of 2 calibration mix cylinders, containing one cylinder of Universal mix, and the other is either an NGA or RGA cylinder.

**Calibration kits contain one box of 2 calibration mix cylinders, 2 regulators, 2 pieces of stainless steel 1/16 in. gas sampling tubing, and 1 carry case, all packaged separately.



GC/MS Systems

Your mass spectrometer is a sensitive, specialized device that delivers a higher level of functionality than other GC detectors. To continue achieving optimal results, it is critical to maintain your system properly by performing the essential tasks within this section. Some of the benefits of maintaining your GC/MSD include:

- Less downtime for repairs
- Longer lifetime for your MSD system
- Reduction in overall operating costs

It is advisable to keep a log book of system performance, Autotune, and maintenance operations performed. This makes it easier to identify variations from normal performance and to take corrective action.

Maintenance Schedule

Task	Every week	Every 6 months	Every year	As needed
Tune the MSD				♦
Change injection port liners	♦			
Check the foreline pump oil level	♦			
Gas ballast the foreline pump	♦			
Check the calibration vial		♦		
Replace the foreline pump oil		♦		
Check the diffusion pump fluid	♦			
Replace the diffusion pump fluid			♦	
Replace the traps and filters			♦	
Clean the ion source				♦
Change the carrier gas trap(s) and purifier				♦
Replace worn out parts				♦
Lubricate seals (where appropriate)				♦
Replace column				♦



For in-depth information about maintaining your GC/MS, request "Maintaining Your Agilent GC and GC/MS Systems" from your Agilent Representative (publication number 5989-7612).



Tips & Tools

A crude sign of a "leak-free" MS system is when the ion ratio of m/z 28 (nitrogen) over m/z 32 (oxygen) is approximately two or greater.

MSD Contamination

Contamination is usually identified by excessive background in the mass spectra. It can come from the GC or from the MSD. The source of the contamination can sometimes be determined by identifying the contaminants. Some contaminants are much more likely to originate in the GC, others are likely to originate in the MSD.

MSD Contamination Identification

The following table lists some of the more common contaminants, the ion characteristics of those contaminants, and the likely sources of those contaminants.

Common Contaminants

Ions (m/z)	Compound	Possible Source
13, 14, 15, 16	Methane	CI gas
18, 28, 32, 44 or 14, 16	H_2O, N_2, O_2, CO_2, CO_2 or N, O	Residual air and water, air leaks, outgassing from Vespel ferrules
31, 51, 69, 100, 119, 131, 169, 181, 214, 219, 264, 376, 414, 426, 464, 502, 576, 614	PFTBA and related ions	PFTBA (tuning compound)
31	Methanol	Cleaning solvent
43, 58	Acetone	Cleaning solvent
78	Benzene	Cleaning solvent
91, 92	Toluene or xylene	Cleaning solvent
105, 106	Xylene	Cleaning solvent
151, 153	Trichloroethane	Cleaning solvent
69	Foreline pump fluid or PFTBA	Foreline pump oil vapor or calibration valve leak
73, 147, 207, 221, 281, 295, 355, 429	Dimethylpolysiloxane	Septum bleed or methyl silicone column coating
77, 94, 115, 141, 168, 170, 262, 354, 446	Diffusion pump fluid	Diffusion pump fluid and related ions
149	Plasticizer (phthalates)	Vacuum seals (O-rings) damaged by high temperatures, use of vinyl or plastic gloves
Peaks spaced 14 amu apart	Hydrocarbons	Fingerprints, foreline pump oil

Cleaning and Maintenance Supplies

Description	Part No.
One Year Maintenance Kit (for diffusion pump systems) Includes Big Universal Trap for He (1/8 in.), abrasive sheets (5/pk), lint-free cloths (15/pk), cotton swabs (100/pk), SantoVac Ultra, 18.5 mL (2 each), rough pump oil (1 liter), filament assembly, Octafluoronapthalene (OFN)	5183-2096
Nylon gloves, lint-free, large, 1 pair	8650-0030
Nylon gloves, lint-free, small, 1 pair	8650-0029
Lint-free industrial wipes, 100% cotton, 9 x 9 in., 300/pk	9310-4828
Ion source cleaning kit Includes lint-free cloths (15/pk), abrasive sheets (5/pk), cotton swabs (100/pk), lint-free nylon gloves, Alumina powder, abrasive	5181-8863
Cloths, lint free, 15/pk	05980-60051
Cotton swabs, 100/pk	5080-5400
Abrasive sheets, aluminum oxide green lapping paper, 600 mesh, 5/pk	5061-5896
Alumina powder, abrasive, 1 kg	8660-0791
PFTBA sample, certified, 10 g	8500-0656
Replacement glass bulb for PFTBA and PFDTD test sample, 5975	G3170-80002
Replacement glass vial for PFTBA and PFDTD test sample	05980-20018
Activated alumina, absorbent pellets for Edwards rough pump traps, non-LC/MS, 1 lb can	8500-1233
MSD Tool Kit, 5975/5973 Includes source hold tool, lint-free cloth, cotton swabs, lint-free nylon gloves, abrasive sheets, wrenches and driving tools	G1099-60566
MSD Tool Kit, 5972/5971 Includes small cleaning rod, large cleaning rod, source hold tool, cotton swabs, lint-free nylon gloves, abrasive sheets, wrenches and driving tools	05971-60561
MS Interface Supplies	
MS interface column nut, female	05988-20066
Column nut for long or long two-hole ferrules	05921-21170
Universal column nut, 2/pk	5181-8830



MS interface column nut, 05988-20066



Universal column nut, 5181-8830



Column installation tool, G1099-20030



Vespel/Graphite ferrules, 5181-3323

Cleaning and Maintenance Supplies

Description	Part No.
Tools	
Screwdriver, 3 in. Pozidriv shaft No. 1 pt, fits no. 2-4 screws	8710-0899
Screwdriver, 4 in. Pozidriv shaft No. 2 pt, fits no. 5-10 screws	8710-0900
Open end wrench, 1/4 and 5/16 in.	8710-0510
MS Interface Column Installation Tool	G1099-20030
Hex nut driver, 5.5 mm	8710-1220
Screwdriver, Torx T20	8710-1615
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T10	5182-3466
Ferrules	
0.4 mm Vespel/Graphite ferrule for 200/250 µm columns, 10/pk	5062-3508
0.5 mm Vespel/Graphite ferrule for 320 µm columns, 10/pk	5062-3506
250 µm Vespel/Graphite ferrule, 10/pk	5181-3323
SilTite metal ferrules for 1/16 in. OD tubing, 10/pk Includes 2 column nuts	5184-3571
SilTite Metal Ferrules, 1/16 in. x 0.4 mm ID, 10/pk Includes 2 column nuts	5184-3569
SilTite Metal Ferrules, 1/16 in. x 0.5 mm ID, 10/pk Includes 2 column nuts	5184-3570

Tips & Tools

Even preconditioned ferrules can shrink slightly at very high temperatures, so if leak problems persist upon a new column installation, check this fitting first.



Electron Impact (EI) Ion Source

Ion Source

The ion source operates by electron ionization (EI) or chemical ionization (CI). The sample enters the ion source from the GC/MSD interface. Electrons emitted by a filament enter the ionization chamber, guided by a magnetic field. The high-energy electrons interact with the sample molecules, ionizing and fragmenting them. The positive voltage on the repeller pushes the positive ions into the lens stack, where they pass through several electrostatic lenses. These lenses concentrate the ions into a tight beam, which is directed into the mass filter.

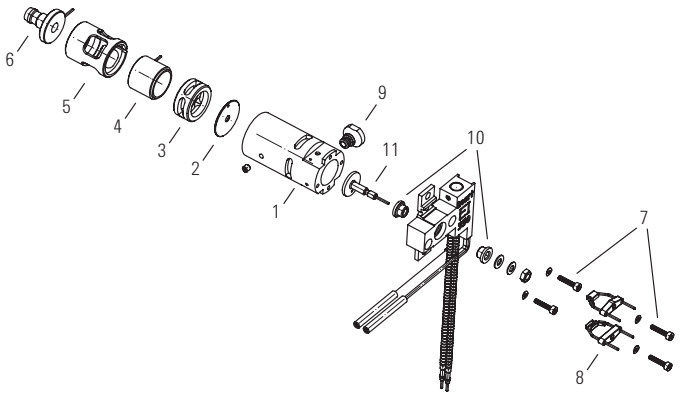
Electron Impact (EI) Ion Source

The recommended cleaning material for the EI ion source is abrasive powder, aluminum oxide powder.

Do not immerse filaments or lens insulators in solvent. If insulators are dirty, clean them with a cotton swab dampened with reagent-grade methanol. If that does not clean the insulators, replace them.

5975/5973 MSD Electron Impact Ion Source Parts (EI)

Item	Description	Part No.	Inert Part No.
1	Ion source body	G1099-20130	G2589-20043
2	Drawout plate, 3 mm	05971-20134	G2589-20100
3	Drawout cylinder	G1072-20008	G1072-20008
4	Lens insulator	G3170-20530	G3170-20530
5	Ion focus lens	05971-20143	05971-20143
6	Entrance lens	G3170-20126	G3170-20126
7	Cap screw, gold plated	G1999-20021	G1999-20021
8	High temperature filament	G2590-60053	G2590-60053
9	Transfer line socket	G1099-20136	G1099-20136
10	Repeller insulator	G1099-20133	G1099-20133
11	Repeller	G1099-20132	G2589-20044



5975/5973 MSD Electron Impact (EI) ion source assembly

Tips & Tools

It is good practice to replace scratched lenses and other ion source parts. Scratched source parts lead to poor performance.

5972/5971/GCD MSD Ion Source Parts (EI)

Description	Part No.
Entrance lens	05971-20126
Lens insulator	G3170-20530
Ion focus lens	05971-20143
Drawout cylinder	G1072-20008
Drawout plate, 3 mm	05971-20134
Set screw	0515-1446
Repeller assembly	05971-60170
Screw for filament on the source	0515-1046
Transfer line tip, gold plated, 5972/5971	05971-20305

Warnings & Caution

Important: Do not abrasively or ultrasonically clean the insulators.

Abrasively clean the surfaces that contact the sample or ion beam. Use an abrasive slurry of alumina powder and reagent-grade methanol on a cotton swab. Use enough force to remove all discolorations. Polishing the parts is not necessary; small scratches will not harm performance. Also abrasively clean the discolorations where electrons from the filaments enter the source body.

Take care to avoid contaminating cleaned and dried parts. Put on new, clean gloves before handling the parts. Do not set the cleaned parts on a dirty surface. Set them only on clean, lint-free cloths.

Chemical Ionization (CI) Ion Source

Because the CI ion source operates at much higher pressures than the EI ion source, it will probably require more frequent cleaning than the EI ion source.

The source should be cleaned whenever there are performance anomalies that are associated with a dirty ion source. Let analytical performance be your guide.

When cleaning the CI ion source, concentrate on the CI repeller, ion source body, and draw out plate. Be sure to clean the 0.5 mm diameter holes in the ion source body and draw out plate.

Cleaning the ion source is very similar to cleaning the EI ion source. Use the same EI cleaning procedure with the following exceptions:

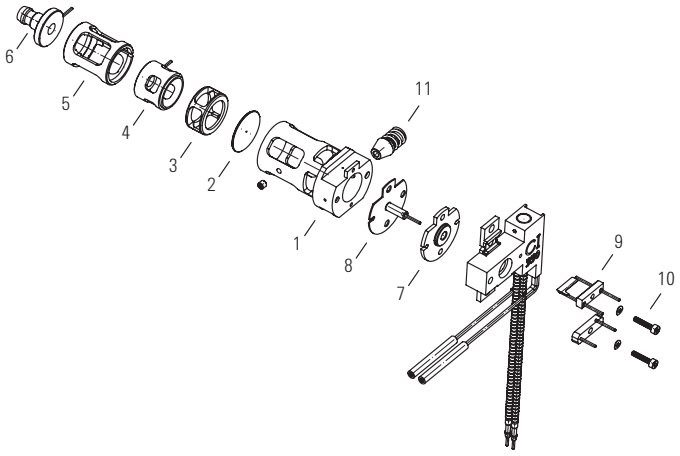
- The CI ion source may not look dirty but deposits left by chemical ionization are very difficult to remove. Clean the CI ion source thoroughly.
- Use a round wooden toothpick to gently clean out the electron entrance hole in the source body and the ion exit hole in the draw out plate.
- Do not use halogenated solvents. Use hexane for the final rinse.

Tips & Tools

Visual appearance is not an accurate guide to cleanliness of the CI ion source.
The CI ion source can show little or no discoloration yet still need cleaning.

5975/5973 MSD Chemical Ionization Ion Source Parts (CI)

Item	Description	Part No.
1	Source body	G1999-20430
2	Draw out plate	G1999-20446
3	Draw out cylinder	G1999-20444
4	Lens insulator	G3170-20540
5	Ion focus lens	G1999-20443
6	Entrance lens	G3170-20126
7	Repeller insulator	G1999-20433
8	Repeller	G1999-20432
9	High temperature filament	G1099-80053
10	Cap screw, gold plated	G1099-20021
11	Interface tip seal/spring	G3170-60412



5975/5973 MSD Chemical Ionization (CI) ion source assembly



QuickSwap restrictor

QuickSwap MS Interface Restrictors

Agilent's QuickSwap Capillary Flow Technology module and pre-swaged fused silica tubing restrictors can increase the productivity of your Agilent 5973N and 5975 inert MSD systems, allowing you to change columns without venting the MSD. QuickSwap not included.

These restrictors are prefabricated for convenience and ease of use. For applications requiring other restrictor sizes, Agilent offers a wide variety of deactivated fused silica tubing, SilTite ferrules and swaging tools.

QuickSwap MS Interface Restrictors

Description	ID (mm)	Unit	Part No.
QuickSwap restrictor	0.092	4/pk	G3185-60361
QuickSwap restrictor	0.100	4/pk	G3185-60362
QuickSwap restrictor	0.110	4/pk	G3185-60363
QuickSwap restrictor	0.120	4/pk	G3185-60364
QuickSwap restrictor variety pack, 2 each of the above ID restrictors			G3185-60300

SilTite Metal Ferrules

Description	Unit	Part No.
For use with 0.25 mm ID capillary columns	10/pk	5188-5361
For use with 0.32 mm ID capillary columns	10/pk	5188-5362
For use with 1/16 in. OD stainless steel tubing Includes 2 column nuts	10/pk	5184-3571
For use with 0.53 mm ID capillary columns	10/pk	5188-5363



EI high temperature filament, G2590-60053

MSD Filaments

Like the filaments in an incandescent light bulb, the ion source filaments will eventually burn out. Certain practices will reduce the chance of early failure.

- When setting up data acquisition parameters, set the solvent delay so that the analyzer will not turn on while the solvent peak is eluting.
- When the software prompts 'Override solvent delay at the beginning of a run' always select 'No.'
- Higher emission current will reduce filament life.
- If you are controlling your MSD from the Edit Parameters screen, always select 'MS Off' before changing any of the filament parameters.

MSD Filaments

Description	5975 Series	5973 Series	5972 Series	5971 Series
Filament assembly (EI)	G2590-60053	G2590-60053	G2590-60053	05971-60140
Filament assembly (CI)	G1099-80053	G1099-80053		
Micro ion vacuum gauge	G3170-80001			
Triode gauge tube for measuring vacuum		0960-0897		

Tips & Tools

It is very useful to switch from one filament to the other every three months so that when filament fails, you know the other will fail soon. This will allow you to change both filaments at the same time. Since the GC/MS system is already vented, it's a good idea to replace other supplies in the flowpath at the same time as the filaments.



Electron multiplier replacement horn

MSD Electron Multipliers and Replacement Horn

The lifetime of an electron multiplier is directly related to the current that flows through it and the extent of contamination or condensation that it experiences. Replace the electron multiplier or replacement horn when voltage is over 2500 volts. To maximize electron multiplier life:

- Maintain the best possible vacuum, especially in the analyzer manifold.
- Use extreme caution and be conservative with venting, pumpdown, and all vacuum system procedures to keep pump fluid background to a minimum.
- After venting, allow four hours for pumpdown and thermal equilibration before scanning.
- Actively look for background contamination and leaks and repair them immediately.
- Don't tune excessively. PFTBA can result in higher background over an extended period of time.
- Replace the electron multiplier if vacuum is poor or voltage is over 2500 volts.

Tips & Tools

These are the recommended replacement multipliers and horns for the MSD. Other manufacturers' products may be incompatible with Agilent instruments and can result in reduced sensitivity, lifetime, and noise problems.

MSD Electron Multipliers and Replacement Horn

Description	5975 Series	5973 Series	5972/5971 Series
Electron multiplier replacement horn Use with electron multipliers with "straight" horns.	05971-80103	05971-80103	05971-80103
Triple axis detector assembly*	G3170-80100		
Triple axis electron multiplier	G3170-80103		
EM signal wire, low noise detector	G3170-80008		
High energy dynode		G1099-80001	
Electron multiplier			05971-80102

*Included on 5975 TAD systems

Vacuum Systems and Pumps

Diffusion Pump

It is not necessary to change the diffusion pump fluid more than once a year, unless you observe symptoms that suggest a problem with the diffusion pump fluid. The MSD must be vented in order to check the diffusion pump fluid (except for the 5975/5973). Therefore, the best time to check the fluid is when the instrument is already vented for other maintenance.



Foreline Pump

Foreline Pump

The oil in the foreline or rough pump should be replaced on average once every six months, but can vary depending upon applications. After oil replacement, if a foreline trap is present, the molecular sieves should be replaced.

Avoid contact with the pump oil. The residue from some samples may be toxic. Dispense of used oil properly.

Pump Oils

Description	5975 Series	5973 Series	5972/5971 Series
Diffusion pump fluid, 18.5 mL	6040-0809 2 required	6040-0809 2 required	6040-0809
Foreline pump oil, P3, 0.5 L	6040-0621		
Foreline pump oil, Inland 45, 1 L		6040-0834	6040-0834
High vacuum grease, 25 g	6040-0289	6040-0289	6040-0834



NEW! 7000A Triple Quadropole GC/MS Series

Gas Filters

Description	Part No.
Chemical Ionization Gas Purifier	G1999-80410
Big Universal Trap, 1/8 in. fittings, Helium (Ar/Me)	RMSH-2
Big universal trap, 1/8 in. fittings, nitrogen	RMSN-2
Mounting clip	UMC-2

Maintenance Supplies

Description	Part No.
Abrasive sheets	5061-5896
Alumina powder, abrasive, 1 kg	8660-0791
Cloths, lint free	05980-60051
Lint-free industrial wipes, 100% cotton	9310-4828
Cotton swabs	5080-5400
Nylon gloves, lint-free, large	8650-0030
Nylon gloves, lint-free, small	8650-0029
Diffusion pump fluid, 18.5 mL	6040-0809
Foreline pump oil, P3, 0.5 L	6040-0621
High vacuum grease, 25 g	6040-0289
Electron multiplier replacement horn	05971-80103
Low noise EM horn	G3170-80103
Filament assembly, high temperature (EI)	G2590-60053
Filament assembly (CI)	G1099-80053
Micro ion vacuum gauge	G3170-80001
Rough pump inlet flange	0905-1463

MS Test and Performance Samples

MS Test and Performance Samples

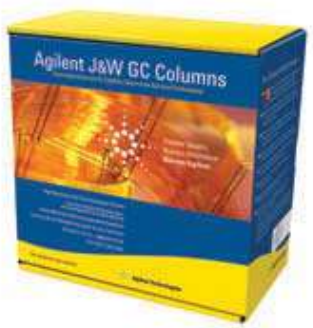
	Description	5975 Series	5973 Series	5972 Series	5971 Series	GCD
Tuning Samples						
EI Tune	PFTBA sample, certified, 10 g	8500-0656	8500-0656	8500-0656	8500-0656	8500-0656
CI Tune	PFTBA MS Sample Kit, 0.5 mL	05971-60571	05971-60571			05971-60571
	PFDTD calibrant	8500-8510	8500-8510			
Performance Verification Samples						
EI	OFN, 1 pg/µL	5188-5348	5188-5348			
	Hexachlorobenzene 10 pg/µL, 1 ng/µL			8500-5808		
	Methyl stearate (in methanol); 1 ng/µL, 2 ea				05990-60075	
	Sample A 10 ng/µL					05970-60045
Negative Mode CI	OFN, 100 fg/µL	5188-5347				
Positive Mode CI	Benzophenone, 100 pg/µL	8500-5440	8500-5440	8500-5440	8500-5440	
Checkout Samples						
HighMass	PHFT, 100 pg/µL	5188-5357				
Semi-Volatile	GC/MS tuning standard, DFTPP	8500-5995	8500-5995	8500-5995	8500-5995	8500-5995
Volatile	p-Bromofluorobenzene (BFB), 25 µg/mL	8500-5851	8500-5851	8500-5851	8500-5851	8500-5851
Evaluation sample	Solution of dodecane, biphenyl, p-cholorodiphenyl, and Methyl palmitate in isooctane. Six 1.0 mL ampoules: 4 at 10 ng/µL, 1 at 100 ng/µL, 1 at 100 pg/µL.	05970-60045	05970-60045	05970-60045	05970-60045	



MS standards

Tips & Tools

Each GC/MS has a specific test and performance sample. Refer to the chart for the exact sample. All volumes are approximately 0.5-1 mL unless otherwise specified.



GC, GC/MS and Duraguard Capillary Columns

For over 40 years, Agilent has broken new ground with innovations in GC column technology.

In 1979, Hewlett-Packard (now Agilent) revolutionized GC analysis with flexible, chemically inert fused silica GC tubing. In the same year, J&W Scientific created the first cross-linked bonded stationary phase. In 1991, J&W Scientific introduced DB-5ms, the first commercial GC stationary phase with lower column bleed using arylene technology. In 1992, Agilent released HP-5ms columns with low column bleed performance. In 2000, Agilent merged with J&W Scientific to unite the world renowned HP and DB column families under one brand – Agilent J&W GC columns. And in 2008, Agilent ushered in a new era of column inertness QC testing with the most rigorous test probe mixture in the industry.

Agilent J&W GC Capillary columns are manufactured in Folsom, California. Every column is individually tested to meet the tightest quality control specifications in the industry. Our goal is to continually refine our materials and processes to provide the best columns in the world, so that each one will continue to deliver the high quality and superior performance you have come to expect. To learn more, view our video at **www.agilent.com/chem/gccol5**.

Introducing the newest Agilent J&W GC Columns

Agilent J&W Ultra Inert GC Capillary Columns

Agilent J&W Ultra Inert GC Columns allow you to perform trace level analysis – including the analysis of acids, bases, or other active compounds – with the utmost confidence. What's more, Agilent has set a new industry standard for column inertness testing by introducing a new Über One Test Probe Mixture that surpasses our most stringent demands for bleed, sensitivity, and efficiency. Agilent J&W Ultra Inert GC Columns are the only GC columns that deliver on the promises of consistent column inertness performance and exceptionally low column bleed for greater sensitivity, better peak shape, and more reliable results. So you can be sure that they will meet the rigorous requirements of today's demanding applications.

Agilent J&W High Efficiency GC Capillary Columns

Agilent J&W High Efficiency columns are ideal for fast chromatography where speed, while maintaining resolution, is the most important attribute of the columns. The columns can be applied to any applications that require reduced analysis time, such as high throughput screening, fast process monitoring, fast QC analyses, and fast method development. High Efficiency columns are suitable for a wide variety of sample matrices, including environmental, petrochemical, flavor/fragrance, clinical toxicology, or pharmaceutical samples.

Agilent J&W LTM Column Modules

Agilent J&W LTM column modules combine a fused silica capillary column with heating and temperature sensing components wound around it. The design heats and cools the column very efficiently for significantly shorter analytical cycle times compared to conventional air-bath GC oven techniques, while simultaneously using less power.

Always Quality.
Always Innovative.
Always Agilent.

The Industry's Best Low-Bleed and Most Inert Columns

Column bleed can decrease spectral integrity, reduce uptime, and shorten column life. Column activity contributes to severe peak tailing, as well as compound loss or degradation for active compounds (e.g. acids and bases), leading to inaccurate quantification. Agilent J&W columns have the widest range of GC/MS and Ultra Inert stationary phases proven to deliver consistent column inertness and exceptionally low column bleed with high upper temperature limits, ensuring accurate peak identification and quantification.

Why low-bleed columns are a smart choice

If you perform trace analyses where sensitivity and instrument performance are important, column bleed (or the lack thereof) should be important to you. Many GC detectors are sensitive to contamination from bleed. By using low-bleed columns, these detectors require less maintenance. Due to the unique relationship between ion storage capacity of the trap and sensitivity levels, ion trap MS users will especially benefit from low-bleed columns.

What makes Agilent J&W low-bleed columns so special?

In short, it's Agilent's unique polymer chemistry and proprietary deactivation. Our MS columns utilize special surface deactivation and siloxane chemistries that enhance the chromatographic performance of siloxane polymers. To provide selectivities virtually identical to their conventional counterparts, we offer DB-5ms, DB-35ms, DB-17ms, and DB-225ms. The HP-5ms uses the same stationary phase as the standard HP-5, providing low bleed without the use of arylene technology. DB-1ms and HP-1ms provide the same selectivity as the standard 100% dimethylpolysiloxane (DB-1) type column. Plus, our unique DB-1ms polymer chemistry and proprietary deactivation techniques help us increase temperature limits (340/360°C), improving thermal stability and optimizing performance.

Tips & Tools

Agilent offers GC Column Accessories, including installation kits, rinse kits, fused silica tubing cutters, and column baskets.

Turn to page 108.



The Tightest QC Specs in the Business

Agilent makes more capillary GC columns than anyone else in the world, and we build them to meet consistently rigid performance criteria, such as separation efficiency, retention characteristics, peak height ratios, and bleed rates.

Agilent's stringent QC performance evaluation tests provide the utmost confidence in the qualitative and quantitative results, especially for difficult-to-chromatograph compounds. We measure peak height ratios for acidic and basic compounds to ensure the highest column performance for the widest range and types of compounds. We also carefully monitor peak symmetry and tailing for a broad range of chemically active compounds.

Tighter GC Column Performance Criteria

Feature	Advantage	Benefit
Narrow Retention Index and Retention Factor Window	• Highest level of column-to-column reproducibility	• Confidence in analytical results
	• Minimal method adjustment when changing columns	• Improved sample throughput, reduced downtime
	• Specify J&W chemistry for intra-company methodologies	• Confidence in method transfer and intra-company results
Increased Plates per Meter	• Highest level of "resolving power" • Improved sample throughput	• Accurate quantification • Potentially shorter run times
Lowest Bleed	• Increased analytical sensitivity for all detectors	• Improved detection limits • Reliable compound identification
	• Fast baseline stabilization • Faster column exchange	• Minimized conditioning time • Increased sample throughput
	• Excellent thermal stability	• Increased column lifetime, reduced downtime • Increased sample throughput
Highest Degree of Inertness	• Better peak shape for active compounds • Minimum compound adsorption	• Improved detection limit, more accurate quantification, and more instrument uptime • More accurate quantification for trace samples and unknown sample screening

Tips & Tools

For additional column recommendations, chromatograms, and method parameters, visit **www.agilent.com/chem/mygccol1**

Choosing a Capillary GC Column

The first step should always be to refer to what has already been done. Our chemists have put together a variety of resources to help you find the right column for your analysis.

- Chromatograms – Find some of the more common chromatograms with column recommendations and method parameters for your reference in this catalog. For a more extensive chromatogram library and a compound search function, go to **www.agilent.com/chem**, then click Library.
- Method Guides – We've evaluated the most common Environmental/EPA methods, ASTM methods, USP methods and general compound analyses and have put together simple guides which specify the best column recommendation for these methods.
- Retention Data Lists – We've analyzed hundreds of compounds on several different phases to help you determine which column will be the best choice for your list of compounds.
- Column Selection Guide – Our Agilent J&W GC Column Selection Guide gives you helpful hints for choosing a stationary phase, picking the right column dimensions, developing temperature programs and determining the right inlet and detector for the application. To order this guide, use publication number 5989-6159EN.

Our Technical Support Chemists have more than 100 years of combined experience running samples and developing methods. We are the gas chromatography column experts and we are at your disposal.

Send in questions on the Technical Support question form on our website **www.agilent.com/chem**, via email at gc-column-support@agilent.com, or contact your local Agilent office or Authorized Agilent Distributor.

Tips & Tools

See where quality begins.
Take a virtual tour of our GC column manufacturing site at **www.agilent.com/chem/gccol5**.



NEW! Agilent J&W Ultra Inert Capillary GC Columns

Ultra Inert Chromatograms

Environmental

Trace Level Polycyclic Aromatic Hydrocarbon (PAH) Analyses — Page 374

US EPA Method 8270 Short Mix — Page 373

Life Sciences

Benzodiazepines I — Page 447

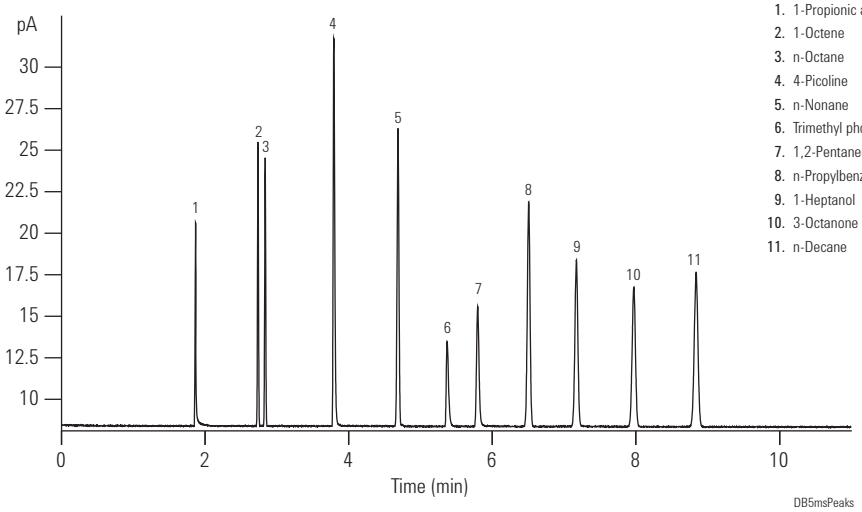
- Individually tested with a unique, demanding Über One test probe mixture
- Consistent column inertness performance
- Exceptionally low column bleed
- Great peak shapes for challenging active analytes
- Excellent signal-to-noise ratios
- Minimum compound adsorption or degradation
- Support of 0.18 mm ID column configuration for higher sample throughput

Ultra Inert Capillary GC Columns

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-5ms Ultra Inert				
0.18	20	0.18	-60 to 325/350	121-5522UI
		0.36	-60 to 325/350	121-5523UI
0.25	15	0.25	-60 to 325/350	122-5512UI
		1.0	-60 to 325/350	122-5513UI
	25	0.25	-60 to 325/350	122-5522UI
	30	0.25	-60 to 325/350	122-5532UI
		0.50	-60 to 325/350	122-5536UI
		1.0	-60 to 325/350	122-5533UI
	50	0.25	-60 to 325/350	122-5552UI
	60	0.25	-60 to 325/350	122-5562UI
		1.0	-60 to 325/350	122-5563UI
0.32	30	0.25	-60 to 325/350	123-5532UI
		0.50	-60 to 325/350	123-5536UI
		1.0	-60 to 325/350	123-5533UI
	60	1.0	-60 to 325/350	123-5563UI
HP-5ms Ultra Inert				
0.18	20	0.18	-60 to 325/350	19091S-577UI
0.25	15	0.25	-60 to 325/350	19091S-431UI
	30	0.25	-60 to 325/350	19091S-433UI
		0.50	-60 to 325/350	19091S-133UI
		1.0	-60 to 325/350	19091S-233UI
	60	0.25	-60 to 325/350	19091S-436UI
0.32	30	0.25	-60 to 325/350	19091S-413UI
		1.0	-60 to 325/350	19091S-213UI

Agilent's Über One Test Probe Mixture

Column:	**DB-5ms Ultra Inert** **122-5532UI** **30 m x 0.25 mm, 0.25 µm**
	Agilent 6890N
Carrier:	Hydrogen, constant pressure, 38 cm/s
Oven:	65°C isothermal
Sampler:	Agilent 7683B, 0.5 µL syringe (Agilent Part No. 5188-5246), 0.02 µL split injection
Injection:	Split/splitless; 250°C, 1.4 mL/min; split column flow 900 ml/min; gas saver flow 75 mL/min at 2.0 min
Detector:	FID at 325°C; 450 mL/min air, 40 mL/min hydrogen, 45 mL/min nitrogen makeup



1. 1-Propionic acid
2. 1-Octene
3. n-Octane
4. 4-Picoline
5. n-Nonane
6. Trimethyl phosphate
7. 1,2-Pentanediol
8. n-Propylbenzene
9. 1-Heptanol
10. 3-Octanone
11. n-Decane

DB5msPeaks

A properly deactivated DB-5ms Ultra Inert Column delivers symmetrical peak shapes, along with increased peak heights, which allow for accurate integration and detection of trace analytes.

NEW! Agilent J&W High Efficiency Capillary GC Columns

- Increase sample throughput and productivity while maintaining resolution
- Reduce carrier gas usage and cost per analysis
- Compatible with existing GC and GC/MS instrument
- Operates with He or H_2 carrier gas
- Available in more than 20 stationary phases
- Rapid and easy method translation with Agilent Method Translation Software

High Efficiency Chromatograms

Environmental

Analysis of Semivolatiles Page 373

CLP Pesticide Analysis Page 361

Petroleum

Fast Analysis of Aromatic Solvent Page 464

High Efficiency Capillary GC Columns

Phase	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-1	0.18	10	0.18	-60 to 325/350	121-1012
			0.20	-60 to 325/350	121-101A
			0.40	-60 to 325/350	121-1013
		20	0.18	-60 to 325/350	121-1022
			0.40	-60 to 325/350	121-1023
		40	0.40	-60 to 325/350	121-1043
HP-1	0.18	20	0.18	-60 to 325/350	19091Z-577
DB-1ms	0.18	20	0.18	-60 to 340/360	121-0122
HP-1ms	0.18	20	0.18	-60 to 325/350	19091S-677
DB-5	0.18	10	0.18	-60 to 325/350	121-5012
			0.40	-60 to 325/350	121-5013
		20	0.18	-60 to 325/350	121-5022
			0.40	-60 to 325/350	121-5023
		40	0.18	-60 to 325/350	121-5042
HP-5	0.18	20	0.18	-60 to 325/350	19091J-577
DB-5ms	0.18	20	0.18	-60 to 325/350	121-5522
			0.36	-60 to 325/350	121-5523
		40	0.18	-60 to 325/350	121-5542

High Efficiency Capillary GC Columns

Phase	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
HP-5ms	0.18	20	0.18	-60 to 325/350	19091S-577
DB-XLB	0.18	20	0.18	30 to 340/360	121-1222
		30	0.18	30 to 340/360	121-1232
DB-35ms	0.18	20	0.18	50 to 340/360	121-3822
DB-17	0.18	20	0.18	40 to 280/300	121-1722
			0.30	40 to 280/300	121-1723
DB-17ms	0.18	20	0.18	40 to 320/340	121-4722
HP-50+	0.18	20	0.18	40 to 280/300	19091L-577
DB-23	0.18	20	0.20	40 to 250/260	121-2323
DB-225	0.18	20	0.20	40 to 220/240	121-2223
DB-624	0.18	20	1.00	-20 to 280	121-1324
DB-1301	0.18	10	0.40	-20 to 280/300	121-1313
DB-1701	0.18	10	0.40	-20 to 280/300	121-0713
		20	0.18	-20 to 280/300	121-0722
DB-WAX	0.18	10	0.18	20 to 250/260	121-7012
		20	0.18	20 to 250/260	121-7022
		40	0.18	20 to 250/260	121-7042
			0.30	20 to 240/250	121-7043
HP-INNOWax	0.18	20	0.18	40 to 260/270	19091N-577
DB-5.625	0.18	20	0.18	-60 to 325/350	121-5621
			0.36	-60 to 325/350	121-5622
DB-VRX	0.18	20	1.00	-10 to 260	121-1524
		40	1.00	-10 to 260	121-1544
DB-608	0.18	20	0.18	40 to 280/300	121-6822

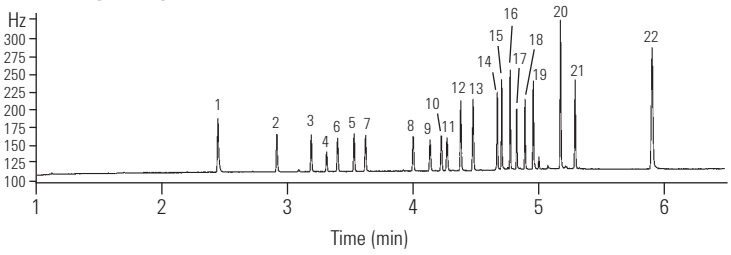
Direct Column-Performance Comparison for Rapid CLP (Contract Laboratory Program) Pesticide Analysis

Agilent's DB-17ms primary column and DB-XLB confirmatory column sufficiently resolved all the peaks of interest in less than 6 minutes with sharp, symmetrical peaks and minimal baseline drift. In contrast, vendor R's primary analysis column resolved only 20 of 22 peaks with visible peak tailing. Vendor R's confirmatory column resolved all 22 peaks of interest but with peak tailing and an unacceptable level of temperature dependent baseline drift.

Carrier:	Hydrogen (69 cm/sec at 120% C, ramped at 99 mL/min to 106 cm/sec at 4.4 minutes)	Injection:	Split/splitless; 220% C, pulsed splitless (35 psi for 0.5 min, purge flow of 40 mL/min on at 1 minute, gas saver flow 20 ml/min on 3 minutes)
Oven:	120% C (0.32 min); 120% C/min to 160% C; 30% C/min to 258% C (0.18 min); 38.81% C/min to 300% C (1.5 min)	Detector:	µECD 320% C; nitrogen makeup; constant column + makeup flow 60 mL/min

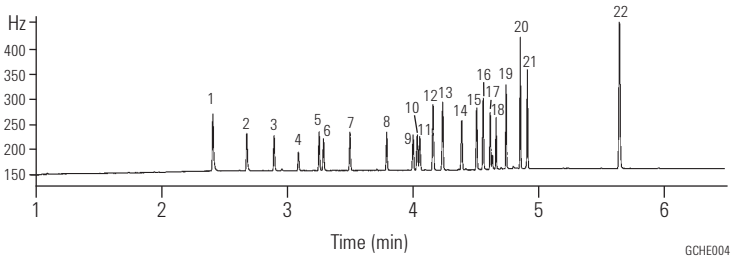
Column: **DB-17ms 121-4722 20 m x 0.18 mm, 0.18 µm**

DB-17ms primary column



Column: **DB-XLB 121-1222 20 m x 0.18 mm, 0.18 µm**

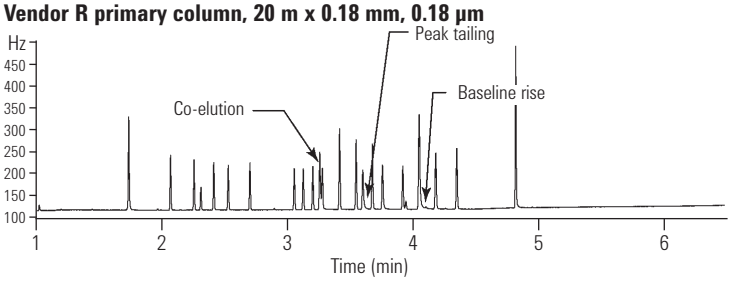
DB-XLB confirmatory column



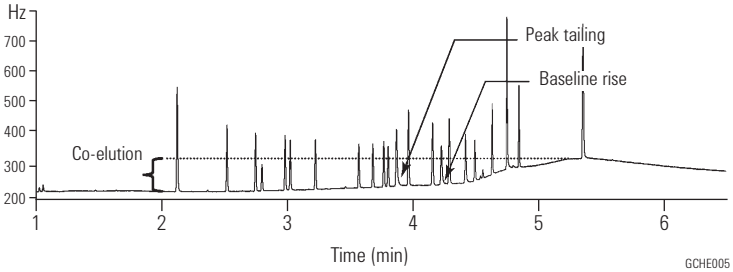
GCHE004

1. Tetrachloro-m-xylene
2. Alpha BHC
3. Gamma BHC
4. Beta BHC
5. Delta BHC
6. Heptachlor
7. Aldrin
8. Heptachlor Epoxide
9. Gamma Chlordane
10. Alpha Chlordane
11. Endosulfan I
12. 4,4' DDE
13. Dieldrin
14. Endrin
15. 4,4' DDD
16. Endosulfan II
17. 4,4' DDT
18. Endrin Aldehyde
19. Endosulfan Sulfate
20. Methoxychlor
21. Endrin Ketone
22. Decachlorobiphenyl

Vendor R primary column, 20 m x 0.18 mm, 0.18 µm



Vendor R confirmatory column, 20 m x 0.18 mm, 0.14 µm



GCHE005

Spearmint Oil

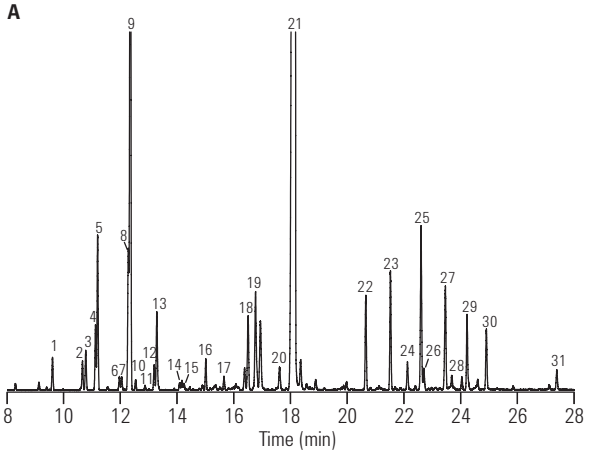
Using hydrogen as a carrier gas in conjunction with the high efficiency column resulted in an overall speed gain of 61% compared to the the original method. In addition, the resolution was well maintained throughout the method translation process.

Carrier:	A: Helium 25 cm/sec measured at 40°C B: Hydrogen 47 cm/sec measured at 40°C
Oven:	A: 40°C hold 1 min, 5°C/min to 290°C B: 40°C hold 0.38 min, 13°C/min to 290°C hold 13.09 min
Injection:	250°C, Split 40:1, 1-µL injection

Column A: **DB-1**
122-1032
30 m x 0.25 mm,
0.25 µm

Original Method with a DB-1, 30 m x 0.25 mm x 0.25 µm column and Helium carrier

A

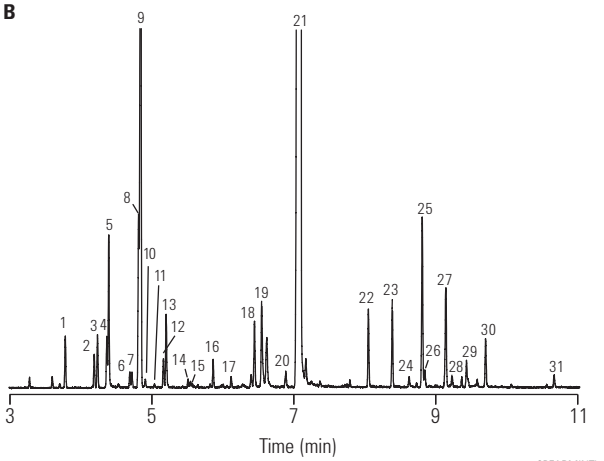


SPEARMINTa

Column B: **DB-1**
121-1022
20 m x 0.18 mm,
0.18 µm

Faster Method with a high efficiency DB-1, 20 m x 0.1 8mm x 0.18 µm column and Hydrogen carrier

B



SPEARMINTb

1. α-Pinene
2. Sabinene
3. β-Pinene
4. 3-Octanol
5. Myrcene
6. α-Terpinene
7. ρ-Cymene
8. 1,8-Cineol
9. Limonene
10. cis-Ocimene
11. trans-Ocimene
12. γ-Terpinene
13. trans-Sabinene hydrate
14. Terpinolene
15. Linalool
16. 3-Octyl acetate
17. Isomenthone
18. Terpinen-4-ol
19. Dihydrocarvone
20. trans-Carveol
21. l-Carvone
22. trans-Dihydrocarveol acetate
23. cis-Carvyl acetate
24. cis-Jasmone
25. β-Bourbonene
26. α-Bourbonene
27. β-Caryophylene
28. α-Copaene
29. trans-β-Farnesene
30. Germacrene-d
31. Viridiflorol

Columns for GC/MS

There is a rapidly increasing population of benchtop GC/MS instruments in analytical laboratories that analyze a broadening range of trace level, higher temperature samples. These samples require increasingly inert, lower bleed, higher temperature columns. In response to this growing need, Agilent Technologies deliberately designed several "ms" columns to chromatograph a broader range of low level samples and generate lower bleed even at higher temperatures.



Tips & Tools

Agilent MS Certified Liners are lot-tested with MSD and FID for superior acid/base deactivation, response linearity and peak symmetry.

Turn to page 153.

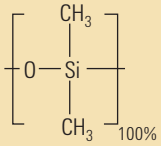
What makes an Agilent J&W low bleed column unique?

Unique polymer chemistry and proprietary surface deactivation, both of which have contributed to columns that adhere to the tightest quality control specifications in the industry for bleed, inertness, selectivity and efficiency. Agilent J&W "ms" columns utilize special surface deactivation and siloxane chemistries which enhance the chromatographic performance of siloxane polymers.

While some of the GC/MS phases utilize different polymer chemistries, their selectivity mimics the standard polysiloxane phases and offers the advantages of low column bleed and, in some cases, extended temperature ranges.

The mass spectrum of septum bleed can look very much like GC column bleed, so the two are often confused. An easy way to tell the two apart: column bleed will be a rise in the baseline, not peaks. If you see bleed peaks, these generally come from lower quality septa or septa being used beyond their operating limits. To minimize septa contributions to background bleed use quality Agilent BTO, Long Life, or Advanced Green septa.





Structure of Dimethylpolysiloxane

DB-1ms Chromatograms

Life Sciences

Drug Screen Page 449

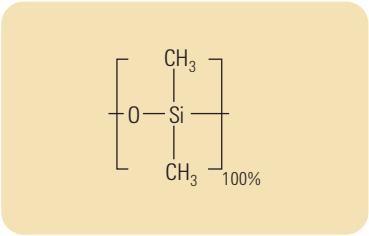
DB-1ms

- 100% Dimethylpolysiloxane, identical selectivity to DB-1
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Improved acid performance compared to standard 100% Dimethylpolysiloxane columns
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- 340/360°C upper temperature limit
- Excellent general purpose column
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: HP-1ms, Rtx-1ms, Rxi-1ms, VF-1ms, CP-Sil 5 CB Low Bleed/MS, MDN-1, AT-1, ZB-1ms, Equity-1

DB-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 340/360	127-0112
		0.40	-60 to 340/360	127-0113
	20	0.10	-60 to 340/360	127-0122
		0.40	-60 to 340/360	127-0123
0.18	20	0.18	-60 to 340/360	121-0122
0.20	12	0.33	-60 to 340/350	128-0112
	25	0.33	-60 to 340/350	128-0122
0.25	15	0.25	-60 to 340/360	122-0112
	30	0.10	-60 to 340/360	122-0131
		0.25	-60 to 340/360	122-0132
	60	0.25	-60 to 340/360	122-0162
0.32	15	0.25	-60 to 340/360	123-0112
	30	0.10	-60 to 340/360	123-0131
		0.25	-60 to 340/360	123-0132
	60	0.25	-60 to 340/360	123-0162



Structure of Dimethylpolysiloxane

HP-1ms

- 100% Dimethylpolysiloxane
- Identical selectivity to HP-1
- Non-polar
- Low bleed characteristics
- Excellent general purpose column
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: DB-1ms, Rtx-1ms, Rxi-1ms, VF-1ms, CP-Sil 5 CB Low Bleed/MS, MDN-1, AT-1, ZB-1ms, Equity-1

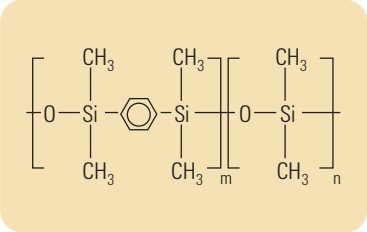
HP-1ms Chromatograms

Environmental

Nitrogen Containing Herbicides (EPA Method 507) Page 372

HP-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-677
0.20	25	0.33	-60 to 325/350	19091S-602
0.25	15	0.25	-60 to 325/350	19091S-931
	30	0.10	-60 to 325/350	19091S-833
		0.25	-60 to 325/350	19091S-933
		0.50	-60 to 325/350	19091S-633
		1.00	-60 to 325/350	19091S-733
	60	0.25	-60 to 325/350	19091S-936
0.32	15	0.25	-60 to 325/350	19091S-911
	25	0.52	-60 to 325/350	19091S-612
	30	0.25	-60 to 325/350	19091S-913
		1.00	-60 to 325/350	19091S-713
	60	0.25	-60 to 325/350	19091S-916



Structure of Poly(dimethylsiloxy)poly (1,4-bix(dimethylsiloxy)phenylen)siloxane

DB-5ms Chromatograms

Environmental

Diesel Fuel	Page 360
EPA Air Analysis Method TO-15 (1 ppbV Standard)	Page 393
EPA Method 525.2	Page 382
EPA Method 8061 (Phthalate Esters)	Page 383
Formaldehyde, 50ppb	Page 394
Organochlorine Pesticides II EPA Method 8081A	Page 363
Organophosphorous Pesticides I, EPA Method 8141A	Page 369
Phenols	Page 385
Sulfur in Air	Page 394

Industrial Chemicals

Amines and Nitriles	Page 421
Phenols II	Page 443
Polyethyleneamines	Page 420
Substituted Anilines	Page 442

Life Sciences

Narcotics	Page 456

DB-5ms

- Phenyl Arylene polymer virtually equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- MSD testing and certification available
- Exact replacement of HP-5TA
- Close equivalent to USP Phase G27
- Test mix available

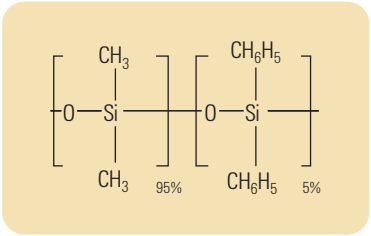
Similar Phases: Rtx-5ms, Rtx-5SIl MS, Rxi-5ms, Rxi-5SIl MS, VF-5ms, PTE-5, CP-Sil 8 CB Low Bleed/MS, BPX-5, AT-5ms, ZB-5ms, SLB-5ms, Equity-5

DB-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5522
		0.36	-60 to 325/350	121-5523
	40	0.18	-60 to 325/350	121-5542
0.20	12	0.33	-60 to 325/350	128-5512
	25	0.33	-60 to 325/350	128-5522
	50	0.33	-60 to 325/350	128-5552

DB-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 325/350	122-5511
		0.25	-60 to 325/350	122-5512
		0.50	-60 to 325/350	122-5516
		1.00	-60 to 325/350	122-5513
	25	0.25	-60 to 325/350	122-5522
		0.40	-60 to 325/350	122-552A
	30	0.10	-60 to 325/350	122-5531
		0.25	-60 to 325/350	122-5532
		0.50	-60 to 325/350	122-5536
		1.00	-60 to 325/350	122-5533
	50	0.25	-60 to 325/350	122-5552
	60	0.10	-60 to 325/350	122-5561
		0.25	-60 to 325/350	122-5562
		1.00	-60 to 325/350	122-5563
0.32	15	0.10	-60 to 325/350	123-5511
		0.25	-60 to 325/350	123-5512
		1.00	-60 to 325/350	123-5513
	25	0.52	-60 to 325/350	123-5526
	30	0.10	-60 to 325/350	123-5531
		0.25	-60 to 325/350	123-5532
		0.50	-60 to 325/350	123-5536
		1.00	-60 to 325/350	123-5533
	60	0.10	-60 to 325/350	123-5561
		0.25	-60 to 325/350	123-5562
		0.50	-60 to 325/350	123-5566
		1.00	-60 to 325/350	123-5563
0.53	15	1.50	-60 to 300/320	125-5512
	30	0.50	-60 to 300/320	125-5537
		1.00	-60 to 300/320	125-553J
		1.50	-60 to 300/320	125-5532



Structure of Diphenyldimethylpolysiloxane

HP-5ms Chromatograms

Environmental

Chlorinated Pesticides, EPA Method 508 — Page 365

Nitrogen/Phosphorus Containing Pesticides, EPA Method 507 — Page 369

Organohalide Pesticides in Water, EPA Method 505 — Page 365

Semivolatile Compounds, EPA Method 8270 — Page 375

Food, Flavors and Fragrances

Fragrance Allergens — Page 397

Industrial Chemicals

Trace Active Amines, 10 ng on-column — Page 419

Phenols I — Page 443

HP-5ms

- (5%-Phenyl)-methylpolysiloxane
- Identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Excellent inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27

Similar Phases: Rtx-5MS, Rtx-5 Amine, DB-5ms, PTE-5, CP-Sil 8CB Low Bleed/MS, BPX-5, ZB-5ms

HP-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-577
0.20	12	0.33	-60 to 325/350	19091S-101
	25	0.33	-60 to 325/350	19091S-102
	50	0.33	-60 to 325/350	19091S-105
0.25	15	0.10	-60 to 325/350	19091S-331
		0.25	-60 to 325/350	19091S-431
		1.00	-60 to 325/350	19091S-231
	30	0.10	-60 to 325/350	19091S-333
		0.25	-60 to 325/350	19091S-433
		0.50	-60 to 325/350	19091S-133
		1.00	-60 to 325/350	19091S-233
	60	0.10	-60 to 325/350	19091S-336
		0.25	-60 to 325/350	19091S-436
0.32	25	0.52	-60 to 325/350	19091S-112
	30	0.10	-60 to 325/350	19091S-313
		0.25	-60 to 325/350	19091S-413
		0.50	-60 to 325/350	19091S-113
		1.00	-60 to 325/350	19091S-213
	60	0.25	-60 to 325/350	19091S-416

DB-XLB Chromatograms

Environmental

Aroclors 1016-1268 (without 1221)	Page 377
CLP Pesticides	Page 362
CLP Pesticide Analysis	Page 361
Congeners in DIN Method PCBs	Page 378
EPA Method 552.2	Page 386
Herbicides I	Page 370
PBDEs	Page 377
PCBs by EPA Method 8082	Page 379
Pesticides, EPA 508.1	Page 364
Phenols	Page 385
Phenoxy Acid Herbicides - Methyl Derivatives, EPA 8151A	Page 372

Food, Flavors and Fragrances

Ylang Ylang Oil	Page 404

DB-XLB

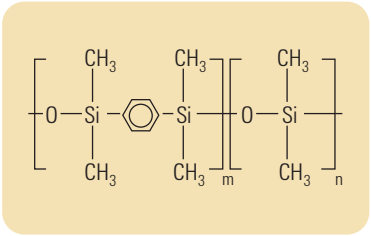
- EXceptionally Low Bleed
- Low polarity
- Extended temperature limit of 340/360°C
- Unique selectivity
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Excellent for pesticides, herbicides, PCBs and PAHs
- Ideal for GC/MS
- MSD testing and certification available
- Bonded and cross-linked
- Solvent rinsable

Note: "DB-XLB is designed for inhibiting column bleed at high temperatures. It also appears to have inadvertently inherited an exceptional ability for separating many PCB congeners when used with MS detection. This stellar performance was maximized after careful optimization of the column dimensions, temperature programs, and carrier gas flow conditions."
(Frame, G. Analytical Chemistry News & Features, Aug. 1, 1997, 468A-475A)

Similar Phases: Rtx-XLB, MDN-12

DB-XLB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	30 to 340/360	121-1222
	30	0.18	30 to 340/360	121-1232
0.20	12	0.33	30 to 340/360	128-1212
	25	0.33	30 to 340/360	128-1222
0.25	15	0.10	30 to 340/360	122-1211
		0.25	30 to 340/360	122-1212
	30	0.10	30 to 340/360	122-1231
		0.25	30 to 340/360	122-1232
		0.50	30 to 340/360	122-1236
		1.00	30 to 340/360	122-1233
	60	0.25	30 to 340/360	122-1262
0.32	30	0.25	30 to 340/360	123-1232
		0.50	30 to 340/360	123-1236
	60	0.25	30 to 340/360	123-1262
0.53	15	1.50	30 to 320/340	125-1212
	30	1.50	30 to 320/340	125-1232



Structure of Poly(dimethylsiloxy)poly (1,4-bix(dimethylsiloxy)phenylen)siloxane

DB-35ms

- Virtually equivalent to a (35%-Phenyl)-methylpolysiloxane
- Mid-polarity
- Very low bleed characteristics, ideal for GC/MS
- Extended temperature limit of 340/360°C
- Excellent inertness for active compounds
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-35ms
- Close equivalent to USP Phase G42

Similar Phases: Rtx-35, Rtx-35ms, VF-35ms, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-35

DB-35ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	50 to 340/360	121-3822
0.20	15	0.33	50 to 340/360	128-3812
	25	0.33	50 to 340/360	128-3822
0.25	15	0.25	50 to 340/360	122-3812
	30	0.15	50 to 340/360	122-3831
		0.25	50 to 340/360	122-3832
	60	0.25	50 to 340/360	122-3862
0.32	15	0.25	50 to 340/360	123-3812
	30	0.25	50 to 340/360	123-3832
0.53	30	0.50	50 to 320/340	125-3837
		1.00	50 to 320/340	125-3832

DB-35ms Chromatograms

Environmental

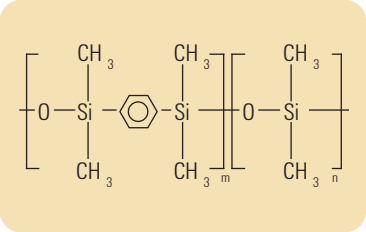
CLP Pesticides	Page 362
EPA Method 552.2	Page 386
Organochlorine Pesticides I EPA Method 8081A	Page 363
Organophosphorous Pesticides I, EPA Method 8141A	Page 369
PCBs by EPA Method 8082	Page 379
Pesticides, EPA 508.1	Page 364
Phenoxy Acid Herbicides - Methyl Derivatives, EPA 8151A	Page 372

Industrial Chemicals

Anilines	Page 442

Life Sciences

Barbiturates	Page 453
Benzodiazepines II	Page 453



Structure of Poly(dimethylsiloxy)poly (1,4-bix(dimethylsiloxy)phenylen)siloxane

DB-17ms

- Virtually equivalent to (50%-Phenyl)-methylpolysiloxane
- 320/340°C upper temperature limit
- Very low bleed mid-polarity column, ideal for GC/MS
- Excellent inertness for active compounds
- Enhanced mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Best column for CLP pesticides

Similar Phases: HP-50+, Rtx-50, VF-17ms, 007-17, SP-2250, SPB-50, BPX-50, SPB-17, AT-50

DB-17ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 320/340	121-4722
0.25	15	0.15	40 to 320/340	122-4711
		0.25	40 to 320/340	122-4712
	30	0.15	40 to 320/340	122-4731
		0.25	40 to 320/340	122-4732
	60	0.25	40 to 320/340	122-4762
0.32	15	0.25	40 to 320/340	123-4712
	30	0.25	40 to 320/340	123-4732

DB-17ms Chromatograms

Environmental

Dioxins and Furans Page 376
PAHs Page 384

Life Sciences

Hallucinogens Page 455
Tocopherols Page 454

DB-225ms

- Virtually equivalent to (50%-Cyanopropylphenyl)-methylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMEs)
- Low bleed
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G7

Similar Phases: HP-225, SP-2330, CP-Sil 43 CB, Rtx-225, BP-225, OV-225, 007-225, AT-225

DB-225ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	40 to 240	122-2912
	30	0.25	40 to 240	122-2932
	60	0.25	40 to 240	122-2962
0.32	30	0.25	40 to 240	123-2932

DB-225ms Chromatograms

Environmental

Tetrachlorodibenzo-p-furans Page 374

Food, Flavors and Fragrances

FAMEs II Page 410



DuraGuard

- Columns with "built in" guard columns, no press-fit connectors
- Minimize front-end contamination and increase column lifetime
- Aid in focusing sample onto the front of the column for better peak shape
- Minimize MSD contamination originating from the column (when used in transfer line)

DuraGuard columns of different phases and dimensions are available through Agilent Technologies' custom column shop. Any DB polysiloxane or GC/MS phase can be made as a DuraGuard column with 0.18 mm ID or larger fused silica tubing. Ask for a custom column quote (part number 100-2000 and specify the phase, ID, length, and film thickness of analytical column, and desired length of DuraGuard).

DuraGuard

Phase	ID (mm)	Length (m)	Film (µm)	DRGD Length (m)	Part No.
DB-1	0.25	30	0.25	10	122-1032G
DB-XLB	0.25	30	0.25	10	122-1232G
DB-5ms	0.25	30	0.25	10	122-5532G
		30	0.50	10	122-5536G
		60	0.25	10	122-5562G
		30	1.00	10	122-5533G
	0.32	30	1.00	10	123-5533G
	0.53	30	0.50	10	125-5537G
DB-5.625	0.18	20	0.36	5	121-5622G5
	0.25	30	0.25	5	122-5631G5
DB-1701	0.53	30	1.00	10	125-0732G
DB-624	0.53	30	3.00	5	125-1334G5

Tips & Tools

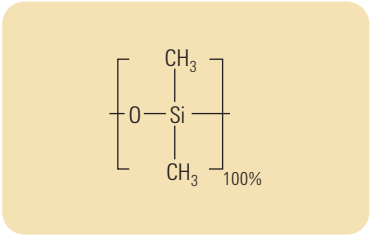
Column contamination from sample matrix components is the number one cause of column failure. Use Agilent DuraGuard GC columns with built-in guard if you do not want to use column connectors.

Polysiloxane Polymers Columns

Polysiloxanes are the most common stationary phases. They are available in the greatest variety and are stable, robust and versatile. Standard polysiloxanes are characterized by the repeating siloxane backbone. Each silicon atom contains two functional groups. The type and amount of the groups distinguish each stationary phase and its properties.

With the merger of Agilent and J&W Scientific there were many similar columns with the same type of polymer. In some cases the manufacturing and QC processes were exactly the same. In these cases the DB version was kept. In the cases where the HP and the DB columns had any manufacturing or QC differences, we opted to keep both phases available as in the case of DB-1 and HP-1. Each of these columns is a high quality product made to meet exacting quality control testing. However, there may be some subtle performance differences. For example the DB-35 and the HP-35 have slightly different selectivities. Therefore, we are still offering both the DB and the HP version for our customers who have methods already developed on these columns.





Structure of Dimethylpolysiloxane

DB-1 Chromatograms

Environmental

EPA Air Analysis Compendium Method TO-14 Standard	Page 392
EPA Method 551	Page 391
Pyrethrins	Page 380

Food, Flavors and Fragrances

Fragrance Reference Standard I	Page 398
Spearmint Oil	Page 227

Industrial Chemicals

Aldehydes and Ketones	Page 423
Aromatics in Finished Gasoline- ASTM Method 5769	Page 482
Esters I	Page 429
PFBHA Derivative	Page 425
Glycols III	Page 432
Halogenated Hydrocarbons II	Page 435
Nitrogen Based Solvents I	Page 439
Triethylene Glycol and Impurities	Page 432
Volatile Amines	Page 419

DB-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

Similar Phases: HP-1, Ultra-1, SPB-1, CP-Sil 5 CB Low Bleed/MS, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, CP-Sil 5 CB MS, ZB-1, AT-1, MDN-1, ZB-1

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.05	10	0.05	-60 to 325/350	126-1012
		0.05	-60 to 325/350	126-10SP
		0.20	-60 to 325/350	126-1013
0.10	5	0.12	-60 to 325/350	127-100A
	10	0.10	-60 to 325/350	127-1012
		0.40	-60 to 325/350	127-1013
	20	0.10	-60 to 325/350	127-1022
		0.40	-60 to 325/350	127-1023
	40	0.20	-60 to 325/350	127-1046
		0.40	-60 to 325/350	127-1043
0.15	10	1.20	-60 to 325/350	12A-1015
0.18	10	0.18	-60 to 325/350	121-1012
		0.20	-60 to 325/350	121-101A
		0.40	-60 to 325/350	121-1013
	20	0.18	-60 to 325/350	121-1022
		0.40	-60 to 325/350	121-1023
	40	0.40	-60 to 325/350	121-1043
0.20	12	0.33	-60 to 325/350	128-1012
	25	0.33	-60 to 325/350	128-1022
	30	0.8	-60 to 325/350	128-1034
	50	0.33	-60 to 325/350	128-1052



DB-1 Chromatograms

Life Sciences

Anabolic Steroids Page 458

Anticonvulsants Page 451

Petroleum

Aromatics in Finished Gasoline- ASTM Method 5769 Page 482

DNPH Derivative Page 424

Polyethylene Page 485

Regular Unleaded Gasoline (California Phase 1) - "Normal" GC Run II Page 484

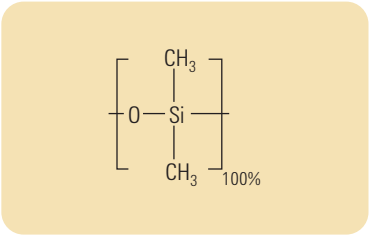
Volatile Sulfur Compounds Page 474

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 325/350	122-1011
		0.25	-60 to 325/350	122-1012
		1.00	-60 to 325/350	122-1013
	25	0.25	-60 to 325/350	122-1022
	30	0.10	-60 to 325/350	122-1031
		0.25	-60 to 325/350	122-1032
		0.50	-60 to 325/350	122-103E
		1.00	-60 to 325/350	122-1033
	50	0.25	-60 to 325/350	122-1052
	60	0.10	-60 to 325/350	122-1061
		0.25	-60 to 325/350	122-1062
		0.50	-60 to 325/350	122-106E
		1.00	-60 to 325/350	122-1063
	100	0.50	-60 to 325/350	122-10AE
	150	1.00	-60 to 325/350	122-10G3
0.32	15	0.10	-60 to 325/350	123-1011
		0.25	-60 to 325/350	123-1012
		1.00	-60 to 325/350	123-1013
		3.00	-60 to 280/300	123-1014
		5.00	-60 to 280/300	123-1015
	25	0.12	-60 to 325/350	123-1027
		0.25	-60 to 325/350	123-1022
		0.52	-60 to 325/350	123-1026
		1.05	-60 to 325/350	123-102F
	30	0.10	-60 to 325/350	123-1031
		0.25	-60 to 325/350	123-1032
		0.50	-60 to 325/350	123-103E
		1.00	-60 to 325/350	123-1033
		1.50	-60 to 300/320	123-103B
		3.00	-60 to 280/300	123-1034
		5.00	-60 to 280/300	123-1035
	50	0.25	-60 to 325/350	123-1052
		0.52	-60 to 325/350	123-1056
		1.05	-60 to 325/350	123-105F
		1.20	-60 to 325/350	123-105C
		5.00	-60 to 280/300	123-1055
	60	0.10	-60 to 325/350	123-1061
		0.25	-60 to 325/350	123-1062
		0.50	-60 to 325/350	123-106E
		1.00	-60 to 325/350	123-1063
		1.50	-60 to 300/320	123-106B
		2.00	-60 to 280/300	123-106G
		3.00	-60 to 280/300	123-1064
		5.00	-60 to 280/300	123-1065

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.45	30	1.27	-60 to 325/350	124-1032
		2.55	-60 to 260/280	124-1034
0.53	5	2.65	-60 to 325/350	125-100B
		5.00	-60 to 325/350	125-1005
	7.5	1.50	-60 to 325/350	125-1002
	10	2.65	-60 to 260/280	125-10HB
		5.00	-60 to 260/280	125-10H5
	15	0.15	-60 to 340/360	125-1011
		0.25	-60 to 320/340	125-101K
		0.50	-60 to 300/320	125-1017
		1.00	-60 to 300/320	125-101J
		1.50	-60 to 300/320	125-1012
		3.00	-60 to 260/280	125-1014
		5.00	-60 to 260/280	125-1015
	25	1.00	-60 to 300/320	125-102J
		5.00	-60 to 260/280	125-1025
	30	0.10	-60 to 340/360	125-1039
		0.25	-60 to 320/340	125-103K
		0.50	-60 to 300/320	125-1037
		1.00	-60 to 300/320	125-103J
		1.50	-60 to 300/320	125-1032
		2.65	-60 to 260/280	125-103B
		3.00	-60 to 260/280	125-1034
		5.00	-60 to 260/280	125-1035
	50	5.00	-60 to 260/280	125-1055
	60	1.00	-60 to 300/320	125-106J
		1.50	-60 to 300/320	125-1062
		3.00	-60 to 260/280	125-1064
		5.00	-60 to 260/280	125-1065
	105	5.00	-60 to 260/280	125-10B5



Structure of Dimethylpolysiloxane

HP-1 Chromatograms

Environmental

Organotin Compounds I Page 380

Industrial Chemicals

Common Industrial Solvents Page 439

Inorganic Hydride Gases Page 446

Solvents IV Page 438

Petroleum

Denatured Fuel Ethanol-ASTM D5501 Page 481

Glycols/Diols Page 433

Oxygenates in Gasoline ASTM D5599 (GC-OFID) Page 480

Sulfur Compounds in Natural Gas-Synthetic Mixture Page 478

HP-1

- 100% Dimethylpolysiloxane
- Non-polar
- Excellent general purpose column – "Industry Standard"
- Wide range of applications
- Superior performance for low molecular weight alcohols (<C5)
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G2

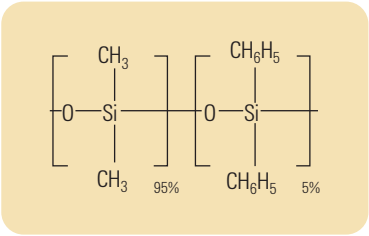
Similar Phases: DB-1, Ultra-1, SPB-1, CP-Sil 5 CB, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, CP-Sil 5 CB MS, ZB-1, AT-1, MDN-1, ZB-1

HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091Z-577
0.20	12	0.33	-60 to 325/350	19091-60312
	17	0.10	-60 to 325/350	19091Z-008
	25	0.11	-60 to 325/350	19091Z-002
		0.33	-60 to 325/350	19091Z-102
		0.50	-60 to 325/350	19091Z-202
	50	0.11	-60 to 325/350	19091Z-005
		0.33	-60 to 325/350	19091Z-105
		0.50	-60 to 325/350	19091Z-205
0.25	15	0.10	-60 to 325/350	19091Z-331
		0.25	-60 to 325/350	19091Z-431
		1.00	-60 to 325/350	19091Z-231
	30	0.10	-60 to 325/350	19091Z-333
		0.25	-60 to 325/350	19091Z-433
		1.00	-60 to 325/350	19091Z-233
	60	0.25	-60 to 325/350	19091Z-436
		1.00	-60 to 325/350	19091Z-236
	100	0.50	-60 to 325/350	19091Z-530

HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	0.25	-60 to 325/350	19091Z-411
		1.00	-60 to 325/350	19091Z-211
	25	0.17	-60 to 325/350	19091Z-012
		0.52	-60 to 325/350	19091Z-112
		1.05	-60 to 325/350	19091Z-212
	30	0.10	-60 to 325/350	19091Z-313
		0.25	-60 to 325/350	19091Z-413
		1.00	-60 to 325/350	19091Z-213
		3.00	-60 to 260/280	19091Z-513
		4.00	-60 to 260/280	19091Z-613
		5.00	-60 to 260/280	19091Z-713
	50	0.17	-60 to 325/350	19091Z-015
		0.52	-60 to 325/350	19091Z-115
		1.05	-60 to 325/350	19091Z-215
	60	0.25	-60 to 325/350	19091Z-416
		1.00	-60 to 325/350	19091Z-216
		5.00	-60 to 260/280	19091Z-716
0.53	5	0.15	-60 to 320/400	19095Z-220
		0.88	-60 to 320/400	19095Z-020
			-60 to 325/350	125-100A
		2.65	-60 to 260/280	19095S-100
	7.5	5.00	-60 to 260/280	19095Z-627
	10	0.88	-60 to 300/320	19095Z-021
		2.65	-60 to 260/280	19095Z-121
	15	0.15	-60 to 320/400	19095Z-221
		1.50	-60 to 300/320	19095Z-321
		3.00	-60 to 260/280	19095Z-421
		5.00	-60 to 260/280	19095Z-621
	30	0.88	-60 to 300/320	19095Z-023
		1.50	-60 to 300/320	19095Z-323
		2.65	-60 to 260/280	19095Z-123
		3.00	-60 to 260/280	19095Z-423
		5.00	-60 to 260/280	19095Z-623
	60	5.00	-60 to 260/280	19095Z-626



Structure of Diphenyldimethylpolysiloxane

DB-5 Chromatograms

Environmental

Organochlorine Pesticides, DB5/1701P — Page 368

Food, Flavors and Fragrances

Bacterial Fatty Acid Methyl Esters — Page 409

Cold-Pressed Orange Oil — Page 402

Lemon Oil — Page 402

Life Sciences

Amphetamines and Precursors - TMS Derivatives — Page 450

Antihistamines — Page 451

Common Drug Screen — Page 448

Marijuana (Δ9-THC) and Major Metabolites - TMS Derivatives — Page 460

Narcotics and Adulterants — Page 456

Over-the-Counter Pain Killers - TMS Derivatives — Page 457

DB-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- Low bleed
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

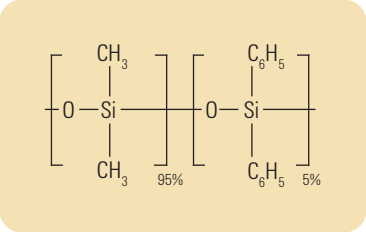
Similar Phases: HP-5, Ultra-2, SPB-5, CP-Sil 8CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5

DB-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 325/350	127-5012
		0.17	-60 to 325/350	127-501E
		0.33	-60 to 325/350	127-501N
		0.40	-60 to 325/350	127-5013
	20	0.10	-60 to 325/350	127-5022
		0.40	-60 to 325/350	127-5023
0.15	10	1.20	-60 to 300/320	12A-5015
0.18	10	0.18	-60 to 325/350	121-5012
		0.40	-60 to 325/350	121-5013
	20	0.18	-60 to 325/350	121-5022
		0.40	-60 to 325/350	121-5023
	40	0.18	-60 to 325/350	121-5042
0.20	12	0.33	-60 to 325/350	128-5012
	15	0.20	-60 to 325/350	128-50H7
	25	0.33	-60 to 325/350	128-5022
	50	0.33	-60 to 325/350	128-5052
0.25	15	0.10	-60 to 325/350	122-5011
		0.25	-60 to 325/350	122-5012
		0.50	-60 to 325/350	122-501E
		1.00	-60 to 325/350	122-5013
	25	0.25	-60 to 325/350	122-5022
	30	0.10	-60 to 325/350	122-5031
		0.25	-60 to 325/350	122-5032
		0.50	-60 to 325/350	122-503E
		1.00	-60 to 325/350	122-5033
	50	0.25	-60 to 325/350	122-5052
	60	0.10	-60 to 325/350	122-5061
		0.25	-60 to 325/350	122-5062
		0.50	-60 to 325/350	122-506E
		1.00	-60 to 325/350	122-5063

DB-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	0.10	-60 to 325/350	123-5011
		0.25	-60 to 325/350	123-5012
		1.00	-60 to 325/350	123-5013
	25	0.17	-60 to 325/350	123-502D
		0.25	-60 to 325/350	123-5022
		0.52	-60 to 325/350	123-5026
		1.05	-60 to 325/350	123-502F
	30	0.10	-60 to 325/350	123-5031
		0.25	-60 to 325/350	123-5032
		0.50	-60 to 325/350	123-503E
		1.00	-60 to 325/350	123-5033
		1.50	-60 to 325/350	123-503B
	50	0.25	-60 to 325/350	123-5052
		0.52	-60 to 325/350	123-5056
		1.00	-60 to 325/350	123-5053
	60	0.25	-60 to 325/350	123-5062
		1.00	-60 to 325/350	123-5063
0.45	15	1.27	-60 to 300/320	124-5012
	30	0.42	-60 to 300/320	124-5037
		1.27	-60 to 300/320	124-5032
0.53	10	2.65	-60 to 260/280	125-50HB
	15	0.25	-60 to 300/320	125-501K
		0.50	-60 to 300/320	125-5017
		1.00	-60 to 300/320	125-501J
		1.50	-60 to 300/320	125-5012
	25	5.00	-60 to 260/280	125-5025
	30	0.25	-60 to 300/320	125-503K
		0.50	-60 to 300/320	125-5037
		0.88	-60 to 300/320	125-503D
		1.00	-60 to 300/320	125-503J
		1.50	-60 to 300/320	125-5032
		2.65	-60 to 260/280	125-503B
		3.00	-60 to 260/280	125-5034
		5.00	-60 to 260/280	125-5035
	60	1.50	-60 to 300/320	125-5062
		5.00	-60 to 260/280	125-5065



Structure of Diphenyldimethylpolysiloxane

HP-5 Chromatograms

Environmental

Organotin Compounds II Page 381

HP-5

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Excellent general purpose column
- Wide range of applications
- High temperature limit
- Bonded and cross-linked
- Solvent rinsable
- Wide range of column dimensions available
- Equivalent to USP Phase G27

Similar Phases: DB-5, Ultra-2, SPB-5, CP-Sil 8 CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5

HP-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091J-577
0.20	12	0.33	-60 to 325/350	19091J-101
	25	0.11	-60 to 325/350	19091J-002
		0.33	-60 to 325/350	19091J-102
		0.50	-60 to 325/350	19091J-202
	50	0.11	-60 to 325/350	19091J-005
		0.33	-60 to 325/350	19091J-105
		0.50	-60 to 325/350	19091J-205
0.25	5	0.10	-60 to 325/350	19091J-330
	15	0.25	-60 to 325/350	19091J-431
		1.00	-60 to 325/350	19091J-231
	30	0.10	-60 to 325/350	19091J-333
		0.25	-60 to 325/350	19091J-433
		1.00	-60 to 325/350	19091J-233
	60	0.25	-60 to 325/350	19091J-436
		1.00	-60 to 325/350	19091J-236

HP-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	0.25	-60 to 325/350	19091J-411
	25	0.17	-60 to 325/350	19091J-012
		0.52	-60 to 325/350	19091J-112
		1.05	-60 to 325/350	19091J-212
	30	0.10	-60 to 325/350	19091J-313
		0.25	-60 to 325/350	19091J-413
		0.50	-60 to 325/350	19091J-113
		1.00	-60 to 325/350	19091J-213
	50	0.17	-60 to 325/350	19091J-015
		0.52	-60 to 325/350	19091J-115
		1.05	-60 to 325/350	19091J-215
	60	0.25	-60 to 325/350	19091J-416
		1.00	-60 to 325/350	19091J-216
0.53	10	2.65	-60 to 260/280	19095J-121
	15	1.50	-60 to 300/320	19095J-321
		5.00	-60 to 260/280	19095J-621
	30	0.88	-60 to 300/320	19095J-023
		1.50	-60 to 300/320	19095J-323
		2.65	-60 to 260/280	19095J-123
		5.00	-60 to 260/280	19095J-623



Ultra 1

Ultra 1 Chromatograms

Industrial Chemicals

Ethylene Glycol Mixture Page 433
Pyrolysates of Polystyrene Page 428

- Non-polar
- 100% Dimethylpolysiloxane
- Equivalent to HP-1 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: DB-1, HP-1, SPB-1, CP-Sil 5 CB, Rtx-1, BP-1, 007-1(MS)

Ultra 1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.33	-60 to 325/350	19091A-101
	17	0.11	-60 to 325/350	19091A-008
	25	0.11	-60 to 325/350	19091A-002
		0.33	-60 to 325/350	19091A-102
	50	0.11	-60 to 325/350	19091A-005
		0.33	-60 to 325/350	19091A-105
0.32	25	0.17	-60 to 325/350	19091A-012
		0.52	-60 to 325/350	19091A-112
	50	0.17	-60 to 325/350	19091A-015
		0.52	-60 to 325/350	19091A-115

Ultra 2

Ultra 2 Chromatograms

Food, Flavors and Fragrances

Flavor Mixture Page 401

Life Sciences

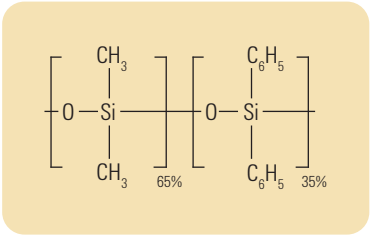
Antiepileptic Drugs Page 452
Tricyclic Antipsychotics Page 452
Urine Drug Screen Page 449

- Non-polar
- (5%-Phenyl)-methylpolysiloxane
- Equivalent to HP-5 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: DB-5, HP-5, SPB-5, CP-Sil 8 CB, Rtx-5, BP-5, CB-5, 007-5, 2B-5

Ultra 2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.33	-60 to 325/350	19091B-101
	25	0.11	-60 to 325/350	19091B-002
		0.33	-60 to 325/350	19091B-102
	50	0.11	-60 to 325/350	19091B-005
		0.33	-60 to 325/350	19091B-105
0.32	25	0.17	-60 to 325/350	19091B-012
		0.52	-60 to 325/350	19091B-112
	50	0.17	-60 to 325/350	19091B-015
		0.52	-60 to 325/350	19091B-115



Structure of Diphenyldimethylpolysiloxane

DB-35 Chromatograms

Environmental

Organochlorine Pesticides IV Page 367

Nitrogen/Phosphorus Containing Pesticides, EPA Method 507 Page 369

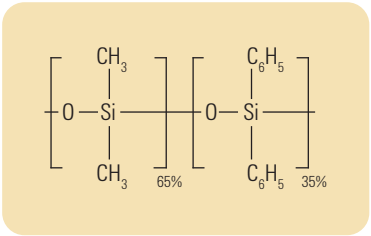
DB-35

- (35%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly more polar than HP-35
- Low bleed
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

Similar Phases: Rtx-35, SPB-35, AT-35, Sup-Herb, HP-35, BPX-35

DB-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	40 to 300/320	122-1932
	60	0.25	40 to 300/320	122-1962
0.32	30	0.25	40 to 300/320	123-1932
		0.50	40 to 300/320	123-1933
0.53	15	1.00	40 to 280/300	125-1912
	30	0.50	40 to 280/300	125-1937
		1.00	40 to 280/300	125-1932



Structure of Diphenyldimethylpolysiloxane

HP-35 Chromatograms

Industrial Chemicals

Polymer Additives Page 446

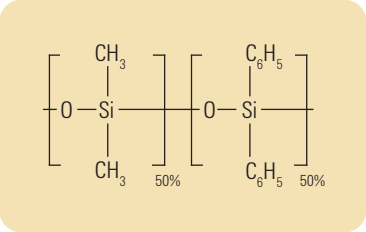
HP-35

- (35%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly less polar than DB-35
- Inert to active solutes
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G42

Similar Phases: Rtx-35, SPB-35, AT-35, Sup-Herb, DB-35, BPX-35

HP-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	40 to 300/320	19091G-131
	30	0.25	40 to 300/320	19091G-133
0.32	30	0.25	40 to 300/320	19091G-113
		0.50	40 to 300/320	19091G-213



Structure of Diphenyldimethylpolysiloxane

DB-17 Chromatograms

Life Sciences

Common Drug Screen Page 448

Free Steroids Page 458

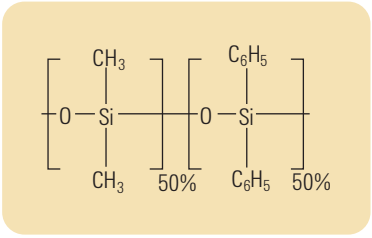
DB-17

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly more polar than HP-50+
- Excellent for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

Similar Phases: HP-50+, Rtx-50, CP-Sil 24 CB, 007-17(MPS-50), HP-17, SP-2250, SPB-50, ZB-50, AT-50

DB-17

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.05	10	0.10	40 to 280/300	126-1713
0.10	10	0.10	40 to 280/300	127-1712
		0.20	40 to 280/300	127-1713
	20	0.10	40 to 280/300	127-1722
0.18	20	0.18	40 to 280/300	121-1722
		0.30	40 to 280/300	121-1723
0.25	15	0.15	40 to 280/300	122-1711
		0.25	40 to 280/300	122-1712
		0.50	40 to 280/300	122-1713
	30	0.15	40 to 280/300	122-1731
		0.25	40 to 280/300	122-1732
		0.50	40 to 280/300	122-1733
	60	0.25	40 to 280/300	122-1762
0.32	15	0.15	40 to 280/300	123-1711
		0.25	40 to 280/300	123-1712
		0.50	40 to 280/300	123-1713
	30	0.15	40 to 280/300	123-1731
		0.25	40 to 280/300	123-1732
		0.50	40 to 280/300	123-1733
	60	0.25	40 to 280/300	123-1762
0.53	5	2.00	40 to 280/300	125-1704
	15	0.25	40 to 260/280	125-1711
		0.50	40 to 260/280	125-1717
		1.00	40 to 260/280	125-1712
		1.50	40 to 260/280	125-1713
	30	0.25	40 to 260/280	125-1731
		0.50	40 to 260/280	125-1737
		1.00	40 to 260/280	125-1732
		1.50	40 to 260/280	125-1733
	60	1.00	40 to 260/280	125-1762



Structure of Diphenyldimethylpolysiloxane

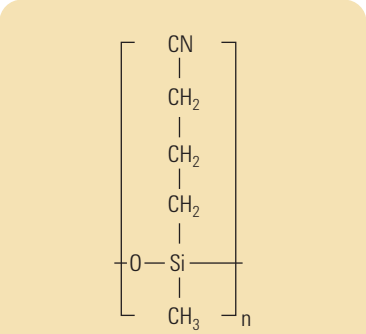
HP-50+

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity – slightly less polar than DB-17
- Excellent for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G3

Similar Phases: DB-17, Rtx-50, CP-Sil 24 CB, 007-17(MPS-50), SP-2250, SPB-50, ZB-50, AT-50

HP-50+

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 280/300	19091L-577
0.20	12	0.31	40 to 280/300	19091L-101
0.25	5	0.15	40 to 280/300	19091L-330
	15	0.25	40 to 280/300	19091L-431
	30	0.15	40 to 280/300	19091L-333
		0.25	40 to 280/300	19091L-433
		0.50	40 to 280/300	19091L-133
0.32	15	0.50	40 to 280/300	19091L-111
	30	0.25	40 to 280/300	19091L-413
		0.50	40 to 280/300	19091L-113
	60	0.25	40 to 280/300	19091L-416
0.53	15	1.00	40 to 260/280	19095L-021
	30	0.50	40 to 260/280	19095L-523
		1.00	40 to 260/280	19095L-023



Structure of cyanpropylmethylpolysiloxane

DB-23

- (50%-Cyanopropyl)-methylpolysiloxane
- High polarity
- Designed for separation of fatty acid methyl esters (FAMEs)
- Excellent resolution for cis- and trans-isomers
- Bonded and cross-linked
- Solvent rinsable
- Replaces HP-23
- Close equivalent to USP Phase G5

Similar Phases: SP-2330, Rtx-2330, 007-23, AT-Silar, BPX-70, SP-2340, VF-23ms

DB-23

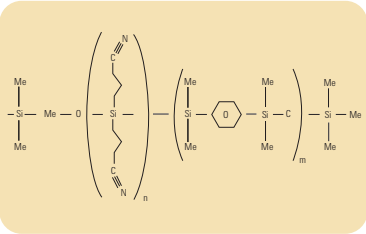
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.20	40 to 250/260	121-2323
0.25	15	0.25	40 to 250/260	122-2312
	30	0.15	40 to 250/260	122-2331
		0.25	40 to 250/260	122-2332
	60	0.15	40 to 250/260	122-2361
		0.25	40 to 250/260	122-2362
0.32	30	0.25	40 to 250/260	123-2332
	60	0.25	40 to 250/260	123-2362
0.53	15	0.50	40 to 230/240	125-2312
	30	0.50	40 to 230/240	125-2332

DB-23 Chromatograms

Food, Flavors and Fragrances

Canola Oil Margarine Partially Hydrogenated FAMEs AOCS Method 1c-89 Page 414

FAMEs I Page 410



Structure of cyanopropylaryl-polysiloxane

HP-88

- (88%-cyanopropyl)aryl-polysiloxane
- 250/320°C upper temperature limits
- High Polarity
- Designed for separation of cis/trans fatty acid methyl esters (FAMES)
- Even better separation than DB-23 of cis-trans isomers

Similar Phases: CP-Sil 88, SP-2560, SP-2340, SP-2330, BPX-70, BPX-90

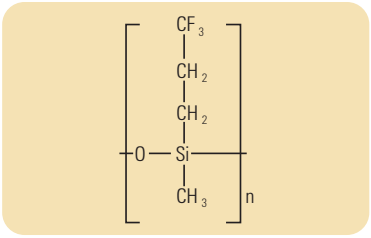
HP-88

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	100	0.20	0 to 250/260	112-88A7
	60	0.20	0 to 250/260	112-8867
	30	0.20	0 to 250/260	112-8837

HP-88 Chromatograms

Food, Flavors and Fragrances

69 Component FAME Mix Page 411



Structure of trifluoropropylmethylpolysiloxane

DB-200

- (35% Trifluoropropyl)-methylpolysiloxane
- 300/320°C temperature limit
- Mid-polarity – more polar than DB-1701 or DB-17
- Ideal for difficult to separate positional isomers
- Unique interactions with compounds containing nitro, halogen and carbonyl groups
- Low ECD bleed
- Unique selectivity
- Close equivalent to USP Phase G6

Similar Phases: Rtx-200, VF-200ms

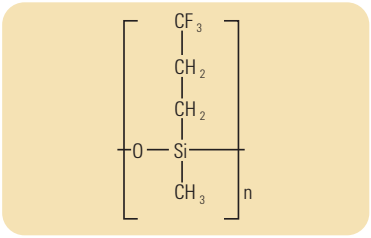
DB-200 Chromatograms

Industrial Chemicals

Acrylate Impurities I	Page 440
Aromatic Solvents	Page 438
Solvents I	Page 436

DB-200

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	30 to 300/320	122-2032
		0.50	30 to 300/320	122-2033
0.32	30	0.25	30 to 300/320	123-2032
		0.50	30 to 300/320	123-2033
0.53	30	1.00	30 to 280/300	125-2032



Structure of trifluoropropylmethylpolysiloxane

DB-210

- (50%-Trifluoropropyl)-methylpolysiloxane
- High polarity
- Excellent for U.S. EPA Methods 8140 and 609
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-210
- Close equivalent to USP Phase G6

Similar Phases: SP-2401

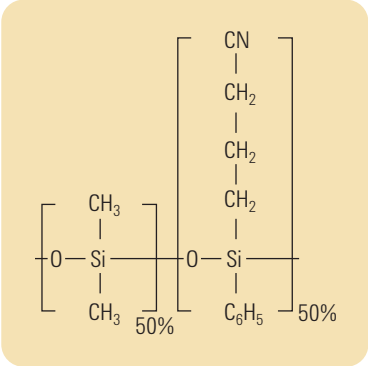
DB-210 Chromatograms

Environmental

Herbicides II	Page 371

DB-210

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	45 to 240/260	122-0212
	30	0.25	45 to 240/260	122-0232
		0.50	45 to 240/260	122-0233
0.32	15	0.50	45 to 240/260	123-0213
	30	0.25	45 to 240/260	123-0232
		0.50	45 to 240/260	123-0233
0.53	15	1.00	45 to 220/240	125-0212
	30	1.00	45 to 220/240	125-0232



Structure of cyanopropylphenylmethylpolysiloxane

DB-225 Chromatograms

Environmental

Tetrachlorodibenzo-p-furans Page 374

Food, Flavors and Fragrances

Alditol Acetates Page 406

FAME Standard II Page 413

DB-225

- (50%-Cyanopropylphenyl)-dimethylpolysiloxane
- Mid/high polarity
- Excellent for separations of cis- and trans-fatty acid methyl esters (FAMEs)
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-225
- Close equivalent to USP Phase G7

Similar Phases: SP-2330, CP-Sil 43 CB, Rtx-225, BP-225, OV-225, 007-225, AT-225

DB-225

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	20	0.10	40 to 220/240	127-2222
0.18	20	0.20	40 to 220/240	121-2223
0.25	15	0.25	40 to 220/240	122-2212
	30	0.15	40 to 220/240	122-2231
		0.25	40 to 220/240	122-2232
0.32	30	0.25	40 to 220/240	123-2232
0.53	15	1.00	40 to 200/220	125-2212
	30	0.50	40 to 200/220	125-2237
		1.00	40 to 200/220	125-2232

Tips & Tools

Need assistance selecting a column for your method? Contact our chromatography technical specialists at **www.agilent.com/chem/TechRep**.

DB-1301

- (6%-Cyanopropyl-phenyl) methylpolysiloxane
- Equivalent to USP Phase G43
- Low/mid-polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

Similar Phases: Rtx-1301, PE-1301, VF-1301ms

DB-1301

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	10	0.40	-20 to 280/300	121-1313
0.25	30	0.25	-20 to 280/300	122-1332
		1.00	-20 to 280/300	122-1333
	60	0.25	-20 to 280/300	122-1362
		1.00	-20 to 280/300	122-1363
0.32	30	0.25	-20 to 280/300	123-1332
		1.00	-20 to 280/300	123-1333
	60	1.00	-20 to 280/300	123-1363
0.53	15	1.00	-20 to 260/280	125-1312
	30	1.00	-20 to 260/280	125-1332
		1.50	-20 to 260/280	125-1333



Tips & Tools

Selecting the right column is only part of the total solution. Don't forget key supplies such as septa, liners and seals.

Turn to pages 148-157.

DB-1701 Chromatograms

Environmental

Organochlorine Pesticides III Page 367
Phenoxy Acid Herbicides Page 371

Food, Flavors and Fragrances

TMS Sugars Page 408

Industrial Chemicals

Acrylate Impurities II Page 441

Life Sciences

Fentanyls Page 454



Tips & Tools

Agilent also offers DB-624 columns for the analysis of volatile priority pollutants and residual solvents.

Turn to page 280.

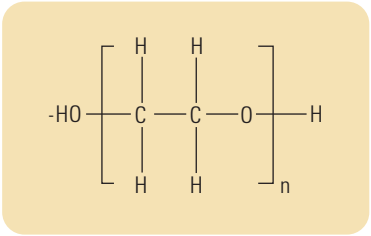
DB-1701

- (14%-Cyanopropyl-phenyl)-methylpolysiloxane
- Low/mid-polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

Similar Phases: SPB-1701, CP-Sil 19 CB, Rtx-1701, BP-10, OV-1701, 007-1701, ZB-1701, VF-1701ms

DB-1701

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	20	0.10	-20 to 280/300	127-0722
		0.40	-20 to 280/300	127-0723
0.18	10	0.40	-20 to 280/300	121-0713
	20	0.18	-20 to 280/300	121-0722
0.25	15	0.25	-20 to 280/300	122-0712
		1.00	-20 to 280/300	122-0713
	30	0.15	-20 to 280/300	122-0731
		0.25	-20 to 280/300	122-0732
		1.00	-20 to 280/300	122-0733
	60	0.15	-20 to 280/300	122-0761
		0.25	-20 to 280/300	122-0762
		0.50	-20 to 280/300	122-0766
		1.00	-20 to 280/300	122-0763
0.32	15	0.25	-20 to 280/300	123-0712
		1.00	-20 to 280/300	123-0713
	30	0.15	-20 to 280/300	123-0731
		0.25	-20 to 280/300	123-0732
		1.00	-20 to 280/300	123-0733
	50	1.00	-20 to 280/300	123-0753
	60	0.25	-20 to 280/300	123-0762
		1.00	-20 to 280/300	123-0763
0.53	15	1.00	-20 to 260/280	125-0712
	30	0.25	-20 to 260/280	125-0731
		0.50	-20 to 260/280	125-0737
		1.00	-20 to 260/280	125-0732
		1.50	-20 to 260/280	125-0733
	60	1.00	-20 to 260/280	125-0762



Structure of Polyethylene glycol

Polyethylene Glycol (PEG) Columns

Agilent offers a full range of PEG columns. Even though each phase is based on the polyethylene glycol polymer, strict control of the cross-linking and deactivation processes result in a variety of unique phase characteristics to meet the varying analysis needs of your laboratory.

PEG Column	Features	Benefits
DB-WAX DB-WaxFF	• Lowest operating temperature limit • Most similar to Carbowax 20M • Available in 0.10 mm ID • Highly inert	• Analyze low boiling point analytes • Transfer older methods to bonded phase • Used for Fast GC for high sample throughput • Broad analyte compatibility
DB-WAXetr	• Middle operating temperature range	• Compromise for high and low boiling analytes
HP-INNOWax	• Highest upper temperature limit • Wide chemical compatibility • Lowest bleed at elevated temperatures • Highly inert	• Analyze high boiling point compounds • Excellent general purpose column • Best choice for MS use • Broad analyte compatibility
DB-FFAP, HP-FFAP	• Acid modified	• Can inject organic acids without derivization
CAM	• Base modified • Non-bonded	• Good peak shape for basic compounds • Cannot be solvent rinsed



DB-WAX and DB-WaxFF Chromatograms

Food, Flavors and Fragrances

FAME Standard I Page 412
Fragrance Reference Standard II Page 399
Lavender Oil Spiked with Camphor Page 400
Peppermint Oil Page 403
Spearmint Oil (Western) Page 403
Ylang Ylang Oil II Page 404

Industrial Chemicals

Aldehydes and Ketones Page 423
Aromatics II Page 426
Ethylene Oxide Page 445
Formaldehyde Underivatized Page 424
Glycols I Page 431
Impurities in Styrene Page 427
Phenols III Page 444

DB-WAX and DB-WaxFF

- Polyethylene glycol (PEG)
- Equivalent to USP Phase G16
- High polarity
- Lower temperature limit of 20°C is the lowest of any bonded PEG phase; improves resolution of low boiling point analytes
- Column-to-column reproducibility
- Bonded and cross-linked
- Exact replacement of HP-WAX
- Solvent rinsable
- DB-WaxFF is a highly reproducible, specially tested microbore DB-Wax for fragrance analysis

Similar Phases: HP-20M, SUPELCOWAX 10, CP-WAX 52 CB, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, HP-INNOWax, Rtx-WAX, ZB-WAX, VF-WAXms

DB-WAX and DB-WaxFF

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-WAX				
0.05	10	0.05	20 to 250/260	126-7012
		0.10	20 to 240/250	126-7013
0.10	10	0.10	20 to 250/260	127-7012
		0.20	20 to 240/250	127-7013
	20	0.10	20 to 250/260	127-7022
		0.20	20 to 240/250	127-7023
0.18	10	0.18	20 to 250/260	121-7012
	20	0.18	20 to 250/260	121-7022
		0.30	20 to 240/250	121-7023
	40	0.18	20 to 250/260	121-7042
		0.30	20 to 240/250	121-7043
0.20	25	0.20	20 to 250/260	128-7022
	30	0.20	20 to 250/260	128-7032
	50	0.20	20 to 250/260	128-7052

DB-WAX and DB-WaxFF

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-WAX				
0.25	15	0.25	20 to 250/260	122-7012
		0.50	20 to 240/250	122-7013
	30	0.15	20 to 250/260	122-7031
		0.25	20 to 250/260	122-7032
		0.50	20 to 240/250	122-7033
	60	0.15	20 to 250/260	122-7061
		0.25	20 to 250/260	122-7062
		0.50	20 to 240/250	122-7063
0.32	15	0.25	20 to 250/260	123-7012
		0.50	20 to 240/250	123-7013
	30	0.15	20 to 250/260	123-7031
		0.25	20 to 250/260	123-7032
		0.50	20 to 240/250	123-7033
	60	0.25	20 to 250/260	123-7062
		0.50	20 to 240/250	123-7063
0.45	30	0.85	20 to 230/240	124-7032
0.53	15	0.50	20 to 230/240	125-7017
		1.00	20 to 230/240	125-7012
	30	0.25	20 to 230/240	125-7031
		0.50	20 to 230/240	125-7037
		1.00	20 to 230/240	125-7032
	60	1.00	20 to 230/240	125-7062
DB-WaxFF				
0.10	20	0.20	20 to 240/250	127-7023FF



Tips & Tools

Ghost peaks can be caused by cored septa material accumulating in the inlet. To prevent coring, use Agilent Premium Non-Stick Septa with CenterGuide.

Turn to pages 148–150.

DB-WAXetr Chromatograms

Industrial Chemicals

Alcohols II Page 417
Impurities in Mixed Xylenes Page 428
Impurities in Styrene Page 427
Organic Acids Page 418
Solvents I Page 436
Solvents II Page 437

DB-WAXetr

- Polyethylene glycol (PEG)
- Extended Temperature Range (etr)
- High polarity
- Excellent column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G16

Similar Phases: HP-20M, SUPELCOWAX 10, CP-WAX 52 CB, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, HP-INNOWax, ZB-WAX

DB-WAXetr

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.40	30 to 250/260	128-7323
0.25	30	0.25	30 to 260/280	122-7332
		0.50	30 to 250/260	122-7333
	60	0.25	30 to 260/280	122-7362
		0.50	30 to 250/260	122-7363
0.32	15	0.25	30 to 260/280	123-7312
		1.00	30 to 250/260	123-7314
	30	0.25	30 to 260/280	123-7332
		0.50	30 to 250/260	123-7333
		1.00	30 to 250/260	123-7334
	50	1.00	30 to 250/260	123-7354
	60	0.25	30 to 260/280	123-7362
		0.50	30 to 250/260	123-7363
		1.00	30 to 250/260	123-7364
0.53	15	1.00	30 to 240/260	125-7312
		2.00	50 to 230/250	125-7314
	30	1.00	30 to 240/260	125-7332
		1.50	30 to 230/240	125-7333
		2.00	50 to 230/250	125-7334
	60	1.00	30 to 240/260	125-7362

HP-INNOWax

- Polyethylene glycol (PEG)
- High polarity
- Highest upper temperature limits of the bonded PEG phases
- Column-to-column repeatability
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G16

Similar Phases: HP-20M, SUPELCOWAX 10, CP-WAX 52 CB, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, DB-WAXetr, ZB-WAX

HP-INNOWax

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 260/270	19091N-577
0.20	25	0.20	40 to 260/270	19091N-102
		0.40	40 to 260/270	19091N-202
	50	0.20	40 to 260/270	19091N-105
		0.40	40 to 260/270	19091N-205
0.25	4	0.25	40 to 260/270	19091N-130
	5	0.15	40 to 260/270	19091N-030
	15	0.10	40 to 260/270	19091N-331
		0.25	40 to 260/270	19091N-131
		0.50	40 to 260/270	19091N-231
	30	0.15	40 to 260/270	19091N-033
		0.25	40 to 260/270	19091N-133
		0.50	40 to 260/270	19091N-233
	60	0.15	40 to 260/270	19091N-036
		0.25	40 to 260/270	19091N-136
		0.50	40 to 260/270	19091N-236
0.32	15	0.25	40 to 260/270	19091N-111
	30	0.15	40 to 260/270	19091N-013
		0.25	40 to 260/270	19091N-113
		0.50	40 to 260/270	19091N-213
	60	0.25	40 to 260/270	19091N-116
		0.50	40 to 260/270	19091N-216
0.53	15	1.00	40 to 240/250	19095N-121
	30	1.00	40 to 240/250	19095N-123
	60	1.00	40 to 240/250	19095N-126

HP-INNOWax Chromatograms

Food, Flavors and Fragrances

Bourbon	Page 406
Free Fatty Acids	Page 408
Perfume	Page 400
Polyunsaturated Fatty Acid Methyl Esters	Page 411
Strawberry Syrup	Page 407
Sulfur and Selenium in Garlic by Headspace	Page 407

Industrial Chemicals

Alcohols III	Page 418
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Free Organic Acids/ C4-C5 Isomers	Page 419
Chlorinated Isooctane	Page 436
Esters III	Page 430
Impurities in Ethylbenzene	Page 427

Petroleum

Aromatics Analysis - Ethylbenzene Impurities	Page 479
Aromatics Analysis: ASTM D16 Analytes	Page 478
Fast Analysis of Aromatic Solvent	Page 464
Impurities in p-Xylene - ASTM D3798	Page 479

DB-FFAP Chromatograms

Food, Flavors and Fragrances

Organic Acids Page 409

Life Sciences

Aspirin and Ibuprofen in Methanol Page 457

DB-FFAP

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 40° to 250°C
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

We do not recommend the use of water or methanol to rinse DB-FFAP GC columns.

Similar Phases: Stabilwax-DA, HP-FFAP, Nukol, 007-FFAP, BP21, CP-Wax 58 (FFAP) CB, AT-1000, OV-351, CP-FFAP-CB

DB-FFAP

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	40 to 250	127-3212
	15	10	40 to 250	127-32H2
0.25	15	0.25	40 to 250	122-3212
	30	0.25	40 to 250	122-3232
		0.50	40 to 250	122-3233
	60	0.25	40 to 250	122-3262
		0.50	40 to 250	122-3263
0.32	15	0.25	40 to 250	123-3212
	25	0.50	40 to 250	123-3223
	30	0.25	40 to 250	123-3232
		0.50	40 to 250	123-3233
		1.00	40 to 250	123-3234
	50	0.50	40 to 250	123-3253
	60	0.25	40 to 250	123-3262
		0.50	40 to 250	123-3263
		1.00	40 to 250	123-3264
0.45	30	0.85	40 to 250	124-3232
0.53	10	1.00	40 to 250	125-32H2
	15	0.50	40 to 250	125-3217
		1.00	40 to 250	125-3212
	30	0.25	40 to 250	125-3231
		0.50	40 to 250	125-3237
		1.00	40 to 250	125-3232
		1.50	40 to 250	125-3233
	60	1.00	40 to 250	125-3262

HP-FFAP

HP-FFAP Chromatograms

Food, Flavors and Fragrances

Alcohol Beverage Standard Page 406

Industrial Chemicals

Acrylates Page 441

Ethoxyethanol Page 418

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 60° to 240/250°C (230/240°C for 0.53 mm)
- Designed for the analysis of volatile fatty acids and phenols
- Replaces OV-351
- Bonded and cross-linked
- Solvent rinsable
- Close equivalent to USP Phase G35

We do not recommend the use of water or methanol to rinse HP-FFAP GC columns.

Similar Phases: Stabilwax-DA, DB-FFAP, Nukol, 007-FFAP, BP21, CP-WAX 58 (FFAP) CB, AT-1000, OV-351, CP-FFAP-CB

HP-FFAP

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.30	60 to 240/250	19091F-102
	50	0.30	60 to 240/250	19091F-105
0.25	30	0.25	60 to 240/250	19091F-433
0.32	25	0.50	60 to 240/250	19091F-112
	30	0.25	60 to 240/250	19091F-413
	50	0.50	60 to 240/250	19091F-115
0.53	10	1.00	60 to 240	19095F-121
	15	1.00	60 to 240	19095F-120
	30	1.00	60 to 240	19095F-123

Tips & Tools

Agilent also offers CAM columns for amine analysis.

Turn to page 293.

Special Application Columns

Agilent chemists have developed many columns with unique characteristics designed to solve the most difficult separation problems of a given method. As a result, we offer a comprehensive line of specialty columns for a variety of applications to enhance the standard phase portfolio. From columns for volatiles to pesticides to petrochemical and more – Agilent exceeds standard QA/QC procedures for the manufacturing and testing of all of our specialty columns to ensure they meet the stringent demands for their application. These columns offer reliable, accurate results with the shortest run times possible on complex sample lists and matrices.



NEW! Biodiesel Capillary GC Columns

Biofuels are becoming more attractive as a viable supplement or alternative to petroleum-based fuels. Agilent J&W Biodiesel Capillary GC columns are purposely designed and application-optimized for the analysis of biodiesel to meet ASTM and CEN testing standards.

Biodiesel EN14105 Free/Total Glycerin and Biodiesel ASTM D6584 Free/Total Glycerin

- Designed for the analysis of free and total glycerin in B100 according to EN14105 or ASTM D6584
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated fused silica tubing
- Excellent peak shape and extended column life
- Bonded and cross-linked
- Solvent rinsable
- Retention gaps please order 160-BD65-5 (5m x 0.53 mm)



Biodiesel EN14103 FAME Analysis

- Specially designed for the analysis of esters and linoleic acid methyl esters in B100 using EN14103
- Bonded and cross-linked
- Solvent rinsable

Biodiesel EN14110 Residual Methanol

- Specially designed for the determination of trace methanol in B100 using EN14110
- Bonded and cross-linked
- Solvent rinsable

Biodiesel Capillary GC Columns

Description	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
Biodiesel ASTM D6584 Free/Total Glycerin	0.32	15	0.1	-60 to 400	123-BD11
Biodiesel EN14105 Free/Total Glycerin	0.32	10	0.1	-60 to 400	123-BD01
Biodiesel EN14103 FAME Analysis	0.32	30	0.25	40 to 260/270	1909BD-113
Biodiesel EN14110 Residual Methanol	0.32	30	1.8	20 to 260/280	123-BD34

Biodiesel Test Samples

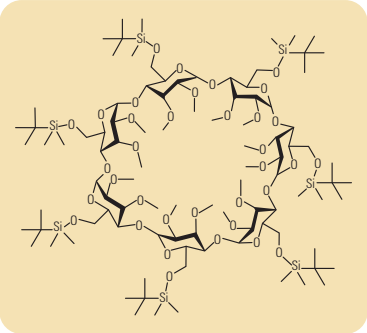
Description	Part No.
Biodiesel MSTFA kit, 10 x 1 mL ampoules, N-Methyl-N-(trimethylsilyl)trifluoro- acetamide for ASTM methode D6584	5190-1407
Biodiesel D6584 kit 2 internal standard solutions, 1 mL, 5/pk and 2 internal standard solutions, 5 mL	5190-1408
Biodiesel E14105 kit, 4 x 1 mL ampoules 4 standard solutions	5190-1409
Biodiesel Monoglyceride kit, 3 x 1 mL ampoules	5190-1410

Chiral Columns

Our proven Cyclodex-B, CycloSil-B and HP-Chiral β offer the chiral analyst a broad range of chiral separations. Although no single column resolves every enantiomeric pair, our no-hassle return policy allows you to try the column for your application and if it doesn't work, simply return it.

Recommendations for choosing a chiral column

- Contact Technical Support through your local Agilent office for a more specific recommendation
- Refer to existing applications and literature
- Choose CycloSil-B as a general purpose column
- Use HP-Chiral β when using a nitrogen specific detector



30% Heptakis (2,3-di-O-methyl-6-O-t-butyl dimethylsilyl)-β-cyclodextrin

CycloSil-B Chromatograms

Food, Flavors and Fragrances

Citrus Flavored Carbonated Beverage (Soda) Page 405

Rosemary Oil Page 405

CycloSil-B

- 30% heptakis (2,3-di-O-methyl-6-O-t-butyl dimethylsilyl)-β-cyclodextrin in DB-1701
- Chiral separations without chiral specific derivatization
- New stationary phase for improved resolution of many chiral separations
- Ideal for many chiral γ-lactones and terpenes

Because CycloSil-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

Similar Phases: LIPODEX C, Rt-β DEXm, β-DEX 110, β-DEX 120

CycloSil-B

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	35 to 260/280	112-6632
0.32	30	0.25	35 to 260/280	113-6632

Cyclodex-B

Cyclodex-B Chromatograms

Food, Flavors and Fragrances

Menthol Page 401

- 10.5% Beta-Cyclodextrin in DB-1701
- Chiral separations without chiral specific derivatization
- Broad range of resolving potential
- Excellent peak shape

Because Cyclodex-B GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

Similar Phases: LIPODEX C, Rt-ß DEXm, ß-DEX 110, ß-DEX 120

Cyclodex-B

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	50 to 230/250	112-2532
	60	0.25	50 to 230/250	112-2562
0.32	30	0.25	50 to 230/250	113-2532

HP-Chiral ß

HP-Chiral ß Chromatograms

Food, Flavors and Fragrances

Chiral Compounds in Essential Oils and Fragrances Page 401

- Beta-cyclodextrin in (35%-Phenyl)-methylpolysiloxane
- Chiral separations without chiral specific derivatization
- Phenyl-based polymer provides low bleed and does not interfere with nitrogen-specific detectors.
- Available in two concentrations of beta-cyclodextrin: 10% and 20%
- 20% beta-cyclodextrin best choice for initial screening

Similar Phases: LIPODEX C, Rt-ß DEXm, ß-DEX 110, ß-DEX 120

HP-Chiral 10ß

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	30 to 240/250	19091G-B133
HP-Chiral 20ß				
0.25	30	0.25	30 to 240/250	19091G-B233
0.32	30	0.25	30 to 240/250	19091G-B213



Food, Flavors and Fragrances Columns

Food and flavor analyses place stringent demands on capillary columns. Samples have many components that are difficult to resolve and column-to-column reproducibility becomes critical. Agilent J&W GC columns are ideal for meeting these needs. Our rigorous quality control specifications and extensive QC testing ensure that the column you buy today will perform just like the column you buy tomorrow.

Recommended Columns for Food, Flavors and Fragrances

- HP-88 for cis- and trans-FAME isomers
- DB-XLB and DB-17ht for triglycerides
- DB-FFAP for organic free fatty acids
- DB-1, DB-WAX for fragrance compounds
- High Efficiency (0.18 mm ID), DB-1, DB-5 or DB-Wax for fast analysis of fragrances and FAMEs
- Highly reproducible and specially tested Microbore (0.1 mm ID) DB-WaxFF for fragrance analysis
- DB-XLB and DB-17ms or DB-XLB and DB-35ms for dual column confirmation of CLP pesticide analysis
- HP-INNOWax or DB-WAXetr for higher temperature polar compound analysis

High Temperature Columns

DB-1ht

- 100% Dimethylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Stx-1ht

DB-1ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 400	122-1111
	30	0.10	-60 to 400	122-1131
0.32	15	0.10	-60 to 400	123-1111
	30	0.10	-60 to 400	123-1131

DB-5ht

DB-5ht Chromatograms

Food, Flavors and Fragrances

Butter Triglycerides I Page 415

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed for extended temperature limit of 400°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: HT5, Stx-5ht, VF-5ht

DB-5ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 400	122-5711
	30	0.10	-60 to 400	122-5731
0.32	10	0.10	-60 to 400	123-5701
	15	0.10	-60 to 400	123-5711
	30	0.10	-60 to 400	123-5731

DB-17ht

DB-17ht Chromatograms

Food, Flavors and Fragrances

Butter Triglycerides II Page 415

- (50%-Phenyl)-methylpolysiloxane
- Mid-polarity
- Extended upper temperature limit of 365°C
- High temperature, polyimide-coated, fused silica tubing
- Excellent peak shape and faster elution times for high boilers
- Improved resolution for triglycerides
- Ideal for confirmational analyses
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rtx-65TG, BPX50, CP-TAP CB

DB-17ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	5	0.15	40 to 340/365	122-1801
	15	0.15	40 to 340/365	122-1811
	30	0.15	40 to 340/365	122-1831
0.32	15	0.15	40 to 340/365	123-1811
	30	0.15	40 to 340/365	123-1831
	60	0.15	40 to 340/365	123-1861



Life Sciences Columns

The life sciences offer some difficult challenges to capillary GC chromatographers. These include complex sample matrices, the necessity for low level detection and the chemically active characteristics of many of the samples. In response to this, Agilent offers a line of columns which are designed specifically for drugs of abuse testing.

Recommended Columns for Life Sciences

- DB-ALC1 and DB-ALC2 for U.S. Blood Alcohol analysis
- DB-ALC2 and HP-Blood Alcohol column for European Blood Alcohol analysis
- Low-bleed columns for controlled substances
- DB-35ms for barbiturates
- DB-17ms for hallucinogens
- DB-EVDX for analysis of drugs of abuse
- DB-624, DB-1301, DB-1, DB-WAX, DB-WAXetr or HP-INNOWax for Residual Solvent analysis

DB-ALC1 and DB-ALC2 Chromatograms

Life Sciences

Blood Alcohols I (Static Headspace/Split)	Page 459
Blood Alcohols II (Static Headspace/Split)	Page 459
Blood Pollutants I	Page 460
Blood Pollutants II	Page 461

DB-ALC1 and DB-ALC2

- Reliable blood alcohol analysis
- Optimized primary and confirmation column pair for U.S. blood alcohol analysis
- Faster GC run times
- Improved resolution of key ethanol/acetone peaks
- Available in 0.32 and 0.53 mm ID
- Bonded and cross-linked

Similar Phases: Rtx-BAC1, Rtx-BAC2

DB-ALC1 and DB-ALC2

Description	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-ALC1	0.32	30	1.80	20 to 260/280	123-9134
DB-ALC1	0.53	30	3.00	20 to 260/280	125-9134
DB-ALC2	0.32	30	1.20	20 to 260/280	123-9234
DB-ALC2	0.53	30	2.00	20 to 260/280	125-9234

HP-Blood Alcohol

- Reliable blood alcohol analysis
- Excellent confirmation column with DB-ALC2 for method using t-butanol as internal standard

HP-Blood Alcohol

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	7.5	20.00	-60 to 270/290	19091S-510

DB-5ms EVDX

DB-EVDX Chromatograms

Life Sciences

Anesthetics Page 450

Sedative Hypnotics Page 455

- Specially configured and tested for drugs of abuse confirmation
- Drug test mix included: caffenine, gluthethimide, lidocaine, phenobarbital, EDDP, methaqualone, methadone, cocaine, desiprmine, carbamazepine
- DB-5ms EVDX is equivalent to (5%-Phenyl)-methylpolysiloxane
- Consistent retention and peak shape
- Low bleed for GC/MS analysis
- Bonded and cross-linked
- Solvent rinsable

DB-EVDX

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.33	-60 to 325/350	128-8522

HP-Fast Residual Solvent

- Equivalent to USP Phase G43
- Thinner film reduces run time by 2.5 times and increases Minimum Detection Limit (MDL) by 2 times compared to standard film thickness used for this method
- Bonded and cross-linked

Similar Phases: DB-624, PE-624, 007-624, 007-502, CP-624, ZB-624

HP-Fast Residual Solvent

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	1.00	-20 to 260	19095V-420



Pesticides Columns

Agilent J&W low bleed columns are ideal for the analysis of pesticides. Not only do they possess less bleed than a standard polymer, which improves the signal to noise ratio and minimum detectable quantities, but they also have higher upper temperature limits which allow for faster run times. Agilent also offers several common phases with additional pesticide specific testing to ensure performance for your application.

Recommended Columns for Pesticides

- DB-35ms (P/N 123-3832) and DB-XLB (P/N 122-1236) for CLP pesticides, chlorinated herbicides, and EPA Method 508.1 pesticides
- High efficiency 0.18 mm ID DB-17ms (P/N 121-4722) and DB-XLB (P/N 121-1222) for faster analysis
- Also ideal for other dual ECD applications such as 8082 PCBs (Aroclors) and haloacetic acids
- DB-5ms (P/N 122-5532) and DB-35ms (P/N 122-3832) for organophosphorous pesticides (EPA Method 8141A)
- HP-5ms for over 550 pesticides using retention time locking software and database

HP-PAS5

- Non-polar
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to assure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: DB-5, Ultra-2, SPB-5, CP-Sil 8CB, RSL-200, Rtx-5, BP-5, CB-5, OV-5, 007-2 (MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, CC-5, ZB-5

HP-PAS5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	25	0.52	-60 to 325/350	19091S-010

DB-1701P

- Low/mid-polarity
- Exact replacement of HP-PAS1701
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to assure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SPB-1701, CP-Sil 19CB, Rtx-1701, BP-10, CB-1701, OV-1701, 007-1701

DB-1701P

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	-20 to 280/300	122-7732
0.32	25	0.25	-20 to 280/300	123-7722
	30	0.25	-20 to 280/300	123-7732
0.53	30	1.00	-20 to 260/280	125-7732

DB-608

DB-608 Chromatograms

Environmental

Organochlorine Pesticides II Page 366

- Specifically designed for the analysis of chlorinated pesticides and PCBs
- U.S. EPA Methods: 608, 508, 8080
- Excellent inertness and recoveries without pesticide breakdown
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-608

Similar Phases: SPB-608, NON-PAKD Pesticide, 007-608

DB-608

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 280/300	121-6822
0.25	30	0.25	40 to 280/300	122-6832
0.32	30	0.50	40 to 280/300	123-1730
0.45	30	0.70	40 to 260/280	124-1730
0.53	15	0.83	40 to 260/280	125-1710
	30	0.50	40 to 260/280	125-6837
		0.83	40 to 260/280	125-1730



Petroleum Columns

Petroleum applications vary greatly in character. From the noble gases to simulated distillation, Agilent offers a broad range of columns designed to meet the needs of the petroleum/petrochemical chromatographer. Refer to the PLOT column section for columns for the analysis of light gases.

Recommended Columns for Petroleum

- DB-HT SimDis for Simulated Distallation
- HP-PONA, DB-5 or HP-1 for PONA and PIANO analysis

DB-2887 Chromatograms

Petroleum

Reference Gas Oil	Page 483
Simulated Distillation	Page 483

DB-2887

- 100% Dimethylpolysiloxane
- Specifically designed for simulated distillation using ASTM Method D2887
- Rapid conditioning, fast run time and low bleed when compared to packed columns
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: HP-1, Petrocol EX2887, MXT-2887, MXT-1, Rtx-2887

DB-2887

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	3.00	-60 to 350	125-2814

Tips & Tools

Agilent offers a line of columns which are purposely designed and application optimized for the analysis of biodiesel to meet ASTM and CEN testing standards.

Turn to pages 264–265.

DB-HT SimDis

DB-HT SimDis Chromatograms

Petroleum

n-Paraffin Standard Page 485

- 100% dimethylpolysiloxane
- "Boiling point" phase for high temperature simulated distillation
- Durable stainless steel tubing
- 430°C upper temperature limit
- Distillation range of C6 to C110+
- Low bleed – even at 430°C
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Petrocol EX2887, CP-SimDist Ultimetal, MXT-2887, Rtx-2887, AC Controls High Temp Sim Dist, AT-2887

DB-HT SimDis

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	5	0.15	-60 to 400/430	145-1001

HP-PONA

HP-PONA Chromatograms

Petroleum

Refinery Gas, HP-PONA Page 473

Sulfur Compounds in Naphtha Page 478

- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- Tested to ensure the resolution of m-xylene from p-xylene and of cyclopentane from 2,3-dimethylbutane
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Petrocol DH, SPB-1, 007-1, Rtx-1, MXT-1, Rtx-1PONA

Note: 100 psi regulator required to reach optimum carrier gas velocity

HP-PONA

Description	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
HP-PONA	0.20	50	0.50	-60 to 325/350	19091S-001
HP-1	0.20	50	0.50	-60 to 325/350	19091Z-205
HP-1	0.25	100	0.50	-60 to 325/350	19091Z-530

DB-Petro Chromatograms

Petroleum

Regular Unleaded Gasoline (California Phase 1) - "Normal" GC Run I — Page 484

Unleaded Gasoline — Page 481

PONA Mix as Specified by AFNOR Method #2 — Page 482

DB-Petro

- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Petrocol DH, HP-PONA, SPB-1, 007-1, Rtx-1, MXT-1

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Petro

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	50	0.50	-60 to 325/350	128-1056
0.25	100	0.50	-60 to 325/350	122-10A6

HP-1 Aluminum Clad

- 100% dimethylpolysiloxane
- Aluminum clad fused silica tubing
- For high temperature simulated distillation
- Bonded and cross-linked
- Solvent rinsable

HP-1 Aluminum Clad

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	5	0.09	0 to 350/450	19095S-205
	10	0.09	0 to 350/450	19095S-200



For optimum performance, ferrules should be replaced every time the column is replaced and during column maintenance.

Turn to page 158.

Semivolatiles Columns

Semivolatiles are usually extracted from soil samples or other environmental matrices. GC columns with precise retention time reproducibility and good mass spectrometer performance are key enablers for these often demanding analyses.

Recommended Columns for Semivolatiles

- HP-5ms, DB-5.625, DB-5ms Ultra Inert, HP-5ms Ultra Inert for EPA methods 8270 and 525
- DB-XLB for PCB congeners
- HP-5ms, DB-5ms Ultra Inert, HP-5ms Ultra Inert or DB-35ms for PAHs
- DB-5ms, DB-5ms Ultra Inert or DB-XLB for phenols

DB-Dioxin

- Specifically engineered for the analysis of polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs)
- Resolves 2,3,7,8-TCDD and 2,3,7,8-TCDF from all other isomers in one run
- Low bleed
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: SP-2331, 007-23, Rtx-2332, CP-Sil 88, Rtx-Dioxin

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Dioxin

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	60	0.15	40 to 250/270	122-2461
		0.25	40 to 250/270	122-2462

DB-Dioxin Chromatograms

Environmental

Dioxins and Furans Page 376

DB-5.625 Chromatograms

Environmental

Analysis of Semivolatiles Page 373

European Red List Volatiles Page 391

DB-5.625

- Close equivalent to a (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Specially processed to exhibit excellent inertness for EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols*
- Surpasses EPA performance criteria for semivolatiles
- Inert for base, neutral and acidic compounds
- High temperature limit with excellent thermal stability and low bleed
- Bonded and cross-linked
- Solvent rinsable

* Pentachlorophenol, 2,4-Dinitrophenol, Carbazole, and N-Nitrosodiphenylamine used to test response factors.

Similar Phases: XTI-5, Rtx-5, PTE-5, BPX-5

DB-5.625

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5621
		0.36	-60 to 325/350	121-5622
0.25	30	0.25	-60 to 325/350	122-5631
		0.50	-60 to 325/350	122-5632
		1.00	-60 to 325/350	122-5633
	60	0.25	-60 to 325/350	122-5661
0.32	30	0.25	-60 to 325/350	123-5631
		0.50	-60 to 325/350	123-5632

HP-5ms Semivolatile

- (5%-Phenyl)-methylpolysiloxane, identical selectivity to HP-5
- Non-polar
- Very low bleed characteristics, ideal for GC/MS
- Specifically tested for inertness for active compounds including acidic and basic compounds
- Improved signal-to-noise ratio for better sensitivity and mass spectral integrity
- Bonded and cross-linked
- Solvent rinsable
- Equivalent to USP Phase G27

HP-5ms Semivolatile

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.50	-60 to 325/350	19091S-139

Volatiles Columns

Agilent offers a selection of advanced polymer chemistries for the increasingly demanding volatiles applications. Whether for a primary analytical column or as a complementary confirmation column, Agilent J&W capillaries are chromatographers' first choice.

Recommended Columns for Volatiles

- DB-VRX and DB-624 for EPA methods 502.2 and 8021
- DB-VRX (60 m, 0.25 mm ID) for GC/MS volatiles methods
- DB-VRX (20 m, 0.18 mm ID) for fast GC/MS volatiles analysis using a 5973 MSD (Not recommended for Ion Trap MS or older MSDs)
- DB-MTBE for extended EPA method 8020
- DB-TPH for the analysis of BTEX and gasoline total petroleum hydrocarbons
- DB-624 (20 m, 0.18 mm ID) for fast GC/MS volatiles analysis

DB-VRX

- Unique selectivity engineered for optimum resolution of volatiles analysis: U.S. EPA Methods 502.2, 524.2 and 8260
- 0.45 mm ID columns provide more plates per meter compared to 0.53 mm ID columns for the fewest coelutions for GC method (an industry first)**
- No subambient cooling required to resolve the six "gases"
- Fast run time:
- < 30 minutes for optimum sample throughput
- < 8 minutes with 0.18 mm ID
- Low polarity
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

**Two coelutions: 1) m- and p-xylene, for which U.S. EPA does not require separation, and 2) 1,1,2,2-tetrachloroethane and o-xylene which are separated by detectors PID and ELCD, respectively. Note to GC/MS analysts: These coeluting compounds have different primary characteristic ions of 83 and 106, respectively.

Similar Phases: VOCOL, NON-PAKD, Rtx-Volatiles, PE-Volatiles, 007-624, HP-624, CP-624, Rtx-VRX, Rtx-VGC

DB-VRX Chromatograms

Environmental

EPA Volatiles by GC/MS (Split Injector)	Page 387
High Speed VOC, EPA Method 8260	Page 388
Unleaded Gasoline	Page 359
Extended Analyte List for EPA Method 8021	Page 389

DB-VRX

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	1.00	-10 to 260	121-1524
	40	1.00	-10 to 260	121-1544
0.25	30	1.40	-10 to 260	122-1534
	60	1.40	-10 to 260	122-1564
0.32	30	1.80	-10 to 260	123-1534
	60	1.80	-10 to 260	123-1564
0.45	30	2.55	-10 to 260	124-1534
	75	2.55	-10 to 260	124-1574

DB-624

- Specifically designed for the analysis of volatile priority pollutants
- No cryogenics needed for U.S. EPA Method 502.2
- Excellent for U.S. EPA Methods: 501.3, 502.2, 503.1, 524.2, 601, 602, 8010, 8015, 8020, 8240, 8260
- Excellent inertness for active compounds
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-624
- Equivalent to USP Phase G43

Similar Phases: AT-624, Rtx-624, PE-624, 007-624, 007-502, CP-624, ZB-624, VF-624ms

DB-624

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	1.00	-20 to 280	121-1324
0.20	25	1.12	-20 to 260	128-1324
0.25	30	1.40	-20 to 260	122-1334
	60	1.40	-20 to 260	122-1364
0.32	30	1.80	-20 to 260	123-1334
	60	1.80	-20 to 260	123-1364
0.45	30	2.55	-20 to 260	124-1334
	75	2.55	-20 to 260	124-1374
0.53	30	3.00	-20 to 260	125-1334
	60	3.00	-20 to 260	125-1364
	75	3.00	-20 to 260	125-1374

DB-624 Chromatograms

Environmental

EPA Volatiles by GC/MS II (Split Injector) Page 387

European Red List Volatiles Page 391

Extended Analyte List for EPA Method 8021 Page 389

Fast VOC Analysis Page 390

Food, Flavors and Fragrances

Fusel Oil Standard & Brandy Sample Page 397

Industrial Chemicals

Alcohols I Page 416

Esters II Page 429

Ethers Page 430

Glycols II Page 431

Halogenated Hydrocarbons I Page 434

Nitrogen Based Solvents II Page 440

Life Sciences

Residual Solvents, DMI Diluent Page 462

Residual Solvents, USP 467 Page 461

Petroleum

1,3-Butadiene Page 469

HP-VOC

- Selectivity engineered for: U.S. EPA Methods 502.2, 524.2 and 8260
- Low polarity – slightly more polar than DB-VRX
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: DB-VRX, NON-PAKD, Rtx-Volatiles, PE-Volatiles, 007-624, HP-624, CP-624, Rtx-VRX, Rtx-VGC

HP-VOC

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	30	1.10	-60 to 280/290	19091R-303
	60	1.10	-60 to 280/290	19091R-306
0.32	60	1.80	-60 to 280/290	19091R-316
	90	1.80	-60 to 280/290	19091R-319
0.53	90	3.00	-60 to 280/290	19095R-429
	105	3.00	-60 to 280/290	19095R-420

DB-502.2

- Available in 105 meters for volatiles analyses
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

Similar Phases: Rtx-502.2, VOCOL, HP-VOC

DB-502.2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	60	1.80	0 to 260/280	123-1464
0.53	105	3.00	0 to 260/280	125-14A4

DB-MTBE Chromatograms

Environmental

Methyl Tert-Butyl Ether (MTBE) FID, Extended 8020 Analysis Page 359

DB-MTBE

- Low polarity stationary phase
- Resolves MTBE from 2-methylpentane and 3-methylpentane for better quantitation
- Engineered for purge and trap injection without the need for cryofocusing
- Bonded and cross-linked
- Solvent rinsable

DB-MTBE

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.45	30	2.55	35 to 260/280	124-0034
0.53	30	3.00	35 to 260/280	125-0034

DB-TPH

- Specifically designed for the analysis of total petroleum hydrocarbons (TPHs), soil analysis, and LUFT
- Three analyses in one injection – gas range organics, diesel range organics and motor oil
- Fast run time
- Bonded and cross-linked
- Solvent rinsable

DB-TPH

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	-10 to 320	123-1632



Tips & Tools

For a precision cut on your capillary column, use Agilent's GC column cutting tool (part number 5183-4620).

PLOT Columns

PLOT columns are ideal for separating compounds that are gases at room temperatures. Agilent Technologies offers a comprehensive line of PLOT columns for analysis of fixed gases, low molecular weight hydrocarbon isomers, volatile polar compounds and reactive analytes such as sulfur gases, amines and hydrides. Our PLOT phases are offered in dimensions from 0.25 to 0.53 mm ID, allowing for easy column selection for various detector and system requirements. For GC/MS systems, we offer several small diameter columns with truly bonded and immobilized stationary phases, eliminating potential detector fouling due to particle generation.

PLOT Column Application Recommendations

Column	Stationary Phase	Typical Applications
HP-PLOT Molesieve	5Å molecular sieve zeolite	Permanent and noble gases. Thick and thin films available. Thick film column will resolve argon and oxygen at 35°C.
HP-PLOT Al_2O_3 KCl	Aluminum oxide deactivated with KCl	Least "polar" Alumina phase. Lowest retention of olefins relative to comparable paraffin. C_1 to C_8 hydrocarbon isomers. Column of choice for accurate quantitation of dienes, especially propadiene and butadiene from ethylene and propylene streams.
HP-PLOT Al_2O_3 S	Aluminum oxide deactivated with sodium sulfate	Excellent general use Alumina column for light hydrocarbons: C_1 to C_8 isomers. Best for resolving acetylene from butane and propylene from isobutane.
GS-Alumina	Aluminum oxide with proprietary deactivation	Most "polar" of the Alumina columns. Highest retention of olefins relative to comparable paraffin. Excellent general use Alumina column for light hydrocarbons: C_1 to C_8 isomers. Best for resolving cyclopropane from propylene. Good stability and recovery from water saturation.
HP-PLOT Q	Polystyrene-divinylbenzene	C_1 to C_3 isomers, alkanes to C_{12}, CO_2, methane, air/CO, water, oxygenated compounds, sulfur compounds, solvents.
HP-PLOT U	Divinylbenzene/ethylene	More polar than HP-PLOT Q and GS-Q. C_1 to C_7 hydrocarbons, CO_2, methane, air/CO, water, glycol dimethacrylate oxygenates, amines, solvents, alcohols, ketones, aldehydes.
GS-GasPro	Proprietary, bonded silica-based	C_1 to C_{12} hydrocarbons, CO_2, trace-level sulfurs, hydride gases, inorganic gases, halocarbons, SF_6, oxygen/nitrogen separation at -80°C.
GS-CarbonPLOT	Bonded, monolithic carbon layer	C_1 to C_5 hydrocarbons, CO_2, air/CO, trace acetylene in ethylene, methane.
GS-OxyPLOT	Proprietary high selectivity adsorbent	High retention for oxygenated hydrocarbons (Methanol retention index +1400). Useful for alcohols, ketones, and ethers in gasoline, diesel, and C_1 to C_4 hydrocarbon streams.

GS-OxyPLOT Chromatograms

Petroleum

Selected Oxygenates Page 465

Trace Oxygenates in Light Hydrocarbon Matrices Page 465

Oxygenates Page 480

GS-OxyPLOT

- Accurate analysis of ppm/ppb level oxygenates in C_1 to C_{10} hydrocarbons
- Strong selectivity for a wide range of oxygenates (ethers, alcohols, aldehydes, and ketones) in complex matrices such as gaseous hydrocarbons, motor fuels, and crude oil
- Suitable for ASTM methods for oxygenates
- Very high column stability (upper temperature limit of 350°C) with no column bleed
- Stable phase coating virtually eliminating particle generation and detector spiking
- Excellent for low concentration, quantitative GC analysis
- Ideal for selective heart-cutting applications

Similar Phases: CP-LowOX

GS-OxyPLOT

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.53	10	350	115-4912

HP-PLOT Al_2O_3 KCl

- Least "polar" Alumina phase
- Aluminum oxide deactivated with KCl
- Standard column choice for light hydrocarbon analysis – C_1 to C_8 hydrocarbon isomers
- Low retention of olefins relative to comparable paraffin
- Excellent for quantitation of dienes, especially propadiene and butadiene from ethylene and propylene streams
- Recommended phase for many ASTM methods
- Preferred KCl deactivated Alumina

Similar Phases: CP-Al_2O_3/KCl PLOT, Rt-Alumina PLOT, Alumina PLOT, Al_2O_3/KCl

HP-PLOT Al_2O_3 KCl

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	5.00	-60 to 200	19091P-K33
0.32	50	8.00	-60 to 200	19091P-K15
0.53	30	15.00	-60 to 200	19095P-K23
	50	15.00	-60 to 200	19095P-K25

GS-Alumina KCl

GS-Alumina KCl Chromatograms

Petroleum

Impurities in Ethylene Page 468

Impurities in Propylene Page 468

- Least "polar" Alumina phase
- Aluminum oxide deactivated with KCl
- Good choice for light hydrocarbon analysis
- Good resolution of propadiene and butadiene from ethylene and propylene streams

Similar Phases: CP-Al_2O_3/KCl PLOT, Rt-Alumina PLOT, Alumina PLOT, Al_2O_3/KCl

GS-Alumina KCl

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.53	30	-60 to 200	115-3332
	50	-60 to 200	115-3352

HP-PLOT Al_2O_3 S

HP-PLOT Al_2O_3 S Chromatograms

Petroleum

Ethylene Page 467

Natural Gas Page 467

Refinery Gas III Page 474

- Middle range of "polarity" for Alumina phases
- Aluminum oxide deactivated with sodium sulfate
- Excellent general use column for light hydrocarbon analysis – C_1 to C_8 hydrocarbon isomers
- Best for resolving acetylene from butane and propylene from isobutane

Similar Phases: GS-Alumina

HP-PLOT Al_2O_3 S

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	5.00	-60 to 200	19091P-S33
0.32	25	8.00	-60 to 200	19091P-S12
	50	8.00	-60 to 200	19091P-S15
0.53	15	15.00	-60 to 200	19095P-S21
	30	15.00	-60 to 200	19095P-S23
	50	15.00	-60 to 200	19095P-S25

GS-Alumina Chromatograms

Petroleum

1,3-Butadiene Purity Page 470

Extended Hydrocarbon Analysis I Page 471

Propylene Page 469

GS-Alumina

- Most "polar" Alumina phase
- Aluminum oxide with proprietary deactivation
- Excellent general use column for light hydrocarbon analysis – C_1 to C_8 hydrocarbon isomers
- Separates C_1 to C_4 saturated and unsaturated hydrocarbons
- Best for resolving cyclopropane from propylene
- Faster, more efficient and provides more sensitivity than packed equivalents
- Minimal conditioning time required
- Preferred substitution for sodium sulfate deactivated Alumina because of its regenerative nature

Similar Phases: Al_2O_3/KCl, Al_2O_3/Na_2SO_4, Rt-Alumina PLOT, Alumina PLOT

Note: Alumina columns have a tendency to adsorb water and CO_2 which, over time, results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully water saturated GS-Alumina columns regenerate in 7 hours or less at 200°C.

GS-Alumina

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.53	30	-60 to 200	115-3532
	50	-60 to 200	115-3552

HP-PLOT Al_2O_3 M

- Most "polar" Alumina phase (similar to GS-Alumina)
- Aluminum oxide deactivated with proprietary deactivation
- Good general use column for light hydrocarbon analysis – C_1 to C_8 hydrocarbon isomers
- Good for resolving acetylene from butane and propylene from isobutane

Similar Phases: GS-Alumina

HP-PLOT Al_2O_3 M

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	50	8.00	-60 to 200	19091P-M15
0.53	30	15.00	-60 to 200	19095P-M23
	50	15.00	-60 to 200	19095P-M25

GS-GasPro Chromatograms

Environmental

C1 and C2 Halocarbons (Freons) Page 395

Industrial Chemicals

Halocarbons Page 444
Halothane Page 445
Inorganic Gases Page 446

Petroleum

Extended Hydrocarbon Analysis II Page 472
Mercaptans Page 477
Sulfur Compounds in Propylene (1 ppm) Page 477
Sulfur Gas Analysis in Light Hydrocarbon Streams I Page 475

GS-CarbonPLOT Chromatograms

Environmental

N_2O III Page 396

GS-GasPro

- Unique bonded silica PLOT column technology
- Excellent choice for light hydrocarbons and sulfur gases
- Retention stability not affected by water
- Separates CO and CO_2 on a single column
- Ideal PLOT column for GC/MS – no particles

Similar Phases: CP-Silica PLOT

GS-GasPro

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.32	5	-80 to 260/300	113-4302
	15	-80 to 260/300	113-4312
	30	-80 to 260/300	113-4332
	60	-80 to 260/300	113-4362

GS-CarbonPLOT

- High stability, bonded carbon layer stationary phase
- Unique selectivity for inorganic and organic gases
- Extended temperature limit of 360°C
- Ideal for GC/MS – no particle generation
- Retention stability not affected by water

Similar Phases: Carbopack, CLOT, Carboxen-1006 PLOT, CP-CarboPLOT P7

GS-CarbonPLOT

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	1.50	0 to 360	113-3112
	30	1.50	0 to 360	113-3132
		3.00	0 to 360	113-3133
	60	1.50	0 to 360	113-3162
0.53	15	3.00	0 to 360	115-3113
	30	3.00	0 to 360	115-3133

HP-PLOT Molesieve

HP-PLOT Molesieve Chromatograms

Environmental

N_2O II Page 396

Petroleum

Noble Gases Page 466

Permanent Gases Page 466

- A PLOT column for the analysis of permanent gases
- O_2, N_2, CO and CH_4 resolve in less than 5 minutes
- Durable molecular sieve 5Å coating minimizes baseline spiking and damage to multiport valves
- Select a thick film for Ar/O_2 separation without cryogenic cooling
- Select thin film HP-PLOT Molesieve columns for routine air monitoring applications
- Replaces GS-Molesieve

Note: Molecular sieve columns will absorb water which, over time, results in changes in retention time. We use an advanced, proprietary deactivation process which allows for rapid regeneration. Fully saturated HP-PLOT Molesieve columns regenerate in 7 hours or less at 200°C.

HP-PLOT Molesieve

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	25.00	-60 to 300	19091P-MS7
	30	12.00	-60 to 300	19091P-MS4
		25.00	-60 to 300	19091P-MS8
0.53	15	25.00	-60 to 300	19095P-MS5
		50.00	-60 to 300	19095P-MS9
	30	25.00	-60 to 300	19095P-MS6
		50.00	-60 to 300	19095P-MS0



HP-PLOT Q

- Bonded polystyrene-divinylbenzene based column
- A PLOT column with polarity between Porapak-Q and Porapak-N
- Excellent column for C_1 to C_3 isomers and Alkanes to C_{12}, CO_2, methane, air/CO, oxygenated compounds, sulfur compounds and solvents
- A PLOT column to replace packed gas-solid columns
- Separates ethane, ethylene and ethyne (acetylene)
- Improved resolution in less time than conventional packed columns
- Minimal conditioning time required – 1 hour
- Preferred "Q" column due to its robust nature

Similar Phases: CP PoraPLOT Q, CP PoraPLOT Q-HT, Rt-QPLOT, SupelQ PLOT, GS-Q

HP-PLOT Q

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	20.00	-60 to 270/290	19091P-Q03
	30	20.00	-60 to 270/290	19091P-Q04
0.53	15	40.00	-60 to 270/290	19095P-Q03
	30	40.00	-60 to 270/290	19095P-Q04

HP-PLOT Q Chromatograms

Environmental

N_2O I	Page 396

Petroleum

Baseline Resolution of Air/CO, CO_2, and Methane in a Natural Gas Sample	Page 466
Ethylene Oxide Synthetic Standard	Page 479
Oxygenates	Page 480
Refinery Gas I	Page 473

Particle Traps for Use with PLOT Columns

Though highly stabilized, it is impossible to guarantee that no particles will dislodge from the column wall. When used in valve-switching applications, the use of a particle trap can prevent scarring of the rotors.

Particle Traps for Use with PLOT Columns

ID (mm)	Length (m)	Part No.
0.32	2.5	5181-3351
0.53	2.5	5181-3352

GS-Q Chromatograms

Petroleum

Sulfur Gas Analysis in Light Hydrocarbon Streams II Page 476

GS-Q

- Porous divinylbenzene homopolymer
- A PLOT column with polarity between Porapak-Q and Porapak-N
- Separates ethane, ethylene and ethyne (acetylene)
- Not recommended for quantification of polar compounds
- Minimal conditioning time required – 1 hour

Similar Phases: CP PoraPLOT Q, CP PoraPLOT Q-HT, Rt-QPLOT, SupelQ PLOT, HP-Q PLOT

GS-Q

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.32	30	-60 to 250	113-3432
0.53	10	-60 to 250	115-34H2
	15	-60 to 250	115-3412
	25	-60 to 250	115-3422
	30	-60 to 250	115-3432

HP-PLOT U

- Bonded divinylbenzene/ethylene glycol dimethacrylate
- More polar than HP-PLOT Q
- Excellent column for C_1 to C_7 hydrocarbons, CO_2, methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, and aldehydes
- Improved resolution in less time than conventional packed columns

Similar Phases: PoraPlot U, RTU PLOT

HP-PLOT U

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	10	-60 to 190	19091P-UO4
0.53	15	20	-60 to 190	19095P-UO3
	30	20	-60 to 190	19095P-UO4



Metal Columns

DB-ProSteel

- Excellent inertness
- Virtually unbreakable
- Available in a wide variety of stationary phases
- Bonded and cross-linked
- Ideal for high temperature analysis and process applications

Our easy to handle DB-ProSteel metal columns are deactivated with a new formula (this is not glass lined steel) to provide inertness which truly rivals fused silica. DB-ProSteel metal columns can be custom wound upon request for small GC ovens. Several of our most popular bonded phases are available in metal.

DB-ProSteel GC columns have the same outer diameter as standard Megabore (0.53 mm ID), so no special ferrules are required.

DB-ProSteel

Phase	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-PS2887	0.53	10	3.00	-60 to 350	145-2814
DB-PS1	0.53	15	0.15	-60 to 340/360	145-1011
DB-PSWAX	0.53	30	1.00	20 to 230/240	145-7032
DB-PS624	0.53	30	3.00	-20 to 260	145-1334

Tips & Tools

Visit our online Chromatogram Library at **www.agilent.com/chem/library** for a comprehensive listing of chromatograms searchable by compound name.

Non-Bonded Stationary Phases

Whenever possible Agilent recommends the use of bonded and cross-linked polymers. Bonded polymers are more rugged, will have longer lifetimes and can be solvent rinsed. However, Agilent recognizes that some methods have been developed on these non-bonded phases and therefore maintains these columns to support established methods.

HP-101

- 100% Dimethylpolysiloxane

Similar Phases: OV-101, SP 200, DB-1, HP-1

Because HP-101 columns are not bonded or cross-linked, we do not recommend solvent rinsing.

HP-101

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.20	-60 to 280	19091Y-102
0.32	25	0.30	-60 to 280	19091Y-012
	50	0.30	-60 to 280	19091Y-015

HP-17

- 50% Phenyl and 50% Methyl siloxane

Similar Phases: OV-17, SP-2250, DB-17, HP-50+

Because the HP-17 is not bonded or cross-linked, we do not recommend solvent rinsing.

HP-17

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	2.00	25 to 260/280	19095L-121

CAM Chromatograms

Industrial Chemicals

Amines in Water Page 422

Primary Amines Page 420

CAM

- Base deactivated polyethylene glycol
- Specifically designed for amine analysis
- Excellent peak shape for primary amines
- Replaces HP-Basicwax

Similar Phases: Stabilwax-DB, Carbowax Amine

Because the CAM is not bonded or cross-linked, we do not recommend solvent rinsing.

CAM

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	60 to 220/240	112-2112
	30	0.25	60 to 220/240	112-2132
		0.50	60 to 220/240	112-2133
	60	0.25	60 to 220/240	112-2162
0.32	30	0.25	60 to 220/240	113-2132
		0.50	60 to 220/240	113-2133
0.53	30	1.00	60 to 200/220	115-2132

Carbowax 20M and HP-20M

- Polyethylene glycol, MW 20,000
- Equivalent to USP Phase G16

Similar Phases: DB-WAX, HP-INNOWax, DB-WAXetr

Because the Carbowax 20M and the HP-20M are not bonded or cross-linked, we do not recommend solvent rinsing. DB-WAX is the recommended bonded alternate for the HP-20M.

Carbowax 20M

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	60 to 220/240	112-2032
0.32	30	0.25	60 to 220/240	113-2032

HP-20M

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.10	60 to 220	19091W-102
	50	0.10	60 to 220	19091W-105
0.32	25	0.30	60 to 220	19091W-012
	50	0.30	60 to 220	19091W-015
0.53	10	1.33	60 to 220	19095W-121
	30	1.33	60 to 220	19095W-123

DX-1 and DX-4

- DX-1: 90% Dimethylpolysiloxane - 10% Polyethylene Glycol
- DX-4: 15% Dimethylpolysiloxane - 85% Polyethylene Glycol

Because DX series GC columns are not bonded and cross-linked, we do not recommend solvent rinsing.

DX-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	1.00	50 to 250/270	123-6133

DX-4

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	50 to 250/270	122-6432
	60	0.25	50 to 250/270	122-6462
0.32	15	0.25	50 to 250/270	123-6412
	30	0.25	50 to 250/270	123-6432
	60	0.25	50 to 250/270	123-6462

SE-30 and SE-54

- SE-30: 100% Dimethylpolysiloxane
- SE-54: (5%-Phenyl)(1%-Vinyl)-methylpolysiloxane

Because SE series GC columns are not bonded or cross-linked, we do not recommend solvent rinsing.

SE-30

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	0 to 325/350	113-3032

SE-54

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	0 to 325/350	112-5432
	60	0.25	0 to 325/350	112-5462
0.32	30	0.25	0 to 325/350	113-5432

Custom GC Column Ordering

Even though we offer over a thousand readily available columns, Agilent recognizes that sometimes you need something a little out of the ordinary. That's why we developed our Custom Column Shop. If you can't find what you're looking for in our standard order guides, we will design, build, and test capillary GC columns to meet your needs.

- We can create columns with non-standard lengths or unusual film thickness.
- We can connect columns together in series or as dual columns.
- We recognize that sometimes customers have specific column performance requirements for their applications that might not be met with standard test mixes. As a result we can also custom-test your columns with your desired test mixture and test conditions to meet your specific performance requirements.
- We can create DuraGuard columns with an integrated guard column. Most phases can be manufactured with a built-in guard column which means you get the advantages of a guard column without the union. Only available in DB-phases.

Custom columns are ordered under the part number 100-2000. Be sure to provide the details of your desired custom service or column including phase, length, ID, and film thickness.

Contact your local Agilent office of your Authorized Agilent Distributor to receive a quote for your custom column needs. You can find order forms in the back of the catalog.

Customers in the United States, Canada, and Puerto Rico can request a Custom Column Quote online at **www.agilent.com/chem/CustomColumn**.





Columns for the 6850 GC

GC capillary columns are typically wound on 7 inch cages that fit into "standard-sized" GCs like the 6890. The 6850 GC has a smaller oven which requires the use of columns wound on a smaller cage diameter. The 5 inch cage configurations listed here are available as standard products.

If you require a column for your 6850 that is not listed below, simply order part number 100-2000 and specify:

- The standard cage part number, on 5 inch cage, or
- The phase and dimensions (length, internal diameter, film thickness), on 5 inch cage

The price of the 5 inch cage column will be the same as the same column on a standard cage.

CAM, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	60 to 220/240	113-2132E
		0.50	60 to 220/240	113-2133E

Cyclodex-B, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	50 to 230/250	112-2532E
0.32	30	0.25	50 to 230/250	113-2532E



DB-1, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 325/350	127-1012E
		0.40	-60 to 325/350	127-1013E
	20	0.10	-60 to 325/350	127-1022E
		0.40	-60 to 325/350	127-1023E
0.18	10	0.18	-60 to 325/350	121-1012E
		0.40	-60 to 325/350	121-1013E
	20	0.18	-60 to 325/350	121-1022E
	40	0.40	-60 to 325/350	121-1043E
0.25	30	0.25	-60 to 325/350	122-1032E
		1.00	-60 to 325/350	122-1033E
0.32	30	1.00	-60 to 325/350	123-1033E
	60	5.00	-60 to 280/300	123-1065E
0.53	10	2.65	-60 to 260/280	125-10HBE
	15	0.15	-60 to 340/360	125-1011E
		1.50	-60 to 300/320	125-1012E
	30	3.00	-60 to 260/280	125-1034E
		5.00	-60 to 260/280	125-1035E
	60	1.50	-60 to 300/320	125-1062E
	60	5.00	-60 to 260/280	125-1065E

DB-1ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 340/360	121-0122E
0.20	25	0.33	-60 to 340/350	128-0122E
0.25	15	0.25	-60 to 340/360	122-0112E
	30	0.25	-60 to 340/360	122-0132E

DB-5, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 325/350	127-5012E
	20	0.10	-60 to 325/350	127-5022E
0.18	10	0.18	-60 to 325/350	121-5012E
	20	0.18	-60 to 325/350	121-5022E
		0.40	-60 to 325/350	121-5023E
0.25	30	0.25	-60 to 325/350	122-5032E
		1.00	-60 to 325/350	122-5033E
0.32	15	0.25	-60 to 325/350	123-5012E
		1.00	-60 to 325/350	123-5013E
	30	0.25	-60 to 325/350	123-5032E
		1.00	-60 to 325/350	123-5033E
	60	1.00	-60 to 325/350	123-5063E
0.53	15	1.50	-60 to 300/320	125-5012E
	30	1.50	-60 to 300/320	125-5032E
	60	1.50	-60 to 300/320	125-5062E
	30	5.00	-60 to 260/280	125-5035E
	60	5.00	-60 to 260/280	125-5065E

DB-5ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5522E
0.25	30	0.25	-60 to 325/350	122-5532E
		0.50	-60 to 325/350	122-5536E
		1.00	-60 to 325/350	122-5533E
	60	0.25	-60 to 325/350	122-5562E
0.32	30	0.25	-60 to 325/350	123-5532E

DB-17, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.50	40 to 280/300	122-1713E
	30	0.15	40 to 280/300	122-1731E
		0.25	40 to 280/300	122-1732E
0.32	30	0.25	40 to 280/300	123-1732E
		0.50	40 to 280/300	123-1733E

DB-17ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 320/340	121-4722E

DB-23, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	40 to 250/260	122-2332E
	60	0.15	40 to 250/260	122-2361E
		0.25	40 to 250/260	122-2362E
0.32	30	0.25	40 to 250/260	123-2332E

DB-210, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	45 to 240/260	122-0232E

DB-225, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	40 to 220/240	123-2232E

DB-225ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	40 to 240	122-2932E

DB-35, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.50	40 to 300/320	123-1933E

DB-35ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	50 to 340/360	121-3822E
0.25	30	0.25	50 to 340/360	122-3832E
0.32	30	0.25	50 to 340/360	123-3832E

DB-624, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	1.00	-20 to 280	121-1324E
0.20	25	1.12	-20 to 260	128-1324E
0.25	30	1.40	-20 to 260	122-1334E
	60	1.40	-20 to 260	122-1364E
0.32	30	1.80	-20 to 260	123-1334E
	60	1.80	-20 to 260	123-1364E
0.53	30	3.00	-20 to 260	125-1334E
	60	3.00	-20 to 260	125-1364E
	75	3.00	-20 to 260	125-1374E

DB-1301, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	60	1.00	-20 to 280/300	122-1363E
0.32	60	1.00	-20 to 280/300	123-1363E

DB-1701, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	-20 to 280/300	122-0732E
		1.00	-20 to 280/300	122-0733E
	60	1.00	-20 to 280/300	122-0763E
0.32	30	0.25	-20 to 280/300	123-0732E
		1.00	-20 to 280/300	123-0733E
	60	1.00	-20 to 280/300	123-0763E
0.53	15	1.00	-20 to 260/280	125-0712E
	30	1.00	-20 to 260/280	125-0732E
	60	1.00	-20 to 260/280	125-0762E

DB-1701P, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	-20 to 280/300	123-7732E

DB-ALC1 and DB-ALC2, 5 in. cage

Phase	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-ALC1	0.53	30	3.00	20 to 260/280	125-9134E
DB-ALC2	0.32	30	1.20	20 to 260/280	123-9234E

DB-FFAP, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	40 to 250	122-3232E
	60	0.25	40 to 250	122-3262E
0.32	30	0.25	40 to 250	123-3232E
0.53	30	1.00	40 to 250	125-3232E

DB-MTBE, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	3.00	35 to 260/280	125-0034E

DB-Petro, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	100	0.50	-60 to 325/350	122-10A6E

DB-VRX, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	40	1.00	-10 to 260	121-1544E
0.25	60	1.40	-10 to 260	122-1564E
0.32	60	1.8	-10 to 260	123-1564E

DB-WAX, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	20 to 250/260	127-7012E
	20	0.20	20 to 240/250	127-7023E
0.18	20	0.18	20 to 250/260	121-7022E
		0.30	20 to 240/250	121-7023E
	40	0.18	20 to 250/260	121-7042E
0.25	15	0.25	20 to 250/260	122-7012E
	30	0.25	20 to 250/260	122-7032E
		0.50	20 to 240/250	122-7033E
	60	0.25	20 to 250/260	122-7062E
		0.50	20 to 240/250	122-7063E
0.32	30	0.25	20 to 250/260	123-7032E
		0.50	20 to 240/250	123-7033E
	60	0.50	20 to 240/250	123-7063E
0.53	15	1.00	20 to 230/240	125-7012E
	30	1.00	20 to 230/240	125-7032E
	60	1.00	20 to 230/240	125-7062E

DB-WAXetr, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	30 to 260/280	122-7332E
0.32	50	1.00	30 to 250/260	123-7354E
0.53	30	1.00	30 to 240/260	125-7332E
		2.00	50 to 230/250	125-7334E

DB-XLB, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	30 to 340/360	121-1222E
0.20	12	0.33	30 to 340/360	128-1212E
0.25	60	0.25	30 to 340/360	122-1262E

GS-Alumina, 5 in. cage

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.53	30	-60 to 200	115-3532E

GS-Q, 5 in. cage

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.32	30	-60 to 250	113-3432E
0.53	30	-60 to 250	115-3432E

GS-OxyPLOT, 5 in. cage

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.53	10	350	115-4912E

HP-1, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091Z-577E
0.20	25	0.33	-60 to 325/350	19091Z-102E
0.25	30	0.25	-60 to 325/350	19091Z-433E
		1.00	-60 to 325/350	19091Z-233E
	60	1.00	-60 to 325/350	19091Z-236E
	100	0.50	-60 to 325/350	19091Z-530E
0.32	15	0.25	-60 to 325/350	19091Z-411E
	25	0.17	-60 to 325/350	19091Z-012E
		0.52	-60 to 325/350	19091Z-112E
	30	0.10	-60 to 325/350	19091Z-313E
		0.25	-60 to 325/350	19091Z-413E
		1.00	-60 to 325/350	19091Z-213E
		3.00	-60 to 325/350	19091Z-513E
		5.00	-60 to 300/320	19091Z-713E
	50	0.52	-60 to 325/350	19091Z-115E
	60	1.00	-60 to 325/350	19091Z-216E
0.53	5	2.65	-60 to 260/280	19095S-100E
	7.5	5.00	-60 to 260/280	19095Z-627E
	10	0.88	-60 to 300/320	19095Z-021E
		2.65	-60 to 260/280	19095Z-121E
	15	0.15	-60 to 320/400	19095Z-221E
		3.00	-60 to 260/280	19095Z-421E
	30	0.88	-60 to 300/320	19095Z-023E
		2.65	-60 to 260/280	19095Z-123E
		1.50	-60 to 300/320	19095Z-323E
		3.00	-60 to 260/280	19095Z-423E
		5.00	-60 to 260/280	19095Z-623E

HP-1ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-677E
0.20	25	0.33	-60 to 325/350	19091S-602E
0.25	15	0.25	-60 to 325/350	19091S-931E
	30	0.25	-60 to 325/350	19091S-933E
		1.00	-60 to 325/350	19091S-733E
	60	0.25	-60 to 325/350	19091S-936E
0.32	30	0.25	-60 to 325/350	19091S-913E

HP-5, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091J-577E
0.20	25	0.33	-60 to 325/350	19091J-102E
	50	0.33	-60 to 325/350	19091J-105E
0.25	15	0.25	-60 to 325/350	19091J-431E
	30	0.25	-60 to 325/350	19091J-433E
	60	0.25	-60 to 325/350	19091J-436E
		1.00	-60 to 325/350	19091J-236E
0.32	25	0.17	-60 to 325/350	19091J-012E
		0.52	-60 to 325/350	19091J-112E
	30	0.50	-60 to 325/350	19091J-113E
		0.25	-60 to 325/350	19091J-413E
		1.00	-60 to 325/350	19091J-213E
	50	1.05	-60 to 325/350	19091J-215E
	60	1.00	-60 to 325/350	19091J-216E
0.53	10	2.65	-60 to 260/280	19095J-121E
	30	0.88	-60 to 300/320	19095J-023E
		2.65	-60 to 260/280	19095J-123E
		1.50	-60 to 300/320	19095J-323E
		5.00	-60 to 260/280	19095J-623E

HP-5ms, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.33	-60 to 325/350	19091S-102E
0.25	30	0.25	-60 to 350/325	19091S-433E
		1.00	-60 to 325/350	19091S-233E
	60	0.25	-60 to 325/350	19091S-436E
0.32	25	0.52	-60 to 325/350	19091S-112E
	30	0.25	-60 to 325/350	19091S-413E

HP-20M, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	25	0.30	60 to 220	19091W-012E
	50	0.30	60 to 220	19091W-015E

HP-35, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	40 to 300/320	19091G-131E

HP-50+, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	40 to 280/300	19091L-413E
		0.50	40 to 280/300	19091L-113E
0.53	30	0.50	40 to 260/280	19095L-523E
		1.00	40 to 260/280	19095L-023E

HP-88, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	100	0.20	0 to 250/260	112-88A7E
	30	0.20	0 to 250/260	112-8837E
	60	0.20	0 to 250/260	112-8867E

HP-101, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.25	-60 to 280	19091-60010E
	25	0.20	-60 to 280	19091Y-102E

HP-Blood Alcohol, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	7.5	20.00	-60 to 270/290	19091S-510E

HP-Fast Residual Solvent, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	1.00	-20 to 260	19095V-420E

HP-FFAP, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.30	60 to 240/250	19091F-102E
	50	0.30	60 to 240/250	19091F-105E
0.25	30	0.25	60 to 240/250	19091F-433E
0.32	25	0.50	60 to 240/250	19091F-112E
	50	0.50	60 to 240/250	19091F-115E
0.53	15	1.00	60 to 240	19095F-120E
	30	1.00	60 to 240	19095F-123E

HP-INNOWax, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 260/270	19091N-577E
0.20	50	0.20	40 to 260/270	19091N-105E
		0.40	40 to 260/270	19091N-205E
0.25	15	0.25	40 to 260/270	19091N-131E
	30	0.25	40 to 260/270	19091N-133E
	60	0.25	40 to 260/270	19091N-136E
	30	0.50	40 to 260/270	19091N-233E
0.32	30	0.25	40 to 260/270	19091N-113E
		0.50	40 to 260/270	19091N-213E
	60	0.50	40 to 260/270	19091N-216E
0.53	15	1.00	40 to 240/250	19095N-121E
	30	1.00	40 to 240/250	19095N-123E

HP-Chiral β, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	30 to 240/250	19091G-B213E

HP-PLOT Al2O3 "KCl", 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	5.00	-60 to 200	19091P-K33E
0.32	50	8.00	-60 to 200	19091P-K15E

HP-PLOT Al2O3 "M", 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	50	8.00	-60 to 200	19091P-M15E

HP-PLOT Molesieve, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	12.00	-60 to 300	19091P-MS4E
0.53	30	25.00	-60 to 300	19095P-MS6E
	30	50.00	-60 to 300	19095P-MS0E

HP-PLOT Al2O3 "S", 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	50	8.00	-60 to 200	19091P-S15E
0.53	50	15.00	-60 to 200	19095P-S25E

HP-PLOT Q, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	20.00	-60 to 270/290	19091P-Q04E
0.53	15	40.00	-60 to 270/290	19095P-Q03E
	30	40.00	-60 to 270/290	19095P-Q04E

HP-PLOT U, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.10	-60 to 190	19091P-U04E
0.53	30	0.20	-60 to 190	19095P-U04E

HP-PONA, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	50	0.50	-60 to 325/350	19091S-001E

Ultra 1, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.33	-60 to 325/350	19091A-102E

Ultra 2, 5 in. cage

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.33	-60 to 325/350	19091B-102E
	50	0.33	-60 to 325/350	19091B-105E
0.32	25	0.17	-60 to 325/350	19091B-012E
	50	0.52	-60 to 325/350	19091B-115E



NEW! Agilent J&W LTM Column Modules

- Suitable for majority of Agilent J&W Capillary GC columns (30 m maximum length)
- Rapid temperature programming rates of up to 1800°C/min
- Fast cooling times – less than one minute for some configurations
- Excellent retention time repeatability, comparable to conventional GC
- Ability to run up to four column modules simultaneously, using different temperature programs
- Works with 7890/6890 GC injectors and detectors for little change to your existing methods
- Compatible with Agilent Capillary Flow Technology, for multi-dimensional GC

LTM column modules combine a fused silica capillary column with heating and temperature sensing components wound around it. The design heats and cools the column very efficiently for significantly shorter analytical cycle times compared to conventional air-bath GC oven techniques, while simultaneously using less power.

LTM column modules are available in two column assembly sizes: 5 inch diameter (standard) and 3 inch diameter (small). The standard format provides faster cooling speeds than the small format. Since the chromatography quality is basically equivalent for the two module sizes, Agilent recommends the 5 inch (standard) configuration.

When utilizing the 3 inch (small) configuration, up to four column modules can be installed per Agilent LTM system, enabling multidimensional GC applications. With the 5 inch (standard) configuration, two column modules can be installed per Agilent LTM system. Module sizes can be mixed so that one 5-inch column module can be used with either one or two 3 inch column modules.

The majority of Agilent J&W Capillary GC columns can be used for LTM column modules, including Wall Coated Open Tubular (WCOT) columns and Porous Layer Open Tubular (PLOT) columns. Any capillary GC column with column length up to 30 meters can be put into the 5 inch format. The 3 inch format is limited to capillary GC columns with column inner diameters (ID) of 0.32 mm or smaller. The 3 inch format is not recommended for PLOT columns or any capillary column that is known to be especially fragile.

All LTM column modules come standard with the following:

- Two 1 meter guard columns (deactivated fused silica tubing) of the same internal diameter as the analytical column, one each for inlet and detector
- Package of five non-reusable ferrules that are appropriate for the dimensions of the guard columns and analytical columns



Agilent LTM System

The Agilent LTM (Low Thermal Mass) system was created to greatly enhance the column temperature programming capabilities of the Agilent 7890A and 6890 series gas chromatographs. The LTM system consists of a replacement door with built-in electronics and slots for inserting one to four LTM GC column modules. The proprietary design allows each module to be independently temperature programmed. The LTM column modules extend outside the GC oven door to allow fast heating and cooling in the ambient air while the GC oven operates isothermally. Deactivated fused silica transfer line connections are made inside the oven to existing injectors, detectors, valves and other modules as desired, regardless of their placement around the oven. By interfacing through the existing oven, the operator retains the original chromatograph's automated sampling, sample injection, detection options, and software.

For more information, visit **www.agilent.com/chem/LTM**.

CAM LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	60 to 220/240	112-2112LTM
	30	0.25	60 to 220/240	112-2132LTM
		0.50	60 to 220/240	112-2133LTM
0.32	30	0.25	60 to 220/240	113-2132LTM
		0.50	60 to 220/240	113-2133LTM
0.53	30	1.00	60 to 200/220	115-2132LTM

Carbowax 20M LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	60 to 220/240	112-2032LTM
0.32	30	0.25	60 to 220/240	113-2032LTM

Cyclodex-B LTM Column Modules

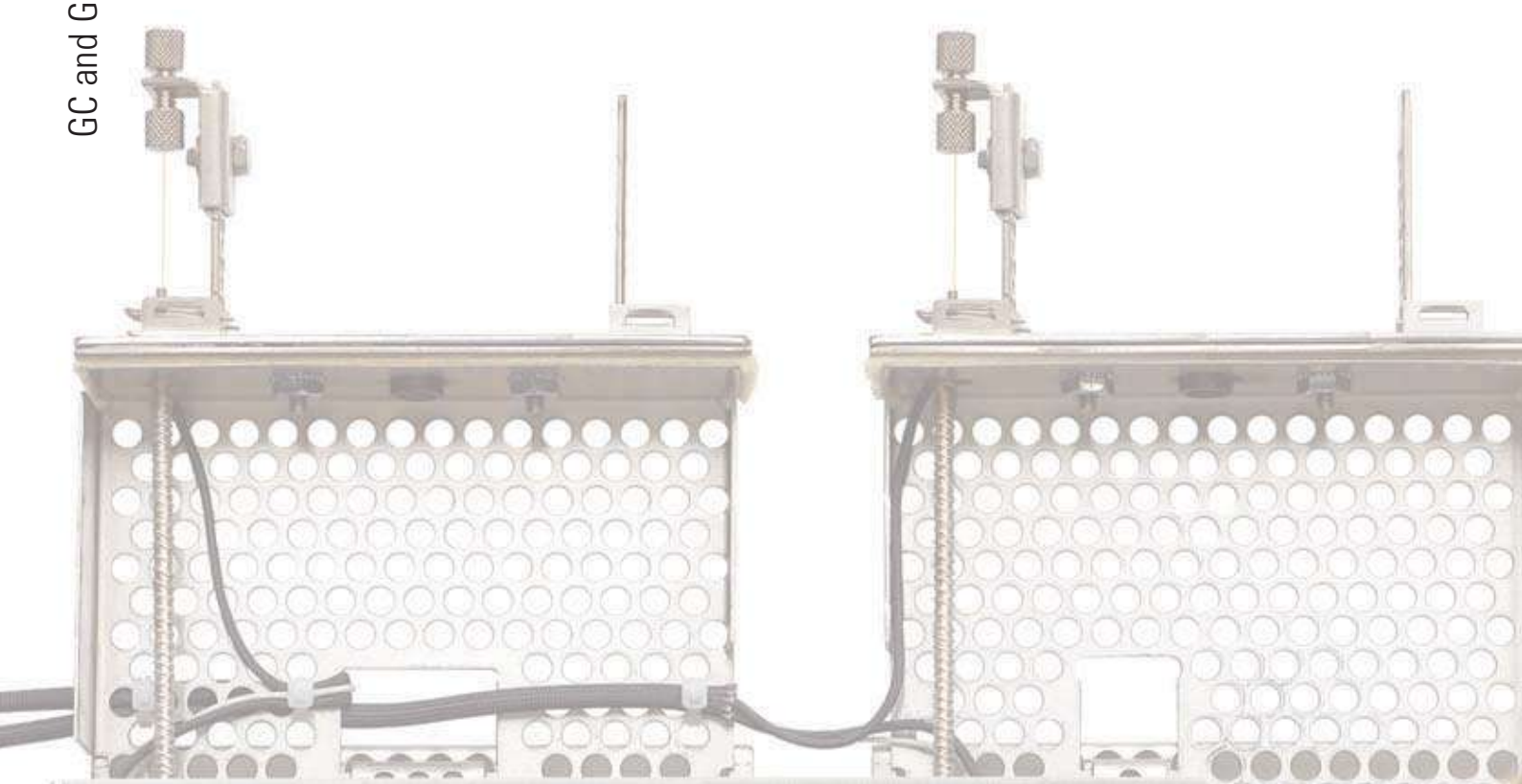
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	10 to 230/250	112-2532LTM
0.32	30	0.25	10 to 230/250	113-2532LTM

CycloSil-B LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	10 to 250	112-6632LTM
0.32	30	0.25	10 to 250	113-6632LTM

DB-1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.05	10	0.05	-60 to 325/350	126-1012LTM
		0.20	-60 to 325/350	126-1013LTM
0.10	5	0.12	-60 to 325/350	127-100ALTM
	10	0.10	-60 to 325/350	127-1012LTM
		0.40	-60 to 325/350	127-1013LTM
	20	0.10	-60 to 325/350	127-1022LTM
		0.40	-60 to 325/350	127-1023LTM
0.15	10	1.20	-60 to 280/300	12A-1015LTM
0.18	10	0.18	-60 to 325/350	121-1012LTM
		0.20	-60 to 325/350	121-101ALTM
		0.40	-60 to 325/350	121-1013LTM
	20	0.18	-60 to 325/350	121-1022LTM
		0.40	-60 to 325/350	121-1023LTM



DB-1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.33	-60 to 325/350	128-1012LTM
	25	0.33	-60 to 325/350	128-1022LTM
	30	0.80	-60 to 325/350	128-1034LTM
0.25	15	0.10	-60 to 325/350	122-1011LTM
		0.25	-60 to 325/350	122-1012LTM
		1.00	-60 to 325/350	122-1013LTM
	25	0.25	-60 to 325/350	122-1022LTM
	30	0.10	-60 to 325/350	122-1031LTM
		0.25	-60 to 325/350	122-1032LTM
		0.50	-60 to 325/350	122-103ELTM
		1.00	-60 to 325/350	122-1033LTM
0.32	10	0.50	-60 to 325/350	123-100ELTM
	15	0.10	-60 to 325/350	123-1011LTM
		0.25	-60 to 325/350	123-1012LTM
		1.00	-60 to 325/350	123-1013LTM
		3.00	-60 to 280/300	123-1014LTM
		5.00	-60 to 280/300	123-1015LTM
	25	0.12	-60 to 325/350	123-1027LTM
		0.25	-60 to 325/350	123-1022LTM
		0.52	-60 to 325/350	123-1026LTM
		1.05	-60 to 325/350	123-102FLTM
	30	0.10	-60 to 325/350	123-1031LTM
		0.25	-60 to 325/350	123-1032LTM
		0.50	-60 to 325/350	123-103ELTM
		1.00	-60 to 325/350	123-1033LTM
		1.50	-60 to 300/320	123-103BLTM
		3.00	-60 to 280/300	123-1034LTM
		5.00	-60 to 280/300	123-1035LTM
0.45	30	1.27	-60 to 300/320	124-1032LTM
		2.55	-60 to 260/280	124-1034LTM

Tips & Tools

Agilent LTM column module technology is compatible with metal capillary columns, but LTM modules are generally not recommended for fast GC applications because of their poor cooling performance compared to fused silica capillaries.

Tips & Tools

LTM column modules should never be programmed beyond the GC column temperature limits recommended by Agilent. For very fast ramping applications (e.g. 600°C/min), limiting the maximum temperatures to 10-20°C below the GC column temperature limits can increase the lifetime of the column modules.

DB-1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	5	0.88	-60 to 300/320	125-100ALTM
		2.65	-60 to 260/280	125-100BLTM
		5.00	-60 to 260/280	125-1005LTM
	7.5	1.50	-60 to 300/320	125-1002LTM
	10	2.65	-60 to 260/280	125-10HBLTM
		5.00	-60 to 260/280	125-10H5LTM
	15	0.15	-60 to 340/360	125-1011LTM
		0.25	-60 to 320/340	125-101KLTM
		0.50	-60 to 300/320	125-1017LTM
		1.00	-60 to 300/320	125-101JLTM
		1.50	-60 to 300/320	125-1012LTM
		3.00	-60 to 260/280	125-1014LTM
		5.00	-60 to 260/280	125-1015LTM
	25	1.00	-60 to 300/320	125-102JLTM
		5.00	-60 to 260/280	125-1025LTM
	30	0.10	-60 to 340/360	125-1039LTM
		0.50	-60 to 300/320	125-1037LTM
		1.00	-60 to 300/320	125-103JLTM
		1.50	-60 to 300/320	125-1032LTM
		2.65	-60 to 260/280	125-103BLTM
		3.00	-60 to 260/280	125-1034LTM
		5.00	-60 to 260/280	125-1035LTM
		0.25	-60 to 320/340	125-103KLTM

DB-1ht LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 400	122-1111LTM
	30	0.10	-60 to 400	122-1131LTM
0.32	15	0.10	-60 to 400	123-1111LTM
	30	0.10	-60 to 400	123-1131LTM

DB-1ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 340/360	127-0112LTM
		0.40	-60 to 340/360	127-0113LTM
	20	0.10	-60 to 340/360	127-0122LTM
		0.40	-60 to 340/360	127-0123LTM
0.18	20.0	0.18	-60 to 340/360	121-0122LTM
0.20	12	0.33	-60 to 340/350	128-0112LTM
	25	0.33	-60 to 340/350	128-0122LTM
0.25	15	0.25	-60 to 340/360	122-0112LTM
	30	0.10	-60 to 340/360	122-0131LTM
		0.25	-60 to 340/360	122-0132LTM
0.32	15	0.25	-60 to 340/360	123-0112LTM
	30	0.10	-60 to 340/360	123-0131LTM
		0.25	-60 to 340/360	123-0132LTM

DB-1301 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	10	0.40	-20 to 280/300	121-1313LTM
0.25	30	0.25	-20 to 280/300	122-1332LTM
		1.00	-20 to 280/300	122-1333LTM
0.32	30	0.25	-20 to 280/300	123-1332LTM
		1.00	-20 to 280/300	123-1333LTM
0.53	15	1.00	-20 to 260/280	125-1312LTM
	30	1.00	-20 to 260/280	125-1332LTM
		1.50	-20 to 260/280	125-1333LTM

DB-17 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.05	10	0.10	40 to 280/300	126-1713LTM
0.10	10	0.10	40 to 280/300	127-1712LTM
		0.20	40 to 280/300	127-1713LTM
	20	0.10	40 to 280/300	127-1722LTM
0.18	20	0.18	40 to 280/300	121-1722LTM
		0.30	40 to 280/300	121-1723LTM
0.25	15	0.15	40 to 280/300	122-1711LTM
		0.25	40 to 280/300	122-1712LTM
		0.50	40 to 280/300	122-1713LTM
	30	0.15	40 to 280/300	122-1731LTM
		0.25	40 to 280/300	122-1732LTM
		0.50	40 to 280/300	122-1733LTM
0.32	15	0.15	40 to 280/300	123-1711LTM
		0.25	40 to 280/300	123-1712LTM
		0.50	40 to 280/300	123-1713LTM
	30	0.15	40 to 280/300	123-1731LTM
		0.25	40 to 280/300	123-1732LTM
		0.50	40 to 280/300	123-1733LTM
0.53	5	2.00	40 to 260/280	125-1704LTM
	15	0.25	40 to 260/280	125-1711LTM
		0.50	40 to 260/280	125-1717LTM
		1.00	40 to 260/280	125-1712LTM
		1.50	40 to 260/280	125-1713LTM
	30	0.25	40 to 260/280	125-1731LTM
		0.50	40 to 260/280	125-1737LTM
		1.00	40 to 260/280	125-1732LTM
		1.50	40 to 260/280	125-1733LTM

DB-17ht LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	5	0.15	40 to 340/365	122-1801LTM
	15	0.15	40 to 340/365	122-1811LTM
	30	0.15	40 to 340/365	122-1831LTM
0.32	15	0.15	40 to 340/365	123-1811LTM
	30	0.15	40 to 340/365	123-1831LTM

DB-17ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 320/340	121-4722LTM
0.25	15	0.15	40 to 320/340	122-4711LTM
	15	0.25	40 to 320/340	122-4712LTM
	30	0.15	40 to 320/340	122-4731LTM
	30	0.25	40 to 320/340	122-4732LTM
0.32	15	0.25	40 to 320/340	123-4712LTM
	30	0.25	40 to 320/340	123-4732LTM

DB-1701 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	20	0.10	-20 to 280/300	127-0722LTM
		0.40	-20 to 280/300	127-0723LTM
0.18	10	0.40	-20 to 280/300	121-0713LTM
	20	0.18	-20 to 280/300	121-0722LTM
0.25	15	0.25	-20 to 280/300	122-0712LTM
		1.00	-20 to 280/300	122-0713LTM
	30	0.15	-20 to 280/300	122-0731LTM
		0.25	-20 to 280/300	122-0732LTM
		1.00	-20 to 280/300	122-0733LTM
0.32	15	0.25	-20 to 280/300	123-0712LTM
		1.00	-20 to 280/300	123-0713LTM
	30	0.15	-20 to 280/300	123-0731LTM
		0.25	-20 to 280/300	123-0732LTM
		1.00	-20 to 280/300	123-0733LTM
0.53	15	1.00	-20 to 260/280	125-0712LTM
	30	0.25	-20 to 260/280	125-0731LTM
		0.50	-20 to 260/280	125-0737LTM
		1.00	-20 to 260/280	125-0732LTM
		1.50	-20 to 260/280	125-0733LTM

DB-1701P LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	-20 to 280/300	122-7732LTM
0.32	25	0.25	-20 to 280/300	123-7722LTM
	30	0.25	-20 to 280/300	123-7732LTM
0.53	30	1.00	-20 to 260/280	125-7732LTM

DB-200 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	30 to 300/320	122-2032LTM
		0.50	30 to 300/320	122-2033LTM
0.32	30	0.25	30 to 300/320	123-2032LTM
		0.50	30 to 300/320	123-2033LTM
0.53	30	1.00	30 to 280/300	125-2032LTM

DB-210 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	45 to 240/260	122-0212LTM
	30	0.25	45 to 240/260	122-0232LTM
		0.50	45 to 240/260	122-0233LTM
0.32	15	0.50	45 to 240/260	123-0213LTM
	30	0.25	45 to 240/260	123-0232LTM
		0.50	45 to 240/260	123-0233LTM
0.53	15	1.00	45 to 220/240	125-0212LTM
	30	1.00	45 to 220/240	125-0232LTM

DB-225 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	20	0.10	40 to 220/240	127-2222LTM
0.18	20	0.20	40 to 220/240	121-2223LTM
0.25	15	0.25	40 to 220/240	122-2212LTM
	30	0.15	40 to 220/240	122-2231LTM
		0.25	40 to 220/240	122-2232LTM
0.32	30	0.25	40 to 220/240	123-2232LTM
0.53	15	1.00	40 to 200/220	125-2212LTM
	30	1.00	40 to 200/220	125-2232LTM
		0.50	40 to 200/220	125-2237LTM

DB-225ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	40 to 240	122-2912LTM
	30	0.25	40 to 240	122-2932LTM
0.32	30	0.25	40 to 240	123-2932LTM

DB-23 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.20	40 to 250/260	121-2323LTM
0.25	15	0.25	40 to 250/260	122-2312LTM
	30	0.15	40 to 250/260	122-2331LTM
		0.25	40 to 250/260	122-2332LTM
0.32	30	0.25	40 to 250/260	123-2332LTM
0.53	15	0.50	40 to 230/240	125-2312LTM
	30	0.50	40 to 230/240	125-2332LTM

DB-2887 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	3.00	-60 to 350	125-2814LTM

DB-35 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	40 to 300/320	122-1932LTM
0.32	30	0.25	40 to 300/320	123-1932LTM
		0.50	40 to 300/320	123-1933LTM
0.53	15	1.00	40 to 280/300	125-1912LTM
	30	1.00	40 to 280/300	125-1932LTM
		0.50	40 to 280/300	125-1937LTM

DB-35ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20.0	0.18	50 to 340/360	121-3822LTM
0.20	15	0.33	50 to 340/360	128-3812LTM
	25	0.33	50 to 340/360	128-3822LTM
0.25	15	0.25	50 to 340/360	122-3812LTM
	30	0.15	50 to 340/360	122-3831LTM
		0.25	50 to 340/360	122-3832LTM
0.32	15	0.25	50 to 340/360	123-3812LTM
	30	0.25	50 to 340/360	123-3832LTM
0.53	30	0.50	50 to 320/340	125-3837LTM
		1.00	50 to 320/340	125-3832LTM

DB-5 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	-60 to 325/350	127-5012LTM
		0.17	-60 to 325/350	127-501ELTM
		0.34	-60 to 325/350	127-501NLTM
		0.40	-60 to 325/350	127-5013LTM
	20	0.10	-60 to 325/350	127-5022LTM
	20	0.40	-60 to 325/350	127-5023LTM
0.15	10.0	1.20	-60 to 300/320	12A-5015LTM
0.18	10	0.18	-60 to 325/350	121-5012LTM
		0.40	-60 to 325/350	121-5013LTM
	20	0.18	-60 to 325/350	121-5022LTM
		0.40	-60 to 325/350	121-5023LTM
0.20	12	0.33	-60 to 325/350	128-5012LTM
	15	0.20	-60 to 325/350	128-50H7LTM
	25	0.33	-60 to 325/350	128-5022LTM
0.25	15	0.10	-60 to 325/350	122-5011LTM
		0.25	-60 to 325/350	122-5012LTM
		0.50	-60 to 325/350	122-501ELTM
		1.00	-60 to 325/350	122-5013LTM
	25	0.25	-60 to 325/350	122-5022LTM
	30	0.10	-60 to 325/350	122-5031LTM
		0.25	-60 to 325/350	122-5032LTM
		0.50	-60 to 325/350	122-503ELTM
		1.00	-60 to 325/350	122-5033LTM
0.32	10	0.50	-60 to 325/350	123-500ELTM
	15	0.10	-60 to 325/350	123-5011LTM
		0.25	-60 to 325/350	123-5012LTM
		1.00	-60 to 325/350	123-5013LTM
	25	0.17	-60 to 325/350	123-502DLTM
		0.25	-60 to 325/350	123-5022LTM
		0.52	-60 to 325/350	123-5026LTM
		1.05	-60 to 325/350	123-502FLTM
	30	0.10	-60 to 325/350	123-5031LTM
		0.25	-60 to 325/350	123-5032LTM
		0.50	-60 to 325/350	123-503ELTM
		1.00	-60 to 325/350	123-5033LTM
		1.50	-60 to 325/350	123-503BLTM

DB-5 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.45	15	1.27	-60 to 300/320	124-5012LTM
	30	0.42	-60 to 300/320	124-5037LTM
		1.27	-60 to 300/320	124-5032LTM
0.53	10	2.65	-60 to 260/280	125-50HBLTM
	15	0.25	-60 to 300/320	125-501KLTM
		0.50	-60 to 300/320	125-5017LTM
		1.00	-60 to 300/320	125-501JLTM
		1.50	-60 to 300/320	125-5012LTM
	25	5.00	-60 to 260/280	125-5025LTM
	30	0.25	-60 to 300/320	125-503KLTM
		0.50	-60 to 300/320	125-5037LTM
		0.88	-60 to 300/320	125-503DLTM
		1.00	-60 to 300/320	125-503JLTM
		1.50	-60 to 300/320	125-5032LTM
		2.65	-60 to 260/280	125-503BLTM
		3.00	-60 to 260/280	125-5034LTM
		5.00	-60 to 260/280	125-5035LTM

DB-5ht LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.10	-60 to 400	122-5711LTM
	30	0.10	-60 to 400	122-5731LTM
0.32	10	0.10	-60 to 400	123-5701LTM
	15	0.10	-60 to 400	123-5711LTM
	30	0.10	-60 to 400	123-5731LTM

DB-5ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5522LTM
		0.36	-60 to 325/350	121-5523LTM
0.20	12	0.33	-60 to 325/350	128-5512LTM
	25	0.33	-60 to 325/350	128-5522LTM
0.25	15	0.10	-60 to 325/350	122-5511LTM
		0.25	-60 to 325/350	122-5512LTM
		0.50	-60 to 325/350	122-5516LTM
		1.00	-60 to 325/350	122-5513LTM
	25	0.25	-60 to 325/350	122-5522LTM
		0.40	-60 to 325/350	122-552ALTM
	30	0.10	-60 to 325/350	122-5531LTM
		0.25	-60 to 325/350	122-5532LTM
		0.50	-60 to 325/350	122-5536LTM
		1.00	-60 to 325/350	122-5533LTM
0.32	15	0.10	-60 to 325/350	123-5511LTM
		0.25	-60 to 325/350	123-5512LTM
		1.00	-60 to 325/350	123-5513LTM
	25	0.52	-60 to 325/350	123-5526LTM
	30	0.10	-60 to 325/350	123-5531LTM
		0.25	-60 to 325/350	123-5532LTM
		0.50	-60 to 325/350	123-5536LTM
		1.00	-60 to 325/350	123-5533LTM
0.53	15	1.50	-60 to 300/320	125-5512LTM
	30	0.50	-60 to 300/320	125-5537LTM
		1.00	-60 to 300/320	125-553JLTM
		1.50	-60 to 300/320	125-5532LTM

DB-5ms Ultra Inert LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5522UILTM
		0.36	-60 to 325/350	121-5523UILTM
0.25	15	0.25	-60 to 325/350	122-5512UILTM
		1.00	-60 to 325/350	122-5513UILTM
	25	0.25	-60 to 325/350	122-5522UILTM
	30	0.25	-60 to 325/350	122-5532UILTM
		0.50	-60 to 325/350	122-5536UILTM
		1.00	-60 to 325/350	122-5533UILTM
0.32	30	0.25	-60 to 325/350	123-5532UILTM
		0.50	-60 to 325/350	123-5536UILTM
		1.00	-60 to 325/350	123-5533UILTM

DB-5.625 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	121-5621LTM
		0.36	-60 to 325/350	121-5622LTM
0.25	30	0.25	-60 to 325/350	122-5631LTM
		0.50	-60 to 325/350	122-5632LTM
		1.00	-60 to 325/350	122-5633LTM
0.32	30	0.25	-60 to 325/350	123-5631LTM
		0.50	-60 to 325/350	123-5632LTM

DB-608 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 280/300	121-6822LTM
0.25	30	0.25	40 to 280/300	122-6832LTM
0.32	30	0.50	40 to 280/300	123-1730LTM
0.45	30	0.70	40 to 260/280	124-1730LTM
0.53	15	0.83	40 to 260/280	125-1710LTM
	30	0.50	40 to 260/280	125-6837LTM
		0.83	40 to 260/280	125-1730LTM

DB-624 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	1.00	-20 to 260	121-1324LTM
0.20	25	1.12	-20 to 260	128-1324LTM
0.25	30	1.40	-20 to 260	122-1334LTM
0.32	30	1.80	-20 to 260	123-1334LTM
0.45	30	2.55	-20 to 260	124-1334LTM
0.53	30	3.00	-20 to 260	125-1334LTM

DB-ALC1 and DB-ALC2 LTM Column Modules

Phase	ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
DB-ALC1	0.32	30	1.80	20 to 260/280	123-9134LTM
	0.53	30	3.00	20 to 260/280	125-9134LTM
DB-ALC2	0.32	30	1.20	20 to 260/280	123-9234LTM
	0.53	30	2.00	20 to 260/280	125-9234LTM

DB-FFAP LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.10	10	0.10	40 to 250	127-3212LTM
	15	0.10	40 to 250	127-32H2LTM
0.25	15	0.25	40 to 250	122-3212LTM
	30	0.25	40 to 250	122-3232LTM
		0.50	40 to 250	122-3233LTM
0.32	15	0.25	40 to 250	123-3212LTM
	25	0.50	40 to 250	123-3223LTM
	30	0.25	40 to 250	123-3232LTM
		0.50	40 to 250	123-3233LTM
		1.00	40 to 250	123-3234LTM
0.45	30	0.85	40 to 250	124-3232LTM
0.53	10	1.00	40 to 250	125-32H2LTM
	15	0.50	40 to 250	125-3217LTM
		1.00	40 to 250	125-3212LTM
	30	0.25	40 to 250	125-3231LTM
		0.50	40 to 250	125-3237LTM
		1.00	40 to 250	125-3232LTM
		1.50	40 to 250	125-3233LTM

DB-MTBE LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.45	30	2.55	35 to 260/280	124-0034LTM
0.53	30	3.00	35 to 260/280	125-0034LTM

DB-TPH LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	-10 to 320	123-1632LTM

DB-VRX LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	1.00	-10 to 260	121-1524LTM
	40	1.00	-10 to 260	121-1544LTM
0.25	30	1.40	-10 to 260	122-1534LTM
0.32	30	1.80	-10 to 260	123-1534LTM
0.45	30	2.55	-10 to 260	124-1534LTM

DB-WAX LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.05	10	0.05	20 to 250/260	126-7012LTM
		0.10	20 to 240/250	126-7013LTM
0.10	10	0.10	20 to 250/260	127-7012LTM
		0.20	20 to 240/250	127-7013LTM
	20	0.10	20 to 250/260	127-7022LTM
		0.20	20 to 240/250	127-7023LTM
0.18	10	0.18	20 to 250/260	121-7012LTM
	20	0.18	20 to 250/260	121-7022LTM
		0.30	20 to 240/250	121-7023LTM
0.20	25	0.20	20 to 250/260	128-7022LTM
	30	0.20	20 to 250/260	128-7032LTM
0.25	15	0.25	20 to 250/260	122-7012LTM
		0.50	20 to 240/250	122-7013LTM
	30	0.15	20 to 250/260	122-7031LTM
		0.25	20 to 250/260	122-7032LTM
		0.50	20 to 240/250	122-7033LTM
0.32	15	0.25	20 to 250/260	123-7012LTM
		0.50	20 to 240/250	123-7013LTM
	30	0.15	20 to 250/260	123-7031LTM
		0.25	20 to 250/260	123-7032LTM
		0.50	20 to 240/250	123-7033LTM
0.45	30	0.85	20 to 230/240	124-7032LTM
0.53	15	0.50	20 to 230/240	125-7017LTM
		1.00	20 to 230/240	125-7012LTM
	30	0.25	20 to 230/240	125-7031LTM
		0.50	20 to 230/240	125-7037LTM
		1.00	20 to 230/240	125-7032LTM

DB-WAXetr LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.40	30 to 250/260	128-7323LTM
0.25	30	0.25	30 to 260/280	122-7332LTM
		0.50	30 to 250/260	122-7333LTM
0.32	15	0.25	30 to 260/280	123-7312LTM
		1.00	30 to 250/260	123-7314LTM
	30	0.25	30 to 260/280	123-7332LTM
		0.50	30 to 250/260	123-7333LTM
		1.00	30 to 250/260	123-7334LTM
0.53	15	1.00	30 to 240/260	125-7312LTM
		2.00	50 to 230/250	125-7314LTM
	30	1.00	30 to 240/260	125-7332LTM
		1.50	30 to 230/240	125-7333LTM
		2.00	50 to 230/250	125-7334LTM

DB-XLB LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	30 to 340/360	121-1222LTM
	30	0.18	30 to 340/360	121-1232LTM
0.20	12	0.33	30 to 340/360	128-1212LTM
	25	0.33	30 to 340/360	128-1222LTM
0.25	15	0.10	30 to 340/360	122-1211LTM
		0.25	30 to 340/360	122-1212LTM
	30	0.10	30 to 340/360	122-1231LTM
		0.25	30 to 340/360	122-1232LTM
		0.50	30 to 340/360	122-1236LTM
		1.00	30 to 340/360	122-1233LTM
0.32	30	0.25	30 to 340/360	123-1232LTM
		0.50	30 to 330/360	123-1236LTM
0.53	15	1.50	30 to 320/340	125-1212LTM
	30	1.50	30 to 320/340	125-1232LTM

DX-1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	1.00	50 to 250/270	123-6133LTM

DX-4 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	50 to 250/270	122-6432LTM
0.32	15	0.25	50 to 250/270	123-6412LTM
	30	0.25	50 to 250/270	123-6432LTM

GS-Alumina LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	0.00	-60 to 200	115-3532LTM

GS-Alumina KCl LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	0.00	-60 to 200	115-3332LTM

GS-CarbonPLOT LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	1.50	0 to 360	113-3112LTM
	30	1.50	0 to 360	113-3132LTM
		3.00	0 to 360	113-3133LTM
0.53	15	3.00	0 to 360	115-3113LTM
	30	3.00	0 to 360	115-3133LTM

GS-Q LTM Column Modules

ID (mm)	Length (m)	Temp Limits (°C)	Part No.
0.32	30	-60 to 250	113-3432LTM
0.53	10	-60 to 250	115-34H2LTM
	15	-60 to 250	115-3412LTM
	25	-60 to 250	115-3422LTM
	30	-60 to 250	115-3432LTM

HP-1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091Z-577LTM
0.20	17	0.11	-60 to 325/350	19091Z-008LTM
	25	0.11	-60 to 325/350	19091Z-002LTM
		0.33	-60 to 325/350	19091Z-102LTM
		0.50	-60 to 325/350	19091Z-202LTM
0.25	15	0.10	-60 to 325/350	19091Z-331LTM
		0.25	-60 to 325/350	19091Z-431LTM
		1.00	-60 to 325/350	19091Z-231LTM
	30	0.10	-60 to 325/350	19091Z-333LTM
		0.25	-60 to 325/350	19091Z-433LTM
		1.00	-60 to 325/350	19091Z-233LTM
0.32	15	0.25	-60 to 325/350	19091Z-411LTM
		1.00	-60 to 325/350	19091Z-211LTM
	25	0.17	-60 to 325/350	19091Z-012LTM
		0.52	-60 to 325/350	19091Z-112LTM
		1.05	-60 to 325/350	19091Z-212LTM
	30	0.10	-60 to 325/350	19091Z-313LTM
		0.25	-60 to 325/350	19091Z-413LTM
		1.00	-60 to 325/350	19091Z-213LTM
		3.00	-60 to 260/280	19091Z-513LTM
		4.00	-60 to 260/280	19091Z-613LTM
		5.00	-60 to 260/280	19091Z-713LTM
0.53	5	0.88	-60 to 320/400	19095Z-020LTM
		2.65	-60 to 260/280	19095S-100LTM
	7.5	5.00	-60 to 260/280	19095Z-627LTM
	10	0.88	-60 to 300/320	19095Z-021LTM
		2.65	-60 to 260/280	19095Z-121LTM
	15	1.50	-60 to 300/320	19095Z-321LTM
		3.00	-60 to 260/280	19095Z-421LTM
		5.00	-60 to 260/280	19095Z-621LTM
	30.0	0.88	-60 to 300/320	19095Z-023LTM
		1.50	-60 to 300/320	19095Z-323LTM
		2.65	-60 to 260/280	19095Z-123LTM
		3.00	-60 to 260/280	19095Z-423LTM
		5.00	-60 to 260/280	19095Z-623LTM

HP-1ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-677LTM
0.20	25	0.33	-60 to 325/350	19091S-602LTM
0.25	15	0.25	-60 to 325/350	19091S-931LTM
	30	0.10	-60 to 325/350	19091S-833LTM
		0.25	-60 to 325/350	19091S-933LTM
		0.50	-60 to 325/350	19091S-633LTM
		1.00	-60 to 325/350	19091S-733LTM
0.32	15	0.25	-60 to 325/350	19091S-911LTM
	25	0.52	-60 to 325/350	19091S-612LTM
	30	0.25	-60 to 325/350	19091S-913LTM
		1.00	-60 to 325/350	19091S-713LTM

HP-101 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.20	-60 to 280	19091Y-102LTM
0.32	25	0.30	-60 to 280	19091Y-012LTM

HP-17 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	2.00	40 to 260/280	19095L-121LTM

HP-20M LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.10	60 to 220	19091W-102LTM
0.32	25	0.30	60 to 220	19091W-012LTM
0.53	10	1.33	60 to 220	19095W-121LTM
	30	1.33	60 to 220	19095W-123LTM

HP-35 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	15	0.25	40 to 300/320	19091G-131LTM
	30	0.25	40 to 300/320	19091G-133LTM
0.32	30	0.25	40 to 300/320	19091G-113LTM
		0.50	40 to 300/320	19091G-213LTM

HP-5 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091J-577LTM
0.20	12	0.33	-60 to 325/350	19091J-101LTM
	25	0.11	-60 to 325/350	19091J-002LTM
		0.33	-60 to 325/350	19091J-102LTM
		0.50	-60 to 325/350	19091J-202LTM
0.25	5	0.10	-60 to 325/350	19091J-330LTM
	15	0.25	-60 to 325/350	19091J-431LTM
		1.00	-60 to 325/350	19091J-231LTM
	30	0.10	-60 to 325/350	19091J-333LTM
		0.25	-60 to 325/350	19091J-433LTM
		1.00	-60 to 325/350	19091J-233LTM
0.32	15	0.25	-60 to 325/350	19091J-411LTM
	25	0.17	-60 to 325/350	19091J-012LTM
		0.52	-60 to 325/350	19091J-112LTM
		1.05	-60 to 325/350	19091J-212LTM
	30	0.10	-60 to 325/350	19091J-313LTM
		0.25	-60 to 325/350	19091J-413LTM
		0.50	-60 to 325/350	19091J-113LTM
		1.00	-60 to 325/350	19091J-213LTM
0.53	10	2.65	-60 to 260/280	19095J-121LTM
	15	1.50	-60 to 300/320	19095J-321LTM
		5.00	-60 to 260/280	19095J-621LTM
	30	0.88	-60 to 300/320	19095J-023LTM
		1.50	-60 to 300/320	19095J-323LTM
		2.65	-60 to 260/280	19095J-123LTM
		5.00	-60 to 260/280	19095J-623LTM

HP-5ms LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-577LTM
0.20	12	0.33	-60 to 325/350	19091S-101LTM
	25	0.33	-60 to 325/350	19091S-102LTM
0.25	15	0.10	-60 to 325/350	19091S-331LTM
		0.25	-60 to 325/350	19091S-431LTM
		1.00	-60 to 325/350	19091S-231LTM
	30	0.10	-60 to 325/350	19091S-333LTM
		0.25	-60 to 325/350	19091S-433LTM
		0.50	-60 to 325/350	19091S-133LTM
		1.00	-60 to 325/350	19091S-233LTM
0.32	25	0.52	-60 to 325/350	19091S-112LTM
	30	0.10	-60 to 325/350	19091S-313LTM
		0.25	-60 to 325/350	19091S-413LTM
		0.50	-60 to 325/350	19091S-113LTM
		1.00	-60 to 325/350	19091S-213LTM

HP-5ms Semivolatile LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30.0	0.50	-60 to 325/350	19091S-139LTM

HP-5ms Ultra Inert LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	-60 to 325/350	19091S-577UILTM
0.25	15	0.25	-60 to 325/350	19091S-431UILTM
	30	0.25	-60 to 325/350	19091S-433UILTM
		0.50	-60 to 325/350	19091S-133UILTM
		1.00	-60 to 325/350	19091S-233UILTM
0.32	30	0.25	-60 to 325/350	19091S-413UILTM
		1.00	-60 to 325/350	19091S-213UILTM

HP-50+ LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 280/300	19091L-577LTM
0.20	12	0.31	40 to 280/300	19091L-101LTM
0.25	5	0.15	40 to 280/300	19091L-330LTM
	15	0.25	40 to 280/300	19091L-431LTM
	30	0.15	40 to 280/300	19091L-333LTM
		0.25	40 to 280/300	19091L-433LTM
		0.50	40 to 280/300	19091L-133LTM
0.32	15	0.50	40 to 280/300	19091L-111LTM
	30	0.25	40 to 280/300	19091L-413LTM
		0.50	40 to 280/300	19091L-113LTM
0.53	15	1.00	40 to 260/280	19095L-021LTM
	30	0.50	40 to 260/280	19095L-523LTM
		1.00	40 to 260/280	19095L-023LTM



Custom Agilent J&W LTM Column Module Ordering

If you need an LTM column module that is not listed, simply order part number 100-2000LTM and specify stationary phase, length, inner diameter, film thickness and 5 inch or 3 inch configuration.

HP-88 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.20	50 to 250/260	112-8837LTM

HP-PLOT Al2O3 "KCl" LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	5.00	-60 to 200	19091P-K33LTM
0.53	30	15.00	-60 to 200	19095P-K23LTM

HP-PLOT Al2O3 "M" LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	15.00	-60 to 200	19095P-M23LTM

HP-PLOT Al2O3 "S" LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	5.00	-60 to 200	19091P-S33LTM
0.32	25	8.00	-60 to 200	19091P-S12LTM
0.53	15	15.00	-60 to 200	19095P-S21LTM
	30	15.00	-60 to 200	19095P-S23LTM

HP-Blood Alcohol LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	7.5	20.00	-60 to 270/290	19091S-510LTM

HP-FFAP LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	25	0.33	60 to 240/250	19091F-102LTM
0.25	30	0.25	60 to 240/250	19091F-433LTM
0.32	25	0.50	60 to 240/250	19091F-112LTM
	30	0.25	60 to 240/250	19091F-413LTM
0.53	10	1.00	60 to 240	19095F-121LTM
	15	1.00	60 to 240	19095F-120LTM
	30	1.00	60 to 240	19095F-123LTM

HP-INNOWax LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.18	20	0.18	40 to 260/270	19091N-577LTM
0.20	25	0.20	40 to 260/270	19091N-102LTM
		0.40	40 to 260/270	19091N-202LTM
0.25	4	0.25	40 to 260/270	19091N-130LTM
	5	0.15	40 to 260/270	19091N-030LTM
	15	0.25	40 to 260/270	19091N-131LTM
		0.50	40 to 260/270	19091N-231LTM
	30	0.15	40 to 260/270	19091N-033LTM
		0.25	40 to 260/270	19091N-133LTM
		0.50	40 to 260/270	19091N-233LTM
0.32	15	0.25	40 to 260/270	19091N-111LTM
	30	0.15	40 to 260/270	19091N-013LTM
		0.25	40 to 260/270	19091N-113LTM
		0.50	40 to 260/270	19091N-213LTM
0.53	15	1.00	40 to 240/250	19095N-121LTM
	30	1.00	40 to 240/250	19095N-123LTM

HP-PLOT Molesieve LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	25.00	-60 to 300	19091P-MS7LTM
	30	12.00	-60 to 300	19091P-MS4LTM
		25.00	-60 to 300	19091P-MS8LTM
0.53	15	25.00	-60 to 300	19095P-MS5LTM
		50.00	-60 to 300	19095P-MS9LTM
	30	50.00	-60 to 300	19095P-MS0LTM
		25.00	-60 to 300	19095P-MS6LTM

HP-PLOT Q LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	15	20.00	-60 to 270/290	19091P-QO3LTM
	30	20.00	-60 to 270/290	19091P-QO4LTM
0.53	15	40.00	-60 to 270/290	19095P-QO3LTM
	30	40.00	-60 to 270/290	19095P-QO4LTM

HP-PLOT U LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	10.00	-60 to 190	19091P-UO4LTM
0.53	15	20.00	-60 to 190	19095P-UO3LTM
	30	20.00	-60 to 190	19095P-UO4LTM

Ultra 1 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.33	-60 to 325/350	19091A-101LTM
	17	0.11	-60 to 325/350	19091A-008LTM
		0.33	-60 to 325/350	19091A-108LTM
	25	0.11	-60 to 325/350	19091A-002LTM
		0.33	-60 to 325/350	19091A-102LTM
0.32	25	0.17	-60 to 325/350	19091A-012LTM
		0.52	-60 to 325/350	19091A-112LTM

Ultra 2 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	12	0.33	-60 to 325/350	19091B-101LTM
	25	0.11	-60 to 325/350	19091B-002LTM
		0.33	-60 to 325/350	19091B-102LTM
0.32	25	0.17	-60 to 325/350	19091B-012LTM
		0.52	-60 to 325/350	19091B-112LTM

HP-VOC LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.20	30	1.12	-60 to 280/290	19091R-303LTM

HP-PAS5 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	25	0.52	-60 to 325/350	19091S-010LTM

HP-Fast Residual Solvent LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	30	1.00	-20 to 260	19095V-420LTM

SE-30 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.32	30	0.25	0 to 325/350	113-3032LTM

SE-54 LTM Column Modules

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.25	30	0.25	0 to 325/350	112-5432LTM
0.32	30	0.25	0 to 325/350	113-5432LTM



Custom Agilent J&W LTM Column Module Ordering

For 3 inch (small) diameter LTM modules, place a custom order using part number 100-2000LTM. Be sure to provide the details of your desired column, including stationary phase, length, inner diameter (ID), and film thickness, with a specific request for a 3 inch (small) diameter LTM column module.

Fused Silica Tubing

Deactivated Tubing

Deactivated tubing can be used as retention gaps, guard columns, or transfer lines. Our standard deactivation process is a phenyl methyl deactivation – the preferred choice for most applications due to its inertness and robustness.

Deactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.05	0.36	1	160-2655-1
		5	160-2655-5
		10	160-2655-10
0.10	0.19	1	160-1010-1
		5	160-1010-5
		10	160-1010-10
	0.36	1	160-2635-1
		5	160-2635-5
		5	19091-60620E
		10	160-2635-10
0.15	0.36	1	160-2625-1
		5	160-2625-5
		10	160-2625-10
0.18	0.34	1	160-2615-1
		5	160-2615-5
		10	160-2615-10
0.20	0.36	1	160-2205-1
		5	160-2205-5
		10	160-2205-10
0.25	0.36	1	160-2255-1
		5	160-2255-5
		10	160-2255-10
		30	160-2255-30
0.32	0.43	1	160-2325-1
		5	160-2325-5
		10	160-2325-10
		30	160-2325-30
0.45	0.67	1	160-2455-1
		5	160-2455-5
		10	160-2455-10
0.53	0.67	1	160-2535-1
		5	160-2535-5
		10	160-2535-10
		30	160-2535-30

Deactivated Fused Silica High Temperature (400°C)

ID (mm)	OD (mm)	Length (m)	Part No.
0.05	0.36	5	160-2815-5
0.10	0.36	5	160-2825-5
0.25	0.35	5	160-2845-5
		10	160-2845-10
0.32	0.43	5	160-2855-5
		10	160-2855-10
0.53	0.67	5	160-2865-5
		10	160-2865-10

ProSteel Deactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.53	0.67	5	160-4535-5

Undeactivated Fused Silica

Undeactivated tubing or bare fused silica is commonly used for capillary electrophoresis. It can also be used for transfer lines and other applications where inertness is not critical.

Undeactivated Fused Silica

ID (mm)	OD (mm)	Length (m)	Part No.
0.02	0.36	5	160-2660-5
0.05	0.36	5	160-2650-5
		10	160-2650-10
0.075	0.36	5	160-2644-5
		10	160-2644-10
0.10	0.36	5	160-2634-5
		10	160-2634-10
0.18	0.34	5	160-2610-5
		10	160-2610-10
0.20	0.36	5	160-2200-5
		10	160-2200-10
		50	19091-20050
0.25	0.36	5	160-2250-5
		10	160-2250-10
0.32	0.43	5	160-2320-5
		10	160-2320-10
		50	19091-21050
0.45	0.67	5	160-2450-5
		10	160-2450-10
0.53	0.67	5	160-2530-5
		10	160-2530-10

Agilent J&W GC Column Test Standards

Compare your column's performance to the test chromatogram shipped with your J&W column from Agilent. The column test standard contains components that test the column for resolution characteristics, efficiency, and inertness. The test mixes are supplied at a concentration of 250 ng/µL in 2 mL vials. Match the phase and column diameter in the chart below to find the test mix for your column.

Agilent J&W GC Column Test Standards

Column Description	Microbore (0.05 & 0.10 mm ID) Part No.	Capillary (0.18 & 0.32 mm ID) Part No.	Megabore (0.45 & 0.53 mm ID) Part No.
OV-351		200-0032	
DB-1ht		200-0010	
DB-1	200-0010	200-0310	200-0110
DB-5	200-0010	200-0310	200-0110
DB-5ht		200-0010	
DB-5ms		200-0185	200-0185
DB-624		200-0113	200-0113
DB-2887			200-0110
DB-WAX	200-0070	200-0370	200-0070
DB-WAXetr		200-0370	200-0070
SE-30		200-0010	
SE-52		200-0010	
SE-54		200-0010	200-0010
HP-1		5080-8858	8500-6812
HP-5		5080-8858	8500-6812
HP-FFAP	8500-6813	8500-6813	8500-6813
GS-OxyPLOT			5188-5379

GC Columns Stationary Phase Applications Guide

Agilent Phase	Similar Phases	Composition	Polarity	Approximate Temp Range (°C)	Application
General Applications					
DB-5ms Ultra Inert		5% Phenyl 95% dimethyl arylene siloxane	Non-polar	From -60 to 325/350	Semivolatiles, halogenated compounds, pesticides, herbicides, drugs of abuse, amines, unknown sample screening
HP-5ms Ultra Inert		5% Phenyl 95% dimethylpolysiloxane	Non-polar	From -60 to 325/350	Semivolatiles, halogenated compounds, pesticides, herbicides, drugs of abuse, amines, unknown sample screening
HP-1ms	DB-1ms, Rtx-1ms, Rxi-1ms, VF-1ms, CP-Sil 5 CB Low Bleed/MS, MDN-1, AT-1, ZB-1ms, Equity-1	100% Dimethylpolysiloxane	Non-polar	From -60 to 325/350	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances
DB-1ms	HP-1ms, Rtx-1ms, Rxi-1ms, VF-1ms, CP-Sil 5 CB Low Bleed/MS, MDN-1, AT-1, ZB-1ms, Equity-1				
HP-1	DB-1, Ultra-1, SPB-1, CP-Sil 5 CB, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, CP-Sil 5 CB MS, ZB-1, AT-1, MDN-1, ZB-1				
DB-1	HP-1, Ultra-1, SPB-1, CP-Sil 5 CB Low Bleed/MS, Rtx-1, BP-1, OV-1, OV-101, 007-1(MS), SP-2100, SE-30, CP-Sil 5 CB MS, ZB-1, AT-1, MDN-1, ZB-1				
HP-5ms	DB-5ms, Rtx-5MS, Rtx-5 Amine, PTE-5, CP-Sil 8CB Low Bleed/MS, BPX-5, ZB-5ms, Equity-5	5% Phenyl 95% dimethylpolysiloxane	Non-polar	From -60 to 325/350	Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides
DB-5	HP-5, Ultra-2, SPB-5, CP-Sil 8CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5				
HP-5	DB-5, Ultra-2, SPB-5, CP-Sil 8 CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5				

GC Columns Stationary Phase Applications Guide

Agilent Phase	Similar Phases	Composition	Polarity	Approximate Temp Range (°C)	Application
General Applications					
DB-5ms	Rtx-5ms, Rtx-5Sil MS, Rxi-5ms, Rxi-5Sil MS, VF-5ms, PTE-5, CP-Sil 8 CB Low Bleed/MS, BPX-5, AT-5ms, ZB-5ms, SLB-5ms, Equity-5	5% Phenyl 95% dimethyl arylene siloxane	Non-polar	From -60 to 325/350	Semivolatiles, alkaloids, drugs, FAMEs, halogenated compounds, pesticides, herbicides
DB-1301	Rtx-1301, PE-1301, VF-1301ms	6% Cyanopropyl-phenyl 94% dimethyl polysiloxane	Mid-polar	From -20 to 280/300	Aroclors, alcohols, pesticides, VOCs
DB-35	Rtx-35, SPB-35, AT-35, Sup-Herb, HP-35, BPX-35	35% Phenyl 65% dimethyl polysiloxane	Mid-polar	From 40 to 300/320	CLP-pesticides, aroclors, pharmaceuticals, drugs of abuse
HP-35	Rtx-35, SPB-35, AT-35, Sup-Herb, DB-35, BPX-35				
DB-35ms	Rtx-35, Rtx-35ms, VF-35ms, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-35	35% Phenyl 65% dimethyl arylene siloxane	Mid-polar	From 50 to 340/360	CLP-pesticides, aroclors, pharmaceuticals, drugs of abuse
DB-1701	SPB-1701, CP-Sil 19 CB, Rtx-1701, BP-10, OV-1701, 007-1701, ZB-1701, VF-1701ms	14% Cyanopropyl-phenyl 86% dimethyl polysiloxane	Mid-polar	From -20 to 280/300	Pesticides, herbicides, TMS sugars, aroclors
DB-1701P	SPB-1701, CP-Sil 19CB, Rtx-1701, BP-10, CB-1701, OV-1701, 007-1701				
HP-50+	DB-17, Rtx-50, CP-Sil 24 CB, 007-17(MPS-50), SP-2250, SPB-50, ZB-50, AT-50	50% Phenyl 50% dimethylpolysiloxane	Mid-polar	From 40 to 280/300	Drugs, glycols, pesticides, steroids
DB-17	HP-50+, Rtx-50, CP-Sil 24 CB, 007-17(MPS-50), HP-17, SP-2250, SPB-50, ZB-50, AT-50				
DB-17ms	HP-50+, Rtx-50, VF-17ms, 007-17, SP-2250, SPB-50, BPX-50, SPB-17, AT-50	50% Phenyl 50% dimethyl arylene siloxane	Mid-polar	From 40 to 320/340	Drugs, glycols, pesticides, steroids
DB-200	Rtx-200, VF-200ms	35% Trifluoropropyl 65% dimethyl polysiloxane	Polar	From 30 to 300/320	Residual solvents, pesticides, herbicides
DB-210	SP-2401	50% Trifluoropropyl 50% dimethyl polysiloxane	Polar	From 45 to 240/260	EPA Methods 8140 and 609
DB-225ms	HP-225, SP-2330, CP-Sil 43 CB, Rtx-225, BP-225, OV-225, 007-225, AT-225	50% Cyanopropyl-phenyl 50% dimethyl polysiloxane	Polar	From 40 to 220/240	FAMEs, alditol acetates, neutral sterols
DB-225	SP-2330, CP-Sil 43 CB, Rtx-225, BP-225, OV-225, 007-225, AT-225				

GC Columns Stationary Phase Applications Guide

Agilent Phase	Similar Phases	Composition	Polarity	Approximate Temp Range (°C)	Application
General Applications					
HP-INNOWax	HP-20M, SUPELCOWAX 10, CP-WAX 52 CB, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, DB-WAXetr, ZB-WAX	Polyethylene glycol	Polar	From 40 to 260/270	Alcohols, free organic acids, solvents, essential oils, flavors and fragrances
DB-WAX	HP-20M, SUPELCOWAX 10, CP-WAX 52 CB, SUPEROX II, CB-WAX, Stabilwax, BP-20, 007-CW, Carbowax, HP-INNOWax, Rtx-WAX, ZB-WAX, VF-WAXms	Polyethylene glycol	Polar	From 20 to 250/260	Solvents, glycols, alcohols
CAM	Stabilwax-DB, Carbowax Amine	Polyethylene glycol-base modified	Polar	From 60 to 220/240	Amines, basic compounds
HP-FFAP	Stabilwax-DA, DB-FFAP, Nukol, 007-FFAP, BP21, CP-WAX 58 (FFAP) CB, AT-1000, OV-351, CP-FFAP-CB	Polyethylene glycol-acid modified	Polar	From 40 to 250	Organic acids, alcohols, aldehydes, ketones, acrylates
DB-FFAP	Stabilwax-DA, HP-FFAP, Nukol, 007-FFAP, BP21, CP-Wax 58 (FFAP) CB, AT-1000, OV-351, CP-FFAP-CB				
DB-23	SP-2330, Rtx-2330, 007-23, AT-Silar, BPX-70, SP-2340, VF-23ms	50% Cyanopropyl 50% dimethyl polysiloxane	Polar	From 40 to 250/260	FAMEs (requiring cis/trans resolution)
CycloSil-β	LIPODEX C, Rt-β DEXm, β-DEX 110, β-DEX 120	30%-heptakis (2,3-di-O-methyl-6-O-t-butyl dimethylsilyl)-B-cyclodextrin in DB-1701	Mid-polar	From 35 to 260/280	Chiral compounds (general purpose)
HP-Chiral β	LIPODEX C, Rt-βDEXm, β-DEX 110, β-DEX 120	beta-Cyclodextrin in phenyl- based stationary phase	Mid-polar	From 30 to 240/250	Chiral compounds (using a Nitrogen selective detector, NPD)
PLOT Phases					
HP-PLOT Molesieve	None	5Å molecular sieve zeolite		From -60 to 300	Permanent and noble gases. Argon and oxygen separation at 35°C
HP-PLOT Al_2O_3 KCl	CP-Al_2O_3/KCl PLOT, Rt-Alumina PLOT, Alumina PLOT, Al_2O_3/KCl	Aluminum Oxide KCl deactivated	Least polar	From -60 to 200	C_1-C_6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes

GC Columns Stationary Phase Applications Guide

Agilent Phase	Similar Phases	Composition	Polarity	Approximate Temp Range (°C)	Application
PLOT Phases					
HP-PLOT Al_2O_3 S	CP-Al_2O_3 PLOT Na_2SO_4	Aluminum Oxide "Sodium Sulfate" deactivated	Mid-polar	From -60 to 200	C_1-C_6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-Alumina	Al_2O_3/KCl, Al_2O_3/Na_2SO_4, Rt-Alumina PLOT, Alumina PLOT	Aluminum Oxide with proprietary deactivation	Most polar	From -60 to 200	C_1-C_6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
HP-PLOT Q	CP PoraPLOT Q, CP PoraPLOT Q-HT, Rt-QPLOT, SupelQ PLOT, GS-Q	Polystyrene-divinylbenzene		From -60 to 270/290	Hydrocarbons including isomers, CO_2, methane, air/CO, water, polar solvents, sulfur compounds
HP-PLOT U	PoraPlot U, RTU PLOT	Divinylbenzene/ ethylene glycol dimethacrylate		From -60 to 190	C_1-C_7 hydrocarbons, CO_2, methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, aldehydes
GS-GasPro	CP-Silica PLOT	Proprietary, bonded silica-based		From -80 to 260/300	C_1-C_{12} hydrocarbons, CO_2, trace-level sulfurs, hydride gases, inorganic gases, halocarbons, SF6, oxygen/nitrogen separation at -80°C
GS-OxyPLOT	CP-LowOX	Proprietary phase, high selectivity		To 350	Oxygenates
GS-CarbonPLOT	Carbopack, CLOT, Carboxen-1006 PLOT, CP-CarboPLOT P7	Bonded monolithic carbon layer		From 0 to 360	C_1-C_5 hydrocarbons, CO_2, air/CO, trace acetylene in ethylene, methane

GC Columns Stationary Phase Applications Guide

Agilent Phase	Similar Phases	Composition	Polarity	Approximate Temp Range (°C)	Application
Specialty Phases - Environmental					
DB-624	AT-624, Rtx-624, PE-624, 007-624, 007-502, CP-624, ZB-624, VF-624ms	6% Cyanopropyl-phenyl, 94% dimethyl polysiloxane	Mid-polar	From -20 to 260	Volatile Priority Pollutants, EPA Method 502.2
DB-VRX	VOCOL, NON-PAKD, Rtx-Volatiles, PE-Volatiles, 007-624, HP-624, CP-624, Rtx-VRX, Rtx-VGC	Proprietary phase	Non-polar	From -10 to 260	Volatile Organic Compounds using MSD, ELCD/PID
DB-35ms	Rtx-35, Rtx-35ms, VF-35ms, SPB-35, AT-35, Sup-Herb, MDN-35, BPX-35	35% Phenyl, 65% dimethyl arylene siloxane	Mid-polar	From 50 to 340/360	CLP Pesticides, Chlorinated Herbicides, PCBs, 508.1 Pesticides
HP-5ms	DB-5ms, Rtx-5MS, Rtx-5 Amine, PTE-5, CP-Sil 8CB Low Bleed/MS, BPX-5, ZB-5ms, Equity-5	5% Phenyl, 95% dimethylpolysiloxane	Non-polar	From -60 to 325/350	Semivolatiles by EPA Method 8270
DB-5	HP-5, Ultra-2, SPB-5, CP-Sil 8CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5				
HP-5	DB-5, Ultra-2, SPB-5, CP-Sil 8 CB, Rtx-5, BP-5, OV-5, 007-2(MPS-5), SE-52, SE-54, XTI-5, PTE-5, HP-5MS, ZB-5, AT-5, MDN-5, ZB-5				
DB-XLB (confirmation column)	Rtx-XLB, MDN-12	Proprietary phase	Non-polar	From 30 to 340/360	PCB Congener Analysis (209 Congeners) CLP Pesticides, Chlorinated Herbicides, PCBs, 508.1 Pesticides
DB-TPH	None	Proprietary phase	Non-polar	From -10 to 290	Leaking Underground Fuel Tank (LUFT) testing
DB-MTBE	None	Proprietary phase	Non-polar	From 35 to 260/280	MTBE in Soil and Water
Specialty Phases - Other					
DB-624	AT-624, Rtx-624, PE-624, 007-624, 007-502, CP-624, ZB-624, VF-624ms	6% Cyanopropyl-phenyl, 94% dimethyl polysiloxane	Mid-polar	From -20 to 260	Residual Solvents
HP-Fast GC Residual Solvents	DB-624, PE-624, 007-624, 007-502, CP-624, ZB-624	6% Cyanopropyl-phenyl, 94% dimethyl polysiloxane	Mid-polar	From -20 to 260	Residual Solvents
DB-ALC1	Rtx-BAC1, Rtx-BAC2	Proprietary phase	Mid-polar	From 20 to 260/280	Blood Alcohol Testing
DB-ALC2	Rtx-BAC1, Rtx-BAC2	Proprietary phase	Mid-polar	From 20 to 260/280	Blood Alcohol Testing
HP-Blood Alcohol	None	Proprietary phase	Mid-polar	From -60 to 270/290	Blood Alcohol Testing

Environmental/EPA Methods

Analyte Type	EPA Method Reference	Common Sample Preparation	Detector Types	Sample Matrix	Recommended Agilent Column
Volatiles					
Trihalomethanes	501	Purge and trap, direct injection, headspace	ELCD, ECD	Drinking water	DB-VRX, 30 m x 0.45 mm, 2.55 µm, 124-1534
					DB-624, 30 m x 0.45 mm, 2.55 µm, 124-1334
Volatile Organic Compounds (VOCs)	502.2, 8021, CLP-Volatiles	Purge and trap, direct injection, headspace	PID, ELCD	Drinking water, waste water, solid wastes	DB-VRX, 75 m x 0.45 mm, 2.55 µm, 124-1574
					DB-624, 75 m x 0.45 mm, 2.55 µm, 124-1374
Purgeable Halogenated Organics	601, 8010	Purge and trap, headspace for screening	PID, ELCD	Waste water, solid wastes	DB-VRX, 75 m x 0.45 mm, 2.55 µm, 124-1574
					DB-624, 75 m x 0.45 mm, 2.55 µm, 124-1374
Purgeable Aromatic Organics	503.1, 602, 8020	Purge and trap, headspace for screening	PID	Drinking water, waste water, solid wastes	DB-VRX, 30 m x 0.45 mm, 2.55 µm, 124-1534
					DB-624, 30 m x 0.45 mm, 2.55 µm, 124-1334
Volatile Organic Compounds (VOCs) Using MSD	524.2, 624, 8240, 8260, CLP-VOCs	Purge and trap, direct injection, headspace	MSD	Drinking water, waste water, solid wastes	DB-VRX, 60 m x 0.25 mm, 1.40 µm, 122-1564
					DB-624, 60 m x 0.25 mm, 1.40 µm, 122-1364
					HP-VOC, 60 m x 0.20 mm, 1.10 µm, 19091R-306
Volatile Organic Compounds (VOCs) Using 5973 MSD	524.2, 624, 8240, 8260, CLP-VOCs	Purge and trap, direct injection, headspace	MSD (5973)	Drinking water, waste water, solid wastes	DB-VRX, 20 m x 0.18 mm, 1.00 µm, 121-1524
					DB-624, 20 m x 0.18 mm, 1.00 µm, 121-1324
EDB and DBCP	504.1, 8011	Microextraction with Hexane	ECD	Drinking water, solid wastes	DB-VRX, 30 m x 0.45 mm, 2.55 µm, 124-1534
					DB-624, 30 m x 0.45 mm, 2.55 µm, 124-1334
Acrylonitrile and Acrolein	603, 8015, 8031	Purge and trap, liquid extraction, sonication	FID, NPD	Waste water, solid wastes	DB-VRX, 30 m x 0.45 mm, 2.55 µm, 124-1534
					DB-624, 30 m x 0.45 mm, 2.55 µm, 124-1334
Semivolatiles					
Semivolatile Organic Compounds	525, 625, 8270	Liquid extraction, sonication, soxhlet extraction, SPE	MSD	Drinking water, waste water, solid wastes	HP-5ms, 30 m x 0.25 mm, 0.50 µm, 19091S-133
Phenols	528, 604, 8040, 8041	Liquid extraction, sonication, soxhlet extraction,derivatization	ECD, FID	Waste water, solid wastes	DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
					DB-XLB, 30 m x 0.25 mm, 0.25 µm, 122-1232
					DB-5ms, 30 m x 0.53 mm, 1.50 µm, 125-5532

Environmental/EPA Methods

Analyte Type	EPA Method Reference	Common Sample Preparation	Detector Types	Sample Matrix	Recommended Agilent Column
Semivolatiles					
Phthalate Esters	506, 606, 8060, 8061	Liquid extraction, sonication, soxhlet extraction, SPE	ECD, FID	Drinking water, waste water, solid wastes	DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
					DB-5ms, 30 m x 0.53 mm, 1.50 µm, 125-5532
					DB-608, 30 m x 0.53 mm, 0.50 µm, 125-6837
Benzidines	605	Liquid extraction	ECD	Waste water	DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
					DB-5ms, 30 m x 0.53 mm, 1.50 µm, 125-5532
					DB-608, 30 m x 0.53 mm, 0.50 µm, 125-6837
Nitrosamines	607, 8070	Liquid extraction, sonication, soxhlet extraction, SPE	NPD	Waste water, solid wastes	DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
					DB-5ms, 30 m x 0.53 mm, 1.50 µm, 125-5532
Nitroaromatics and Isophorone	609, 8090	Liquid extraction, sonication, soxhlet extraction, SPE	ECD, FID	Waste water, solid wastes	HP-5ms, 30 m x 0.25 mm, 0.50 µm, 19091S-133
					DB-5ms, 30 m x 0.53 mm, 1.50 µm, 125-5532
					DB-608, 30 m x 0.53 mm, 0.50 µm, 125-6837
Polynuclear Aromatic Hydrocarbons (PAHs)	610, 8100	Liquid extraction, sonication, soxhlet extraction, SPE	FID	Waste water, solid wastes	DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
					DB-5ms, 30 m x 0.32 mm, 0.25 µm, 123-5532
					DB-1ms, 30 m x 0.25 mm, 0.25 µm, 122-0132
Chlorinated Hydrocarbons	612, 8120, 8121	Liquid extraction, sonication, soxhlet extraction, SPE	ECD	Waste water, solid wastes	DB-5ms, 30 m x 0.32 mm, 0.50 µm, 123-5536
					HP-5ms, 30 m x 0.32 mm, 0.50 µm, 19091S-113
					DB-1, 30 m x 0.32 mm, 0.50 µm, 123-103E
Chlorinated Disinfection Byproducts	551, 551.1A	Liquid extraction, derivatization	ECD	Drinking water	DB-5ms, 30 m x 0.25 mm, 1.00 µm, 122-5533
					DB-1, 30 m x 0.25 mm, 1.00 µm, 122-1033
Halogenated Acetic Acids	552, 552.1, 552.2	Liquid extraction, derivatization	ECD	Drinking water	DB-35ms, 30 m x 0.32 mm, 0.25 µm, 123-3832
					DB-XLB, 30 m x 0.32 mm, 0.50 µm, 123-1236
Pesticides, Herbicides, and PCBs					
Organochlorine Pesticides and PCBs	508.1, 608, 8081A, 8082, CLP-Pesticides	Liquid extraction, derivatization	ECD	Drinking water	DB-35ms, 30 m x 0.32 mm, 0.25 µm, 123-3832
					DB-XLB, 30 m x 0.32 mm, 0.50 µm, 123-1236
Phenoxy Acid Herbicides	515, 615, 8150, 8151	Liquid extraction, derivatization	ECD	Drinking water	DB-35ms, 30 m x 0.32 mm, 0.25 µm, 123-3832

Environmental/EPA Methods

Analyte Type	EPA Method Reference	Common Sample Preparation	Detector Types	Sample Matrix	Recommended Agilent Column
Pesticides, Herbicides, and PCBs					
N- and P-Containing Pesticides and Herbicides	507, 614, 619, 622, 8140, 8141A	Liquid extraction, derivatization	NPD, ELCD, FPD	Drinking water	DB-35ms, 30 m x 0.25 mm, 0.25 µm, 122-3832
					DB-5ms, 30 m x 0.25 mm, 0.25 µm, 122-5532
PBC Congeners Using MSD		Liquid extraction, derivatization	MSD		DB-XLB, 30 m x 0.18 mm, 0.18 µm, 121-1232
					DB-XLB, 60 m x 0.25 mm, 0.25 µm, 122-1262

United States Pharmacopoeia (USP) GC Phases

USP	Phase Composition	Agilent Phase Recommendation
G1	Dimethylpolysiloxane oil	HP-1*, DB-1*, HP-1ms*, DB-1ms*
G2	Dimethylpolysiloxane gum	HP-1*, DB-1*, HP-1ms*, DB-1ms*
G3	50% Phenyl – 50% methylpolysiloxane	DB-17*, HP-50+*
G5	3-cyanopropyl polysiloxane	DB-23
G6	Trifluoropropylmethylpolysilicone	DB-200, DB-210
G7	50% 3-cyanopropyl – 50% phenylmethylsilicone	DB-225, DB-225ms
G8	80% Bis(3-cyanopropyl)-20% 3-cyanopropylphenylpolysiloxane or 90%3-cyanopropyl-10%phenylmethylsiloxane	HP-88
G14	Polyethylene glycol (average molecular weight of 950-1,050)	DB-WAX
G15	Polyethylene glycol (average molecular weight of 3,000-3,700)	DB-WAX
G16	Polyethylene glycol (average molecular weight of 15,000)	DB-WAX*
G17	75% Phenyl – 25% methylpolysiloxane	DB-17, HP-50+
G19	25% Phenyl – 25% cyanopropylmethylsilicone	DB-225*, DB-225ms
G20	Polyethylene glycol (average molecular weight of 380-420)	DB-WAX
G25	Polyethylene glycol TPA (Carbowax 20M terephthalic acid)	DB-FFAP*, HP-FFAP*
G27	5% Phenyl – 95% methylpolysiloxane	DB-5*, HP-5*, HP-5ms*, DB-5ms
G28	25% Phenyl – 75% methylpolysiloxane	DB-35, HP-35, DB-35ms
G32	20% Phenylmethyl – 80% dimethylpolysiloxane	DB-35, HP-35, DB-35ms
G35	Polyethylene glycol & diepoxide esterified with nitroterepthalic acid	DB-FFAP*, HP-FFAP*
G36	1% Vinyl – 5% phenylmethylpolysiloxane	DB-5, HP-5, HP-5ms, DB-5ms
G38	Phase G1 plus a tailing inhibitor	DB-1, HP-1, HP-1ms, DB-1ms
G39	Polyethylene glycol (average molecular weight of 1,500)	DB-WAX
G41	Phenylmethyldimethylsilicone (10% phenyl substituted)	DB-5, HP-5, HP-5ms, DB-5ms
G42	35% Phenyl – 65% dimethylvinylsiloxane	DB-35*, HP-35*, DB-35ms
G43	6% Cyanopropylphenyl – 94% dimethylpolysiloxane	DB-624*, DB-1301
G45	Divinylbenzene-ethylene glycol-dimethacrylate	HP-PLOT U*
G46	14% Cyanopropylphenyl – 86% methylpolysiloxane	DB-1701*

*Indicates an exact equivalent

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 1945	Standard Test Method for the Analysis of Natural Gas by GC	HP-PLOT MoleSieve 15 m x 0.53 mm, 50.00 µm	19095P-MS9
		HP-PLOT Q 15 m x 0.53 mm, 40.00 µm	19095P-QO3
D 1946	Standard Test Method for the Analysis of Reformed Gas by GC	HP-PLOT MoleSieve 15 m x 0.53 mm, 50.00 µm	19095P-MS9
		HP-PLOT Q 15 m x 0.53 mm, 40.00 µm	19095P-QO3
D 1983	Standard Test Method for Fatty Acid Composition by Gas-Liquid Chromatography of Methyl Esters	DB-WAX 30 m x 0.25 mm, 0.25 µm	122-7032
D 2163	Standard Test Method for the Analysis of Liquified Petroleum (LP) Gases and Propene Concentrates by GC	HP-PLOT Al_2O_3 KCl 30 m x 0.53 mm, 15.00 µm	19095P-K23
		HP-PLOT Al_2O_3 S 30 m x 0.53 mm, 15.00 µm	19095P-S23
D 2268	Standard Test Method for Analysis of High-Purity n-Heptane and Isooctane by Capillary GC	DB-1 60 m x 0.25 mm, 0.50 µm	122-106E
D 2306	Standard Test Method for C8 Aromatic Hydrocarbons by GC	HP-INNOWax 60 m x 0.25 mm, 0.25 µm	19091N-136
D 2426	Standard Test Method for Butadiene Dimer and Styrene in Butadiene Concentrates by GC	DB-1 30 m x 0.53 mm, 5.00 µm	125-1035
D 2427	Standard Test Method for Determination of C2 through C5 Hydrocarbons in Gasoline by GC	DB-1 30 m x 0.53 mm, 5.00 µm	125-1035
		GS-Alumina 30 m x 0.53 mm	115-3532
D 2504	Standard Test Method for Noncondensable Gases in C2 and Lighter Hydrocarbon Products by GC	HP-PLOT MoleSieve 30 m x 0.53 mm, 50.00 µm	19095P-MS0
D 2505	Standard Test Method for Ethylene, Other Hydrocarbons, and Carbon Dioxide in High-Purity Ethylene by GC	GS-GasPro 60 m x 0.32 mm	113-4362
D 2593	Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by GC	GS-Alumina 30 m x 0.53 mm	115-3532
D 2712	Standard Test Method for for Hydrocarbon Traces in Propylene Concentrates by GC	GS-Alumina 50 m x 0.53 mm	115-3552
D 2804	Standard Test Method for Purity of Methyl Ethyl Ketone by GC	DB-WAX 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-210 15 m x 0.53 mm, 1.00 µm	125-0212
D 2887	Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC	DB-2887 10 m x 0.53 mm, 3.00 µm	125-2814
Extended D 2887	Standard Test Method for Boiling Range Distribution of Petroleum Fractions by GC, to C60	HP-1 10 m x 0.53 mm, 0.88 µm	19095Z-021
		HP-1 5 m x 0.53 mm, 0.88 µm	19095Z-020

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 2908	Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection GC	Contact Agilent for column recommendation	
D 3054	Standard Test Method for Analysis of Cyclohexane by GC	DB-1 60 m x 0.32 mm, 0.50 µm	123-106E
D 3257	Standard Test Method for Aromatics in Mineral Spirits by GC	DB-624 30 m x 0.53 mm, 3.00 µm	125-1334
D 3329	Standard Test Method for Purity of Methyl Isobutyl Ketone by GC	DB-WAX 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-624 30 m x 0.45 mm, 2.55 µm	124-1334
D 3432	Standard Test Method for Unreacted Toluene Diisocyanates in Urethane Prepolymers and Coating Solutions by GC	HP-1MS 30 m x 0.32 mm, 1.00 µm	19091S-713
D 3447	Standard Test Method for Purity of Halogentated Organic Solvents	DB-624 30 m x 0.53 mm, 3.00 µm	125-1334
D 3545	Standard Test Method for Alcohol Content and Purity of Acetate Esters by GC	DB-624 30 m x 0.53 mm, 3.00 µm	125-1334
D 3687	Standard Test Method for Analysis of Organic Vapors Collected by the Activated Charcoal Tube Adsorption Method	DB-WAX 30 m x 0.53 mm, 1.00 µm	125-7032
		DB-WAX 30 m x 0.53 mm, 1.00 µm	124-7032
D 3695	Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection GC	DB-WAX 30 m x 0.53 mm, 1.00 µm	125-7032
D 3710	Standard Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by GC	DB-2887 10 m x 0.53 mm, 3.00 µm	125-2814
D 3760	Standard Test Method for Analysis of Isopropylbenzene (Cumene) by GC	DB-WAX 60 m x 0.32 mm, 0.25 µm	123-7062
		HP-1 50 m x 0.32 mm, 0.52 µm	19091Z-115
D 3797	Standard Test Method for Analysis of o-Xylene by GC	HP-INNOWax 60 m x 0.32 mm, 0.50 µm	19091N-216
D 3798	Standard Test Method for Analysis of p-Xylene by GC	HP-INNOWax 60 m x 0.32 mm, 0.50 µm	19091N-216
D 3871	Standard Test Method for Purgeable Organic Compounds in Water Using Headspace Sampling	DB-VRX 75 m x 0.45 mm, 2.55 µm	124-1574
D 3893	Standard Test Method for Purity of Methyl Amyl Ketone and Methyl Isoamyl Ketone by GC	DB-VRX 30 m x 0.45 mm, 2.55 µm	124-1534
D 3973	Standard Test Method for Low-Molecular Weight Halogenated Hydrocarbons in Water	DB-VRX 30 m x 0.45 mm, 2.55 µm	124-1534
D 4415	Standard Test Method for Determination of Dimer in Acrylic Acid	DB-FFAP 30 m x 0.32 mm, 0.25 µm	123-3232
D 4424	Standard Test Method for Butylene Analysis by GC	HP-PLOT Al2O3 S 50 m x 0.53 mm, 15.00 µm	19095P-S25

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 4443	Standard Test Method for Residual Vinyl Chloride Monomer Content in PPB Range in Vinyl Chloride Homo- and Co-Polymers by Headspace GC	DB-VRX 30 m x 0.45 mm, 2.55 µm	124-1534
D 4735	Standard Test Method for Determination of Trace Thiophene in Refined Benzene by GC	DB-FFAP 30 m x 0.45 mm, 0.85 µm	124-3232
D 4773	Standard Test Method for Propylene Glycol Monomethyl Ether, Dipropylene Glycol Monomethyl Ether, and Propylene Glycol Monomethyl Ether Acetate	Custom	100-2000
D 4864	Standard Test Method for Determination of Traces of Methanol in Propylene Concentrates by GC	DB-WAX 30 m x 0.45 mm, 0.85 µm	124-7032
D 4947	Standard Test Method for Chlordane and Heptachlor Residues in Indoor Air	DB-5 30 m x 0.53 mm, 1.50 µm	125-5032
		DB-608 30 m x 0.53 mm, 0.83 µm	125-1730
D 4961	Standard Test Method for GC Analysis of Major Organic Impurities in Phenol Produced by the Cumene Process	DB-FFAP 30 m x 0.45 mm, 0.85 µm	124-3232
		HP-PLOT Q 15 m x 0.53 mm, 40.00 µm	19095P-QO3
D 4983	Standard Test Method for Cyclohexylamine Morpholine and Diethylaminoethanol in Water and Condensed Steam by Direct Aqueous Injection GC	HP-5MS 30 m x 0.32 mm, 1.00 µm	19091S-213
		CAM 30 m x 0.53 mm, 1.00 µm	115-2132
D 5008	Standard Test Method for Ethyl Methyl Pentonal Content and Purity Value of 2-Ethylhexanol by GC	HP-1 15 m x 0.53 mm, 5.00 µm	19095Z-621
		HP-INNOWax 30 m x 0.32 mm, 0.25 µm	19091N-113
D 5060	Standard Test Method for Determining Impurities in High-Purity Ethylbenzene by GC	HP-INNOWax 60 m x 0.32 mm, 0.50 µm	19091N-216
D 5075	Standard Test Method for Nicotine in Indoor Air	DB-5 30 m x 0.53 mm, 1.50 µm	125-5032
		DB-5 30 m x 0.32 mm, 1.00 µm	123-5033
D 5134	Standard Test Method for Detailed Analysis of Petroleum Naphthas Through n-Nonane by Capillary GC	HP-PONA 50 m x 0.20 mm, 0.50 µm	19091S-001
D 5135	Standard Test Method for Analysis of Styrene by Capillary GC	HP-INNOWax 60 m x 0.32 mm, 0.50 µm	19091N-216
D 5175	Standard Test Method for Organohalide Pesticides and Polychlorinated Biphenyls in Water by Microextraction and GC	DB-1 30 m x 0.32 mm, 1.00 µm	123-1033
		DB-608 30 m x 0.32 mm, 0.50 µm	123-1730
		DB-XLB 30 m x 0.25 mm, 0.25 µm	122-1232

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 5303	Standard Test Method for Trace Carbonyl Sulfide in Propylene by GC	GS-GasPro 30 m x 0.32 mm	113-4332
		HP-PLOT Q 30 m x 0.53 mm, 40.00 µm	19095P-QO4
D 5307	Standard Test Method for Determination of Boiling Range Distribution of Crude Petroleum by GC	HP-1 7.5 m x 0.53 mm, 5.00 µm	19095Z-627
D 5310	Standard Test Method for Tar Acid Composition by Capillary GC	HP-5MS 30 m x 0.25 mm, 0.25 µm	19091S-433
		DB-225ms 30 m x 0.25 mm, 0.25 µm	122-2932
D 5316	Standard Test Method for 1, 2-Dibromoethane and 1, 2-Dibromo-3-Chloropropane in Water by Microextraction and GC	HP-1MS 30 m x 0.32 mm, 1.00 µm	19091S-713
		DB-624 30 m x 0.45 mm, 2.55 µm	124-1334
D 5317	Standard Test Method for Determination of Chlorinated Organic Acid Compounds in Water by GC with Electron Capture Detector	HP-5MS 30 m x 0.25 mm, 0.25 µm	19091S-433
		DB-1701P 30 m x 0.25 mm, 0.25 µm	122-7732
		DB-XLB 30 m x 0.25 mm, 0.25 µm	122-1232
		DB-35ms 30 m x 0.25 mm, 0.25 µm	122-3832
D 5320	Standard Test Method for Determination of 1, 1-Trichloroethane and Methylene Chloride in Stabilized Trichloroethylene and Tetrachloroethylene	DB-1 30 m x 0.53 mm, 3.00 µm	125-1034
		DB-VRX 30 m x 0.32 mm, 1.80 µm	123-1534
D 5399	Standard Test Method for Boiling Point Distribution of Hydrocarbon Solvents by GC	DB-2887 30 m x 0.32 mm, 1.80 µm	125-2814
D 5441	Standard Test Method for Analysis of Methyl Tert-Butyl Ether (MTBD) by GC	HP-PONA 50 m x 0.20 mm, 0.50 µm	19091S-001
		DB-Petro 100 m x 0.25 mm, 0.50 µm	122-10A6
D 5442	Standard Test Method for Analysis of Petroleum Waxes by GC	DB-1 25 m x 0.32 mm, 0.25 µm	123-1022
		DB-5 15 m x 0.25 mm, 0.25 µm	122-5012
D 5475	Standard Test Method for Nitrogen- and Phosphorus-Containing Pesticides in Water by GC with a Nitrogen Phosphorus Detector	HP-5MS 30 m x 0.25 mm, 0.25 µm	19091S-433
		DB-1701P 30 m x 0.25 mm, 0.25 µm	122-7732
		DB-XLB 30 m x 0.25 mm, 0.25 µm	122-1232
		DB-35ms 30 m x 0.25 mm, 0.25 µm	122-3832

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 5480	Standard Test Method for Engine Oil Volatility by GC	DB-PS1 15 m x 0.53 mm, 0.15 µm	145-1011
D 5501	Standard Test Method for Determination of Ethanol Content of Denatured Fuel Ethanol by GC	HP-1 100 m x 0.25 mm, 0.50 µm	19091Z-530
D 5507	Standard Test Method for Determination of Trace Organic Impurities in Monomer Grade Vinyl Chloride by Capillary Column/Multi-dimensional GC	HP-PLOT Q 15 m x 0.53 mm, 40.00 µm	19095P-QO3
		HP-PLOT U 30 m x 0.53 mm, 20 µm	19095P-UO4
D 5508	Standard Test Method for Determinationof Residual Acrylonitrile Monomer in Styrene-Acyrlonitrile Co-polymer Resins and Nitrile-Butadiene Rubber by Headspace Capillary GC	HP-PLOT Q 30 m x 0.53 mm, 40.00 µm	19095P-QO4
D 5580	Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, C9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by GC	DB-1 30 m x 0.53 mm, 5.00 µm	125-1035
D 5599	Standard Test Method for Determination of Oxygenates in Gasoline by GC and Oxygen Selective Flame Ionization Detection	DB-5 30 m x 0.25 mm, 0.25 µm	122-5032
D 5623	Standard Test Method for Sulfur Compounds in Light Petroleum Liquids by GC and Sulfur Selective Detection	HP-1 30 m x 0.32 mm, 4.00 µm	19091Z-613
D 5713	Standard Test Method for Analysis of High Purity Benzene for Cyclohexane Feedstock by Capillary GC	DB-Petro 50 m x 0.20 mm, 0.50 µm	128-1056
D 5739	Standard Practice for Oil Spill Source Identification by GC and Positive Ion Electron Impact Low Resolution Mass Spectrometry	DB-5 30 m x 0.25 mm, 0.25 µm	122-5032
		DB-TPH 30 m x 0.32 mm, 0.25 µm	123-1632
D 5769	Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasoline by GC/MS	HP-1 60 m x 0.25 mm, 1.00 µm	19091Z-236
D 5790	Standard Test Method for Measurement of Purgeable Organic Compounds in Water by Capillary Column GC/MS	DB-VRX 60 m x 0.25 mm, 1.40 µm	122-1564
		DB-VRX 20 m x 0.18 mm, 1.00 µm	121-1524
		DB-624 60 m x 0.25 mm, 1.40 µm	122-1364
		DB-624 20 m x 0.18 mm, 1.00 µm	121-1324
D 5812	Standard Test Method for Determination of Organochlotine Pesticides in Water by Capillary Column GC	HP-5MS 30 m x 0.25 mm, 0.25 µm	19091S-433
		DB-1701P 30 m x 0.25 mm, 0.25 µm	122-7732
		DB-XLB 30 m x 0.25 mm, 0.25 µm	122-1232
		DB-35ms 30 m x 0.25 mm, 0.25 µm	122-3832

ASTM Methods

Method Designation	Method Title	Column Recommendation	Part No.
D 5917	Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC and External Calibration	HP-INNOWax 60 m x 0.32 mm, 0.25 µm	19091N-116
D 5974	Standard Test Method for Fatty and Rosin Acids in Tall Oil Fraction Products by Capillary GC	DB-23 60 m x 0.25 mm, 0.25 µm	122-2362
D 5986	Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C8-C12 Aromatics and Total Aromatics in Finished Gasoline by GC/FTIR	HP-1 60 m x 0.53 mm, 5.00 µm	19095Z-626
D 6144	Standard Test Method for Trace Impurities in Alpha-Methylstyrene by Capillary GC	HP-1 60 m x 0.25 mm, 1.00 µm	19091Z-236
D 6159	Standard Test Method for Determination of Hydrocarbon Impurities in Ethylene by GC	HP-PLOT Al2O3 "KCl" 50 m x 0.53 mm, 15.00 µm	19095P-K25
		GS-Alumina 50 m x 0.53 mm	115-3552
		DB-1 50 m x 0.53 mm	125-1035
D 6160	Standard Test Method for Determination of PCBs in Waste Materials by GC	HP-5MS 30 m x 0.32 mm, 0.25 µm	19091S-413
		DB-XLB 30 m x 0.25 mm, 0.25 µm	122-1232
D 6352	Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 to 700 by GC	DB-HT SimDis 5 m x 0.53 mm, 0.15 µm	145-1001
D 6417	Standard Test Method for Estimation of Engine Oil Volatility by Capillary GC	DB-HT SimDis 5 m x 0.53 mm, 0.15 µm	145-1001
D 2360	Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by GC	HP-INNOWax 60 m x 0.32 mm, 0.25 µm	19091N-116
E 1616	Standard Test Method for Analysis of Acetic Anhydride Using GC	HP-1 50 m x 0.32 mm, 0.52 µm	19091Z-115
E 1863	Standard Test Method for Analysis of Acrylonitrile by GC	DB-WAXetr 60 m x 0.32 mm, 1.00 µm	123-7364
E 202	Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols	DB-624 30 m x 0.53 mm, 3.00 µm	125-1334
E 475	Standard Test Method for Assay of Di-tert-Butyl Peroxide Using GC	HP-5 30 m x 0.53 mm, 5.00 µm	19095J-623

Tips & Tools

Gain extra confidence to meet high standards with Agilent's solution for the revised USP <467>. Visit **www.agilent.com/chem/usp467an**.

GC Column Troubleshooting and Maintenance



These at-a-glance troubleshooting tables will help you pinpoint and fix the most common GC column problems.

Please consult Agilent's J&W GC Column Installation Guide (publication number 830-0120) and the Agilent J&W GC Column Selection Guide (publication number 5989-6159EN) for more in-depth information, including:

- Comprehensive column selection principles
- Maintenance procedures, including column installation, conditioning, testing, and storage
- Strategies for increasing your productivity
- The most current method development procedures

To request your copy of the Agilent J&W GC Column Selection Guide, visit **www.agilent.com/chem/guides**.

The Agilent J&W GC Column Installation Guide comes standard with every Agilent J&W GC column. You can also request a copy by contacting your local Agilent Representative or Agilent Authorized Distributor.

Excessive Baseline Noise

Possible Cause	Solution	Comments
Injector contamination	Clean the injector; replace liner, gold seal	Try a condensation test; gas lines may also need cleaning
Column contamination	Bake-out the column	Limit the bake-out to 1-2 hours
	Solvent rinse the column	Only for bonded and cross-linked phases
		Check for inlet contamination
Detector contamination	Clean the detector	Usually the noise increases over time and not suddenly
Contaminated or low quality gases	Use better grade gases; also check for expired gas traps or leaks	Usually occurs after changing a gas cylinder
Column inserted too far into the detector	Reinstall the column	Consult GC manual for proper insertion distance
Incorrect detector gas flow rates	Adjust the flow rates to the recommended values	Consult GC manual for proper flow rates
Leak when using an MS, ECD, or TCD	Find and eliminate the leak	Usually at the column fittings or injector
Old detector filament, lamp or electron multiplier	Replace appropriate part	
Septum degradation	Replace septum	For high temperature applications use an appropriate septum

Baseline Instability or Disturbances

Possible Cause	Solution	Comments
Injector contamination	Clean the injector	Try a condensation test; gas lines may also need cleaning
Unequilibrated detector	Allow the detector to stabilize	Some detectors may require up to 24 hours to fully stabilize
Incompletely conditioned column	Fully condition the column	More critical for trace level analyses
Change in carrier gas flow rate during the temperature program	Normal in many cases	MS, TCD and ECD respond to changes in carrier gas flow rate
Column contamination	Trim the column	Remove 0.5-1 meter from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases
		Check for inlet contamination
Column activity	Irreversible. Replace the column	Only affects active compounds
Solvent-phase polarity mismatch	Change sample solvent to a single solvent	More tailing for the early eluting peaks or those closest to the solvent front
	Use a retention gap	3-5 meter retention gap is sufficient
Solvent effect violation for splitless or on-column injections	Decrease the initial column temperature	Peak tailing decreases with retention
Too low of a split ratio	Increase the split ratio	Flow from split vent should be 20 ml/min or higher
Poor column installation	Reinstall the column	More tailing for the early eluting peaks
Some active compounds always tail	None	Most common for amines and carboxylic acids

Split Peaks

Possible Cause	Solution	Comments
Injection technique	Change technique	Usually related to erratic plunger depression or having sample in the syringe needle. Use an auto injector.
Mixed sample solvent	Change sample solvent to a single solvent	Worse for solvents with large differences in polarity or boiling points
Poor column installation	Reinstall the column	Usually a large error in the insertion distance
Sample degradation in the injector	Reduce the injector temperature	Peak broadening or tailing may occur if the temperature is too low
	Change to an on-column injection	Requires an on-column injector
Poor sample focusing	Use a retention gap	For splitless and on-column injection

Retention Time Shift

Possible Cause	Solution	Comments
Change in carrier gas velocity	Check the carrier gas velocity	All peaks will shift in the same direction by approximately the same amount
Change in column temperature	Check the column temperature	Not all peaks will shift by the same amount
Change in column dimension	Verify column identity	
Large change in compound concentration	Try a different sample concentration	May also affect adjacent peaks. Sample overloading is corrected with an increase split ratio or sample dilution.
Leak in the injector	Leak check the injector	A change in peak size usually occurs also
Blockage in a gas line	Clean or replace the plugged line	More common for the split line; also check flow controllers and solenoids
Septum leak	Replace septum	Check for needle barb
Sample solvent incompatibility	Change sample solvent to a single solvent Use a retention gap	For splitless injection

Change in Peak Size

Possible Cause	Solution	Comments
Change in detector response	Check gas flows, temperatures and settings	All peaks may not be equally affected
	Check background level or noise	May be caused by system contamination and not the detector
Change in the split ratio	Check split ratio	All peaks may not be equally affected
Change in the purge activation time	Check the purge activation line	For splitless injection
Change in injection volume	Check the injection technique	Injection volumes are not linear
Change in sample concentration	Check and verify sample concentration	Changes may also be caused by degradation, evaporation, or variances in sample temperature or pH
Leak in the syringe	Use a different syringe	Sample leaks passed the plunger or around the needle; leaks are not often readily visible
Column contamination	Trim the column	Remove 0.5-1 meter from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases
Column activity	Irreversible	Only affects active compounds
Coelution	Change column temperature or stationary phase	Decrease column temperature and check for the appearance of a peak shoulder or tail
Change in injector discrimination	Maintain the same injector parameters	Most severe for split injections
Sample flashback	Inject less, use a larger liner, reduce the inlet temperature	Less solvent and higher flow rates are most helpful
Decomposition from inlet contamination	Clean the injector; replace liner, gold seal	Only use deactivated liners and glass wool in the inlet

Loss of Resolution

Possible Cause	Solution	Comments
Decrease in separation		
Different column temperature	Check the column temperature	Differences in other peaks will be visible
Different column dimensions or phase	Verify column identity	Differences in other peaks will be visible
Coelution with another peak	Change column temperature	Decrease column temperature and check for the appearance of a peak shoulder or tail
Increase in peak width		
Change in carrier gas velocity	Check the carrier gas velocity	A change in the retention time also occurs
Column contamination	Trim the column	Remove 0.5-1 meter from the front of the column
	Solvent rinse the column	Only for bonded and cross-linked phases
Change in the injector	Check the injector settings	Typical areas: split ratio, liner, temperature, injection volume
Change in sample concentration	Try a different sample concentration	Peak widths increase at higher concentrations
Improper solvent effect, lack of focusing	Lower oven temperature, better solvent, sample phase polarity match, use a retention gap	For splitless injection



Solvent Retention Data

Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium, constant pressure at 30 cm/sec (40°C)
Oven: 40°C for 5 min
40-260°C at 10°min
260°C for 3 min
Injection: Split 1:10, 250°C
Detector: FID, 300°C

Column: **DB-1**
125-1034
30 m x 0.53 mm, 3.00 µm

Carrier: Helium, constant pressure at 30 cm/sec (40°C)
Oven: 40°C for 5 min
40-260°C at 10°/min
Injection: Split 1:10, 250°C
Detector: FID, 300°C

Column: **DB-WAX**
125-7032
30 m x 0.53 mm, 1.00 µm

Carrier: Helium, constant pressure at 34 cm/sec (40°C)
Oven: 40°C for 5 min
40-230°C at 10°/min
230°C for 7 min
Injection: Split 1:10, 250°C
Detector: FID, 300°C

These solvent tables have many uses, not least of which is to determine impurities in bulk solvents. All of the columns were selected for their capacity, selectivity and reproducibility.

Warning: Other manufacturers' look-a-like columns do not have the same selectivity as Agilent J&W GC Columns. We do not recommend using this data on other manufacturers' columns.

Analyte	DB-624	DB-1	DB-WAX
1,1,1,2-tetrachloroethane	14.38	13.43	13.80
1,1,1-trichloroethane	8.05	7.56	4.85
1,1,2,2-tetrachloroethane	16.38	14.67	17.73
1,1,2-trichloroethane	12.60	11.00	13.80
1,1,2-trichlorotrifluoroethane (Freon 113)	4.00	4.09	2.13
1,10-decanediol	27.43	25.84	34.11
1,1-dichloroethane	6.11	5.02	9.10
1,1-dichloroethylene (vinylidine chloride)	4.00	3.75	2.65
1,1-dichloropropane	8.72	8.55	9.71
1,1-dichloropropene	8.34	7.85	4.56
1,2,3-trichlorobenzene	22.23	21.28	21.25
1,2,3-trichloropropane	16.46	14.84	17.06
1,2,3-trimethylbenzene (hemimellitene)	18.18	17.61	15.29
1,2,4,5-tetrachlorobenzene	24.02	23.35	22.08
1,2,4-trichlorobenzene	21.41	20.63	20.03
1,2,4-trimethylbenzene (pseudocumene)	17.47	16.99	14.27
1,2-dibromo-3-chloropropane (DBCP)	20.02	18.50	20.57
1,2-dibromoethane (EDB)	13.43	12.10	13.80
1,2-dichlorobenzene	18.69	17.81	17.80
1,2-dichloroethane (ethylene dichloride)	9.62	7.17	7.20
1,2-dichloropropane	10.17	8.93	4.95
1,3,5-trichlorobenzene	20.35	19.85	18.19
1,3,5-trimethylbenzene (mesitylene)	16.82	16.41	13.55
1,3-butanediol	16.10	13.30	20.96
1,3-dichlorobenzene	17.96	17.20	16.60
1,3-dichloropropane	12.86	11.35	12.38
1,3-diisopropylbenzene	20.35	20.02	15.47
1,3-dioxolane	7.30	4.09	7.09
1,3-propanediol	13.13	9.95	18.97
1,4-butanediol	17.70	15.03	23.14
1,4-dichlorobenzene	18.79	17.31	17.06
1,4-diisopropylbenzene	20.73	20.42	16.20
1,4-dioxane	10.38	9.18	9.65
1,5-pentanediol	19.52	17.17	24.43
1,6-hexanediol	21.30	19.17	25.75
1,7-heptanediol	22.97	21.03	27.26
1,8-octanediol	24.54	22.73	29.06
1,9-nonanediol	26.02	24.33	31.29
1-butanol	9.73	7.90	11.48
1-chloro-4-nitrobenzene (diisopropyl ketone)	3.06	21.34	23.97
1-chlorobutane	8.25	7.56	3.99
1-chlorohexane	14.21	13.69	9.10
1-decanol	22.65	21.85	21.12
1-heptanol	17.22	16.13	16.91
1-hexanol	15.06	13.81	15.31
1-methyl-2-pyrrolidone	19.66	17.21	20.71
1-nonanol	20.97	20.11	19.80
1-octanol	19.17	18.21	18.40
1-pentanol	12.63	11.11	13.54
1-penten-3-ol	10.20	8.54	11.77
1-penten-3-one (ethyl vinyl ketone)	10.03	8.40	8.56
1-propanol	6.34	4.44	9.11
2,2-dichloropropane	7.16	6.34	3.99
2,3-butanediol	14.14	11.40	18.70
2,3-butanedione (diacetal)	6.99	5.09	7.44
2,3-pentanedione	10.34	8.66	9.49
2,4-dimethyl-3-pentanone	12.94	11.90	7.94
2,6-dimethyl-4-heptanone	17.06	16.26	12.03
2-butanone (MEK)	7.19	5.41	5.35
2-buten-1-ol (crotyl alcohol)	9.87	7.99	12.95
2-butoxyethanol (butyl cellosolve)	15.89	14.72	16.31
2-chlorotoluene	16.71	16.07	14.71
2-ethoxyethanol (cellosolve)	10.98	9.39	13.11
2-ethoxyethyl acetate	15.57	14.40	14.31
2-ethyl-1-hexanol	18.40	17.42	17.41
2-heptanol	15.63	14.61	14.71
2-heptanone	15.46	14.26	12.27
2-hexanol	13.31	12.06	12.95
2-hexanone	13.01	11.60	10.04
2-methoxyethanol (methyl cellosolve)	8.67	6.74	12.25
2-methyl-1-butanol (active amyl alcohol)	11.87	10.30	12.73
2-methyl-2-butanol (tert-amyl alcohol)	8.73	7.14	8.43
2-methyl-3-buten-2-ol	7.91	6.17	9.11
2-methyl-3-pentanone	11.85	10.59	7.94
2-methylbutyl acetate	14.82	14.81	12.05
2-nitrotoluene	21.60	20.02	22.62
2-octanone	17.63	16.46	14.20
2-pentanol	10.60	9.10	10.94
2-pentanone	10.11	8.46	7.44
2-penten-1-ol	12.63	11.11	14.65
2-phenoxyethanol	22.65	20.92	26.14
2-propen-1-ol (allyl alcohol)	6.21	4.09	10.78
2-propyn-1-ol (propargyl alcohol)	7.55	4.57	15.16
3-buten-1-ol	9.02	6.95	12.02
3-chloropropene (allyl chloride)	4.57	3.96	3.46
3-chlorotoluene	16.82	16.07	14.90
3-heptanol	15.53	14.54	14.29
3-heptanone	15.29	14.19	11.66
3-hexanol	13.16	11.97	12.49
3-hexanone	12.80	11.52	9.34
3-methyl-1-butanol (iso-amyl alcohol)	11.78	10.17	12.73
3-methyl-2-butanone	9.21	7.60	6.15
3-methyl-2-buten-1-ol	12.85	11.33	14.82
3-nitrotoluene	22.40	20.72	21.92
3-octanone	17.45	16.46	13.66
3-pentanol	10.60	9.10	10.66
3-pentanone	10.34	8.80	7.44
3-penten-2-one (methyl vinyl ketone)	6.93	5.09	6.61
4-chlorostyrene (diisobutyl ketone)	19.35	18.56	18.19
4-chlorotoluene	16.82	16.07	14.90
4-heptanone	14.95	13.88	11.06
4-hexen-3-one	14.24	12.76	12.55
4-hydroxy-4-methyl-2-pentanone	14.98	12.89	15.70
4-methyl-2-pentanol	12.28	10.93	11.89
4-methyl-2-pentanone	11.64	10.22	8.19
4-methyl-3-penten-3-one	13.20	11.90	11.26
4-methylstyrene	17.68	16.99	15.61
4-nitrotoluene	22.79	21.05	23.14
4-phenyl-2-butanone (benzyl acetone)	22.91	21.36	22.76
4-tert-butyltoluene	19.35	18.97	15.13
5-methyl-2-hexanone	14.73	13.46	11.40

Analyte	DB-624	DB-1	DB-WAX
5-methyl-3-heptanone	16.52	15.55	12.38
acetal (acetaldehyde diethyl acetal)	10.58	10.21	5.09
acetaldeyde	2.46	2.16	2.47
acetone	4.05	3.05	3.60
acetic acid	9.10	16.87	16.87
acetonitrile	4.27	2.87	8.12
acetophenone	19.69	18.13	20.13
acrolein	3.81	2.98	4.10
acrylic acid	12.21	19.16	19.61
acrylonitrile	5.22	3.43	7.81
a-ethylphenethyl alcohol	22.65	21.38	23.10
allyl ether	9.65	9.05	6.04
allyl ethyl ether	6.41	6.00	3.05
a-methylphenyl alcohol	19.60	18.03	22.00
a-methylstyrene	17.22	16.62	15.13
amyl acetate	15.57	14.04	10.96
benzaldehyde	17.45	15.88	17.25
benzene	8.69	8.00	6.46
benzonitrile 1	18.21	16.26	19.55
benzyl acetate	21.07	19.86	21.01
benzyl alcohol	19.27	17.42	22.82
benzyl ether	29.08	27.72	30.41
b-ethylphenethyl alcohol	23.03	21.71	24.12
bromobenzene	16.39	15.54	15.47
bromochloromethane	7.59	4.79	9.26
bromodichloromethane	10.64	9.22	11.76
bromoethane	4.27	3.75	2.95
bromoform	15.61	14.20	17.00
butyl acetate	13.24	12.36	9.85
butyl ether	14.41	14.39	6.97
butyl ethyl ether	9.34	9.18	3.27
butyl methyl ether	7.10	6.85	2.80
butylbenzene	18.69	18.24	14.81
butyraldehyde	6.84	5.29	4.72
carbon disulfide	4.27	4.09	2.65
carbon tetrachloride	8.34	8.18	4.85
chlorobenzene	14.25	13.44	13.00
chlorodibromomethane	13.25	11.81	14.52
chloroform	7.75	6.34	8.58
cis-1,2-dichloroethylene	7.16	5.98	7.84
cis-1,3-dichloropropene	11.38	10.20	11.27
cis-2-hexen-1-ol	15.19	13.81	16.31
cis-3-hexen-1-ol	14.88	13.51	15.87
cis-4-hepten-1-ol	17.22	16.02	17.67
crotonaldehyde	9.18	7.03	9.07
cyclohexane	8.10	8.32	2.27
cyclohexanol	15.63	14.26	16.31
cyclohexanone	16.04	14.26	14.61
cyclopentanol	3.16	11.56	14.57
cyclopentanone	13.39	11.42	12.46
decane	16.82	17.12	7.63
dibromomethane	10.37	8.93	11.98
diethylene glycol	18.24	15.60	23.91
diethylene glycol monobutyl ether	21.46	20.26	21.74
diethylene glycol monoethyl ether	18.04	16.60	19.48
diethylene glycol monomethyl ether	16.78	15.09	19.06
diglyme (diethylene glycol dimethyl ether)	9.92	8.68	6.04
DMF (dimethylformamide)	13.73	10.80	15.25
DMSO (methyl sulfoxide)	15.58	11.94	19.21
dodecane	20.58	20.85	12.23
epichlorohydrin	11.22	9.35	11.69
ethanol	3.47	2.68	6.46
ethyl acetate	7.34	6.21	5.03
ethyl acrylate	10.02	8.93	7.87
ethyl benzoate	21.22	20.15	20.27
ethyl ether	3.72	3.50	2.13
ethyl formate	4.27	3.56	3.78
ethyl propionate	10.37	9.42	6.93
ethyl vinyl ether	3.72	3.50	2.39
ethylbenzene	14.42	13.90	11.13
ethylene glycol	12.15	8.54	19.47
ethylene glycol monobutyl ether	15.84	14.68	16.24
ethylene glycol monoethyl ether	10.95	9.35	13.11
ethylene glycol monomethyl ether	8.64	6.72	12.24
fluorobenzene	9.18	8.36	7.72
fluorotrichloromethane (Freon 11)	3.24	3.23	2.13
furan	3.72	3.36	3.27
furfural	14.63	12.54	18.32
furfuryl alcohol	15.32	13.25	19.90
glycidol	11.93	9.10	17.25
glyme (propylene glycol dimethyl ether)	8.65	7.56	6.04
heptanal	15.60	14.52	12.32
heptane	9.15	9.58	2.65
hexachloro-1,3-butadiene	21.69	21.46	17.84

Analyte	DB-624	DB-1	DB-WAX
hexadecane	26.63	26.88	18.70
hexanal	13.14	11.88	10.07
hexane	5.82	6.25	2.05
iodobenzene	18.10	17.87	18.30
iodomethane	4.27	3.75	3.46
iso-amyl acetate	14.75	13.97	10.31
iso-butanol	8.60	6.74	10.96
iso-butyl acetate	12.19	11.30	8.36
iso-butylbenzene	17.68	17.31	13.47
iso-butyraldehyde	5.66	4.37	3.54
iso-octane	8.81	9.27	2.44
isophorone	21.04	19.31	19.47
iso-propanol	4.27	3.22	6.28
iso-propyl acetate	8.87	7.88	5.32
iso-propyl ether	6.23	6.21	3.27
iso-propylbenzene (cumene)	15.88	15.43	12.13
methacrolein	6.01	4.68	4.83
methacrylonitrile	7.53	5.36	7.54
methanol	2.59	2.15	5.40
methyl acetate	4.60	3.79	3.78
methyl benzoate	19.90	18.76	19.70
methyl formate	2.80	2.44	2.85
methyl propionate	7.88	6.78	5.54
methyl tert-butyl ether (MTBE)	5.30	5.06	2.30
methylene chloride	4.80	3.85	6.18
morpholine	12.98	13.62	13.62
m-tolualdehyde	19.63	18.23	19.77
m-xylene	14.62	14.11	11.44
nitrobenzene	20.35	18.56	21.41
nonanal	19.71	18.84	16.05
nonane	14.63	14.95	4.97
octanal	17.76	16.80	14.29
octane	12.11	12.48	3.22
o-tolualdehyde	19.63	18.23	19.73
o-xylene	15.28	14.69	12.39
pentachlorobenzene	27.10	26.38	25.09
pentadecane	25.26	25.51	17.28
pentanal (valeraldehyde)	10.25	8.76	7.46
pentane	3.37	3.51	1.89
pentyl ether	18.53	18.51	12.66
propionaldehyde	3.91	3.11	3.25
propionic acid	11.89	18.18	18.18
propionitrile	7.25	4.43	8.72
propyl acetate	10.51	9.47	7.38
propyl benzoate	22.92	21.91	21.46
propyl ether	9.05	9.05	3.05
propyl formate	7.66	6.48	5.93
propyl propionate	13.07	12.25	9.17
propylbenzene	16.56	16.07	12.86
propylene glycol (1,2-propanediol)	13.16	9.90	18.96
p-tolualdehyde	19.96	18.50	20.13
p-xylene	14.62	14.11	11.30
pyridine	11.70	10.21	12.44
sec-butanol	7.55	5.80	8.77
sec-butyl acetate	11.76	10.91	7.69
sec-butylbenzene	17.68	17.37	13.64
styrene	15.28	14.55	13.80
styrene oxide	19.46	18.24	19.46
tert-amyl methyl ether	8.89	8.68	3.27
tert-butanol	5.01	3.72	5.54
tert-butyl acetate	10.02	9.32	5.40
tert-butyl ethyl ether	6.90	6.85	2.47
tert-butylbenzene	17.39	16.99	13.41
tetrachloroethylene	12.86	12.66	8.58
tetradecane	23.80	24.06	15.75
tetrahydropyran	10.06	9.35	5.83
THF (tetrahydrofuran)	7.64	6.75	4.45
toluene	11.93	11.33	9.06
trans-1,2-dichloroethylene	5.33	6.17	4.38
trans-1,3-dichloropropene	12.30	10.80	12.78
trans-1,4-dichloro-2-butene	16.46	14.91	17.00
trans-2-hepten-1-ol	17.22	16.13	17.77
trichloroethylene	9.80	9.22	7.84
tridecane	22.24	22.51	14.09
triethylamine	8.91	8.93	3.26
triglyme (triethylene glycol dimethyl ether)	21.95	20.75	20.77
undecane	18.78	19.07	10.10
vinyl acetate	6.37	4.09	5.03

Pesticide Elution Order Using Low Bleed Phases

Pesticide Retention Data

Column: **30 m x 0.25 mm, 0.25 µm**

Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min (DB-1701 ramped to 280°C)
300°C for 5 min (DB-1701 held at 280°C for 10 min)

Many analysts have reported obtaining excellent results with DB-35ms. Some now use it as their primary analytical column in selective detector applications because of its selectivity, inertness and high upper temperature limits.

Alphabetical Order By Analyte

Compound	DB-5ms	DB-XLB	DB-35ms	DB-17ms	DB-1701
Alachlor	24.29	25.84	27.40	27.91	27.59
Aldrin	25.99	27.33	28.28	28.54	26.79
Aspon	25.72	26.69	28.11	27.55	28.22
Atrazine	21.11	22.65	24.82	24.50	25.12
Azinphos-ethyl	37.51	39.94	43.31	43.27	48.74
Azinphos-methyl	36.28	38.83	42.60	42.75	45.86
α-BHC	20.01	21.83	23.50	23.83	23.06
β-BHC	21.12	24.95	26.62	26.70	24.84
γ-BHC	21.46	23.37	25.32	25.73	27.97
δ-BHC	22.70	25.98	27.83	28.08	28.89
Bolstar	32.16	33.89	36.25	35.94	34.96
1-Bromo-2-nitrobenzene (IS)	11.50	12.73	14.87	15.66	14.68
2-Bromobiphenyl (SS)	17.31	18.49	20.24	21.01	18.62
Captafol	33.91	36.35	39.46	40.31	40.40
Captan	27.98	30.15	33.20	34.14	32.25
Carbophenothion	32.56	34.49	36.69	36.26	35.48
γ-Chlordane	28.54	30.72	31.77	31.91	30.91
α-Chlordane	29.06	30.90	32.19	32.43	31.21
Chlorfenvinphos	27.61	29.34	31.47	31.15	31.02
4-Chloro-3-nitrobenzotrifluoride (SS)	7.66	8.55	8.83	8.59	10.00
Chlorobenzilate	31.28	32.82	34.03	34.27	33.78
Chloroneb	15.53	16.87	18.68	19.37	17.92
Chloropropylate	31.28	32.92	34.48	34.85	33.98
Chlorothalonil	22.16	26.44	28.06	28.08	27.73
Chlorpyrifos	25.84	27.52	29.31	28.86	28.36
Chlorpyrifos-methyl	23.86	25.64	27.79	27.55	26.70
Coumaphos	38.74	41.40	44.01	43.52	
Crotoxyphos	28.16	29.48	32.13	32.09	31.89
Dacthal	26.11	27.55	29.13	29.61	28.82
p,p'-DDD	31.62	33.93	35.60	35.92	34.60
p,p'-DDE	29.97	31.82	33.20	33.53	31.50
p,p'-DDT	33.07	35.12	36.71	37.05	35.37
Demeton-O	17.91	18.97	20.58	20.13	20.49
Demeton-S	20.52	21.83	24.03	23.67	24.05
Diallate A	19.88	20.87	21.97	22.31	21.42
Diallate B	20.26	21.35	22.40	22.71	22.10
Diazinon	21.99	23.05	24.59	24.21	24.16
1,2-Dibromo-3-chloropropane	6.63	7.11	8.05	8.47	7.90

Alphabetical Order By Analyte (Continued)

Compound	DB-5ms	DB-XLB	DB-35ms	DB-17ms	DB-1701
α,α-Dibromo-m-xylene	16.72	18.27	20.60	21.40	19.41
Dibutylchlorendate (SS)	36.32	37.75	38.67	38.74	39.65
Dichlofenthion	23.64	25.07	26.58	26.02	26.02
Dichlorvos	9.31	9.93	11.53	11.39	12.45
Dicrotophos	19.12	20.58	23.77	23.98	24.66
Dieldrin	30.14	32.03	33.59	33.90	32.16
Dimethoate	20.52	22.32	25.80	26.02	26.70
Dioxathion	21.41	22.78	25.53	25.49	24.80
Disulfoton	22.37	23.68	25.53	25.09	24.95
Endosulfan I	29.06	30.95	32.37	32.61	30.72
Endosulfan II	31.39	34.11	36.04	36.36	34.97
Endosulfan sulfate	32.88	35.74	37.84	38.13	38.91
Endrin	31.00	32.92	34.89	35.35	32.97
Endrin aldehyde	31.96	34.57	37.00	37.52	37.01
Endrin ketone	34.68	37.26	40.23	40.99	41.57
EPN	34.86	37.04	39.61	39.26	41.19
Ethion	31.55	33.09	35.39	35.11	34.85
Ethoprop	18.47	19.60	21.42	21.02	21.29
Ethylparathion	26.17	28.09	29.94	29.36	30.10
Famphur	32.38	34.38	37.69	37.72	39.69
Fenitrothion	25.19	26.96	29.47	29.22	29.36
Fensulfothion	31.25	33.31	36.44	36.36	37.10
Fenthion	26.02	27.62	30.25	30.22	29.07
Fonofos	21.76	23.19	25.29	25.03	24.41
Heptachlor	24.52	25.98	26.92	27.11	25.69
Heptachlor epoxide	27.59	29.32	30.76	31.07	29.68
Hexachlorobenzene	20.12	22.13	22.91	23.01	21.03
Hexachlorocyclopentadiene	11.42	11.94	12.08	12.25	11.60
Hexamethylphosphoramide	10.25	11.10	12.74	12.54	15.46
Isodrin	27.17	28.71	30.10	30.48	28.44
Kelthane	35.37	37.59	39.54	39.91	
Kelthane Decomp. Product	26.57	28.71	30.35	30.68	
Leptophos	36.17	38.15	40.73	40.55	40.94
Malathion	25.62	26.96	29.31	29.13	29.20
Merphos	30.01	31.47	32.94	32.22	31.89
Methoxychlor	35.22	37.05	39.54	40.31	38.91
Methylparathion	24.14	26.14	28.56	28.22	28.57
Mevinphos	13.50	14.48	16.72	16.69	17.56
Mirex	37.09	39.12	40.67	40.99	37.96
Monocrotophos	19.55	21.15	24.70	24.97	26.50
Naled	18.86	20.15	22.72	22.70	22.41
trans-Nonachlor	29.18	31.15	31.91	31.91	31.29
Pentachloronitrobenzene (IS)	21.22	23.47	24.84	25.08	23.64
cis-Permethrine	38.62	40.27	42.12	42.53	42.25
trans-Permethrine	38.89	40.57	42.42	42.80	46.52
Perthane	31.00	32.67	34.29	34.68	32.51
Phorate	19.79	21.02	22.85	22.45	22.33

Alphabetical Order By Analyte (Continued)

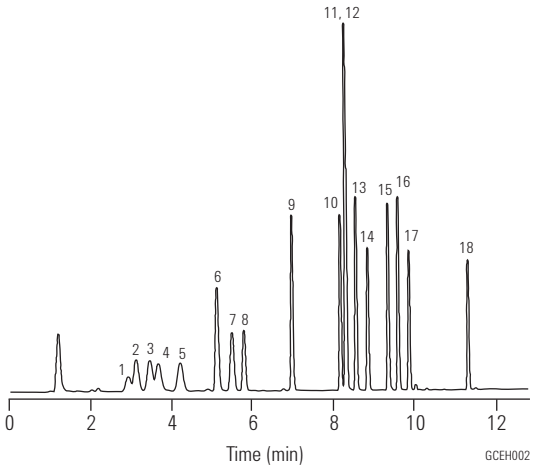
Compound	DB-5ms	DB-XLB	DB-35ms	DB-17ms	DB-1701
Phosmet	34.73	37.24	40.83	40.91	42.38
Phosphamidon	23.56	23.40	27.79	27.72	28.85
Propachlor	17.88	19.32	21.17	21.81	21.74
Ronnel	24.58	26.14	27.95	27.55	27.10
Simazine	20.91	22.65	25.05	24.87	25.23
Stirophos	28.66	30.50	32.94	32.69	32.27
Sulfotep	19.37	20.42	22.46	22.27	22.56
TEPP	16.76	17.91	20.69	20.74	21.98
Terbufos	21.64	22.78	24.23	23.67	23.91
Terrazole	14.17	15.12	16.60	17.25	15.86
Tetrachloro-m-xylene (SS)	18.12	19.81	20.24	20.32	18.70
Thionazin	17.72	18.97	21.26	21.12	20.85
Tokuthion	29.55	31.19	32.83	32.22	31.67
Trichloronate	26.51	28.09	29.31	28.59	28.57
Trifluralin	19.30	20.35	19.98	19.47	22.15
Tri-o-cresylphosphate	36.64	38.40	40.93	40.83	42.62



Environmental Applications, Hydrocarbons

Methyl Tert-Butyl Ether (MTBE) FID, Extended 8020 Analysis

Column:	**DB-MTBE** **124-0034** **30 m x 0.45 mm, 2.55 µm**
Carrier:	Helium at 10 mL/min
Oven:	35°C for 4 min 35-200°C at 20°/min 200°C for 5 min
Sampler:	Purge and Trap (O.I.A. 4560) Trap: Tenax only Preheat: 175°C Desorb: 180°C for 3 min
Injection:	LVI (Low Volume Injector), 150°C
Detector:	FID (O.I.A. 4410), 200°C
Sample:	40 ppb per component in 5 mL water

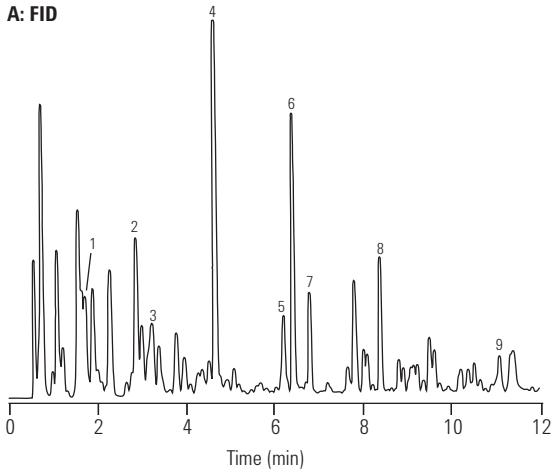


1. Methyl-tert-butyl-ether (MTBE)
2. 2-Methylpentane
3. 3-Methylpentane
4. Diisopropyl ether (DIPE)
5. Ethyl-tert-butyl ether (ETBE)
6. Benzene
7. tert-Amyl methyl ether (TAME)
8. α,α,α-Trifluorotoluene
9. Toluene
10. Ethylbenzene
11. m-Xylene
12. p-Xylene
13. o-Xylene
14. Cumene
15. 1,3,5-Trimethylbenzene
16. 1,2,4-Trimethylbenzene
17. 1,2,3-Trimethylbenzene
18. Napthalene

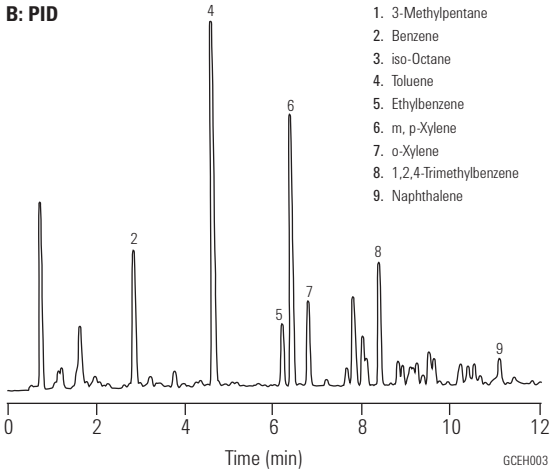
Unleaded Gasoline

Column:	**DB-VRX** **124-1534** **30 m x 0.45 mm, 2.55 µm**
Carrier:	Helium at 109 cm/sec (10.4 mL/min), measured at 40°C
Oven:	40°C for 2 min 40-200°C at 12°/min 200°C for 5 min
Sampler:	Purge and Trap (O.I.A. 4560) Trap: BTEX (Supelco) at 50°C during purge Preheat: Desorb: 270°C for 1 min
Injection:	LVI (Low Volume Injector)
Detector:	A: PID (O.I.A. 4430), 200°C B: FID, 250°C
Sample:	115 ppb gasoline in 5 mL water

A: FID



B: PID



1. 3-Methylpentane
2. Benzene
3. iso-Octane
4. Toluene
5. Ethylbenzene
6. m, p-Xylene
7. o-Xylene
8. 1,2,4-Trimethylbenzene
9. Naphthalene

Diesel Fuel

Column: **DB-5ms**
125-5532
30 m x 0.53 mm, 1.50 µm

Carrier: Helium at 48.5 cm/sec, measured at 60°C

Oven: 60°C for 2 min
60-300°C at 12°/min
300°C for 10 min

Injection: Direct, 280°C

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL injection in hexane
A - Standard, 50 ng/component
B - Sample, 0.6 mg/mL

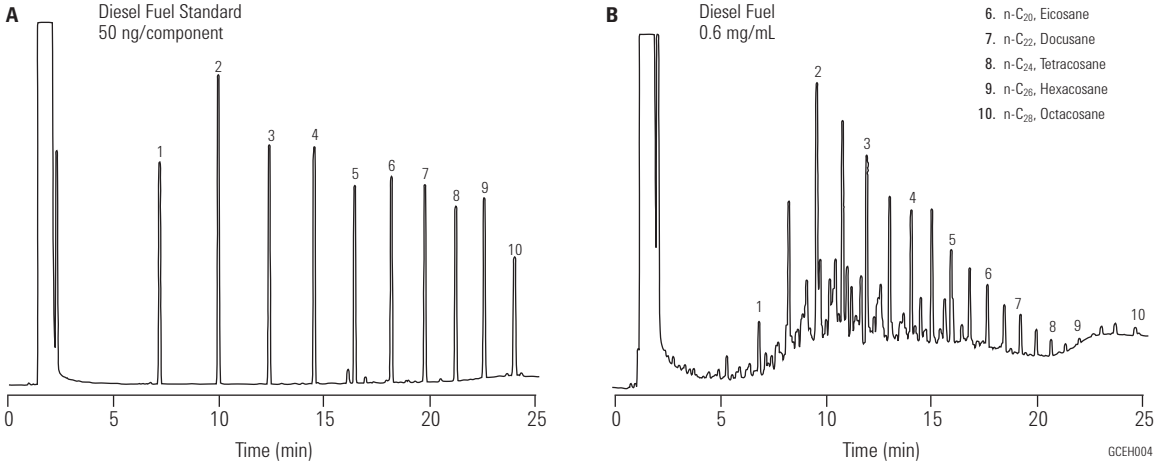
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. n-C_{10}, Decane
2. n-C_{12}, Dodecane
3. n-C_{14}, Tetradecane
4. n-C_{16}, Hexadecane
5. n-C_{18}, Octadecane
6. n-C_{20}, Eicosane
7. n-C_{22}, Docusane
8. n-C_{24}, Tetracosane
9. n-C_{26}, Hexacosane
10. n-C_{28}, Octacosane





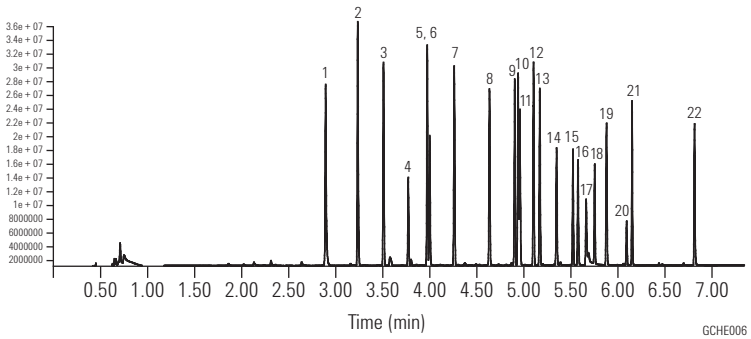
Environmental Applications, Pesticides and Herbicides

CLP Pesticide Analysis

Column: **DB-XLB**
121-1222
20 m x 0.18 mm, 0.18 µm

Carrier:	H_2, constant flow, 77.3 cm/s at 120 °C
Oven:	120°C for 0.49 min 120°C to 160°C at 59.4°/min 160°C to 260°C at 23.7°/min 260°C to 300°C (1.69min) at 35.6°/min
Injection:	Pulsed Splitless, 220°C Pulse pressure & time: 35psi for 0.5 min Flow ramp at 6.25 min of 99 mL/min 2 to 3 mL/min 2 mm ID liner
Detector:	µ-ECD, 320°C Ar/CH4 (P5) makeup gas at 60mL/min
Sample:	0.5 µL, 50 ppb

Faster Method (using a High Efficiency GC Column and H_2 carrier)

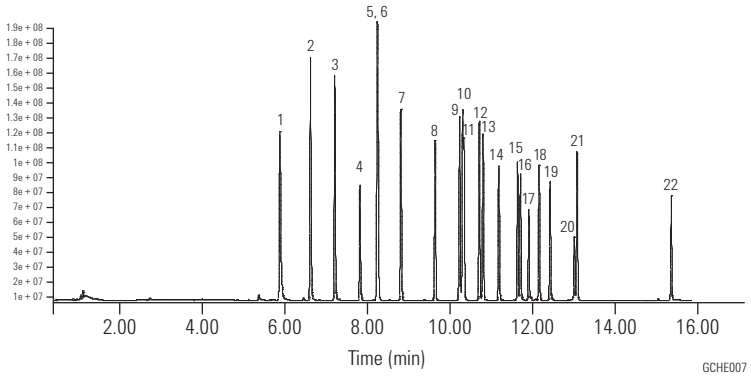


1. TCMX
2. Alpha BHC
3. Gamma BHC
4. Beta BHC
5. Delta BHC
6. Heptachlor
7. Aldrin
8. Heptachlor Epoxide
9. Gamma Chlordane
10. Alpha Chlordane
11. Endosulfan I
12. 4,4' DDE
13. Dieldrin
14. Endrin
15. 4,4' DDD
16. Endosulfan II
17. 4,4' DDT
18. Endrin Aldehyde
19. Endosulfan Sulfate
20. Methoxychlor
21. Endrin Ketone
22. DCB

Column: **DB-XLB**
123-1232
30 m x 0.32 mm, 0.25 µm

Carrier:	He, constant flow, 38 cm/s at 120°C
Oven:	120°C for 1.17 min 120°C to 160°C at 25°/min 160°C to 260°C at 10°/min 260°C to 300°C (4 min) at 15°/min
Injection:	Pulsed Splitless, 220°C Pulse pressure & time: 35 psi for 1.15 min
Detector:	µ-ECD, 320°C Ar/CH4 (P5) makeup gas at 60 mL/min
Sample:	2 µL, 50 ppb

Original Method (using a 0.32 mm ID column and Helium carrier)



Contract Laboratory Program (CLP) pesticide analysis on High Efficiency (0.18 mm I.D.) GC columns. In this example, the analysis of 22 CLP pesticides were achieved in 16 minutes using the original method, whereas the improved method was completed in just under 7 minutes. That's a 56% faster sample run time.

CLP Pesticides

Column: **DB-35ms**
123-3832
30 m x 0.32 mm, 0.25 µm

Column: **DB-XLB**
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier: Helium at 45 cm/sec (EPC in constant flow mode)

Oven: 110°C for 0.5 min
110-320°C at 15°C/min
320°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: µECD, 350°C
Nitrogen makeup gas
(column + makeup flow = 30 mL/min constant flow)

Sample: 50 pg per component

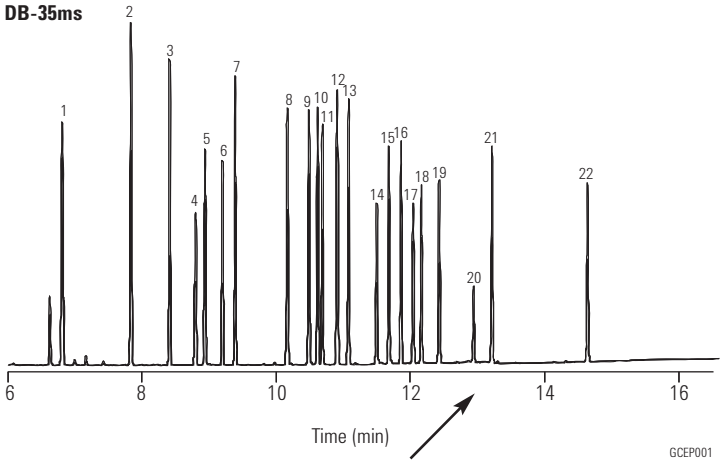
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

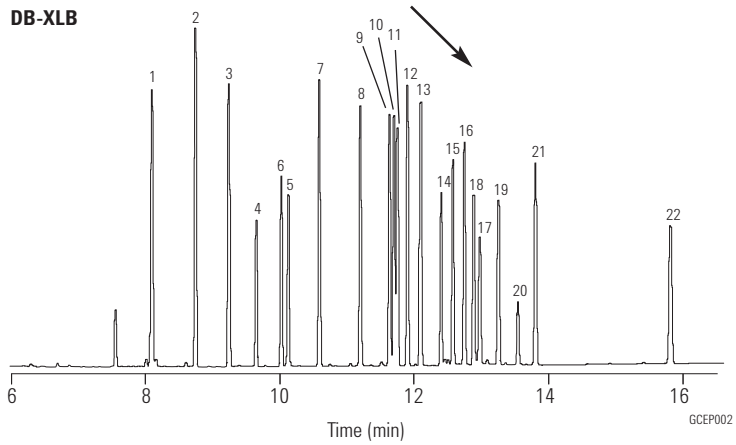
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

DB-35ms



Complete resolution and confirmation of 22 CLP Pesticides in under 16 minutes!

DB-XLB



1. Tetrachloro m-xylene (SS)
2. α-BHC
3. γ-BHC
4. β-BHC
5. Heptachlor
6. δ-BHC
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. α-Chlordane
11. Endosulfan I
12. 4,4'-DDE
13. Dieldrin
14. Endrin
15. 4,4'-DDD
16. Endosulfan II
17. 4,4'-DDT
18. Endrin aldehyde
19. Endosulfan sulfate
20. Methoxychlor
21. Endrin ketone
22. Decachlorobiphenyl (SS)

SS - Surrogate Standard

Organochlorine Pesticides I
EPA Method 8081A

Column: **DB-35ms**
122-3832
30 m x 0.25 mm, 0.25 µm

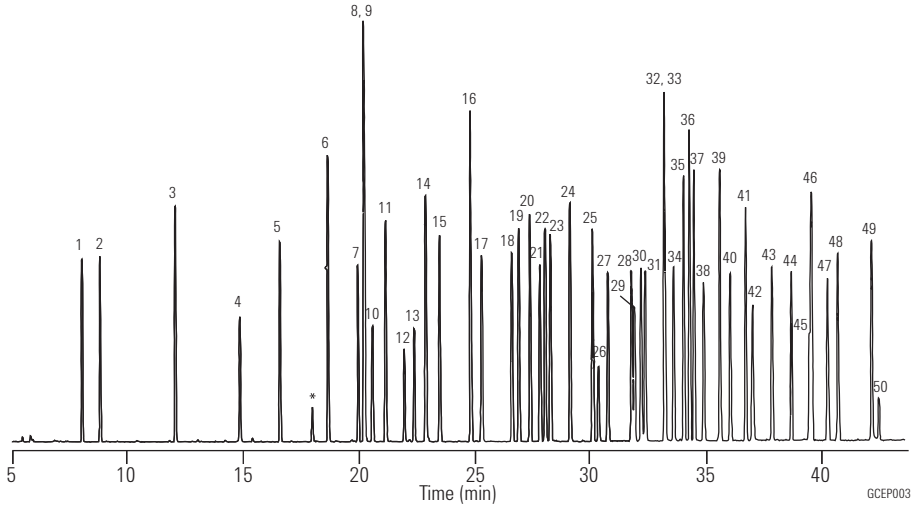
Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan at m/z 50-500

Sample: 1 µL of 35 µg/mL composite 8081A standards, Accustandard Inc.



1. 1,2-Dibromo-3-chloropropane
2. 4-Chloro-3-nitrobenzotrifluoride (SS)
3. Hexachloropentadiene
4. 1-Bromo-2-nitrobenzene (IS)
5. Terrazole
6. Chloroneb
7. Trifluralin
8. 2-Bromobiphenyl (SS)
9. Tetrachloro m-xylene (SS)
10. α, α-Dibromo-m-xylene
11. Propachlor
12. Di-allate A
13. Di-allate B
14. Hexachlorobenzene
15. α-BHC
16. Pentachloronitrobenzene (IS)
17. γ-BHC
18. β-BHC
19. Heptachlor
20. Alachlor
21. δ-BHC
22. Chlorothalonil
23. Aldrin
24. Dacthal
25. Isodrin
26. Kelthane
27. Heptachlor epoxide
28. γ-Chlordane
29. trans-Nonachlor
30. α-Chlordane
31. Endosulfan I
32. Captan
33. p,p'-DDE
34. Dieldrin
35. Chlorobenzilate
36. Perthane
37. Chloropropylate
38. Endrin
39. p,p'-DDD
40. Endosulfan II
41. p,p'-DDT
42. Endrin aldehyde
43. Endosulfan sulfate
44. Dibutylchlorendate (SS)
45. Captafol
46. Methoxychlor
47. Endrin ketone
48. Mirex
49. cis-Permethrin
50. trans-Permethrin

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

Organochlorine Pesticides II
EPA Method 8081A

Column: **DB-5ms**
122-5532
30 m x 0.25 mm, 0.25 µm

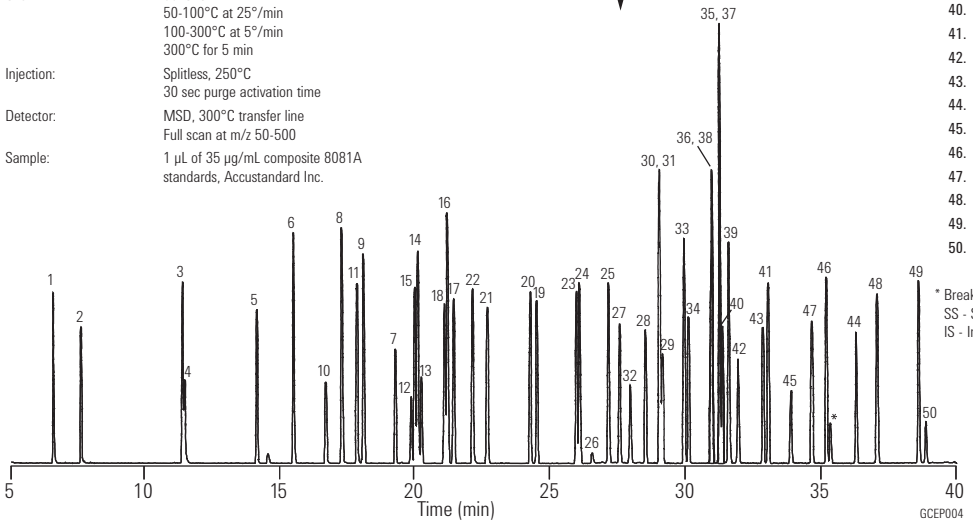
Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan at m/z 50-500

Sample: 1 µL of 35 µg/mL composite 8081A standards, Accustandard Inc.



* Breakdown Products
SS - Surrogate Standard
IS - Internal Standard

Standards used were a composite of individual solutions supplied courtesy of Accustandard Inc., 25 Science Park, New Haven, CT 06511, 800-442-5290.

Pesticides, EPA 508.1

Column: **DB-35ms**
123-3832
30 m x 0.32 mm, 0.25 µm

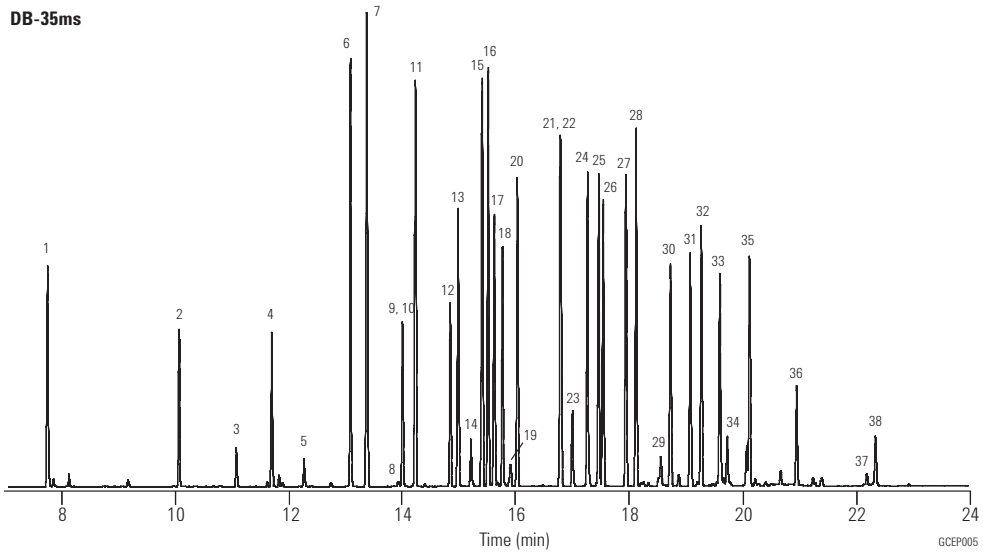
Column: **DB-XLB**
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier:	Helium at 45 cm/sec (EPC in constant flow mode)
Oven:	75°C for 0.5 min 75-300°C at 10° C/min 300°C for 2 min
Injection:	Splitless, 250°C 30 sec purge activation time
Detector:	µECD, 350°C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)
Sample:	50 pg per component

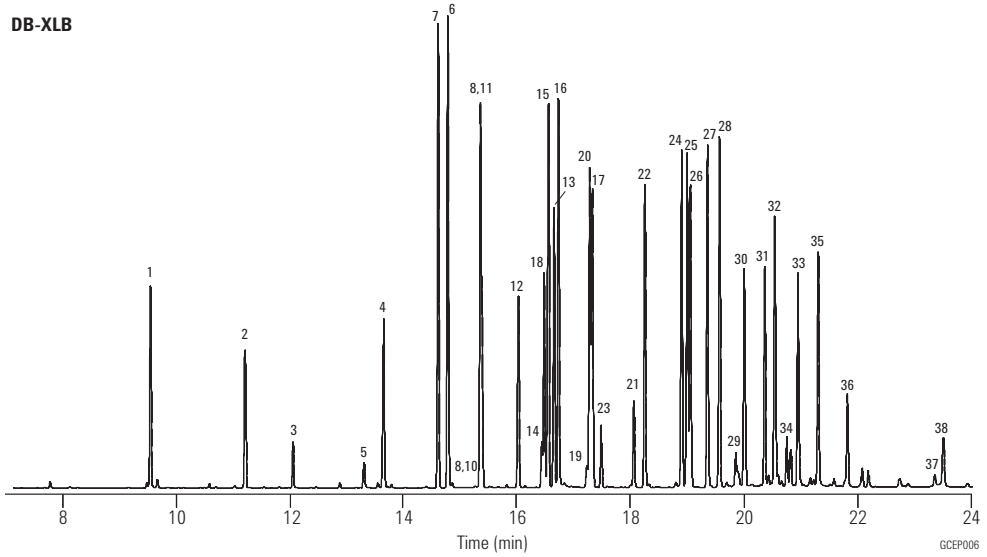
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

DB-35ms



DB-XLB



1. Hexachlorocyclopentadiene
2. Etridiazole
3. Chloroneb
4. Trifluralin
5. Propachlor
6. Hexachlorobezene
7. α-BHC
8. Atrazine
9. Pentachloronitrobenzene
10. Simazine
11. γ-BHC
12. β-BHC
13. Heptachlor
14. Alachlor
15. δ-BHC
16. Chlorothalonil
17. Aldrin
18. Metribuzin
19. Metolachlor
20. DCPA
21. 4,4'-Dibromobiphenyl
22. Heptachlor epoxide
23. Cyanazine
24. γ-Chlordane
25. α-Chlordane
26. Endosulfan I
27. 4,4'-DDE
28. Dieldrin
29. Chlorobenzilate
30. Endrin
31. 4,4'-DDD
32. Endosulfan II
33. 4,4'-DDT
34. Endrin aldehyde
35. Endosulfan sulfate
36. Methoxychlor
37. cis-Permethrin
38. trans-Permethrin

Chlorinated Pesticides, EPA Method 508

Column: **HP-5ms**
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 24 psi, 45 cm/sec (80°C) constant flow

Oven: 80°C for 1 min
80-180°C at 30°C/min
180-205°C at 3°C/min
205°C for 4 min
205-290°C at 20°C/min
290°C for 2 min

Injection: Splitless
1 min purge delay

Detector: ECD, 320°C
Makeup gas Nitrogen, 60 mL/min
Anode purge 3 mL/min

Sample: 1 µL

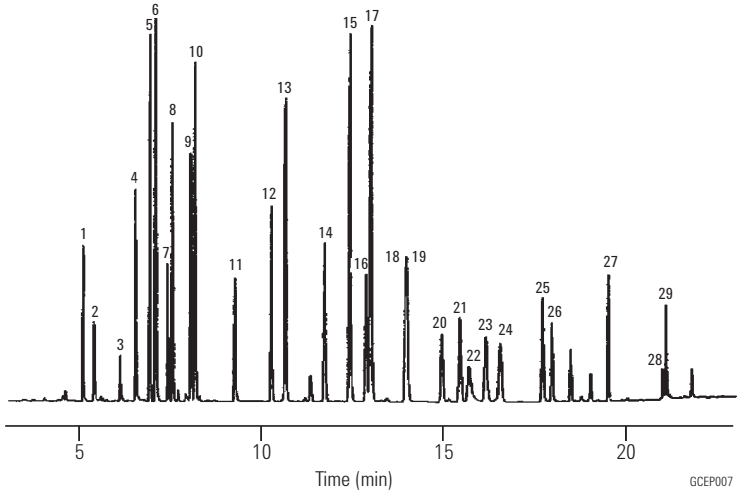
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Etridiazole
2. Chloroneb
3. Propachlor
4. Trifluralin
5. α-BHC
6. Hexachlorobezene
7. β-BHC
8. δ-BHC
9. γ-BHC
10. Chlorothalonil
11. Heptachlor
12. Aldrin
13. DCPA
14. Heptachlor epoxide
15. γ-Chlordane
16. Endosulfan I
17. α-Chlordane
18. Dieldrin
19. 4,4'-DDE
20. Endrin
21. Endosulfan II
22. Chlorobenzilate
23. 4,4'-DDD
24. Endrin aldehyde
25. Endosulfan sulfate
26. 4,4'-DDT
27. Methoxychlor
28. cis-Permethrin
29. trans-Permethrin



Organohalide Pesticides in Water, EPA Method 505

Column: **HP-5ms**
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 2.0 mL/min, constant flow, 42 cm/sec (22.4 psi at 80°C)

Oven: 80°C for 1 min
80-175°C at 30°C/min
175°C for 4 min
175- 215°C at 6°C/min
215°C for 2 min
215- 290°Cat 15°C/min
290°C for 5 min

Injection: Splitless, 250°C
1 min purge delay

Detector: ECD, 300°C
Makeup gas: N2, 60 mL/min
Anode purge 6 mL/min

Sample: 1 µL injection volume
16 components EPA-505 targeted pesticides and 14 ppb Aroclor 1260 in hexane.
Concentration of pesticides: 50 ppb each except 1.25 ppm for atrazine and simazine.

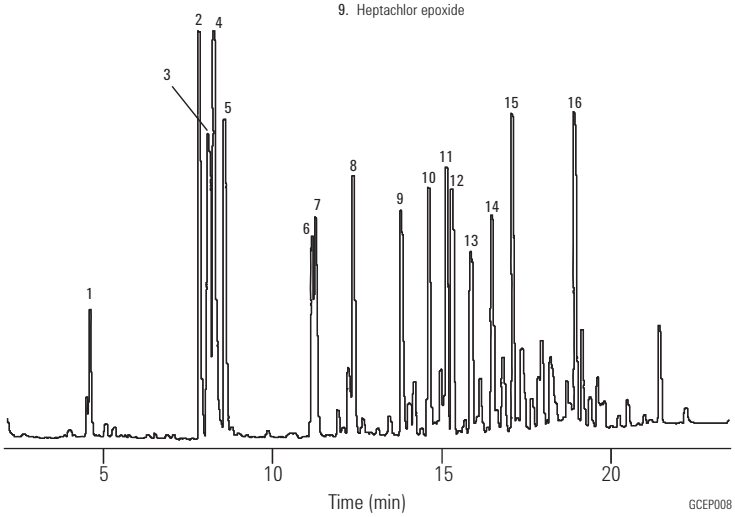
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Hexachlorocyclopentadiene
2. Hexachlorobenzene
3. Simazine
4. Atrazine
5. Lindane
6. Heptachlor
7. Alachlor
8. Adrin
9. Heptachlor epoxide
10. δ-Chlordane
11. α-Chlordane
12. trans-Nonachlor
13. Dieldrin
14. Endrin
15. cis-Nonachlor
16. Methoxychlor



Organochlorine Pesticides I

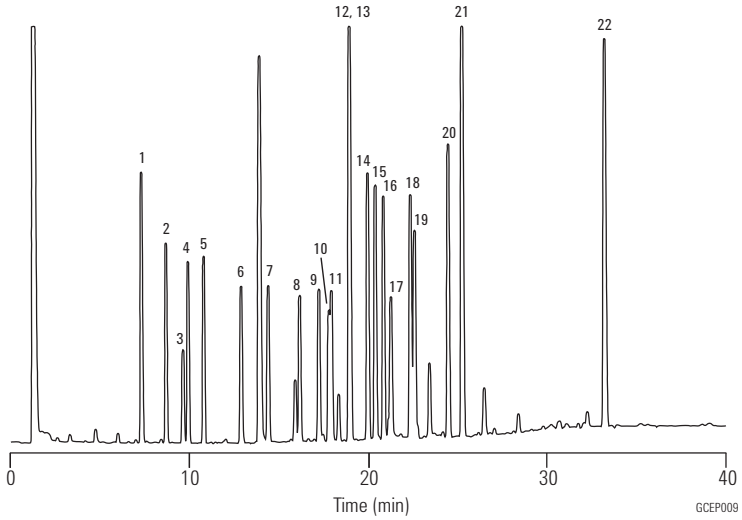
Column: **DB-5**
125-5037
30 m x 0.53 mm, 0.50 µm

Carrier:	Helium at 30 cm/sec (4.0 mL/min)
Oven:	150-275°C at 4°/min 275°C for 30 min
Injection:	Splitless, 250°C
Detector:	ECD, 300°C Nitrogen makeup gas at 30 mL/min
Sample:	0.7 µL of 100 pg/µL standard in isooctane

Suggested Supplies

Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Septum:	11 mm Advanced Green septa, 5183-4759
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p′-DDE
14. Endrin
15. Endosulfan II
16. p,p′-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p′-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)



Organochlorine Pesticides II

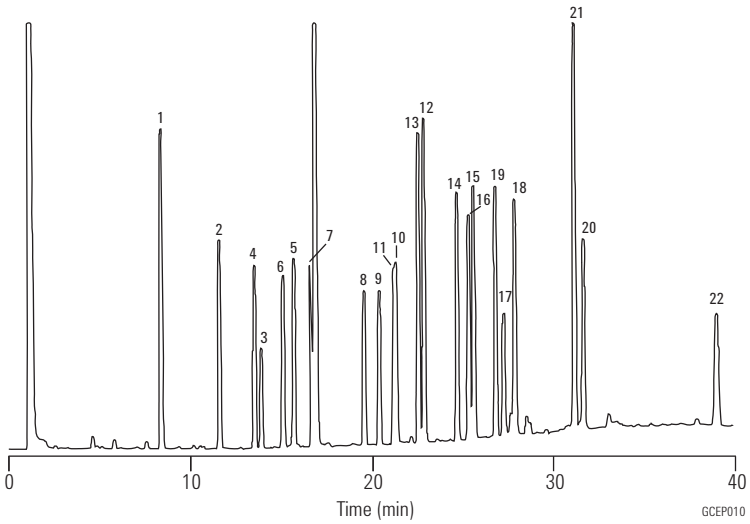
Column: **DB-608**
125-6837
30 m x 0.53 mm, 0.50 µm

Carrier:	Helium at 30 cm/sec (4.0 mL/min)
Oven:	150-275°C at 4°/min 275°C for 30 min
Injection:	Splitless, 250°C
Detector:	ECD, 300°C Nitrogen makeup gas at 30 mL/min
Sample:	0.7 µL of 100 pg/µL standard in isooctane

Suggested Supplies

Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal:	11 mm Advanced Green septa, 5183-4759
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p′-DDE
14. Endrin
15. Endosulfan II
16. p,p′-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p′-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)



Organochlorine Pesticides III

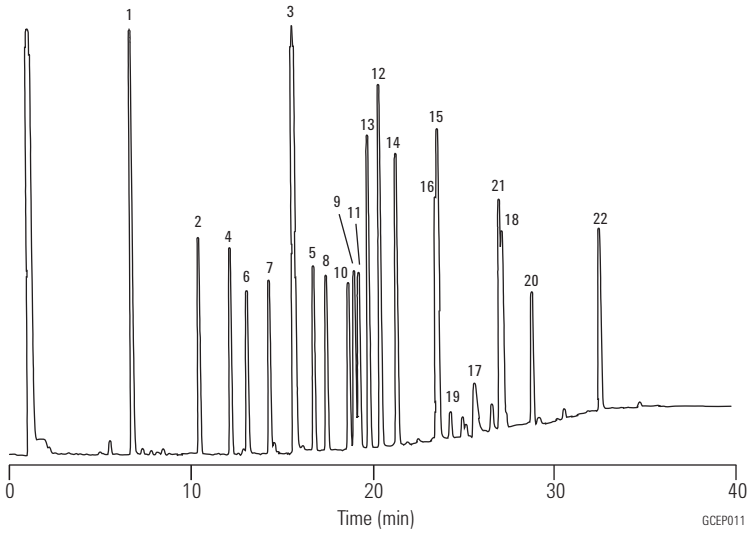
Column: **DB-1701**
125-0737
30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)
Oven: 150-275°C at 4°/min
275°C for 30 min
Injection: Splitless, 250°C
Detector: ECD, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.7 µL of 100 pg/µL standard in isooctane

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p'-DDE
14. Endrin
15. Endosulfan II
16. p,p'-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p'-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)



Organochlorine Pesticides IV

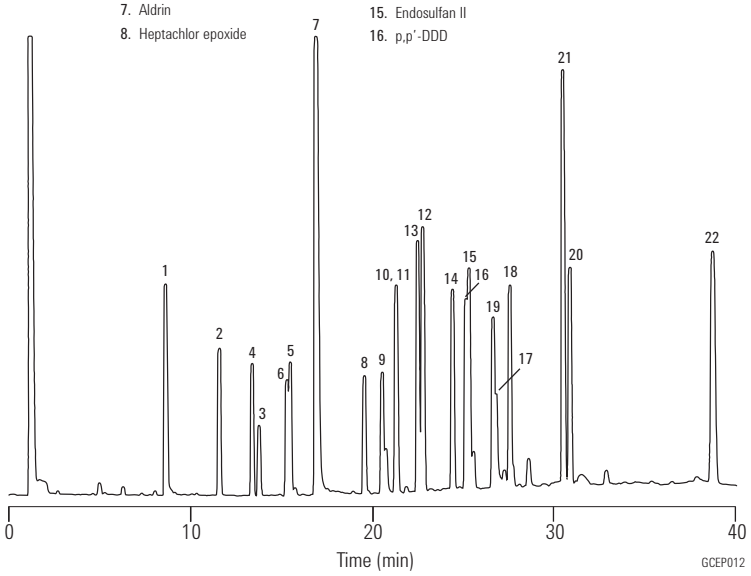
Column: **DB-35**
125-1937
30 m x 0.53 mm, 0.50 µm

Carrier: Helium at 30 cm/sec (4.0 mL/min)
Oven: 150-275°C at 4°/min
275°C for 30 min
Injection: Splitless, 250°C
Detector: ECD, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.7 µL of 100 pg/µL standard in isooctane

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 2,4,5,6-Tetrachloro-m-xylene (IS)
2. α-BHC
3. β-BHC
4. γ-BHC
5. δ-BHC
6. Heptachlor
7. Aldrin
8. Heptachlor epoxide
9. γ-Chlordane
10. Endosulfan I
11. α-Chlordane
12. Dieldrin
13. p,p'-DDE
14. Endrin
15. Endosulfan II
16. p,p'-DDD
17. Endrin aldehyde
18. Endosulfan sulfate
19. p,p'-DDT
20. Endrin ketone
21. Methoxychlor
22. Decachlorobiphenyl (IS)

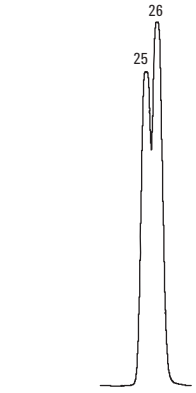


Organochlorine Pesticides, DB-5/1701P

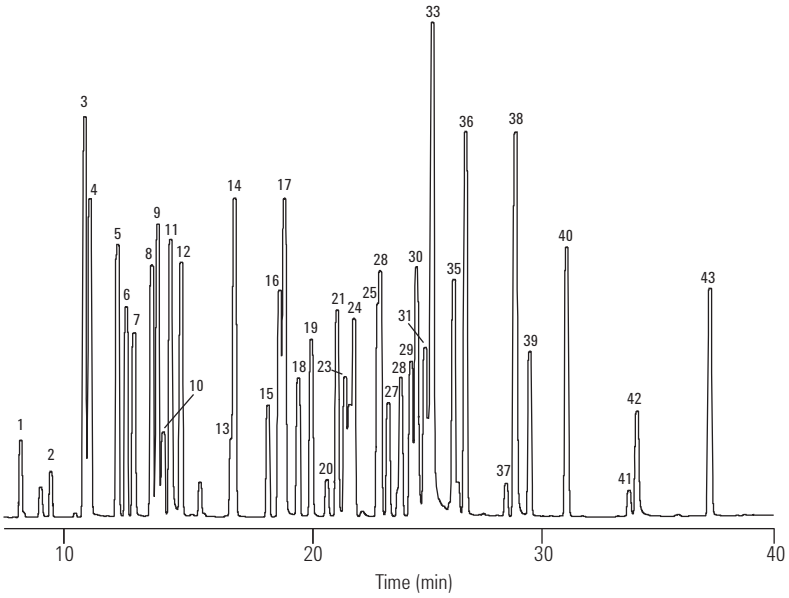
Column: **DB-5**
123-5032
30 m x 0.32 mm, 0.25 µm

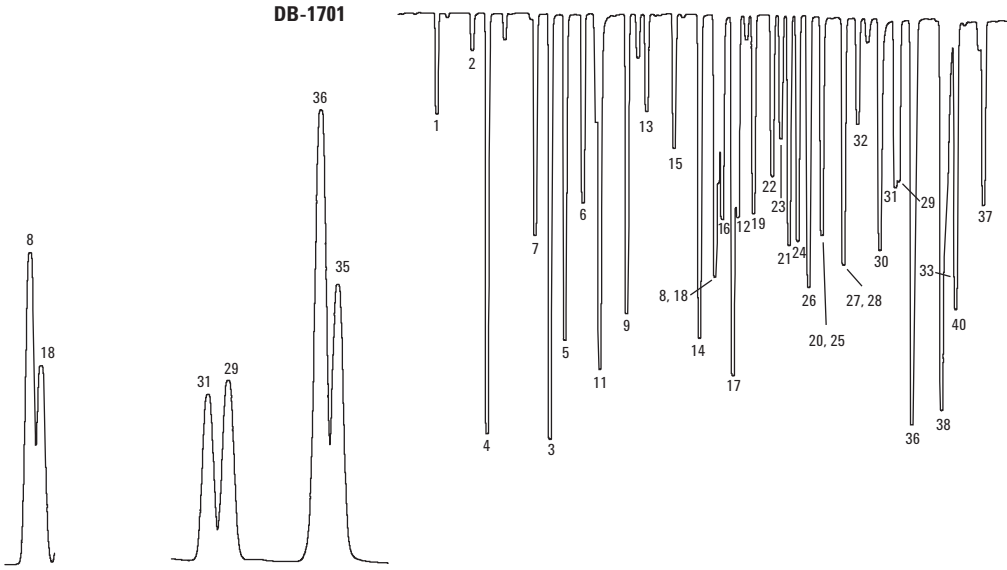
Column:	123-7732, 160-2535-10
Carrier:	Helium at 29.2 cm/sec, measured at 150°C
Oven:	60°C for 0.5 min 60-140°C at 20°/min 140-280°C at 11°/min 280°C for 23 min
Injection:	Splitless, 200°C
Detector:	ECD, 325°C Nitrogen makeup gas at 30 mL/min
Sample:	2.0 µL, 20-200 pg/µL

1. Etridiazole
2. Chloroneb
3. Propachlor
4. Tetrachloro-m-xylene (IS)
5. Trifluralin
6. α-BHC
7. Hexachlorobenzene
8. β-BHC
9. γ-BHC
10. Pentachloronitrobenzene
11. p,p'-Dichlorobiphenyl
12. δ-BHC
13. Heptachlor
14. Alachlor
15. Aldrin
16. Chlorpyrifos
17. DCPA
18. Isodrin
19. Heptachlor epoxide
20. Captan
21. γ-Chlordane
22. o,p'-DDE
23. Endosulfan I
24. α-Chlordane
25. Dieldrin
26. p,p'-DDE
27. o,p'-DDD
28. Endrin
29. Endosulfan II
30. Chlorobenzilate
31. p,p'-DDD
32. o,p'-DDT
33. Endrin aldehyde
34. Endrin ketone
35. Carbophenothion
36. p,p'-DDT
37. Endosulfan sulfate
38. Hexabromobenzene (HBB)
39. Methoxychlor
40. Mirex
41. cis-Permethrin
42. trans-Permethrin
43. Decachlorobiphenyl (IS)



Enlarged view of critical pair on DB-5





Enlarged view of critical pair on DB-1701

GCEP013

Nitrogen/Phosphorus Containing Pesticides, EPA Method 507

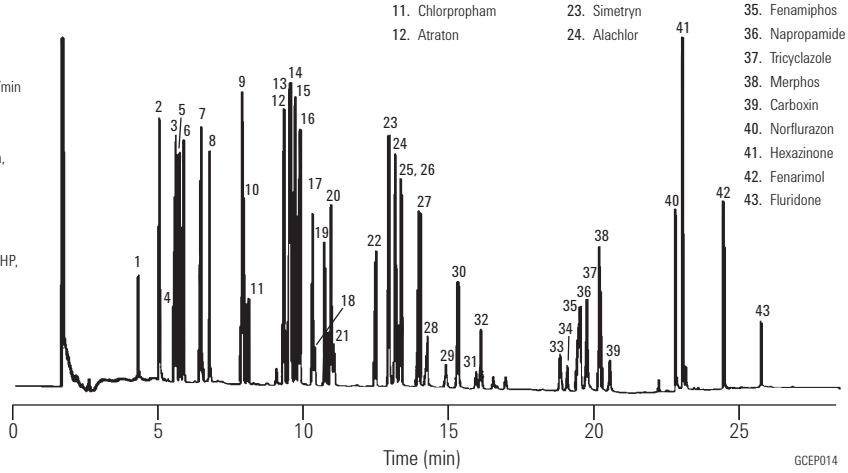
Column: **HP-5ms**
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier:	Helium, 30 cm/sec (13.6 psi) pressure program
Oven:	80-178°C at 30°C/min 178°C for 4 min 178-205°C at 2°C/min 205-310°C at 30°C/min 310°C for 4 min
Injection:	Splitless, 260°C 1 min purge delay
Detector:	NPD, 290°C Helium makeup gas at 30 mL/min

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Dichlorvos
2. EPTC
3. Butylate
4. Mevinphos
5. Vernolate
6. Pebulate
7. Tebuthiuron
8. Molinate
9. Ethoprop
10. Cycloate
11. Chlorpropham
12. Atraton
13. Simazine
14. Prometon
15. Atrazine
16. Propazine
17. Terbufos
18. Pronamide
19. Diazinon
20. Disulfoton
21. Terbacil
22. Metribuzin
23. Simetryn
24. Alachlor
25. Ametryn
26. Prometryn
27. Terbutryn
28. Bromacil
29. Metolachlor
30. Triademefon
31. MGK-264
32. Diphenamid
33. Stirofos
34. Butachlor
35. Fenamiphos
36. Napropamide
37. Tricyclazole
38. Merphos
39. Carboxin
40. Norflurazon
41. Hexazinone
42. Fenarimol
43. Fluridone



GCEP014

Organophosphorous Pesticides I, EPA Method 8141A

Column: **DB-5ms**
122-5532
30 m x 0.25 mm, 0.25 µm

Carrier:	Helium at 35 cm/sec, measured at 50°C
Oven:	50°C for 1 min 50-100°C at 25°/min 100-300°C at 5°/min 300°C for 5 min
Injection:	Splitless, 250°C 30 sec purge activation time
Detector:	MSD, 300°C transfer line Full scan m/z 50-500
Sample:	1 µL of 40 µg/mL 8141A standards Accustandard Inc.

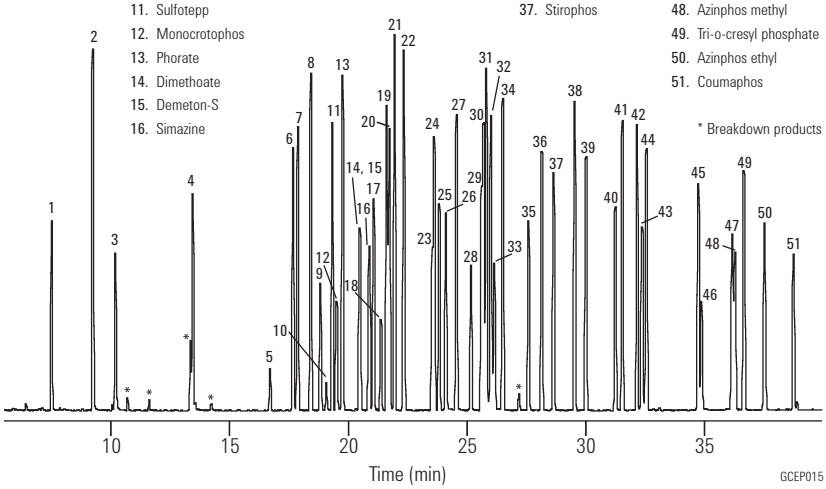
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

Note: All standards used were supplied courtesy of Accustandard Inc., 25 Science Park, New Haven, CT 06511, 800-442-5290.

1. 4-Chloro-3-nitrotrifluoride
2. Dichlorovos
3. Hexamethylphosphoramide
4. Mevinphos
5. TEPP
6. Thionazin
7. Demeton-O
8. Ethoprop
9. Naled
10. Dicrotophos
11. Sulfotepp
12. Monocrotophos
13. Phorate
14. Dimethoate
15. Demeton-S
16. Simazine
17. Atrazine
18. Dioxathion
19. Terbufos
20. Fonofos
21. Diazinon
22. Disulfoton
23. Phosphamidon
24. Dichlofenthion
25. Chlorpyrifos-methyl
26. Methyl parathion
27. Ronnel
28. Fenitrothion
29. Malathion
30. Aspon
31. Chlorpyrifos
32. Fenthion
33. Ethyl parathion
34. Trichloronate
35. Chlorfenvinphos
36. Crotoxyphos
37. Stirophos
38. Tokuthion
39. Merphos
40. Fensulfothion
41. Ethion
42. Bolstar
43. Famphur
44. Carbophenothion
45. Phosmet
46. EPN
47. Leptophos
48. Azinphos methyl
49. Tri-o-cresyl phosphate
50. Azinphos ethyl
51. Coumaphos

* Breakdown products



GCEP015

Organophosphorous Pesticides II, EPA Method 8141A

Column: **DB-35ms**
122-3832
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-100°C at 25°/min
100-300°C at 5°/min
300°C for 5 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan m/z 50-500

Sample: 1 µL of 40 µg/mL 8141A standards
Accustandard Inc.

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

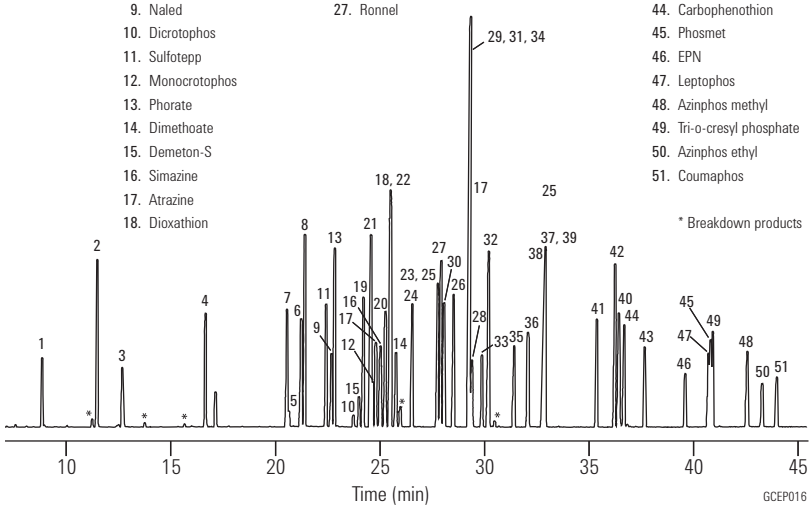
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

Note: All standards used were supplied courtesy of Accustandard Inc., New Haven, CT

1. 4-Chloro-3-nitrotrifluoride
2. Dichlorvos
3. Hexamethylphosphoramide
4. Mevinphos
5. TEPP
6. Thionazin
7. Demeton-O
8. Ethoprop
9. Naled
10. Dicrotophos
11. Sulfotepp
12. Monocrotophos
13. Phorate
14. Dimethoate
15. Demeton-S
16. Simazine
17. Atrazine
18. Dioxathion
19. Terbufos
20. Fonofos
21. Diazinon
22. Disulfoton
23. Phosphamidon
24. Dichlofenthion
25. Chlorpyrifos-methyl
26. Methyl parathion
27. Ronnel
28. Fenitrothion
29. Malathion
30. Aspon
31. Chlorpyrifos
32. Fenthion
33. Ethyl parathion
34. Trichloronate
35. Chlorfenvinphos
36. Crotoxyphos
37. Stirophos
38. Tokuthion
39. Merphos
40. Fensulfothion
41. Ethion
42. Bolstar
43. Famphur
44. Carbophenothion
45. Phosmet
46. EPN
47. Leptophos
48. Azinphos methyl
49. Tri-o-cresyl phosphate
50. Azinphos ethyl
51. Coumaphos

* Breakdown products



Herbicides I

Column: **DB-XLB**
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 32 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-180°C at 10°/min
180-230°C at 5°/min
230-320°C at 10°/min
320°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
Full scan 50-400

Sample: 2 µL x 10-50 ng/µL solution in acetone

Suggested Supplies

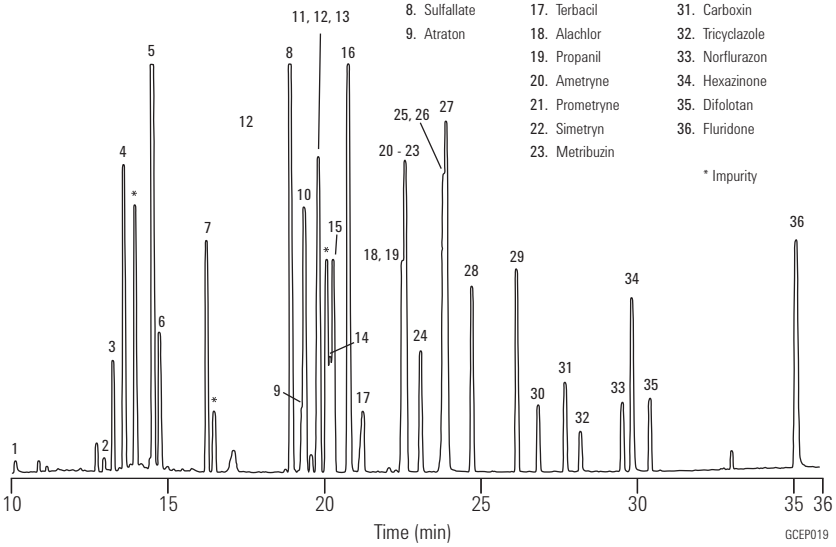
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Monuron
2. Diuron
3. EPTC
4. Dichlobenil
5. Vernolate
6. Pebulate
7. Molinate
8. Sulfallate
9. Atraton
10. Prometon
11. Atrazine
12. Propazine
13. Simazine
14. Terbuthylazine
15. Pronamide
16. Secbumeton
17. Terbacil
18. Alachlor
19. Propanil
20. Ametryne
21. Prometryne
22. Simetryn
23. Metribuzin
24. Terbutryn
25. Metolachlor
26. Bromacil
27. Dacthal
28. Diphenamid
29. Butachlor
30. Napropamide
31. Carboxin
32. Tricyclazole
33. Norflurazon
34. Hexazinone
35. Difolotan
36. Fluridone

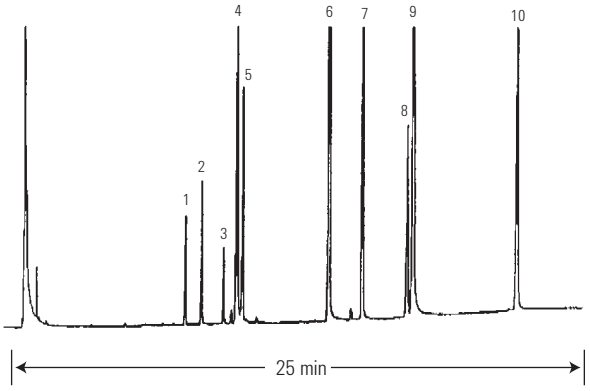
* Impurity



Herbicides II

Column: **DB-210**
122-0232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 35 cm/sec
Oven: 140-215°C at 3°/min
Injection: Split 1:50, 1 µL
Detector: ECD, 300°C
Nitrogen makeup gas at 30 mL/min



GCHERB01

1. Phorate
2. Ethoprop
3. Terbufos
4. Atrazine
5. Fonofos
6. Propachlor
7. Chlorpyrifos
8. Alachlor
9. Metolachlor
10. Cyanazine

Phenoxy Acid Herbicides

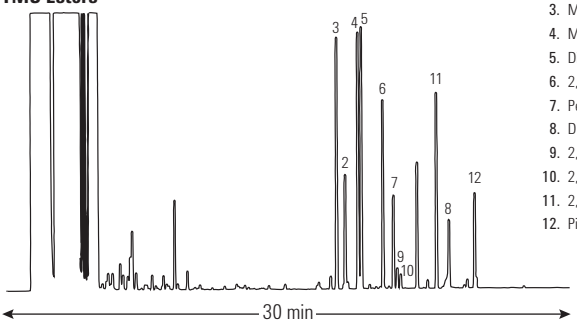
Column: **DB-1701**
123-0732
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 50°C
Oven: 50°C for 1 min
50-160°C at 10°/min
160°C for 3 min
160-260°C at 10°/min
260°C for 5 min
Injection: Splitless, 250°C
45 sec purge activation time
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 0.1 µg/µL standard in methanol

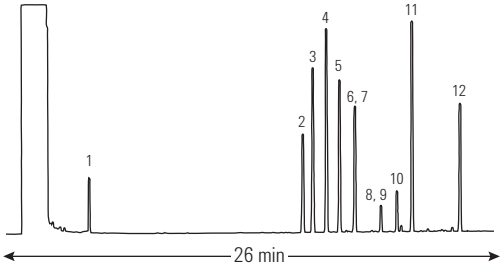
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

TMS Esters



Methyl Ethers



GCEP018

1. Dalapon
2. Dicamba
3. MCPP
4. MCPA
5. Dichloroprop
6. 2,4-D
7. Pentachlorophenol
8. Dinoseb
9. 2,4,5-TP
10. 2,4,5-T
11. 2,4-DB
12. Picloram

Phenoxy Acid Herbicides - Methyl Derivatives, EPA 8151A

Column: **DB-35ms**
123-3832
30 m x 0.32 mm, 0.25 µm
123-1236

Carrier: Helium at 45 cm/sec (EPC in constant flow mode)

Oven: 50°C for 0.5 min
50-100°C at 25°C/min
100-320°C at 12°C/min
320°C for 2 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: µECD, 350°C
Nitrogen makeup gas
(column + makeup flow =
30 mL/min constant flow)

Sample: 50 pg per component

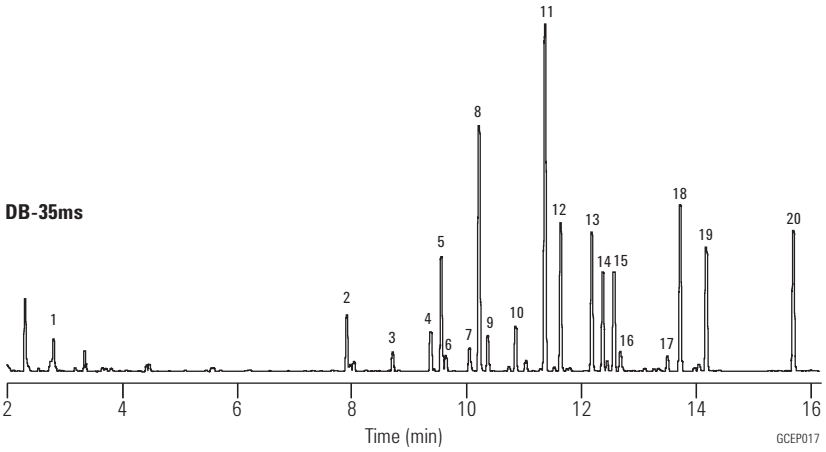
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Dalapon
2. 3,5-Dichlorobenzoic acid
3. 4-Nitrophenol
4. Methyl-2,4-dichlorophenylacetate (SS)
5. Dicamba
6. MCPP
7. MCPA
8. 4,4
9. Dichloroprop
10. 2,4-D
11. Pentachlorophenol
12. 2,4,5-T,P
13. 2,4,5-T
14. Chloramben
15. Dinoseb
16. 2,4-DB
17. Bentazone
18. DCPA
19. Picloram
20. Acifluorofen



Nitrogen Containing Herbicides (EPA Method 507)

Column: **DB-35**
125-1937
30 m x 0.53 mm, 0.50 µm

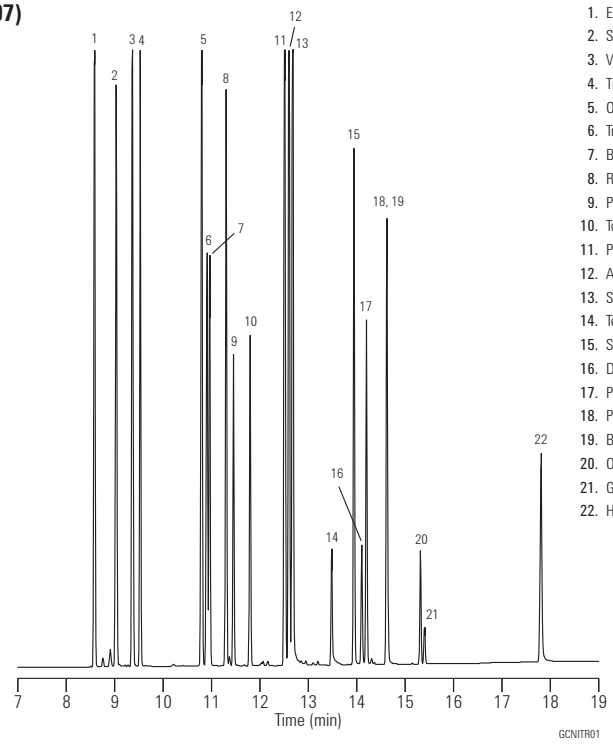
Carrier: Helium at 38 cm/sec (5 mL/min), measured at 150°C

Oven: 60°C for 1 min
60-290°C at 15°/min
290°C for 5 min

Injection: Megabore Direct, 290°C, 1 µL of 3 ng/µL standard

Detector: NPD, 290°C

1. Eptam
2. Sutan
3. Vernam
4. Tillam
5. Ordram
6. Treflan
7. Balan
8. Ro-Neet
9. Propachlor
10. Tolban
11. Propazine
12. Atrazine
13. Simazine
14. Terbacil
15. Sencor
16. Dual
17. Paarlan
18. Prowl
19. Bromacil
20. Oxadiazon
21. GOAL
22. Hexazinone



Environmental Applications, Semivolatiles

US EPA Method 8270 Short Mix

Column: **DB-5ms Ultra Inert**
122-5532UI
30 m x 0.25 mm, 0.25 µm

Carrier: Helium constant flow 30 cm/s

Oven: 40°C (1 min) to 100°C (15°C/min), 10°C to 210°C (1 min), 5°C/min. to 310°C (8 min)

Injection: Split/splitless; 260°C, 53.7 mL/min. total flow, purge flow 50 mL/min. on at 0.5 min., gas saver flow 80 mL/min. on at 3.0 min.

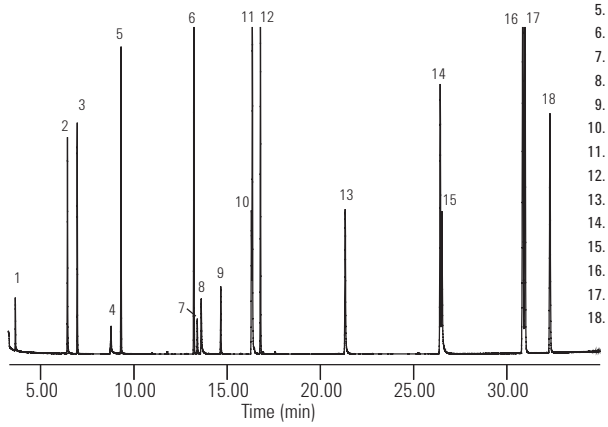
Detector: MSD source at 300°C, quadrapole at 180°C, transfer line at 290°C, full scan m/z 50-550

Sample: 1.0 µL splitless injection, 5 ng each component on column

Suggested Supplies

Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. N-nitrosodimethylamine
2. Aniline
3. 1,4 dichoronezene-D4
4. 1,4 dichlorobenzene
5. Naphthalene-D8
6. Acenapthene-D10
7. 2,4-dinitrophenol
8. 4-nitrophenol
9. 2-methyl-4,6-dinitrophenol
10. Pentachlorophenol
11. 4-aminobiphenyl
12. Phenanthrene- D10
13. Benzidine
14. Chrysene-D12
15. 3,3'-dichlorobenzidine
16. Benzo [b] fluoranthene
17. Benzo [k] fluoranthene
18. Perylene-D12

Semivolatile analysis using methods similar to US EPA Method 8270 is becoming increasingly important in environmental laboratories worldwide. Acidic compounds such as benzoic acid or 2,4-dinitrophenol – along with strong bases such as pyridine or benzidine – are examples of active species found in the semivolatile sample set. This DB-5ms Ultra Inert column demonstrates excellent inertness performance for these difficult analytes.

Analysis of Semivolatiles

Column A: **DB-5.625**
122-5632
30 m x 0.25 mm, 0.50 µm

Column B: **DB-5.625**
121-5622
20 m x 0.18 mm, 0.36 µm

Carrier: He constant-flow mode 1.1 mL/min

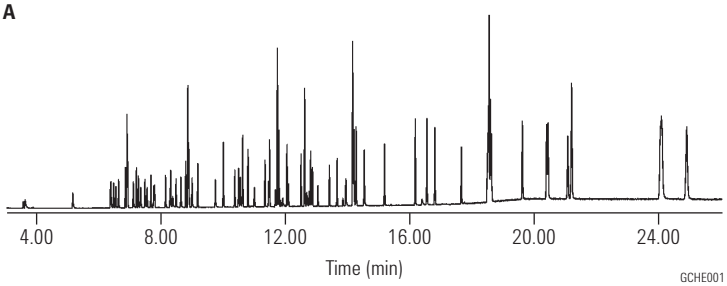
Oven: 40°C (1 min), 25°C/min to 320°C 4.80 min hold

Injection: Splitless 0.5 µL injected at 300°C, QuickSwap pressure 5.0 psi during acquisition, 80.0 psi during backflush with inlet set to 1.0 psi during backflush

Detector: Agilent 5975C Performance Turbo MSD equipped with 6 mm large-aperture drawout lens, part number G2589-20045

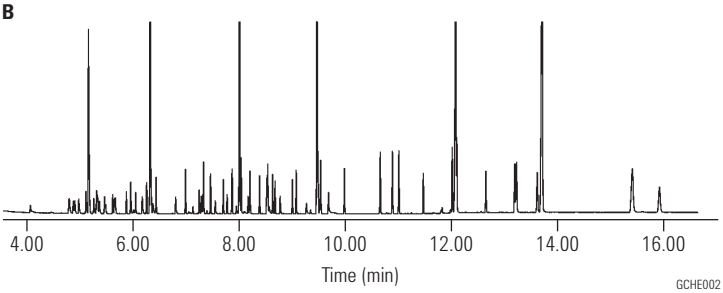
Translating 0.25 mm ID column method to 0.18 mm ID format results in 32% reduction in analysis time. Resolution of 77 peaks of interest is also maintained for the faster 0.18 mm ID separation.

A



U.S. EPA Method 8270, 5 ng/mL System Performance Check Compounds Chromatogram using a DB-5.625, 30 m x 0.25 mm x 0.5 µm

B



U.S. EPA Method 8270, 5 ng/mL System Performance Check Compounds Chromatogram using a DB-5.625, 20 m x 0.18 mm x 0.36 µm

Trace Level Polycyclic Aromatic Hydrocarbon (PAH) Analyses

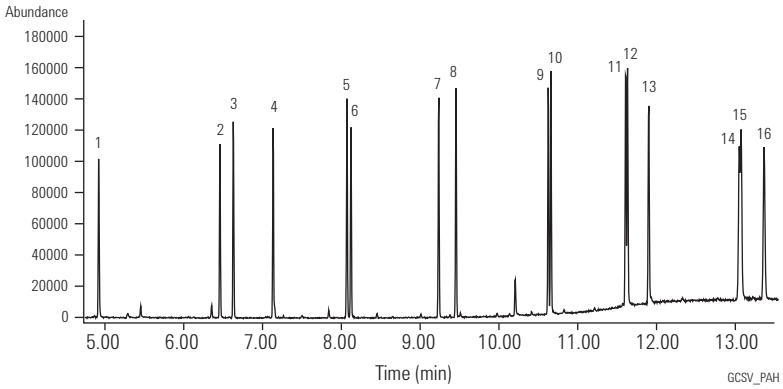
Column: **DB-5ms Ultra Inert**
122-5532UI
30 m x 0.25 mm, 0.25 µm

Carrier: Helium constant flow 30 cm/s

Oven: 40°C (1 min) to 100°C (15°C/min)
10°C to 210°C (1 min)
5°C/min. to 310°C (8 min)

Injection: Split/splitless; 260°C, 53.7 mL/min. total flow, purge flow 50 mL/min. on at 0.5 min., gas saver flow 80 mL/min. on at 3.0 min.

Detector: MSD source at 300°C
Quadrapole at 180°C
Transfer line at 290°C
Scan range 50-550 AMU



1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Phenanthrene
6. Anthracene
7. Fluoranthene
8. Pyrene
9. Benz[a]anthracene
10. Chrysene
11. Benzo[b]fluoranthene
12. Benzo[k]fluoranthene
13. Benzo[a]pyrene
14. Indeno[1,2,3-cd]pyrene
15. Dibenz[a,h]anthracene
16. Benzo[g,h,i]perylene

Tetrachlorodibenzo-p-furans

Column A: **DB-225**
122-2232
30 m x 0.25 mm, 0.25 µm

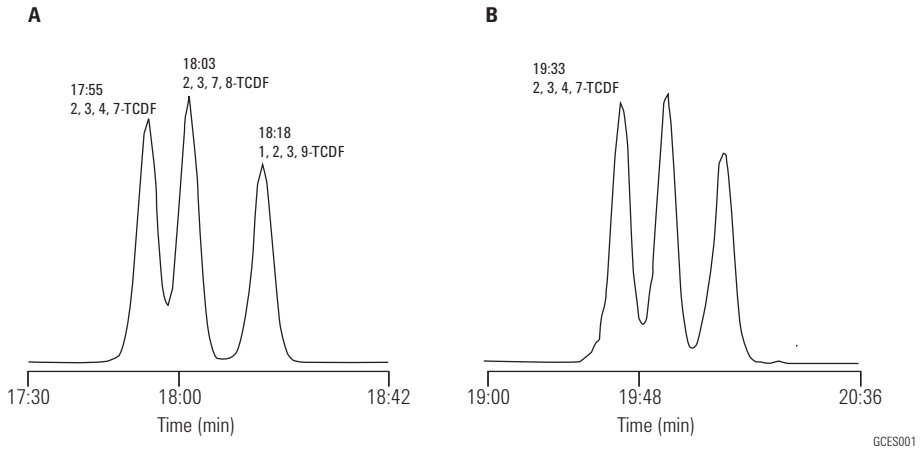
Column B: **DB-225ms**
122-2932
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 12 mL/min

Oven: 160-250°C at 7°/min
250°C until compounds elute

Injection: Splitless, 240°C

Detector: VG Autospec Ultima



Note the separation between 2,3,7,8-TCDF and 2,3,4,7-TCDF on DB-225 is also easily achievable (and actually a little better!) on DB-225ms.

Semivolatile Compounds, EPA Method 8270

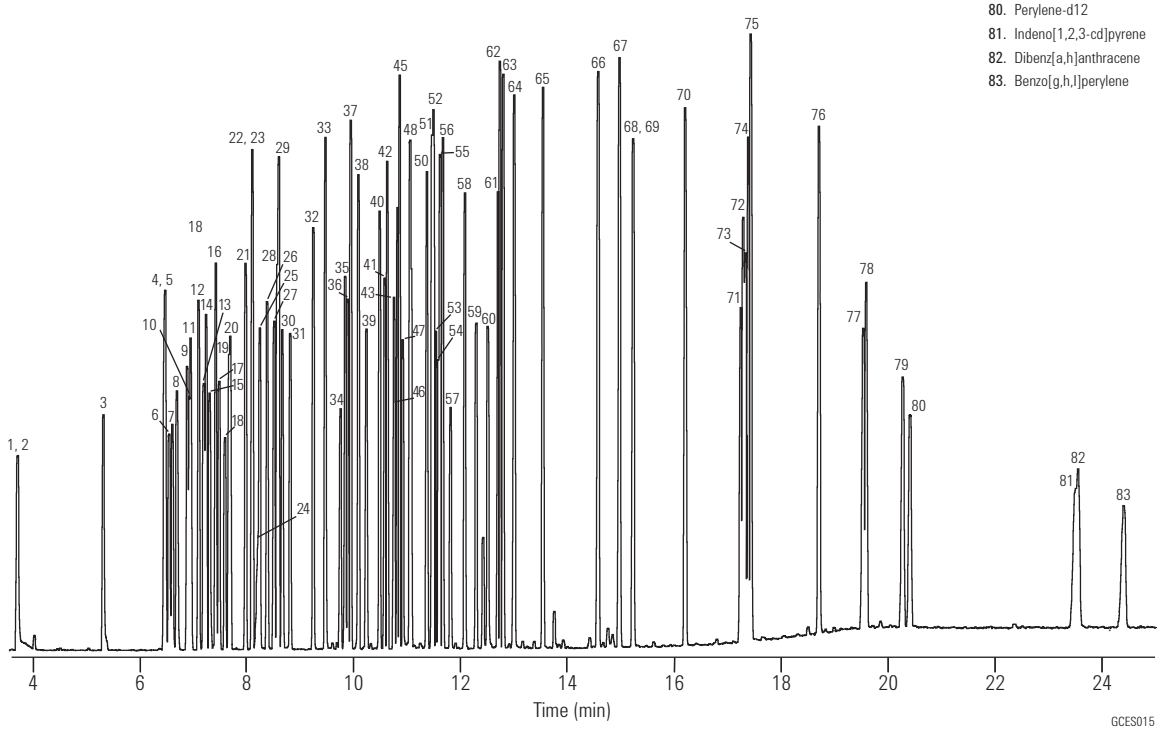
Column: **HP-5ms**
19091S-133
30 m x 0.25 mm, 0.50 µm

Carrier:	Ramped flow 1.2 mL/min for 0.0 min Ramp at 99 mL/min to 2.0 mL/min 2.0 mL/min for 0.35 min Ramp at 10 mL/min to 1.2 mL/min
Oven:	40°C for 1.0 min 40-100°C at 15°C/min 100-240°C at 20°C/min 240-310°C at 10°C/min
Injection:	Splitless, 250°C 30 mL/min purge flow at 0.35 min
Detector:	5973 MSD, 310°C transfer line Scan range 35-500 amu, 3.25 scans/sec
Sample:	1 µL of 50 ng standard

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. n-Nitrosodimethylamine
2. Pyridine
3. 2-Fluorophenol
4. Phenol-d5
5. Phenol
6. Aniline
7. Bis(2-chloroethyl) ether
8. 2-Chlorophenol
9. 1,3-Dichlorobenzene
10. 1,4-Dichlorobenzene-d4
11. 1,4-Dichlorobenzene
12. Benzyl alcohol
13. 1,2-Dichlorobenzene
14. 2-Methylphenol
15. Bis(2-chloroisopropyl) ether
16. 4-Methylphenol
17. n-Nitroso-di-n-propylamine
18. Hexachloroethane
19. Nitrobenzene-d5
20. Nitrobenzene
21. Isophorone
22. 2-Nitrophenol
23. 2,4-Dimethylphenol
24. Benzoic acid
25. Bis(2-chloroethoxy) methane
26. 2,4-Dichlorophenol
27. 1,2,4-Trichlorobenzene
28. Naphthalene-d8
29. Naphthalene
30. 4-Chloroaniline
31. Hexachlorobutadiene
32. 4-Chloro-3-methylphenol
33. 2-Methylnaphthalene
34. Hexachlorocyclopentadiene
35. 2,4,6-Trichlorophenol
36. 2,4,5-Trichlorophenol
37. 2-Fluorobiphenyl
38. 2-Chloronaphthalene
39. 2-Nitroaniline
40. Dimethylphthalate
41. 2,6-Dinitrotoluene
42. Acenaphthylene
43. 3-Nitroaniline
44. Acenaphthene-d10
45. Acenaphthene
46. 2,4-Dinitrophenol
47. 4-Nitrophenol
48. Dibenzofuran
49. 2,4-Dinitrotoluene
50. Diethylphthalate
51. 4-Chlorophenyl-phenyl ether
52. Fluorene
53. 4-Nitroaniline
54. 4,6-Dinitro-2-methylphenol
55. n-Nitrosodiphenylamine
56. Azobenzene
57. 2,4,6-Tribromophenol
58. 4-Bromophenyl-phenylether
59. Hexachlorobenzene
60. Pentachlorophenol
61. Phenanthrene-d10
62. Phenanthrene
63. Anthracene
64. Carbazole
65. Di-n-butylphthalate
66. Fluoranthene
67. Pyrene
68. Terphenyl-d14
69. Benzidine
70. Butylbenzylphthalate
71. 3,3'-Dichlorobenzidine
72. Benzo[a]anthracene
73. Chrysene-d12
74. Chrysene
75. Bis(2-ethylhexyl) phthalate
76. Di-n-octylphthalate
77. Benzo[b]fluoranthene
78. Benzo[k]fluoranthene
79. Benzo[a]pyrene
80. Perylene-d12
81. Indeno[1,2,3-cd]pyrene
82. Dibenz[a,h]anthracene
83. Benzo[g,h,i]perylene



A variety of Agilent HP-5ms and DB-5ms columns can be used for 8270 and similar semivolatiles applications. The column shown above was chosen to maximize inertness and robustness to residues with a thicker 0.5 µm film, but the price paid is a slightly longer run time.

An HP-5ms, 30 m x 0.25 mm ID, 0.25 µm, P/N 19091S-433 would give shorter run times, with slightly less inertness and robustness. A DB-5ms, 30 m x 0.25 mm ID, 0.25 µm, P/N 122-5532, would give slightly less inertness, but offer better resolution of PAHs such as Benzo[b]fluoranthene and Benzo[k]fluoranthene. A DB-5ms, 20 m x 0.18 mm x 0.18 µm, P/N 121-5522, can offer significantly reduced run times with a modest loss of inertness.

Dioxins and Furans

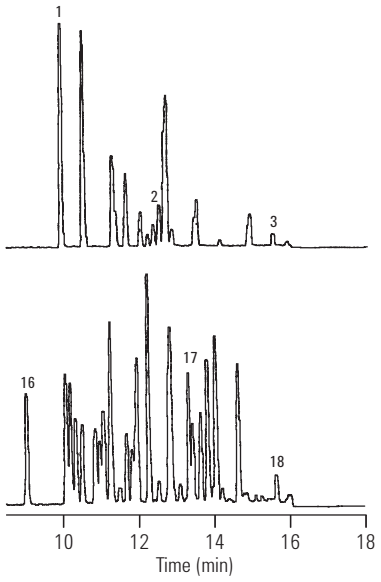
Column: **DB-Dioxin**
122-2461
60 m x 0.25 mm, 0.15 µm

Carrier: Helium at 34.3 cm/sec, measured at 250°C

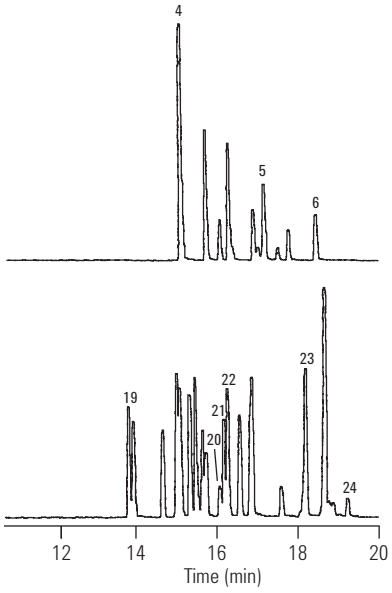
Oven: 180°C for 1 min
180-270°C at 2.5°/min
270°C for 40 min

1. 1,3,6,8-TCDD
2. 2,3,7,8-TCDD
3. 1,2,8,9-TCDD
4. 1,2,4,6,8-/1,2,4,7,9-PeCDD
5. 1,2,3,7,8 + unknown-PeCDD
6. 1,2,4,8,9-PeCDD
7. 1,2,4,6,7,9-/1,2,4,6,8,9-HeCDD
8. 1,2,3,4,7,8-HeCDD
9. 1,2,3,4,6,9-HeCDD
10. 1,2,3,6,7,8-HeCDD
11. 1,2,3,7,8,9-HeCDD
12. 1,2,3,4,6,7-HeCDD
13. 1,2,3,4,6,7,9-HpCDD
14. 1,2,3,4,6,7,8-HpCDD
15. OcCDD
16. 1,3,6,8-TCDF
17. 2,3,7,8-TCDF
18. 1,2,8,9-TCDF
19. 1,3,4,6,8-PeCDF
20. 1,2,3,4,8-PeCDF
21. 1,2,3,7,8-PeCDF
22. 1,2,3,4,6-PeCDF
23. 2,3,4,7,8-PeCDF
24. 1,2,3,8,9-PeCDF
25. 1,3,4,6,7,9-HeCDF
26. 1,2,3,4,7,8/1,2,4,6,8,9-HeCDF
27. 1,2,3,6,7,8-HeCDF
28. 2,3,4,6,7,8-HeCDF
29. 1,2,3,7,8,9-HeCDF
30. 1,2,3,4,8,9-HeCDF
31. 1,2,3,4,6,7,8-HpCDF
32. 1,2,3,4,7,8,9-HpCDF
33. OcCDF

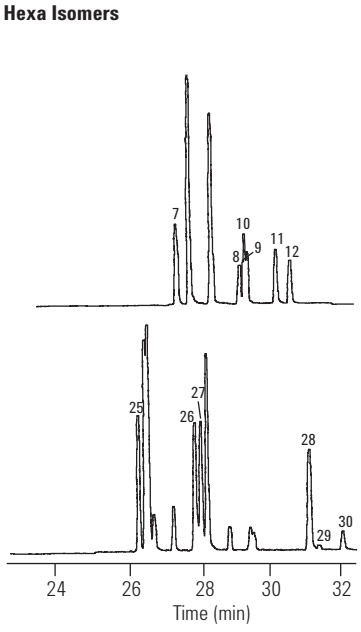
Tetra Isomers



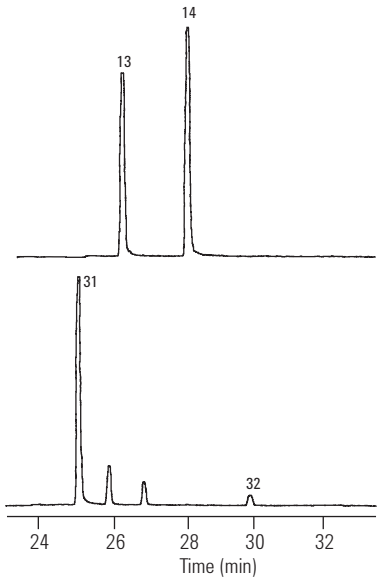
Penta Isomers



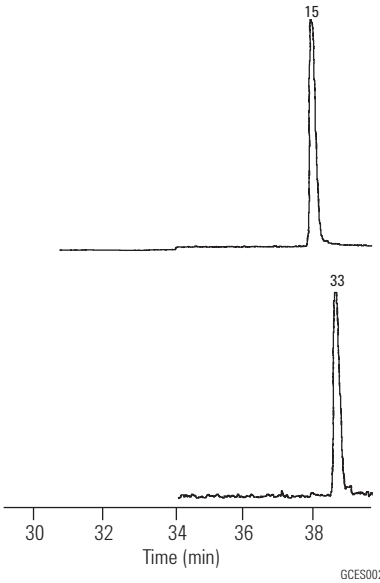
Hexa Isomers



Hepta Isomers



Octa Isomers



GCES002

PBDEs by ECD

Column: **DB-XLB**
15 m x 0.18 mm ID, 0.07 µm
Agilent Technologies custom column

Carrier: Hydrogen at 72 cm/sec at 100°C (4.0 mL/min), constant flow mode

Oven: 100°C for 0.5 min
100°C to 300°C at 30°C/min
300°C for 5 min

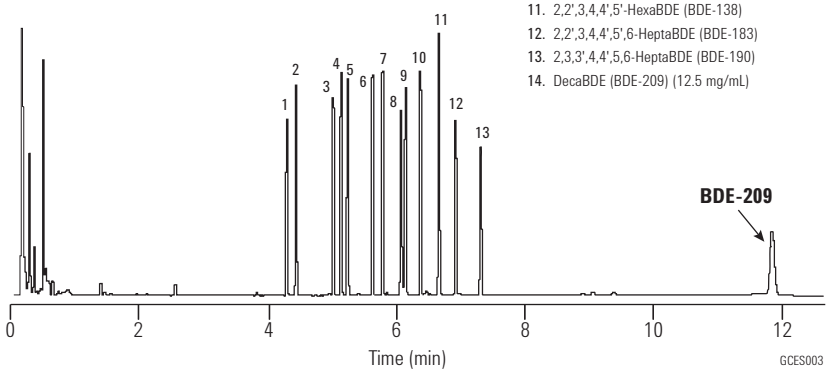
Injection: Split, 250°C
Split ratio 20:1

Detector: ECD, 300°C
Peak, Congener (2.5 mg/mL)

Sample: 1 µL

Special thanks to Accustandard, Inc. of New Haven , CT, for PBDE standards.

1. 2,2',4-TriBDE (BDE-17)
2. 2,4,4'-TriBDE (BDE-28)
3. 2,3',4',6-Tetra-BDE (BDE-71)
4. 2,2',4,4'-Tetra-BDE (BDE-47)
5. 2,3',4,4'-TetraBDE (BDE-66)
6. 2,2',4,4',6-PentaBDE (BDE-100)
7. 2,2',4,4',5-PentaBDE (BDE-99)
8. 2,2',3,4,4'-PentaBDE (BDE-85)
9. 2,2',4,4',5,6'-HexaBDE (BDE-154)
10. 2,2',4,4',5,5'-HexaBDE (BDE-153)
11. 2,2',3,4,4',5'-HexaBDE (BDE-138)
12. 2,2',3,4,4',5',6-HeptaBDE (BDE-183)
13. 2,3,3',4,4',5,6-HeptaBDE (BDE-190)
14. DecaBDE (BDE-209) (12.5 mg/mL)



Aroclors 1016-1268 (without 1221)

Column: **DB-XLB**
121-1232
30 m x 0.18 mm, 0.18 µm

Carrier: Helium at 37 cm/sec, measured at 150°C

Oven: 100°C for 1 min
100-265°C at 1.2°/min

Injection: Hot On-column, 250°C

Detector: MSD, 340°C transfer line, SIM

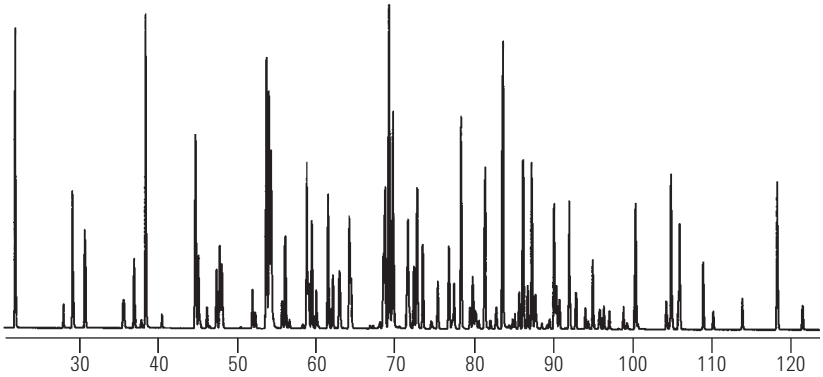
Sample: 1 µL in isooctane, 12.5 ppm

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



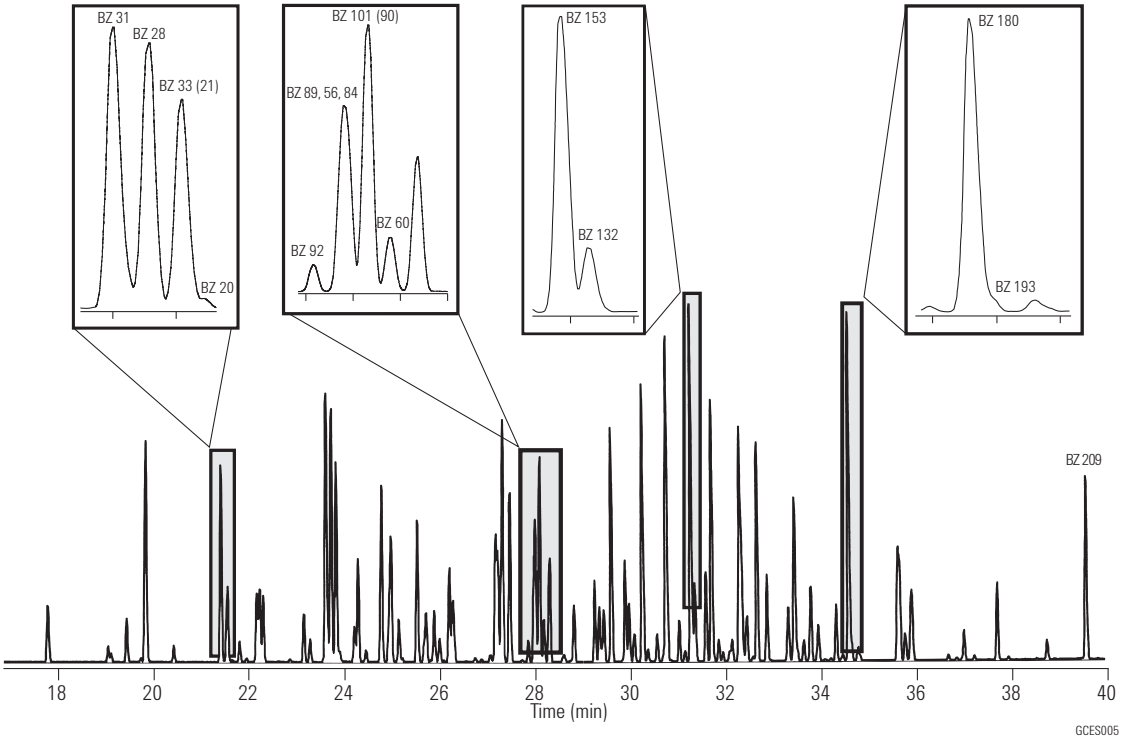
IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time	IUPAC	Retention Time
3	26.03	50	57.51	44	67.36	121	75.40	116	82.12	134	89.02	160	96.50	192	106.05
2	32.69	26	57.60	59	67.95	95	75.45	148	82.63	106	89.04	129	96.58	180	106.68
1	33.92	25	57.98	42	67.98	91	75.55	78	82.78	142	89.27	178	96.87	200	106.76
4	35.61	31	59.42	35	68.52	66	75.65	87	82.85	188	89.54	158	96.99	193	107.01
10	35.74	53	59.43	71	68.89	155	75.83	136	82.94	131	89.62	175	97.74	191	107.69
9	40.70	28	59.79	41	68.93	55	76.58	117	83.33	118	89.71	182	97.78	170	110.82
7	40.85	21	59.84	96	69.31	80	77.19	115	83.48	133	90.17	187	98.18	198	110.90
6	42.15	33	60.05	64	70.13	84	77.48	85	83.54	184	90.67	166	98.85	199	111.22
5	43.11	20	60.10	40	70.22	89	77.52	111	83.89	122	90.73	183	99.04	190	111.48
8	43.64	51	60.36	37	70.33	56	77.69	154	83.96	114	91.05	126	99.87	196	112.14
19	45.84	45	61.48	72	70.34	92	77.78	110	84.44	165	91.17	159	100.21	169	112.22
14	46.58	22	61.87	103	70.74	60	78.45	81	84.67	146	91.26	128	100.37	203	112.33
30	48.01	46	62.44	68	70.90	90	78.64	120	84.93	161	91.66	185	100.70	208	115.39
11	50.08	73	63.60	100	71.75	101	78.78	82	85.61	132	91.86	162	101.00	189	116.61
18	50.25	36	63.97	67	71.99	113	79.37	151	85.89	168	92.22	174	101.25	207	116.62
17	50.60	69	64.03	94	71.99	150	79.43	135	86.21	153	92.28	181	101.94	195	116.65
12	50.85	43	64.08	57	72.03	99	79.47	77	86.47	179	92.93	167	101.95	194	120.33
13	51.69	52	64.57	58	72.78	152	80.10	144	86.69	105	93.48	202	102.58	205	121.34
27	51.74	48	64.85	102	73.18	83	80.57	147	87.25	141	93.90	177	102.70	206	124.75
24	52.08	49	65.24	61	73.22	119	80.64	149	87.53	176	94.08	171	103.36	209	128.32
16	52.95	104	65.62	98	73.69	86	80.87	139	87.82	186	94.75	201	103.39		
15	53.46	39	65.80	93	73.83	112	80.89	143	87.83	137	95.11	204	103.47		
32	53.70	65	65.85	76	73.97	108	81.13	140	88.20	127	95.16	197	103.64		
54	54.87	47	65.86	63	74.03	145	81.15	124	88.29	130	95.41	173	105.18		
34	55.33	62	65.87	88	74.33	125	81.18	107	88.69	163	95.76	156	105.30		
23	55.54	38	65.96	74	74.68	97	81.48	123	88.81	164	95.77	172	105.56		
29	56.14	75	66.23	70	75.15	79	81.87	109	88.93	138	96.35	157	105.72		

Congeners in DIN Method PCBs

Column:	**DB-XLB** **122-1236** **30 m x 0.25 mm, 0.50 µm**
Carrier:	Helium at 34.2 cm/sec, measured at 150°C
Oven:	100°C for 1 min 100-320°C at 5.6°/min
Injection:	Hot On-column, 250°C Split flow 100 mL/min
Detector:	MSD, 300°C transfer line SIM of 221.9, 255.9, 291.9, 325.8, 359.8, 395.8, 429.7, 463.7
Sample:	2 µL dilute Aroclor mixture

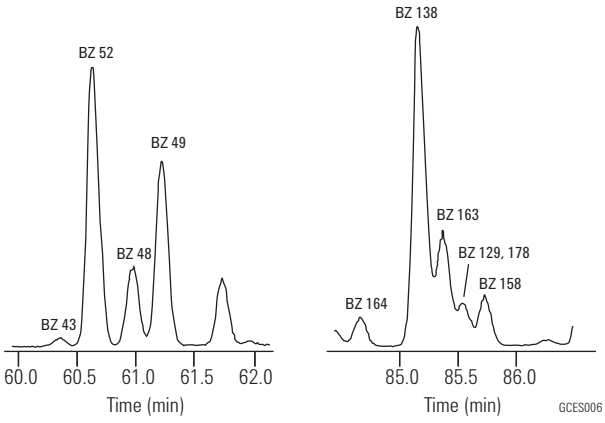
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267



Extended Temperature Program Resolving Congeners 52 and 138

Column:	**DB-XLB** **122-1236** **30 m x 0.25 mm, 0.50 µm**
Carrier:	Helium at 34.2 cm/sec, measured at 150°C
Oven:	100°C for 1 min 100-275°C at 1.6°/min
Injection:	Hot On-column, 250°C Split flow 100 mL/min
Detector:	MSD, 300°C transfer line SIM of 221.9, 255.9, 291.9, 325.8, 359.8, 395.8, 429.7, 463.7
Sample:	2 µL dilute Aroclor mixture



PCBs by EPA Method 8082

Column: **DB-35ms**
123-3832
30 m x 0.32 mm, 0.25 µm

Column: **DB-XLB**
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier:	Helium at 45 cm/sec (EPC in constant flow mode)
Oven:	110°C for 0.5 min 110-320°C at 15°C/min 320°C for 5 min
Injection:	Splitless, 250°C 30 sec purge activation time
Detector:	µECD, 350°C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)
Sample:	50 pg per component

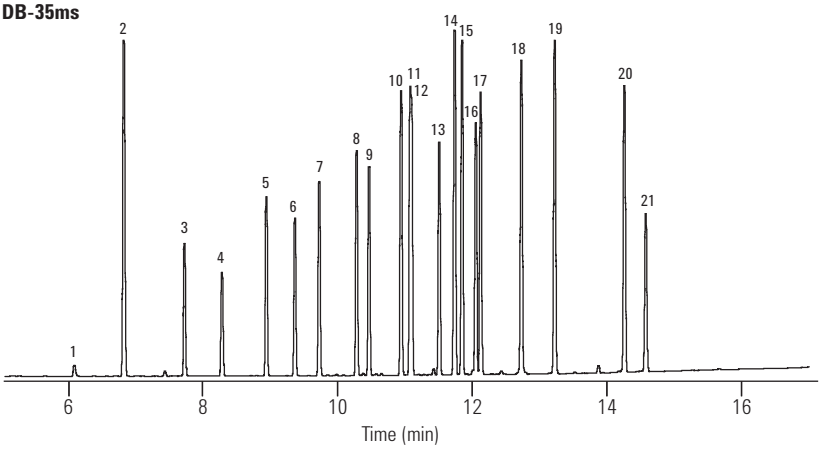
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

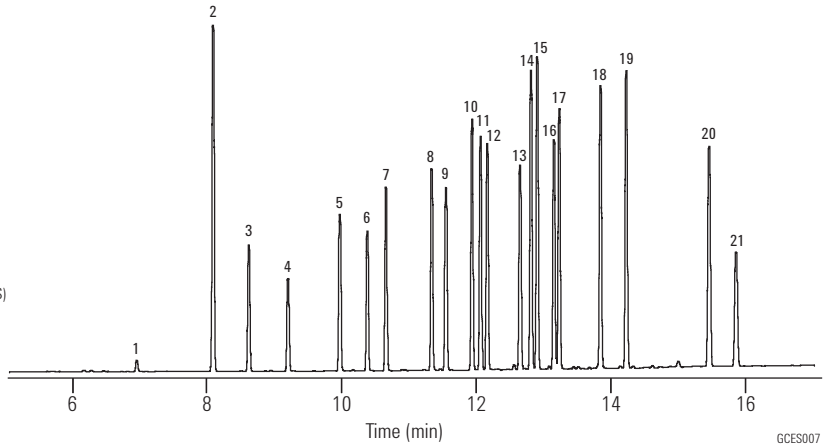
1. IUPAC 1
2. Tetrachloro-m-xylene (IS/SS)
3. IUPAC 5
4. IUPAC 18
5. IUPAC 31
6. IUPAC 52
7. IUPAC 44
8. IUPAC 66
9. IUPAC 101
10. IUPAC 87
11. IUPAC 110
12. IUPAC 151
13. IUPAC 153
14. IUPAC 141
15. IUPAC 137
16. IUPAC 187
17. IUPAC 183
18. IUPAC 180
19. IUPAC 170
20. IUPAC 206
21. Decachlorobiphenyl (IS/SS)

IS/SS - Internal Standard/ Surrogate Standard

DB-35ms



DB-XLB



GCES007



Pyrethrins

Column: **DB-1**
123-1032
30 m x 0.32 mm, 0.25 µm

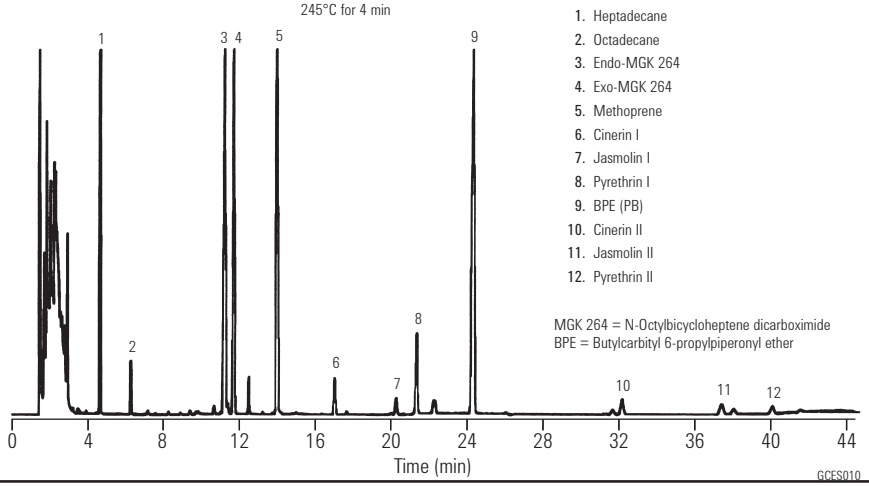
Chromatogram courtesy of Khan Nguyen and Richard Moorman of Sandoz Agro Inc.

Carrier: Helium at 39 cm/sec, measured at 150°C
Oven: 180°C for 11 min
180-200°C at 10°/min
200°C for 8 min
200-210°C at 10°/min
210°C for 18 min
210-245°C at 30°/min
245°C for 4 min

Injection: Split, 250°C
Split ratio 1:20
Detector: FID, 300°C
Helium makeup gas at 30 mL/min
Sample: 1 µL

1. Heptadecane
2. Octadecane
3. Endo-MGK 264
4. Exo-MGK 264
5. Methoprene
6. Cinerin I
7. Jasmolin I
8. Pyrethrin I
9. BPE (PB)
10. Cinerin II
11. Jasmolin II
12. Pyrethrin II

MGK 264 = N-Octylbicycloheptene dicarboximide
BPE = Butylcarbityl 6-propylpiperonyl ether



GCES010

Organotin Compounds I

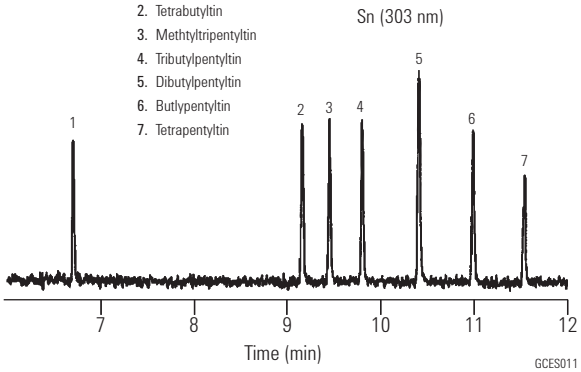
Column: **HP-1**
19091Z-012
25 m x 0.32 mm, 0.17 µm

Carrier: Helium, 100 kPa
Oven: 50°C for 1 min
50-260°C at 15°C/min
Injection: Splitless
Detector: AED, 330°C
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Dimethylpentyltin
2. Tetrabutyltin
3. Methtyltripentyltin
4. Tributylpentyltin
5. Dibutylpentyltin
6. Butlypentyltin
7. Tetrapentyltin



GCES011

Organotin Compounds II

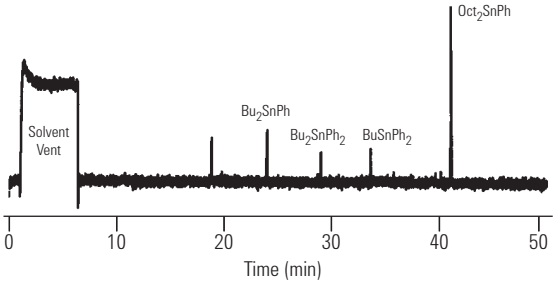
Column: **HP-5**
19091J-002
25 m x 0.20 mm, 0.11 µm

Carrier:	Helium, 0.75 mL/min constant flow
Oven:	60-360°C at 5°C/min
Injection:	Splitless, 300°C
Detector:	AED, 300°C Hg selective at 254 mm
Sample:	1 µL

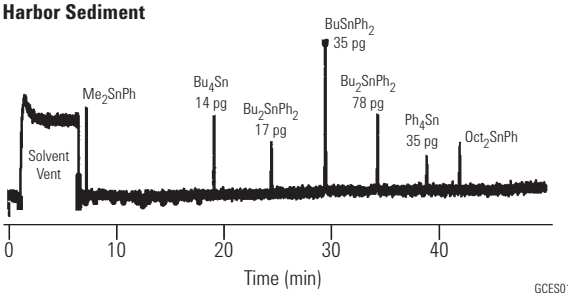
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

Standard Solution



Harbor Sediment



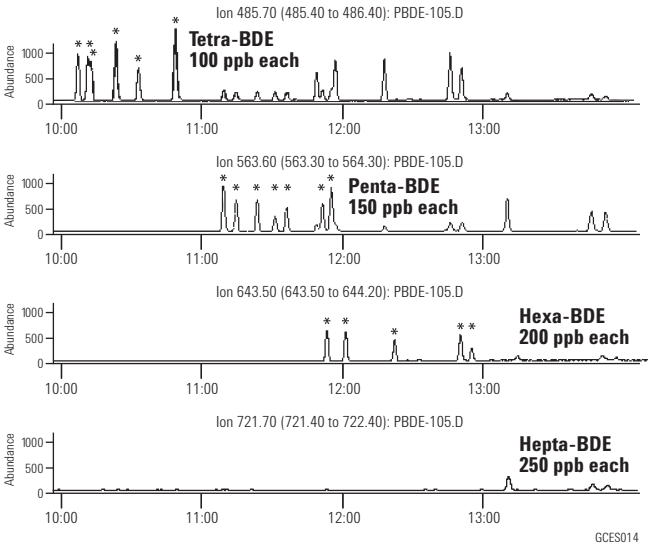
GCES013

PBDEs

Column: **DB-XLB**
122-1231
30 m x 0.25 mm, 0.10 µm

Carrier:	Helium at 38 cm/sec at 100°C (1.2 mL/min), constant flow mode
Oven:	100°C for 1 min; 100°C to 340°C at 20°C/min, 340°C for 12 min
Injection:	Cool on-column, oven-track mode
Detector:	Agilent 5973 MSD, 325°C transfer line, EI SIM (ions monitored: 231.8, 248.0, 327.9, 398.6, 400.5, 405.8, 845.7, 563.6, 643.5, 721.4, 799.3)
Sample:	0.5 µL

For a complete Application Note, visit www.agilent.com/chem, select "Online Literature" from the Literature Library and type 5989-0094EN into the "Keyword" field.



GCES014

EPA Method 525.2

Column: **DB-5ms**
122-5532
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, at 32 cm/sec, measured at 45°C, constant flow mode

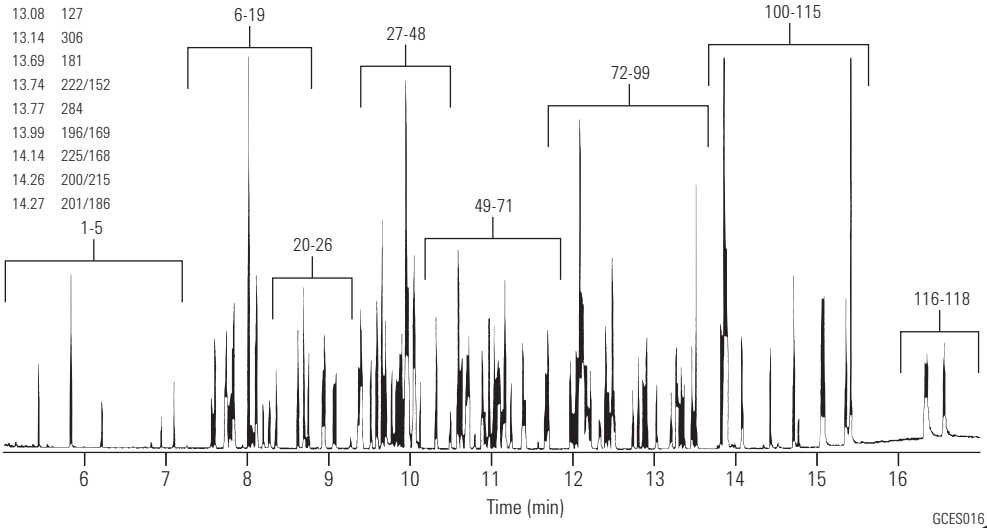
Oven: 45°C for 1 min
45-130°C at 30°/min
130°C for 3 min
130-180°C at 12°/min
180-240°C at 7°/min
240-325°C at 12°/min
325°C for 5 min

Injection: Splitless, 300°C
1.0 min purge activation time
FocusLiner

Detector: MSD, 325°C transfer line
Full scan m/z 45-450

Sample: Composite mixture of Accustandard Method 525.2 standards (M-525.2-SV-ASL, M-525.2-FS-ASL, M-525.2-CP-ASL, M-525.2-NP1-ASL, M-525.2-NP2-ASL): target compounds at 2 ng/µL, IS/SS at 5 ng/µL

Compound	RT	m/z
1. Isophorone	5.85	82
2. 1,3-Dimethyl-2-nitrobenzene (SS)	6.65	134
3. Dichlorvos	7.41	109
4. Hexachlorocyclo-pentadiene	8.87	237
5. EPTC	9.17	128
6. Mevinphos	10.09	127
7. Butylate	10.18	57/146
8. Vernolate	10.42	128
9. Dimethyl phthalate	10.45	163
10. Terrazole (Etridazole)	10.47	211/183
11. 2,6-Dinitrotoluene	10.56	165
12. Tillam (Pebulate)	10.61	128
13. Acenaphthylene	10.65	152
14. Acenaphthene-d10 (IS)	11	164
15. Chloroneb	11.17	191
16. 2-Chlorobiphenyl	11.19	188
17. Tebuthiuron	11.37	156
18. 2,4-Dinitrotoluene	11.51	165
19. Molinate	11.68	126
20. Diethyl phthalate	12.21	149
21. Fluorene	12.35	166
22. Propachlor	12.46	120
23. Ethoprop	12.82	158
24. Cycloate	12.86	83/154
25. Chlorpropham	13.08	127
26. Trifluralin	13.14	306
27. α-BHC	13.69	181
28. 2,3-Dichlorobiphenyl	13.74	222/152
29. Hexachlorobenzene	13.77	284
30. Gesatamine (Atraton)	13.99	196/169
31. Prometon	14.14	225/168
32. Atrazine	14.26	200/215
33. Simazine	14.27	201/186
34. β-BHC	14.28	181
35. Pentachlorophenol	14.35	266
36. Propazine	14.35	214/172
37. γ-BHC	14.52	181
38. Terbufos	14.62	57
39. Pronamide	14.69	173
40. Diazinon	14.76	137/179
41. Phenanthrene-d10 (IS)	14.85	188
42. Chlorothalonil	14.89	266
43. Phenanthrene	14.92	178
44. Terbacil	15.02	161
45. Methyl paraoxon	15.04	109
46. Disulfoton	15.05	88
47. Anthracene	15.06	178
48. δ-BHC	15.20	181
49. 2,4,5-Trichlorobiphenyl	15.59	256
50. Metribuzin	15.95	198
51. Alachlor	16.14	160
52. Simetryn	16.23	213
53. Ametryn	16.33	227/170
54. Heptachlor	16.36	100
55. Prometryne	16.40	241/184
56. Prebane (Terbutryne)	16.72	226/185
57. Bromacil	16.79	205
58. Di-n-butyl phthalate	16.90	149
59. 2,2',4,4'-Tetrachlorobiphenyl	17.02	292
60. Metolachlor	17.11	162
61. Dursban (Chlorpyrifos)	17.15	197/97
62. Cyanazine	17.23	225/68
63. Dacthal (DCPA methyl ester)	17.27	301
64. Aldrin	17.29	66
65. Triadimefon	17.43	57
66. Diphenamid	17.73	72/167
67. MGK-264 (Isomer A)	17.78	164/66
68. MGK-264 (Isomer B)	18.11	164
69. Heptachlor epoxide	18.28	81
70. 2,2',3',4,6-Pentachlorobiphenyl	18.34	326
71. Merphos	18.36	209/153
72. γ-Chlordane	18.88	373
73. Tetrachlorvinphos (Stirifos)	18.95	109
74. Butachlor	19.03	176/160
75. Pyrene-d10 (SS)	19.13	212
76. Pyrene	19.18	202
77. α-Chlordane	19.21	375/373
78. Endosulfan I	19.22	195
79. trans-Nonachlor	19.28	409
80. Fenamiphos	19.33	303/154
81. Napropamide	19.39	72
82. Tricyclazole	19.61	189
83. p,p'-DDE	19.76	246
84. DEF	19.84	57/169
85. 2,2',4,4',5,6'-Hexachlorobiphenyl	19.90	360
86. Dieldrin	19.92	79
87. Carboxin	19.97	143
88. Endrin	20.43	67/81
89. Chlorobenzilate	20.56	139
90. Endosulfan II	20.68	195
91. p,p'-DDD	20.77	235/165
92. Endrin aldehyde	21.01	67
93. Norflurazon	21.36	145
94. Benzyl butyl phthalate	21.49	149
95. Endosulfan sulfate	21.53	272
96. p,p'-DDT	21.61	235/165
97. Hexazinone	21.68	171
98. Bis(2-ethylhexyl) adipate	21.87	129
99. Triphenylphosphate (SS)	21.98	326/325
100. Endrin ketone (breakdown product)	22.52	67/317
101. 2,2',3,3',4,4',6-Heptachlorobiphenyl	22.59	394/396
102. Benz[a]anthracene	22.66	228
103. Chrysene-d12 (IS)	22.68	240
104. 2,2',3,3',4,5',6,6'-Octachlorobiphenyl	22.70	430/428
105. Methoxychlor	22.73	227
106. Chrysene	22.74	228
107. Bis(2-ethylhexyl) phthalate	23.10	149
108. Fenarimol	23.80	139
109. cis-Permethrin	24.38	183
110. trans-Permethrin	24.50	183
111. Benzo[b]fluoranthene	25.06	252
112. Benzo[k]fluoranthene	25.12	252
113. Fluridone	25.66	328
114. Benzo[a]pyrene	25.67	252
115. Perylene-d12 (SS)	25.78	264
116. Indeno[1,2,3-c,d]pyrene	27.63	276
117. Dibenz[a,h]anthracene	27.69	278
118. Benzo[g,h,i]perylene	28.11	276



GCES016

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

EPA Method 8061 (Phthalate Esters)

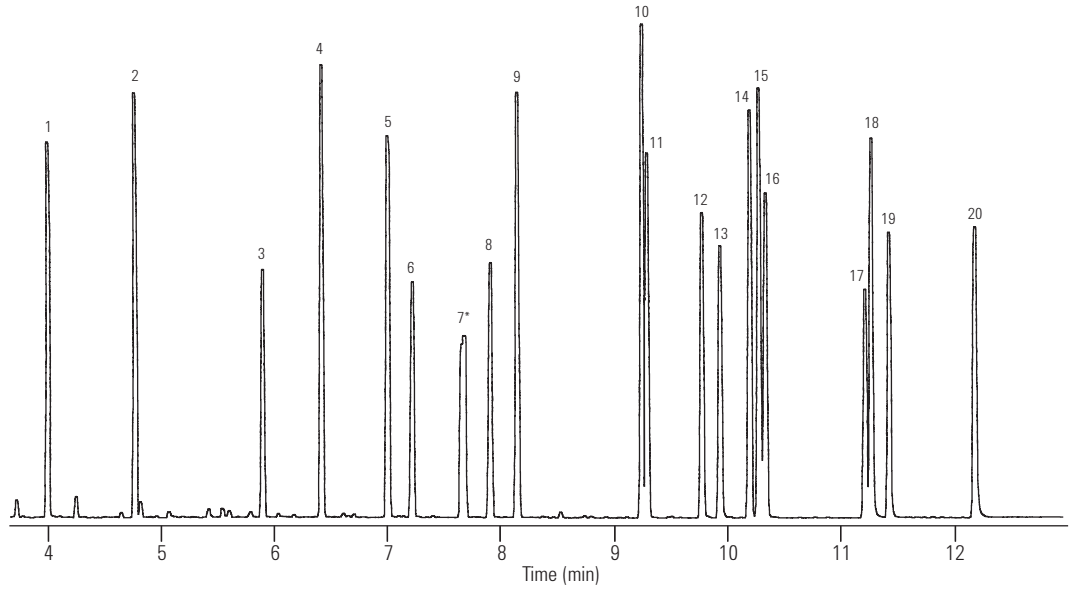
Column:	**DB-5ms** **121-5522** **20 m x 0.18 mm, 0.18 µm**
Carrier:	Helium at 49 cm/sec, measured at 80°C constant flow program
Oven:	80°C for 0.5 min 80-160°C at 30°/min 160-320°C at 15°/min
Injection:	Splitless, 300°C 30 sec purge activation time
Detector:	MSD, 325°C transfer line Full scan m/z 50-400
Sample:	1 µL of 20 ng/µL Method 8061 mixture (Accustandard) in hexane

1. Dimethyl phthalate
2. Diethyl phthalate
3. Benzyl benzoate (IS)
4. Diisobutyl phthalate
5. Di-n-butyl phthalate
6. Bis(4-methoxyethyl) phthalate
7. Bis(4-methyl-2-pentyl) phthalate *
8. Bis(2-ethoxyethyl) phthalate
9. Diamyl phthalate
10. Dihexyl phthalate
11. Butyl benzyl phthalate
12. Hexyl 2-ethylhexyl phthalate
13. Bis(2-n-butoxyethyl) phthalate
14. Dicyclohexyl phthalate
15. Bis(2-ethylhexyl) phthalate
16. Diphenyl phthalate (SS)
17. Diphenyl isophthalate (SS)
18. Di-n-octyl phthalate
19. Dibenzyl phthalate (SS)
20. Dinonyl phthalate

* Two isomers
IS - Internal Standard
SS - Surrogate Standard

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267



GCES017

PAHs

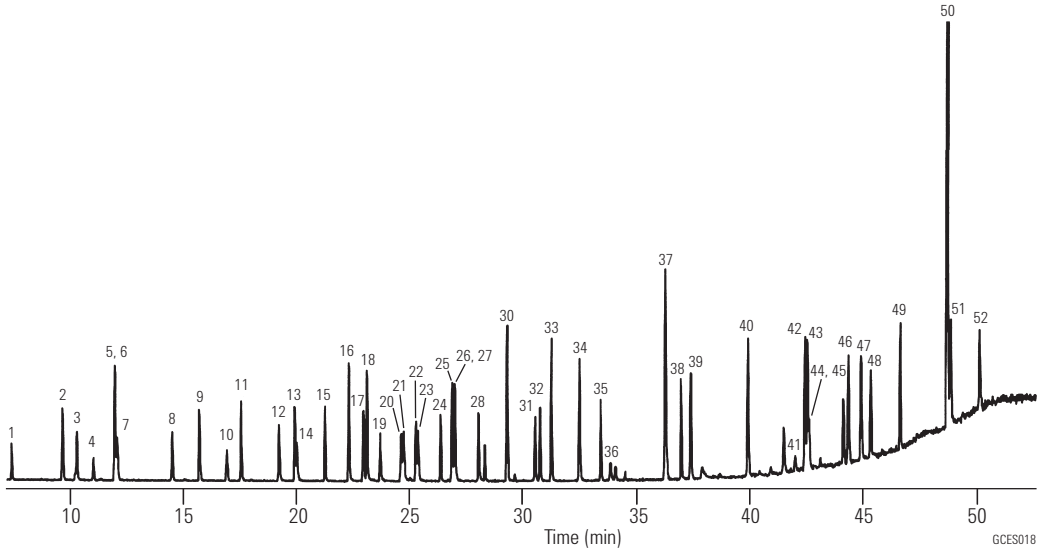
Column:	**DB-17ms** **122-4732** **30 m x 0.25 mm, 0.25 µm**
Carrier:	Helium at: 34.1 cm/sec, measured at 150°C
Oven:	95°C for 0.5 min 95-340°C at 5°/min 340°C for 5 min
Injection:	Split, 300°C Split ratio 1:40
Detector:	MSD, 340°C transfer line Scan 80-330 amu
Sample:	2 µL, PAH standard

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

The DB-35ms is also an excellent column for PAH analysis.

		Ions
1.	Naphthalene	128
2.	2-Methylnaphthalene	142, 141
3.	1-Methylnaphthalene	142, 141
4.	Azulene	128
5.	Acenaphthene	154
6.	Biphenyl	154
7.	2,6-Dimethylnaphthalene	156, 155
8.	Acenaphthalene	152
9.	Dibenzofuran	168, 139
10.	Dibenzo-p-dioxin	184
11.	Fluorene	166, 165
12.	1-Nitronaphthalene	127, 173
13.	9,10-Dihydroanthracene	179, 180
14.	2-Nitronaphthalene	127, 173
15.	2-Nitrobiphenyl	152, 115
16.	Dibenzothiophene	184
17.	Phenanthrene	178
18.	Anthracene	178
19.	3-Nitrobiphenyl	199, 152
20.	4-Nitrobiphenyl	199, 152
21.	5,6-Benzoquinoline	179
22.	Carbazole	167
23.	2-Methylanthracene	192, 191
24.	1,2,3,4-Tetrahydrofluoranthene	178, 206
25.	2-Phenylnaphthalene	204
26.	9-Methylanthracene	192, 191
27.	3,6-Dimethylphenanthrene	206, 191
28.	1,3-Dinitronaphthalene	126, 218
29.	1,5-Dinitronaphthalene	218, 114
30.	Fluoranthene	202
31.	2,2'-Dinitrobiphenyl	198, 139
32.	Pyrene	202
33.	2-Methylfluoranthene	216, 215
34.	2,3-Benzofluorene	216, 215
35.	Dodecahydrotriphenylene	240, 198
36.	1-Amino-4-nitronaphthalene	188, 115
37.	9-Phenylanthracene	254, 253
38.	1,2-Benzanthracene	228
39.	Chrysene	240
40.	Benz[a]anthracene-7,12-dione	258, 202
41.	2,7-Dinitrofluorene	256, 163
42.	Benzo[b]fluoroanthene	252
43.	Benzo[k]fluoranthene	252
44.	7,12-Dimethylbenz[a]anthracene	256, 241
45.	Benzo[e]pyrene	252
46.	Benzo[a]pyrene	252
47.	Perylene	252
48.	3-Methylcholanthrene	268
49.	9,10-Diphenylanthracene	330
50.	1,2,3,4-Dibenzanthracene	278
51.	1,2,5,6-Dibenzanthracene	278
52.	Benzo[g,h,i]perylene	276



Phenols

Column: **DB-5ms**
122-5532
30 m x 0.25 mm, 0.25 µm

Column: **DB-XLB**
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: He at 1.2 mL/min Constant Flow

Oven: 40°C for 2.00 min
40-100°C at 40°C/ min
100°C for 0.50 min
100-140°C at 2°C/min
140-340°C at 30°C/min

Injection: Pulsed Splitless, 200°C
Pulse Pressure & Time: 25.0 psi for 1.00 min
Purge Flow & Time: 50.0 mL/min for 0.25 min
Gas Saver Flow & Time: 20.0 mL/min for 3.00 min

Detector: MSD, 320°C Transfer Line
Quadrapole at 150°C
Source at 230°C

1. Phenol
2. 2-Chlorophenol
3. 2-Methylphenol
4. 4-Methylphenol
5. 3-Methylphenol
6. 2-Chloro-5-methylphenol
7. 2,6-Dimethylphenol
8. 2-Nitrophenol
9. 2,4-Dimethylphenol
10. 2,5-Dimethylphenol
11. 2,4-Dichlorophenol
12. 2,3-Dimethylphenol
13. 2,5-Dichlorophenol
14. 2,3-Dichlorophenol
15. 2-Chlorophenol
16. 4-Chlorophenol
17. 3,4-Dimethylphenol
18. 2,6-Dichlorophenol
19. 4-Chloro-2-methylphenol
20. 4-Chloro-3-methylphenol
21. 2,3,5-Trichlorophenol
22. 2,4-Dibromophenol
23. 2,4,6-Trichlorophenol
24. 2,4,5-Trichlorophenol
25. 2,3,4-Trichlorophenol
26. 3,5-Dichlorophenol
27. 2,3,6-Trichlorophenol
28. 3,4,-Dichlorophenol
29. 3-Nitrophenol
30. 2,5-Dinitrophenol
31. 2,4-Dinitrophenol
32. 4-Nitrophenol
33. 2,3,5,6-Tetrachlorophenol
34. 2,3,4,5-Tetrachlorophenol
35. 2,3,4,6-Tetrachlorophenol
36. 3,4,5-Trichlorophenol
37. 2-Methyl-4,6-dinitrophenol
38. Pentachlorophenol
39. Dinoseb
40. 2-Cyclohexyl-4,6-dinitrophenol

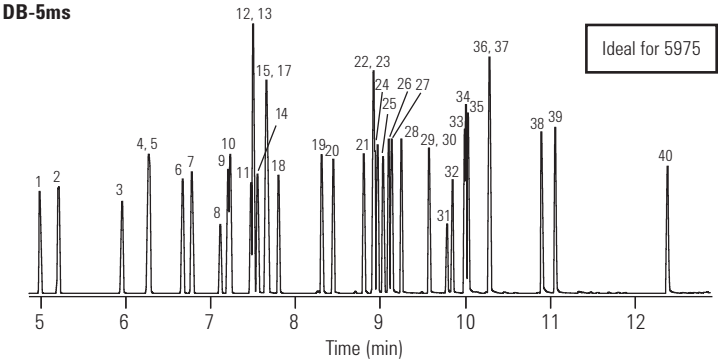
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

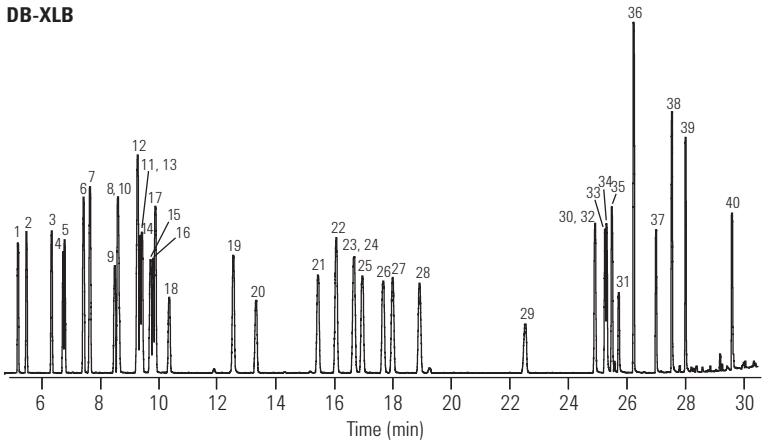
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

DB-5ms



DB-XLB



GCES019

EPA Method 552.2

Column: **DB-35ms**
123-3832
30 m x 0.32 mm, 0.25 µm

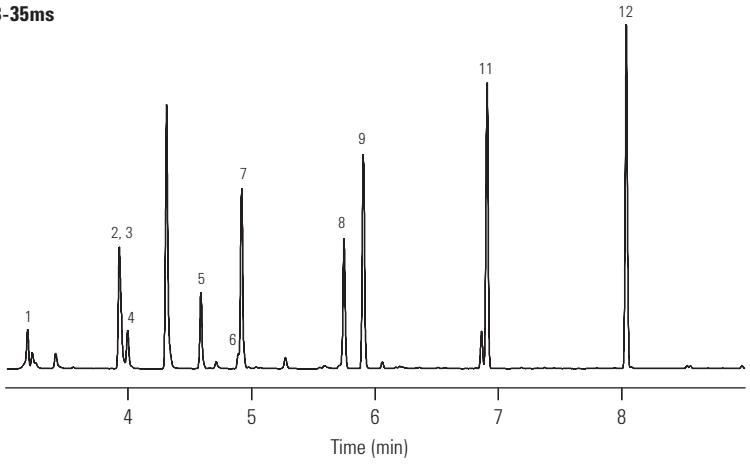
Column: **DB-XLB**
123-1236
30 m x 0.32 mm, 0.50 µm

Carrier:	Helium at 45 cm/sec (EPC in constant flow mode)
Oven:	40°C for 0.5 min 40-200°C at 15°C/min 200°C for 2 min
Injection:	Splitless, 250°C 30 sec purge activation time
Detector:	µECD, 350°C Nitrogen makeup gas (column + makeup flow = 30 mL/min constant flow)
Sample:	50 pg per component

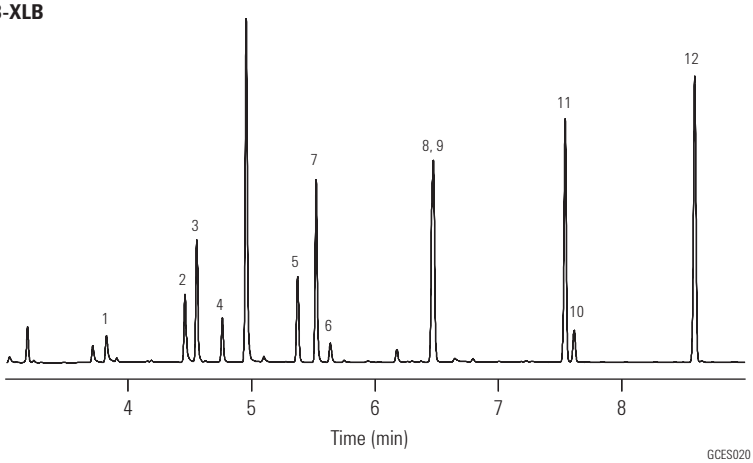
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

DB-35ms



DB-XLB



GCES020

1. Chloroacetic acid
2. Bromoacetic acid
3. Dichloroacetic acid
4. Dalapon
5. Trichloroacetic acid
6. 1,2,3-Trichloropropane (IS)
7. Bromochloroacetic acid
8. Bromodichloroacetic acid
9. Dibromoacetic acid
10. 2,3-Dibromopropionic acid (SS)
11. Chlorodibromoacetic acid
12. Tribromoacetic acid

IS - Internal Standard
SS - Surrogate Standard

Environmental Applications, Volatiles

EPA Volatiles by GC/MS (Split Injector)

Column: **DB-VRX**
122-1564
60 m x 0.25 mm, 1.40 µm

Carrier: Helium at 30 cm/sec, measured at 45°C

Oven: 45°C for 10 min
45-190°C at 12°/min
190°C for 2 min
190-225°C at 6°/min
225°C for 1 min

Sampler: Purge and Trap (O.I.A. 4560)
Purge: Helium for 11 min at 40 mL/min
Trap: Tenax/Silica Gel/Carbosieve
Preheat: 175°C
Desorb: 220°C for 0.6 min

Injection: Split, 110°C
Split flow 30 mL/min

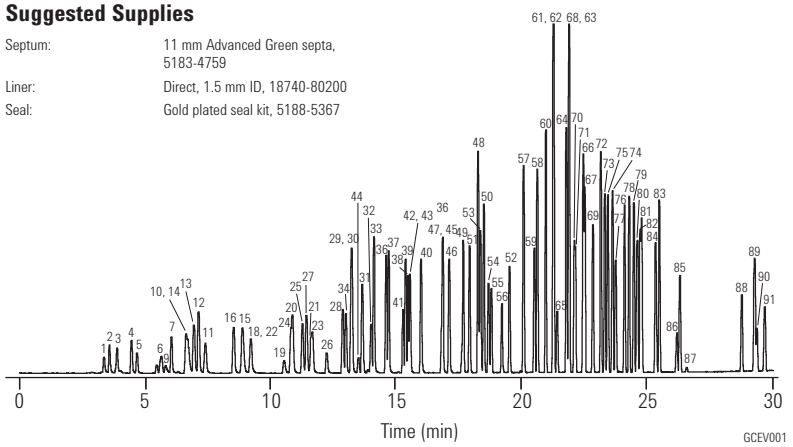
Detector: MSD, 235°C transfer line
Full scan 35-260 amu (m/z 44 subtracted)

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal kit, 5188-5367



Column: **DB-624**
122-1364
60 m x 0.25 mm, 1.40 µm

Carrier: Helium at 31 cm/sec, measured at 40°C

Oven: 45°C for 3 min
45-90°C at 8°/min
90°C for 4 min
90-200°C at 6°/min
200°C for 5 min

Sampler: Purge and Trap (O.I.A. 4560)
Purge: Helium for 11 min at 40 mL/min
Trap: Tenax/Silica Gel/Carbosieve
Preheat: 175°C
Desorb: 220°C for 0.6 min

Injection: Split, 110°C
Split flow 30 mL/min

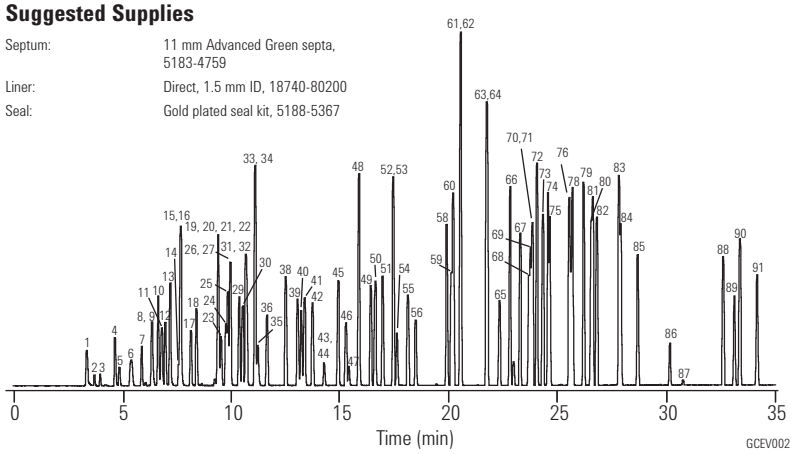
Detector: MSD, 235°C transfer line
Full scan 35-260 amu (m/z 44 subtracted)

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal kit, 5188-5367



1. Dichlorodifluoromethane
2. Chloromethane
3. Vinyl chloride
4. Bromomethane
5. Chloroethane
6. Trichlorofluoromethane
7. Diethyl ether
8. 1,1-Dichloroethene
9. Acetone
10. Iodomethane
11. Carbon disulfide
12. Allyl chloride
13. Methylene chloride
14. Acrylonitrile
15. Methyl-tert-butyl ether
16. trans-1,2-Dichloroethene
17. Hexane
18. 1,1-Dichloroethane
19. 2-Butanone
20. cis-1,2-Dichloroethene
21. 2,2-Dichloropropane
22. Propionitrile
23. Methyl acrylate
24. Methacrylonitrile
25. Bromochloromethane
26. Tetrahydrofuran
27. Chloroform
28. Pentafluorobenzene (IS)
29. 1,1,1-Trichloroethane
30. 1-Chlorobutane
31. 1,1-Dichloropropene
32. Carbon tetrachloride
33. Benzene
34. 1,2-Dichloroethane
35. 2,2-Dimethylhexane
36. Fluorobenzene (IS)
37. 1,4-Difluorobenzene (IS)
38. Trichloroethene
39. 1,2-Dichloropropane
40. Methyl methacrylate
41. Dibromomethane
42. Bromodichloromethane
43. 2-Nitropropane
44. Chloroacetonitrile
45. cis-1,3-Dichloropropene
46. 4-Methyl-2-pentanone
47. 1,1-Dichloro-2-propanone
48. Toluene
49. trans-1,3-Dichloropropene
50. Ethyl methacrylate
51. 1,1,2-Trichloroethane
52. Tetrachloroethene
53. 1,3-Dichloropropane
54. 2-Hexanone
55. Dibromochloromethane
56. 1,2-Dibromoethane
57. 1-Chloro-3-fluorobenzene (IS)
58. Chlorobenzene
59. 1,1,1,2-Tetrachloroethane
60. Ethylbenzene
61. m-Xylene
62. p-Xylene
63. o-Xylene
64. Styrene
65. Bromoform
66. Isopropylbenzene
67. 4-Bromofluorobenzene (SS)
68. 1,1,2,2-Tetrachloroethane
69. Bromobenzene
70. 1,2,3-Trichloropropane
71. trans-1,4-Dichloro-2-butene
72. n-Propylbenzene
73. 2-Chlorotoluene
74. 1,3,5-Trimethylbenzene
75. 4-Chlorotoluene
76. tert-Butylbenzene
77. Pentachloroethane
78. 1,2,4-Trimethylbenzene
79. sec-Butylbenzene
80. 1,3-Dichlorobenzene
81. p-Isopropyltoluene
82. 1,4-Dichlorobenzene
83. n-Butylbenzene
84. 1,2-Dichlorobenzene
85. Hexachloroethane
86. 1,2-Dibromo-3-chloropropane
87. Nitrobenzene
88. 1,2,4-Trichlorobenzene
89. Hexachlorobutadiene
90. Naphthalene
91. 1,2,3-Trichlorobenzene

IS - Internal Standard
SS - Surrogate Standard
Note: Some compounds not present in both chromatograms

High Speed VOC, EPA Method 8260

Column: **DB-VRX**
121-1524
20 m x 0.18 mm, 1.00 µm

Carrier: Helium at 55 cm/sec (1.5 mL/min)

Oven:
45°C for 3.0 minutes
45-190°C at 36°C/min
190-225°C at 20°C/min
225°C for 0.5 min

Sampler: Purge and Trap (Tekmar 3100)
Purge: 11 min
Trap: Vocarb 3000
Preheat: 245°C
Desorb: 250°C for 1min
Bake: 260°C for 10 min
Line & valve: 100°C

Injection: Split, 150°C
Split ratio 60:1

Detector: Agilent 5973 MSD,
Scan range: 35-260 amu
Scan rate: 3.25 scans/sec
Quad temperature: 150°C
Source temperature: 200°C
Transfer line temp: 200°C

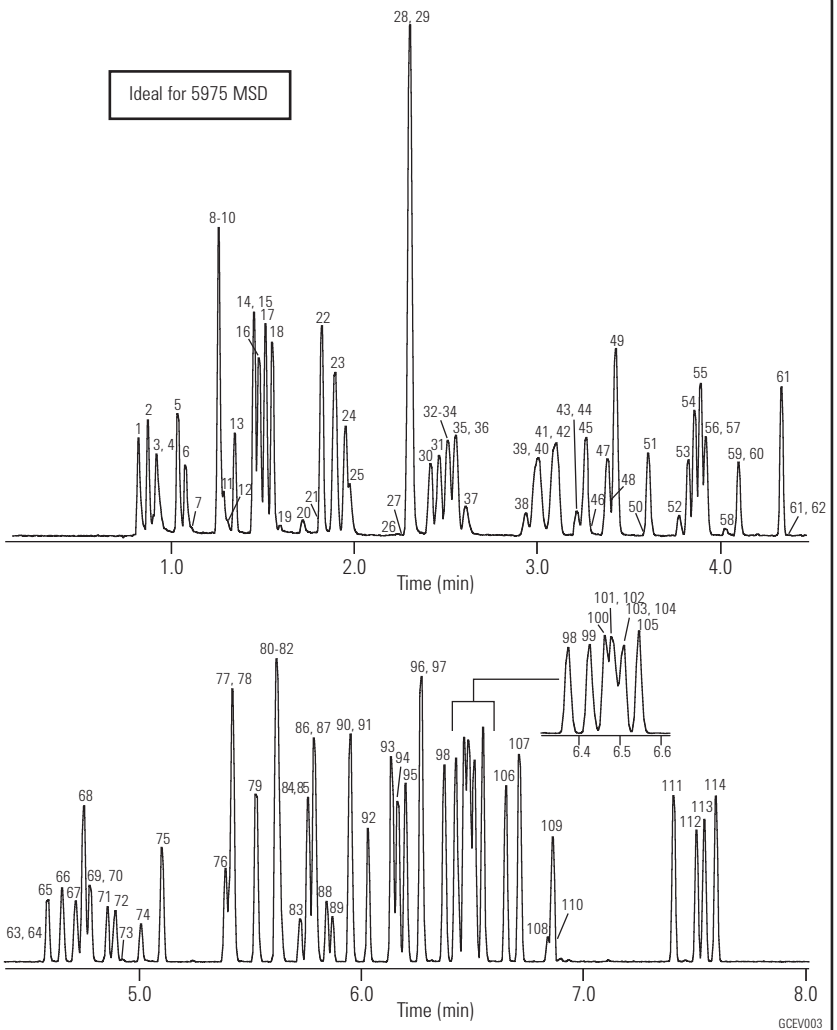
Sample: 5 mL
- Halogentated and aromatic analytes at 40 ppb
- Internal standards at 20 ppb
- Polar analytes (i.e., ethers, alcohols and ketones at 100-800 ppb)

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885



1. Dichlorodifluoromethane
2. Chloromethane
3. Hydroxypropionitrile
4. Vinyl chloride
5. Bromomethane
6. Chloroethane
7. Ethanol
8. Acetonitrile
9. Acrolein
10. Trichlorofluoromethane
11. Isopropyl alcohol
12. Acetone
13. Ethyl ether
14. 1,1-Dichloroethene
15. tert-Butyl alcohol
16. Acrylonitrile
17. Methylene chloride
18. Allyl chloride
19. Allyl alcohol
20. 1-Propanol
21. Propargyl alcohol
22. trans-1,2-Dichloroethene
23. MTBE
24. 1,1-Dichloroethane
25. Propionitrile
26. 2-Butanone
27. Diisopropyl ether
28. cis-1,2-Dichloroethene
29. Methacrylonitrile
30. Bromochloromethane
31. Chloroform
32. 2,2-Dichloropropane
33. Ethyl acetate
34. Ethyl-tert-butyl ether
35. Methyl acrylate
36. Dibromofluoromethane (IS)
37. Isobutanol
38. Dichloroethane-d4 (IS)
39. Pentafluorobenzene
40. 1,2-Dichloroethane
41. 1,1,1-Trichloroethane
42. 1-Chlorobutane
43. Crotonaldehyde
44. 2-Chloroethanol
45. 1,1-Dichloropropene
46. 1-Butanol
47. Carbon tetrachloride
48. Chloroacetonitrile
49. Benzene
50. tert-Amylmethyl ether
51. Fluorobenzene (IS)
52. 2-Pentanone
53. Dibromomethane
54. 1,2-Dichloropropane
55. Trichloroethene
56. Bromodichloromethane
57. 2-Nitropropane
58. 1,4-Dioxane
59. Epichlorohydrin
60. Methyl methacrylate
61. cis-1,3-Dichloropropene
62. Propiolactone
63. Bromoacetone
64. Pyridine
65. trans-1,3-Dichloropropene
66. 1,1,2-Trichloroethane
67. Toluene-d8 (IS)
68. Toluene
69. 1,3-Dichloropropane
70. Paraldehyde
71. Ethyl methacrylate
72. Dibromochloromethane
73. 3-Chloropropionitrile
74. 1,2-Dibromoethane
75. Tetrachloroethene
76. 1,1,1,2-Tetrachloroethane
77. 1-Chlorohexane
78. Chlorobenzene
79. Ethylbenzene
80. Bromoform
81. m-Xylene
82. p-Xylene
83. trans-Dichlorobutene
84. 1,3-Dichloro-2-propanol
85. Styrene
86. 1,1,2,2-Tetrachloroethane
87. o-Xylene
88. 1,2,3-Trichlropropane
89. cis-Dichlorobutene
90. 4-Bromofluorobenzene (IS)
91. Isopropylbenzene
92. Bromobenzene
93. Propylbenzene
94. 2-Chlorotoluene
95. 4-Chlorotoluene
96. 1,3,5-Trimethylbenzene
97. Pentachloroethane
98. tert-Butylbenzene
99. 1,2,4-Trimethylbenzene
100. sec-Butylbenzene
101. 1,3-Dichlorobenzene
102. Benzylchloride
103. 1,4-Dichlorobenzene-d4 (IS)
104. 1,4-Dichlorobenzene
105. Isopropyltoluene
106. 1,2-Dichlorobenzene
107. Butylbenzene
108. 1,2-Dibromo-3-chloropropane
109. Hexachloroethane
110. Nitrobenzene
111. 1,2,4-Trichlorobenzene
112. Naphthalene
113. Hexachlorobutadiene
114. 1,2,3-Trichlorobenzene

Extended Analyte List for EPA Method 8021

Column: **DB-624**
124-1374
75 m x 0.45 mm, 2.55 µm

Column: **DB-VRX**
124-1574
75 m x 0.45 mm, 2.55 µm

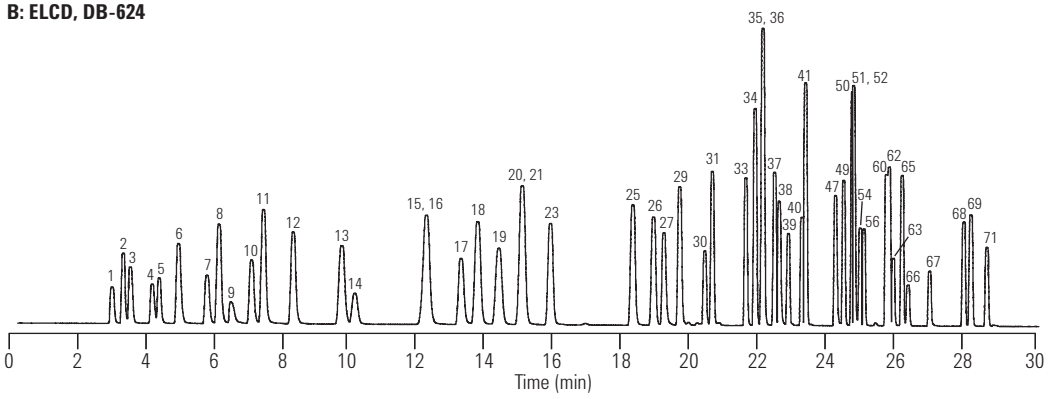
Carrier:	Helium at 9 mL/min, measured at 35°C
Oven:	35°C for 12 min 35-60°C at 5°/min 60°C for 1 min 60-200°C at 17°/min 200°C for 5 min
Sampler:	Purge and Trap (O.I.A. 4560) Trap: Vocarb 3000 Preheat: 175°C Desorb: 260°C for 1 min
Injection:	J&W LVI (Low Volume Injector), 150°C
Detector:	A: PID (O.I.A. 4430), 200°C Helium makeup gas at 20 mL/min B: ELCD (O.I.A. 4420), with NiCat reaction tube in the halogen mode, 950°C reactor temperature
Sample:	20 ppb per component in 5 mL water

Suggested Supplies

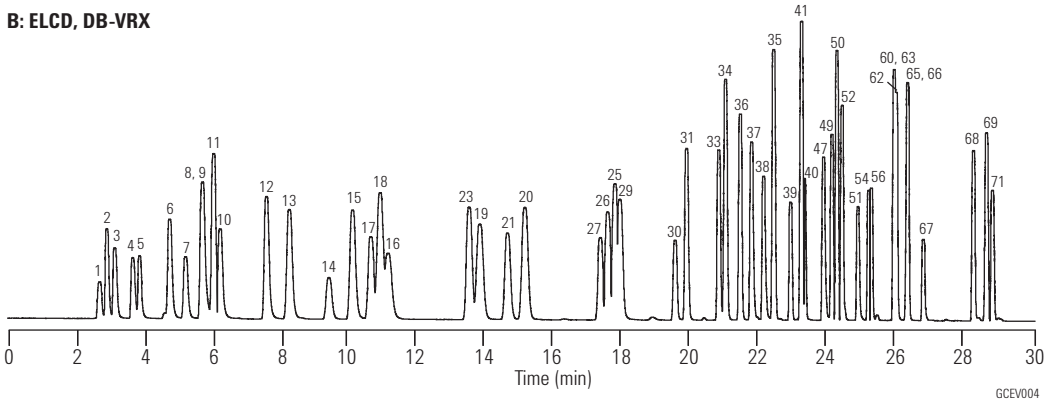
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885
Syringe:	11 mm Advanced Green septa, 5183-4759

1. Dichlorodifluoromethane
2. Chloromethane
3. Vinyl chloride
4. Bromomethane
5. Chloroethane
6. Trichlorofluoromethane
7. 2-Chloropropane (IS)
8. 1,1-Dichloroethene
9. Iodomethane
10. Allyl chloride
11. Methylene chloride
12. trans-1,2-Dichloroethene
13. 1,1-Dichloroethane
14. Chloroprene
15. cis-1,2-Dichloroethene
16. 2,2-Dichloropropane
17. Bromochloromethane
18. Chloroform
19. 1,1,1-Trichloroethane
20. Carbon tetrachloride
21. 1,1-Dichloropropene
22. Benzene
23. 1,2-Dichloroethane
24. Fluorobenzene (IS)
25. Trichloroethene
26. 1,2-Dichloropropane
27. Dibromomethane
28. Trifluorotoluene (IS)
29. Bromodichloromethane
30. 2-Chloroethyl vinyl ether
31. cis-1,3-Dichloropropene
32. Toluene
33. trans-1,3-Dichloropropene
34. 1,1,2-Trichloroethane
35. Tetrachloroethene
36. 1,3-Dichloropropane
37. Dibromochloromethane
38. 1,2-Dibromoethane
39. 1-Chloro-3-fluorobenzene (IS)
40. Chlorobenzene
41. 1,1,1,2-Tetrachloroethane
42. Ethylbenzene
43. m-Xlyene
44. p-Xylene
45. Styrene
46. o-Xylene
47. Bromoform
48. Isopropylbenzene
49. cis-1,4-Dichlorobutene
50. 1,1,2,2-Tetrachloroethane
51. Bromobenzene
52. 1,2,3-Trichloropropane
53. n-Propylbenzene
54. 2-Chlorotoluene
55. 1,3,5-Trimethylbenzene
56. 4-Chlorotoluene
57. tert-Butylbenzene
58. 1,2,4-Trimethylbenzene
59. sec-Butylbenzene
60. 1,3-Dichlorobenzene
61. p-Isopropyltoluene
62. 1,4-Dichlorobenzene
63. Benzyl chloride
64. n-Butylbenzene
65. 1,2-Dichlorobenzene
66. Bis(2-chloroisopropyl) ether
67. 1,2-Dibromo-3-chloropropane
68. 1,2,4-Trichlorobenzene
69. Hexachlorobutadiene
70. Naphthalene
71. 1,2,3-Trichlorobenzene

B: ELCD, DB-624



B: ELCD, DB-VRX



GCEV004

Fast VOC Analysis

Column: **DB-624**
121-1324
20 m x 0.18 mm, 1.00 µm

Carrier: Helium at 37 cm/sec, (constant flow mode)

Oven: 35°C for 4 min
35-200°C at 15°/min
200°C for 0.1 min
60-200°C at 17°/min

Sampler: Purge and trap (Tekmar LSC 3000)
Purge: Helium for 11 min at 50 mL/min
Trap:
Preheat: 250°C
Desorb: 260°C for 2 min
Line & valve: 100°C

Detector: MSD, 250°C transfer line
Full scan 35 -260 amu
3.25 scans per second

Sample: 10 ppb per component in 25 mL water

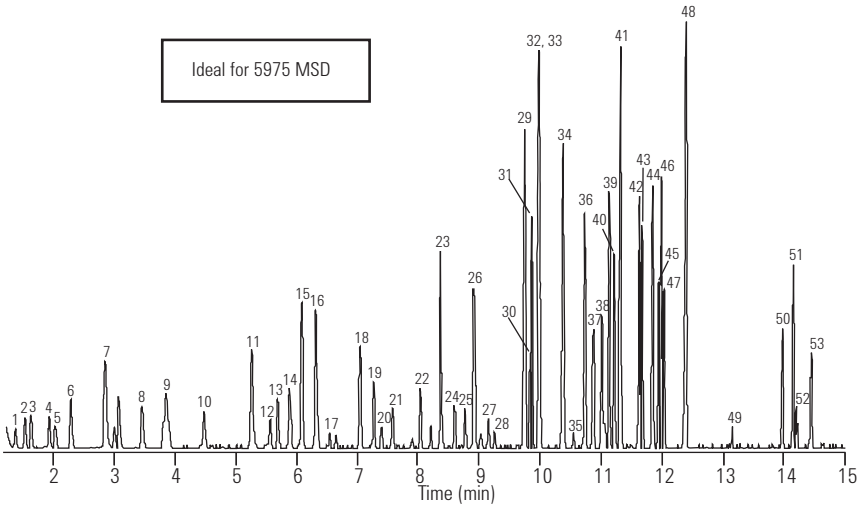
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

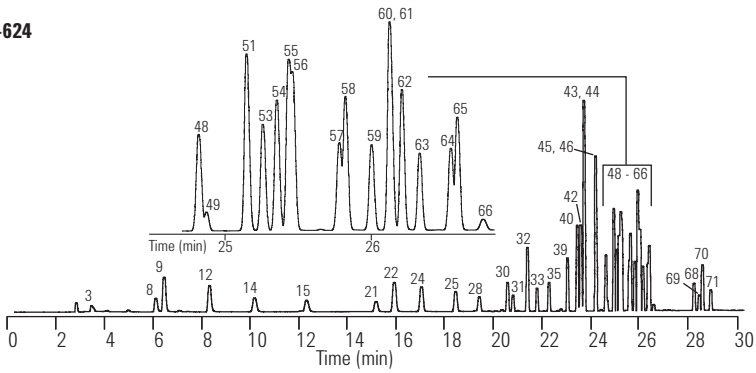
Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

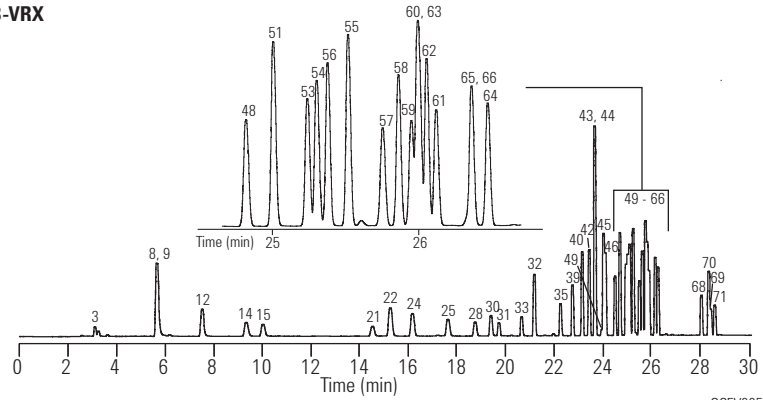
1. Dichlorofluoromethane
2. Chloromethane
3. Vinyl chloride
4. Bromomethane
5. Chloroethane
6. Trichlorofluoromethane
7. 1,1-Dichloroethene
8. Methylene chloride
9. trans-1,2-Dichloroethene
10. 1,1-Dichloroethane
11. 2,2-Dichloropropane
12. Bromochloromethane
13. Chloroform
14. 1,1,1-Trichloroethane
15. Carbon tetrachloride
16. Benzene
17. Fluorobenzene
18. Trichloroethene
19. 1,2-Dichloropropane
20. Dibromomethane
21. Bromodichloromethane
22. cis-1,3-Dichloropropene
23. Toluene
24. trans-1,3-Dichloropropene
25. 1,1,2-Trichloroethane
26. Tetrachloroethene
27. Dibromochloromethane
28. 1,2-Dibromomethane
29. Chlorobenzene
30. 1,1,1,2-Tetrachloroethane
31. Ethylbenzene
32. m-Xylene
33. p-Xylene
34. o-Xylene
35. Bromoform
36. Isopropylbenzene
37. Bromofluorobenzene
38. Bromobenzene
39. n-Propylbenzene
40. 2-Chlorotoluene
41. 1,3,5-Trimethylbenzene
42. tert-Butylbenzene
43. 1,2,4-Trimethylbenzene
44. sec-Butylbenzene
45. 1,3-Dichlorobenzene
46. 4-Isopropyltoluene
47. 1,4-Dichlorobenzene
48. 1,2-Dichlorobenzene
49. 1,2-Dibromo-3-chloropropane
50. 1,2,4-Trichlorobenzene
51. Hexachlorobutadiene
52. Napthalene
53. 1,2,3-Trichlorobenzene



A: PID, DB-624



A: PID, DB-VRX



GCEV005

EPA Method 551

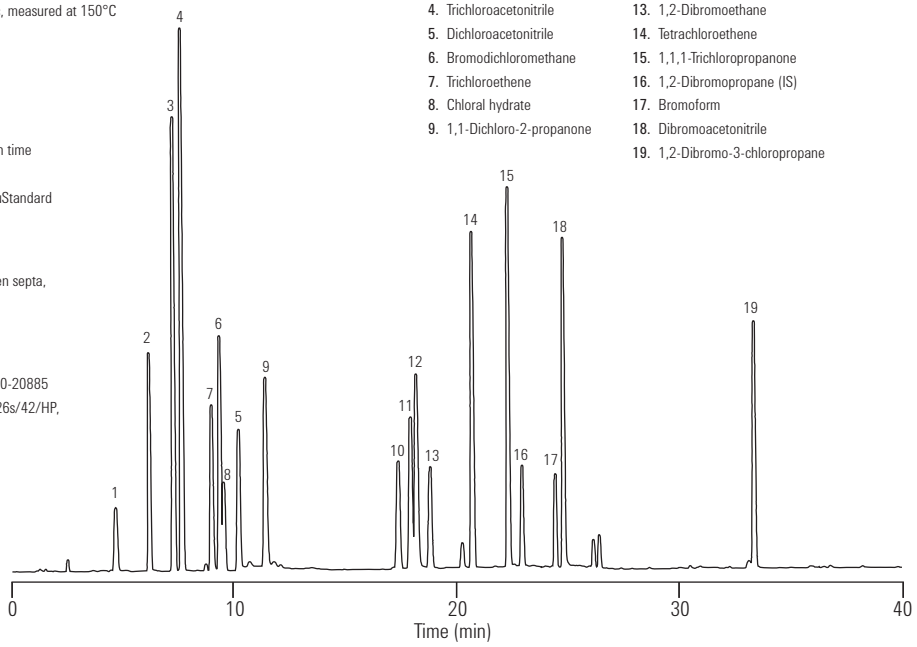
Column: **DB-1**
122-1033
30 m x 0.25 mm, 1.00 µm

Carrier: Helium at 24.8 cm/sec, measured at 150°C
Oven: 35°C for 9 min
35-40°C at 10°/min
40°C for 3 min
40-150°C at 6°/min
150°C for 1 min
Injection: Splitless, 200°C
15 sec purge activation time
Detector: ECD, 300°C
Sample: 1 µL of 50 pg/µL, AccuStandard

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Chloroform
2. 1,1,1-Trichloroethane
3. Carbon tetrachloride
4. Trichloroacetonitrile
5. Dichloroacetonitrile
6. Bromodichloromethane
7. Trichloroethene
8. Chloral hydrate
9. 1,1-Dichloro-2-propanone
10. Chloropicrin
11. Dibromochloromethane
12. Bromochloroacetonitrile
13. 1,2-Dibromoethane
14. Tetrachloroethene
15. 1,1,1-Trichloropropanone
16. 1,2-Dibromopropane (IS)
17. Bromoform
18. Dibromoacetonitrile
19. 1,2-Dibromo-3-chloropropane



GCEV008

European Red List Volatiles

Column: **DB-5.625**
122-5632
30 m x 0.25 mm, 0.50 µm

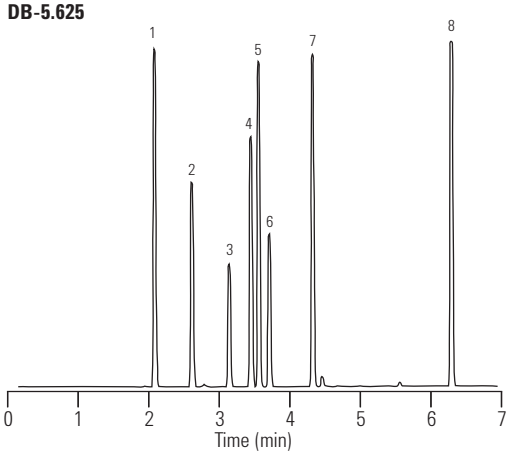
Column: **DB-624**
122-1334
30 m x 0.25 mm, 1.40 µm

Carrier: Helium at 35 cm/sec, measured at 40°C
Oven: 40°C for 2 min
40-140°C at 12°/min
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of headspace of neat mixture

Suggested Supplies

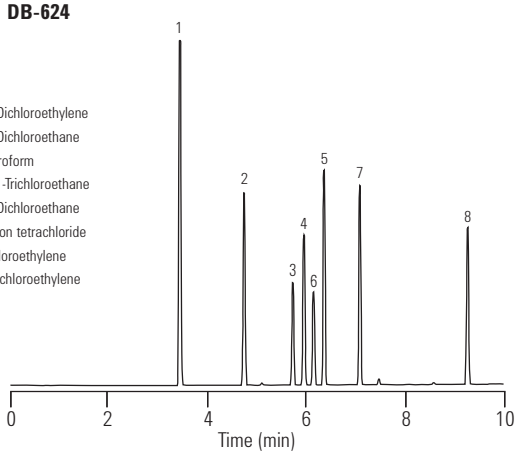
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

DB-5.625



DB-624

1. 1,1-Dichloroethylene
2. 1,1-Dichloroethane
3. Chloroform
4. 1,1,1-Trichloroethane
5. 1,2-Dichloroethane
6. Carbon tetrachloride
7. Trichloroethylene
8. Tetrachloroethylene



GCEV010

Environmental Applications, Air Analysis

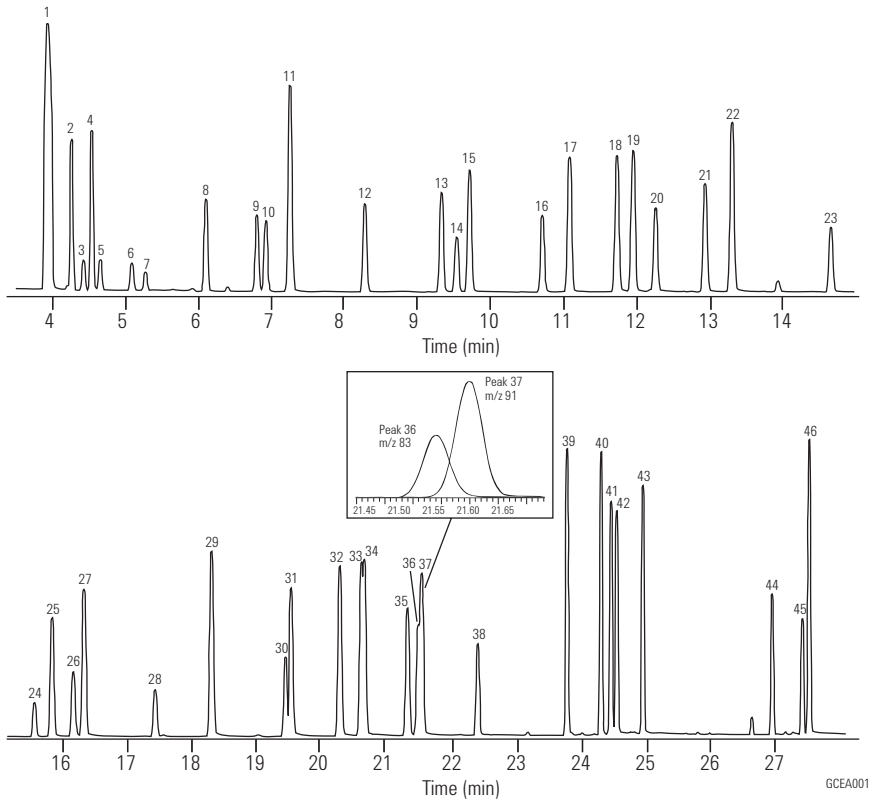
EPA Air Analysis Compendium Method TO-14 Standard

Column: **DB-1**
123-1063
60 m x 0.32 mm, 1.00 µm

Carrier:	Helium at 25 cm/sec measured off of CO_2 at 35°C constant flow mode
Oven:	35°C for 5 min 35-120°C at 5°/min 120-220°C at 30°/min 220°C for 5 min
Injection:	Entech 7100 cryogenic sample preconcentrator
Detector:	MSD Full scan of m/z 40-250
Sample:	400 mL of a 10 ppbV TO-14 standard and 100 mL of a 20 ppbV IS/SS standard

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. CO_2
2. Freon 12 (Dichlorodifluoromethane)
3. Chloromethane
4. Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)
5. Vinyl chloride
6. Bromomethane
7. Chloroethane
8. Freon 11 (Trichlorofluoromethane)
9. 1,1-Dichloroethene
10. Methylene chloride
11. Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)
12. 1,1-Dichloroethane
13. cis-1,2-Dichloroethene
14. Bromochloromethane (IS)
15. Chloroform
16. 1,2-Dichloroethane
17. 1,1,1-Trichloroethane
18. Benzene
19. Carbon tetrachloride
20. 1,4-Difluorobenzene (IS)
21. 1,2-Dichloropropane
22. Trichloroethene
23. cis-1,3-Dichloropropene
24. trans-1,3-Dichloropropene
25. 1,1,2-Trichloroethane
26. Toluene-d8 (SS)
27. Toluene
28. 1,2-Dibromoethane
29. Tetrachloroethene
30. Chlorobenzene-d5 (SS)
31. Chlorobenzene
32. Ethylbenzene
33. m-Xylene
34. p-Xylene
35. Styrene
36. 1,1,2,2-Tetrachloroethane
37. o-Xylene
38. 4-Bromofluorobenzene (SS)
39. 1,3,5-Trimethylbenzene
40. 1,2,4-Trimethylbenzene
41. 1,3-Dichlorobenzene
42. 1,2-Dichlorobenzene
43. 1,4-Dichlorobenzene
44. 1,2,4-Trichlorobenzene
45. 1,2-Dibromobenzene (IS)
46. Hexachloro-1,3-butadiene

Agilent wishes to thank Entech Instruments for providing this chromatogram.

EPA Air Analysis Method TO-15 (1 ppbV Standard)

Column: **DB-5ms**
123-5563
60 m x 0.32 mm, 1.00 µm

Carrier: Helium, 1.5 mL/min

Oven: 35°C for 5 min
35-140°C at 6°C/min
140-220°C at 15°C/min
220°C for 3 min

Sampler: Entech 7100 cryogenic sample preconcentrator

Detector: GC/MS 6890/5973N
Scan 29-180 amu 0-6 min
33-280 amu 6-30 min
Electron Impact 70 eV

Sample: 400 mL sample load,
All compounds at 10 ppbV except Formaldehyde (50 ppbV), Acetaldehyde (20 ppbV),
Propanol (20 ppbV), Acetone (30 ppbV),
2-Butanone (30 ppbV)

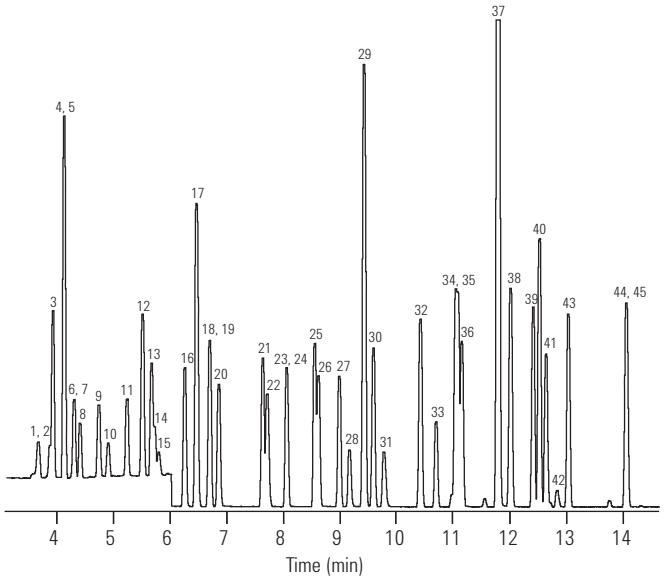
Suggested Supplies

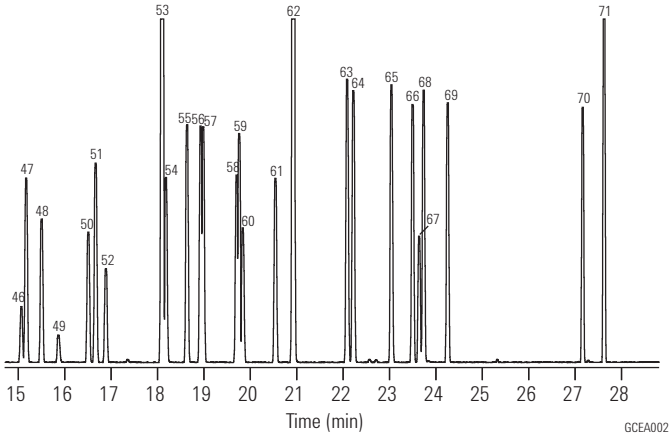
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

Agilent wishes to thank Entech Instruments for providing this chromatogram.





GCEA002

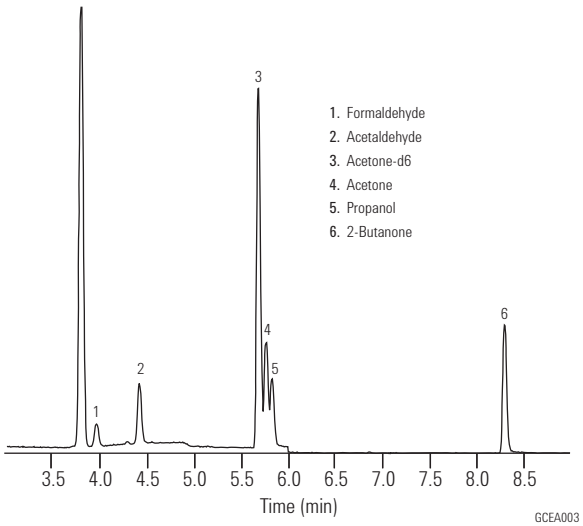
		Quantitation Ion			Quantitation Ion			Quantitation Ion
1.	Formaldehyde	30	25.	2-Butanone (MEK)	72	49.	2-Hexanone	43
2.	Propene	41	26.	n-Hexane	57	50.	Dibromochloromethane	129
3.	Dichlorodifluoromethane	85	27.	cis-1,2-Dichloroethene	96	51.	Tetrachloroethene	166
4.	Chloromethane	50	28.	Ethyl acetate	43	52.	1,2-Dibromoethane	107
5.	Dichlorotetrafluoroethane	85	29.	Bromochloromethane (IS)	128	53.	Chlorobenzene-d5 (IS)	117
6.	Acetaldehyde	29	30.	Chloroform	83	54.	Chlorobenzene	112
7.	Vinyl chloride	62	31.	Tetrahydrofuran	42	55.	Ethylbenzene	91
8.	1,3-Butadiene	39	32.	1,1,1-Trichloroethane	97	56.	m-Xylene	91
9.	Bromomethane	94	33.	1,2-Dichloroethane	62	57.	p-Xylene	91
10.	Chloroethane	64	34.	Benzene	78	58.	Styrene	104
11.	Bromoethene	106	35.	Carbon tetrachloride	117	59.	o-Xylene	91
12.	Trichlorofluoromethane	101	36.	Cyclohexane	56	60.	Bromoform	173
13.	Acetone	58	37.	1,4-Difluorobenzene (IS)	114	61.	1,1,2,2-Tetrachloroethane	83
14.	Propanal	29	38.	2,2,4-Trimethylpentane (Isooctane)	57	62.	4-Bromofluorobenzene	95
15.	Isopropyl alcohol	45	39.	n-Heptane	41	63.	4-Ethyltoluene	105
16.	1,1-Dichloroethene	61	40.	Trichloroethene	130	64.	1,3,5-Trimethylbenzene	105
17.	1,1,2-Trichloro-1,2-2-trifluoroethane	101	41.	1,2-Dichloropropane	63	65.	1,2,4-Trimethylbenzene	105
18.	Methylene chloride	49	42.	1,4-Dioxane	88	66.	1,3-Dichlorobenzene	146
19.	3-Chloro-1-propene (Allyl chloride)	76	43.	Bromodichloromethane	83	67.	Benzyl chloride	91
20.	Carbon disulfide	76	44.	4-Methyl-2-pentanone (MIBK)	43	68.	1,4-Dichlorobenzene	146
21.	trans-1,2-Dichloroethene	96	45.	cis-1,3-Dichloropropene	75	69.	1,2-Dichlorobenzene	146
22.	tert-Butyl methyl ether (MTBE)	73	46.	trans-1,3-Dichloropropene	75	70.	1,2,4-Trichlorobenzene	180
23.	1,1-Dichloroethane	63	47.	Toluene	91	71.	Hexachlorobutadiene	225
24.	Vinyl acetate	43	48.	1,1,2-Trichloroethane	97			

Formaldehyde, 50ppb

Column:	**DB-5ms** **123-5563** **60 m x 0.32 mm, 1.00 µm**
Carrier:	Helium, 1.5 mL/min
Oven:	35°C for 5 min 35-85°C at 10°C/min
Sampler:	Entech 7100 cryogenic sample preconcentrator
Detector:	GC/MS 6890/5973N Scan 29-180 amu 0-6 min 33-280 amu 6-30 min Electron Impact 70 eV
Sample:	100 cc 50 ppb Formaldehyde/20 ppb others

Suggested Supplies

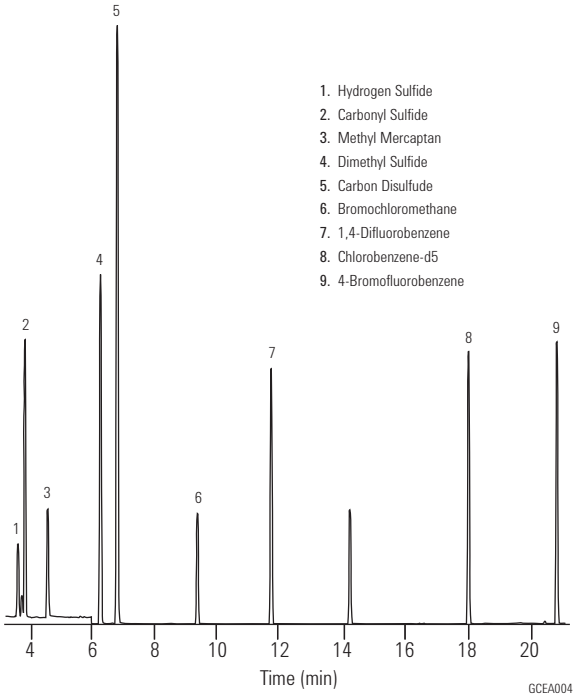
Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



Agilent wishes to thank Entech Instruments for providing this chromatogram.

Sulfur in Air

Column:	**DB-5ms** **123-5563** **60 m x 0.32 mm, 1.00 µm**
Carrier:	Helium, 1.5 mL/min
Oven:	35°C for 5 min 35-140°C at 6°C/min 140-220°C at 15°C/min 220°C for 3 min
Sampler:	Entech 7100 cryogenic sample preconcentrator
Detector:	GC/MS 6890/5973N Scan 29-180 amu 0-6 min 33-280 amu 6-30 min Electron Impact 70 eV
Sample:	400 cc 10 ppb Sulfurs



Agilent wishes to thank Entech Instruments for providing this chromatogram.

C_1 and C_2 Halocarbons (Freons)

Column: **GS-GasPro**
113-4362
60 m x 0.32 mm

Carrier: Helium at 35 cm/sec, constant velocity

Oven: 40°C for 2 min,
40-120°C at 10°/min
120°C for 3 min
120-200°C at 10°/min

Injection: Splitless, 250°C
0.20 min purge activation time

Detector: MSD, 280°C,
full scan 45-180 amu

Sample: 1.0 µL of 100 ppm mixture
of Accustandard M-REF &
M-REF-X in methanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

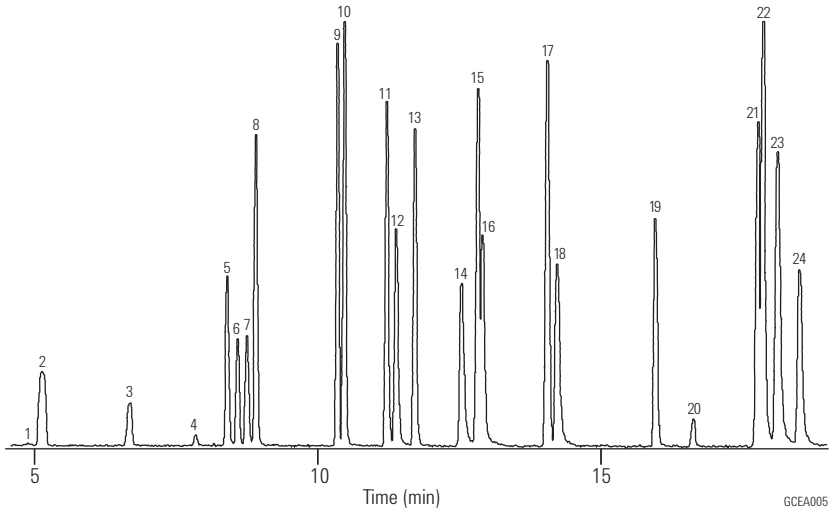
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

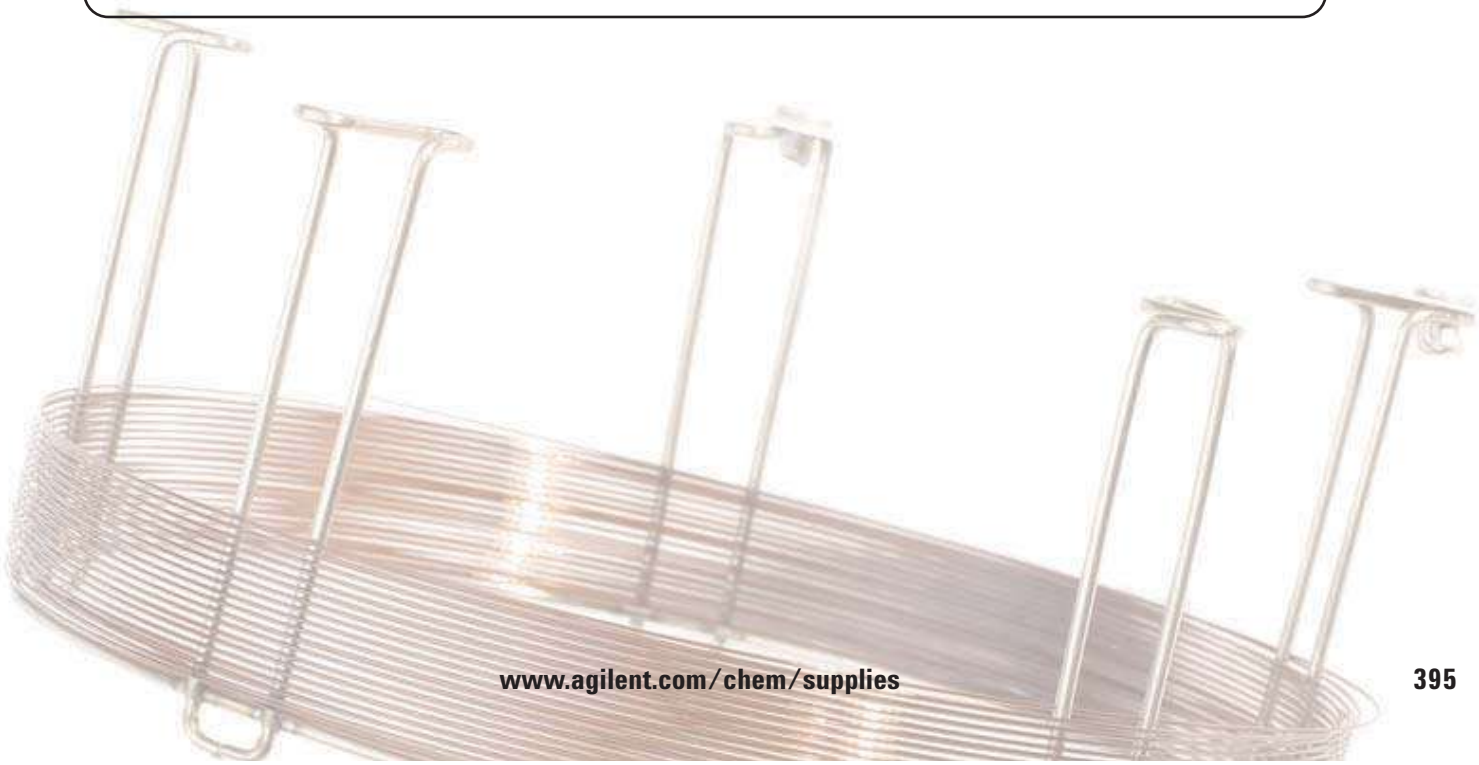
Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

		Freon #
1.	Chlorotrifluoromethane*	13
2.	Trifluoromethane	23
3.	Bromotrifluoromethane	13B1
4.	Chloropentafluoroethane	115
5.	Pentafluoroethane	125
6.	1,1,1-Trifluoroethane	143a
7.	Dichlorodifluoromethane	12
8.	Chlorodifluoromethane	22
9.	1,1,1,2-Tetrafluoroethane	134a
10.	Chloromethane	40
11.	1,1,2,2-Tetrafluoroethane	134
12.	Bromochlorodifluoromethane	12B1
13.	1,1-Difluoroethane	152a
14.	1,2-Dichloro-1,1,2,2-tetrafluoroethane	114
15.	2-Chloro-1,1,1,2-tetrafluoroethane	124
16.	1-Chloro-1,1-difluoroethane	142b
17.	Dichlorofluoromethane	21
18.	Trichlorofluoromethane	11
19.	Chloroethane	160
20.	Dichloromethane	
21.	1,1-Dichloro-1-fluoroethane	141b
22.	2,2-Dichloro-1,1,1-trifluoroethane	123
23.	1,1,2-Trichloro-1,2,2-trifluoroethane	113
24.	1,2-Dibromo-1,1,2,2-tetrafluoroethane	114B2

*Peak not shown

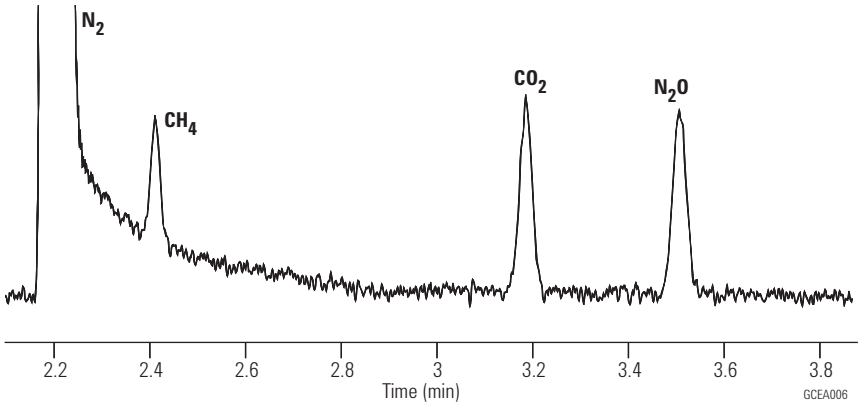




N_2O I

Column: **HP-PLOT Q**
19095P-Q04
30 m x 0.53 mm,
40.00 µm

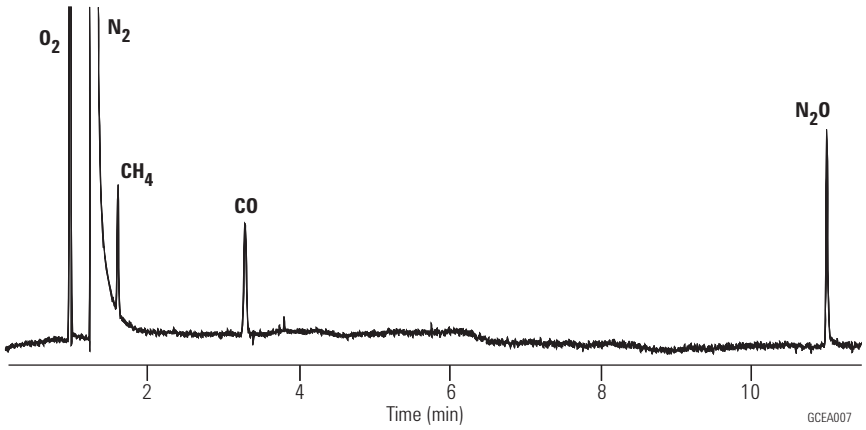
Carrier: Helium, 5 psi (approximately 8 mL/min)
Oven: 35°C isothermal
Injection: 250 µL, injected
Split ratio 1:3
Detector: TCD, 200°C
Sample: approximately 200 ppmV methane
200 ppmV CO_2
250 ppmV N_2O
(nitrogen balance gas)



N_2O II

Column: **HP-PLOT Molesieve**
19095P-MS6
30 m x 0.53 mm,
25.00 µm

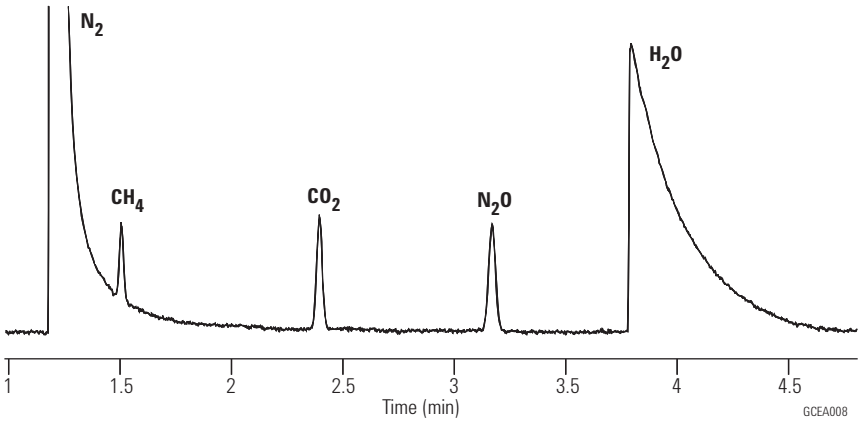
Carrier: Helium, 6 psi (approximately 10 mL/min)
Oven: 50°C (5 min), 25°C/min to 200°C and hold
Injection: 250 µL injected
Split ratio 1:4
Detector: TCD, 250°C
Column compensation on
Sample: approximately 200 ppmV methane
200 ppmV CO_2
250 ppmV N_2O
(nitrogen balance gas)



N_2O III

Column: **GS-CarbonPLOT**
113-3133
30 m x 0.32 mm,
3.00 µm

Carrier: Helium, 12 psi (approximately 3 mL/min)
Oven: 35°C isothermal
Injection: 250 µL injected
Split ratio 1:4
Detector: TCD, 200°C
Sample: approximately 200 ppmV methane
200 ppmV CO_2
250 ppmV N_2O
(nitrogen balance gas)



Foods, Flavors and Fragrance Applications

Fragrance Allergens

Column: **HP-5ms**
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 1.2 mL/min, constant pressure of 70 kPa

Oven: 50°C - 1 min - 8°C/min - 250°C, 250-300°C @ 35°C/min 300°C Hold, 5 min 5973N MSD in scan (40-350 amu) Solvent Delay, 3.0 min

Injection: Split, 250°C Split ratio 1:50

Sample: 1 µL, 50 ppm standard

Suggested Supplies

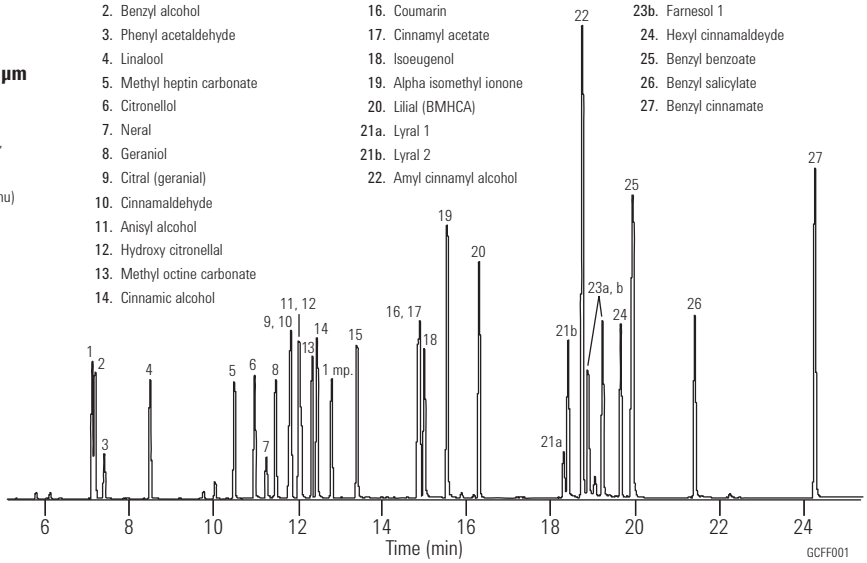
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Limonene
2. Benzyl alcohol
3. Phenyl acetaldehyde
4. Linalool
5. Methyl heptin carbonate
6. Citronellol
7. Neral
8. Geraniol
9. Citral (geranial)
10. Cinnamaldehyde
11. Anisyl alcohol
12. Hydroxy citronellal
13. Methyl octine carbonate
14. Cinnamic alcohol
15. Eugenol
16. Coumarin
17. Cinnamyl acetate
18. Isoeugenol
19. Alpha isomethyl ionone
20. Lilial (BMHCA)
21a. Lyral 1
21b. Lyral 2
22. Amyl cinnamyl alcohol
23a. Farnesol 1
23b. Farnesol 1
24. Hexyl cinnamaldehyde
25. Benzyl benzoate
26. Benzyl salicylate
27. Benzyl cinnamate



Fusel Oil Standard & Brandy Sample

Column: **DB-624**
122-1364
60 m x 0.25 mm, 1.40 µm

Carrier: H_2, 50 cm/sec, Constant

Oven: 40°C for 5 min 10°C/min to 250°C

Detector: FID, 300°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

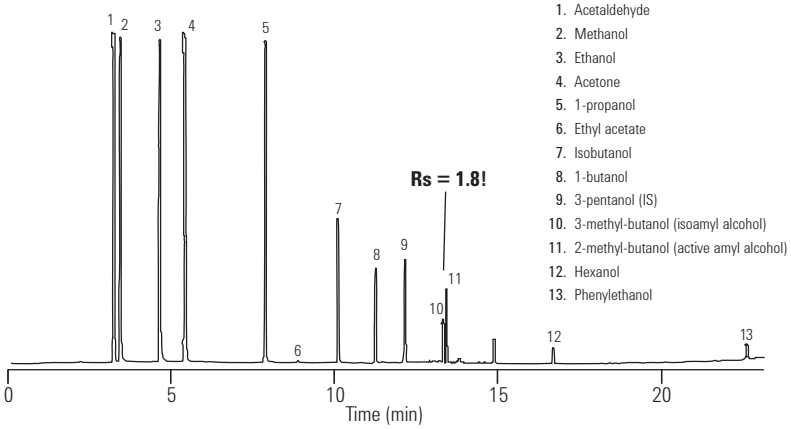
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

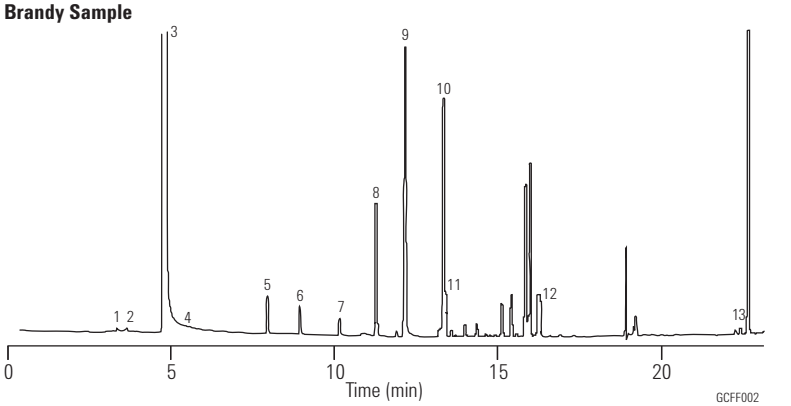
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

Fusel Oil Standard

1. Acetaldehyde
2. Methanol
3. Ethanol
4. Acetone
5. 1-propanol
6. Ethyl acetate
7. Isobutanol
8. 1-butanol
9. 3-pentanol (IS)
10. 3-methyl-butanol (isoamyl alcohol)
11. 2-methyl-butanol (active amyl alcohol)
12. Hexanol
13. Phenylethanol



Brandy Sample



Fragrance Reference Standard I

Column: **DB-1**
122-1032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 25 cm/sec, measured at 150°C
Oven: 40°C for 1 min
40-290°C at 5°/min
Injection: Split, 250°C
Split ratio 1:50

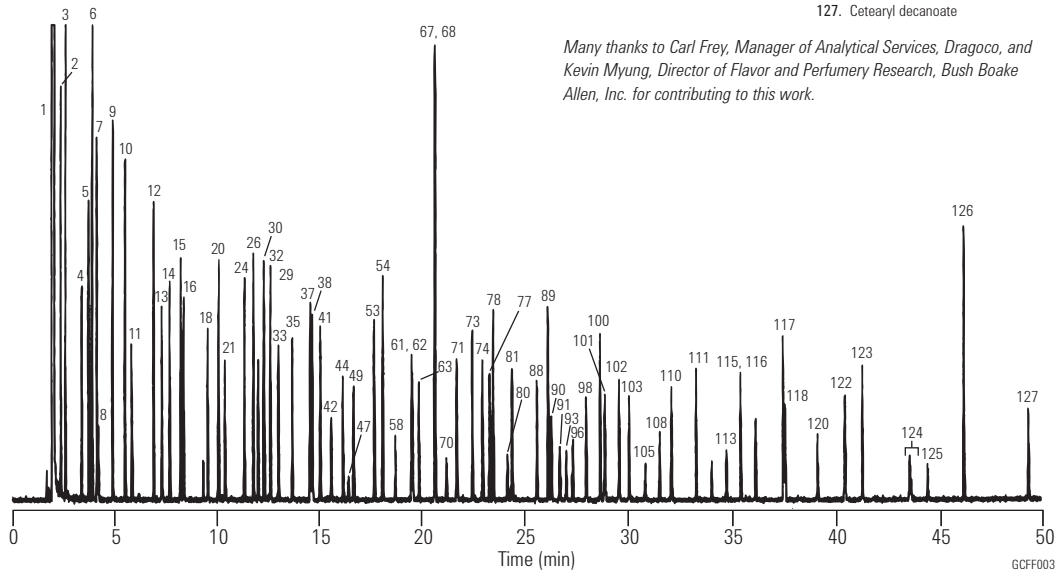
Detector: MSD, 300°C transfer line
Sample: 1 µL of a 1:20 dilution of neat sample in acetone

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Acetone
2. 2,3-Butanedione (diacetyl)
3. Ethyl acetate
4. 2,3-Pentanedione (acetyl propionyl)
5. Ethyl propionate
6. Methyl butyrate
7. 3-Methylbutyl alcohol
8. 2-Methylbutyl alcohol
9. Isobutyl acetate
10. Ethyl butyrate
11. Furfural
12. Ethyl isovalerate
13. Hexanol
14. Allyl butyrate
15. Ethyl pentanoate
16. Hexylene glycol
17. α-Thujone
18. Benzaldehyde
19. α-Pinene
20. Camphene
21. 3,5,5-Trimethylhexanol
22. Sabinene
23. β-Pinene
24. Ethyl hexanoate
25. Myrcene
26. Hexyl acetate
cis-Linalool oxide
Methyl benzoate
trans-Linalool oxide
28. Methyl-cresol
29. Benzyl alcohol
30. para-Cymene
31. 1,8-Cineol
32. Limonene
33. 2,6-Dimethylhept-5-enal
34. γ-Terpinene
35. Octanol
37. Ethyl heptanoate
38. Linalool
39. Benzene ethanol
41. Rose oxide, cis-rose
42. Rose oxide, trans-rose
43. Camphor
44. Citronellal
45. Benzyl acetate
46. Menthone
47. Isoborneol
48. Isomenthone
49. Borneol
51. Terpinen-4-ol
52. α-Terpineol
53. Ethyl octanoate
54. Octyl acetate
56. Fenchyl acetate
57. Citronellol
58. Neral
59. Carvonel
Phenylethyl acetate
60. Geraniol
61. Linalyl acetate
62. Geranial
63. Hydroxycitronellal
64. Citronellyl formate
66. Bornyl acetate
67. Vertenex (isomer 1)
68. Ethyl nonanoate
69. Geranyl formate
70. Vertenex (isomer 2)
71. γ-Nonalactone
72. Citronellyl acetate
73. Hydroxycitronellal
74. Geranyl acetate
76. Diphenyl oxide
78. Ethyl decanoate
79. α-Copaene
80. Florazone (isomer 1)
81. Florazone (isomer 2)
82. β-Caryophyllene
83. Citronellyl propionate
85. 3,7-Guaiadiene
88. Dodecanol
89. Ethyl undecanoate
90. Eugenyl acetate
91. Frambione (raspberry ketone)
93. Isoamyl salicylate
94. δ-Cadinene
95. cis-Nerolidol
96. Rosatol (rosetone)
Geranyl butyrate
97. trans-Nerolidol
98. n-Amyl salicylate
99. Phenylethyl tiglate
100. Ethyl dodecanoate
101. Benzophenone
102. Dibenzyl ether
103. γ-Dodecalactone
104. Citronellyl tiglate
105. Evernyl
106. Geranyl tiglate
107. Geranyl-2-methyl valerate
108. Celestocide
109. Heptadec-1-ene
110. Benzyl benzoate
111. Ethyl tetradecanoate
112. Benzyl salicylate
113. Tonalid
114. Nonadec-1-ene
115. Isopropylmyristate
116. Ethyl pentadecanoate
Nonadecane
117. Ethyl hexadecanoate
118. Musk T (ethylene brassylate)
119. Eicosane
120. Cinnamyl phenyl acetate
121. Heneicosane
122. Phenyl ethyl cinnamate
123. Ethyl octadecanoate
124. Hercolyn D (tetrahydro & dihydro methyl abietate)
125. Cinnamyl cinnamate
126. Cetearyl octanoate
127. Cetearyl decanoate

Many thanks to Carl Frey, Manager of Analytical Services, Dragoco, and Kevin Myung, Director of Flavor and Perfumery Research, Bush Boake Allen, Inc. for contributing to this work.



Fragrance Reference Standard II

Column: **DB-WAX 122-7032 30 m x 0.25 mm, 0.25 µm**

Carrier: Helium at 25 cm/sec, measured at 150°C

Oven: 45°C for 2 min
45-250°C at 3°/min
250°C for 34 min

Injection: Split, 250°C
Split ratio 1:50

Detector: MSD, 250°C transfer line

Sample: 1 µL of a 1:20 dilution of neat sample in acetone

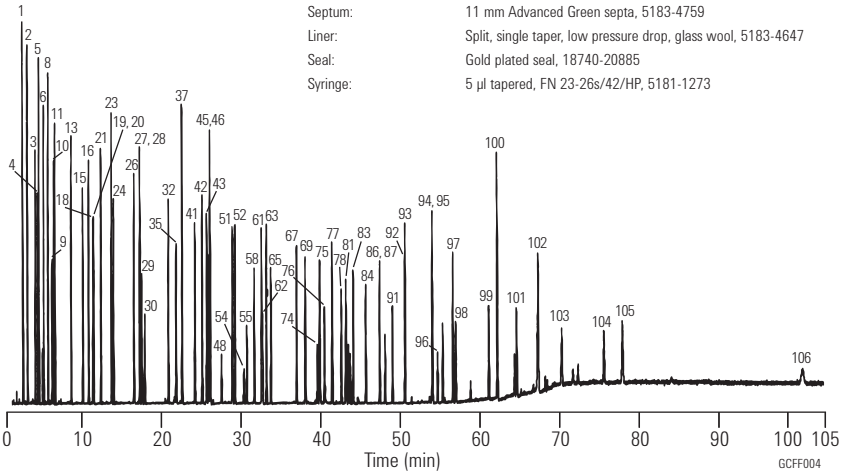
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. Acetone
2. Ethyl acetate
3. Ethyl propionate
4. 2,3-Butanedione (diacetyl)
5. Methyl butyrate
6. Isobutyl acetate
7. α-Pinene
8. Ethyl butyrate
9. 2,3-Pentanedione (acetyl propionyl)
10. Camphene
11. Ethyl isovalerate
12. β-Pinene
13. Ethyl pentanoate
14. Myrcene
15. Allyl butyrate
16. Limonene
17. 1,8-Cineol
18. 3,5,5-Trimethylhexanol
19. 3-Methylbutyl alcohol
20. 2-Methylbutyl alcohol
21. Ethyl hexanoate
22. γ-Terpinene
23. p-Cymene
24. Hexyl acetate
25. Terpinolene
26. Ethyl heptanoate
27. 2,6-Dimethylhept-5-enal (MelonalTM)
28. Rose oxide, cis-rose
29. Hexanol
30. Rose oxide, trans-rose
31. Methyl-para-cresol
32. Ethyl octanoate
33. cis-Linalool oxide
34. Menthone
35. Furfural
36. trans-Linalool oxide
37. Octyl acetate
38. Isomenthone
39. α-Copaene
40. Camphor
41. Benzaldehyde
42. Ethyl nonanoate
43. Linalool
44. Linalyl acetate
45. Vertenex (isomer 1)
46. Octanol
47. β-Caryophyllene
48. Vertenex (isomer 2)
49. Terpinen-4-ol
50. Methyl benzoate
51. Hexylene glycol
52. Ethyl decanoate
53. Citronellyl acetate
54. Isoborneol
55. Neral
56. α-Terpineol
57. Geranyl formate
58. Borneol
59. β-Bisabolene
60. Benzyl acetate
61. Neryl acetate
62. Geranial
63. Ethyl undecanoate
64. δ-Cadinene
65. Geranyl acetate
66. Citronellol
67. Ethyl dodecanoate
68. Geraniol
69. Benzyl alcohol
70. Geranyl butyrate
71. Nonadecane
72. Benzene ethanol
73. Nonadec-1-ene
74. Florazone (isomer 1)
75. Florazone (isomer 2)
76. Hydroxycitronellal
77. Dodecanol
78. Diphenyl oxide
79. Citronellyl tiglate
80. Eugenyl methyl ether
81. γ-Nonalactone
83. Ethyl tetradecanoate
84. n-Amyl salicylate
85. Geranyl tiglate
86. Ethyl pentadecanoate
87. Isopropylmyristate
90. Phenylethyl tiglate
91. Rosatol (rosetone)
92. Eugenyl acetate
93. Ethyl hexadecanoate
94. γ-Dodecalactone
95. Dibenzyl ether
96. Tonalid
97. Ethyl octadecanoate
98. Benzophenone
99. Benzyl benzoate
100. Cetearyl octanoate
101. Musk T (ethylene brassylate)
102. Cetearyl decanoate
103. Frambione (raspberry ketone)
104. Cinnamyl phenyl acetate
105. Phenyl ethyl cinnamate
106. Cinnamyl cinnamate

Many thanks to Carl Frey, Manager of Analytical Services, Dragoco, and Kevin Myung, Director of Flavor and Perfumery Research, Bush Boake Allen, Inc. for contributing to this work.

Perfume

Column: **HP-INNOWax**
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 30 cm/sec
0.9 mL/min constant flow

Oven: 80°C for 1 min
80-250°C at 5°C/min
250°C for 2 min

Injection: Split, 250°C
Split ratio 20:1

Detector: MSD, 280°C

Suggested Supplies

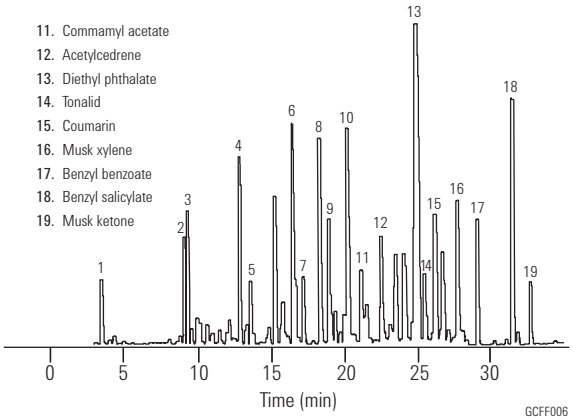
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Limonene
2. Linalool
3. Linalyl acetate
4. Benzyl acetate
5. Citronellol
6. Benzene ethanol
7. α-Methyl Ionone
8. Carvocrol and geraiol
9. Isoamyl salicylate
10. n-Amyl salicylate
11. Commamyl acetate
12. Acetylcedrene
13. Diethyl phthalate
14. Tonalid
15. Coumarin
16. Musk xylene
17. Benzyl benzoate
18. Benzyl salicylate
19. Musk ketone



Lavender Oil Spiked with Camphor

Column: **DB-WaxFF**
127-7023FF
20 m x 0.10 mm, 0.20 µm

Carrier: H_2, 38 psi, 0.33 min, 5 psi/min to 45 psi, hold

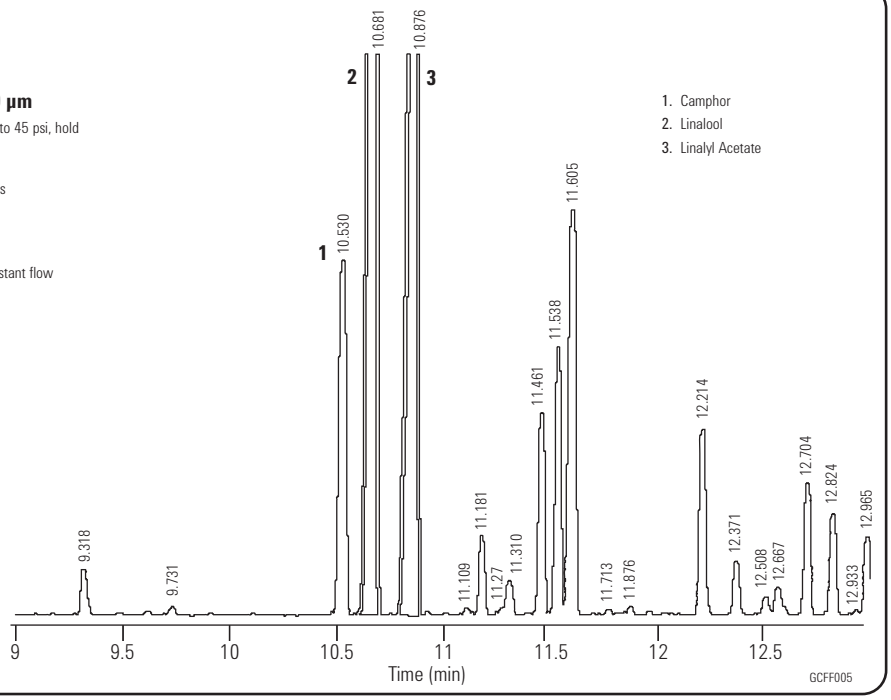
Oven: 50°C, 0.33 min
10°C/min to 200°C
200°C hold until last peak elutes

Injection: Split, 250°C
Split ratio 1:650

Detector: FID, 250°C
Column + make-up (N2) in constant flow

Sample: 0.5 µL

1. Camphor
2. Linalool
3. Linalyl Acetate



Special thanks to Mr. Marin, MANE, France.

Flavor Mixture

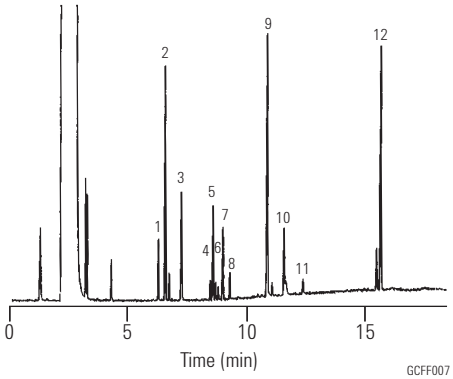
Column: **ULTRA 2**
19091B-112
25 m x 0.32 mm, 0.52 µm

Carrier: Helium, 90 kPa., 2.2 mL/min constant flow
Oven: 80°C for 1 min
80-210°C at 8°C/min
210°C for 2 min
Injection: Split, 250°C
Split ratio 20:1
Detector: IRD, 280°C
Wide Band MCT, 550 to 4000 cm-1

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Fenchone
2. Thujone
3. Benzaldehyde
4. trans-Carveol
5. Farnesol
6. cis-Carveol
7. trans-Geraniol
8. Citral
9. Eugenol
10. Vanillin
11. trans-Isoeugenol
12. trans-Citronellyl tiglate
13. cis-Citronellyl tiglate



Chiral Compounds in Essential Oils and Fragrances

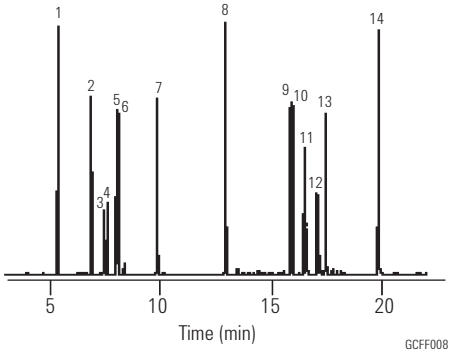
Column: **HP-Chiral β**
19091G-B233
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen, 39 cm/sec, Constant pressure
Oven: 65°C for 1 min
65-170° C at 5°C/min
Injection: Split, 250°C
Split ratio 30:1
Detector: FID, 300°C
Sample: 1 µL
0.25 ng/µL each analyte in Hexane

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. 1,2-Dimethylbenzene
2. Myrcene
3. (-)-Camphene
4. (+)-Camphene
5. (+)-β-Pinene
6. 1S-(-)-β-Pinene
7. Cineole
8. (R)-(+)-Citronellal
9. 1S,2R,5S-(+)-Menthol
10. 1R,2S,5R-(-)-Menthol
11. α-Terpineol
12. (+/-)-Isoborneol
13. (+)-Borneol
14. trans-Cinnamaldehyde

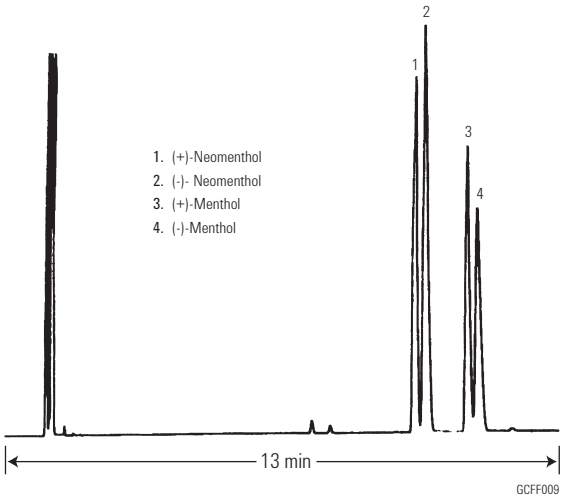


Menthol

Column: **Cyclodex-β**
112-2532
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen, 55 cm/sec
Oven: 105°C isothermal
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 1 µg/µL each chloroform

1. (+)-Neomenthol
2. (-)- Neomenthol
3. (+)-Menthol
4. (-)-Menthol



Lemon Oil

Column: **DB-5**
127-5022
20 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 60 cm/sec, measured at 40°C

Oven: 40°C for 3 min
40-185°C at 30°/min
185°C for 3 min

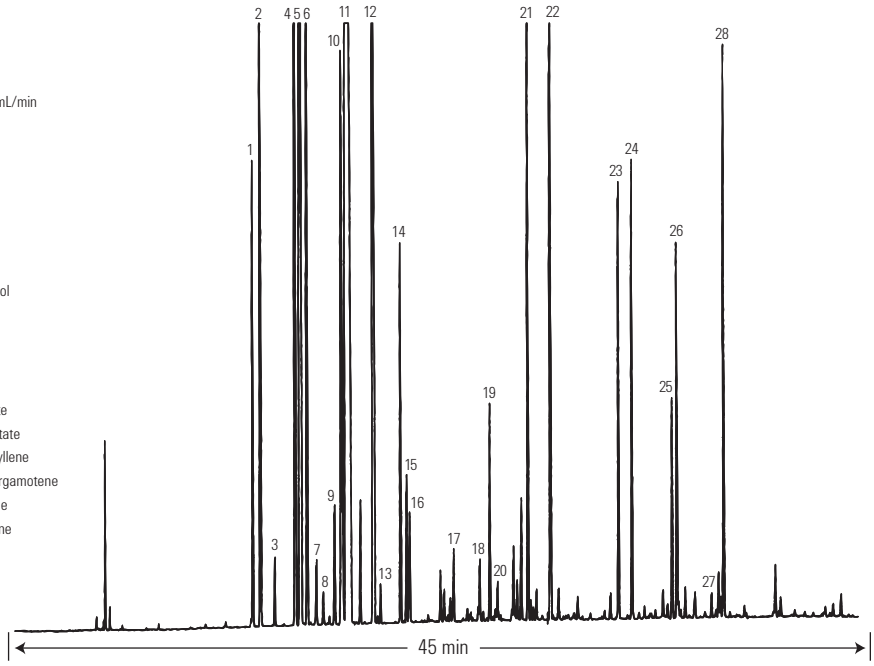
Injection: Split, 275°C
Split ratio 1:275

Detector: Nitrogen makeup gas at 30 mL/min

1. α-Thujone
2. β-Thujone
3. Camphene
4. Sabinene
5. β-Pinene
6. Myrcene
7. Octanal
8. α-Phellandrene
9. α-Terpinene
10. r-Cymene
11. δ-Limonene
12. γ-Trepinene
13. Octanol
14. Terpinolene
15. Linalool
16. Nonanal
17. Citronellal
18. Trepinen-4-ol
19. α-Trepineol
20. Decanal
21. Neral
22. Geranial
23. Nerylacetate
24. Geranylacetate
25. β-Caryophyllene
26. trans-α-Bergamotene
27. α-Humulene
28. β-Bisabolene

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



Cold-Pressed Orange Oil

Column: **DB-5**
127-5022
20 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 60 cm/sec, measured at 70°C

Oven: 70°C for 1 min
70-250°C at 30°/min
250-310°C at 20°/min
310°C for 2 min

Injection: Split, 275°C
Split ratio 1:275

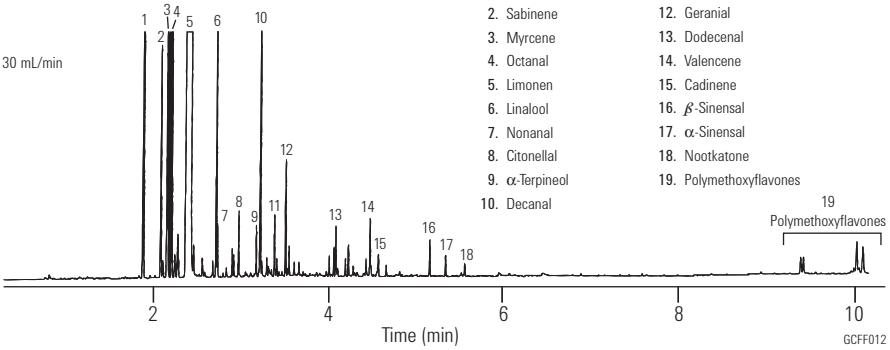
Detector: FID, 350°C
Nitrogen makeup gas at 30 mL/min

Chromatogram courtesy of Tastemaker

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. α-Pinene
2. Sabinene
3. Myrcene
4. Octanal
5. Limonen
6. Linalool
7. Nonanal
8. Citonellal
9. α-Terpineol
10. Decanal
11. Neral
12. Geranial
13. Dodecenal
14. Valencene
15. Cadinene
16. β-Sinensal
17. α-Sinensal
18. Nootkatone
19. Polymethoxyflavones



Peppermint Oil

Column: **DB-WAX**
122-7062
60 m x 0.25 mm, 0.25 µm

Carrier: Helium at 25 cm/sec (0.73 mL/min)

Oven: 75°C for 8 min
75-200°C at 4°/min
200°C for 5 min

Injection: Split, 270°C
Split ratio 1:150

Detector: FID, 270°C
Nitrogen makeup gas at 30 mL/min

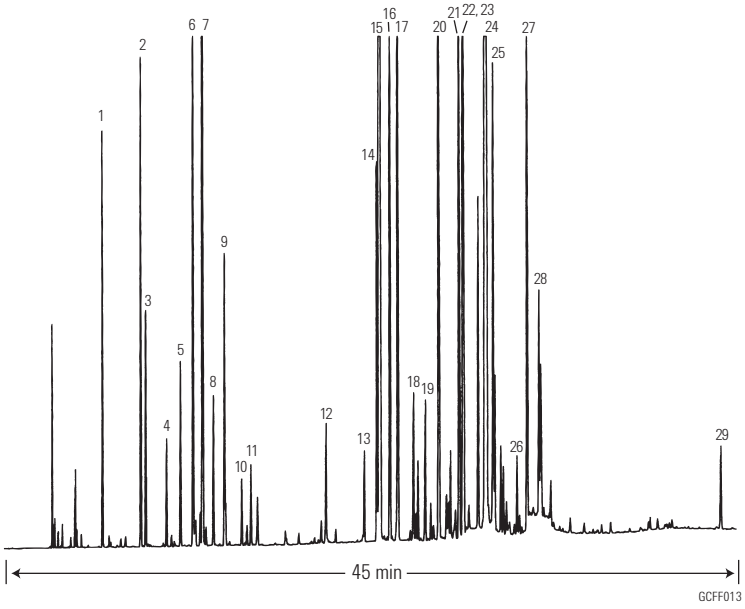
Sample: 1µL neat

1. α-Pinene
2. β-Pinene
3. Sabinene
4. Myrcene
5. α-Terpinene
6. (+/-)-Limonene
7. 1,8-Cineol
8. cis-Ocimene
9. Terpinene
10. r-Cymene
11. γ-Terpinolene
12. 3-Octanol
13. 1-Octen-3-ol
14. trans-Sabiene hydrate
15. (+/-)-Methone
16. Methofuran
17. d-Isomethone
18. β-Bourbonene
19. Linalool
20. Menthyl acetate
21. Neomenthol
22. Trepinen-4-ol
23. β-Caryophyllene
24. (+/-)-Menthol
25. Pulegone
26. α-Terpineol
27. Germacrene-D
28. Piperitone
29. Viridiflorol

Thanks to Mr. William Faas of A.M. Todd Company for providing the sample and assisting with peak identification.

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



Spearmint Oil (Western)

Column: **DB-WAX**
122-7062
60 m x 0.25 mm, 0.25 µm

Carrier: Helium at 25 cm/sec (0.73 mL/min)

Oven: 75°C for 8 min
75-200°C at 4°/min
200°C for 5 min

Injection: Split, 270°C
Split ratio 1:150

Detector: FID, 270°C
Nitrogen makeup gas at 30 mL/min

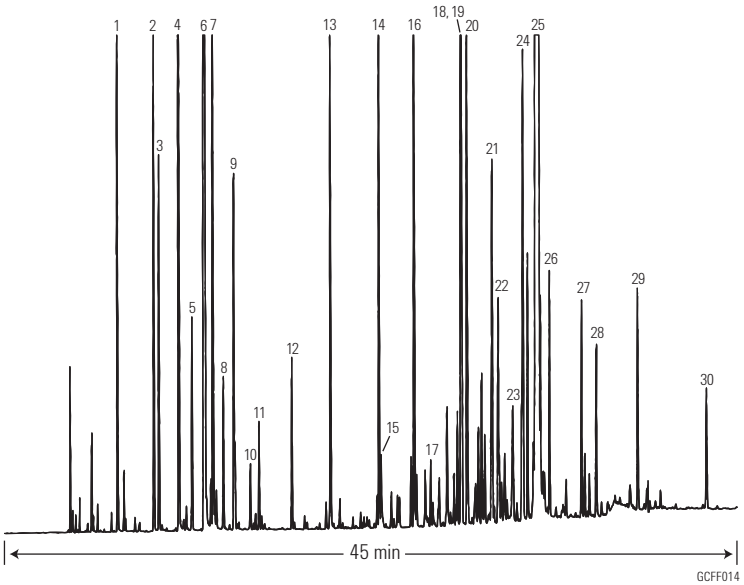
Sample: 1µL neat

1. α-Pinene
2. β-Pinene
3. Sabinene
4. Myrcene
5. α-Terpinene
6. (+/-)-Limonene
7. 1,8-Cineol
8. cis-Ocimene
9. γ-Terpinene
10. r-Cymene
11. Terpinolene
12. 3-Octylacetate
13. 3-Octanol
14. trans-Sabiene hydrate
15. (+/-)-Methone
16. β-Bourbonene
17. Linalool
18. Trepinen-4-ol
19. β-Caryophyllene
20. Dihydrocarvone
21. trans-Dihydrocarvyl
22. trans-β-Farnesene
23. α-Terpineol
24. Germacrene-D
25. (+/-)-Carvone
26. cis-Carvylacetate
27. trans-Carveol
28. cis-Carveol
29. cis-Jasmone
30. Viridiflorol

Thanks to Mr. William Faas of A.M. Todd Company for providing the sample and assisting with peak identification.

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



Ylang Ylang Oil

Column: **DB-XLB**
122-1232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 34 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-250°C at 3.5°/min

Injection: Split, 250°C
Split ratio 1:125

Detector: MSD, 310°C transfer line
full scan at m/z 35-550

Sample: 1µL of 10% oil in methylene chloride

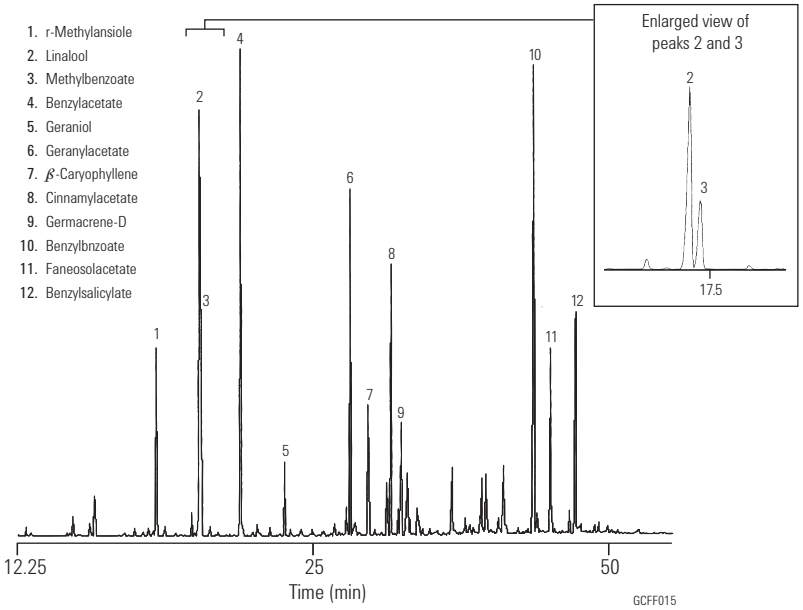
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



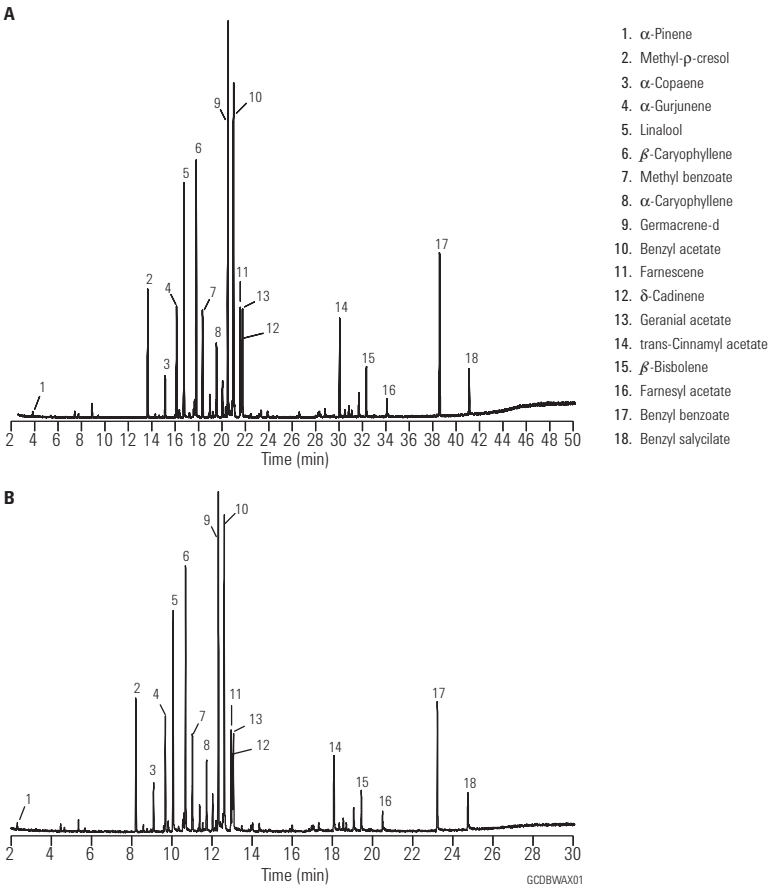
Ylang Ylang Oil II

Column: **DB-WAX**
121-7022
20 m x 0.18 mm, 0.18 µm

Carrier: A: Helium 26.3 cm/sec measured at 45°C
B: Hydrogen 44.3 cm/sec measured at 45 °C

Oven: A: 45°C hold 1.28 min
4.68°C/min to 250°C hold 21.81 min

B: 45°C hold 0.77 min
7.79°C/min to 250°C hold 13.09 min



1. α-Pinene
2. Methyl-ρ-cresol
3. α-Copaene
4. α-Gurjunene
5. Linalool
6. β-Caryophyllene
7. Methyl benzoate
8. α-Caryophyllene
9. Germacrene-d
10. Benzyl acetate
11. Farnescene
12. δ-Cadinene
13. Geranial acetate
14. trans-Cinnamyl acetate
15. β-Bisbolene
16. Farnesyl acetate
17. Benzyl benzoate
18. Benzyl salycilate

Rosemary Oil

Column: **Cyclosil-β**
112-6632
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 40 cm/sec, measured at 60°C

Oven: 55°C for 1 min
50-180°C at 5°/min

Injection: Split, 250°C
Split ratio 50:1

Detector: FID, 340°C

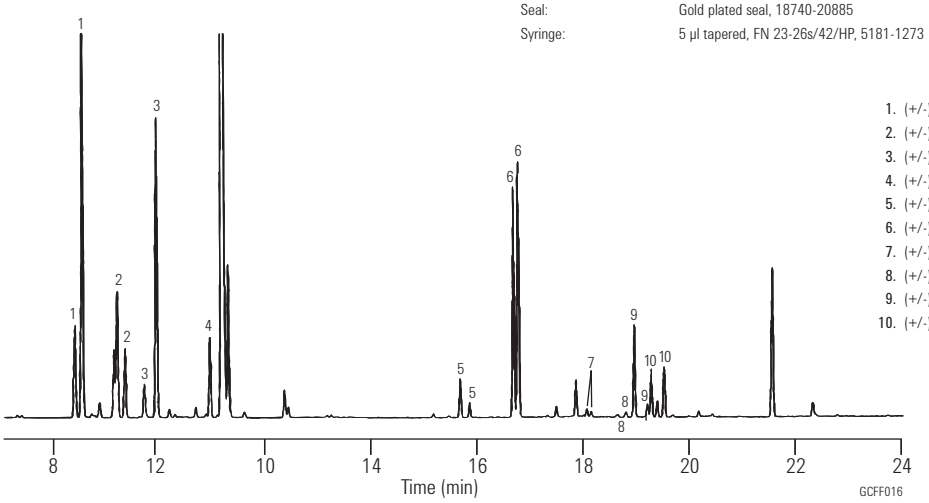
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. (+/-)-α-Pinene
2. (+/-)-Camphene
3. (+/-)-β-Pinene
4. (+/-)-Limonene
5. (+/-)-Linalool
6. (+/-)-Camphor
7. (+/-)-Terpinene-4-ol
8. (+/-)-Isoborneol
9. (+/-)-Borneol
10. (+/-)-α-Terpineol

Citrus Flavored Carbonated Beverage (Soda)

Column: **Cyclosil-β**
112-6632
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 37 cm/sec,
measured at 40°C

Oven: 40-190°C at 2 min

Sampler: Headspace
no stir, NaCl 1g/10 mL sample
Adsorption: 27°C for 68 min
Desorbtion: 250°C for 15 min

Injection: Split, 1:5
Ployacrylate fiber, 85 µm

Detector: MSD, 280°C transfer line

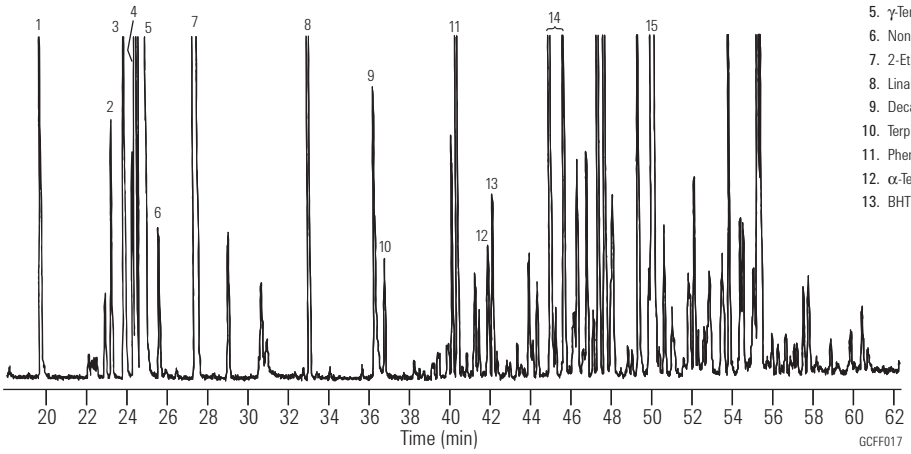
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

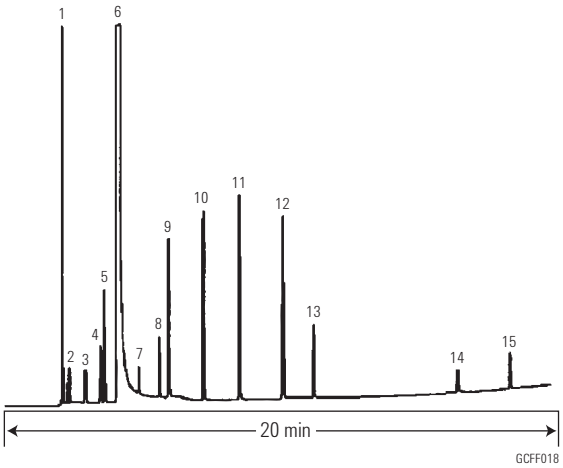


1. S-(-)-Limonene
2. p-Cymene
3. (+)-Limonene
4. Octanol
5. γ-Terpinene
6. Nonanol
7. 2-Ethyl-1-Hexanol
8. Linalool
9. Decanol
10. Terpinen-4-ol
11. Phenethylalcohol
12. α-Terpineol
13. BHT

Alcohol Beverage Standard

Column: **HP-FFAP**
19091F-105
50 m x 0.20 mm, 0.30 µm

Carrier: Hydrogen
Oven: 60°C for 4 min
60-200°C at 6°C/min
200°C for 2 min
Detector: FID

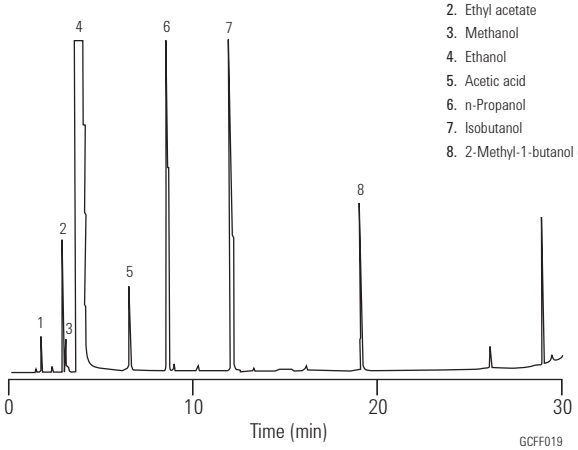


1. Acetaldehyde
2. Acetone
3. Ethyl formate
4. Ethyl acetate
5. Methanol
6. Ethanol
7. Diacetyl
8. sec-Butanol
9. n-Propanol
10. Isobutanol
11. n-Butanol
12. Isoamyl alcohol
13. n-Amyl alcohol
14. Acetic acid
15. Propionic acid

Bourbon

Column: **HP-INNOWax**
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 33 cm/sec, 15.5 psi (35°C)
1.5 mL/min constant flow
Oven: 35°C for 5 min
35-150°C at 5°C/min
150-250°C at 20°C/min
250°C for 2 min
Injection: Split, 220°C
Split ratio 25:1
Detector: FID 280°C
Sample: 1 µL

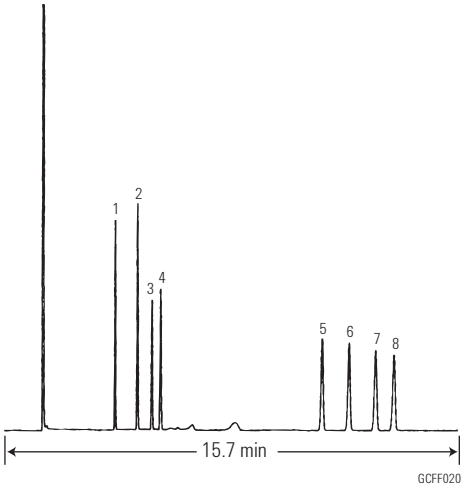


1. Acetaldehyde
2. Ethyl acetate
3. Methanol
4. Ethanol
5. Acetic acid
6. n-Propanol
7. Isobutanol
8. 2-Methyl-1-butanol or 3-Methyl-1-Butanol

Alditol Acetates

Column: **DB-225**
122-2231
30 m x 0.25 mm, 0.15 µm

Carrier: Hydrogen a 36.5 cm/sec
Oven: 220°C isothermal
Injection: Split, 225°C
Split ratio 1:50
Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL



1. Rhamnitol
2. Fucitol
3. Ribitol
4. Arabinitol
5. Mannitol
6. Galactitol
7. Glucitol
8. Inositol

Strawberry Syrup

Column: **HP-INNOWax**
19091N-213
30 m x 0.32 mm, 0.50 µm

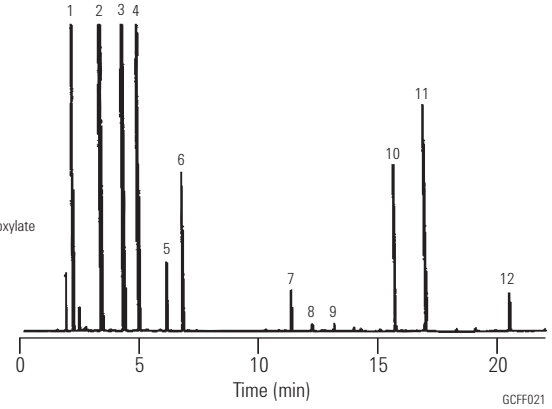
Carrier: Helium, 40 cm/sec, 11.7 psi (60°C)
2.5 mL/min constant flow

Oven: 60°C for 1 min
60-250°C at 10°C/min
250°C for 2 min

Injection: Split, 220°C
Split ratio 60:1

Detector: FID 275°C

1. Ethyl acetate
2. Ethyl butyrate
3. Isoamyl acetate
4. Amyl acetate
5. Isoamyl butyrate
6. Amyl butyrate
7. Ethyl benzoate
8. Citronellol
9. Geraniol
10. Ethyl-3-phenyl oxiran carboxylate
11. Strawberry aldehyde
12. Benzyl benzoate



Sulfur and Selenium in Garlic by Headspace

Column: **HP-INNOWax**
19091N-116
60 m x 0.32 mm, 0.25 µm

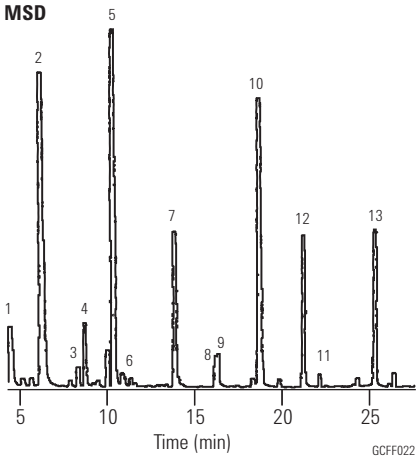
Carrier: Helium, 28 cm/sec, 5.6 psi (35°C), 1.2 mL/min constant flow

Oven: 35°C for 3 min
35°-230°C at 5°C/min
230°C for 5 min

Injection: Splitless, SI inlet, 140°C

Detector: MSD 230°C

1. CH_3-Se-CH_3
2. C_3H5-S-CH_3
3. C_3H_5-Se-CH_3
4. CH_3-S-S-CH_3
5. C_3H_5-S-C_3H_5
6. CH_3-S-Se-CH_3
7. C_3H_5-S-S-CH_3
   a. CH_3-Se-Se-CH_3
8. CH_3-Se-S-C_3H_5
9. CH_3-S-S-S-CH_3
10. C_3H_5-S-S-C_3H_5
11. CH_3-S-Se-S-CH_3
12. CH_3-S-S-S-C_3H_5
13. C_3H_5-S-S-S-C_3H_5
14. C_3H_5-S-S-S-C_3H_5



TMS Sugars

Column: **DB-1701**
122-0732
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 40 cm/sec

Oven: 180°C for 2 min
180-200°C at 5°/min

Injection: Split, 225°C
Split ratio 1:50

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

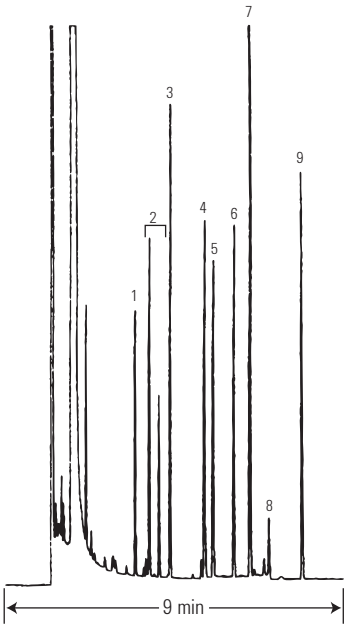
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. D-Arabinose
2. D-Ribose anomers
3. D-Zylose
4. D-Mannose
5. D-Fructose
6. α-D-Galactose
7. α-D-Glucose
8. D-Fructose (anomer)
9. β-D-Glucose



GCFF023

Free Fatty Acids

Column: **HP-INNOWax**
19091N-133
30 m x 0.25 mm, 0.25 µm

Carrier: Helium 42 cm/sec, 24 psi (120°C)
1.8 mL/min constant flow

Oven: 120°C for 1 min
120-250°C at 10°C/min
250°C for 5 min

Injection: Split, 250°C
Split ratio 40:1

Detector: FID 280°C

Sample: 1 µL
0.05 to 0.11% each in methylene chloride

Suggested Supplies

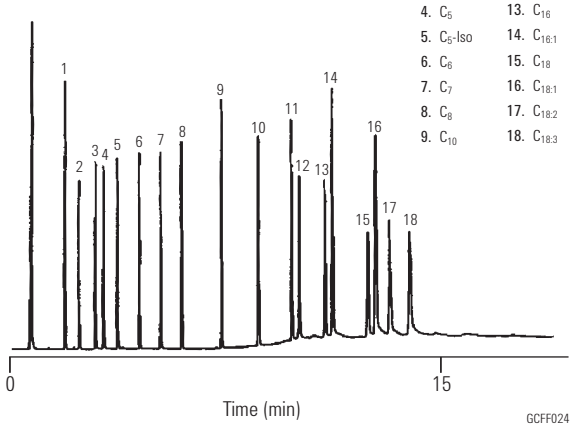
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. C_2
2. C_3
3. C_4
4. C_5
5. C_5-Iso
6. C_6
7. C_7
8. C_8
9. C_{10}
10. C_{12}
11. C_{14}
12. $C_{14:1}$
13. C_{16}
14. $C_{16:1}$
15. C_{18}
16. $C_{18:1}$
17. $C_{18:2}$
18. $C_{18:3}$



GCFF024

Organic Acids

Column: **DB-FFAP**
122-3232
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 100°C

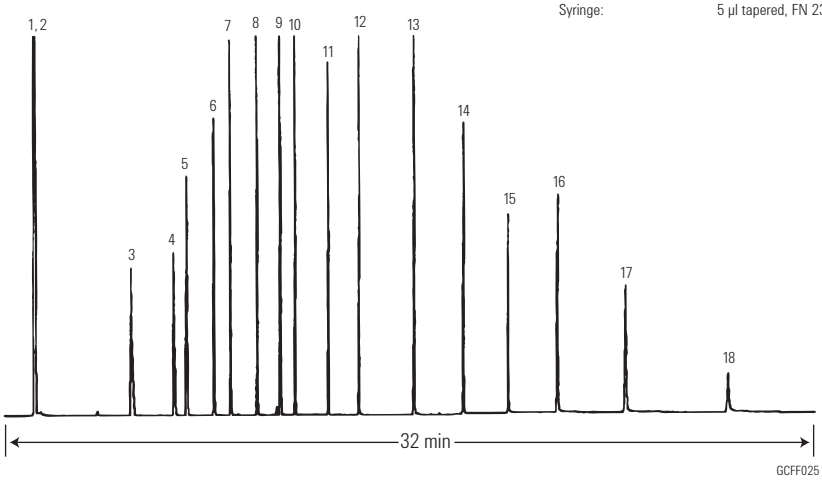
Oven: 100°C for 5 min
100-250°C at 10°/min
250°C for 12 min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. Acetone
2. Formic acid
3. Acetic acid
4. Propionic acid
5. Isobutyric acid
6. Butyric acid
7. Isovaleric acid
8. Valeric acid (pentanoic acid)
9. Isocaproic acid
10. Caproic acid (hexanoic acid)
11. Heptanoic acid
12. Octanoic acid
13. Decanoic acid
14. Dodecanoic acid
15. Tetradecanoic acid
16. Hexadecanoic acid
17. Octadecanoic acid
18. Arachidic acid (eicosanoic acid)

Bacterial Fatty Acid Methyl Esters

Column: **DB-5**
122-5032
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 42 cm/sec

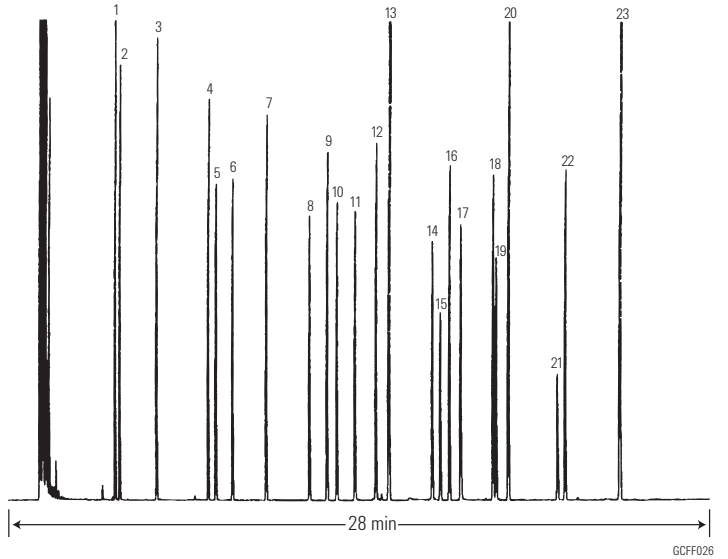
Oven: 150°C for 4 min
150-250°C at 4°/min

Injection: Split ratio 1:100

Detector: FID
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. $C_{11:0}$ Methylundecanoate
2. 2-OH $C_{10:0}$ Methyl 2-hydroxydecanoate
3. $C_{12:0}$ Methyl laurate
4. $C_{13:0}$ Methyl tridecanoate
5. 2-OH $C_{12:0}$ Methyl 2-hydroxydodecanoate
6. 3-OH $C_{12:0}$ Methyl 3-hydroxydodecanoate
7. $C_{14:0}$ Methyl myristate
8. 12-Me $C_{14:0}$ Methyl 12-methyltetradecanoate
9. $C_{15:0}$ Methyl pentadecanoate
10. 2-OH $C_{14:0}$ Methyl 2-hydroxytetradecanoate
11. 3-OH $C_{14:0}$ Methyl 3-hydroxytetradecanoate
12. $C_{16:1}$ Methyl palmitoleate
13. $C_{16:0}$ Methyl palmitate
14. 14-Me $C_{16:0}$ Methyl 14-methylhexadecanoate
15. 9,10-diMe $C_{16:0}$ Methyl cis-9,10-methyl hexadecanoate
16. $C_{17:0}$ Methyl heptadecanoate
17. 2-OH $C_{16:0}$ Methyl 2-hydroxyhexadecanoate
18. $C_{18:1}$ Methyl oleate
19. $C_{18:1}$ Methyl elaidate
20. $C_{18:0}$ Methyl stearate
21. 9,10-diMe $C_{18:0}$ Methyl cis-9,10-methylene octadecanoate
22. $C_{19:0}$ Methyl nonadecanoate
23. $C_{20:0}$ Methyl arachidate

FAMEs I

Column: **DB-23**
122-2362
60 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 43 cm/sec
Constant pressure mode

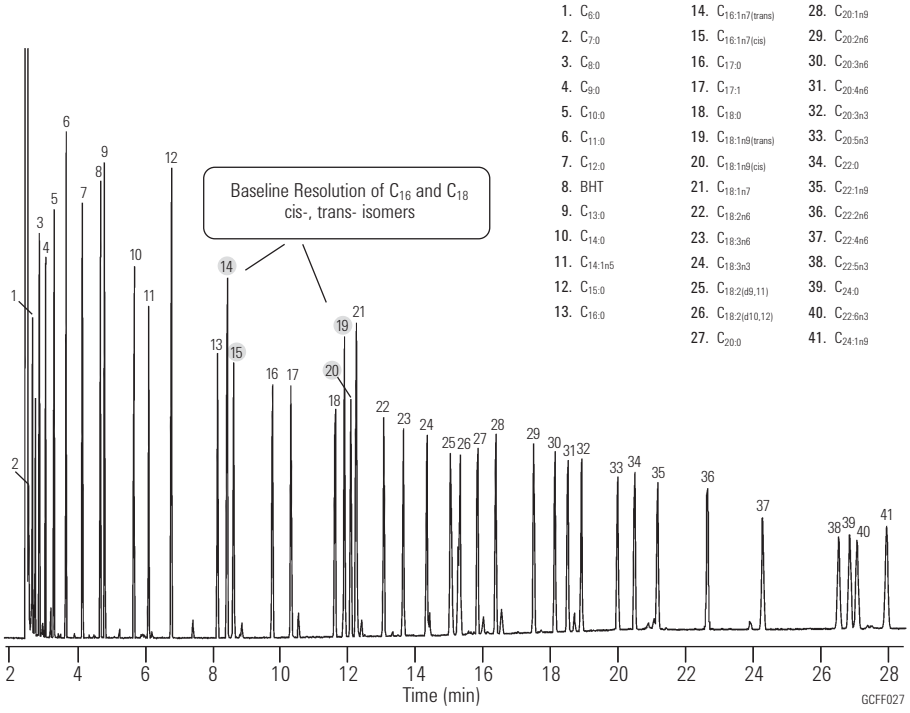
Oven: 130°C for 1.0 min
130-170°C at 6.5°C/min
170-215°C at 2.75°C/min
215°C for 12 min
215-230°C at 40°C/min
230°C for 3 min

Injection: Split, 270°C
Split ratio 50:1

Detector: FID, 280°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. $C_{6:0}$
2. $C_{7:0}$
3. $C_{8:0}$
4. $C_{9:0}$
5. $C_{10:0}$
6. $C_{11:0}$
7. $C_{12:0}$
8. BHT
9. $C_{13:0}$
10. $C_{14:0}$
11. $C_{14:1n5}$
12. $C_{15:0}$
13. $C_{16:0}$
14. $C_{16:1n7(trans)}$
15. $C_{16:1n7(cis)}$
16. $C_{17:0}$
17. $C_{17:1}$
18. $C_{18:0}$
19. $C_{18:1n9(trans)}$
20. $C_{18:1n9(cis)}$
21. $C_{18:1n7}$
22. $C_{18:2n6}$
23. $C_{18:3n6}$
24. $C_{18:3n3}$
25. $C_{18:2(d9,11)}$
26. $C_{18:2(d10,12)}$
27. $C_{20:0}$
28. $C_{20:1n9}$
29. $C_{20:2n6}$
30. $C_{20:3n6}$
31. $C_{20:4n6}$
32. $C_{20:3n3}$
33. $C_{20:5n3}$
34. $C_{22:0}$
35. $C_{22:1n9}$
36. $C_{22:2n6}$
37. $C_{22:4n6}$
38. $C_{22:5n3}$
39. $C_{24:0}$
40. $C_{22:6n3}$
41. $C_{24:1n9}$

Chromatogram provided courtesy of Steve Watkins and Jeremy Ching, FAME Analytics, http://www.fameanalytics.com

FAMEs II

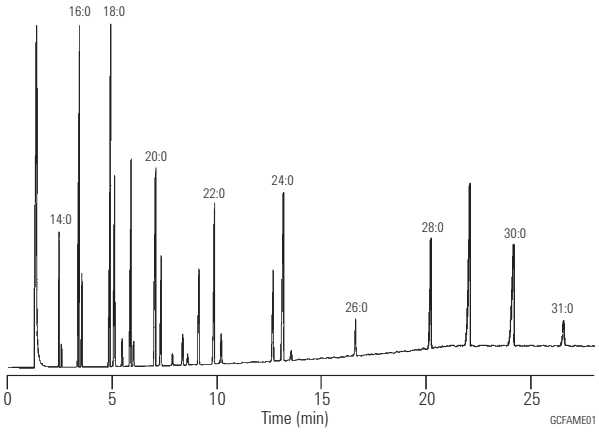
Column: **DB-225ms**
122-2932
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 40 cm/sec

Oven: 200°C for 1 min
200-260°C at 3°/min

Injection: Split 1:50, 250°C

Detector: FID
Nitrogen make-up gas at 30 mL/min



The higher isothermal upper temperature limit of DB-225ms (260°C vs. 220°C for DB-225) allows the elution of higher molecular weight FAMEs (above 24:0) while maintaining a reasonable run time.

Polyunsaturated Fatty Acid Methyl Esters

Column: **HP-INNOWax**
19091N-213
30 m x 0.32 mm, 0.50 µm

Carrier: Helium, 30 cm/sec, 10.7 psi (150°C)
1.5 mL/min constant flow

Oven: 150°C for 1 min
150-200°C at 15°C/min
200-250°C at 2°C/min
250°C for 5 min

Injection: Split, 220°C
Split ratio 60:1

Detector: FID, 275°C

Sample: 0.5 µL

Suggested Supplies

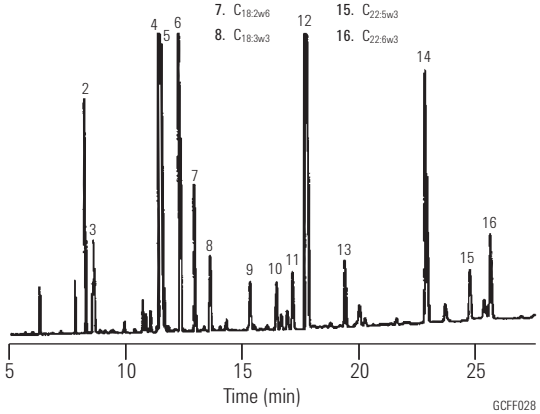
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. $C_{14:0}$
2. $C_{16:0}$
3. $C_{16:1w7}$
4. $C_{18:0}$
5. $C_{18:1w9}$
6. $C_{18:1w7}$
7. $C_{18:2w6}$
8. $C_{18:3w3}$
9. $C_{20:1w9}$
10. $C_{20:2w6}$
11. $C_{20:3w6}$
12. $C_{20:4w6}$
13. $C_{20:5w3}$
14. $C_{22:4w6}$
15. $C_{22:5w3}$
16. $C_{22:6w3}$



69 Component FAME Mix

Column: **HP-88**
112-8867
60 m x 0.25 mm, 0.20 µm

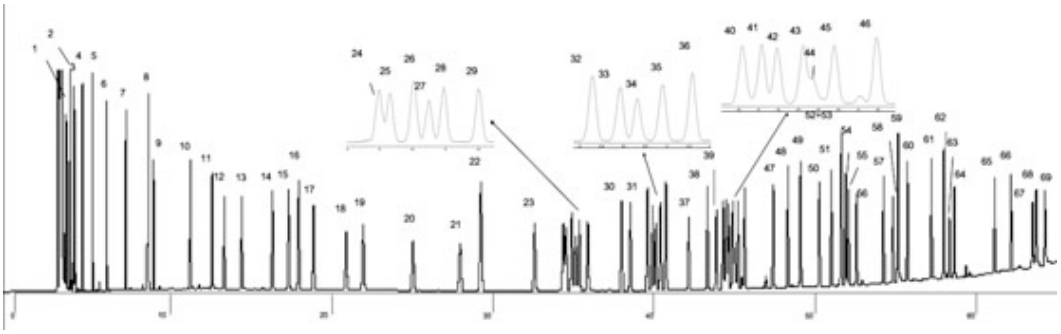
Carrier: He at 1.4 mL/min constant flow

Oven: 125°C
125°C to 145°C at 8°/min
145°C for 26 min
145°C to 220°C at 2°/min
220°C for 1 min

Injection: Split, 250°C
Split ratio 50:1
1 µL of 70 ppm each in $CHCl_3$

Detector: FID, 260°C

1. nC6:0
2. nC7:0
3. nC8:0
4. nC9:0
5. nC10:0
6. nC11:0
7. nC12:0
8. C12:1 (11c)
9. nC13:0
10. nC14:0
11. C14:1 (9t)
12. C14:1 (9c)
13. nC15:0
14. C15:1 (10t)
15. C15:1 (10c)
16. C15:1 (14c)
17. nC16:0
18. C16:1 (9t)
19. C16:1 (9c)
20. nC17:0
21. C17:1 (10t)
22. C17:1 (10c)
23. nC18:0
24. C18:1 (6t)
25. C18:1 (9t)
26. C18:1 (11t)
27. nC18:1 (6c)
28. C18:1 (9c)
29. C18:1 (11c)
30. nC18:2 (9t,12t)
31. C19:1 (10t)
32. nC19:0
33. C19:1 (7t)
34. C18:2 (9c,12c)
35. C19:1 (7c)
36. C19:1 (10c)
37. C18:3 g(6c,9c,12c)
38. nC20:0
39. C18:3 (9c,12c,15c)
40. C20:1 (5c)
41. C19:2 (10c,13c)
42. C20:1 (11t)
43. C18:2 CONJ
44. C20:1 (8c)
45. C20:1 (11c)
46. C18:2 (10t,12c)
47. nC21:0
48. C20:2 (11c,14c)
49. C21:1 (12c)
50. C20:3 (8c,11c,14c)
51. nC22:0
52. C22:1 (13t)
53. C20:4 (5c,8c,11c,14c)
54. C20:3 (11c,14c,17c)
55. C21:2 (12c,15c)
56. C22:1 (13c)
57. nC23:0
58. C20:5 (EPA)
59. C22:2 (13c,16c)
60. C23:1 (14c)
61. nC24:0
62. C22:3 (13c,16c,19c)
63. C22:4 (7c,10c,13c,16c)
64. C24:1 (15c)
65. C22:5 (DPA)
66. C22:6 (DHA)
67. C18:1-12 Hydroxy (9t)
68. C18:0 12 Hydroxy
69. C18:1-12 Hydroxy (9c)



FAME Standard I

Column: **DB-WAX**
127-7012
10 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 77 cm/sec, measured at 40°C

Oven: 40°C for 0.5 min
40-195°C at 25°/min
195-205°C at 3°/min
205-230°C at 8°/min
230°C for 1 min

Injection: Split, 250°C
Split ratio 1:30

Detector: FID, 250°C

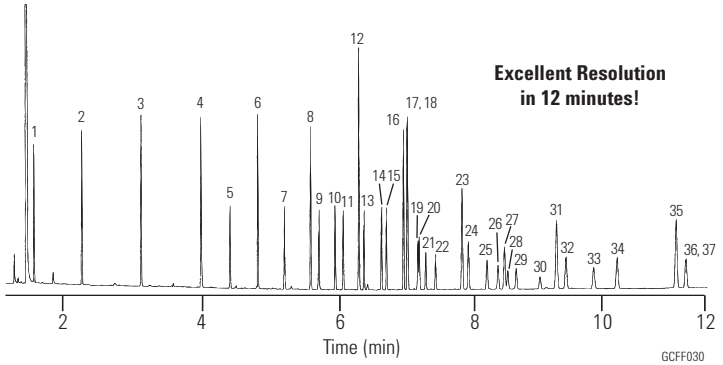
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. Butyric acid methyl ester ($C_{4:0}$)
2. Caproic acid methyl ester ($C_{6:0}$)
3. Caprylic acid methyl ester ($C_{8:0}$)
4. Capric acid methyl ester ($C_{10:0}$)
5. Undecanoic acid methyl ester ($C_{11:0}$)
6. Lauric acid methyl ester ($C_{12:0}$)
7. Tridecanoic acid methyl ester ($C_{13:0}$)
8. Myristic acid methyl ester ($C_{14:0}$)
9. Myristoleic acid methyl ester ($C_{14:1}$)
10. Pentadecanoic acid methyl ester ($C_{15:0}$)
11. cis-10-Pentadecenoic acid methyl ester ($C_{15:1}$)
12. Palmitic acid methyl ester ($C_{16:0}$)
13. Palmitoleic acid methyl ester ($C_{16:1}$)
14. Heptadecanoic acid methyl ester ($C_{17:0}$)
15. cis-10-Heptadecenoic acid methyl ester ($C_{17:1}$)
16. Stearic acid methyl ester ($C_{18:0}$)
17. Oleic acid methyl ester ($C_{18:1n9c}$)
18. Elaidic acid methyl ester ($C_{18:1n9t}$)
19. Linoleic acid methyl ester ($C_{18:2n6c}$)
20. Linolelaidic acid methyl ester ($C_{18:2n6t}$)
21. γ-Linolenic acid methyl ester ($C_{18:3n6}$)
22. Linolenic acid methyl ester ($C_{18:3n3}$)
23. Arachidic acid methyl ester ($C_{20:0}$)
24. cis-11-Eicosenoic acid methyl ester ($C_{20:1}$)
25. cis-11,14-Eicosadienoic acid methyl ester ($C_{20:2}$)
26. cis-8,11,14-Eicosatrienoic acid methyl ester ($C_{20:3n6}$)
27. Heneicosanoic acid methyl ester ($C_{21:0}$)
28. cis-11,14,17-Eicosatrienoic acid methyl ester ($C_{20:3n3}$)
29. Arachidonic acid methyl ester ($C_{20:4n6}$)
30. cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester ($C_{20:5n3}$)
31. Behenic acid methyl ester ($C_{22:0}$)
32. Erucic acid methyl ester ($C_{22:1n9}$)
33. cis-13,16-Docosadienoic acid methyl ester ($C_{22:2}$)
34. Tricosanoic acid methyl ester ($C_{23:0}$)
35. Lignoceric acid methyl ester ($C_{24:0}$)
36. cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester ($C_{22:6n3}$)
37. Nervonic acid methyl ester ($C_{24:1}$)



FAME Standard II

Column: **DB-225**
127-2222
20 m x 0.10 mm, 0.10 µm

Carrier: Hydrogen at 59.3 cm/sec, measured at 35°C

Oven: 35° for 0.5 min
35-195°C at 25°/min
195-205°C at 3°/min
205-230°C at 8°/min
230°C for 1 min

Injection: Split, 250°C
Split ratio 1:30

Detector: FID, 250°C

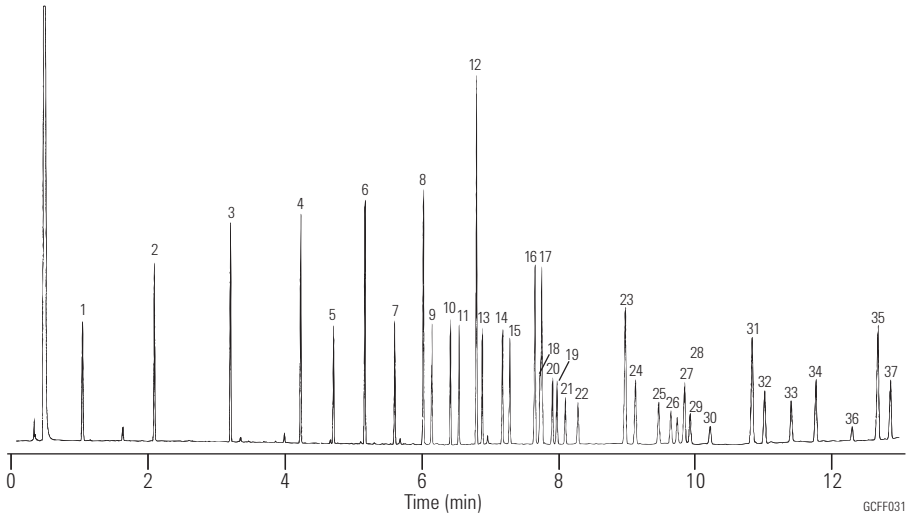
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



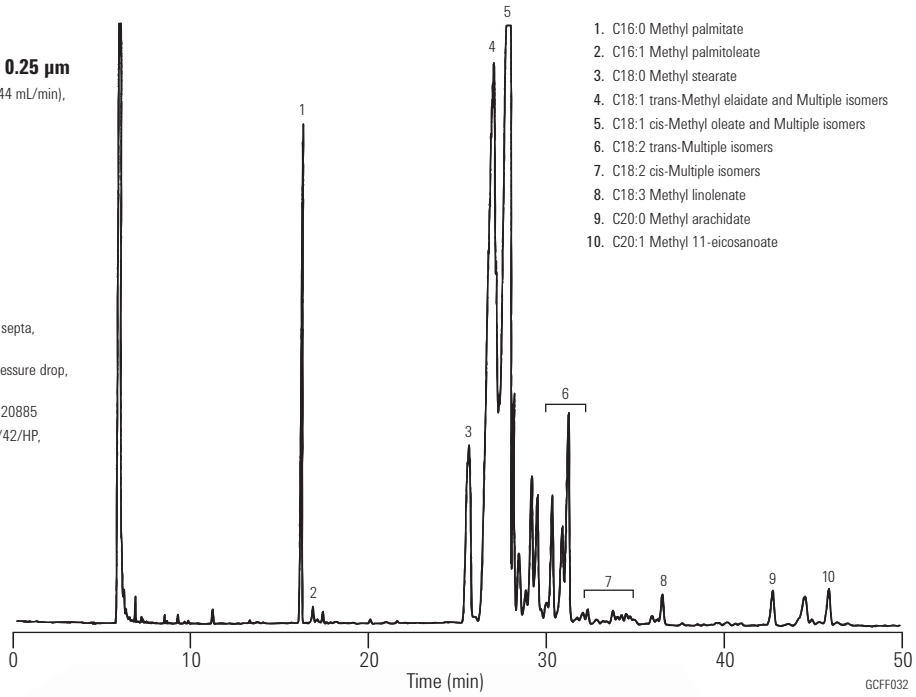
1. Butyric acid methyl ester (C4:0)
2. Caproic acid methyl ester (C6:0)
3. Caprylic acid methyl ester (C8:0)
4. Capric acid methyl ester (C10:0)
5. Undecanoic acid methyl ester (C11:0)
6. Lauric acid methyl ester (C12:0)
7. Tridecanoic acid methyl ester (C13:0)
8. Myristic acid methyl ester (C14:0)
9. Myristoleic acid methyl ester (C14:1)
10. Pentadecanoic acid methyl ester (C15:0)
11. cis-10-Pentadecenoic acid methyl ester (C15:1)
12. Palmitic acid methyl ester (C16:0)
13. Palmitoleic acid methyl ester (C16:1)
14. Heptadecanoic acid methyl ester (C17:0)
15. cis-10-Heptadecenoic acid methyl ester (C17:1)
16. Stearic acid methyl ester (C18:0)
17. Oleic acid methyl ester (C18:1n9c)
18. Elaidic acid methyl ester (C18:1n9t)
19. Linoleic acid methyl ester (C18:2n6c)
20. Linolelaidic acid methyl ester (C18:2n6t)
21. γ-Linolenic acid methyl ester (C18:3n6)
22. Linolenic acid methyl ester (C18:3n3)
23. Arachidic acid methyl ester (C20:0)
24. cis-11-Eicosenoic acid methyl ester (C20:1)
25. cis-11,14-Eicosadienoic acid methyl ester (C20:2)
26. cis-8,11,14-Eicosatrienoic acid methyl ester (C20:3n6)
27. Heneicosanoic acid methyl ester (C21:0)
28. cis-11,14,17-Eicosatrienoic acid methyl ester (C20:3n3)
29. Arachidonic acid methyl ester (C20:4n6)
30. cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester(C20:5n3)
31. Behenic acid methyl ester (C22:0)
32. Erucic acid methyl ester (C22:1n9)
33. cis-13,16-Docosadienoic acid methyl ester (C22:2)
34. Tricosanoic acid methyl ester (C23:0)
35. Lignoceric acid methyl ester (C24:0)
36. cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester (C22:6n3)
37. Nervonic acid methyl ester (C24:1)

Canola Oil Margarine Partially Hydrogenated FAMEs AOCS Method 1c-89

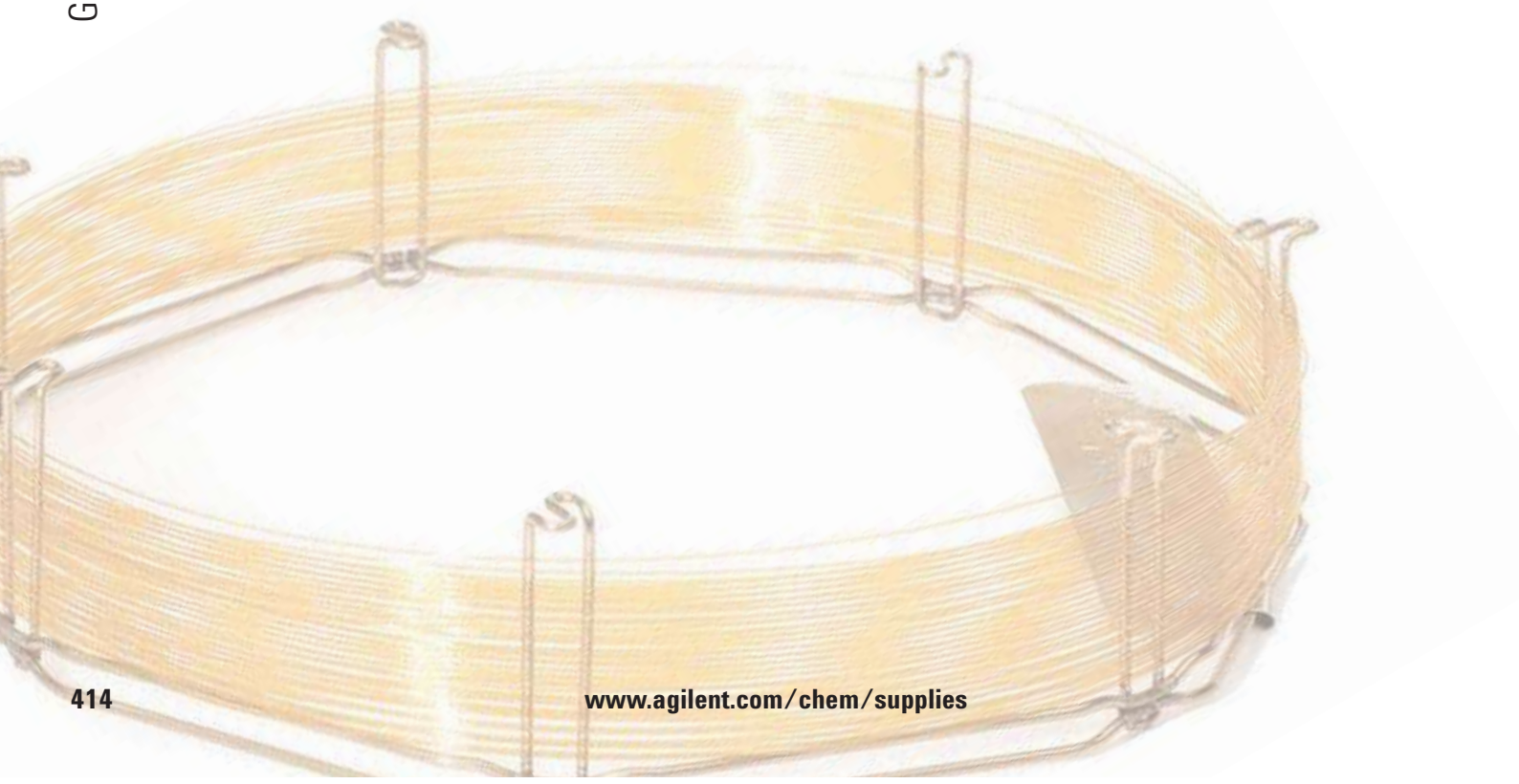
Column:	**DB-23 122-2362 60 m x 0.25 mm, 0.25 µm**
Carrier:	Helium at 15 cm/sec (0.44 mL/min), measured at 150°C
Oven:	150-200°C at 1.3°/min 200°C for 10 min
Injection:	Split, 210°C Split 1:100
Detector:	FID, 210°C
Sample:	1 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. C16:0 Methyl palmitate
2. C16:1 Methyl palmitoleate
3. C18:0 Methyl stearate
4. C18:1 trans-Methyl elaidate and Multiple isomers
5. C18:1 cis-Methyl oleate and Multiple isomers
6. C18:2 trans-Multiple isomers
7. C18:2 cis-Multiple isomers
8. C18:3 Methyl linolenate
9. C20:0 Methyl arachidate
10. C20:1 Methyl 11-eicosanoate



Butter Triglycerides I

Column: **DB-5ht**
123-5731
30 m x 0.32 mm, 0.10 µm

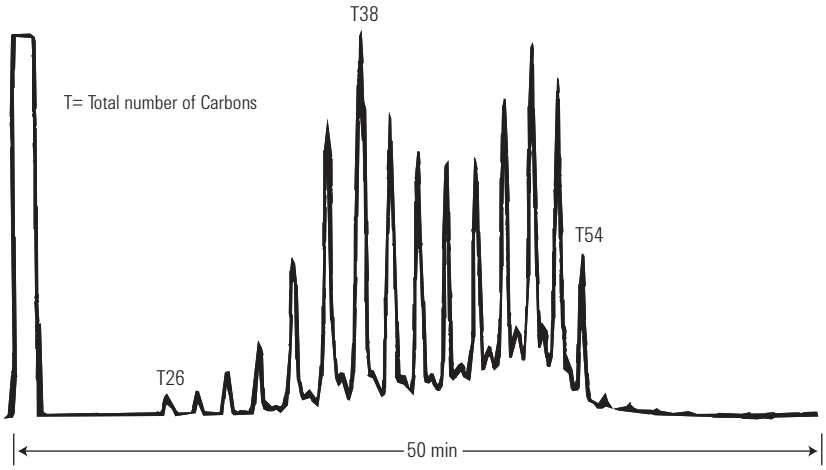
Carrier: Hydrogen at 55 cm/sec, measured at 250°C

Oven: 35-250°C at 70°/min
250-400°C at 5°/min
400°C for 20 min

Injection: Cool On-column

Detector: FID, 400°C
Nitrogen makeup gas at 30 mL/min
Baseline Corrected

Sample: 1 µL of 9 µg/µL in toluene (approx. 1% w/w solution)



Butter Triglycerides II

Column: **DB-17ht**
123-1831
30 m x 0.32 mm, 0.15 µm

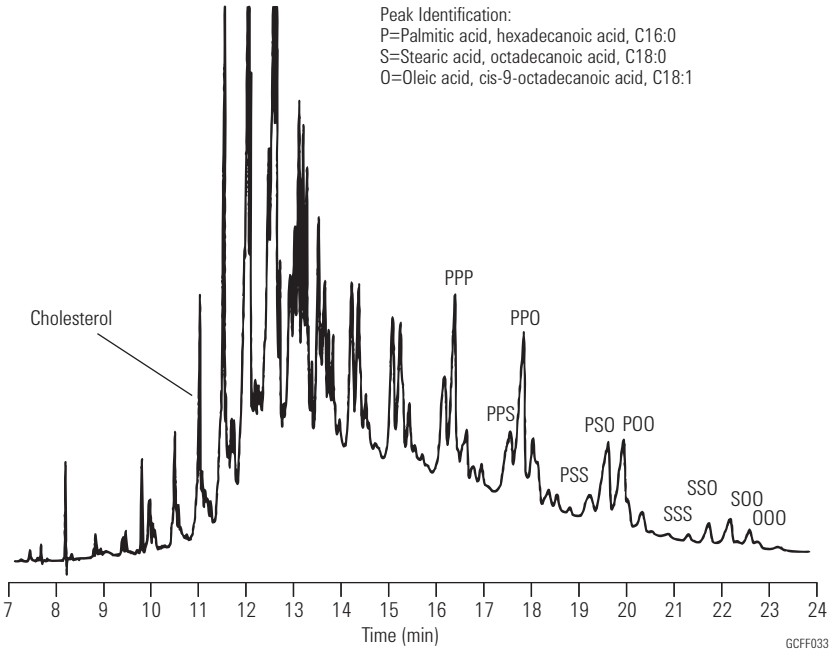
Carrier: Hydrogen at 40 cm/sec

Oven: 250-365°C at 5°/min
365°C for 1 min

Injection: Cool On-column

Detector: FID, 400°C
Nitrogen makeup gas at 30 mL/min
Baseline Corrected

Sample: 1 µL of 9 µg/µL in toluene (approx. 1% w/w solution)



Industrial Chemical Applications

Alcohols I

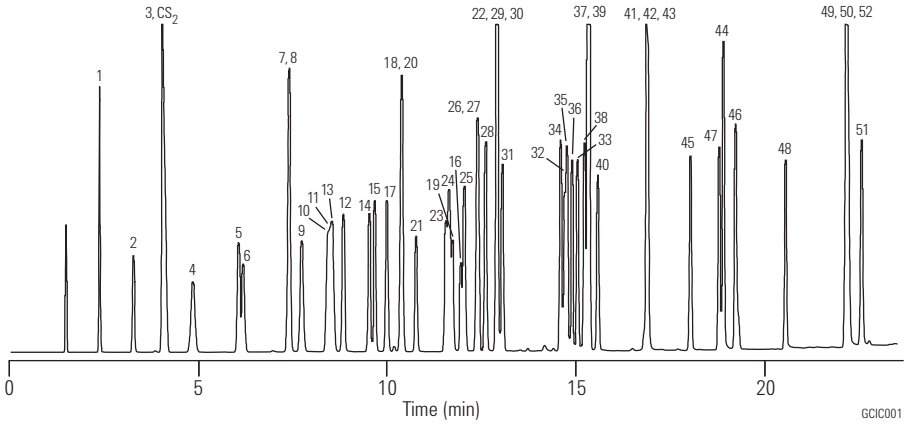
Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier:	Helium at 30 cm/sec, measured at 40°C
Oven:	40°C for 5 min 40-260°C at 10°C/min 260°C for 3 min
Injection:	Split, 250°C Split ratio 1:10
Detector:	FID, 300°C Nitrogen makeup gas at 30 mL/min
Sample:	1 µL of 0.01-0.05% each solvent in CS_2

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Methanol
2. Ethanol
3. Isopropanol
4. tert-Butanol
5. 2-Propen-1-ol (allyl alcohol)
6. 1-Propanol
7. 2-Propyn-1-ol (propargyl alcohol)
8. sec-Butanol
9. 2-Methyl-3-buten-2-ol
10. Isobutanol
11. 2-Methoxyethanol (methyl Cellosolve)
12. 3-Buten-1-ol
13. 2-Methyl-2-butanol (tert-amyl alcohol)
14. 1-Butanol
15. 2-Buten-1-ol (crotyl alcohol)
16. Ethylene glycol
17. 1-Penten-3-ol
18. 2-Pentanol
19. Glycidol
20. 3-Pentanol
21. 2-Ethoxyethanol (Cellosolve)
22. Propylene glycol
23. 3-Methyl-1-butanol (isoamyl alcohol)
24. 2-Methyl-1-butanol (active amyl alcohol)
25. 4-Methyl-2-pentanol
26. 1-Pentanol
27. 2-Penten-1-ol
28. 3-Methyl-2-buten-1-ol
29. Cyclopentanol
30. 3-Hexanol
31. 2-Hexanol
32. 4-Hydroxy-4-methyl-2-pentanone
33. Furfuyl alcohol
34. cis-3-Hexen-1-ol
35. 1-Hexanol
36. cis-2-Hexen-1-ol
37. Cyclohexanol
38. 3-Heptanol
39. 2-Heptanol
40. 2-Butoxyethanol (butyl Cellosolve)
41. cis-4-Hepten-1-ol
42. trans-2-Hepten-1-ol
43. 1-Heptanol
44. Benzyl alcohol
45. 2-Ethyl-1-hexanol
46. a-Methylphenyl alcohol
47. 1-Octanol
48. 1-Nonanol
49. 2-Phenoxyethanol
50. a-Ethylphenethyl alcohol
51. b-Ethylphenethyl alcohol
52. 1-Decanol



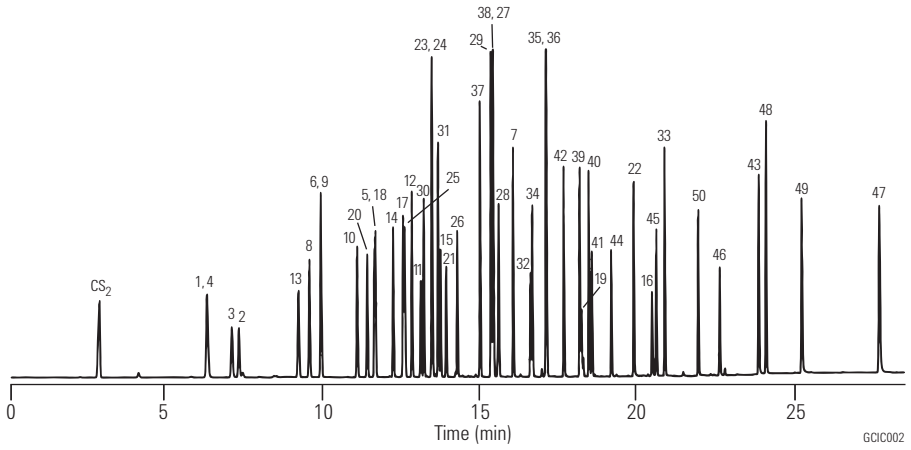
Alcohols II

Column:	**DB-WAXetr** **123-7354** **50 m x 0.32 mm, 1.00 µm**
Carrier:	Helium at 50 cm/sec, measured at 40°C
Oven:	40°C for 5 min 40-230°C at 10°/min 230°C for 5 min
Injection:	Split, 250°C Split ratio 1:5
Detector:	FID, 250°C Nitrogen makeup gas at 35 mL/min
Sample:	1 µL of 0.15% each solvent in CS_2

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Methanol
2. Ethanol
3. Isopropanol
4. tert-Butanol
5. 2-Propen-1-ol (allyl alcohol)
6. 1-Propanol
7. 2-Propyn-1-ol (propargyl alcohol)
8. sec-Butanol
9. 2-Methyl-3-buten-2-ol
10. Isobutanol
11. 2-Methoxyethanol (methyl Cellosolve)
12. 3-Buten-1-ol
13. 2-Methyl-2-butanol (tert-amyl alcohol)
14. 1-Butanol
15. 2-Buten-1-ol (crotyl alcohol)
16. Ethylene glycol
17. 1-Penten-3-ol
18. 2-Pentanol
19. Glycidol
20. 3-Pentanol
21. 2-Ethoxyethanol (Cellosolve)
22. Propylene glycol
23. 3-Methyl-1-butanol (isoamyl alcohol)
24. 2-Methyl-1-butanol (active amyl alcohol)
25. 4-Methyl-2-pentanol
26. 1-Pentanol
27. 2-Penten-1-ol
28. 3-Methyl-2-buten-1-ol
29. Cyclopentanol
30. 3-Hexanol
31. 2-Hexanol
32. 4-Hydroxy-4-methyl-2-pentanone
33. Furfuryl alcohol
34. cis-3-Hexen-1-ol
35. cis-2-Hexen-1-ol
36. Cyclohexanol
37. 3-Heptanol
38. 2-Heptanol
39. 2-Butoxyethanol (butyl Cellosolve)
40. cis-4-Hepten-1-ol
41. trans-2-Hepten-1-ol
42. 1-Heptanol
43. Benzyl alcohol
44. 2-Ethyl-1-hexanol
45. 1-Octanol
46. 1-Nonanol
47. 2-Phenoxyethanol
48. a-Ethylphenethyl alcohol
49. b-Ethylphenethyl alcohol
50. 1-Decanol

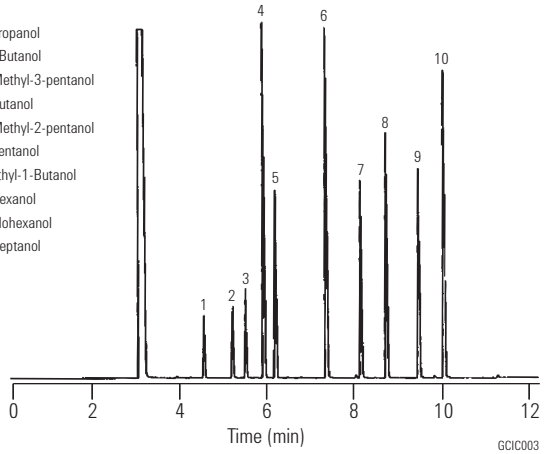


Alcohols III

Column: **HP-INNOWax**
19095N-123
30 m x 0.53 mm, 1.00 µm

Carrier:	Helium, 29 cm/sec, 3.0 psi (45°C)
Oven:	45°C for 1 min 45-150°C at 10°C/min 4 mL/min constant flow
Injection:	Split, 250°C Split ratio 25:1
Detector:	FID 250°C
Sample:	1 µL

1. 1-Propanol
2. iso-Butanol
3. 3-Methyl-3-pentanol
4. 1-Butanol
5. 4-Methyl-2-pentanol
6. 1-Pentanol
7. 2-Ethyl-1-Butanol
8. 1-Hexanol
9. Cyclohexanol
10. 1-Heptanol



Ethoxyethanol

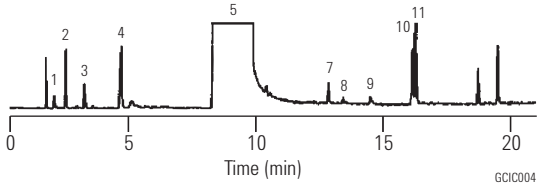
Column: **HP-FFAP**
19095F-123
30 m x 0.53 mm, 1.00 µm

Carrier:	Helium, 10 mL/min
Oven:	60°C for 1 min 60-100°C at 5°C/min 100-210°C at 10°C/min
Injection:	Split ratio 10:1
Detector:	TCD

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Ethylene oxide
2. Ethyl formate
3. Ethyl alcohol
4. Water
5. 2-Ethoxyethanol
6. 2-Ethoxyethyl acetate
7. Hydroxy acetate
8. Acetic acid
9. Formic acid
10. Ethylene glycol/monoformate
11. Ethylene glycol/monoacetate



Organic Acids

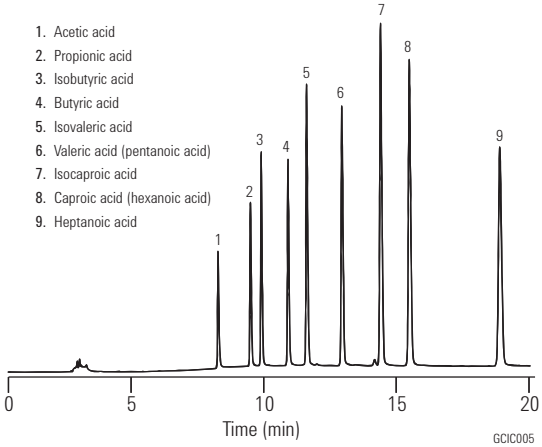
Column: **DB-WAXetr**
125-7332
30 m x 0.53 mm, 1.00 µm

Carrier:	Helium at 37 cm/sec, measured at 40°C
Oven:	125°C for 5 min 125-180°C at 15°C/min 180°C for 12 min
Injection:	Split, 250°C
Detector:	FID, 250°C

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Acetic acid
2. Propionic acid
3. Isobutyric acid
4. Butyric acid
5. Isovaleric acid
6. Valeric acid (pentanoic acid)
7. Isocaproic acid
8. Caproic acid (hexanoic acid)
9. Heptanoic acid



Free Organic Acids/C4-C5 Isomers

Column: **HP-INNOWax**
19091N-133
30 m x 0.25 mm, 0.25 µm

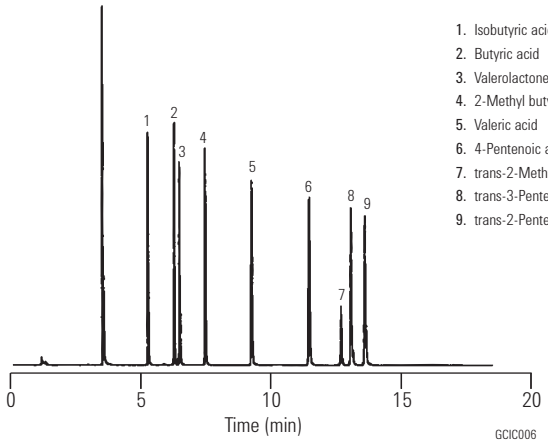
Carrier: Helium 42 cm/sec, 24 psi (120°C)
1.8 mL/min constant flow

Oven: 110°C for 1 min
110-133 at 2°C/min
133-160°C at 3°C/min

Injection: Split, 250°C
Split ratio 40:1

Detector: FID 300°C

Sample: 1 µL



1. Isobutyric acid
2. Butyric acid
3. Valerolactone
4. 2-Methyl butyric acid
5. Valeric acid
6. 4-Pentenoic acid
7. trans-2-Methyl-2-butenoic acid
8. trans-3-Pentenoic acid
9. trans-2-Pentenoic acid

Volatile Amines

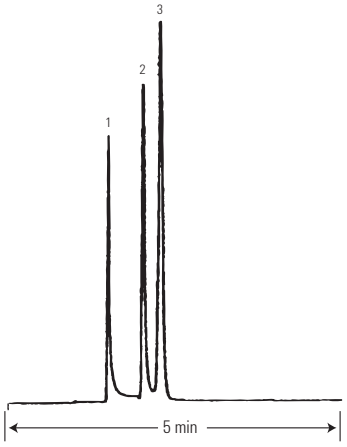
Column: **DB-1**
125-1035
30 m x 0.53 mm, 5.00 µm

Oven: 30°C isothermal

Sampler: Headspace

Injection: Split ratio 1:10

Detector: FID
Nitrogen makeup gas at 30 mL/min



1. Methylamine
2. Dimethylamine
3. Trimethylamine

Trace Active Amines, 10 ng on-column

Column: **HP-5ms**
19091S-213
30 m x 0.32 mm, 1.00 µm

Carrier: Helium, constant pressure 9.79 psi

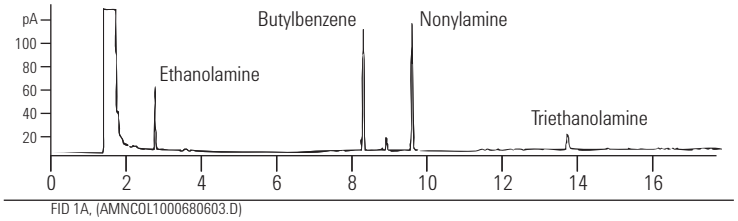
Oven: 75°C for 0.5 min
75-250°C at 10°C/min
250-320°C at 25°C/min
320°C for 5 min

Injection: On-column
Oven tracking mode

Detector: FID 300°C

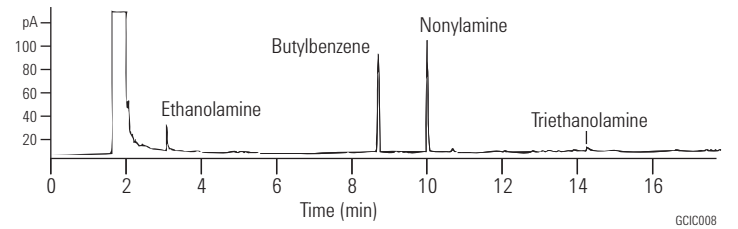
Sample: 0.5 µL of each standard in methanol

HP-5ms



FID 1A, (AMNCOL1000680603.D)

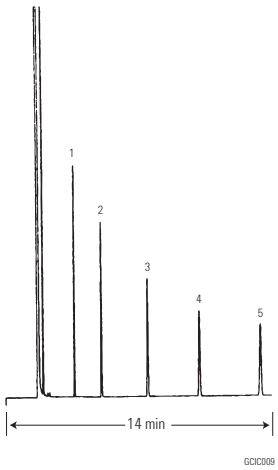
Another 5% Phenyl Amines Column



Primary Amines

Column: **CAM**
112-2132
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 40 cm/sec
Oven: 110°C isothermal
Injection: Split
Detector: FID
Nitrogen makeup gas at 30 mL/min

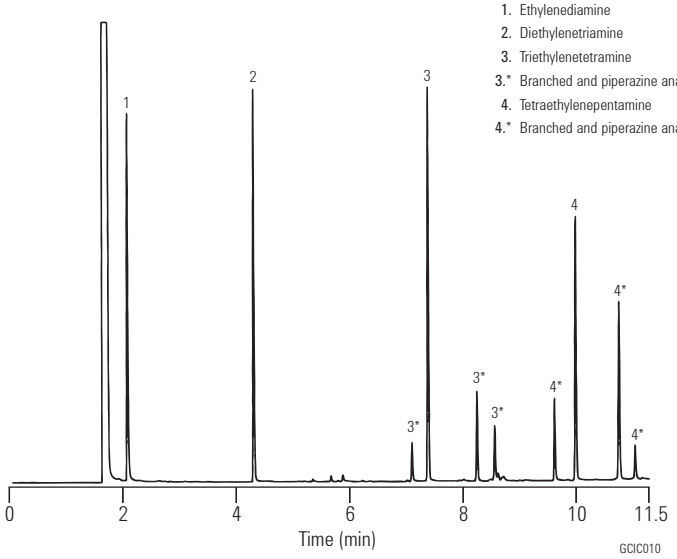


1. n-Octylamine
2. n-Nonylamine
3. n-Decylamine
4. Benylamine
5. Dicyclohexylamine

Polyethyleneamines

Column: **DB-5ms**
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 30 cm/sec, measured at 100°C
Oven: 100°C for 1 min
100-320°C at 20°C/min
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 100 ng/µL standard in methanol



1. Ethylenediamine
2. Diethylenetriamine
3. Triethylenetetramine
3.* Branched and piperazine analogs of peak #3
4. Tetraethylenepentamine
4.* Branched and piperazine analogs of peak #4

Amines and Nitriles

Column: **DB-5ms**
122-5536
30 m x 0.25 mm, 0.50 µm

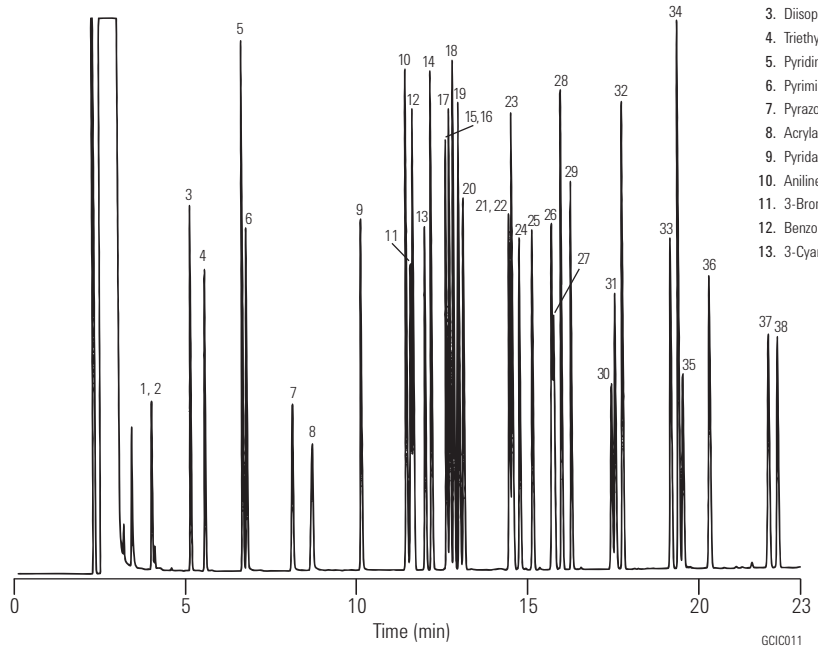
Carrier: Helium at 22 cm/sec, measured at 40°C

Oven: 40°C for 1 min
40-260°C at 10°C/min

Injection: Split, 250°C
Split ratio 1:50

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 100 ng/µL standard in methanol



Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

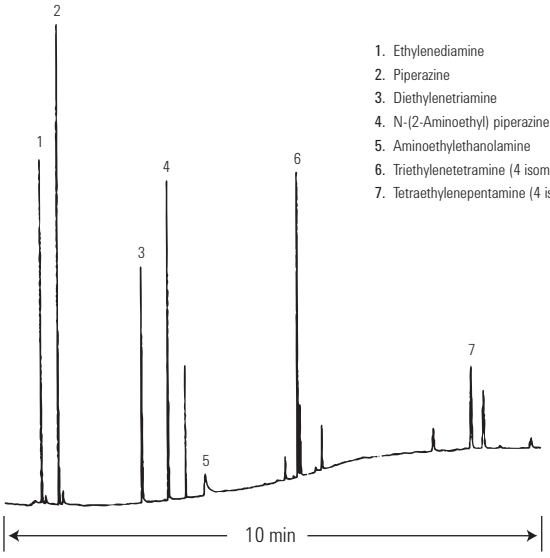
1. Diethylamine
2. Propionitrile
3. Diisopropylamine
4. Triethylamine
5. Pyridine
6. Pyrimidine
7. Pyrazole
8. Acrylamide
9. Pyridazine
10. Aniline
11. 3-Bromopyridine
12. Benzonitrile
13. 3-Cyanopyridine
14. Benzylamine
15. n-Octylamine
16. 1-Methyl-2-pyrrolidine
17. N,N-Dimethylbenzylamine
18. Phenylethylamine
19. N-Benzylmethylamine
20. 2-Cyanopyridine
21. 2-Chloroaniline
22. n-Nonylamine
23. 2,4-Dimethylaniline
24. 4-Chlorobenzonitrile
25. 2,6-Dimethylaniline
26. 3-Chloroaniline
27. 4-Chloroaniline
28. N,N-Diethylaniline
29. n-Decylamine
30. 4-Bromoaniline
31. 3,4-Diaminotoluene
32. 2,6-Diethylaniline
33. 2-Nitroaniline
34. Dicyclohexylamine
35. 3,4-Dichloroaniline
36. 3-Nitroaniline
37. 4-Nitroaniline
38. Diphenylaniline



Amines in Water

Column: **CAM**
112-2132
30 m x 0.25 mm, 0.25 µm

Carrier:	Hydrogen at 38 cm/sec
Oven:	120-220°C at 10°C/min
Injection:	Split
Detector:	FID Nitrogen makeup gas at 30 mL/min



1. Ethylenediamine
2. Piperazine
3. Diethylenetriamine
4. N-(2-Aminoethyl) piperazine
5. Aminoethylethanolamine
6. Triethylenetetramine (4 isomers)
7. Tetraethylenepentamine (4 isomers)

Aldehydes and Acids

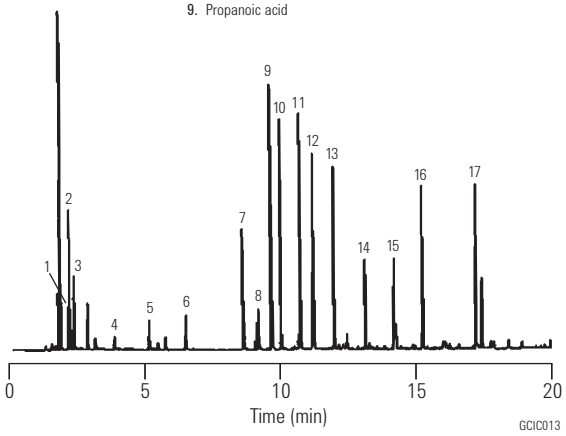
Column: **HP-INNOWax**
19091N-213
30 m x 0.32 mm, 0.50 µm

Carrier:	Helium, 40 cm/sec, 11.7 psi (60°C)
Oven:	60°C for 1 min 60-250°C at 10°C/min 2.5 mL/min constant flow
Injection:	Split, 250°C Split ratio 40:1
Detector:	FID 275°C
Sample:	0.5 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Butanal
2. 2-Methyl butanal
3. Pentanal
4. Hexanal
5. Heptanal
6. Octanal
7. Acetic acid
8. Decanal
9. Propanoic acid
10. iso-Butyric acid
11. Butyric acid
12. iso-Valeric acid
13. Valeric acid
14. Hexanoic acid
15. Heptanoic acid
16. Octanoic acid
17. Decanoic acid



Aldehydes and Ketones

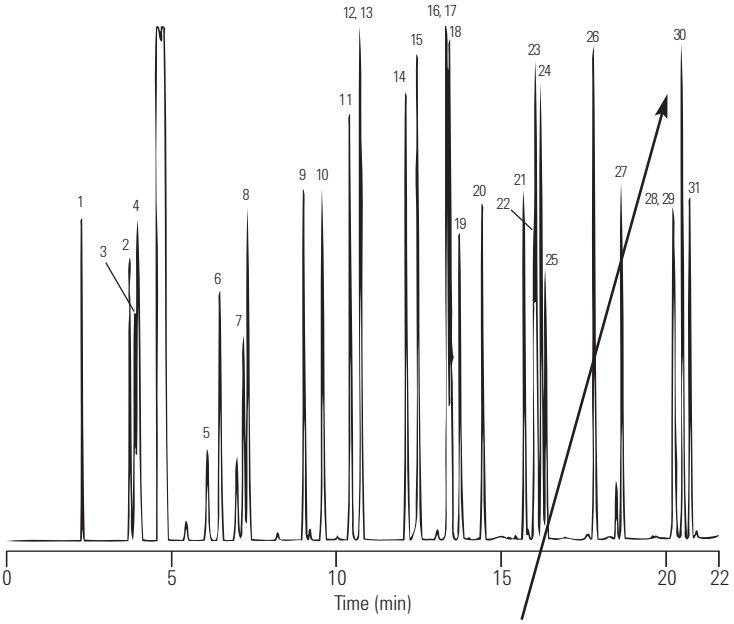
Column:	**DB-1** **123-1034** **30 m x 0.32 mm, 3.00 µm**
Column:	**DB-WAX** **123-7033** **30 m x 0.32 mm, 0.50 µm**
Carrier:	Helium at 32 cm/sec, measured at 40°C
Oven:	40°C for 5 min 40-210°C at 10°C/min40°C for 5 min 40-210°C at 10°C/min
Injection:	Split, 250°C Split ratio 1:100
Detector:	FID, 300°C Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

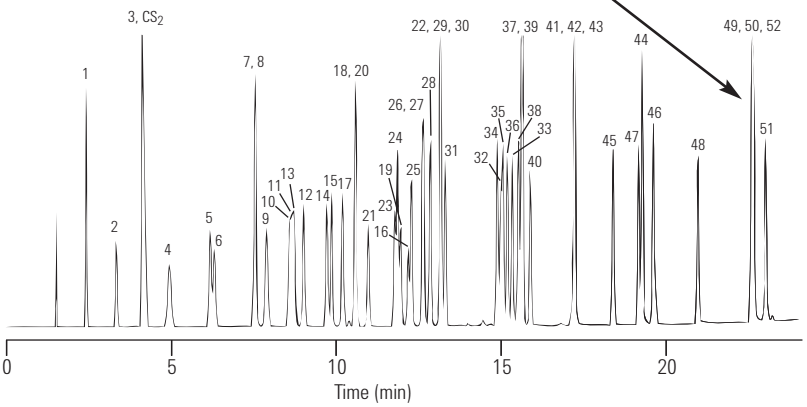
1. Acetaldehyde
2. Acrolein
3. Acetone
4. Propionaldehyde
5. Isobutyraldehyde
6. Methacrolein
7. Butyraldehyde
8. 2-Butanone (MEK)
9. Crotonaldehyde
10. 3-Methyl-2-butanone
11. 2-Pentanone
12. 3-Pentanone
13. Valeraldehyde (pentanal)
14. 4-Methyl-2-pentanone (MIBK)
15. 2-Methyl-3-pentanone
16. 3-Hexanone
17. Cyclopentanone
18. 2-Hexanone
19. Hexanal
20. Furfural
21. 4-Heptanone
22. 3-Heptanone
23. 2-Heptanone
24. Cyclohexanone
25. Heptanal
26. Benzaldehyde
27. Octyl aldehyde
28. o-Tolualdehyde
29. m-Tolualdehyde
30. p-Tolualdehyde
31. Nonyl aldehyde

DB-1



DB-1 provides the best overall resolution; however, DB-WAX provides better resolution of o- and m-tolualdehyde.

DB-WAX

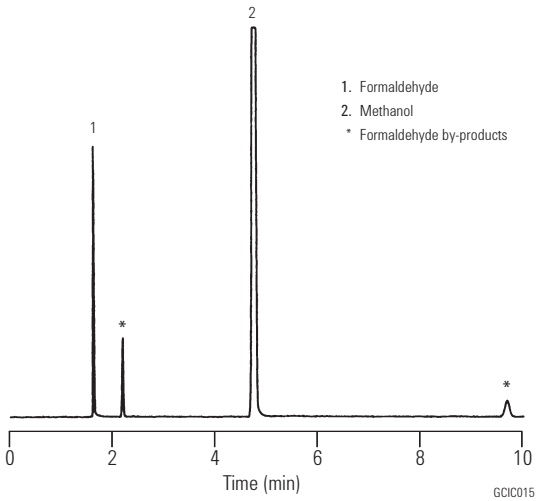


GCIC014

Formaldehyde Underivatized

Column: **DB-WAX**
123-7033
30 m x 0.32 mm, 0.50 µm

Carrier: Helium at 36 cm/sec, measured at 35°C
Oven: 35°C isothermal
Injection: Split, 200°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min



1. Formaldehyde
2. Methanol
* Formaldehyde by-products

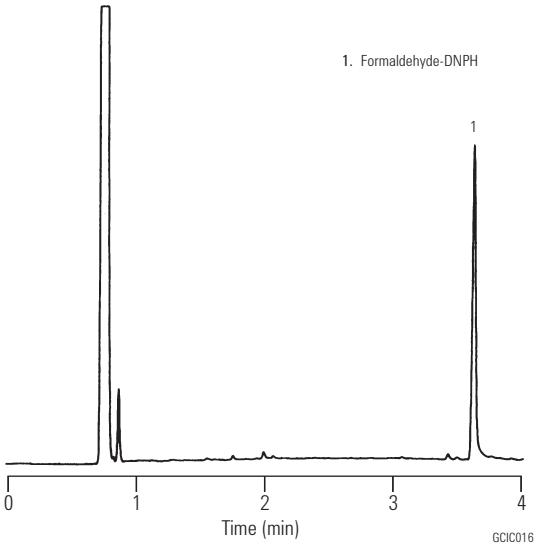
DNPH Derivative

Column: **DB-1**
123-1012
15 m x 0.32 mm, 0.25 µm

Carrier: Helium at 35 cm/sec, measured at 150°C
Oven: 150-250°C at 20°C/min
Injection: Split, 300°C
Split ratio 1:100
Detector: ECD, 375°C
Nitrogen makeup gas at 35 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



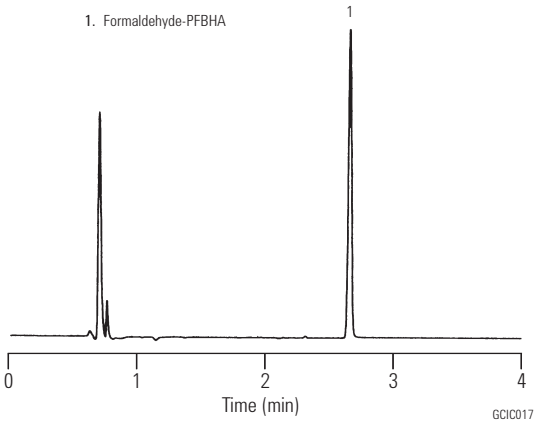
1. Formaldehyde-DNPH

PFBHA Derivative

Column: **DB-1**
123-1012
15 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 60°C
Oven: 60-100°C at 10°C/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 375°C
Nitrogen makeup gas at 35 mL/min

1. Formaldehyde-PFBHA



Aromatics I

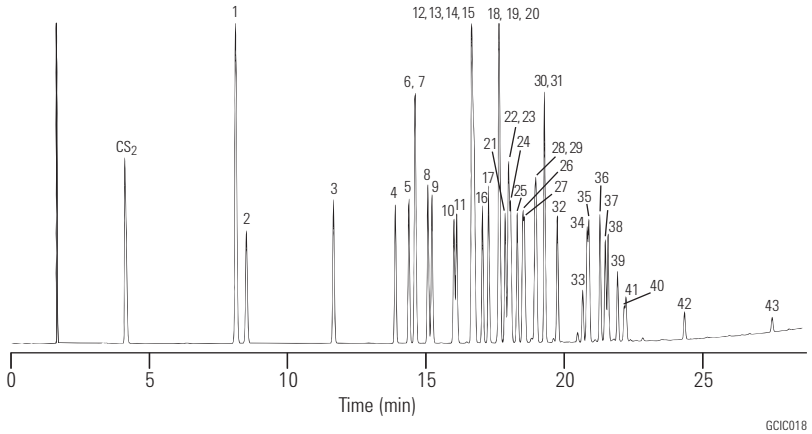
Column: **DB-1**
125-1034
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C
Oven: 40°C for 5 min
40-260°C at 10°C/min
Injection: Split, 250°C
Split ratio 1:10
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Benzene
2. Fluorobenzene
3. Toluene
4. Chlorobenzene
5. Ethylbenzene
6. m-Xylene
7. p-Xylene
8. Styrene
9. o-Xylene
10. Isopropylbenzene (cumene)
11. Bromobenzene
12. Propylbenzene
13. 2-Chlorotoluene
14. 3-Chlorotoluene
15. 4-Chlorotoluene
16. 1,3,5-Trimethylbenzene (mesitylene)
17. α-Methylstyrene
18. tert-Butylbenzene
19. 1,2,4-Trimethylbenzene (pseudocumene)
20. 4-Methylstyrene
21. 1,3-Dichlorobenzene
22. 1,4-Dichlorobenzene
23. Isobutylbenzene
24. sec-Butylbenzene
25. 1,2,3-Trimethylbenzene (hemimellitene)
26. 1,2-Dichlorobenzene
27. Iodobenzene
28. Styrene oxide
29. Butylbenzene
30. 4-Chlorostyrene
31. Nitrobenzene
32. 4-tert-Butyltoluene
33. 1,3,5-Trichlorobenzene
34. 2-Nitrotoluene
35. 1,3-Diisopropylbenzene
36. 1,4-Diisopropylbenzene
37. 1,2,4-Trichlorobenzene
38. 3-Nitrotoluene
39. 4-Nitrotoluene
40. 1,2,3-Trichlorobenzene
41. 1-Chloro-4-nitrobenzene
42. 1,2,4,5-Tetrachlorobenzene
43. Pentachlorobenzene



Aromatics II

Column: **DB-WAX**
125-7032
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C

Oven: 40°C for 5 min
40-230°C at 10°C/min
230°C for 7 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

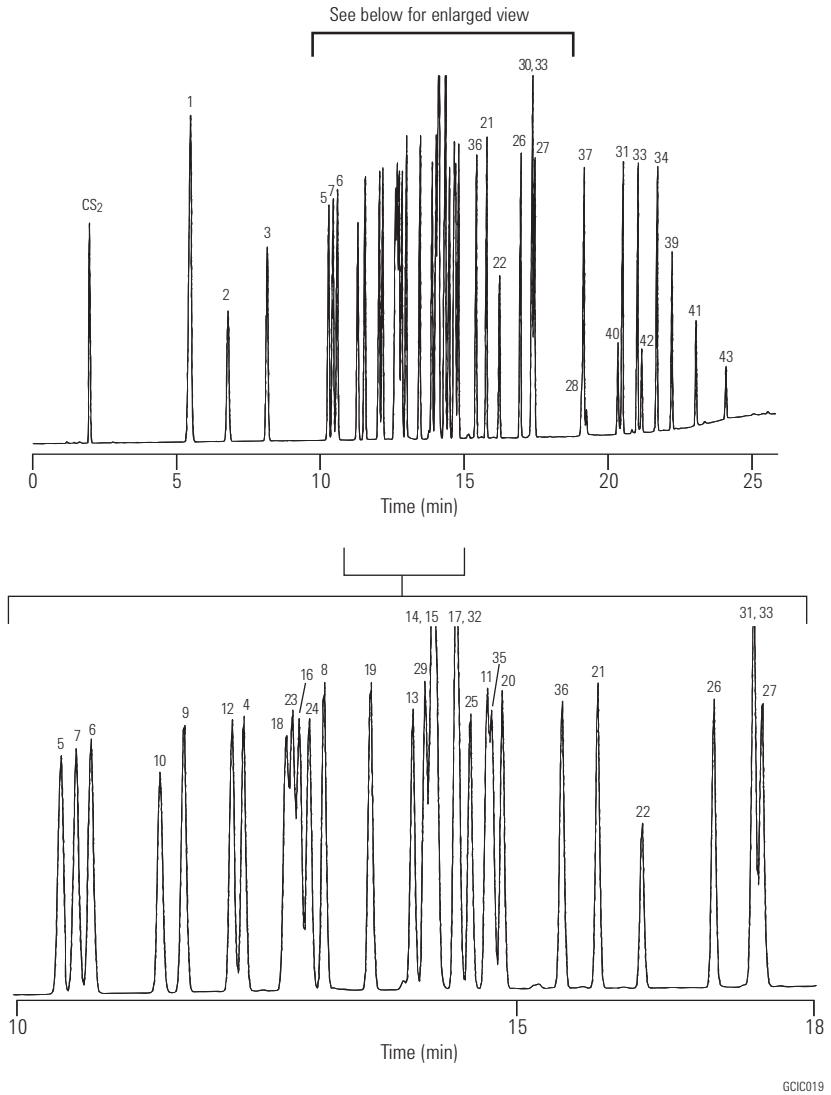
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. Benzene
2. Fluorobenzene
3. Toluene
4. Chlorobenzene
5. Ethylbenzene
6. m-Xylene
7. p-Xylene
8. Styrene
9. o-Xylene
10. Isopropylbenzene (cumene)
11. Bromobenzene
12. Propylbenzene
13. 2-Chlorotoluene
14. 3-Chlorotoluene
15. 4-Chlorotoluene
16. 1,3,5-Trimethylbenzene (mesitylene)
17. α-Methylstyrene
18. tert-Butylbenzene
19. 1,2,4-Trimethylbenzene (pseudocumene)
20. 4-Methylstyrene
21. 1,3-Dichlorobenzene
22. 1,4-Dichlorobenzene
23. Isobutylbenzene
24. sec-Butylbenzene
25. 1,2,3-Trimethylbenzene (hemimellitene)
26. 1,2-Dichlorobenzene
27. Iodobenzene
28. Styrene oxide (peak not shown)
29. Butylbenzene
30. 4-Chlorostyrene
31. Nitrobenzene
32. 4-tert-Butyltoluene
33. 1,3,5-Trichlorobenzene
34. 2-Nitrotoluene
35. 1,3-Diisopropylbenzene
36. 1,4-Diisopropylbenzene
37. 1,2,4-Trichlorobenzene
38. 3-Nitrotoluene
39. 4-Nitrotoluene
40. 1,2,3-Trichlorobenzene
41. 1-Chloro-4-nitrobenzene
42. 1,2,4,5-Tetrachlorobenzene
43. Pentachlorobenzene

Impurities in Styrene

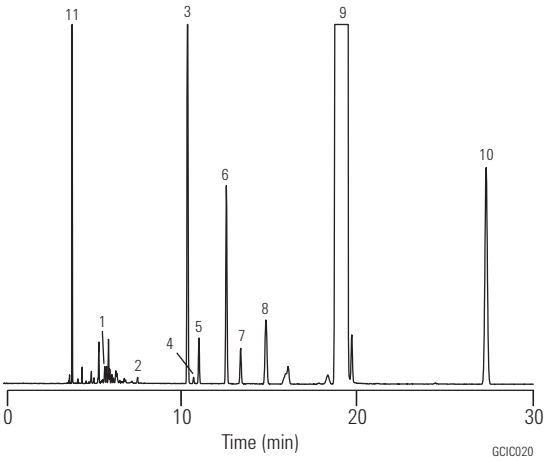
Column: **DB-WAXetr**
123-7363
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 29.4 cm/sec, measured at 70°C
Oven: 80°C isothermal
Injection: Split, 230°C
Split ratio 1:150
Detector: FID, 240°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Benzene
2. Toluene
3. Ethylbenzene
4. p-Xylene
5. m-Xylene
6. Isopropylbenzene
7. o-Xylene
8. n-Propylbenzene
9. Styrene
10. α-Methylstyrene
11. Heptane (IS)

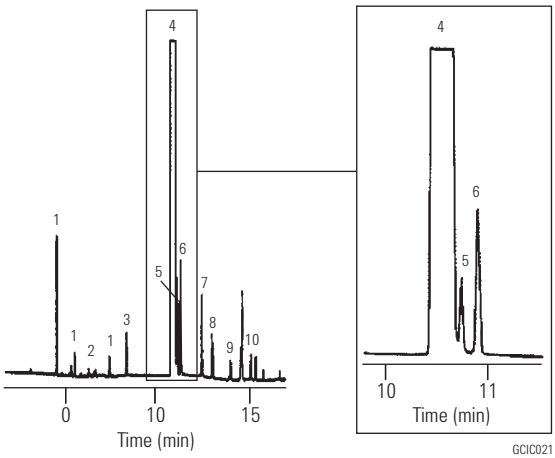


Impurities in Ethylbenzene

Column: **HP-INNOWax**
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium, 32 cm/sec, 19.9 psi (60°C)
2.5 mL/min constant flow
Oven: 60°C for 1 min
60-92°C at 4°C/min
92°C for 4.5 min
92-220°C at 20°C/min
Injection: Split, 220°C
Split ratio 100:1
ASTM Method D5060
Detector: FID 270°C
Sample: 0.5 µL
Neat, 99%+

1. Hydrocarbon
2. Benzene
3. Toluene
4. Ethylbenzene
5. p-Xylene
6. m-Xylene
7. Cumene
8. o-Xylene
9. Propylbenzene
10. Styrene

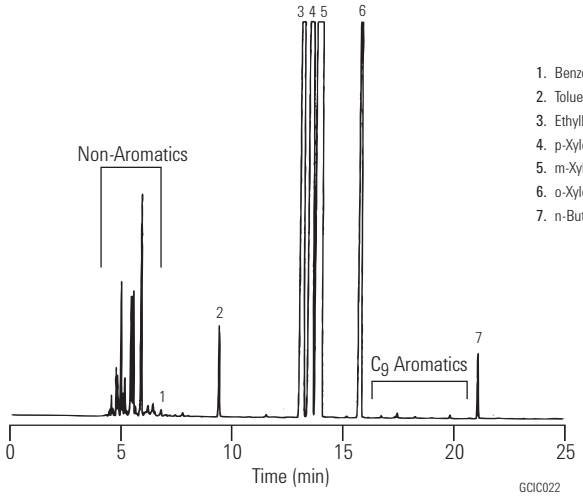


Impurities in Mixed Xylenes

Column: **DB-WAXetr**
123-7362
60 m x 0.32 mm, 0.25 µm

Carrier: Helium at 20 cm/sec, measured at 145°C
Oven: 60°C for 10 min
60-150°C at 5°/min
150°C for 10 min
Injection: Split, 230°C
Split ratio 1:150
Detector: FID, 240°C

ASDM D2360

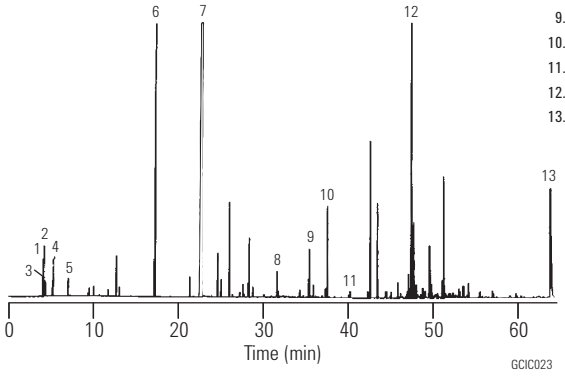


1. Benzene
2. Toluene
3. Ethylbenzene
4. p-Xylene
5. m-Xylene
6. o-Xylene
7. n-Butylbenzene (IS)

Pyrolysates of Polystyrene

Column: **ULTRA 1**
19091A-105
50 m x 0.20 mm, 0.33 µm

Carrier: Helium, 30 psi, 12 mL/min
Oven: 0-280 at 5°C/min
Injection: Split, 280°C
Split ratio 30:1
Pyrolyzer 600°C
Detector: FID 300°C
Sample: 100 mg pyrolyzed



1. Propylene
2. Propane
3. 1-Butene
4. Butene
5. Pentane
6. Toluene
7. Styrene
8. C_2H_5-C(Ph) = CH_2
9. C_4H_9-CH_2CH_2-Ph
10. C_4H_9-C(Ph) = CH_2
11. C_4H_9-CH=C(Ph)CH_3
12. Styrene dimer
13. Styrene trimer

Esters I

Column: **DB-1**
125-1034
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

1. Methyl formate
2. Ethyl formate
3. Methyl acetate
4. Vinyl acetate
5. Ethyl acetate
6. Propyl formate
7. Methyl propionate
8. Isopropyl acetate
9. Ethyl acrylate
10. tert-Butyl acetate
11. Ethyl propionate
12. Propyl acetate
13. sec-Butyl acetate
14. Isobutyl acetate
15. Propyl propionate
16. Butyl acetate
17. Isoamyl acetate
18. Amyl acetate
19. 2-Ethoxyethyl acetate
20. 2-Methylbutyl acetate
21. Methyl benzoate
22. Benzyl acetate
23. Ethyl benzoate
24. Propyl benzoate

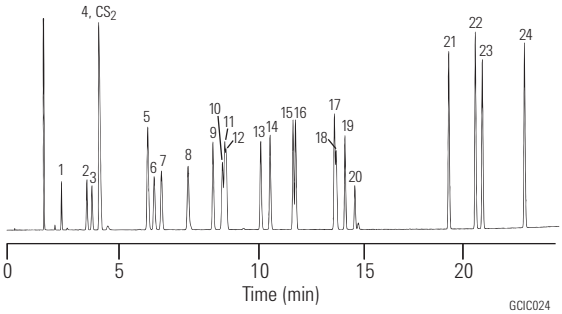
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



GCIC024

Esters II

Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

1. Methyl formate
2. Ethyl formate
3. Methyl acetate
4. Vinyl acetate
5. Ethyl acetate
6. Propyl formate
7. Methyl propionate
8. Isopropyl acetate
9. Ethyl acrylate
10. tert-Butyl acetate
11. Ethyl propionate
12. Propyl acetate
13. sec-Butyl acetate
14. Isobutyl acetate
15. Propyl propionate
16. Butyl acetate
17. Isoamyl acetate
18. Amyl acetate
19. 2-Ethoxyethyl acetate
20. 2-Methylbutyl acetate
21. Methyl benzoate
22. Benzyl acetate
23. Ethyl benzoate
24. Propyl benzoate

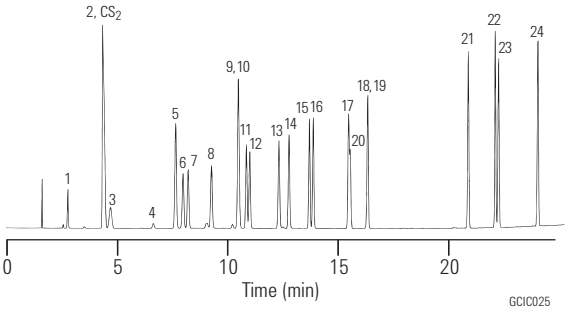
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



GCIC025

Esters III

Column: **HP-INNOWax**
19095N-123
30 m x 0.53 mm, 1.00 µm

Carrier: Helium 29 cm/sec, 3.0 psi (45°C)
4 mL/min constant flow

Oven: 45°C for 1 min
45-200°C at 5°C/min

Injection: Split, 250°C
Split ratio 25:1

Detector: FID 250°C

Sample: 1 µL

Suggested Supplies

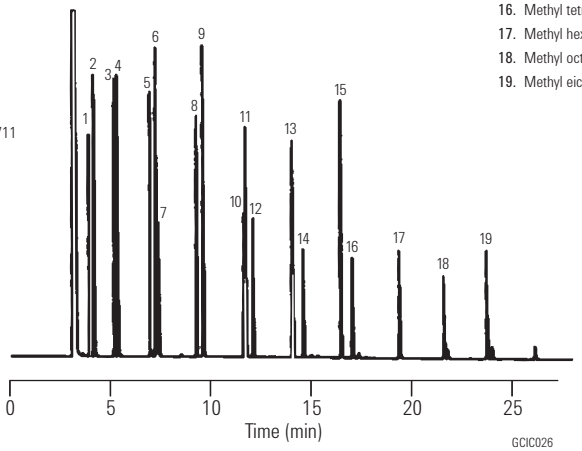
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Ethyl propionate
2. Propyl acetate
3. Ethyl butyrate
4. Propyl propionate
5. Propyl butyrate
6. Ethyl valerate
7. Butyl propionate
8. Propyl valerate
9. Ethyl caproate
10. Butyl valerate
11. Propyl caproate
12. Methyl decanoate
13. Butyl caproate
14. Methyl dodecanoate
15. Butyl heptanoate
16. Methyl tetradecanoate
17. Methyl hexadecanoate
18. Methyl octadecanoate
19. Methyl eicosenoate



Ethers

Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec,
measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

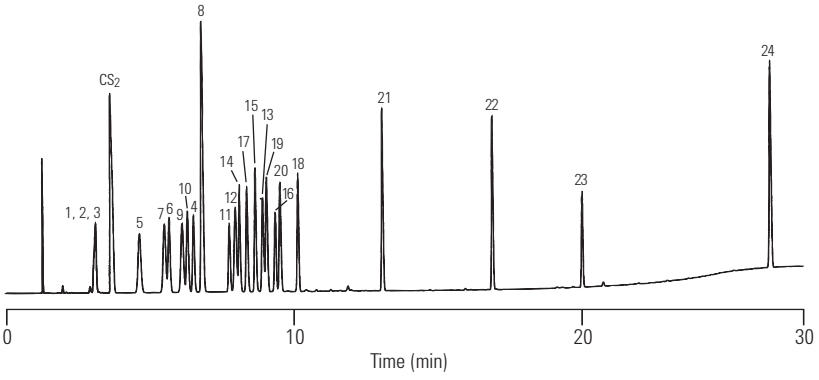
Septum: 11 mm Advanced Green septa,
5183-4759

Liner: General Purpose Split/Splitless Liner,
taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP,
5181-1267

1. Furan
2. Ethyl vinyl ether
3. Ethyl ether
4. 1,3-Dioxalane
5. Methyl-tert-butyl ether (MTBE)
6. Allyl ethyl ether
7. Isopropyl ether
8. Tetrahydrofuran (THF)
9. tert-Amyl methyl ether
10. Butyl methyl ether
11. Glyme (propylene glycol dimethyl ether)
12. tert-Amyl methyl ether
13. Diglyme (diethylene glycol dimethyl ether)
14. Propyl ether
15. Allyl ether
16. 1,4-Dioxane
17. Butyl ethyl ether
18. Epichlorohydrin
19. Tetrahydropyran
20. Acetal (acetaldehyde diethyl acetal)
21. Butyl ether
22. Pentyl ether
23. Triglyme (triethylene glycol dimethyl ether)
24. Benzyl ether



Glycols I

Column: **DB-WAX**
124-7032
30 m x 0.45 mm, 0.85 µm

Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 2 min
50-220°C at 10°/min

Injection: Megabore Direct, 250°C

Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL

1. Ethylene glycol monomethyl ether
2. Ethylene glycol monoethyl ether
3. 1,3-Propanediol
4. 1,2-Propanediol (propylene glycol)
5. 2,3-Butanediol
6. 1,3-Butanediol
7. Ethylene glycol monobutyl ether
8. Diethylene glycol monomethyl ether
9. 1,4-Butanediol
10. Diethylene glycol monoethyl ether
11. Dipropylene glycol
12. 1,5-Pentanediol
13. 1,6-Hexanediol
14. 1,7-Heptanediol
15. Diethylene glycol monobutyl ether
16. 1,8-Octanediol
17. 1,9-Nonanediol
18. Ethylene glycol
19. 1,10-Decanediol

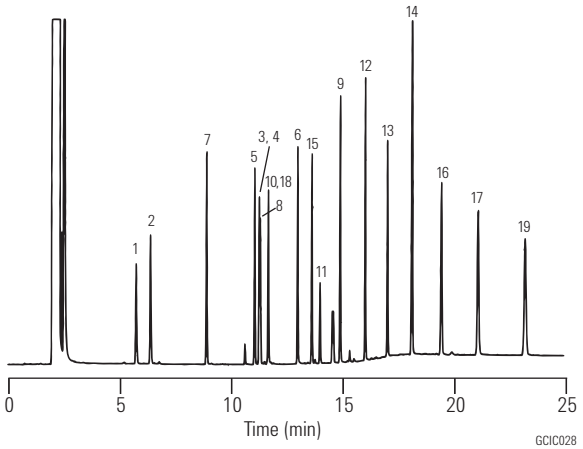
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



Glycols II

Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C

Oven: 40°C for 5 min
40-260°C at 10°/min
260°C for 3 min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

1. Ethylene glycol monomethyl ether
2. Glyme
3. Ethylene glycol
4. Diglyme
5. Ethylene glycol monoethyl ether
6. 1,3-Propanediol
7. 1,2-Propanediol (propylene glycol)
8. 2,3-Butanediol
9. 1,3-Butanediol
10. Ethylene glycol monobutyl ether
11. 1,4-Butanediol
12. Diethylene glycol monomethyl ether
13. Diethylene glycol
14. Diethylene glycol monoethyl ether
15. 1,5-Pentanediol
16. 1,6-Hexanediol
17. Diethylene glycol monobutyl ether
18. Triglyme
19. 1,7-Heptanediol
20. 1,8-Octanediol
21. 1,9-Nonanediol
22. 1,10-Decanediol

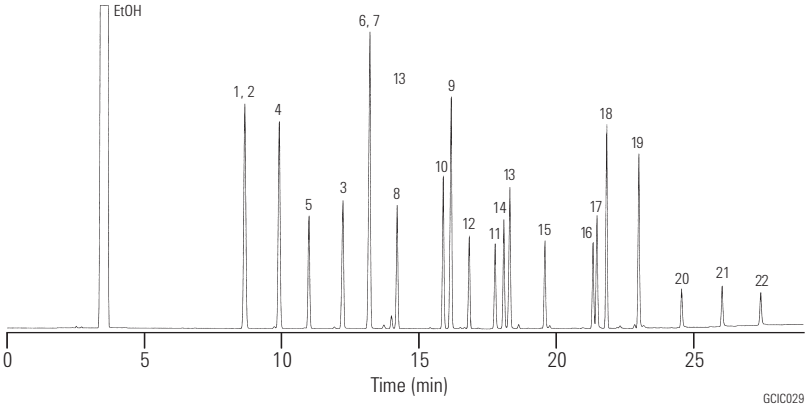
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



Glycols III

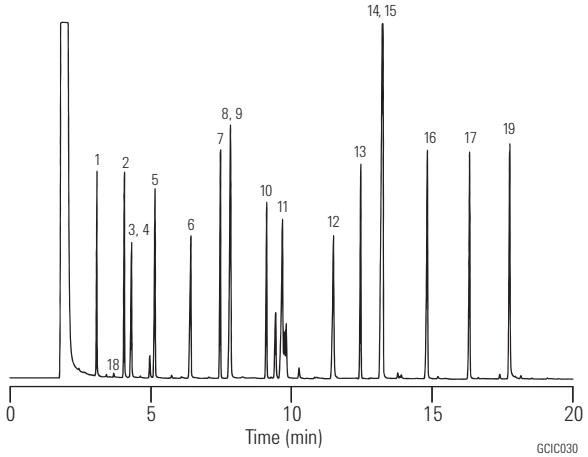
Column: **DB-1**
124-1032
30 m x 0.45 mm, 1.27 µm

Carrier: Helium at 35 cm/sec, measured at 50°C
Oven: 50°C for 2 min
50-260°C at 10°/min
Injection: Split, 250°C
Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Ethylene glycol monomethyl ether
2. Ethylene glycol monoethyl ether
3. 1,3-Propanediol
4. 1,2-Propanediol
5. 2,3-Butanediol
6. 1,3-Butanediol
7. Ethylene glycol monobutyl ether
8. Diethylene glycol monomethyl ether
9. 1,4-Butanediol
10. Diethylene glycol monoethyl ether
11. Dipropylene glycol
12. 1,5-Pentanediol
13. 1,6-Hexanediol
14. 1,7-Heptanediol
15. Diethylene glycol monobutyl ether
16. 1,8-Octanediol
17. 1,9-Nonanediol
18. Ethylene glycol
19. 1,10-Decanediol



Triethylene Glycol and Impurities

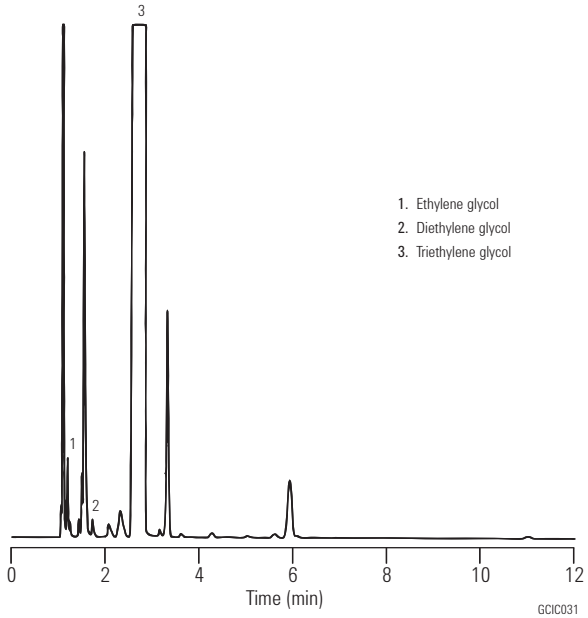
Column: **DB-1**
124-1032
30 m x 0.45 mm, 1.27 µm

Carrier: Helium at 35 cm/sec, measured at 50°C
Oven: 170°C isothermal
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.5 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Ethylene glycol
2. Diethylene glycol
3. Triethylene glycol



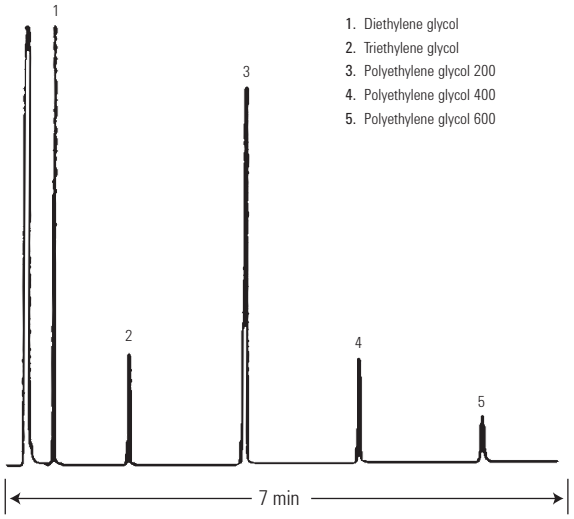
Ethylene Glycol Mixture

Column: **ULTRA 1**
19091A-101
12 m x 0.20 mm, 0.33 µm

Carrier: Helium, 25 cm/sec
Oven: 100°C for 0.5 min
100-200°C at 20°C/min
Injection: Split, 250°C
Split ratio 100:1
Detector: FID
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Liner, splitless, single-taper, glass wool, deactivated, 5062-3587
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

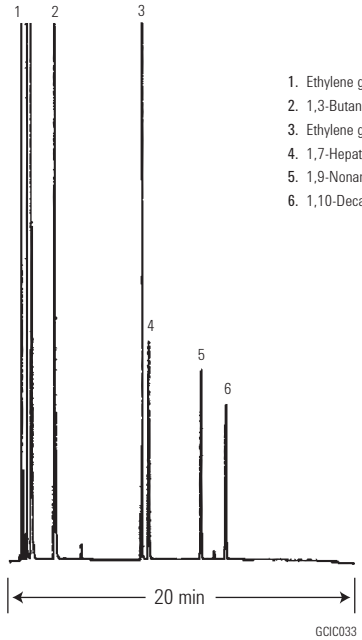


1. Diethylene glycol
2. Triethylene glycol
3. Polyethylene glycol 200
4. Polyethylene glycol 400
5. Polyethylene glycol 600

Glycols/Diols

Column: **HP-1**
19095Z-023
30 m x 0.53 mm, 0.88 µm

Carrier: Helium
Oven: 50°C for 3 min
50-180°C at 8°C/min
Injection: On-column
Detector: FID 250°C
Sample: 1 µL



1. Ethylene glycol
2. 1,3-Butanediol
3. Ethylene glycol phenyl ether
4. 1,7-Hepatanediol
5. 1,9-Nonanediol
6. 1,10-Decanediol

Halogenated Hydrocarbons I

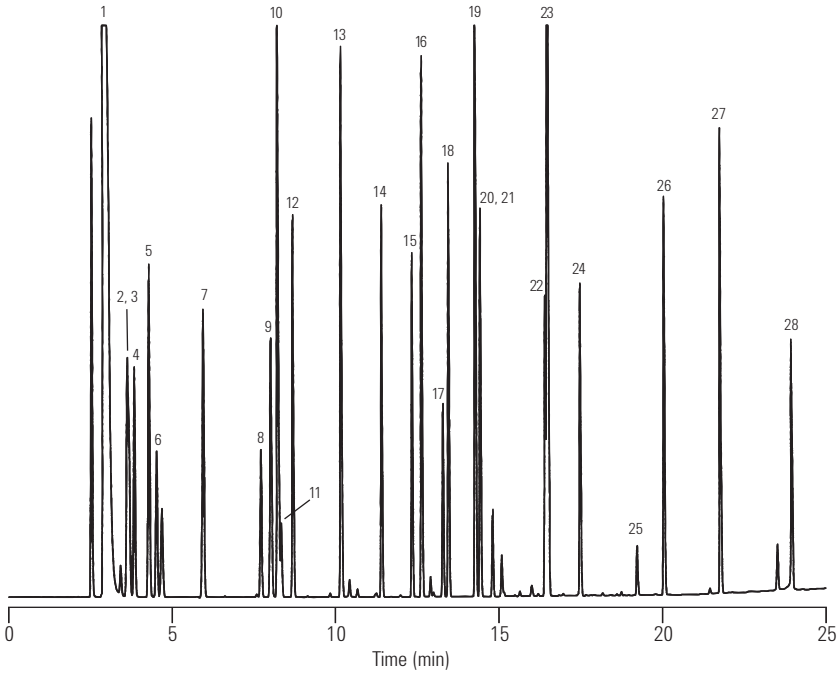
Column: **DB-624**
123-1334
30 m x 0.32 mm, 1.80 µm

Carrier:	Helium at 35 cm/sec
Oven:	35°C for 5 min 35-245°C at 10°/min
Injection:	Split, 250°C Split ratio 1:50
Detector:	FID, 300°C Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal:	Gold plated seal, 18740-20885
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Pentane
2. Iodomethane
3. 1,1-Dichloroethene
4. 1,1,2-Trichlorotrifluoroethane (Freon-113)
5. 3-Chloropropene (allyl chloride)
6. Methylene chloride
7. 1,1-Dichloroethane
8. Chloroform
9. 1,1,1-Trichloroethane
10. 1-Chlorobutane
11. Carbon tetrachloride
12. 1,2-Dichloroethane
13. 1,2-Dichloropropane
14. cis-1,2-Dichloropropene
15. trans-1,2-Dichloropropene
16. 1,1,2-Trichloroethane
17. 1,1,1,2-Tetrachloroethane
18. 1,2-Dibromoethane (EDB)
19. 1-Chlorohexane
20. trans-1,4-Dichloro-2-butene
21. Iodoform
22. Hexachlorobutadiene
23. 1,2,3-Trichloropropane
24. 1,1,2,2-Tetrachloroethane
25. Pentachloroethane
26. 1,2-Dibromo-3-chloropropane (DBCP)
27. Hexachloroethane
28. Hexachlorocyclopentadiene



GCIC034

Halogenated Hydrocarbons II

Column: **DB-1**
123-1034
30 m x 0.32 mm, 3.00 µm

Carrier: Helium at 35 cm/sec, measured at 35°C

Oven: 35°C for 5 min
35-245°C at 10°/min
245°C for 2 min

Injection: Split, 250°C
Split ratio 1:100

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: In pentane

Suggested Supplies

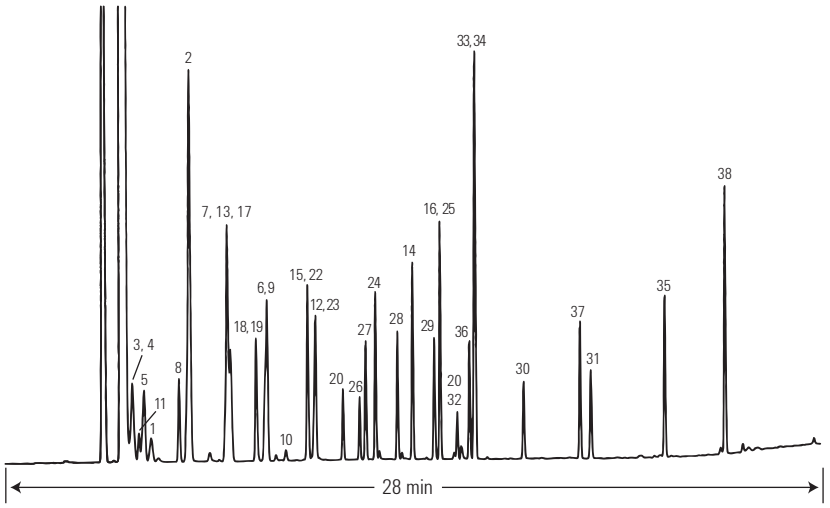
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 1,1,2-Trichlorotrifluoroethane (Freon-113)
2. 1,1-Dichloroethene
3. Bromoethane (ethyl bromide)
4. Iodomethane
5. 3-Chloropropene (allyl chloride)
6. 1-Chlorobutane
7. 2,2-Dichloropropane
8. trans-1,2-Dichloroethene
9. 1,1,1-Trichloroethane
10. Carbon tetrachloride
11. Methylene chloride
12. Trichloroethene
13. Chloroform
14. Tetrachloroethene
15. 1,2-Dichloropropane
16. 1-Chlorohexane
17. Bromochloromethane
18. 1,1-Dichloroethane
19. 1,2-Dichloroethane
20. Iodoform
21. cis-1,3-Dichloropropene
22. Dibromomethane
23. Bromodichloromethane
24. 1,3-Dichloropropane
25. 1,1-Dichloropropane
26. trans-1,3-Dichloropropene
27. 1,1,2-Trichloroethane
28. 1,2-Dibromoethane (EDB)
29. 1,1,1,2-Tetrachloroethane
30. Pentachloroethane
31. Hexachloroethane
32. Bromoform
33. trans-1,4-Dichloro-2-butene
34. 1,2,3-Trichloropropane
35. Hexachlorobutadiene
36. 1,1,2,2-Tetrachloroethane
37. 1,2-Dibromo-3-chloropropane (DBCP)
38. Hexachlorocyclopentadiene



GCIC035

Chlorinated Isooctane

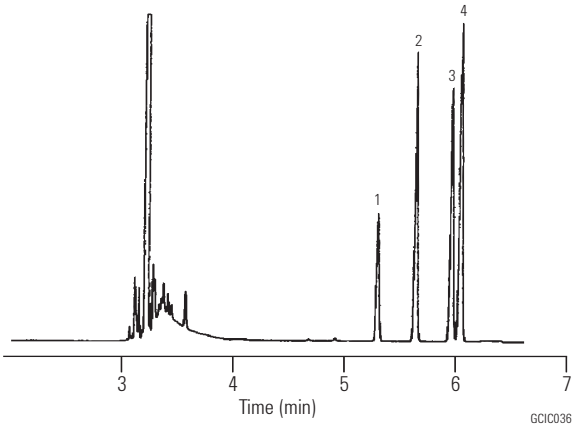
Column: **HP-INNOWax**
19091N-136
60 m x 0.25 mm, 0.25 µm

Carrier:	Helium, 33 cm/sec, 35.7 psi (80°C) 2 mL/min
Oven:	80°C isothermal
Injection:	Split, 250°C Split ratio 150:1
Detector:	FID 300°C
Sample:	Monochloro isomers, 0.5 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal:	Gold plated seal, 18740-20885
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 1-Chloro isooctane
2. 4-Chloromethyl 2,2'-dimethyl pentane
3. 3-Chloro isooctane
4. 4-Chloro isooctane



Solvents I

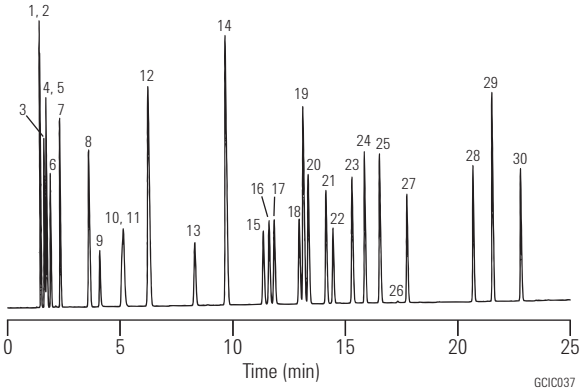
Column: **DB-WAXetr**
125-7332
30 m x 0.53 mm, 1.00 µm

Carrier:	Helium at 30 cm/sec, measured at 40°C
Oven:	40°C for 5 min 40-140°C at 5°/min
Injection:	Split, 250°C
Detector:	FID, 250°C

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal:	Gold plated seal, 18740-20885
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. 3-Methylpentane
2. Hexane
3. Isooctane
4. Methyl-tert-butyl ether (MTBE)
5. Heptane
6. Cyclohexane
7. Octane
8. Nonane
9. Methanol
10. Ethanol
11. Benzene
12. Decane
13. Toluene
14. Undecane
15. Ethylbenzene
16. p-Xylene
17. m-Xylene
18. Cumene
19. Dodecane
20. o-Xylene
21. Propylbenzene
22. Chlorobenzene
23. Mesitylene
24. Styrene
25. 1,2,4-Trimethylbenzene
26. Naphthalene
27. 4-Chlorotoluene
28. 1,3-Dichlorobenzene
29. 1,4-Dichlorobenzene
30. 1,2-Dichlorobenzene



Solvents II

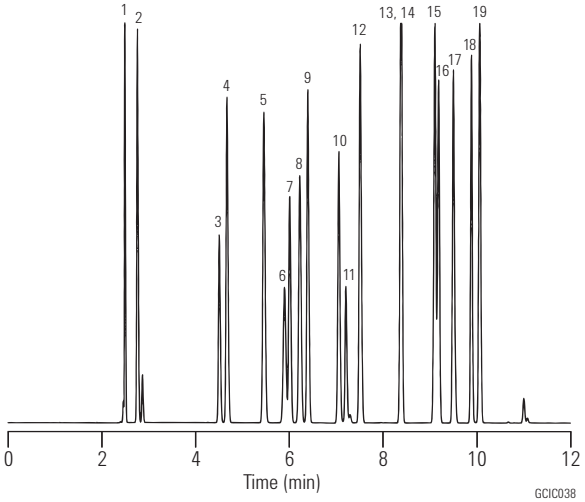
Column: **DB-WAXetr**
123-7354
50 m x 0.32 mm, 1.00 µm

Carrier: Helium at 41 cm/sec, measured at 50°C
Oven: 50°C for 5 min
50-170°C at 10°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 280°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Hexane
2. Isooctane
3. Acetone
4. Ethyl formate
5. Tetrahydrofuran
6. Trichloroethane
7. Ethyl acetate
8. Isopropyl acetate
9. Methyl ethyl ketone
10. Isopropyl alcohol
11. Methylene chloride
12. Benzene
13. 2-Pentanone
14. Methyl isobutyl ketone
15. Isobutyl acetate
16. Chloroform
17. sec-Butyl alcohol
18. Toluene
19. n-Propanol



Solvents III

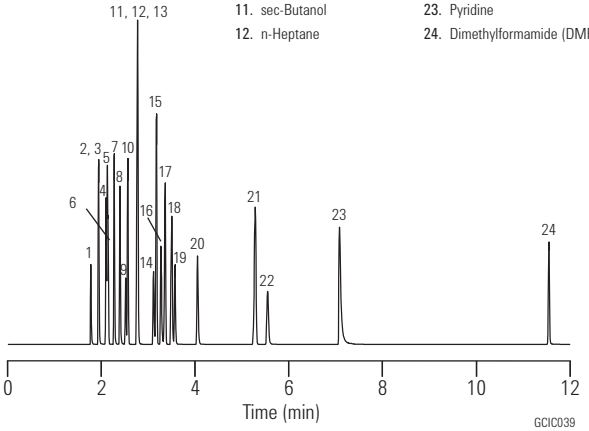
Column: **DB-200**
122-2033
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 31 cm/sec
Oven: 45°C for 7 min
45-145°C at 20°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.5 µL of 0.5-1.0 µg/µL
standard in water

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Methanol
2. Ethanol
3. Ethyl ether
4. Isopropanol
5. n-Hexane
6. Methylene chloride
7. tert-Butanol
8. n-Propanol
9. Chloroform
10. Cyclohexane
11. sec-Butanol
12. n-Heptane
13. Acetone
14. Acetonitrile
15. Benzene
16. Tetrahydrofuran (THF)
17. Trichloroethylene
18. n-Butanol
19. Ethyl acetate
20. Methyl ethyl ketone (MEK)
21. Toluene
22. 1,4-Dioxane
23. Pyridine
24. Dimethylformamide (DMF)



Solvents IV

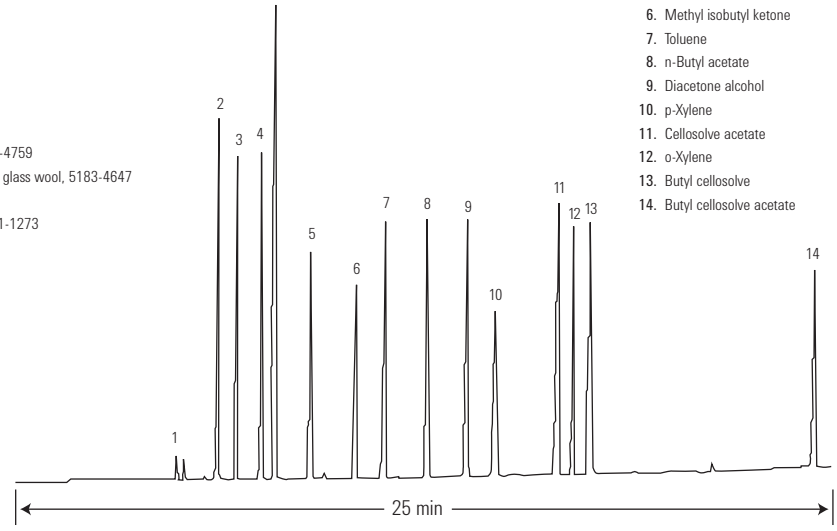
Column: **HP-1**
19091Z-205
50 m x 0.20 mm, 0.50 µm

Carrier: Helium, 30 psi
Oven: 70-200°C at 5°C/min
200°C for 2 min
Injection: Split
Detector: TCD
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Isopropanol
2. Methyl ethyl ketone
3. Ethyl acetate
4. n-Butyl alcohol
5. Ethyl cellosolve
6. Methyl isobutyl ketone
7. Toluene
8. n-Butyl acetate
9. Diacetone alcohol
10. p-Xylene
11. Cellosolve acetate
12. o-Xylene
13. Butyl cellosolve
14. Butyl cellosolve acetate



GCIC040

Aromatic Solvents

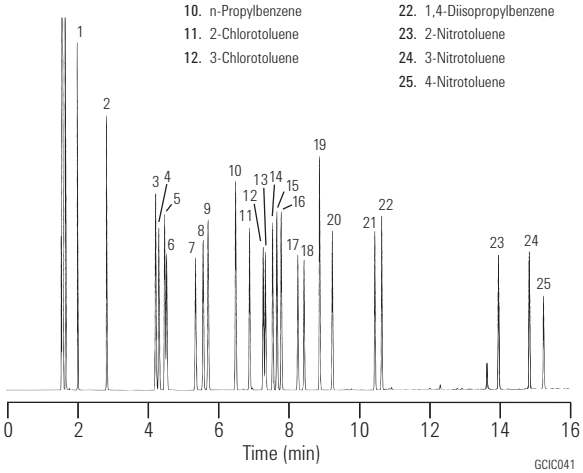
Column: **DB-200**
122-2032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 31 cm/sec
Oven: 50°C for 5 min
50-160°C at 10°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.5 µL of 0.5 µg/µL
standard in hexane

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Benzene
2. Toluene
3. Ethylbenzene
4. Chlorobenzene
5. p-Xylene
6. m-Xylene
7. o-Xylene
8. Styrene
9. Isopropylbenzene
10. n-Propylbenzene
11. 2-Chlorotoluene
12. 3-Chlorotoluene
13. 4-Chlorotoluene
14. tert-Butylbenzene
15. sec-Butylbenzene
16. Isobutylbenzene
17. 1,3-Dichlorobenzene
18. 1,4-Dichlorobenzene
19. n-Butylbenzene
20. 1,2-Dichlorobenzene
21. 1,3-Diisopropylbenzene
22. 1,4-Diisopropylbenzene
23. 2-Nitrotoluene
24. 3-Nitrotoluene
25. 4-Nitrotoluene



GCIC041

Common Industrial Solvents

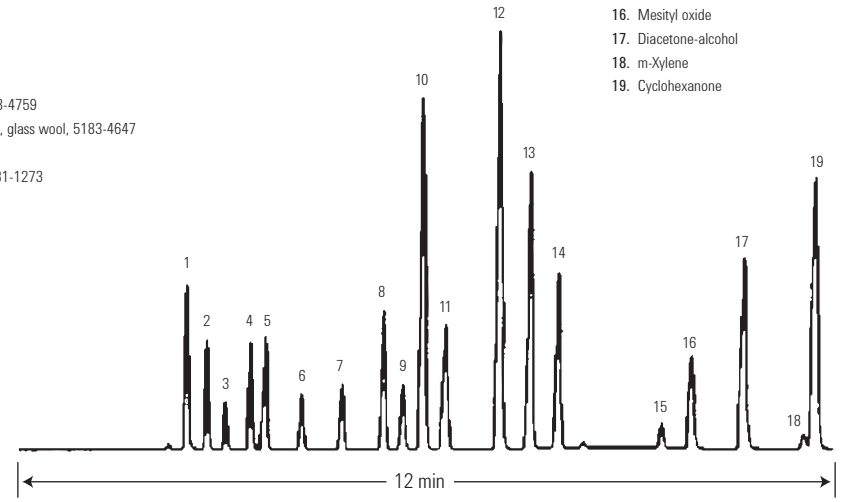
Column: **HP-1**
19091Z-212
25 m x 0.32 mm, 1.05 µm

Carrier: Helium, 35 kPa
Oven: 30-140°C at 10°C/min
Injection: Split ratio 200:1
Detector: IRD, 200°C
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Methanol
2. Methyl formate
3. Ethanol
4. Acetone
5. Isopropanol
6. Dichloromethane
7. n-Propanol
8. Methyl ethyl ketone
9. sec-Butanol
10. Ethyl acetate
11. Isobutanol
12. Isopropyl acetate
13. Nitropropane
14. 1,4-Dioxane
15. Toluene
16. Mesityl oxide
17. Diacetone-alcohol
18. m-Xylene
19. Cyclohexanone



GCIC042

Nitrogen Based Solvents I

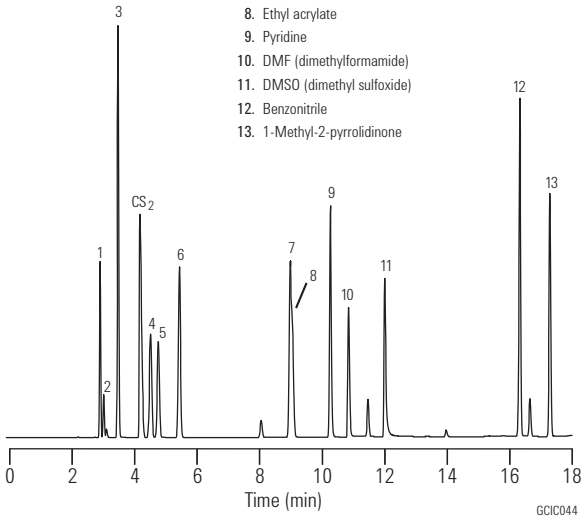
Column: **DB-1**
125-1034
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 30 cm/sec, measured at 40°C
Oven: 40°C for 5 min
40-260°C at 10°/min
Injection: Split, 250°C
Split ratio 1:10
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Acetonitrile
2. Acrolein
3. Acrylonitrile
4. Propionitrile
5. Methacrolein
6. Methacrylonitrile
7. Triethylamine
8. Ethyl acrylate
9. Pyridine
10. DMF (dimethylformamide)
11. DMSO (dimethyl sulfoxide)
12. Benzonitrile
13. 1-Methyl-2-pyrrolidinone



GCIC044

Nitrogen Based Solvents II

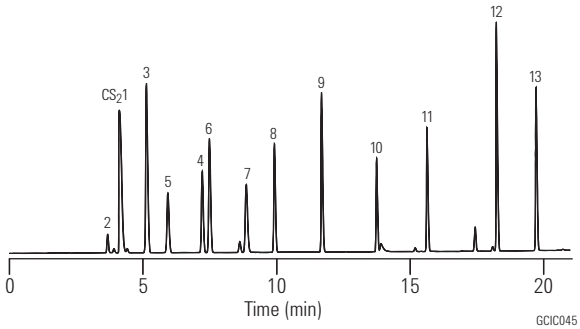
Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier:	Helium at 30 cm/sec, measured at 40°C
Oven:	40°C for 5 min 40-260°C at 10°/min 260°C for 3 min
Injection:	Split, 250°C Split ratio 1:10
Detector:	FID, 300°C Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Acetonitrile
2. Acrolein
3. Acrylonitrile
4. Propionitrile
5. Methacrolein
6. Methacrylonitrile
7. Triethylamine
8. Ethyl acrylate
9. Pyridine
10. DMF (dimethylformamide)
11. DMSO (dimethyl sulfoxide)
12. Benzonitrile
13. 1-Methyl-2-pyrrolidinone



Acrylate Impurities I

Column: **DB-200**
125-2032
30 m x 0.53 mm, 1.00 µm

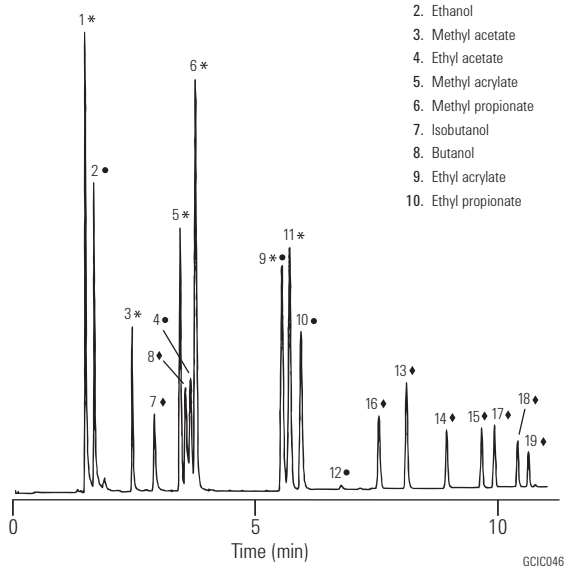
Carrier:	Helium at 34.5 cm/sec measured at 35°C
Oven:	35°C for 5 min, 35 - 200°C at 10°/min
Injection:	Split, 230°C Split ratio 1:10
Detector:	FID, 250°C

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273

1. Methanol
2. Ethanol
3. Methyl acetate
4. Ethyl acetate
5. Methyl acrylate
6. Methyl propionate
7. Isobutanol
8. Butanol
9. Ethyl acrylate
10. Ethyl propionate
11. Methyl methacrylate
12. Isopropyl acrylate
13. Isobutyl acetate
14. Butyl acetate
15. Isobutyl acrylate
16. Dibutyl ether
17. Isobutyl propionate
18. Butyl acrylate
19. Butyl propionate

* Methyl acrylate impurities
• Ethyl acrylate impurities
♦ Butyl acrylate impurities



Acrylate Impurities II

Column: **DB-1701**
125-0732
30 m x 0.53 mm, 1.00 µm

Carrier: Helium at 36.8 cm/sec measured at 35°C

Oven: 35°C for 5 min, 35-200°C at 10°/min

Injection: Split, 230°C
Split ratio 1:10

Detector: FID, 250°C

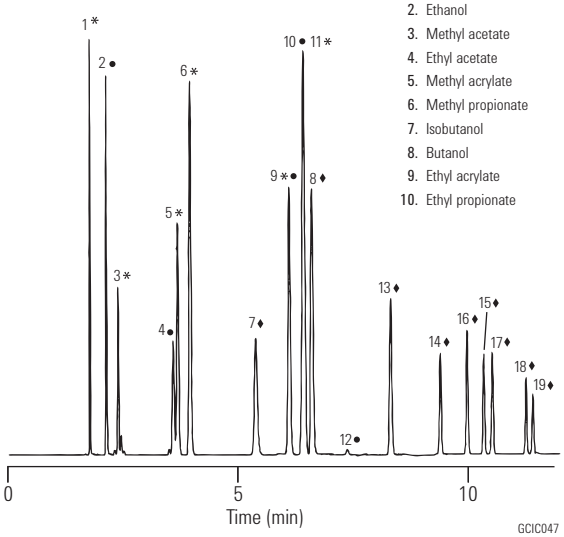
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Split, single taper, low pressure drop, glass wool, 5183-4647

Seal: Gold plated seal, 18740-20885

Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. Methanol
2. Ethanol
3. Methyl acetate
4. Ethyl acetate
5. Methyl acrylate
6. Methyl propionate
7. Isobutanol
8. Butanol
9. Ethyl acrylate
10. Ethyl propionate
11. Methyl methacrylate
12. Isopropyl acrylate
13. Isobutyl acetate
14. Butyl acetate
15. Isobutyl acrylate
16. Dibutyl ether
17. Isobutyl propionate
18. Butyl acrylate
19. Butyl propionate

* Methyl acrylate impurities
• Ethyl acrylate impurities
♦ Butyl acrylate impurities

Acrylates

Column: **HP-FFAP**
19095F-121
10 m x 0.53 mm, 1.00 µm

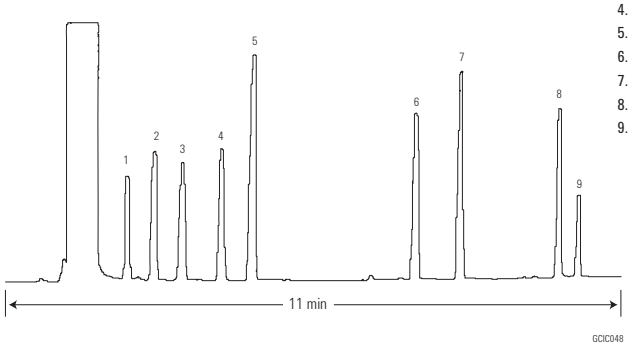
Carrier: Hydrogen

Oven: 35°C for 1 min
35-60°C at 10°C/min
60-160°C at 15°C/min

Injection: On-column

Detector: FID

Sample: 1 µL



1. Methyl methacrylate
2. Ethyl methacrylate
3. sec-Butyl methacrylate
4. Allyl acrylate
5. n-Butyl acrylate
6. Hexyl methacrylate
7. Cyclohexyl methacrylate
8. Hydroxypropyl acrylate
9. Unknown

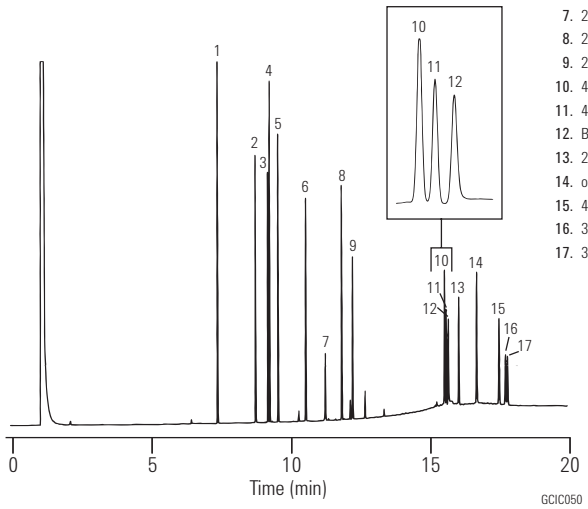
Anilines

Column: **DB-35ms**
128-3822
25 m x 0.20 mm, 0.33 µm

Carrier:	Helium at 35 cm/sec, measured at 50°C
Oven:	50°C for 2 min 50-340°C at 20°/min 340°C for 10 min
Injection:	Splitless, 280°C 0.50 min purge activation time
Detector:	FID, 320°C Nitrogen makeup gas at 30 mL/min
Sample:	1 µL of 5 ng on-column per component

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal:	Gold plated seal, 18740-20885
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. o-Toluidine
2. 4-Chloroaniline
3. 2-Methoxy-5-methylaniline
4. 2,4,5-Trimethylaniline
5. 4-Chloro-2-methylaniline
6. 2,4-Diaminotoluene
7. 2,4-Diaminoanisole
8. 2-Aminonaphthalene
9. 2-Methyl-5-nitroaniline
10. 4,4'-Oxydianiline
11. 4,4'-Methylenedianiline
12. Benzidine
13. 2-Aminoazotoluene
14. o-Tolidine
15. 4,4'-Thiodianiline
16. 3,3'-Dimethoxybenzidine
17. 3,3'-Dichlorobenzidine

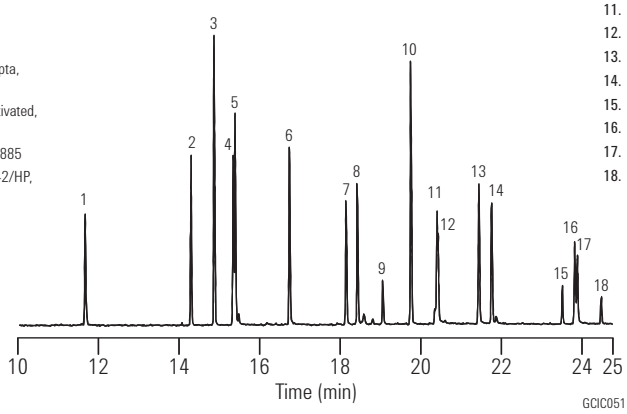
Substituted Anilines

Column: **DB-5ms**
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier:	Helium at 33.3 cm/sec, measured at 150°C
Oven:	40°C for 5 min 40-290°C at 12°/min 290°C for 10 min
Injection:	Splitless, 250°C 30 sec purge activation time
Detector:	MSD, 325°C transfer line
Sample:	1 µL of 25 ng/µL standard

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal:	Gold plated seal, 18740-20885
Syringe:	10 µl tapered, FN 23-26s/42/HP, 5181-1267



		m/z
1.	Aniline	93
2.	2-Chloroaniline	127
3.	2,6-Dimethylaniline	121
4.	3-Chloroaniline	127
5.	4-Chloroaniline	127
6.	4-Bromoaniline	171
7.	2-Nitroaniline	138
8.	3,4-Dichloroaniline	161
9.	3-Nitroaniline	65
10.	2,4,5-Trichloroaniline	195
11.	4-Chloro-2-nitroaniline	172
12.	4-Nitroaniline	138
13.	2-Chloro-4-nitroaniline	172
14.	2,6-Dichloro-4-nitroaniline	176
15.	2-Chloro-4,6-dinitroaniline	217
16.	2,6-Dibromo-4-nitroaniline	266
17.	2,4-Dinitroaniline	183
18.	2-Bromo-4,6-dinitroaniline	261

Phenols I

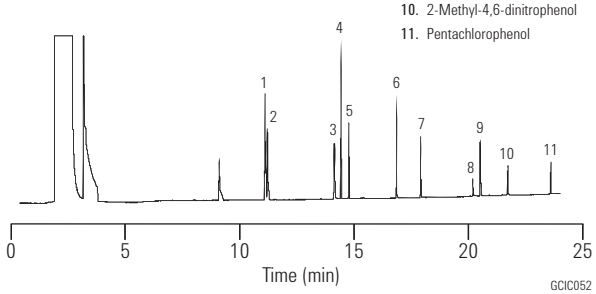
Column: **HP-5ms**
19091S-433
30 m x 0.25 mm, 0.25 µm

Carrier: Helium, 33 cm/sec, constant flow
Oven: 35°C for 5 min
35-220°C at 8°C/min
Injection: Splitless, 250°C
Detector: FID, 300°C
Sample: 1 µL
20 µg/mL phenols in methylene chloride

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Phenol
2. 2-Chlorophenol
3. 2-Nitrophenol
4. 2,4-Dimethylphenol
5. 2,4-Dichlorophenol
6. 4-Chloro-3-methylphenol
7. 2,4,6-Trinitrophenol
8. 2,4-Dinitrophenol
9. 4-Nitrophenol
10. 2-Methyl-4,6-dinitrophenol
11. Pentachlorophenol



Phenols II

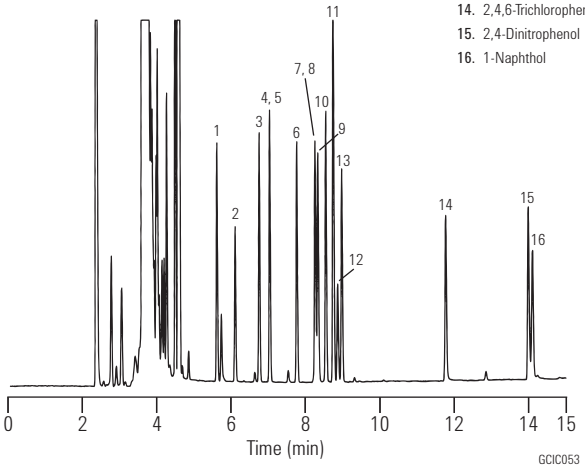
Column: **DB-5ms**
122-5536
30 m x 0.25 mm, 0.50 µm

Carrier: Helium at 22 cm/sec,
measured at 100°C
Oven: 100°C for 1 min
100-270°C at 10°/min
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 50 ng/µL standard
in toluene/p-xylene

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Phenol
2. 2-Chlorophenol
3. o-Cresol
4. m-Cresol
5. p-Cresol
6. 2,6-Xylenol
7. 2,4-Xylenol
8. 2,5-Xylenol
9. 2-Nitrophenol
10. 3,5-Xylenol
11. 2,3-Xylenol
12. 2,4-Dichlorophenol
13. 3,4-Xylenol
14. 2,4,6-Trichlorophenol
15. 2,4-Dinitrophenol
16. 1-Naphthol



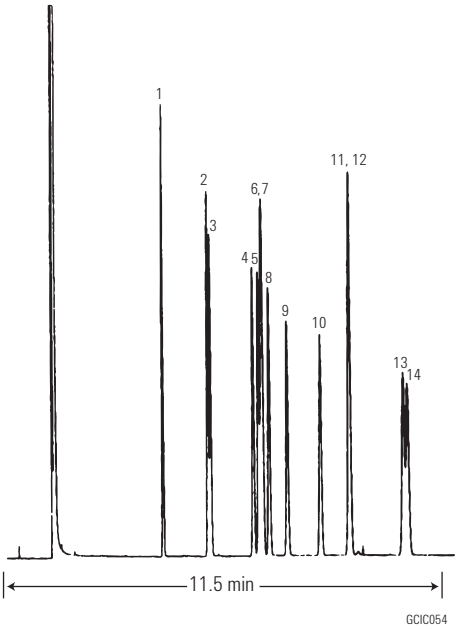
Phenols III

Column: **DB-WAX**
122-7032
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 43 cm/sec
Oven: 165°C isothermal
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Split, single taper, low pressure drop, glass wool, 5183-4647
Seal: Gold plated seal, 18740-20885
Syringe: 5 µl tapered, FN 23-26s/42/HP, 5181-1273



1. 2,6-Xylenol
2. 2-Cresol
3. Phenol
4. 2-Ethylphenol
5. 2,5-Xylenol
6. 4-Cresol
7. 2,4-Xylenol
8. 3-Cresol
9. 2-Isopropylphenol
10. 2,3-Xylenol
11. 3,5-Xylenol
12. 4-Ethylphenol
13. 3,4-Xylenol
14. 2,3,5-Trimethylphenol

Halocarbons

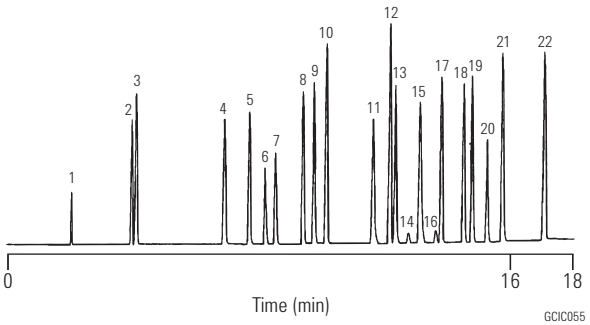
Column: **GS-GasPro**
113-4332
30 m x 0.32 mm

Carrier: Helium at 30 cm/sec
Oven: 130°C for 4 min
130-225°C at 10°/min
225°C Hold
Injection: Split, 250°C
Split ratio 1:67
Detector: FID, 250°C
Sample: 1 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

1. CH_4
2. $CHClF_2$ (Freon 22)
3. CCl_2F_2 (Freon 12)
4. $ClCF_2\ CF_2\ Cl$ (Freon 114)
5. $CHCl_2\ F$ (Freon 21)
6. CCl_3F (Freon 11)
7. CF_2Br_2 (Freon 12B2)
8. CH_3I
9. CH_2Cl_2
10. trans-ClCH=CHCl
11. CF_3CCl_3 (Freon 113)
12. cis-ClCH=CHCl
13. $CHCl_3$
14. ? from CCl_4
15. CCl_4
16. ? from CCl_4
17. CH_3CH_2I
18. CH_2Br_2
19. $CHCl_2Br$
20. C_4F_9I
21. $CHClBr_2$
22. $CH_3CH_2CH_2I$

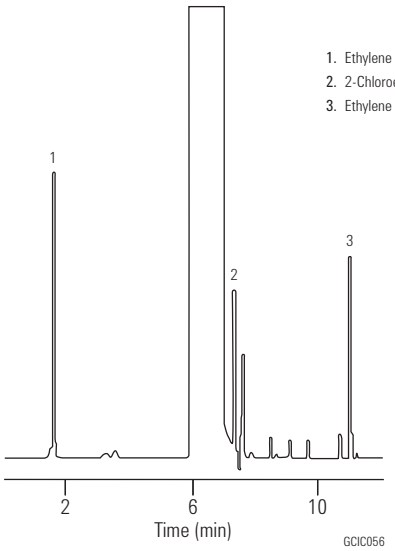


Ethylene Oxide

Column: **DB-WAX**
122-7032
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 1 mL/min
Oven: 60°C for 2 min
60-180°C at 16°/min
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

(Courtesy of J. Chromatogr. Sci., 28:97 [1990])



1. Ethylene oxide
2. 2-Chloroethanol
3. Ethylene glycol (solvent: Dimethylformamide)

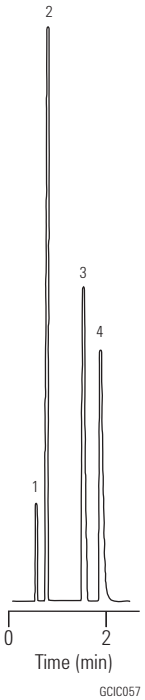
Halothane

Column: **GS-GasPro**
113-4312
15 m x 0.32 mm

Carrier: Helium at 45 cm/sec
Oven: 240°C, isothermal
Injection: Split, 200°C
Split ratio 1:100
Detector: FID, 200°C
Sample: 0.2 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



1. Nitrogen
2. Halothane
3. Diethyl ether
4. Acetone

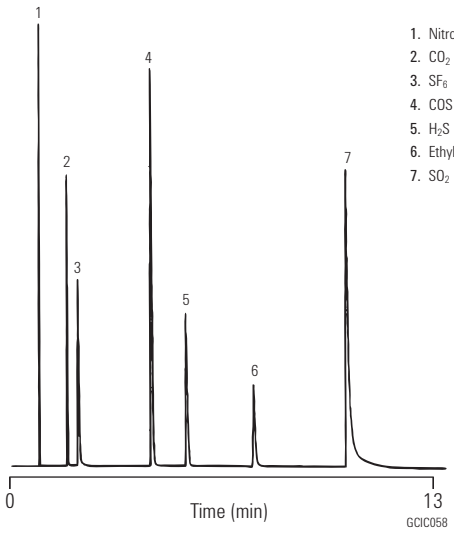
Inorganic Gases

Column: **GS-GasPro**
113-4332
30 m x 0.32 mm

Carrier:	Helium at 53 cm/sec
Oven:	25°C for 3 min 25-200°C at 10°/min 200°C Hold
Injection:	Split, 200°C Split ratio 1:50
Detector:	TCD, 250°C
Sample:	50 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885

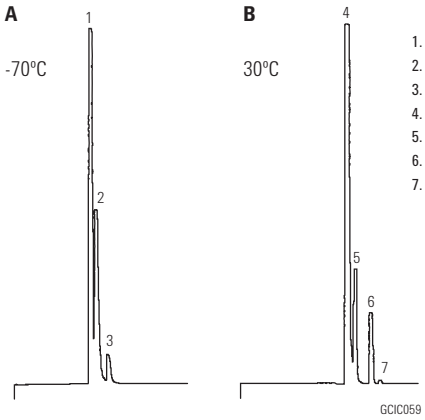


1. Nitrogen
2. CO_2
3. SF_6
4. COS
5. H_2S
6. Ethylene oxide
7. SO_2

Inorganic Hydride Gases

Column: **HP-1**
19091Z-205
50 m x 0.20 mm, 0.50 µm

Carrier:	Helium, 35 cm/sec
Oven:	A: -70°C isothermal B: 30°C isothermal
Injection:	Split ratio 25:1
Detector:	FPD, 535 µm filter
Sample:	1 µL

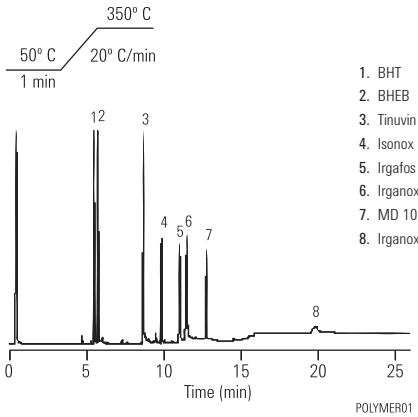


1. Arsine 0.1%
2. Phosphine 0.1%
3. Selenide 0.1%
4. Diborane 0.10 ppm
5. Tetraborane 0.10 ppm
6. Pentaborane 0.10 ppm
7. Dihydropentaborane 0.60 ppm

Polymer Additives

Column: **HP-35 (use only 10 meters)**
19091G-013
30 m x 0.32 mm, 0.15 µm

Carrier:	Helium, 6 psi (4 mL/min at 50°C) hold for 5 min. ramp to 50 psi (21 mL/min at 350°C) at 5 psi/min.
Injection:	EPC on-column, oven track 0.5 µL injection
Detector:	FID



1. BHT
2. BHEB
3. Tinuvin P
4. Isonox 129
5. Irgafos 168
6. Irganox 1076
7. MD 1024
8. Irganox 1010

Life Science Applications

Benzodiazepines I

Column: **DB-5ms Ultra Inert**
122-5532UI
30 m x 0.25 mm, 0.25 µm

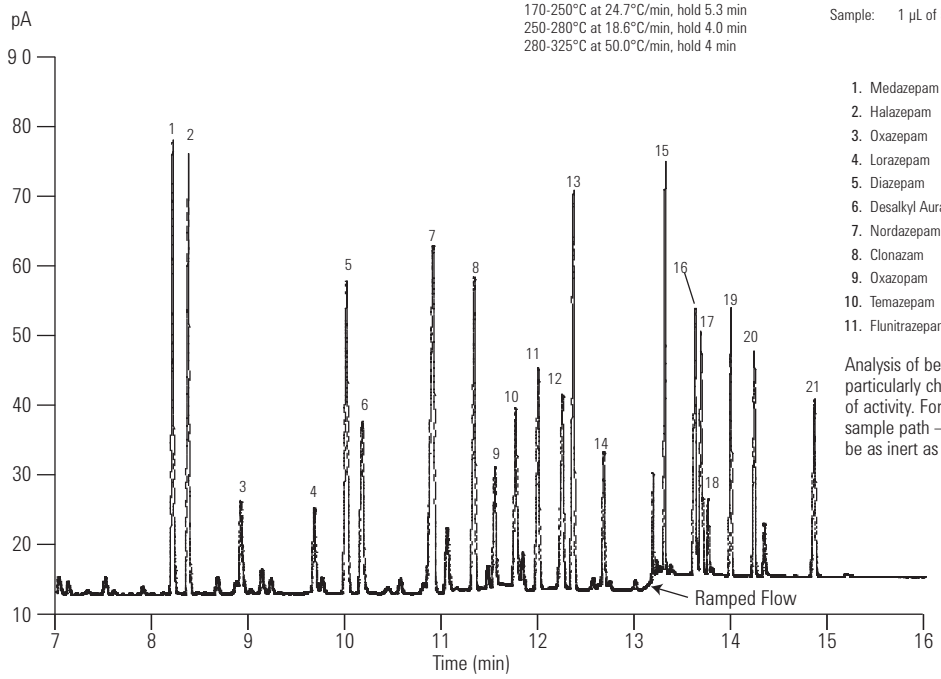
Carrier: Hydrogen, 53 cm/sec, constant flow
1.6 for 11 min
1.6 to 2.4 at 60 mL/min$_2$ hold 2 min
2.4 to 5.0 at 50 mL/min^2 hold 9 min

Oven: 170°C for 3.2 min
170-250°C at 24.7°C/min, hold 5.3 min
250-280°C at 18.6°C/min, hold 4.0 min
280-325°C at 50.0°C/min, hold 4 min

Injection: Pulsed Splitless, 280°C
20 psi pulse pressure for 0.38 min
50 mL/min purge at 0.40 min
Direct Connect liner G1544-80730

Detector: FID, 350°C

Sample: 1 µL of 5-10 ppm



1. Medazepam
2. Halazepam
3. Oxazepam
4. Lorazepam
5. Diazepam
6. Desalkyl Aurazepam
7. Nordazepam
8. Clonazam
9. Oxazopam
10. Temazepam
11. Flunitrazepam
12. Bromazepam
13. Prazepam
14. Lormetazepam
15. Nitrazepam
16. Chlordiazepoxide
17. Clonazepam
18. Demoxepam
19. Estazolam
20. Alprazolam
21. Triazolam

Analysis of benzodiazepines and other drugs is particularly challenging because of their high level of activity. For this reason, all aspects of the sample path – particularly the GC Column – must be as inert as possible.

BENZODIAZ



Common Drug Screen

Column: **DB-5**
122-5032
30 m x 0.25 mm, 0.25 µm

Column: **DB-17**
122-1732
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 41 cm/sec, measured at 80°C

Oven: 80°C for 1 min
80-280°C at 10°/min
280°C for 9 min

Injection: Split, 250°C
Split ratio 1:40

Detector: FID, 300°C

Suggested Supplies

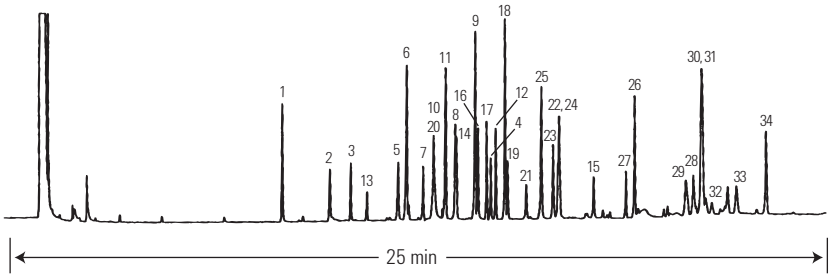
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

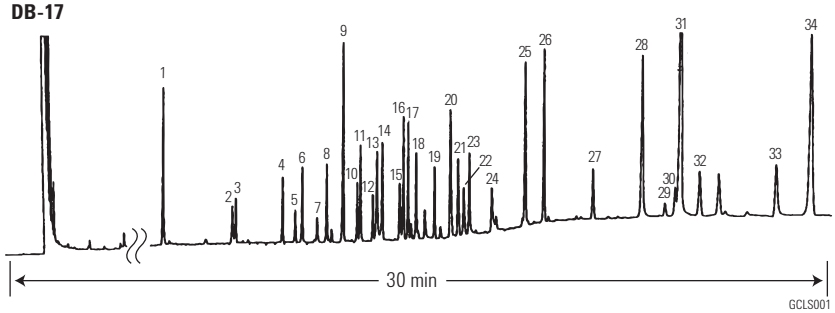
Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

DB-5



DB-17



		DB-17 Time	DB-5 Time
1.	Nicotine	9.87	8.57
2.	Phenmetrazine	11.8	9.95
3.	Ibuprofen	12.06	10.64
4.	Procaine	13.48	14.82
5.	Allobarbital	13.91	12.02
6.	Aprobarbital	14.14	12.27
7.	Butabarbital	14.56	12.76
8.	Secobarbital	14.87	14.31
9.	Pentobarbital	15.41	13.73
10.	Phenacetin	15.72	12.94
11.	Amobarbital	15.87	13.43
12.	Benzphetamine	16.14	14.96
13.	Acetaminophen	16.34	11.12
14.	Hydroxyphenamate	16.47	15.31
15.	Dimenhydrinate	16.93	13.79
16.	Meprobamate	17.12	14.44
17.	Benactyzine	17.26	14.71
18.	Hexobarbital	17.52	15.22
19.	Doxylamine	17.69	15.87
20.	Caffeine	18.05	13.11
21.	Chlorpheniramine	18.47	16.35
22.	Methapyrilene	18.72	16.68
23.	Thenyldiamine	18.87	16.85
24.	Phenobarbital	19.11	16.29
25.	Bromopheniramine	19.71	17.39
26.	Chlorcyclizine	20.75	19.13
27.	Cocaine	21.32	18.88
28.	Pyrrobutamine	22.79	20.89
29.	Codeine	24.27	20.66
30.	Diazepam	25.27	21.13
31.	Morphine	25.36	21.12
32.	Hydrocodone	25.98	21.26
33.	Oxymorphone	28.27	22.21
34.	Heroin	29.32	23.14

Drug Screen

Column: **DB-1ms**
122-0132
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 50°C

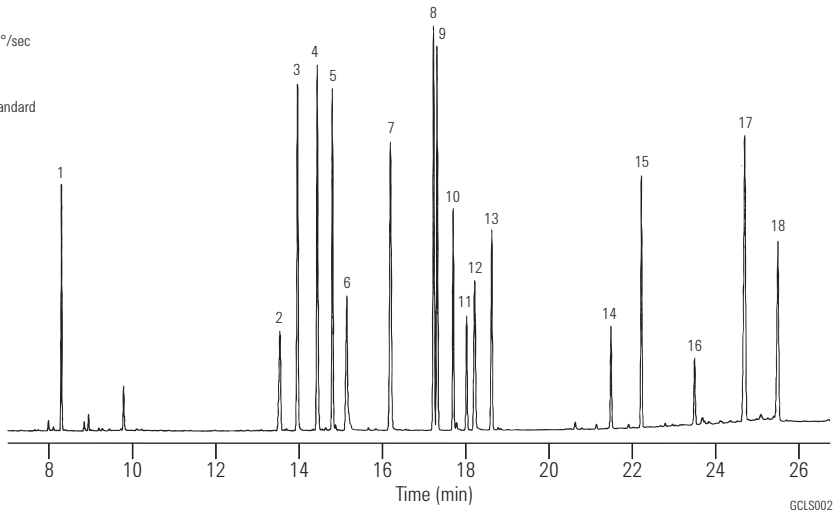
Oven: 50°C for 1.0 min
50-125°C at 25°/min
125-325°C at 10°/min
325°C for 5 min

Injection: Cold Splitless
Optic II injector, 50-250°C at 10°/sec
45 sec purge activation time

Detector: FID, 300°C

Sample: 1 µL injection of 50-150 ppm standard

1. Nicotine
2. Caffeine
3. Glutethimide
4. Lidocaine
5. PCP
6. Phenobarbital
7. Methadone primary metabolite
8. Methaqualone
9. Methadone
10. Cocaine
11. Desipramine
12. Carbazepine
13. Trimipramine
14. Heroin
15. Fentanyl
16. Ibogaine
17. Triazolam
18. LSD



GCLS002

Urine Drug Screen

Column: **ULTRA 2**
19091B-115
50 m x 0.32 mm, 0.52 µm

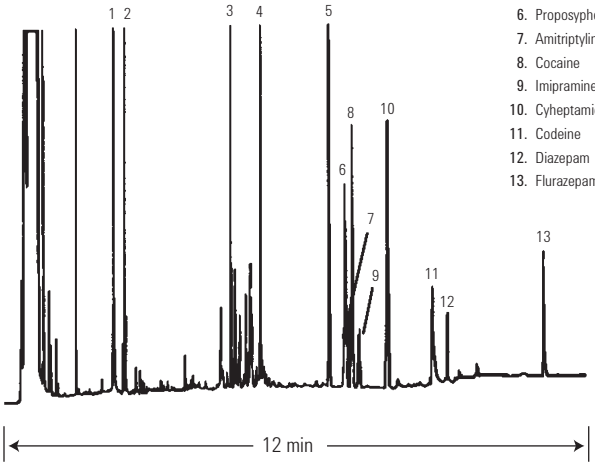
Carrier: Hydrogen 80 cm/sec

Oven: 45°C for 1.5 min
45-300°C at 6°C/min

Injection: Splitless

Detector: FID

1. Amphetamine
2. Methamphetamine
3. Meperidine
4. Phencyclidine (PCP)
5. Methadone
6. Proposyphene
7. Amitriptyline
8. Cocaine
9. Imipramine
10. Cyheptamide (ISTD)
11. Codeine
12. Diazepam
13. Flurazepam



GCLS003

Amphetamines and Precursors - TMS Derivatives

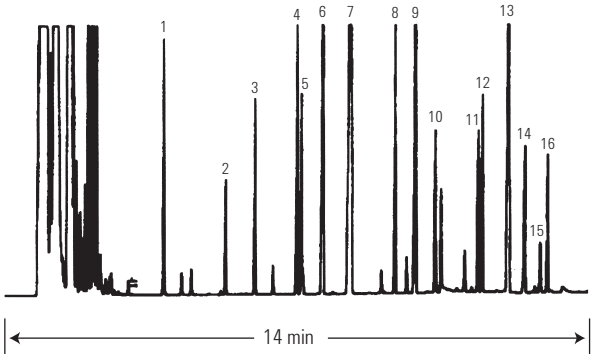
Column: **DB-5**
121-5023
20 m x 0.18 mm, 0.40 µm

Carrier: Helium at 39 cm/sec, measured at 100°C
Oven: 100-240°C at 10°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 2 µg/µL each in pyridine

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Phenylacetone
2. Dimethylamphetamine
3. Amphetamine
4. Phentermine
5. Methamphetamine
6. Methyl ephedrine
7. Nicotinamine
8. Ephedrine
9. Phenacetin
10. 3,4-Methylenedioxyamphetamine (MDA)
11. 3,4-Methylenedioxymethylamphetamine
12. 4-Methyl-2,5-dimethoxyamphetamine (STP)
13. Phenyl ephedrine
14. 3,4-Methylenedioxyethylamphetamine (MDE; Eve)
15. Caffeine
16. Benzphetamine



GCLS004

Anesthetics

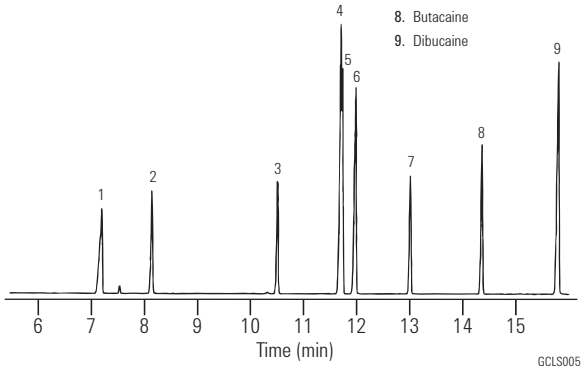
Column: **DB-EVDX**
128-8522
25 m x 0.20 mm, 0.33 µm

Carrier: Helium at 35 cm/sec, measured at 55°C
Oven: 55°C for 1 min
55-130°C at 25°/min
130-325°C at 15°/min
Injection: Splitless, 250°C
45 sec purge activation time
Detector: MSD, 280°C transfer line
full scan at m/z 35-400
Sample: 1 µL of 50-100 ng/µL standard in methanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Salicylamide
2. Benzocaine
3. Lidocaine
4. Procaine
5. Nefopam
6. Mepivacaine
7. Tetracaine
8. Butacaine
9. Dibucaine



GCLS005

Anticonvulsants

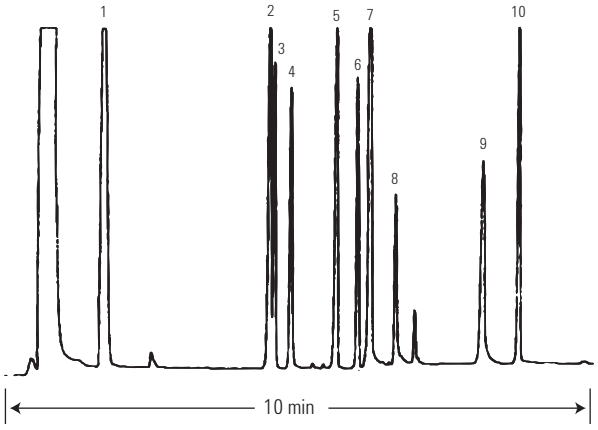
Column: **DB-1**
125-1032
30 m x 0.53 mm, 1.50 µm

Carrier: Helium at 8 mL/min
Oven: 160°C for 2 min
160-275°C at 15°/min
Injection: Megabore Direct, 250°C
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 100 ng/µL in methanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Ethosuximide
2. Methsuximide
3. Phensuximide
4. N-Desmethyl methsuximide
5. Phenylethylmalonamide
6. Phenobarbital
7. Primidone
8. Carbamazepine
9. Phenytoin
10. 5-Methyl-5-phenylhydantoin



GCLS006

Antihistamines

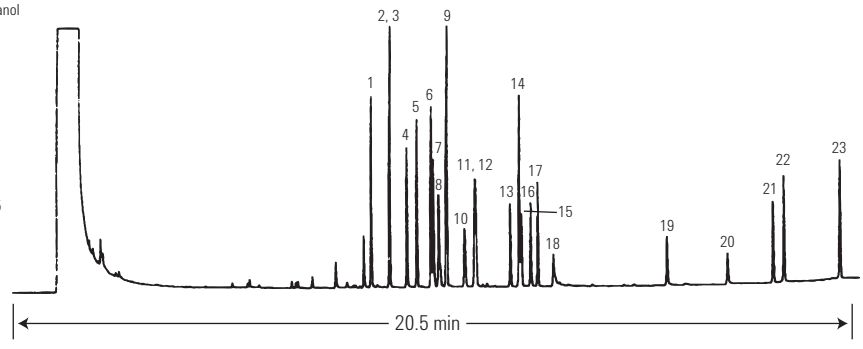
Column: **DB-5**
123-5032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 55°C
Oven: 55°C for 1 min
55-175°C at 30°/min
175-320°C at 10°/min
320°C for 1 min
Injection: Splitless, 250°C
30 sec purge activation time
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 50 ng/µL each in methanol

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Pheniramine
2. Dimenhydrinate
3. Diphenhydramine
4. Doxylamine
5. Phenyltoloxamine
6. Tripelennamine
7. Methapyrilene
8. Chlorpheniramine
9. Cyclizine
10. Carbinoxamine
11. Diphenylpyraline
12. Bromopheniramine
13. Thonzylamine
14. Chlorcyclizine
15. Pyrilamine
16. Triprolidine
17. Promethazine
18. Antazoline
19. Clemizole
20. Hydroxyzine
21. Meclizine
22. Cinnanzine
23. Buclizine



GCLS007

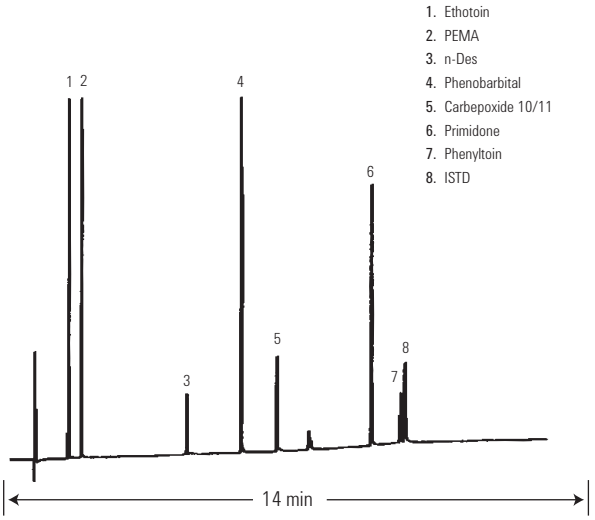
Antiepileptic Drugs

Column: **ULTRA 2**
19091B-012
25 m x 0.32 mm, 0.17 µm

Carrier: Helium, 14 psi
Oven: 100-230°C at 15°C/min
Injection: Split ratio 35:1
Detector: NPD

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. Ethotoin
2. PEMA
3. n-Des
4. Phenobarbital
5. Carbepoxide 10/11
6. Primidone
7. Phenyltoin
8. ISTD

GCLS008

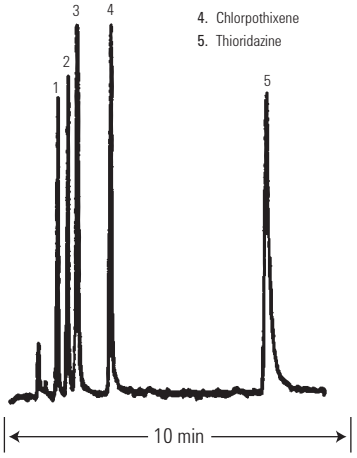
Tricyclic Antipsychotics

Column: **ULTRA 2**
19091B-101
12 m x 0.20 mm, 0.33 µm

Carrier: Hydrogen, 106 cm/sec
Oven: 250°C for 3 min
250-290°C at 10°C/min
290°C for 10 min
Injection: Split ratio 75:1
Detector: FPD

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. Trifluprомazine
2. Promethazine
3. Promazine
4. Chlorpothixene
5. Thioridazine

GCLS009

Barbiturates

Column: **DB-35ms**
122-3832
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 31 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-300°C at 10°/min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 40-270

Suggested Supplies

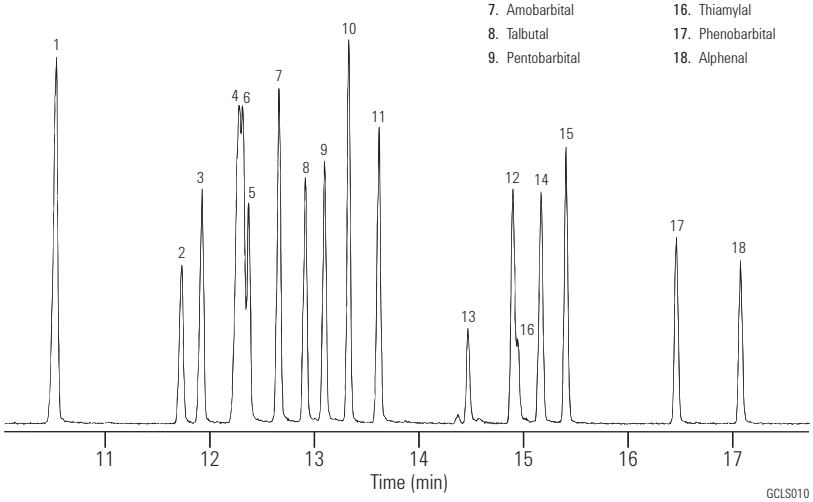
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Barbital
2. Allobarbital
3. Aprobarbital
4. Butabarbital
5. Butethal
6. Butalbital
7. Amobarbital
8. Talbutal
9. Pentobarbital
10. Methohexital
11. Secobarbital
12. Hexobarbital
13. Thiopental
14. Cyclopentylbarbital
15. Mephobarbital
16. Thiamylal
17. Phenobarbital
18. Alphenal



GCLS010

Benzodiazepines II

Column: **DB-35ms**
122-3832
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 31 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-340°C at 10°/min
340°C for 6 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 40-400

Suggested Supplies

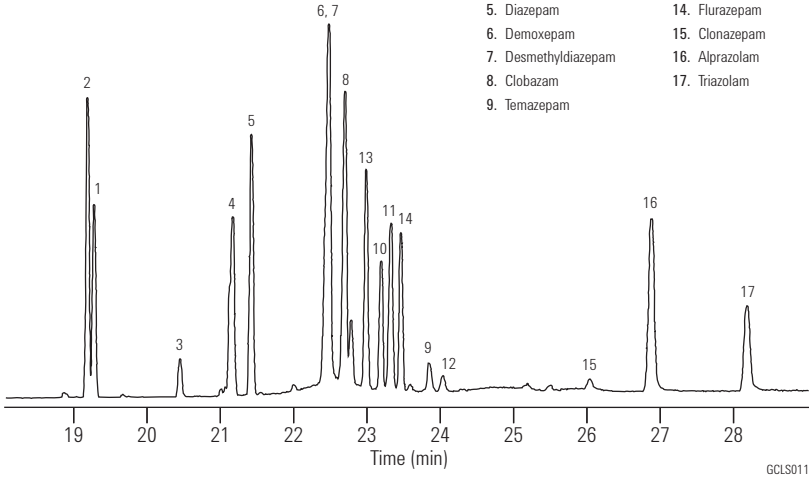
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Splitless, single taper, deactivated, 4 mm ID, 5181-3316

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Medazepam
2. Halazepam
3. Oxazepam
4. Lorazepam
5. Diazepam
6. Demoxepam
7. Desmethyldiazepam
8. Clobazam
9. Temazepam
10. Flunitrazepam
11. Delorazepam
12. Bromazepam
13. Prazepam
14. Flurazepam
15. Clonazepam
16. Alprazolam
17. Triazolam



GCLS011

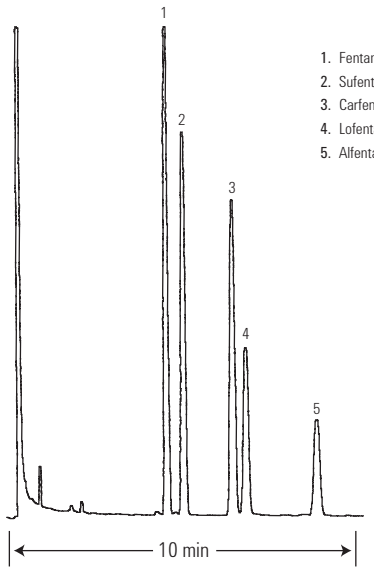
Fentanyls

Column: **DB-1701**
125-0732
30 m x 0.53 mm, 1.00 µm

Carrier:	Hydrogen at 15 mL/min
Oven:	270°C isothermal
Injection:	Split, 250°C Split ratio 1:5
Detector:	FID, 300°C Nitrogen makeup gas at 30 mL/min
Sample:	0.8 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273



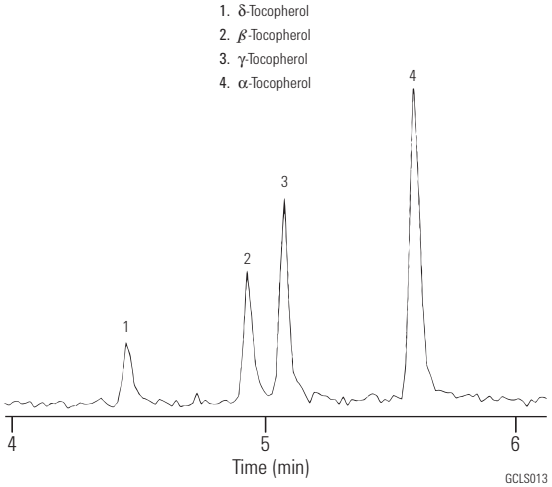
Tocopherols

Column: **DB-17ms**
122-4732
30 m x 0.25 mm, 0.25 µm

Carrier:	Helium at 40 cm/sec, measured at 150°C
Oven:	300°C for 1 min 300-320°C at 25°/min 320°C for 4 min
Injection:	Split, 310°C Split ratio 1:25
Detector:	MSD, 310°C transfer line full scan at m/z 45-550
Sample:	1 µL of 1-10 ng/µL in isooctane

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Split, single taper, low pressure drop, glass wool, 5183-4647
Seal:	Gold plated seal, 18740-20885
Syringe:	5 µl tapered, FN 23-26s/42/HP, 5181-1273



Hallucinogens

Column: **DB-17ms**
122-4732
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 30 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-125°C at 25°/min
125-255°C at 10°/min
255-320°C at 25°/min
320°C for 16 min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
full scan at m/z 40-350

Sample: 1 µL of 10-50 ng/µL standard in methanol

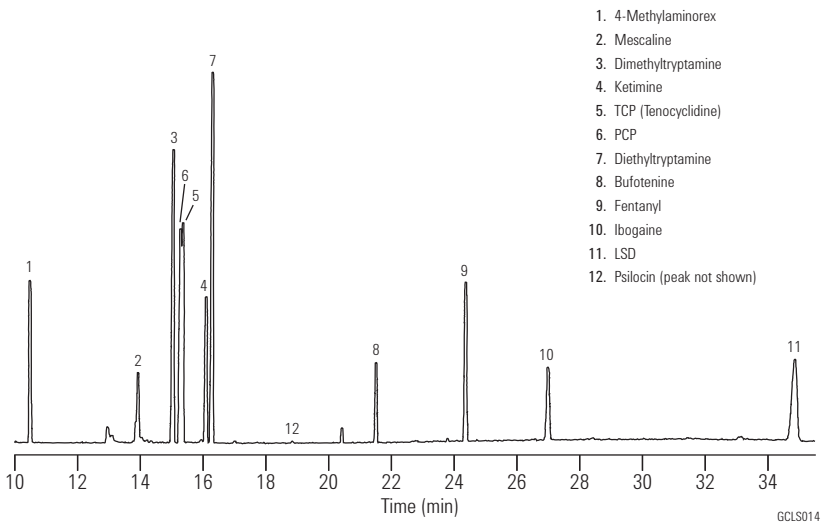
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. 4-Methylaminorex
2. Mescaline
3. Dimethyltryptamine
4. Ketimine
5. TCP (Tenocyclidine)
6. PCP
7. Diethyltryptamine
8. Bufotenine
9. Fentanyl
10. Ibogaine
11. LSD
12. Psilocin (peak not shown)

Sedative Hypnotics

Column: **DB-EVDX**
128-8522
25 m x 0.20 mm, 0.33 µm

Carrier: Helium at 35 cm/sec, measured at 55°C

Oven: 55°C for 1 min
55-130°C at 25°/min
130-325°C at 15°/min
325°C for 4 min

Injection: Splitless, 250°C
45 sec purge activation time

Detector: MSD, 280°C transfer line
full scan at m/z 35-400

Sample: 1 µL of 50-100 ng/µL standard in methanol

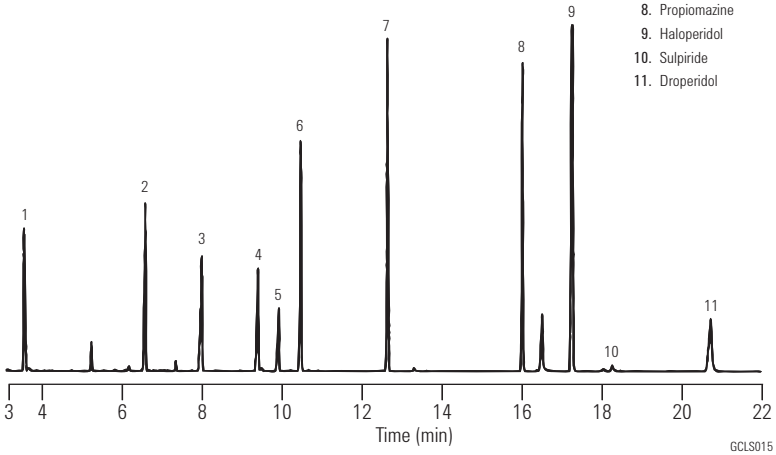
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



1. Ethchlorvynol
2. Ethinamate
3. Pyrithyldione
4. Talbutal
5. Meprobamate
6. Glutethimide
7. Methaqualone
8. Propiomazine
9. Haloperidol
10. Sulpiride
11. Droperidol

Narcotics

Column: **DB-5ms**
122-5532
30 m x 0.25 mm, 0.25 µm

Carrier: Helium at 31 cm/sec, measured at 50°C

Oven: 50°C for 0.5 min
50-150°C at 25°/min
150-325°C at 10°/min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: MSD, 300°C transfer line
full scan at m/z 40-380

Suggested Supplies

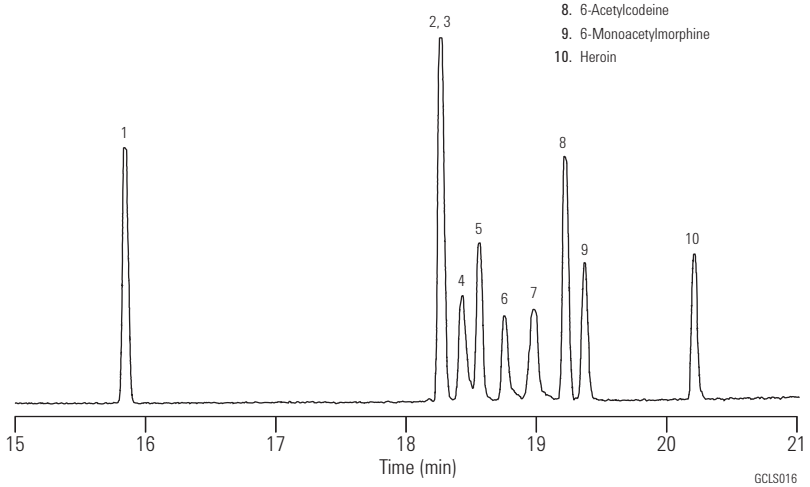
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Dextromethorphan
2. Codeine
3. Dihydrocodeine
4. Norcodeine
5. Ethylmorphine
6. Morphine
7. Normorphine
8. 6-Acetylcodeine
9. 6-Monoacetylmorphine
10. Heroin



Narcotics and Adulterants

Column: **DB-5**
123-5032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 140°C

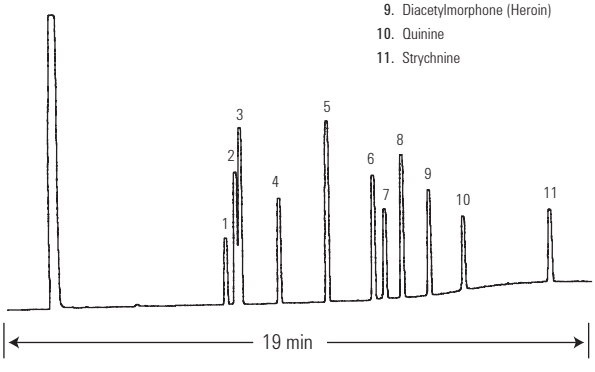
Oven: 140-320°C at 12°/min
320°C for 4 min

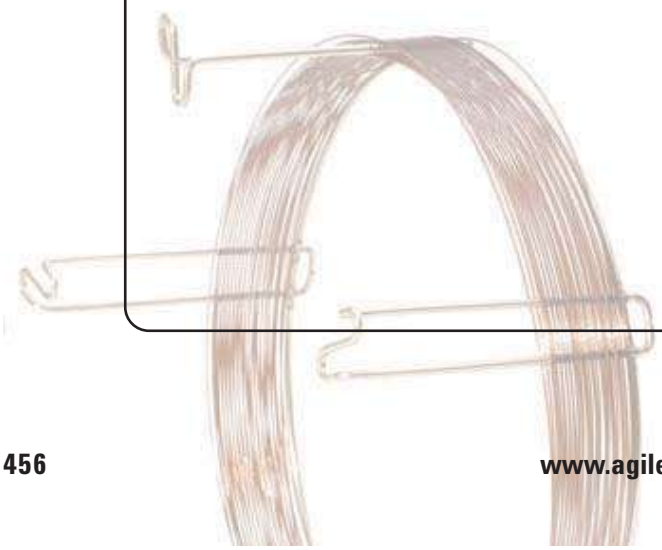
Injection: Split, 250°C
Split ratio 1:75

Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

Sample: 1 µL of 0.5 µg/µL each in methanol

1. Caffeine
2. Ketamine
3. Lidocaine
4. Procaine
5. Cocaine
6. Codeine
7. Morphine
8. 6-Acetylcodeine
9. Diacetylmorphone (Heroin)
10. Quinine
11. Strychnine

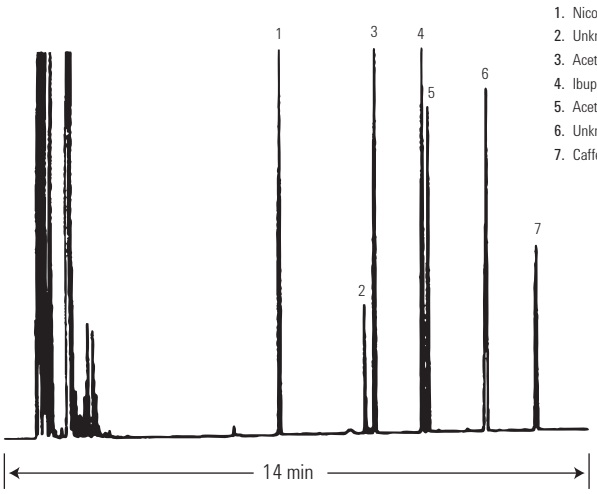




Over-the-Counter Pain Killers - TMS Derivatives

Column: **DB-5**
121-5023
20 m x 0.18 mm, 0.40 µm

Carrier: Helium at 39 cm/sec, measured at 100°C
Oven: 100-240°C at 10°/min
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 1 µL of 2 µg/µL each in pyridine



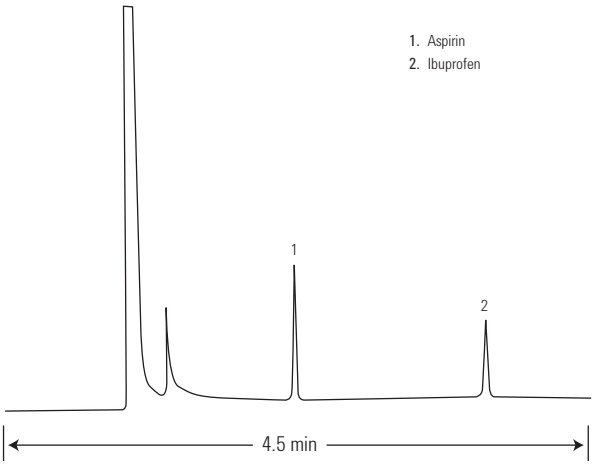
1. Nicotine
2. Unknown
3. Acetylsalicylic acid (aspirin)
4. Ibuprofen
5. Acetaminophen
6. Unknown
7. Caffeine

GCLS018

Aspirin and Ibuprofen in Methanol

Column: **DB-FFAP**
122-3232
30 m x 0.25 mm, 0.25 µm

Carrier: Hydrogen at 24 cm/sec, measured at 180°C
Oven: 180°C isothermal
Injection: Split, 250°C
Split ratio 1:50
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min



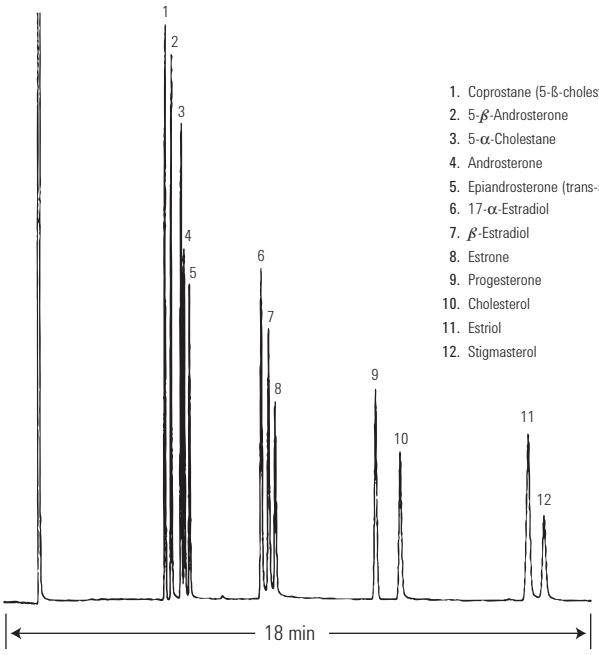
1. Aspirin
2. Ibuprofen

GCLS019

Free Steroids

Column: **DB-17**
122-1731
30 m x 0.25 mm, 0.15 µm

Carrier: Hydrogen at 44 cm/sec
Oven: 260°C isothermal
Injection: Split, 250°C
Split ratio 1:100
Detector: FID, 300°C
Nitrogen makeup gas at
30 mL/min
Sample: 1 µL



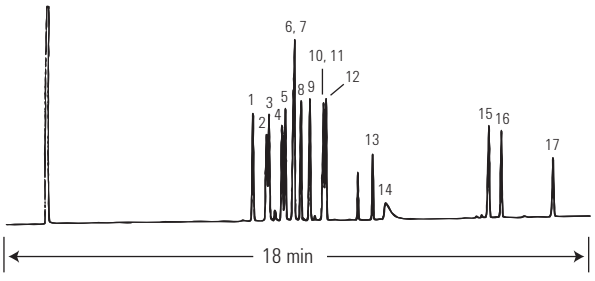
GCLS020

1. Coprostane (5-ß-cholestane)
2. 5-β-Androsterone
3. 5-α-Cholestane
4. Androsterone
5. Epiandrosterone (trans-androsterone)
6. 17-α-Estradiol
7. β-Estradiol
8. Estrone
9. Progesterone
10. Cholesterol
11. Estriol
12. Stigmasterol

Anabolic Steroids

Column: **DB-1**
122-1031
30 m x 0.25 mm, 0.10 µm

Carrier: Helium at 40 cm/sec, measured at 180°C
Oven: 180-320°C at 10°/min
320°C for 4 min
Injection: Split ratio 1:40
Detector: FID, Nitrogen makeup gas at 30 mL/min
Sample: 2 µL of 0.125 µg/µL each in methanol



GCLS021

1. Dehydroisoandrosterone (Prasterone)
2. 5α-Androstan-17α-ol-3-one (Stanolone)
3. 19-Nortestosterone (Nandrolone)
4. Mesterolone
5. Testosterone
6. 1-Dehydrotestosterone (Boldenone)
7. 17α-Methyltestosterone
8. 1-Dehydro-17-α-methyltestosterone (Methandrostenolone)
9. Norethandrolone
10. 1-Dehydrotestosterone acetate
11. Oxymetholone
12. 19-Nortestosterone-17-propionate
13. 4-Chlortestosterone-17-acetate (Clostebal)
14. Stanozolol
15. 1-Dehydrotestosterone benzoate
16. 19-Nortestosterone-17-decanoate
17. 1-Dehydrotestosterone undecylenate

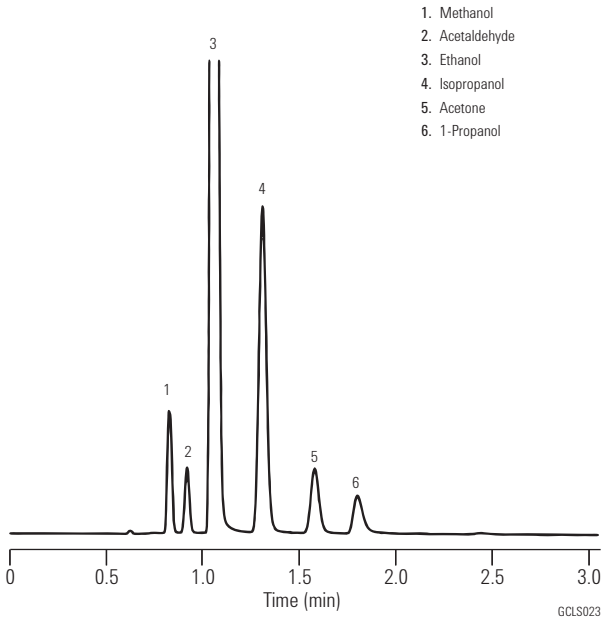
Blood Alcohols I (Static Headspace/Split)

Column: **DB-ALC1**
125-9134
30 m x 0.53 mm, 3.00 µm

Carrier:	Helium at 80 cm/sec, measured at 40°C
Oven:	40°C Isothermal
Sampler:	Headspace
Injection:	Split, 250°C Split ratio 1:10
Detector:	FID, 300°C Nitrogen makeup gas at 23 mL/min
Sample:	

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



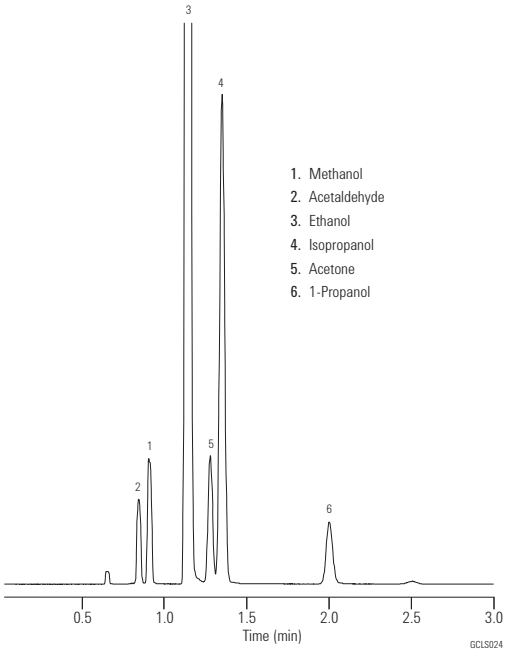
Blood Alcohols II (Static Headspace/Split)

Column: **DB-ALC1**
125-9234
30 m x 0.53 mm, 2.00 µm

Carrier:	Helium at 80 cm/sec, measured at 40°C
Oven:	40°C Isothermal
Sampler:	Headspace Oven: 70°C Loop: 80°C Transfer Line: 90°C Vial Equil. Time: 10 min Pressurization Time: 0.20 min Loop Fill Time: 0.20 min Loop Equil. Time: 0.05 min Inject Time: 0.1 - 0.2 min Sample Loop Size: 1.0 mL
Injection:	Split, 250°C Split ratio 1:10
Detector:	FID, 300°C Nitrogen makeup gas at 23 mL/min
Sample:	0.1% Ethanol, 0.001% Others

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



Marijuana (Δ9-THC) and Major Metabolites - TMS Derivatives

Column: **DB-5**
123-5032
30 m x 0.32 mm, 0.25 µm

Carrier: Helium at 40 cm/sec, measured at 100°C

Oven: 100°C for 1 min
100-175°C at 30°/min
175-295°C at 12°/min

Injection: Splitless, 250°C
30 sec purge activation time

Detector: FID, 300°C
Nitrogen makeup
gas at 30 mL/min

Sample: 1 µL of 0.1 µg/µL each in pyridine

Suggested Supplies

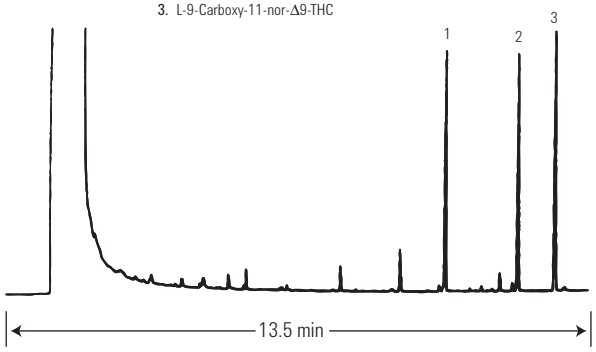
Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct connect, single taper, deactivated, 4 mm ID, G1544-80730

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267

1. Δ9-THC
2. L-11-Hydroxy-Δ9-THC
3. L-9-Carboxy-11-nor-Δ9-THC



GCLS022

Blood Pollutants I

Column: **DB-ALC1**
125-9134
30 m x 0.53 mm, 3.00 µm

Carrier: Helium, 36 cm/sec, measured at 40°C

Oven: 40°C for 5 min
40-210°C at 10°/min

Injection: Split, 250°C
Split ratio 1:10

Detector: FID, 300°C

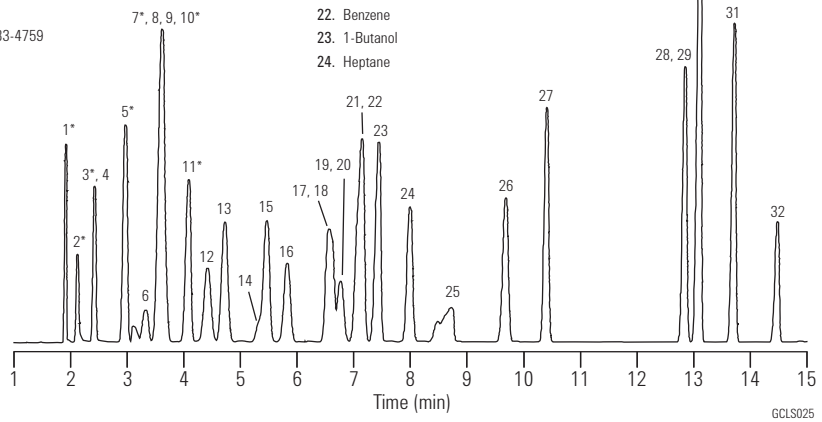
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

1. Methanol*
2. Acetaldehyde*
3. Ethanol*
4. Diethyl ether
5. Isopropyl alcohol*
6. Methylene Chloride
7. Acetone*
8. Acetonitrile
9. Ethyl formate
10. t-Butyl alcohol*
11. 1-Propanol
12. MTBE
13. Hexane
14. Chloroform
15. sec-Butyl alcohol
16. 2-Chlorobutane
17. MEK (2-Butanone)
18. Ethyl acetate
19. 1,1-Trichloroethane
20. Carbon tetrachloride
21. 1-Chlorobutane
22. Benzene
23. 1-Butanol
24. Heptane
25. Ethylene glycol
26. soamyl alcohol
27. Toluene
28. Isopropyl amine (not shown)
29. Ethylbenzene
30. m,p-Xylene
31. o-Xylene
32. DMSO



GCLS025

Blood Pollutants II

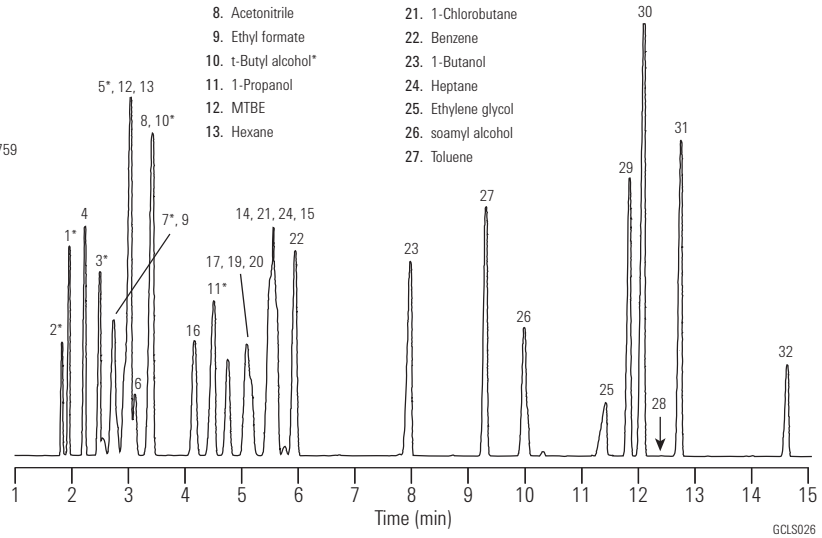
Column: **DB-ALC1**
125-9234
30 m x 0.53 mm, 2.00 µm

Carrier: Helium, 36 cm/sec, measured at 40°C
Oven: 40°C for 5 min
40-210°C at 10°/min
Injection: Split, 250°C
Split ratio 1:10
Detector: FID, 300°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

1. Methanol*
2. Acetaldehyde*
3. Ethanol*
4. Diethyl ether
5. Isopropyl alcohol*
6. Methylene Chloride
7. Acetone*
8. Acetonitrile
9. Ethyl formate
10. t-Butyl alcohol*
11. 1-Propanol
12. MTBE
13. Hexane
14. Chloroform
15. sec-Butyl alcohol
16. 2-Chlorobutane
17. MEK (2-Butanone)
18. Ethyl acetate
19. 1,1-Trichloroethane
20. Carbon tetrachloride
21. 1-Chlorobutane
22. Benzene
23. 1-Butanol
24. Heptane
25. Ethylene glycol
26. soamyl alcohol
27. Toluene
28. Isopropyl amine (not shown)
29. Ethylbenzene
30. m,p-Xylene
31. o-Xylene
32. DMSO



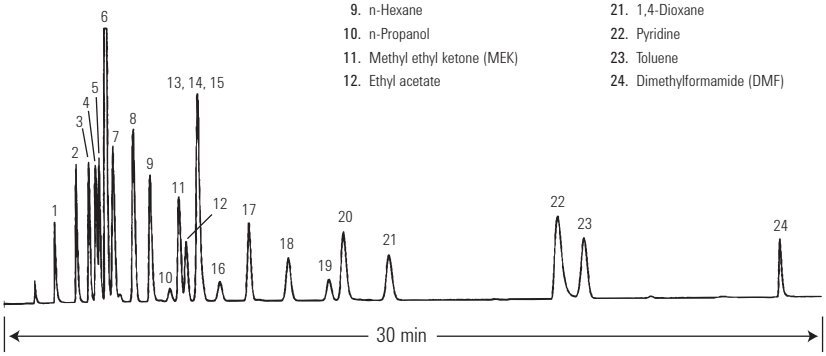
GCLS026

Residual Solvents, USP 467

Column: **DB-624**
125-1334
30 m x 0.53 mm, 3.00 µm

Carrier: Helium at 35 cm/sec, measured at 40°C
Oven: 40°C for 20 min
40-90°C at 5°/min
Injection: Megabore Direct, 250°C
5 m phenylmethylsilane deactivated retention gap
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min

1. Methanol
2. Ethanol
3. Ethyl ether
4. Acetone
5. Isopropanol
6. Acetonitrile
7. Methylene chloride
8. tert-Butanol
9. n-Hexane
10. n-Propanol
11. Methyl ethyl ketone (MEK)
12. Ethyl acetate
13. Tetrahydrofuran (THF)
14. Chloroform
15. sec-Butanol
16. Cyclohexane
17. Benzene
18. n-Heptane
19. Trichloroethylene
20. n-Butanol
21. 1,4-Dioxane
22. Pyridine
23. Toluene
24. Dimethylformamide (DMF)



GCLS027

Residual Solvents, DMI Diluent

Column: **DB-624**
123-1364
60 m x 0.32 mm, 1.80 µm

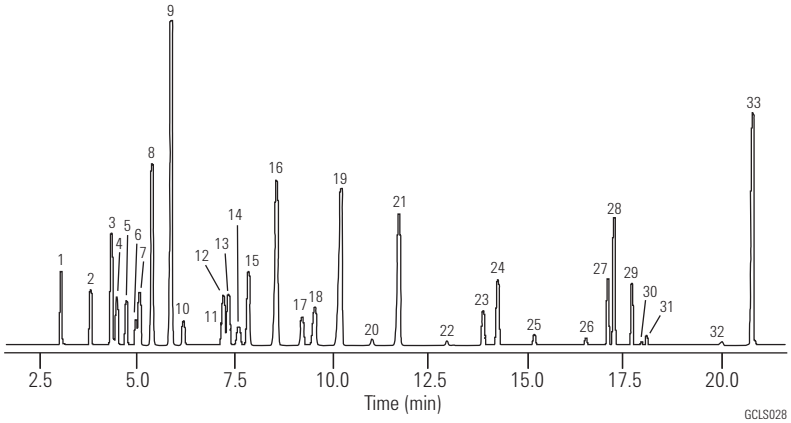
Oven:	50-60°C, 1°C/min 60-115°C, 9.2°C/min 115-220°C, 35°C/min 220°C - hold 6 min
Sampler:	Headspace Platen 140°C Transfer line, valve 250°C Sample Loop 2mL
Injection:	Split, 250°C Split ratio 1:18
Detector:	FID, 270°C Nitrogen makeup
Sample:	5,000 ppm standard

1. Methanol
2. Ethanol
3. Acetone
4. 2-Propanol
5. Acetonitrile
6. Methylene chloride
7. 2-Methyl-2-propanol (tert-butanol)
8. MTBE
9. Hexane
10. 1-Propanol
11. DMI impurity
12. 2-Butanone (MEK)
13. Ethyl acetate
14. 2-Butanol
15. Tetrahydrofuran
16. Cyclohexane
17. Isopropyl acetate
18. 1,2-Dimethoxyethane
19. Heptane
20. 1-Methoxy-2-propanol
21. Methylcyclohexane
22. 2-Ethoxyethanol
23. MIBK (2-Pentanone)
24. Toluene
25. 1-Pentanol
26. n,n-Dimethylformamide (DMF)
27. Ethyl benzene
28. m,p-Xylene
29. o-Xylene
30. Dimethyl sulfoxide (DMSO)
31. n,n-Dimethylacetamide
32. n-Methylpyrrolidone
33. 1,3-Dimethyl-2-imidazolidinone (DMI)

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885

Special thanks to Julie Kancler, Brian Wallace, Teledyne.





Residual Solvents

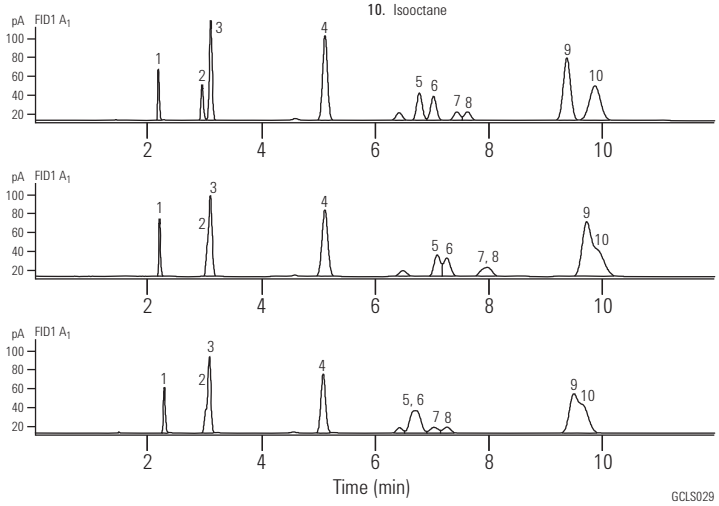
Column: **DB-624**
123-1364
60 m x 0.32 mm, 1.80 µm

Carrier: Helium, 35-40 cm/sec, set to yield same RT for Hexane on all columns.
Oven: 40°C Isothermal
Sampler: Ambient Headspace
Injection: Split ratio 1:8
Detector: FID, 240°C
Sample: 4 µL

1. Methanol
2. Ethanol
3. Diethyl ether
4. Hexane
5. Ethyl Acetate
6. 2-Butanone
7. 2-Butanol
8. Chloroform
9. Benzene
10. Isooctane

The three chromatograms to the right show how widely different the two other manufacturer's columns are compared to the DB-624, the original USP G-43 stationary phase column recommended for the analysis of these common organic volatile impurities in pharmaceutical samples.

Top Chromatogram: DB-624
Middle Chromatogram: Manufacturer A's "-624"
Bottom Chromatogram: Manufacturer B's "-624"



Peak Numbers	Critical Pair	DB-624	% Resolution* Manufacturer A's 624	Manufacturer B's 624
2,3	ethanol and diethyl ether	100%	0%	0%
5,6	ethyl acetate and 2-butanone	95%	38%	0%
7,8	2-butanol and chloroform	60%	0%	60%
9,10	benzene and isooctane	100%	0%	0%

*Resolution calculated as follows: %R = 100% x valley height/average of peak height 1 + peak height 2

Tips & Tools

For the latest residual solvent application for USP 467, request publication number 5989-8085EN.

Petroleum Applications

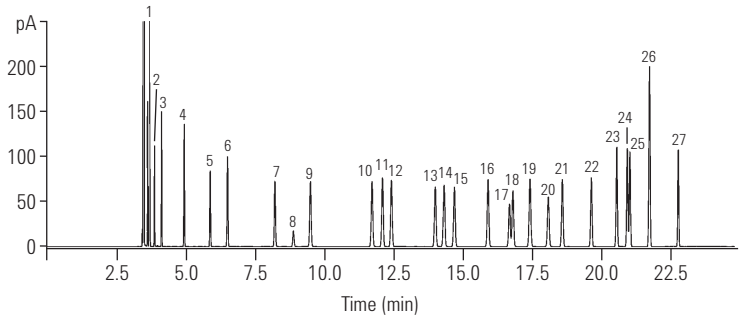
Fast Analysis of Aromatic Solvent

This application showcases the practicality using high efficiency GC columns in daily aromatic solvent analysis. The result: a three-fold reduction in run time (compared to a 0.32 mm I.D. column) with no compromise in resolution.

Column: **HP-INNOWax**
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 20 psi constant pressure mode
Oven: 75°C (10 min); 3°C/min to 100°C (0 min)
10°C/min to 145°C (0 min)
Injection: Split/splitless at 250°C
100:1 split ratio
Detector: FID at 250°C
Sample: 1.0 µL

Unified aromatic solvent method

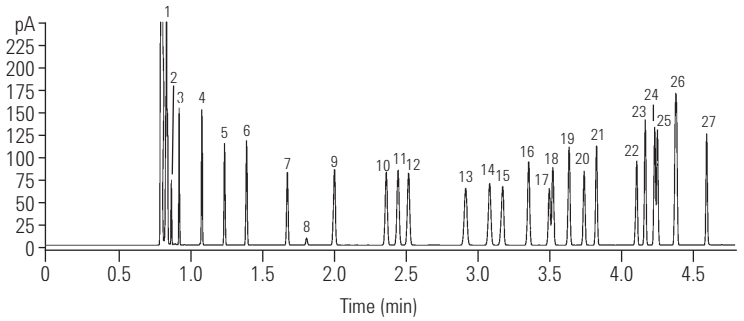


1. Heptane
2. Cyclohexane
3. Octane
4. Nonane
5. Benzene
6. Decane
7. Toluene
8. 1,4-Dioxan
9. Undecane
10. Ethylbenzene
11. p-Xylene
12. m-Xylene
13. Cumene
14. Dodecane
15. o-Xylene
16. Propylbenzene
17. p-Ethyltoluene
18. m-Ethyltoluene
19. t-Butylbenzene
20. s-Butylbenzene
21. Styrene
22. Tridecane
23. 1,3-Diethylbenzene
24. 1,2-Diethylbenzene
25. n-Butylbenzene
26. a-Methylstyrene
27. Phenylacetylene

Column: **HP-INNOWax**
19091N-577
20 m x 0.18 mm, 0.18 µm

Carrier: Helium at 33 psi constant pressure mode
Oven: 70°C (3 min); 45°C/min to 145°C (1 min)
Injection: Split/splitless at 250°C
100:1 to 600:1 split ratio
Detector: FID at 250°C
Sample: 0.2 to 1.0 µL

Optimized unified aromatic solvent method



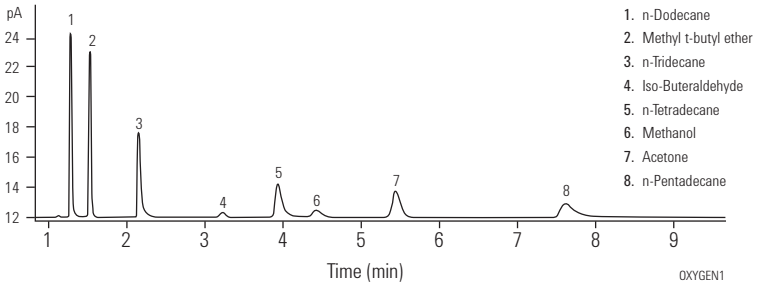
GCHE003

GC and GC/MS

Selected Oxygenates

Column: **GS-OxyPLOT**
115-4912
10 m x 0.53 mm

Carrier: Helium at 41 cm/s
Oven: 150°C Isothermal
Injection: Split, 1:40, 250°C
Detector: FID, 290°C



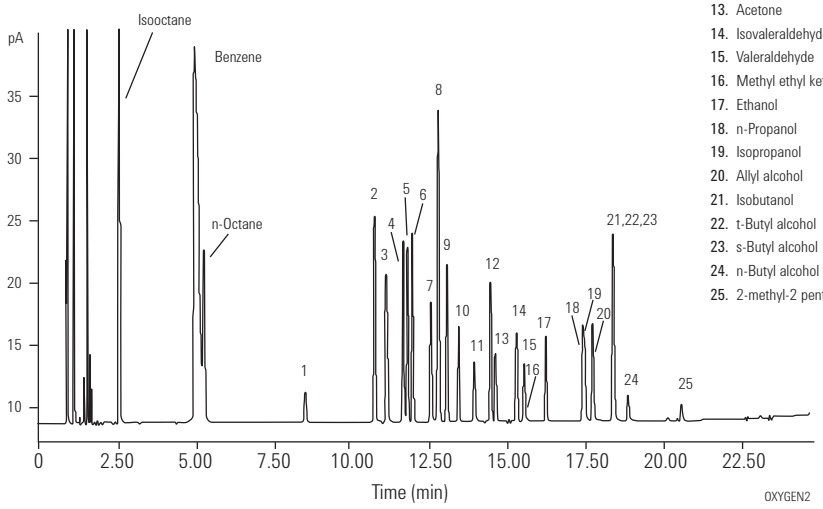
1. n-Dodecane
2. Methyl t-butyl ether
3. n-Tridecane
4. Iso-Buteraldehyde
5. n-Tetradecane
6. Methanol
7. Acetone
8. n-Pentadecane

Trace Oxygenates in Light Hydrocarbon Matrices

Column: **DB-1**
125-102J
25 m x 0.53 mm, 1.00 µm

Column: **GS-OxyPLOT**
115-4912
10 m x 0.53 mm

Carrier: Helium (tm = 0.96 min at 50°C)
Oven: 50°C for 5 min
50°C to 240°C
Injection: Split
Detector: FID



1. Dimethyl ether
2. Diethyl ether
3. Acealdehyde
4. Ethyl t-butyl ether
5. Methyl t-butyl ether
6. Diisopropyl ether
7. Propionaldehyde
8. Tert-amyl methyl ether
9. Propyl ether
10. Isobutylaldehyde
11. Butylaldehyde
12. Methanol
13. Acetone
14. Isovaleraldehyde
15. Valeraldehyde
16. Methyl ethyl ketone
17. Ethanol
18. n-Propanol
19. Isopropanol
20. Allyl alcohol
21. Isobutanol
22. t-Butyl alcohol
23. s-Butyl alcohol
24. n-Butyl alcohol
25. 2-methyl-2 pentanol

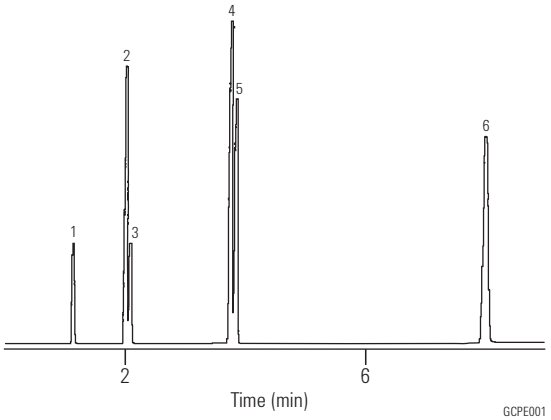
Noble Gases

Column: **HP-PLOT Molesieve**
19095P-MS0
30 m x 0.53 mm, 50.00 µm

Carrier:	Helium, 4 mL/min
Oven:	35°C for 3 min 35-120°C at 25°C/min 120°C for 5 min
Injection:	Split ratio 50:1
Detector:	TCD
Sample:	250 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. Neon
2. Argon
3. Oxygen
4. Nitrogen
5. Krypton
6. Xenon

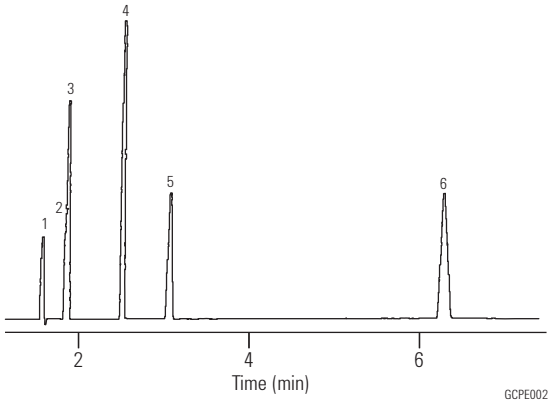
Permanent Gases

Column: **HP-PLOT Molesieve**
19091P-MS4
30 m x 0.32 mm, 12.00 µm

Carrier:	Helium, 2 mL/min
Oven:	40°C Isothermal
Injection:	Split ratio 75:1
Detector:	TCD
Sample:	250 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. Neon
2. Argon
3. Oxygen
4. Nitrogen
5. Methane
6. Carbon monoxide

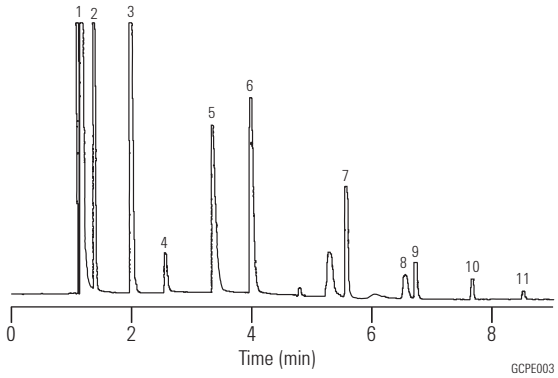
Baseline Resolution of Air/CO, CO_2, and Methane in a Natural Gas Sample

Column: **HP-PLOT Q**
19095P-Q04
30 m x 0.53 mm, 40.00 µm

Carrier:	Helium (8.6 mL/min @ 60°C)
Oven:	60°C for 2 min 60-240°C at 30°C/min 240°C for 1 min
Injection:	Split ratio 12:1
Detector:	TCD, 250°C
Sample:	0.25 cc natural gas sample, Methane, 80%+

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. Air/CO
2. CO_2
3. Ethane
4. H_2S
5. Water
6. C_3
7. i-C_4/n-C_4
8. neo-C_5
9. i-C_5/n-C_5
10. C_6
11. C_7

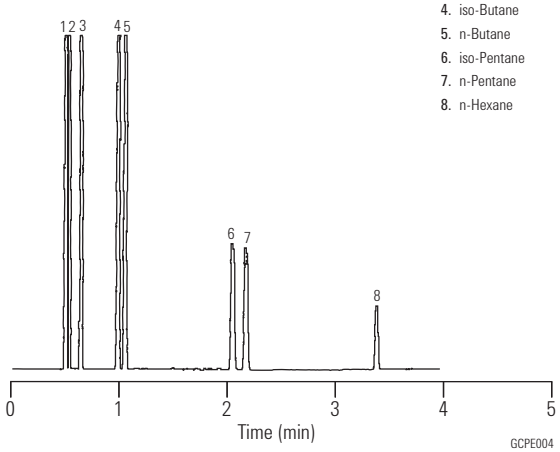
Natural Gas

Column: **HP-PLOT Al_2O_3 S**
19095P-S21
15 m x 0.53 mm, 15.00 µm

Carrier: Helium, 50 cm/sec (100°C), 6 mL/min
Oven: 100°C for 1.5 min
100-180°C at 30°C/min
Injection: Split, 250°C
Split ratio 50:1
Detector: FID, 250°C
Sample: 5 µL
Natural Gas P/N 5080-8756

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885

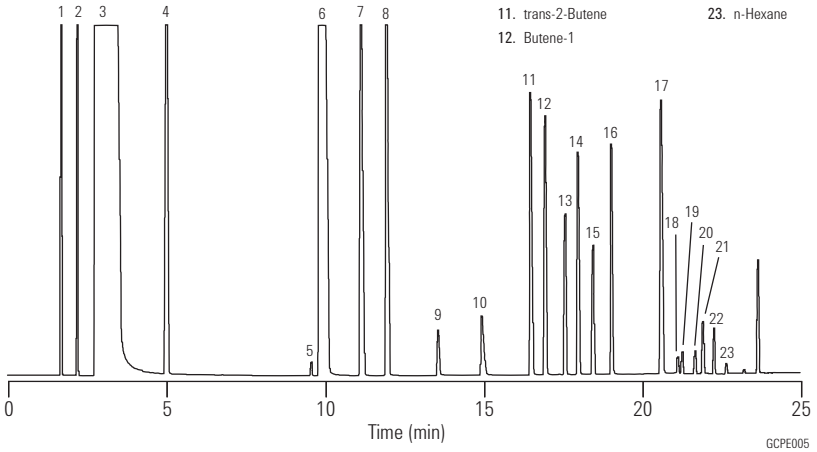


1. Methane
2. Ethane
3. Propane
4. iso-Butane
5. n-Butane
6. iso-Pentane
7. n-Pentane
8. n-Hexane

Ethylene

Column: **HP-PLOT Al_2O_3 S**
19095P-S25
50 m x 0.53 mm, 15.00 µm

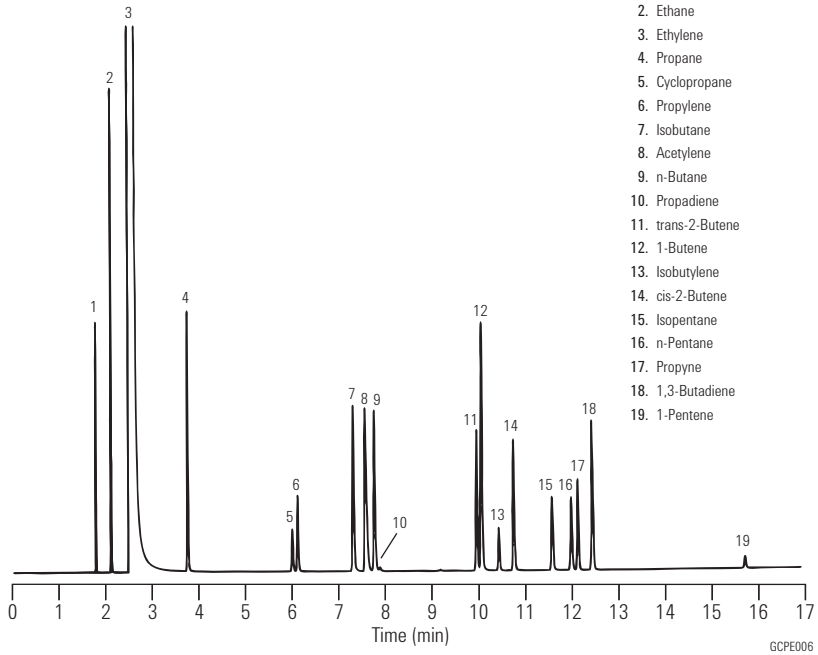
Carrier: Helium, 50 cm/sec (35°C),
7 mL/min constant flow
Oven: 35°C for 2 min
35-100°C at 5°C/min
Injection: Split, 250°C
Split ratio 65:1
Detector: FID, 250°C
Sample: 5 µL
Ethylene 98.4%



1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Cyclopropane
6. Propylene
7. Isobutane
8. n-Butane
9. Propadiene
10. Acetylene
11. trans-2-Butene
12. Butene-1
13. Isobutylene
14. cis-2-Butene
15. Isopentane
16. n-Pentane
17. 1,3-Butadiene
18. Propyne
19. trans-2-Pentene
20. 2-Methyl-2-butene
21. Pentene-1
22. cis-2-Pentene
23. n-Hexane

Impurities in Ethylene

Column:	**GS-Alumina KCl 115-3352 50 m x 0.53 mm**
Carrier:	Helium at 8 mL/min, measured at 35°C
Oven:	35°C for 2 min 35-190°C at 10°/min 190°C for 3 min
Injection:	Split, 200°C Split ratio 1:40
Detector:	FID, 200°C Nitrogen makeup gas at 20 mL/min
Sample:	0.2 mL of trace hydrocarbons in ethylene



1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Cyclopropane
6. Propylene
7. Isobutane
8. Acetylene
9. n-Butane
10. Propadiene
11. trans-2-Butene
12. 1-Butene
13. Isobutylene
14. cis-2-Butene
15. Isopentane
16. n-Pentane
17. Propyne
18. 1,3-Butadiene
19. 1-Pentene

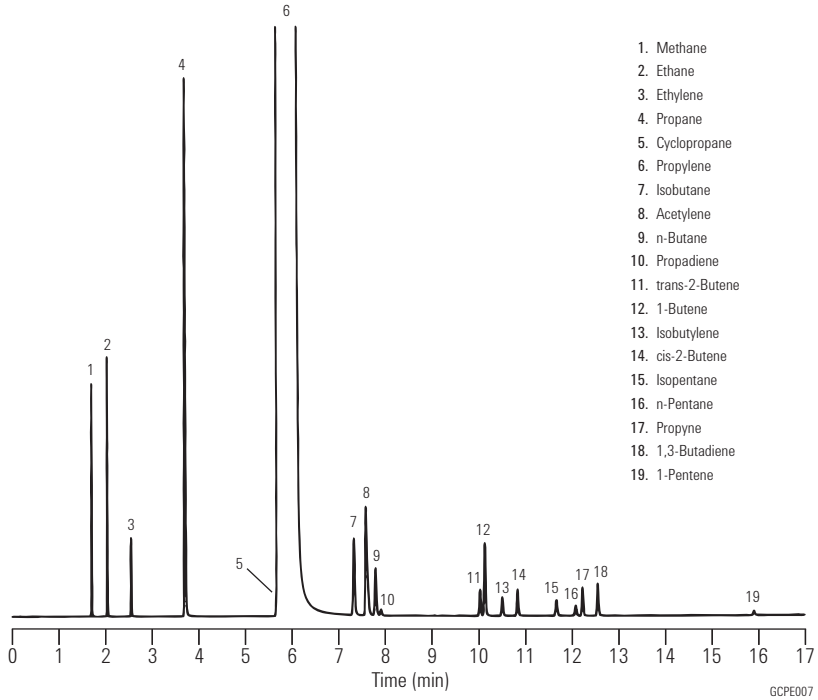
GCPE006

Impurities in Propylene

Column:	**GS-Alumina KCl 115-3352 50 m x 0.53 mm**
Carrier:	Helium at 10 mL/min, measured at 35°C
Oven:	35°C for 2 min 35-190°C at 10°/min 190°C for 3 min
Injection:	Split, 200°C Split ratio 1:30
Detector:	FID, 200°C Nitrogen makeup gas at 20 mL/min
Sample:	0.2 mL of trace hydrocarbons in propylene

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Cyclopropane
6. Propylene
7. Isobutane
8. Acetylene
9. n-Butane
10. Propadiene
11. trans-2-Butene
12. 1-Butene
13. Isobutylene
14. cis-2-Butene
15. Isopentane
16. n-Pentane
17. Propyne
18. 1,3-Butadiene
19. 1-Pentene

GCPE007

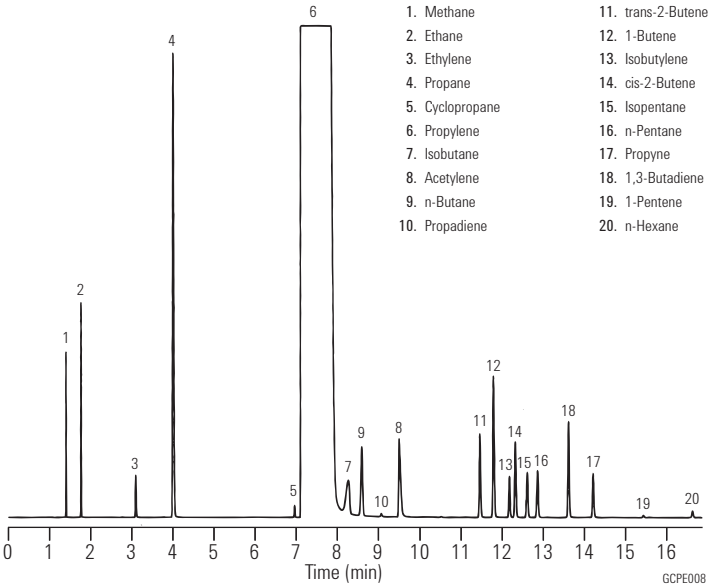
Propylene

Column: **GS-Alumina**
115-3552
50 m x 0.53 mm

Carrier:	Helium at 10 mL/min, measured at 35°C
Oven:	35°C for 2 min 35-190°C at 10°/min 190°C for 3 min
Injection:	Split, 200°C Split ratio 1:30
Detector:	FID, 200°C Nitrogen makeup gas at 20 mL/min
Sample:	0.2 mL of trace hydrocarbons in propylene

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Cyclopropane
6. Propylene
7. Isobutane
8. Acetylene
9. n-Butane
10. Propadiene
11. trans-2-Butene
12. 1-Butene
13. Isobutylene
14. cis-2-Butene
15. Isopentane
16. n-Pentane
17. Propyne
18. 1,3-Butadiene
19. 1-Pentene
20. n-Hexane

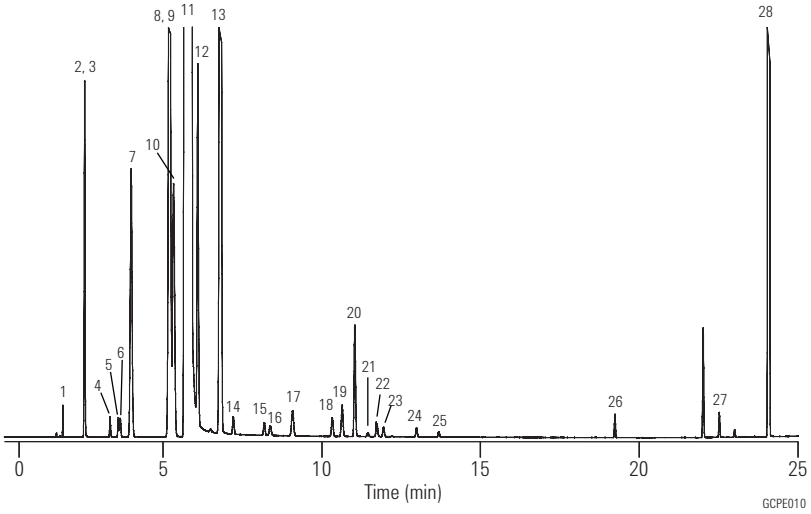
1,3-Butadiene

Column: **DB-624**
128-1324
25 m x 0.20 mm, 1.12 µm

Carrier:	Helium at 1.0 mL/min
Oven:	-20°C for 3 min -20 - 20°C at 4°/min 20 - 200°C at 8°/min 200°C for 10 min
Injection:	Split, 250°C Split ratio 1:150
Detector:	FID, 250°C
Sample:	0.5 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



Refined Butadiene Standard Component	Gravimetric concentration (PPM)
1. Acetylene	20.7
2. Propane	19.8
3. Propylene	296
4. Propadiene (allene)	21.1
5. Propyne (methylacetylene)	21
6. Cyclopropane	20
7. Isobutane	506
8. Butene-1	999
9. Isobutylene	495
10. n-Butane	494
11. 1,3-Butadiene	balance
12. trans-2-Butene	442
13. cis-2-Butene	1946
14. 1-Butyne (ethylacetylene)	20.2
15. 1,2-Butadiene	28.9
16. 3-Methyl-1-butene	19.8
17. Isopentane	50.1
18. Pentene-1	29.8
19. n-Pentane	50.1
20. 2-Butyne (dimethylacetylene)	150
21. trans-2-Pentene	5.57
22. Isoprene	20
23. cis-2-Pentene	13.9
24. trans-1,3-Pentadiene	13.8
25. cis-1,3-Pentadiene	7.73
26. Benzene	20.3
27. Toluene	20.2
28. Dimer (4-vinylcyclohexene-1)	

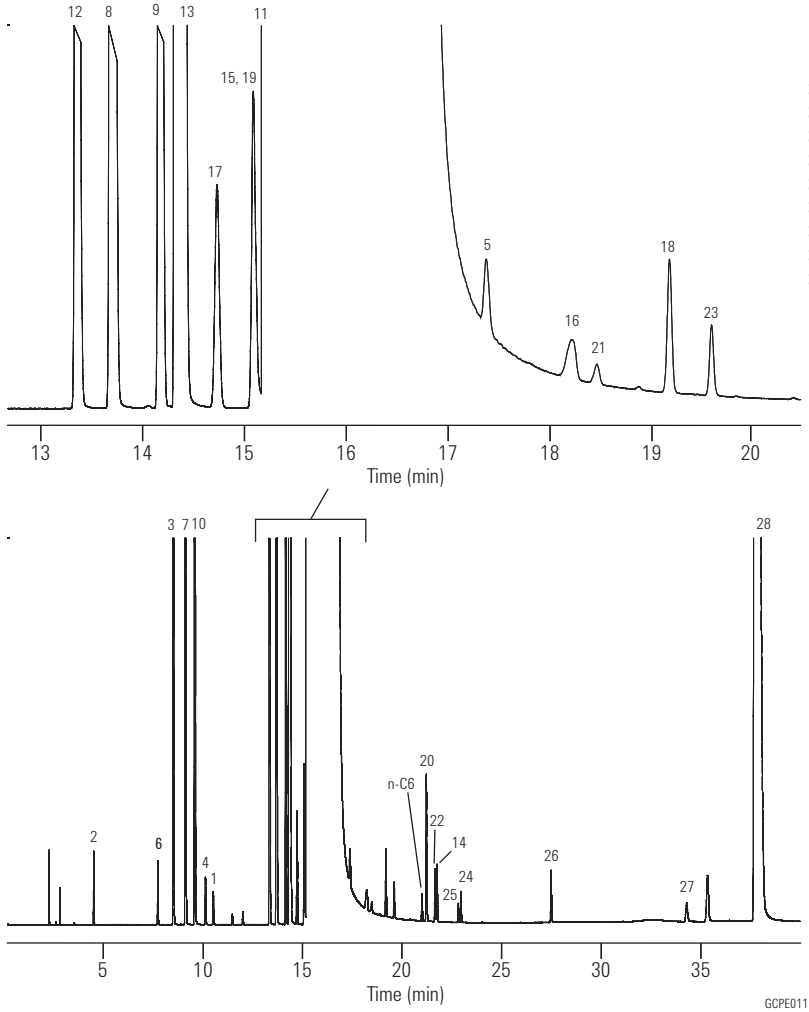
Agilent Technologies wishes to thank DCG Industries (Pearland, TX) for providing this chromatogram.

1,3-Butadiene Purity

Column:	**GS-Alumina 115-3552 50 m x 0.53 mm**
Carrier:	Helium, 6.0 mL/min (constant flow mode)
Oven:	45°C for 3 min 6°/min to 195°C 195°C for 15 min
Injection:	Split, 250°C Split ratio 1:50
Detector:	FID, 250°C
Sample:	0.5 µL

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



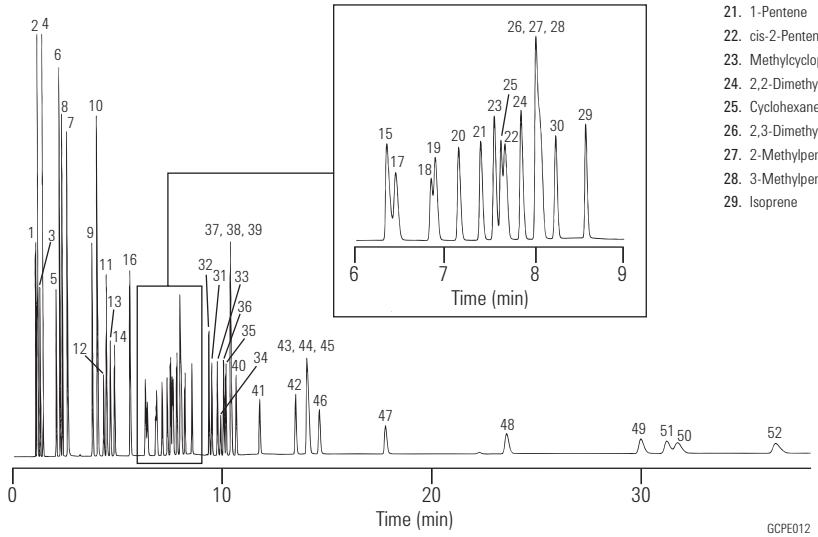
Refined Butadiene Standard Component	Gravimetric concentration (PPM)
1. Acetylene	20.7
2. Propane	19.8
3. Propylene	296
4. Propadiene (allene)	21.1
5. Propyne (methylacetylene)	21
6. Cyclopropane	20
7. Isobutane	506
8. Butene-1	999
9. Isobutylene	495
10. n-Butane	494
11. 1,3-Butadiene	balance
12. trans-2-Butene	442
13. cis-2-Butene	1946
14. 1-Butyne (ethylacetylene)	20.2
15. 1,2-Butadiene	28.9
16. 3-Methyl-1-butene	19.8
17. Isopentane	50.1
18. Pentene-1	29.8
19. n-Pentane	50.1
20. 2-Butyne (dimethylacetylene)	150
21. trans-2-Pentene	5.57
22. Isoprene	20
23. cis-2-Pentene	13.9
24. trans-1,3-Pentadiene	13.8
25. cis-1,3-Pentadiene	7.73
26. Benzene	20.3
27. Toluene	20.2
28. Dimer (4-vinylcyclohexene-1)	

Extended Hydrocarbon Analysis I

Column:	**GS-Alumina** **115-3532** **30 m x 0.53 mm**
Carrier:	Helium at 52 cm/sec (6.7 mL/min), measured at 100°C
Oven:	100°C for 1 min 100-140°C at 8°/min 140°C for 0.5 min 140-200°C at 30°/min
Injection:	Split, 250°C Split ratio 1:8
Detector:	FID, 275°C Nitrogen makeup gas at 29 mL/min
Sample:	300 µL injection of 100 ppm V SUMMA cannister mixture

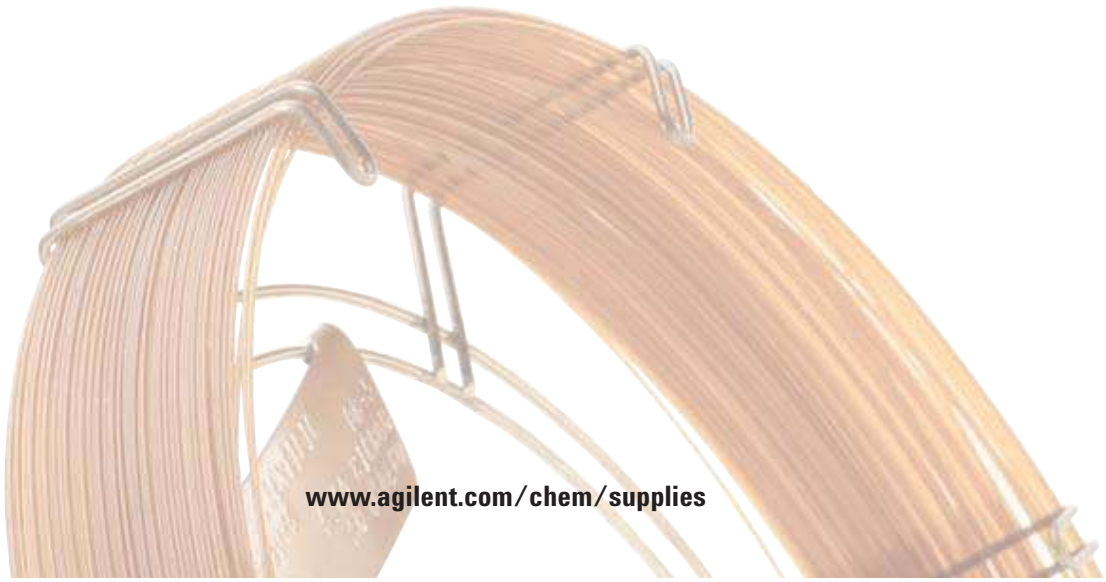
Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885



GCPE012

1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Propylene
6. Isobutane
7. Acetylene
8. n-Butane
9. trans-2-Butene
10. 1-Butene
11. cis-2-Butene
12. Cyclopentane
13. Isopentane
14. n-Pentane
15. Propyne
16. 1,3-Butadiene
17. Cyclopentene
18. 3-Methyl-1-butene
19. trans-2-Pentene
20. 2-Methyl-2-butene
21. 1-Pentene
22. cis-2-Pentene
23. Methylcyclopentane
24. 2,2-Dimethylbutane
25. Cyclohexane
26. 2,3-Dimethylbutane
27. 2-Methylpentane
28. 3-Methylpentane
29. Isoprene
30. n-Hexane
31. 4-Methyl-1-pentene
32. trans-2-Hexene
33. 2-Methyl-1-pentene
34. cis-2-Hexene
35. 2,4-Dimethylpentane
36. Methylcyclohexane
37. 2,3-Dimethylpentane
38. 2-Methylhexane
39. 3-Methylhexane
40. n-Heptane
41. Benzene
42. Isooctane (2,2,4-Trimethylpentane)
43. 2,3,4-Trimethylpentane
44. 3-Methylheptane
45. 2-Methylheptane
46. n-Octane
47. Toluene
48. n-Nonane
49. Ethylbenzene
50. m-Xylene
51. p-Xylene
52. o-Xylene



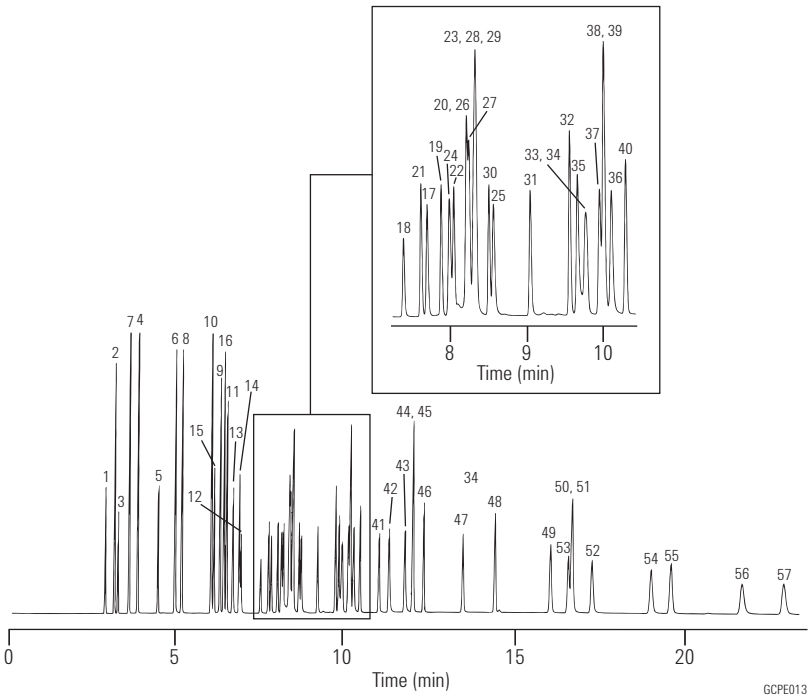
Extended Hydrocarbon Analysis II

Column:	**GS-GasPro** **113-4362** **60 m x 0.32 mm**
Carrier:	Helium at 40 cm/sec (3.3 mL/min), measured at 80°C
Oven:	80°C for 0.5 min 80-175°C at 25°/min 175°C for 2 min 175-250°C at 25°/min
Injection:	Split, 250°C Split ratio 1:17
Detector:	FID, 275°C Nitrogen makeup gas at 32 mL/min
Sample:	500 µL injection of 100 ppmV SUMMA cannister mixture

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885

1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Propylene
6. Isobutane
7. Acetylene
8. n-Butane
9. trans-2-Butene
10. 1-Butene
11. cis-2-Butene
12. Cyclopentane
13. Isopentane
14. n-Pentane
15. Propyne
16. 1,3-Butadiene
17. Cyclopentene
18. 3-Methyl-1-butene
19. trans-2-Pentene
20. 2-Methyl-2-butene
21. 1-Pentene
22. cis-2-Pentene
23. Methylcyclopentane
24. 2,2-Dimethylbutane
25. Cyclohexane
26. 2,3-Dimethylbutane
27. 2-Methylpentane
28. 3-Methylpentane
29. Isoprene
30. n-Hexane
31. 4-Methyl-1-pentene
32. trans-2-Hexene
33. 2-Methyl-1-pentene
34. cis-2-Hexene
35. 2,4-Dimethylpentane
36. Methylcyclohexane
37. 2,3-Dimethylpentane
38. 2-Methylhexane
39. 3-Methylhexane
40. n-Heptane
41. Benzene
42. Isooctane (2,2,4-Trimethylpentane)
43. 2,3,4-Trimethylpentane
44. 3-Methylheptane
45. 2-Methylheptane
46. n-Octane
47. Toluene
48. n-Nonane
49. Ethylbenzene
50. m-Xylene
51. p-Xylene
52. o-Xylene
53. Styrene
54. Isopropylbenzene (Cumene)
55. n-Propylbenzene
56. 1,3,5-Trimethylbenzene
57. 1,2,4-Trimethylbenzene



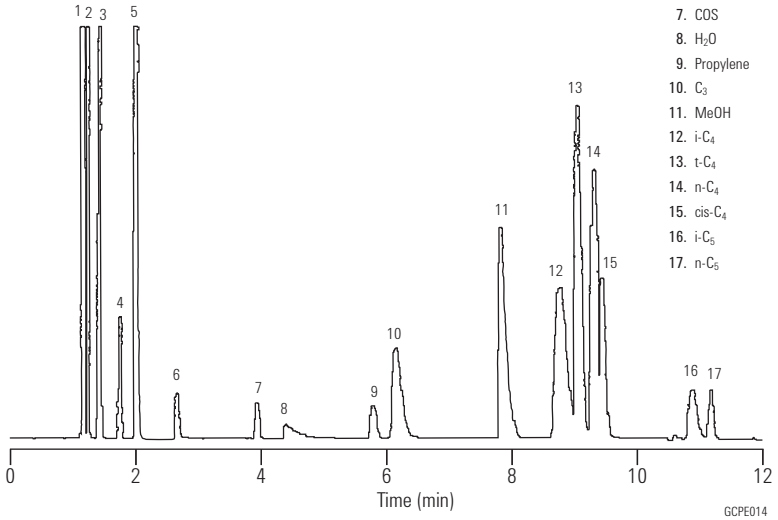
Refinery Gas I

Column: **HP-PLOT Q**
19095P-Q04
30 m x 0.53 mm, 40.00 µm

Carrier: Helium p=9.0 psi @ 60°C
Oven: 60°C for 5 min
60-200°C at 20°C/min
200°C for 1 min
Injection: Split, 250°C
Split flow 100mL/min
0.25 cc valve
Detector: TCD, 250°C
Sample: Refinery gas and others

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



1. Air/CO
2. C_1
3. CO_2
4. Ethylene
5. C_2
6. H_2S
7. COS
8. H_2O
9. Propylene
10. C_3
11. MeOH
12. i-C_4
13. t-C_4
14. n-C_4
15. cis-C_4
16. i-C_5
17. n-C_5

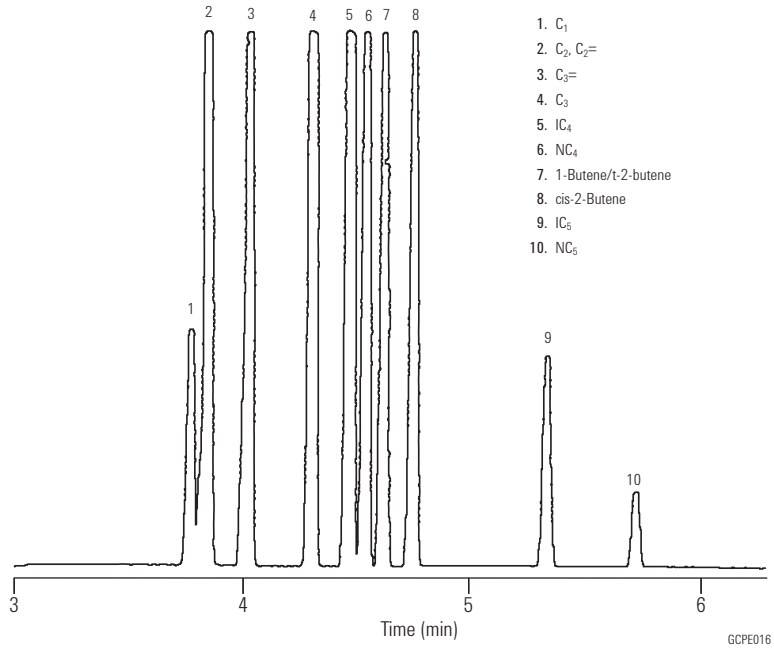
Refinery Gas II

Column: **HP-PONA**
19091S-001
50 m x 0.20 mm, 0.50 µm

Carrier: Helium, 1 mL/min
Oven: 35°C for 3 min
35-100°C at 10°C/min
100°C for 5 min
Injection: Split 200 - 400:1
2 cc loop
Detector: FID, 250°C

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



1. C_1
2. C_2, C_2=
3. C_3=
4. C_3
5. IC_4
6. NC_4
7. 1-Butene/t-2-butene
8. cis-2-Butene
9. IC_5
10. NC_5

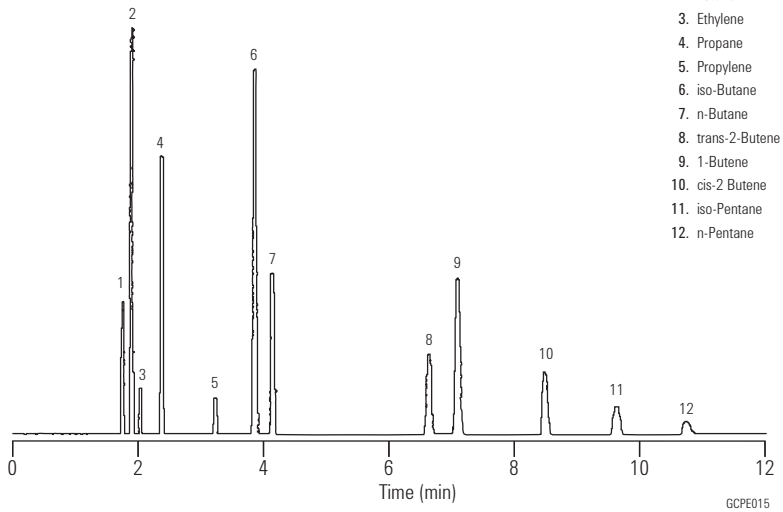
Refinery Gas III

Column: **HP-PLOT Al_2O_3 S**
19095P-S25
50 m x 0.53 mm, 15.00 µm

Carrier: Helium 7 mL/min
Oven: 100°C Isothermal
Injection: Split, 250°C
Split ratio 100:1
Detector: FID, 250°C
Sample: 5 µL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



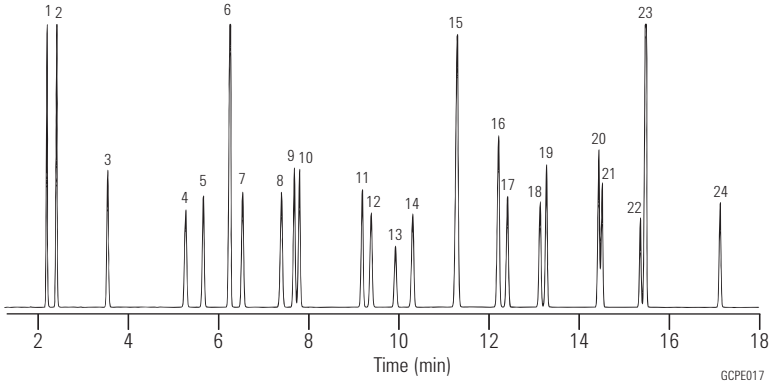
1. Methane
2. Ethane
3. Ethylene
4. Propane
5. Propylene
6. iso-Butane
7. n-Butane
8. trans-2-Butene
9. 1-Butene
10. cis-2 Butene
11. iso-Pentane
12. n-Pentane

Volatile Sulfur Compounds

Column: **DB-1**
123-1035
30 m x 0.32 mm, 5.00 µm

Carrier: Helium at 23 cm/sec (H_2S at 50°C)
Oven: 50°C for 4 min, 50-120°C at 20°/min, 120°C for 4 min, 120-220°C at 25°/min, 220°C for 2.5 min
Injection: Split, 200°C
Split ratio 1:10
Detector: PFPD (OI Analytical), 220°C
Sample: 600 µL of sulfur gas standard
3 ppmV each component

1. Hydrogen sulfide
2. Carbonyl sulfide
3. Methyl mercaptan
4. Ethyl mercaptan
5. Dimethyl sulfide
6. Carbon disulfide
7. 2-Propanethiol
8. 2-Methyl-2-propanethiol
9. 1-Propanethiol
10. Ethyl methyl sulfide
11. Thiophene
12. 2-Methyl-1-propanethiol
13. Diethyl sulfide
14. 1-Butanethiol
15. Methyl disulfide
16. 2-Methylthiophene
17. 3-Methylthiophene
18. Tetrahydrothiophene
19. 1-Pentanethiol
20. 2-Ethylthiophene
21. 2,5-Dimethylthiophene
22. 1-Hexanethiol
23. Ethyl disulfide
24. 1-Heptanethiol



Agilent wishes to thank Air Toxics, Ltd. (Folsom, CA) for providing the standard mixture shown in this chromatogram.

Sulfur Gas Analysis in Light Hydrocarbon Streams I

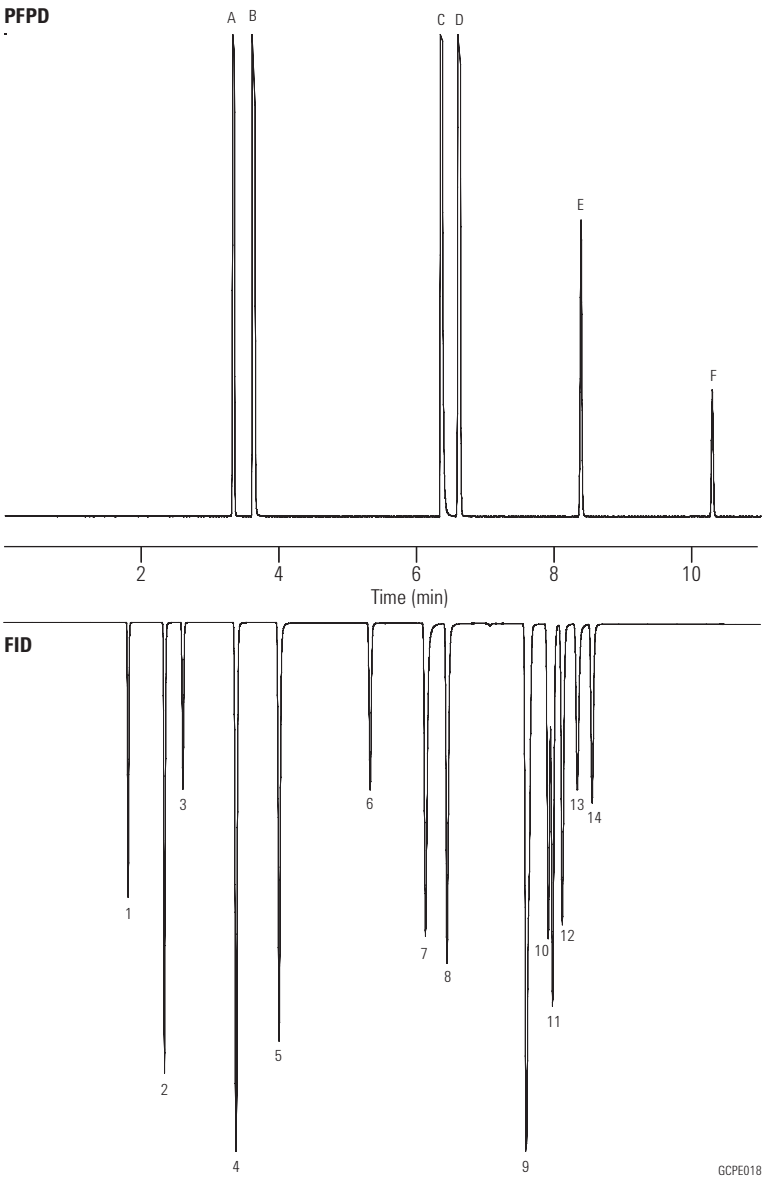
Column: **GS-GasPro**
113-4332
30 m x 0.32 mm

Carrier:	Helium, 10 psig, 2.0 mL/min @ 60°C
Oven:	60°C for 2 min, 20°/min to 260°C and hold
Injection:	Split, 200°C Split ratio 1:20
Detector:	Two separate analyses under identical conditions on FID and PFPD

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885

Sulfur compounds (PFPD)
A. Carbonyl sulfide
B. Hydrogen sulfide
C. Sulfur dioxide
D. Carbon disulfide
E. Methyl mercaptan
F. Ethyl mercaptan



1. Methane
2. Ethane
3. Ethylene
4. Acetylene
5. Propane
6. Propylene
7. iso-Butane
8. n-Butane
9. 1-Butene/Methyl acetylene
10. trans-2-Butene
11. 1,3-Butadiene
12. cis-2-Butene
13. iso-Pentane
14. n-Pentane

Sulfur Gas Analysis in Light Hydrocarbon Streams II

Column: **GS-Q**
113-3432
30 m x 0.32 mm

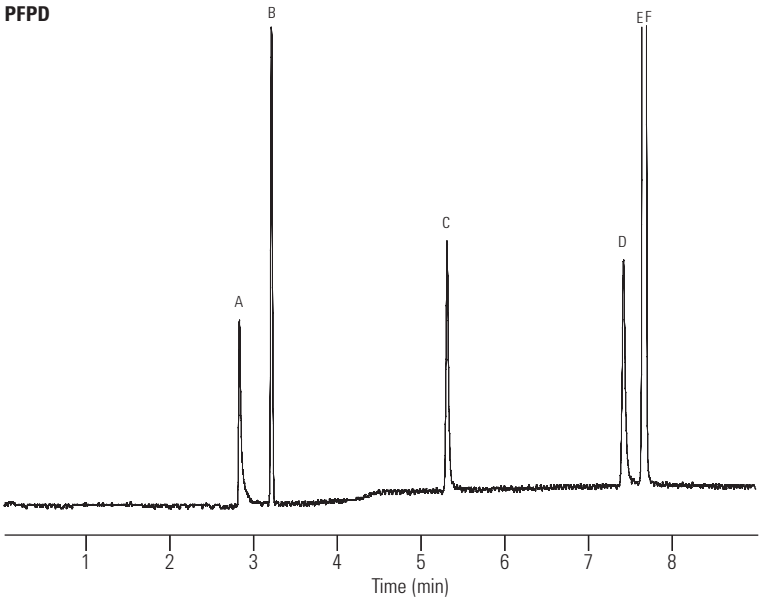
Carrier:	Helium, 10 psig, 1.7 mL/min @ 100°C
Oven:	100°C for 2 min, 20°/min to 250°C and hold
Injection:	Split, 200°C Split ratio 1:20
Detector:	Two separate analyses under identical conditions on FID and PFPD

Suggested Supplies

Septum:	11 mm Advanced Green septa, 5183-4759
Liner:	Direct, 1.5 mm ID, 18740-80200
Seal:	Gold plated seal, 18740-20885

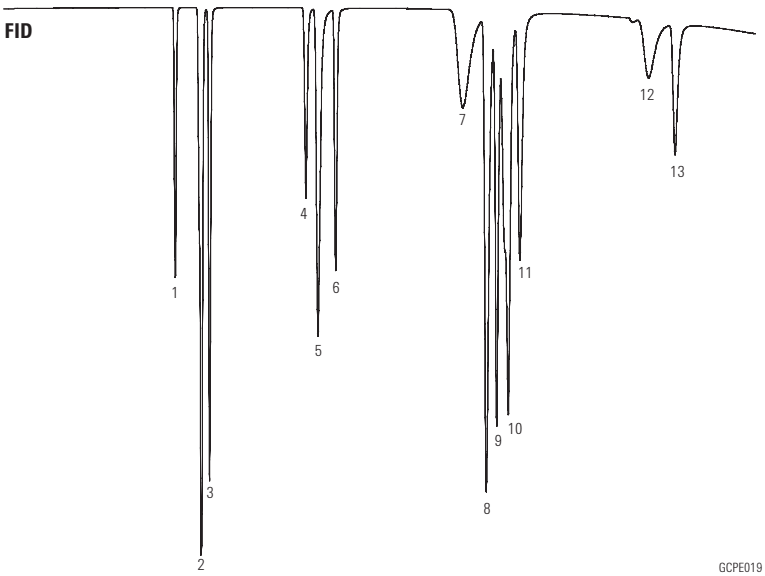
Sulfur compounds (PFPD)
A. Hydrogen sulfide
B. Carbonyl sulfide
C. Methyl mercaptan
D. Ethyl mercaptan
E. Carbon disulfide

PFPD



1. Methane
2. Ethylene/Acetylene
3. Ethane
4. Propylene
5. Propane
6. Methyl acetylene
7. iso-Butane
8. 1-Butene
9. 1,3-Butadiene
10. n-Butane/cis-2-Butene
11. trans-2-Butene
12. iso-Pentane
13. n-Pentane

FID



GCPE019

Sulfur Compounds in Propylene (1 ppm)

Column: **GS-GasPro**
113-4332
30 m x 0.32 mm

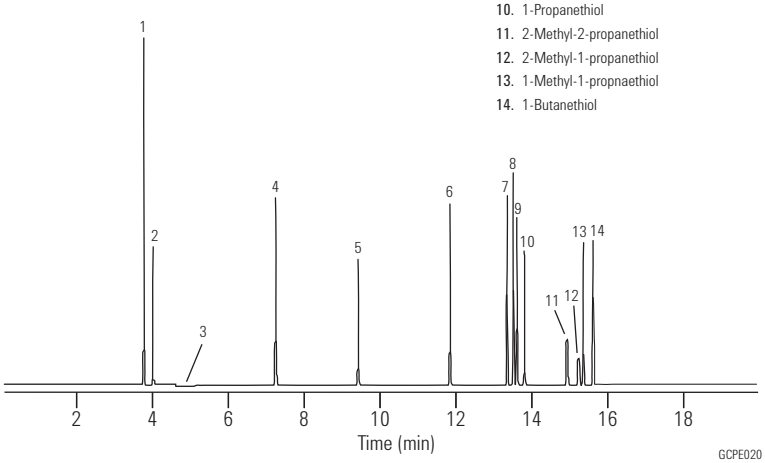
Oven: 60°C for 2.5 minutes
60-250°C at 10°C/min

Injection: OI Analytical Volatiles Inlet
Split ratio 5:1
200 µL gas sampling valve

Detector: OI Analytical Model 5380 PFPD

Sample: 1 ppm Sulfur compounds in Propylene

1. COS
2. H_2S
3. Propylene
4. CS_2
5. Methyl mercaptan
6. Ethyl mercaptan
7. Thiophene
8. Dimethyl sulfide
9. 2-Propanethiol
10. 1-Propanethiol
11. 2-Methyl-2-propanethiol
12. 2-Methyl-1-propanethiol
13. 1-Methyl-1-propnaethiol
14. 1-Butanethiol



GCPE020

Chromatogram courtesy of OI Analytical.

Mercaptans

Column: **GS-GasPro**
113-4332
30 m x 0.32 mm

Carrier: Helium at 25 cm/sec

Oven: 175°C for 2 min
175-260°C at 10°/min

Injection: Split
Split flow 80 mL/min

Detector: FID

Sample: 0.2 mL

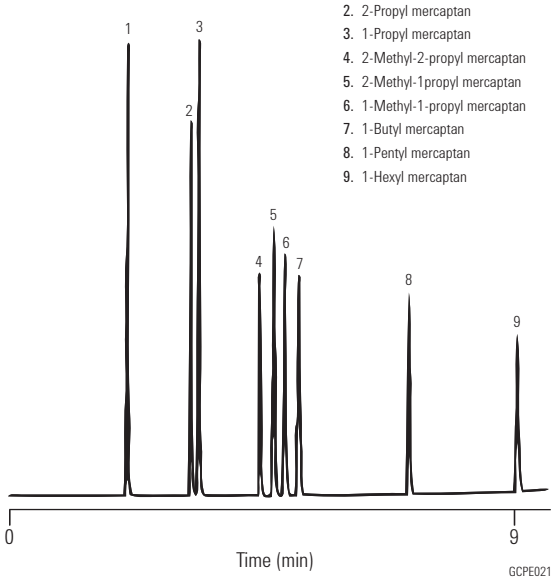
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: Direct, 1.5 mm ID, 18740-80200

Seal: Gold plated seal, 18740-20885

1. Ethyl mercaptan
2. 2-Propyl mercaptan
3. 1-Propyl mercaptan
4. 2-Methyl-2-propyl mercaptan
5. 2-Methyl-1propyl mercaptan
6. 1-Methyl-1-propyl mercaptan
7. 1-Butyl mercaptan
8. 1-Pentyl mercaptan
9. 1-Hexyl mercaptan



GCPE021

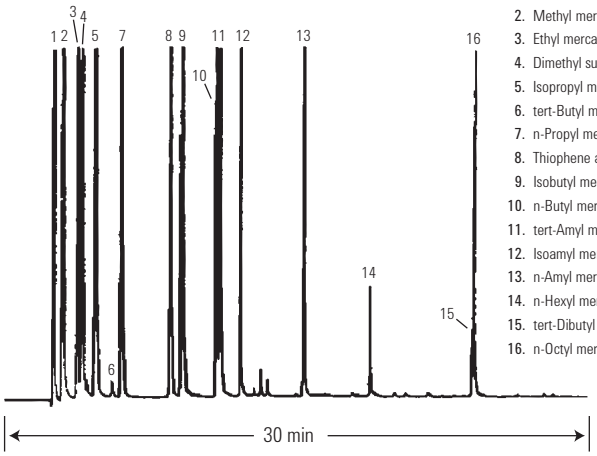
Sulfur Compounds in Natural Gas-Synthetic Mixture

Column: **HP-1**
19091Z-205
50 m x 0.20 mm, 0.50 µm

Carrier: Helium
Oven: 35°C for 10 min
35-300°C at 7°C/min
Injection: Split 100:1
Detector: FPD
Sample: 0.5 mL

Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct, 1.5 mm ID, 18740-80200
Seal: Gold plated seal, 18740-20885



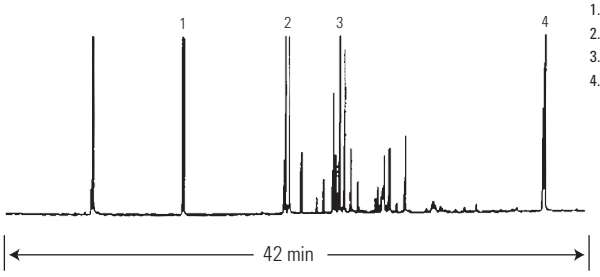
GCPE022

1. Hydrogen sulfide
2. Methyl mercaptan
3. Ethyl mercaptan
4. Dimethyl sulfide
5. Isopropyl mercaptan
6. tert-Butyl mercaptan
7. n-Propyl mercaptan
8. Thiophene and sec-Butyl mercaptan
9. Isobutyl mercaptan
10. n-Butyl mercaptan
11. tert-Amyl mercaptan
12. Isoamyl mercaptan
13. n-Amyl mercaptan
14. n-Hexyl mercaptan
15. tert-Dibutyl disulfide
16. n-Octyl mercaptan

Sulfur Compounds in Naphtha

Column: **HP-PONA**
19091S-001
50 m x 0.20 mm, 0.50 µm

Carrier: Helium, 26 cm/sec
Oven: 35°C for 15 min
35-70°C at 8°C/min
70-130°C at 15°C/min
Injection: Split ratio 400:1
Detector: FPD
Sample: 3 µL



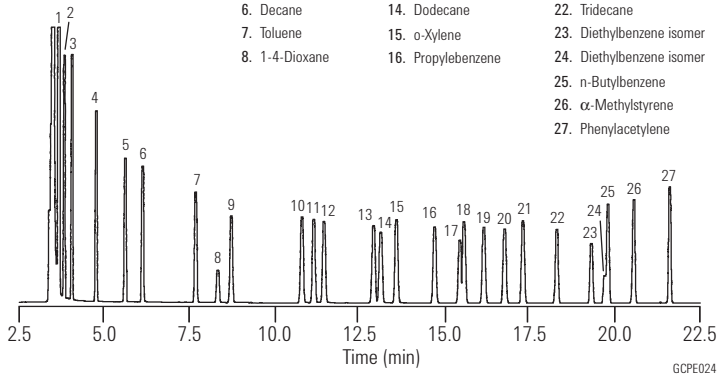
GCPE023

1. Thiophene
2. Methyl thiophenes
3. Ethyl and dimethyl thiophenes
4. Benzothiophene

Aromatics Analysis: ASTM D16 Analytes

Column: **HP-INNOWax**
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 20 psi, constant pressure mode
Oven: 75°C for 10 min
3°C/min to 100°C
10°C/min to 145°C
Injection: Split, 250°C
Split ratio 100:1 to 400:1
Detector: FID, 250°C
Data aquisition rate at 20 Hz



GCPE024

1. Heptane
2. Cyclohexane
3. Octane
4. Nonane
5. Benzene
6. Decane
7. Toluene
8. 1-4-Dioxane
9. Undecane
10. Ethylbenzene
11. p-Xylene
12. m-Xylene
13. Cumene
14. Dodecane
15. o-Xylene
16. Propylebenzene
17. p-Ethyltoluene
18. m-Ethyltoluene
19. tert-Butylbenzene
20. sec-Butylbenzene
21. Styrene
22. Tridecane
23. Diethylbenzene isomer
24. Diethylbenzene isomer
25. n-Butylbenzene
26. α-Methylstyrene
27. Phenylacetylene

Aromatics Analysis - Ethylbenzene Impurities

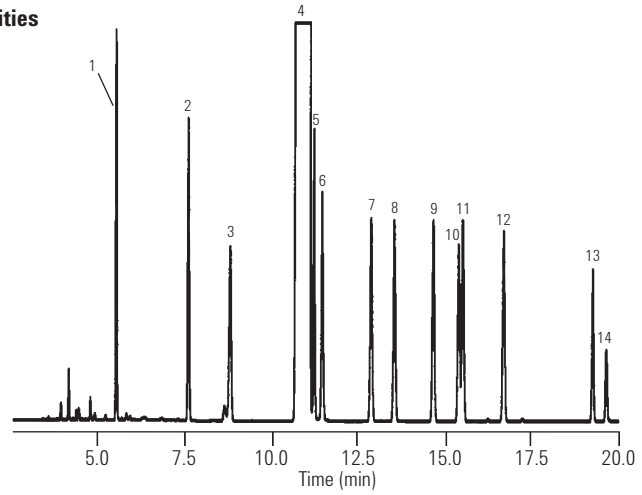
Column: **HP-INNOWax**
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium at 20 psi, constant pressure mode

Oven: 75°C for 10 min
3°C/min to 100°C
10°C/min to 145°C

Injection: Split, 250°C
Split ratio 100:1 to 400:1

Detector: FID, 250°C
Data aquisition rate at 20 Hz



1. Benzene
2. Toluene
3. Undecane
4. Ethylbenzene
5. p-Xylene
6. m-Xylene
7. Isopropylbenzene
8. o-Xylene
9. n-Propylebenzene
10. p-Ethyltoluene
11. m-Ethyltoluene
12. s-Butylbenzene
13. Diethylbenzene
14. Diethylbenzene

GCPE025

Impurities in p-Xylene - ASTM D3798

Column: **HP-INNOWax**
19091N-216
60 m x 0.32 mm, 0.50 µm

Carrier: Helium, 32 cm/sec, 19.9 psi (60°C),
2.5 mL/min constant flow

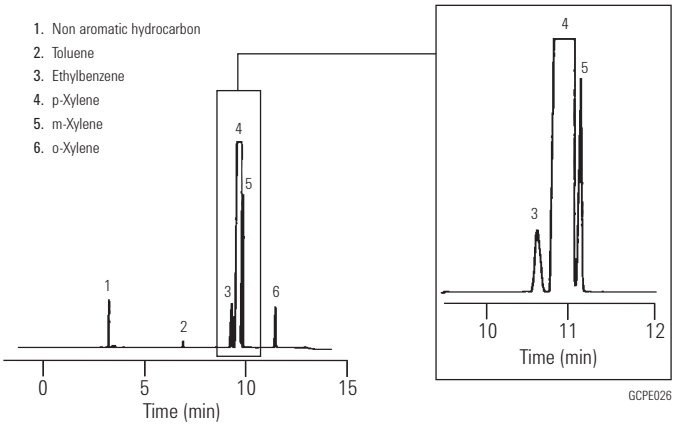
Oven: 60°C for 1 min
60-92°C at 4°C/min
92°C for 4.5 min
92-220°C at 20°C/min
220°C for 5 min

Injection: Split, 220°C
Split ratio 100:1

Detector: FID, 270°C

Sample: 0.5 µL
Neat, 99%+

1. Non aromatic hydrocarbon
2. Toluene
3. Ethylbenzene
4. p-Xylene
5. m-Xylene
6. o-Xylene



GCPE026

Ethylene Oxide Synthetic Standard

Column: **HP-PLOT Q**
19095P-QO4
30 m x 0.53 mm, 40.00 µm

Carrier: Helium, 25 psi

Oven: 50°C for 2 min
50-250°C at 15°C/min

Injection: Split ratio 40:1

Detector: FID

Sample: 1 µL liquid injection
sample 2000 ppm v/v

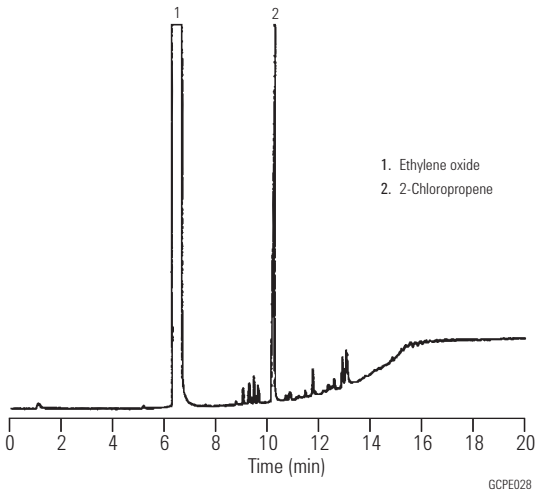
Suggested Supplies

Septum: 11 mm Advanced Green septa, 5183-4759

Liner: General Purpose Split/Splitless Liner, taper, glass wool, 5183-4711

Seal: Gold plated seal, 18740-20885

Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



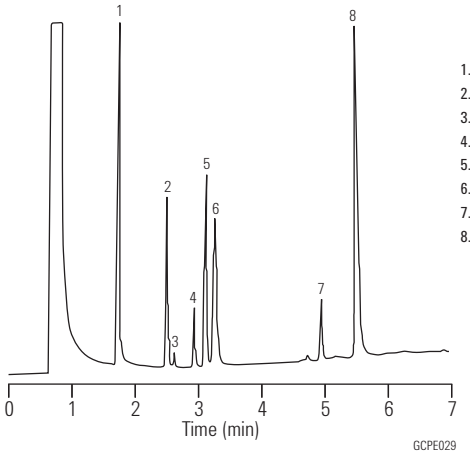
1. Ethylene oxide
2. 2-Chloropropene

GCPE028

Oxygenates

Column: **HP-PLOT Q**
19095P-QO4
30 m x 0.53 mm, 40.00 µm

Carrier: Helium, 25 psig
Oven: 150°C for 2 min
150-250°C at 15°C/min
Detector: FID



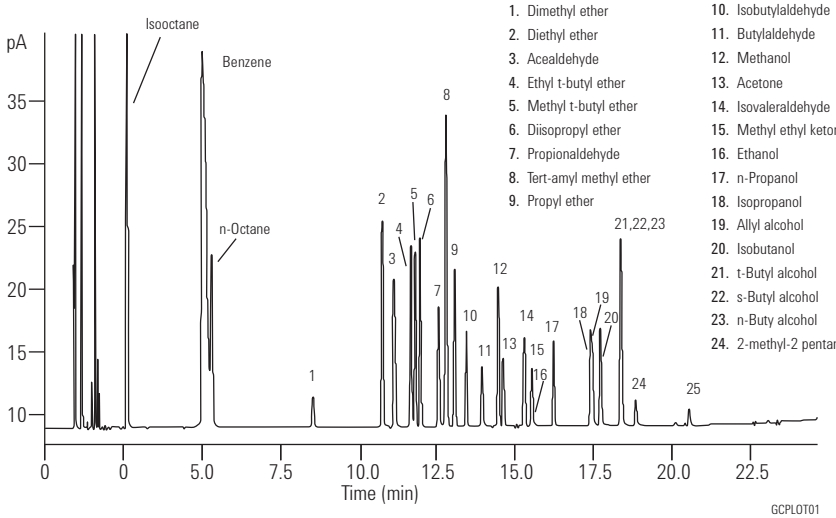
1. Ethanol
2. 2-Propanone
3. Dichloromethane
4. Acetic acid, methyl ester
5. Diethyl ether
6. Pentane
7. Acetic acid, ethyl ester
8. Hexane

Oxygenates

Column A: **DB-1**
125-102J
25 m x 0.53 mm
1.00 µm

Column B: **GS-OxyPLOT**
115-4912
10 m x 0.53 mm

Carrier: Helium (t_m = 0.96 min at 50°C)
Oven: 50°C for 5 min.
50°C to 240°C
Injection: Split
Detector: FID

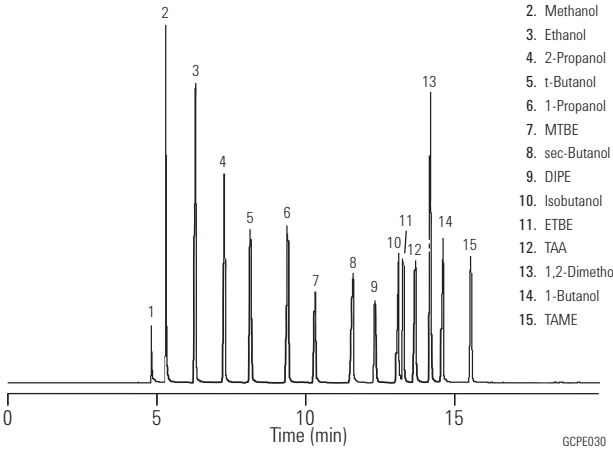


1. Dimethyl ether
2. Diethyl ether
3. Acealdehyde
4. Ethyl t-butyl ether
5. Methyl t-butyl ether
6. Diisopropyl ether
7. Propionaldehyde
8. Tert-amyl methyl ether
9. Propyl ether
10. Isobutylaldehyde
11. Butylaldehyde
12. Methanol
13. Acetone
14. Isovaleraldehyde
15. Methyl ethyl ketone
16. Ethanol
17. n-Propanol
18. Isopropanol
19. Allyl alcohol
20. Isobutanol
21. t-Butyl alcohol
22. s-Butyl alcohol
23. n-Buty alcohol
24. 2-methyl-2 pentanol

Oxygenates in Gasoline ASTM D5599 (GC-OFID)

Column: **HP-1**
19091Z-236
60 m x 0.25 mm, 1.00 µm

Carrier: Helium 30 cm/sec constant flow
Oven: 40°C for 6 min
40-50°C at 5°C/min
50°C for 4 min
50-175°C at 25°C/min
175°C for 5 min
Injection: Split ratio 150:1
Detector: Wasson ECE OFID
Sample: 0.5 µL

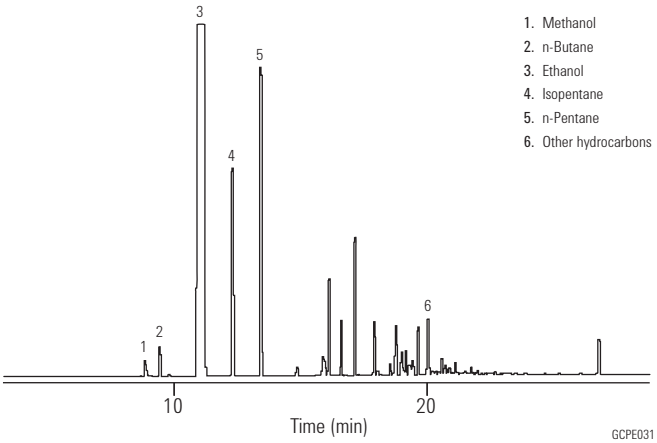


1. Water
2. Methanol
3. Ethanol
4. 2-Propanol
5. t-Butanol
6. 1-Propanol
7. MTBE
8. sec-Butanol
9. DIPE
10. Isobutanol
11. ETBE
12. TAA
13. 1,2-Dimethoxyethane
14. 1-Butanol
15. TAME

Denatured Fuel Ethanol-ASTM D5501

Column: **HP-1**
19091Z-530
100 m x 0.25 mm, 0.50 µm

Carrier: Helium 24 cm/sec
Oven: 15°C for 12 min
15-250°C at 19°C/min
250°C for 20 min
Injection: Split ratio 200:1
Detector: FID 250°C
Nitrogen makeup
gas at 30 mL/min
Sample: 0.5 µL

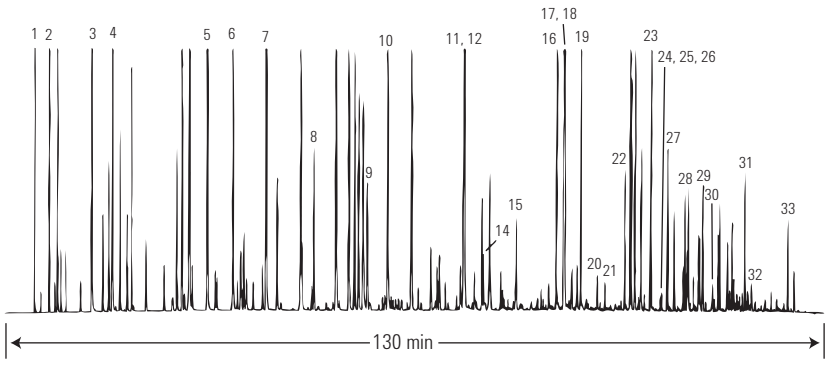


1. Methanol
2. n-Butane
3. Ethanol
4. Isopentane
5. n-Pentane
6. Other hydrocarbons

Unleaded Gasoline

Column: **DB-Petro**
122-10A6
100 m x 0.25 mm, 0.50 µm

Carrier: Helium at 25.6 cm/sec
Oven: 0°C for 15 min
0-50°C at 1°/min
50-130°C at 2°/min
130-180°C at 4°/min
180°C for 20 min
Injection: Split, 200°C
Split ratio 1:300
Detector: FID, 250°C
Nitrogen makeup gas
at 30 mL/min
Sample: 1 µL of neat sample



1. Methane
2. n-Butane
3. Isopentane
4. n-Pentane
5. n-Hexane
6. Methylcyclopentane
7. Benzene
8. Cyclohexane
9. Isooctane
10. n-Heptane
11. Toluene *
12. 2,3,3-Trimethylpentane
13. 2-Methylheptane
14. 4-Methylheptane
15. n-Octane
16. Ethylbenzene
17. m-Xylene **
18. p-Xylene
19. o-Xylene
20. n-Nonane
21. Isopropylbenzene
22. Propylbenzene
23. 1,2,4-Trimethylbenzene
24. Isobutylbenzene
25. sec-Butylbenzene
26. n-Decane
27. 1,2,3-Trimethylbenzene
28. Butylbenzene
29. n-Undecane
30. 1,2,4,5-Tetramethylbenzene
31. Naphthalene
32. Dodecane
33. Tridecane

*Valley point with 12 = 78%
**Valley point with 18 = 87%

PONA Mix as Specified by AFNOR Method #2

Column: **DB-Petro**
128-1056
50 m x 0.20 mm, 0.50 µm

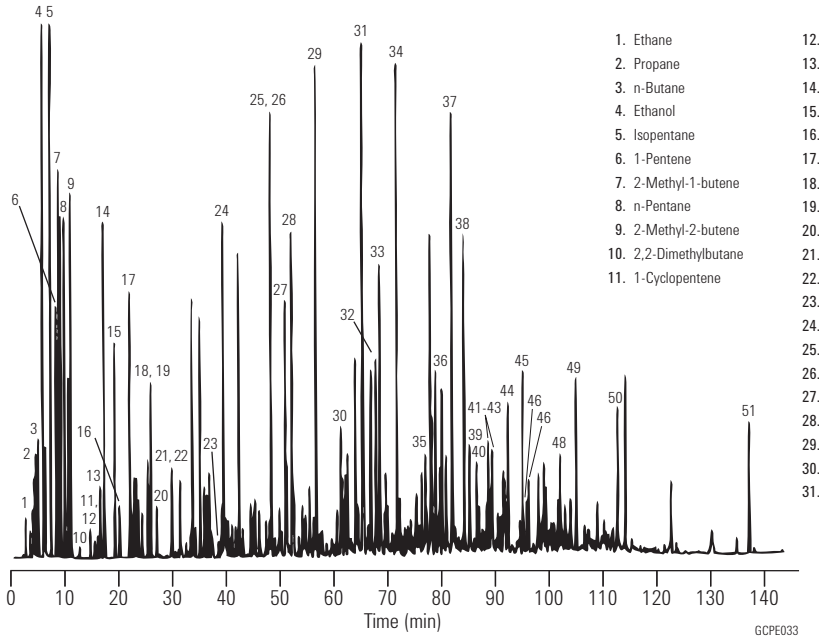
Carrier: Helium at 16.7 cm/sec, measured at 35°C

Oven: 10°C for 15 min
10-70°C at 1.3°/min
70-250°C at 1.7°/min

Injection: Split, 250°C
Split ratio 1:200

Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min

Sample: 0.3 µL petroleum reformate



1. Ethane
2. Propane
3. n-Butane
4. Ethanol
5. Isopentane
6. 1-Pentene
7. 2-Methyl-1-butene
8. n-Pentane
9. 2-Methyl-2-butene
10. 2,2-Dimethylbutane
11. 1-Cyclopentene
12. Cyclopentane
13. 2,3-Dimethylbutane
14. 2-Methylpentane
15. 3-Methylpentane
16. 2-Methyl-1-pentene
17. n-Hexane
18. 2,2-Dimethylpentane
19. Methylcyclopentane
20. 2,4-Dimethylpentane
21. Benzene
22. 1-Methyl-1-cyclopentene
23. Isooctane
24. n-Heptane
25. Toluene
26. 2,3,3-Trimethylpentane
27. 2-Methylheptane
28. 3-Methylheptane
29. n-Octane
30. Ethylbenzene
31. m-Xylene
32. p-Xylene
33. o-Xylene
34. n-Nonane
35. n-Propylbenzene
36. 1,3,5-Trimethylbenzene
37. 1,2,4-Trimethylbenzene
38. n-Decane
39. 1,2,3-Trimethylbenzene
40. Indan
41. 1,3-Diethylbenzene
42. 1-Methyl-3-propylbenzene
43. 1,3-Diethyl-5-ethylbenzene
44. 1,2-Diethyl-4-ethylbenzene
45. n-Undecane
46. 1,2,4,5-Tetramethylbenzene
47. 1,2,3,5-Tetramethylbenzene
48. Naphthalene
49. n-Dodecane
50. 2-Methylnaphthalene
51. Tetradecane

Aromatics in Finished Gasoline- ASTM Method 5769

Column: **DB-1**
122-1063
60 m x 0.25 mm, 1.00 µm

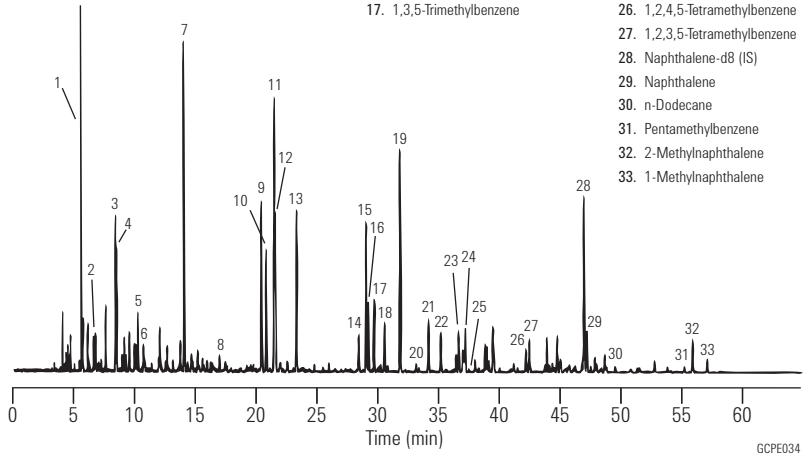
Carrier: Helium at 35 cm/sec, measured at 50°C

Oven: 50°C for 1 min
50-190°C at 2°/min
190°C for 1 min

Injection: Split, 250°C
Split ratio 1:100

Detector: MSD

Sample: 0.3 µL unleaded gasoline
Calib std: ASTM/EPA gasoline refinery aromatics (AccuStandard M-GRA-CAL/IS-SET)



1. Methyl-tert-butyl-ether (MTBE)
2. n-Hexane
3. Benzene-d6 (IS)
4. Benzene
5. Isooctane
6. n-Heptane
7. Toluene
8. n-Octane
9. Ethylbenzene-d10 (IS)
10. Ethylbenzene
11. m-Xylene
12. p-Xylene
13. o-Xylene
14. n-Propylbenzene
15. 1-Methyl-3-ethylbenzene
16. 1-Methyl-4-ethylbenzene
17. 1,3,5-Trimethylbenzene
18. 1-Methyl-2-ethylbenzene
19. 1,2,4-Trimethylbenzene
20. n-Decane
21. 1,2,3-Trimethylbenzene
22. Indan
23. 1,4-Diethylbenzene
24. n-Butylbenzene (valley)
25. 1,2-Diethylbenzene
26. 1,2,4,5-Tetramethylbenzene
27. 1,2,3,5-Tetramethylbenzene
28. Naphthalene-d8 (IS)
29. Naphthalene
30. n-Dodecane
31. Pentamethylbenzene
32. 2-Methylnaphthalene
33. 1-Methylnaphthalene

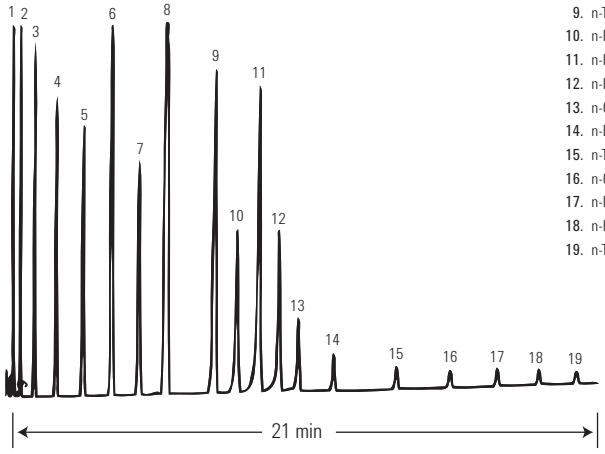
Simulated Distillation

Column: **DB-2887**
125-2814
10 m x 0.53 mm, 3.00 µm

Carrier: Helium at 7 mL/min
Oven: 35-350°C at 15°/min
Injection: Direct
Detector: FID
Nitrogen makeup gas
at 30 mL/min

Suggested Supplies

Septum: 11 mm non-stick BTO septa, 5183-4757
Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



GCPE035

1. n-Pentane
2. n-Hexane
3. n-Heptane
4. n-Octane
5. n-Nonane
6. n-Decane
7. n-Undecane
8. n-Dodecane
9. n-Tetradecane
10. n-Pentadecane
11. n-Hexadecane
12. n-Heptadecane
13. n-Octadecane
14. n-Eicosane
15. n-Tetracosane
16. n-Octacosane
17. n-Dotriacontane
18. n-Hexatriacontane
19. n-Tetracontane

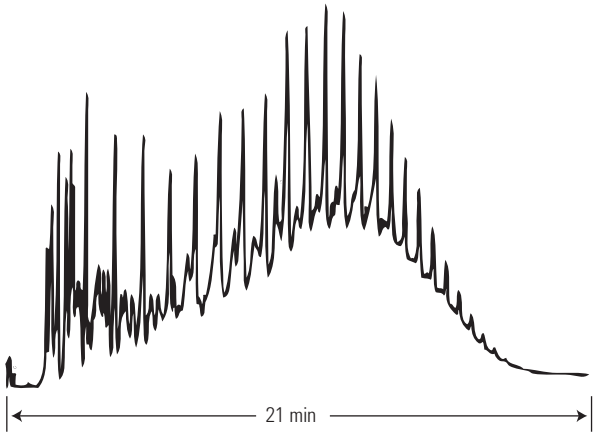
Reference Gas Oil

Column: **DB-2887**
125-2814
10 m x 0.53 mm, 3.00 µm

Carrier: Helium at 7 mL/min
Oven: 35-350°C at 15°/min
Injection: Direct
Detector: FID
Nitrogen makeup gas
at 30 mL/min

Suggested Supplies

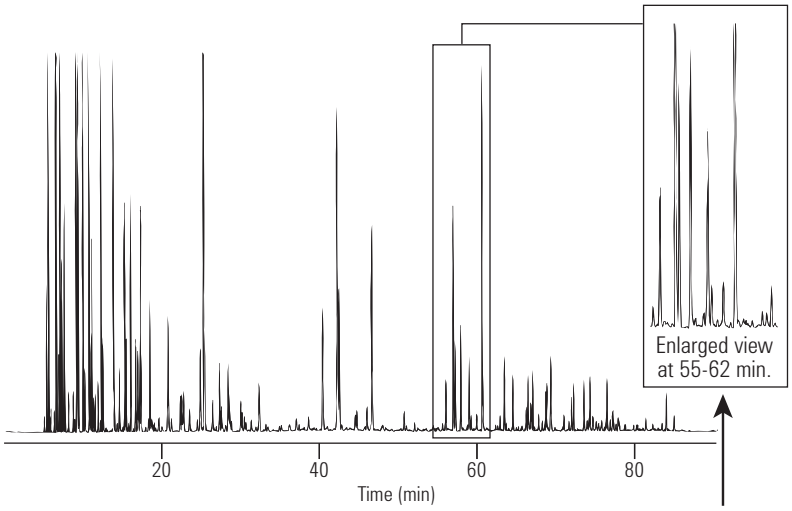
Septum: 11 mm Advanced Green septa, 5183-4759
Liner: Direct connect, dual taper, deactivated, 4 mm ID, G1544-80700
Seal: Gold plated seal, 18740-20885
Syringe: 10 µl tapered, FN 23-26s/42/HP, 5181-1267



GCPE036

Regular Unleaded Gasoline (California Phase 1) - "Normal" GC Run I

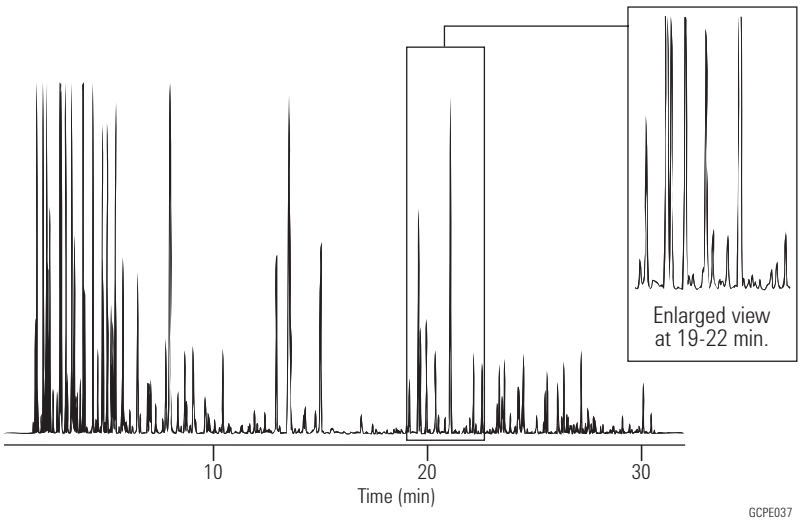
Column:	**DB-Petro 122-10A6 100 m x 0.25 mm, 0.50 µm**
Carrier:	Hydrogen at 31 cm/sec
Oven:	35°C for 9.5 min 35-45°C at 13.3°/min 45°C for 11 min 45-60°C at 1.4°/min 60°C for 11 min 60-220°C at 2.7°/min 220°C for 3.6 min
Injection:	Split ratio 1:200
Detector:	FID, 300°C
Sample:	0.2 µL



Compare Resolution

Regular Unleaded Gasoline (California Phase 1) - "Normal" GC Run II

Column:	**DB-1 127-1046 40 m x 0.10 mm, 0.20 µm**
Carrier:	Hydrogen at 34.8 cm/sec
Oven:	35°C for 3.6 min 35-45°C at 36.1°/min 45°C for 4.2 min 45-60°C at 3.9°/min 60°C for 4.2 min 60-220°C at 6.9°/min 220°C for 1.4 min
Injection:	Split ratio 1:400
Detector:	FID, 300°C
Sample:	0.2 µL

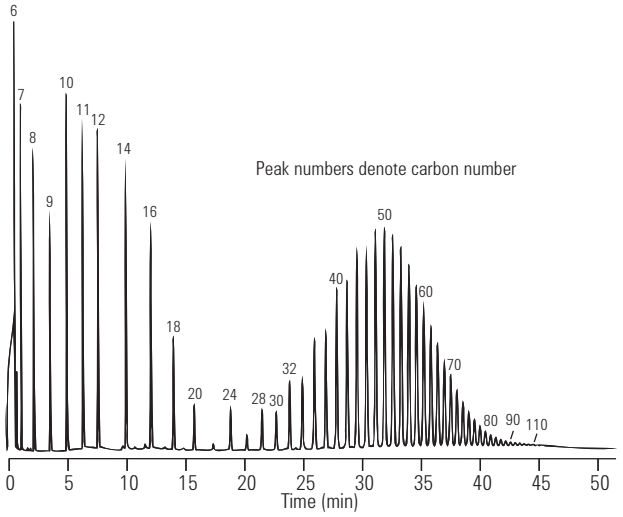


GCPE037

n-Paraffin Standard

Column: **DB-HT SimDis**
145-1001
5 m x 0.53 mm, 0.15 µm

Carrier: Helium at 18 mL/min, measured at 35°C
Oven: -30-430°C at 10°/min
Injection: OPTIC PTV
55-450°C at 2°/sec
Detector: FID, 450°C
Nitrogen makeup gas at 15 mL/min
Sample: 0.5 µL of about 2% n-paraffins in CS_2

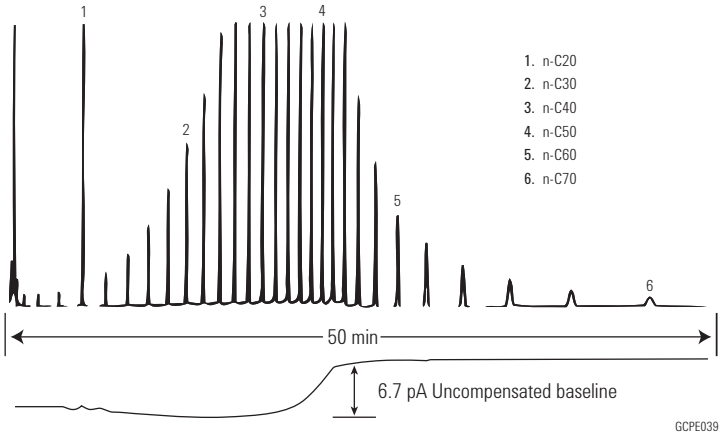


GCPE038

Polyethylene

Column: **DB-1**
125-1011
15 m x 0.53 mm, 0.15 µm

Carrier: Helium at 8 mL/min
Oven: 120-360°C at 10°/min
Injection: Split ratio 1:500
Detector: FID, 300°C
Nitrogen makeup gas at 30 mL/min
Sample: 0.5 µL
3% Solution in CS_2

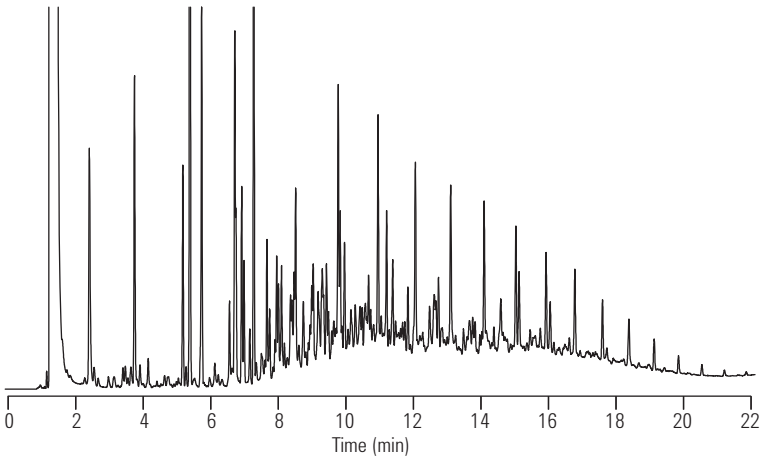


GCPE039

Direct Injection of Gasoline and Diesel Fuel in Methylene Chloride

Column: **DB-TPH**
124-1632
30 m x 0.45 mm, 1.00 µm

Carrier: Helium at 67 cm/sec, measured at 40°C
Oven: 40°C for 2 min
40-280°C at 12°/min
Injection: Megabore Direct, 250°C
Detector: FID, 250°C
Nitrogen makeup gas at 30 mL/min



GCGAS001

LC and LC/MS

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LC and LC/MS

Run samples up to 20x faster than conventional LC with the Agilent 1200 Series Rapid Resolution System.



Agilent's 1200 Series Rapid Resolution HPLC delivers 60% more resolving power than traditional LC. It also features a 30-second cycle time, so you can achieve rugged, precise HPLC, ultra-fast separations, and results you can trust. And we've expanded our portfolio of LC and LC/MS columns and supplies designed to work seamlessly with your LC system.

- The Agilent 1200 Series Evaporative Light Scattering Detector (ELSD), a powerful tool for sensitive detection of compounds that are less volatile than the mobile phase.
- Method Development Capillary Kits for automated development and optimized separation.
- Two new Eclipse Plus bonded phases: a phenyl hexyl bonded phase, plus a C18 bonded phase for PAH separations.
- An expanded portfolio of Rapid Resolution High Throughput (RRHT) columns with over 140 1.8 µm column choices – so you never have to choose between speed, resolution, and sensitivity.
- New Poroshell 120 columns featuring high efficiency and high resolution with 50% less pressure than sub-2 micron columns.

The following pages contain solutions, specifications, and chromatograms, as well as helpful column selection charts. There is even a maintenance guide that includes schedules, troubleshooting tips, and problem-solving methods for the 1100/1200 Series.

General LC Supplies

Agilent offers a wide range of supplies for operation and maintenance of LC systems. These products have been carefully designed or selected by Agilent to work with your Agilent instruments for maximum performance and uptime.

LC Tubing and Connectors

Rigid Capillary Tubing

- Squarely cut, pre-cleaned and ready to use
- Use with stainless steel fittings and ferrules (P/N 5062-2418) or PEEK fittings (P/N 0100-1516)

Length (mm)	ID (mm)	Unit	Part No.
100	0.17	10/pk	5061-3361
200	0.17	10/pk	5061-3362



Universal Connection Capillaries

- Made of flexible stainless steel (0.6 mm OD) with 1/16 in. OD tubing at both ends to accept standard fittings.
- Pre-swaged fittings are assembled according to Swagelok specifications.

Universal Connection Capillaries

From	To	ID (mm)	Length (mm)	Material*	Color Code	Fittings	Part No.
Pump	Autosampler	0.17	600	SS	Green	Pre-swaged	G1312-67305
		0.25	130	SS	Blue	Pre-swaged	01090-87308
		0.25	320	SS	Blue	Pre-swaged	79835-87638
		0.17	500	SS	Green	Not swaged	G1328-87600
	Manual Valve	0.17	900	SS	Green	1 end pre-swaged	G1329-87300
	Universal	0.25	700	SS	Blue	1 end pre-swaged	01018-67305
Autosampler	Column	0.12	180	SS	Red	1 end pre-swaged	G1313-87304
		0.12	280	SS	Red	1 end pre-swaged	01090-87610
		0.12	105	SS	Red	1 end pre-swaged	01090-87611
		0.17	180	SS	Green	1 end pre-swaged	G1313-87305
		0.17	280	SS	Green	1 end pre-swaged	01090-87304
		0.17	800	SS	Green	1 end pre-swaged	01048-87302
		0.17	130	SS	Green	1 end pre-swaged	01090-87305
Manual Valve	Column	0.17	500	SS	Green	Not swaged	G1328-87600
Column compartment	Column	0.12	70	SS	Red	1 end pre-swaged	G1316-87303
Detector	Waste	0.17	90	SS	Green	With fittings	G1316-87300
Column	DAD	0.12	150	SS	Red	Pre-swaged	G1315-87312
		0.17	380	SS	Green	Pre-swaged	G1315-87311
VWD	Inlet	0.18	40	PEEK		With fittings	5062-8522
		0.12	105	SS	Red	Without fittings	5021-1820
		0.12	150	SS	Red	Without fittings	5021-1821
		0.12	280	SS	Red	Without fittings	5021-1822
		0.12	400	SS	Red	Without fittings	5021-1823
		0.12	70	SS	Red	1 end pre-swaged	G1316-87303
		0.17	105	SS	Green	Without fittings	5021-1816
		0.17	150	SS	Green	Without fittings	5021-1817
		0.17	280	SS	Green	Without fittings	5021-1818
		0.17	400	SS	Green	Without fittings	5021-1819
		0.17	90	SS	Green	With fittings	G1316-87300
VWD	Outlet	0.25	48	PEEK		With fittings	5062-8535

*SS = stainless steel

Flexible Stainless Steel Capillaries Without Fittings

- Color coded stainless steel tubings
- For use with stainless steel fittings (P/N 5062-2418) or PEEK fingertight fittings (P/N 0100-1516)

Flexible Stainless Steel Capillaries Without Fittings

ID (mm)	Length (mm)	Color Code	Volume (µL)	Part No.
0.12	105	Red	1.2	5021-1820
0.12	150	Red	1.7	5021-1821
0.12	200	Red	2.3	5065-9935
0.12	280	Red	3.2	5021-1822
0.12	400	Red	4.5	5021-1823
0.12	500	Red	5.6	5065-9964
0.17	105	Green	2.4	5021-1816
0.17	150	Green	3.4	5021-1817
0.17	200	Green	4.6	5065-9931
0.17	280	Green	6.4	5021-1818
0.17	400	Green	9.1	5021-1819
0.17	600	Green	13.6	5065-9933
0.17	700	Green	15.9	5065-9932
0.17	900	Green	20.5	5065-9963
0.25	250	Blue	12.3	5065-9979
0.25	280	Blue	13.8	5022-6508
0.25	320	Blue	15.8	5065-9980
0.25	800	Blue	39.3	5065-9930
0.50	105	None	20.6	5065-9927
0.50	150	None	29.5	5022-6509
0.50	280	None	55	5022-6510
0.50	800	None	157	5065-9926

Capillary and Fittings Kits

Description	Part No.
SS Flexible Capillary Tubing Kit Includes 0.12 mm ID capillaries: 3 each 105 mm long, 1 each 150 mm long, 1 each 280 mm long, plus fittings	5061-3304
SS Flexible Capillary Tubing Kit Includes preswaged 0.12 mm ID capillaries: 3 each 70 mm long, 1 each 280 mm long, 1 each 35 mm long	5061-3315

PEEK Tubing

- Flexible and easy to cut to desired lengths
- Color coded for easy tracking
- Accepts both stainless and PEEK fittings
- 1/16 in. OD

PEEK Tubing

Length (m)	ID (mm)	Color Code	Part No.
1.5	0.50	Orange	0890-1761
1.5	0.25	Blue	0890-1762
5	0.25	Blue	5042-6463
1.5	0.18	Yellow	0890-1763
5	0.18	Yellow	5042-6462
1.5	0.13	Red	0890-1915
5	0.13	Red	5042-6461

Other Tubing

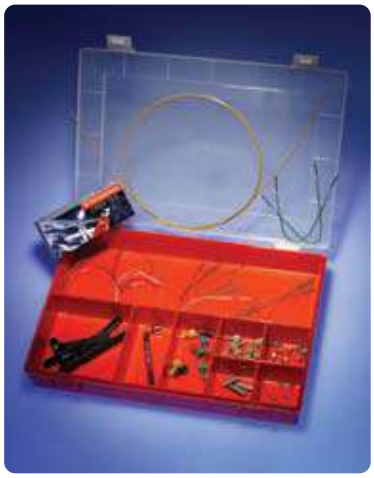
Description	Length (m)	ID (mm)	OD (mm)	Part No.
Teflon tubing, FEP, primary use for valve solutions	5	0.7	1.6	5062-2462
Teflon Solvent tubing, primary use for flow path from solvent bottle to degasser, to pump	5	1.5	3.1	5062-2483
Corrugated tubing, polypropylene	5	6.5		5062-2463
Silicone Tubing, 1 mm ID, 3 mm OD, 5 m	5	1	3	5065-9978
Clamps and micro clamps, 10/pk				5065-9976
Barbed Y-Connector PP for 3/16 in. ID tube, 10/pk				5065-9971



Plastic tubing cutter, 8710-1930

Accessories

Description	Part No.
Plastic tubing cutter	8710-1930
Blades for plastic tubing cutter, 5/pk	8710-1931



Capillary and Fittings Kits

Agilent starter kits contain the most often used capillaries and fittings. We included our genuine flexible stainless steel capillaries to make the best connection in your LC system, no matter the brand. The kits are for use with 3-4 or 1-2 mm ID columns, as well as for Micro LC columns. The free Cybertool, which contains over 30 tools, is useful in every laboratory.

Description	Contents	Part No.
Capillary/fitting starter kit, 0.17 mm ID	Kit includes: Qty 1 - PEEK capillary 0.18 mm ID, 1.5 m Qty 4 - Stainless steel capillary, 105 x 0.17 mm Qty 4 - Stainless steel capillary, 150 x 0.17 mm Qty 2 - Stainless steel capillary, 200 x 0.17 mm Qty 2 - Stainless steel capillary, 280 x 0.17 mm Qty 1 - Stainless steel capillary, 400 x 0.17 mm Tubing cutter for PEEK capillaries 1/16 in. stainless steel fittings, 10/pk 1/16 in. PEEK fittings, color 10/pk 1/16 in. PEEK fittings, 10/pk Qty 3 - ZDV union, stainless steel Rheotool Cybertool	5065-9939
Capillary/fitting starter kit, 0.12 mm ID	Kit includes: PEEK capillary 0.13 mm ID, 1.5 m Qty 4 - Stainless steel capillary, 105 x 0.12 mm Qty 4 - Stainless steel capillary, 150 x 0.12 mm Qty 2 - Stainless steel capillary, 200 x 0.12 mm Qty 2 - Stainless steel capillary, 280 x 0.12 mm Stainless steel capillary, 400 x 0.12 mm Tubing cutter for PEEK capillaries 1/16 in. stainless steel fittings, 10/pk 1/16 in. PEEK fittings, color 10/pk 1/16 in. PEEK fittings, 10/pk Qty 3 - ZDV fitting Rheotool Cybertool	5065-9937
Capillary/fitting starter kit for 1100 Capillary LC System	Kit includes: Qty 2 - Fused silica/PEEK capillary 50 µm, 55 cm Qty 1 - Fused silica/PEEK capillary 50 µm, 20 cm Qty 1 - Fused silica/PEEK capillary 100 µm, 110 cm Qty 2 - Fused silica/PEEK capillary 50 µm, 50 cm Qty 2 - Fused silica/PEEK capillary 50 µm, 40 cm Qty 4 - 4 mm stainless steel fitting, male 10-32 Qty 4 - 1/32 in. PEEK ferrule and stainless steel lock ring Qty 4 - PEEK fittings for µ-valves Qty 4 - Double winged PEEK nuts and 1/32 in. ferrules Qty 1 - Cybertool	5065-9938
Rapid Resolution High Throughput capillary kit	Kit includes: Qty 5 - Capillaries to optimize the 1100 Series LC for use with RRHT columns	5065-9947
1200 capillary kit for 0.12 mm ID	Includes capillaries to optimize 1200 LC for low dispersion operation	G1316-68716



Stainless steel fittings, 5062-2418



Stainless steel long fittings, 5065-4454



PEEK fittings, 5063-6591



PEEK RheFlex fittings, 0100-1631



PEEK long fittings, 5062-8541



Finger-tight PEEK fittings, 5065-4426



Double winged fitting, 5042-6500



ChromTrac identifiers, 0350-1402

LC Fittings

To ensure leak-free connections – and to prevent the loss of peak shape and resolution – always use the manufacturer's recommended fitting style with columns, valves, and unions. For example:

- Different columns have different fitting requirements (ZORBAX columns use standard Swagelok fittings).
- Agilent 1100/1200 modules use standard Swagelok fittings.
- Rheodyne injection valves require Rheodyne fittings.

Fittings for 1/16 in. OD Capillaries

Description	Part No.
1/16 in. stainless steel fittings, front and back ferrules, 10/pk	5062-2418
1/16 in. stainless steel long fittings, front and back ferrules, 10/pk	5065-4454
1/16 in. extra long stainless steel fittings and ferrules, 10/pk	5065-9967
1/16 in. male fittings, stainless steel	5061-3303
1/16 in. front ferrule, stainless steel	5180-4108
1/16 in. back ferrule, stainless steel	5180-4114
1/16 in. finger-tight polyketone fittings, max pressure 600 bar=2,Character10/pk	5042-8957
1/16 in. finger-tight PEEK fittings, beige, 10/pk	5063-6591
1/16 in. finger-tight PEEK fittings, beige, 2/pk	0100-1516
1/16 in. finger-tight PEEK long fittings, beige, 10/pk	5062-8541
1/16 in. finger-tight PEEK fittings, 10/pk 2 each: yellow, blue, black, green, red	5065-4426
1/16 in. double winged 2 piece fitting, 10/pk	5042-6500
PEEK RheFlex 2-piece fittings, 5/pk	0100-1631
PEEK RheFlex 2-piece fittings, colored, 10/pk	0100-2175
ChromTrac identifiers, 20/pk 2 each: black, green, white. 4 each: yellow, blue, red	0350-1402
1/16 in. blanking nut, stainless steel	01080-83202
Stainless steel hex nut fitting, PEEK ferrule, max 600 bar, 6/pk	5067-1540
1/16 in. PEEK ferrule, max 600 bar, 6/pk, for use with 5067-1540 fitting	5067-1547
1/16 in. plastic fitting (plug)	0100-1259
1/16 in. finger-tight polyketone fittings, max pressure 600 bar, 10/pk	5042-8957
0.8 mm ID stainless steel ferrules, 6/pk	5067-1557
0.8 mm ID stainless steel fittings, M4/4 mm, 6/pk	5067-1558



0100-0900



5022-2133



5042-8519

Unions

Description	Use With	Part No.
True ZDV Union, no fittings	Nano LC	5022-2145
Universal ZDV union, stainless steel, no fittings	Capillary/Nano/ Standard LC	5022-2184
ZDV union, with fittings	Standard LC	0100-0900
ZDV union, PEEK with fittings	Bio applications	0100-2441
High flow union, no fittings	Prep LC	5022-2133
PEEK adapter 1/4-28 to 10-32		0100-1847
Adapter, PEEK int. 1/4-28 to ext. 10-32		0100-2298
Barbed Y-Connector PP for 3/16 in. ID tube, 10/pk		5065-9971
Adapter, female to female 1/4-28		5042-8517
Adapter, male luer to female 1/4-28		5042-8518
T-connector, PEEK, swept volume 0.57 µL, for 1/16 in. OD tubing	for 1/16 in. OD tubing	5022-2144
Micro T-connector, PEEK, swept vol 29 nL, with 1/32 in. ID fittings		5042-8519





Semi prep filter, 5064-8273



High pressure semi prep filter, 5022-2165

HPLC In-Line Filters

Column inlet frit contamination can increase column back pressure and reduce efficiency. Microbore column blockages are a particular problem, due to the small diameter of the inlet frit. To prevent blockages, always use the appropriate filters in your LC system. Agilent offers two types of high pressure in-line filter kits for use with any HPLC system.

Universal Solvent Filter

Ideal for microbore, narrow-bore, high-speed or standard analytical columns.

Universal solvent filters are installed between the LC pump and the injector, so particles from the solvent can be removed before they reach the injector. The filter assembly consists of a 4.8 mm frit, two inserts and a two-piece holder. The frit is placed between the tapered edges of the inserts in such a way that the solvent is evenly distributed over the whole surface of the frit. This provides efficient filtration and extends the life of the frit.

Low-volume Column Inlet Filter

A high-capacity filter with built-in efficiency.

This low-volume column inlet filter is positioned immediately before the LC column, so it can remove particles from both the injection system and the sample. With a frit diameter of only 2.1 mm – plus tapered inserts – this filter minimizes external bandspreading while maximizing the filtration capacity.

In Line Filters

Low dispersion in-line filter	Universal in-line filter
• Positioned immediately before the LC column • Removes particles from the sample and injection system • Minimizes external band spreading due to frit diameter of only 2.1 mm and tapered inserts • Can be used with any microbore, high speed, or standard analytical columns	• Installed between the LC pump and the injector to remove particles from the solvent • Uses a high capacity filter • Frit is placed between the tapered edges of the inserts so the solvent is evenly distributed over the filtering frit



RRLC in-line filter, 5067-1551



Low dispersion in-line filter, 01090-68702

HPLC In-Line Filters

Description	Frit Porosity (µm)	Frit Inlet ID (mm)	Flow Rate	Part No.	Replacement Frits
RRLC In-line filter 4.6 mm, 0.2 µm pore size filter, connecting capillary, max 600 bar	0.2	4.6	max 600 bar	5067-1553	5067-1562, 10/pk
RRLC In-line filter 2.1 mm, 0.2 µm pore size filter, connecting capillary, max 600 bar	0.2	2.1	max 600 bar	5067-1551	5067-1555, 10/pk
Low dispersion in-line filter Includes two frits, 1.6 mm, 2 µm pore size; filter holder with inserts; 60 x 0.12 mm connecting capillary	2 0.5	1.6	< 1 mL/min	01090-68702	280959-904, 10/pk 280959-907, 10/pk
Universal in-line filter Includes two frits, 4.8 mm, 2 µm pore size; filter holder with inserts; 130 x 0.25 mm connecting capillary	2	4.8	1-5 mL/min	01090-68703	01090-27609, 2/pk
Semi prep filter	0.5	12.7	1-5 mL/min	5064-8273	5022-2185
High pressure semi prep filter	10	19	5-10 mL/min	5022-2165	5022-2166, 10/pk
Prep Filter	10		10-100 mL/min	5065-4500	5065-9901 Replacement Glass Cartridge
In-line filter for G1311A	Recommended when high salt concentrations are used			G1311-60006	



Glass solvent filter degasser, 3150-0577

Solvent Filters/Degassers

An added benefit of filtering solvents is that they are degassed at the same time. This is particularly beneficial if you do not have an on-line degasser in your system. The benefits of solvent filtration:

- Degasses eluents as particulates are removed
- Prevents the formation of spurious peaks within the detector due to solvent outgassing at the low-pressure end of the chromatograph
- Increases solvent inlet lifetime
- Eliminates pump downtime caused by air locks and particulates in check valves
- Decreases piston wear, while increasing column life

Solvent Filters/Degassers

Description	Part No.
HPLC Solvent filter/degasser assembly	3150-0577
Replacement Parts for 3150-0577	
Glass funnel, 250 mL	5188-2743
PTFE coated sieve	5188-2744
PTFE seal	5188-2745
Funnel base, glass	5188-2746
Solvent filtration system	5067-0215
Replacement Parts for 5067-0215	
Replacement flask, 1 L	5067-0216
Support base	5067-0217
Funnel	5067-0224
Filter Membranes	
Regenerated Cellulose filter membranes 47/45, 100/pk	3150-0576
Nylon filter membranes 47/45, 100/pk	9301-0895
PTFE filter membranes 47/45, 10/pk	3150-0509



7725i manual injection valve

Manual Injection Valves

Agilent provides the latest developments in LC injection technology from Rheodyne.

- Continuous flow path with "make-before-break" design
- Sample capacity
- Choice of stainless or PEEK flow path
- Easy access to fittings due to wide 30° port angles

Series 7725i and 9725i Analytical Injection Valves

Stainless steel (SS) 7725i and PEEK 9725i valves are the most popular injection valves for analytical HPLC. Features include:

- A 20 µL loop (installed). Loops are also available in stainless steel or PEEK from 5 µL to 5 mL (10 mL for PEEK).
- Make-Before-Break (MBB) technology allows switching without flow interruption.
- Wide 30° port angles offer easier access to fittings.
- Built-in position sensing switch provides the chromatograph with a reproducible start signal.

Tips & Tools

Patented Make-Before-Break (MBB) technology provides uninterrupted flow when switching between load and inject positions. Additionally, MBB greatly reduces transient pressure shocks, which extends column life.



Series 3725i-038 and 3725i Preparative Injection Valves

The series 3725i-038 (stainless steel) and 3725i (PEEK) are the most suitable manual valves for large sample volumes, high flow rates, and preparative columns sized 1.0-10 cm in diameter.

- Versatile ports accommodate 1/8 in. (3.2 mm) and 1/16 in. (1.6 mm) OD tubing. Note: 1/16 in. OD tubing requires an adapter, PN 5067-1503.
- 1.0 mm diameter passages allow flow rates up to 800 mL/min with virtually no pressure drop.
- Make-Before-Break technology allows switching without flow interruption.
- High reproducibility for both partial-filling and complete-filling methods.
- Sample range is 100 µL to 20 mL (10 mL loop is installed).
- Flow range is 10 to 800 mL/min.
- Built-in position sensing switch gives the chromatograph a reproducible start signal.

Manual Injection Valves with Position Sensing Switches

Description	Part No.
7725i, stainless steel	5063-6502
9725i, PEEK	0101-1253
3725i, stainless steel prep valve	0101-1232
3725i, PEEK prep valve	0101-1231
Manual prep injection valve kit, stainless steel With position sensing, 10 mL loop, 25 mL syringe, ring mounting bracket, start cable, SS connecting capillaries, 0.5 mm ID, 40 cm and 60 cm	5065-9922
PEEK adapter, 1/8 in. to 1/16 in., 4/pk	5067-1503



Stators and Seals



1400-3166

Injection Valve Replacement Parts

- Rotor seals wear with use and need routine replacement.
- Stators only need replacement if the ports are damaged.
- PEEK rotor seals are incompatible with concentrated nitric and sulfuric acids.

Description	Part No.
Rotor Seals	
Vespel: operating pH 0 to 10 (7125)	0101-0623
Tefzel: operating pH 0 to 14 (7125)	0101-0620
PEEK: operating pH 0 to 14 (7125, 7725, 9725)	0101-1255
Rhebuild kit for 7725 Series	0101-1254
PEEK: operating pH 0 to 14 (3725)	0101-1233
Rotor seal, PEEK, for 7010/7000/7040	0101-1256
Stator Face Assembly	
Rheodyne Series 7125	0101-0624
Rheodyne Series 7725	0100-1859
Stators	
Rheodyne Series 7725	0100-1860
Accessories	
Isolation Seal, Rheodyne Series 7725, 9725, 3725	1535-4046
Rheotool socket wrench, 1/4 in.	8710-2391
Hex Key 9/64" 15cm long, T-handle	8710-2394
Ring stand mounting bracket	1400-3166
PEEK adapter, 1/8 in. to 1/16 in. for 3725i, 4/pk	5067-1503
Position sensor switch for manual valves	0490-1849



Stainless steel sample loops

Manual Injection Valve Sample Loops

The right mix of injection valve sample loops are available for your application needs. Agilent offers factory-cut and finished loops of the highest quality.

- Stainless steel loops are square cut, free of burrs, for a flush connection
- Flexible PEEK loops have a clean, straight cut for low dead volume connections

Stainless Steel Sample Loops

- Sample loops for Rheodyne 7725 Series and 7125 Series valves are not interchangeable due to the change in port angle
- Actual volumes can differ due to tolerance of metal tubing bore
- Accuracy of large metal loops is ±5%, intermediate loops ±10%, small loops ±30%

Stainless Steel Loops for 7125 and 7010 Injectors

Description	ID (mm)	Part No.
5 µL	0.18	1535-4860
10 µL	0.30	0101-0376
20 µL	0.51	0101-0377
50 µL	0.51	0101-0378
100 µL	0.51	0101-0379
200 µL	0.76	0101-1252
500 µL	0.76	0101-1251
1 mL	0.76	0101-1219
2 mL	1.00	0101-1250
5 mL	1.00	0101-1249

Stainless Steel Loops for 7725 Injectors

Description	ID (mm)	Part No.
5 µL	0.18	0101-1248
10 µL	0.30	0100-1923
20 µL	0.30	0100-1922
50 µL	0.51	0100-1924
100 µL	0.51	0100-1921
200 µL	0.76	0101-1247
500 µL	0.76	0101-1246
1 mL	0.76	0101-1245
2 mL	1.00	0101-1244
5 mL	1.00	0101-1243



PEEK sample loops

PEEK Sample Loops

- Inert to most organic solvents
- Wall thickness, temperature, exposure time and concentration of organic solvents affect the durability of PEEK tubing
- Concentrated nitric acid and sulfuric acid weaken PEEK tubing
- THF, methylene chloride and DMSO cause PEEK to swell
- Actual volumes can differ because of tolerance of tubing bore
- Accuracy of large PEEK loops is ±14%, intermediate loops ±21%, small loops ±65%

PEEK Loops for 9725 Injectors

Description	ID (mm)	Part No.
5 µL	0.18	0101-1241
10 µL	0.25	0101-1240
20 µL	0.25	0101-1239
50 µL	0.51	0101-1238
100 µL	0.51	0101-1242
200 µL	0.51	0101-1237
500 µL	0.76	0101-1236
1 mL	0.76	0101-1235
2 mL	0.76	0101-1234
5 mL	0.76	0101-1230

PEEK Loops for 3725 Injectors

Description	ID (mm)	Part No.
2 mL	1.6	0101-1229
5 mL	1.6	0101-1228
10 mL	2.0	0101-1227
20 mL	2.0	0101-1226



Syringes for manual injection valves

Syringes for Manual Injection Valves

The syringes for manual injection have a blunt-tip point style needle to prevent damaging the valve's internal parts. They can be used with any type/brand of manual injection valve.

Volume (µL)	Description	Needle	Part No.
10	Removable	22/51/3	5182-9725
10	Fixed	22/51/3	5182-9644
25	Removable	22/51/3	5182-9719
25	Fixed	22/51/3	5182-9628
50	Removable	22/51/3	5183-4538
50	Fixed	22/51/3	5182-9619
100	Removable	22/51/3	5183-4539
100	Fixed	22/51/3	5182-9613
250	Removable	22/51/3	5182-9720
250	Fixed	22/51/3	5182-9624
500	Removable	22/51/3	5183-4540
500	Fixed	22/51/3	5182-9658



Switching valve

Switching Valve Supplies

A set of valve types specially designed for the Agilent 1100/1200 Series HPLC system allows you to extend your HPLC applications. New valve offerings give you:

- More flexibility in solvent selection and column selection.
- New automation capabilities in sample preparation.
- Increased sample throughput through alternating column regeneration.
- Increased separation performance with multidimensional chromatography.

Capillary Tubing Kits

Application	Valve Kit	Part No.
Column regeneration Capillaries: 0.17 mm ID	G1157A	G1156-68711
Column regeneration Capillaries: 0.25 mm ID	G1157A	G1156-68713
Column regeneration Capillaries: 0.17 mm ID	G1316A #057	G1316-68711
Column selection Capillaries: 0.17 mm ID	G1159A	G1156-68712
Sample enrichment Capillaries: 0.17 mm ID	G1316A #055	G1316-68710
Sample enrichment Capillaries: 0.17 mm ID	G1158A	G1156-68714
Solvent selection Flow rate up to 10 mL/min	G1160A	G1160-68706 5067-4601*

*Use for method development applications. Kit contains longer tubing.

Switching Valve Replacement Parts

Use With	Description	RheBuild Kit Part No.	Rotor Seal Part No.	Stator Part No.
G1160A	12 Position/13 Port Preparative Solvent Selection Valve	0101-1288		0101-1365
G1159A	6 Position/14 Port Column Selection Valve (Six Column Selector)	0101-1290		0101-1364
G1157A	2 Position/10 Port Valve Dual-sided MBB	0101-1359		0101-1362 Stator head
G1158A	2 Position/6 Port Switching Valve	0101-1358 (PEEK)	0100-1855 (Vespel) 0100-1854 (Tefzel) 0100-2233 (PEEK)	0100-1850 Stator head
G1158B	2 Position/6 Port, 600 bar Switching Valve		0101-1409 (HP PEEK blend)	0101-1417
G1162A	2 Position/6 Port Micro Switching Valve		0100-2087	0100-2089
G1163A	2 Position/10 Port Micro Switching Valve		0101-1361	0101-1363
G1156A	6 Position/7 Port Selection Valve		0101-1361	0101-1410



1100/1200 Series Instrument Parts and Supplies

The Agilent 1100/1200 Series HPLC modules were designed for long hours of operation and ease of use. To keep your system operating at optimal performance, scheduled routine maintenance is advised. Regular attention to these tasks will further increase your lab's productivity.

Recommended Routine Maintenance Procedures

- Clean or replace the solvent inlet filter
- Flush the degasser
- Perform pump maintenance
- Perform autosampler maintenance
- Perform column switching valve maintenance (if installed)
- Perform detector maintenance

The time needed is approximately 4 hours for a complete system. The frequency of maintenance is dependent upon your usage and applications.

Failure to maintain your HPLC can have these results:

- Variations in flow and area counts, causing poor precision of quantitative analyses
- Noisy baselines make integration and peak recognition difficult
- Poor injection volume precision may result if the autosampler is not maintained
- Retention time fluctuations can lead to improper peak identification
- If you regularly use UV spectra, the quality of the spectra will be comprised, jeopardizing peak identification

The 1100/1200 Series LC instruments and columns are manufactured under very high quality standards and are well known for their robustness and reliability, delivering the same precise results in daily operation. To ensure that your instrument is also working to your fullest satisfaction, we recommend exchanging the few parts which have a natural wear at a regular maintenance schedule.

1100/1200 Series LC Maintenance Schedule

Item	Typical Schedule	Action/Comments
Pumps		
PTFE Frits in Purge valve	Every month	Before re-installation of the purge valve, always check the gold seal and replace it if deformed.
Solvent inlet filter	Every 6 months	Never use the system without a filter installed.
Piston seals, Outlet Gold seal, Plastic cap, Wash seal, Gasket wash seal	Every 12 months	When piston seals are exchanged, check the surface of the piston for scratches and deposits. Never re-install a used pump seal.
Piston, Outlet ball valve, Cartridge active inlet valve	Every 24 months	Pistons can be cleaned with alcohol or tooth paste. Use only long-life, genuine Agilent pistons. After exchanging the active inlet valve cartridge, pump several mL until the system is stable.
Autosampler		
Needle and needle seat, Rotor Seal	Every 12 months	Make sure you use rotor seals of the correct material depending on the operating pH.
Piston seal, Isolation seal, Stator face	Every 24 months	
Column		
Guard column	Every 100-500 injections	Change the guard after 25-50 injections for dirty samples, 100-250 injections for most samples, and 500 injections for very clean samples.
Column inlet fittings	Every 5-10 column changes	PEEK fittings make changing inlet fittings fast and easy. SS fittings are reliable and can be used at higher pressure.
Detectors		
DAD and MWD Detectors	Exchange Standard lamps after 1000 hours Exchange Long-life lamps after 2000 hours	A noisy baseline may indicate it is time to change the lamp.
Flow cell	Check cleanliness every 6 months	Low light intensity can be caused by a dirty flow cell.
VWD Detectors	Exchange lamp after 1000 hours	Low light intensity can be caused by a dirty flow cell.
Flow cell	Check cleanliness every 6 months	

Usage of replacement parts can vary depending on the conditions under which the instruments are used, so these recommendations are for average usage. The lifetime is influenced by types of solvents/buffers used, flow rates and pressure, cleanliness of solvents but also laboratory environment.

When buffers are used, or small ID capillaries - 0.12 mm ID and smaller - we recommend filtering the mobile phase before use to avoid blocking of the capillaries, frits, column or flow cell.



Mounting tool, 0100-1710



Capillary mounting tool, G1377-44900

LC Tools

Your Agilent LC system arrives with a full complement of tools needed to perform general maintenance and operation procedures. Should you need additional or replacement tools, Agilent offers a selection of high-precision, high-quality, stainless steel tools, to avoid any deformation of the screws or nuts.

Description	Part No.
Tool Kit Hex Keys, Rheotool Includes 3 hex keys, 4 mm, 1.5 mm, and 9/64 in., with straight or T-handle plus Rheotool.	5064-8211
Torque wrench adapter Used with Nanoliter flow cell for Diode Array Detector to mount capillaries of P/N G1315-68714 cell	G1315-45003
Insert tool (seal wash option)	01018-23702
Mounting tool for flangeless nut	0100-1710
Tool for micro seal capillary mounting Simplifies the connection of the micro seats with the capillary	G1377-44900
Mounting clamp	5021-1866
Velocity regulator	5062-2486
USB Memory Stick	G4208-68700
Compact Flash Card	01100-68700

Vacuum Degassers

A vacuum degasser is recommended for:

- Maximum sensitivity in the low UV wavelength range
- High injection precision
- High retention time reproducibility
- Flow rates below 0.5 mL/min

Vacuum Degasser Care

- To generally clean the vacuum degasser tubing, flush the system with isopropanol
- Flush the degasser with water after using buffers
- Speed solvent changes by drawing solvent through the degasser and tubing with syringe adapter kit



Glass filter, 5041-2168



Ferrules and rings, 5063-6598



PPS nuts, 5063-6599

G1322A 1100 Series Vacuum Degasser

Description	Unit	Part No.
Online degasser accessory kit Includes 8 screws, 8 bushings, 4 markers, tubing, syringe, syringe adapter		G1322-68705
Glass filter, solvent inlet, 20 µm		5041-2168
Disposable syringes, 20 mL	10/pk	5062-8534
Syringe Adapter, 1/16 in. OD, 2 in. long		9301-1337
Tefzel Ferrules and SS Lock Rings, 1/8 in.	10/pk	5063-6598
PPS nuts, 1/8 in., 1/4 - 28 thread	10/pk	5063-6599
Union, 1/4 - 28 threads, Polypropylene	10/pk	5022-2155
PTFE solvent tubing, 5 m, 1.5 mm ID, 3 mm OD		5062-2483
Tubing kit, degasser to pump 4/pk, 30 cm pieces of tubing with screws and bushings		G1322-67300
Mounting tool for flangeless nut		0100-1710
Plastic tubing cutter		8710-1930

G1379A/B 1100/1200 Series Micro Vacuum Degasser

Description	Part No.
Dual channel micro degasser vacuum chamber	G1379-60010
Micro vacuum degasser tubing kit for G1379A	G1379-67310
Micro vacuum degasser tubing kit for G1379B	5042-8922
Mounting tool for flangeless nut	0100-1710

Pumps

The Agilent 1100/1200 Series of HPLC modules has several different pump units to choose from: isocratic, quaternary, binary, capillary, nano, and preparative. The 1100/1200 was designed for ease of use – all pump maintenance parts can be accessed from the front by simply removing the front cover. Scheduled routine maintenance of these pumps based on your application is recommended to achieve maximum uptime.

1100/1200 Pump Routine Maintenance Procedures

- Replace the seals and pistons
- Replace the PTFE frit
- Replace the cartridge in the Active Inlet Valve
- Clean the outlet ball valve
- Clean or replace the solvent inlet frits

Routine pump maintenance should be done on a regular basis to keep your Agilent 1100/1200 system performing at its optimum. You may perform all the maintenance at once or perform maintenance on an as-needed basis. Some parts may need to be replaced more than others depending upon your application and solvent preparation procedures.

Seal Wash

The routine use of highly concentrated buffer solutions (100 mM) will reduce the life of the seals and pistons in your 1100/1200 Series pump. You can counteract the problem with one of our seal wash kits, which flushes the backside of the seal with a wash solvent; water/isopropanol (90/10) is recommended as the wash solvent. The continuous seal wash uses gravity to flow the wash solvent, and is compatible with 1100/1200 standard and capillary pumps. The active seal wash uses a peristaltic pump to flow the wash solvent, and is compatible with the 1200 Series pump and 1100 pumps with serial numbers DE40906378, DE40926032, DE40914884 and higher.



Peristaltic pump, 5042-8507

Seal Wash

Description	Part No.
Active seal wash kit for isocratic or quaternary pumps Includes 2 wash seal gaskets, 2 pump seals, peristaltic pump (includes pump cassette and motor), 2 seal keepers, 2 support ring assemblies, seal insert tool, silicone tubing	G1311-68711
Active seal wash kit for binary pumps Includes 4 wash seal gaskets, 4 pump seals, 2 peristaltic pumps (includes pump cassette and motor), 4 seal keepers, 4 support ring assemblies, seal insert tool, silicone tubing	G1312-68711
Continuous seal wash kit Includes 2 wash seal gaskets, 4 m flex tubing, 2 pump seals, 1 flow regulator, 2 seal keepers, 2 support ring assemblies, 20 mL luer lock syringe, seal insert tool, abrasive paper	01018-68722
Silicone Tubing, 1 mm ID, 3 mm OD, 5 m	5065-9978
Seal Keeper	5001-3743
Wash seal	0905-1175
Wash seal gasket	5062-2484
Peristaltic pump cassette with silicone tubing	5042-8507
Peristalitic pump with ChemSure tubing	5065-9952
ChemSure tubing for peristaltic pump	5042-8954



Pump start up kit, G1311-68710

Purge Valve

Common to all 1100/1200 pump modules, the purge valve has a gold seal held in place with a plastic cup.

- The most frequently replaced item in the 1100/1200 Series pumps is the purge valve PTFE frit (P/N 01018-22707), which can clog with seal material or solvent particulates.
- When replacing the frit, remember that the cutout in the frit goes on top so that more surface area will be provided on the side facing the solvent flow.
- The gold seal should be replaced after the valve has been removed a few times.



Purge valve assembly, G1311-60009

Purge Valve

Description	Part No.
Pump Start Up Kit Includes 1 outlet cap, 2 PTFE frits, 4 piston seals, 1 outlet gold seal, 2 glass solvent inlet filters, 1 cartridge for active inlet valve	G1311-68710
PTFE frits, 5/pk	01018-22707
Gold seal, outlet	5001-3707
Outlet caps	5062-2485
Purge valve assembly, 400 bar	G1311-60009
Purge valve assembly, 600 bar	G1312-60023

Outlet Ball Valve

- Before exchanging the outlet ball valve, try cleaning it in a sonicator by placing the valve in an upright position (onto the plastic cap) in a small beaker with alcohol. Sonicate for 5 to 10 minutes.
- The 1100/1200 Series binary pump has a different outlet ball valve which includes a sieve.



Outlet ball valve, G1311-60012

Outlet Ball Valve

Description	Part No.
Outlet ball valve, (quaternary, isocratic)	G1311-60012
Outlet ball valve for binary pump, 400 bar	G1312-60012
Outlet valve for binary SL pump, 600 bar	G1312-60022
Gold seal, outlet	5001-3707
Outlet caps, 4/pk	5062-2485
Binary pump outlet valve SS sieve, 10/pk	5063-6505



Active inlet valve, G1312-60025

Inlet Valves

Active Inlet Valve (AIV)

Description	Part No.
Active inlet valve, without cartridge	G1312-60025
Cartridge for active inlet valve, 400 bar	5062-8562
Cartridge for active inlet valve, 600 bar	G1312-60020
Gold Seal for inlet valve	5001-3708



Cartridge, 400 bar, 5062-8562

Passive Inlet Valve (PIV)

Description	Part No.
Passive inlet valve for 1120 Compact LC System	G4280-60005



Sapphire piston and seals

Seals and Pistons

Pump seals should be replaced when there are leaks on the bottom of the pump head, when retention times are inconsistent, or when the pressure ripple is unstable.

Each time the seals are replaced, the pistons (plungers) should be examined for scratches. Scratched pistons will cause small leaks and can damage the seals.

Seals and Pistons

Description	Part No.
Sapphire Piston	5063-6586
Piston Seals, graphite filled PTFE (reversed phase), 2/pk	5063-6589
Piston Seals, polyethylene (normal phase), 2/pk	0905-1420
Piston housing assembly (includes springs)	G1311-60002
Extended PM kit Contains 5063-6589 piston seals (2), 01018-22707 PTFE frits (5/pk), 5062-8562 cartridge active inlet valve, G1311-60012 outlet ball valve & 5063-6586 pistons (2)	5065-4499



Filter frit adapters, 5062-8517

Solvent Filters for 1100/1200 Series Pumps

Unfiltered solvents or solvents contaminated with microbial growth can clog solvent inlet filters, reducing the lifetime of the filter and impacting pump performance. Remember to clean or replace the solvent inlet filters at least once every 3 months.

Inlet Filters		Frit Adapter		Frit Inlet ID (mm)	Tube OD (mm)	
Description	**Part No.**	**Description**	**Part No.**			**Recommended Use**
Glass filter, solvent inlet, 20 µm pore size	5041-2168	Frit adapter, PTFE, 3 mm, 4/pk	5062-8517	5	3.2	Analytical scale, micro scale
Glass filter, solvent inlet, 40 µm pore size	3150-0944	Frit adapter, 4mm, PTFE	G1361-23204	7	4	Preparative LC
Glass filter, solvent inlet, 40 µm pore size	3150-0944	Frit adapter, PTFE for 1/8 in. OD tubing	G2258-23201	7	3.2	G2258A Dual Loop autosampler



Pump start up kit, G1311-68710



Solvent reservoirs, 9301-1421



Seal keeper, 5042-8952

Pump Supplies

G1311/12/54A 1100/1200 Series Standard Pump

Description	Part No.
Pump Start Up Kit Includes 1 outlet cap, 2 PTFE frits, 4 piston seals, 1 outlet gold seal, 2 glass solvent inlet filters, 1 cartridge for active inlet valve	G1311-68710
PM Kit for isocratic/quaternary pump includes piston seal, PTFE frits, 2 gold seals and 2 outlet caps	G1310-68730
PM Kit for binary pump, includes 4 piston seals, PTFE frits, 3 gold seals, 2 sieves and 3 outlet caps	G1312-68730
PM Kit for seal wash option includes 2 wash seals and a pack of 6 wash seal gaskets	G1310-68731
1100/1200 pump accessory kit	G1311-68705
Bottle head assembly, for F29/32 tapered solvent bottle	G1312-68716
Solvent reservoir, 1 liter, F29/32	9301-0656
Bottle head assembly, for screw bottle	G1311-60003
Solvent reservoir, 1L	9301-1420
Solvent reservoir, 1L with cap	9301-1421
Solvent reservoir, amber, 1L, For use with bottle head assembly	9301-1450
Bottle cap with 3-hole insert	5063-6531
Solvent mixer, 1100 Series	G1312-87330
Capillary, damper to purge valve	G1312-67301
Capillary outlet ball valve to piston 2, stainless steel, 230 mm long, 0.6 mm ID	G1312-67300
Restriction capillary, stainless steel, 495 mm long, 0.17 mm ID	G1312-67304
Tubing kit, degasser to pump 4/pk, 30 cm pieces of tubing with screws and bushings	G1322-67300
Seal keeper, ceramic, hipped	5042-8952





Active inlet valve, G1312-60025



Solvent mixer, 5067-1565

G1312B 1200 Series Binary Pump SL

Description	Part No.
PM Kit for binary pump, includes 4 piston seals, PTFE frits, 3 gold seals, 2 sieves and 3 outlet caps	G1312-68730
Pump configuration kit for G1312B Needs G1158B 2 Position / 6 Port valve. Includes side cover with fixed rail, top and right cover for pump housing, plus 6 connecting capillaries. This allows automatic switching between different delay volumes to optimize the system for 2.1 mm ID or 4.6 mm ID columns.	G1312-68726
Side and top cover bin pump, valve rail	5042-1567
Flex capillary, 0.17 x 280 mm, no fittings	5021-1818
Column connecting capillary with fittings, 9 cm, 0.17 mm ID, 1/16 in. male/male	G1316-87300
Stainless steel capillary, 230 x 0.17 mm, m/m, p-s/p-s	5067-1570
Stainless steel capillary, 320 x 0.17 mm, m/m, p-s/p-s	5067-1571
Stainless steel capillary, 150 x 0.17 mm, m/f, pre-swaged	5067-1572
Active inlet valve, without cartridge	G1312-60025
Cartridge for active inlet valve, 600 bar	G1312-60020
Outlet valve for binary SL pump, 600 bar	G1312-60022
Purge valve assembly, 600 bar	G1312-60023
Seal keeper, ceramic	5042-8586
Seal keeper, ceramic, hipped	5042-8952
Stainless steel capillary 400 x 0.17 mm, m/m, ps/ps pump to autosampler	G1312-87303
Stainless steel capillary 700 x 0.17 mm, m/m, ps/ps pump to cooled ALS	G1312-87304
Stainless steel capillary 150 x 0.17 mm, m/m, ps/ps damper to pressure sensor	G1312-87305
Stainless steel capillary 105 x 0.17 mm, m/m, ps/ps damper to mixer or mixer to outlet valve	G1312-87306
Calibration capillary assembly	G1312-67500
Absorber capillary, 500 µL	G1312-87300
Stainless steel restriction capillary, 0.17 mm ID, T-piece to pressure sensor	G1312-87301
Solvent mixer, short, 200 µL	5067-1565

G1376A/G1382A 1100/1200 Series Capillary Pump

Description	Part No.
Capillary pump accessories kit	G1376-68705
Capillary pump PM kit	G1376-68710
Semi prep filter	5064-8273
Replacement frits, 0.5 µm, for P/N 5064-8273	5022-2185
Torque wrench adapter	G1315-45003
Bottle head assembly with tubing and filter	G1376-60003
Solvent inlet filter, stainless steel	01018-60025
Stainless steel capillary, pump-ALS 90 cm, 0.17 mm ID	G1329-87300
Extended flow range kit, 100 µL/min	G1376-68707



Prep filter, 5065-4500



Prep bottle, 5065-4421



Glass stop valve assembly, 5065-9909

G1361A 1100/1200 Series Prep Pump

Description	Part No.
Accessory kit prep pump/gradient G1361A Includes stainless steel connecting capillaries, solvent mixer, 2 L solvent bottle, bottle head assembly, filter, glass stop valve, stainless steel union, tubing, and other parts	G1361-68707
Accessory kit for prep pump G1361A Includes stainless steel connecting capillaries, wrenches, 2 L solvent bottle, bottle head assembly, filter, glass stop valve, stainless steel union, tubing, and other parts	G1361-68708
PM kit for prep pump Includes 3150-0942 filter, 5022-2192 filter assembly, 5065-4445 peristaltic pump, 0890-1764 tubing and 4 prep pump seals	G1361-68710
Hi flow inline filter kit, glass, 10 µm Contains glass filter, caps and connecting tubing	5065-4500
Hi flow replacement inline filter, glass	5065-9901
O-ring, Viton, 30 mm	0905-1516
Glass filter, solvent inlet, 40 µm pore size	3150-0944
Frit adapter, PTFE for 4.7 mm OD tubing	G1361-23205
Stainless steel filter assembly with PEEK ring, 2 µm pore size	5022-2192
Solvent bottle, clear, 2 L, 2 inlets	5065-4421
Solvent bottle, amber, 2 L	9301-6341
Solvent bottle, clear, 2 L	9301-6342
Bottle head assembly for prep system	G1361-60022
Sapphire plunger	G1361-22402
Piston seal for G1361A Preparative Pump	5022-2188
Frit adapter	G1361-23204
Peristaltic pump	5065-4445
Valve assembly, inlet/outlet	G1361-60012
Stainless steel capillary outlet valve to 1 multi assembly, 0.6 x 173 mm, male/male	G1361-67300
Stainless steel capillary outlet valve 1 to multi assembly, 0.6 x 175 mm, male/male	G1361-67301
Stainless steel capillary EMPV to next module, 0.6 x 400 mm, male/male	G1361-67302
Stainless steel capillary EMPV to multi assembly, 0.5 x 160 mm, male/male	G1361-67303
Stainless steel capillary union to EMPV2, male/female	G1361-67304
Stainless steel capillary union to mixer, 0.6 x 40 mm, male/female	G1361-67305
Stainless steel capillary EMPV1 to union, male/female	G1361-67306
Manual prep injection valve kit, SS With position sensing, 10 mL loop, 25 mL syringe, ring mounting bracket, start cable, SS connecting capillaries, 0.5 mm ID, 40 cm and 60 cm	5065-9922
Glass stop valve assembly Includes stop valve and 2 adapters	5065-9909
Inlet tubing, stainless steel for pressurized solvent	G1361-60008



Injection Valve Assembly, 0101-0921

Autosampler Supplies

Injection Valve Maintenance

Rotor seal replacement is the most common injection valve maintenance procedure.

Injection Valve Maintenance

Use With	Description	Part No.	RheBuild Kit Part No.	Rotor Seal Part No.	Stator Part No.
G1313A, G1329A, G1367A	2 Position/6 Port Injection Valve	0101-0921	0101-1257	0100-1853 (Vespel) 0100-1849 (Tefzel) 0100-2231 (PEEK)	0100-1850 Stator head 0100-1851 Stator face
G1367C SL G1367D SL Plus	2 Position/6 Port Injection Valve, 600 bar	0101-1422		0101-1416 5067-4103	0101-1417
G1377A	2 Position/6 Port Micro Injection Valve	0101-1050	0101-1257	0100-2088 (Vespel)	0100-2089
G2258A	10 Port, Dual Loop Valve	0101-1385		0100-2415	0101-1390
G2260A	2 Position/6 Port MBB Injection Valve	0101-1267	0101-1268		



1100/1200 Series LC System Needles and Needle Seats

The needle should be replaced when it becomes bent, burred or blunt. The needle seat should be replaced when it is leaking or plugged. You should suspect a leak if you notice a trail of buffer crystals on the needle seat. The needle seat can become blocked if the sample contains particulates, as this is the first restriction that the sample experiences. If this occurs, try backflushing the needle seat capillary.

Agilent Autosampler	Needle Assembly Description	Part No.	Compatible with Needle Seat	Part No.
G1313A, G1327A, G1329A	Needle assembly, standard autosampler	G1313-87201	Standard needle seat 0.17 mm ID capillary, 2.3 µL	G1313-87101
			Standard needle seat 0.12 mm ID capillary, 1.2 µL	G1313-87103
G1313A, G1327A, G1329A	Needle assembly, for use with PEEK seat	G1313-87203	Standard needle seat, PEEK 0.17 mm ID capillary, 2.3 µL	G1313-87102
G1313A, G1327A, G1329A	Needle assembly, 900 µL upgrade	G1313-87202	Standard needle seat 0.17 mm ID capillary, 2.3 µL	G1313-87101
G1387A, G1389A	Needle assembly, micro LC autosampler	G1329-80001	Micro LC Needle seat 100 µm ID capillary, 1.2 µL	G1329-87101
			Micro LC Needle seat 50 µm ID capillary, 0.3 µL	G1329-87103
G1367A/B	Needle assembly, well plate autosampler (green)	G1367-87200	Needle seat, well plate autosampler 0.17 mm ID capillary, 2.3 µL	G1367-87101
	Needle assembly, well plate autosampler (new, blue)	G1367-87201	Needle seat, well plate autosampler 0.12 mm ID capillary, 1.2 µL	G1367-87102
G1367C SL	Needle assembly, well plate autosampler	G1367-87201	Needle seat, 600 bar, without capillary	G1367-87104
			Seat capillary 0.17 x 100 mm, 0.8 mm OD	G1367-87302
			Seat capillary 0.12 x 100 mm, 0.8 mm OD	G1367-87303
G1367D SL Plus	Needle assembly, well plate autosampler (black)	G1367-87202	Needle seat, 600 bar, without capillary	G1367-87105
			Seat capillary 0.17 x 100 mm, 0.8 mm OD	G1367-87302
			Seat capillary 0.12 x 100 mm, 0.8 mm OD	G1367-87303
G1377A	Needle assembly, micro well plate sampler	G1377-87201	Needle seat, micro well plate autosampler (without seat capillary)	G1377-87101
			Seat Capillary, 100 µm Fused silica/PEEK with fittings, Black	G1375-87317
			Seat Capillary, 75 µm Fused silica/PEEK with fittings, Blue	G1375-87316
			Seat Capillary, 50 µm, Green	G1375-87300
G2258A	Needle assembly, dual loop autosampler	G2258-68710	Twin needle seat, dual loop autosampler	G2258-87102
G2260A	Needle assembly, prep autosampler	G2260-87201	Needle seat, prep autosampler 0.5 mm ID, 20 µL	G2260-87101



Maintenance kit, G1313-68709

1100/1200 Series Autosampler Kits

Description	Part No.
PM Kit for 1200 Autosampler SL Includes PEEK rotor seal, needle seat, needle, 2 seals, and 15 finger caps	G1329-68719
G1313/27A Autosampler maintenance kit Includes 1 rotor seal (Vespel), 1 needle, 1 needle seat, 2 metering seals, 15 finger caps	G1313-68709
G1313/27A Autosampler accessory kit Includes 3 hex keys, 2 wrenches, tubing, 1 label halftray, wrist strap, 15 finger caps, 0.17 ID x 180 mm capillary, 100 screw top 2 mL vials and caps, tray for 40 2 mL vials, tray for 15 6 mL vials	G1313-68705
G1313/27A Autosampler Preventative Maintenance Kit Includes 1 each: rotor seal, isolation seal, stator face, needle, needle seat	5065-4498
PM Kit for standard autosamplers Includes Vespel rotor seal, standard needle seat, and needle	G1313-68730
Light protection kit for G1329A Includes opaque front and side doors and front cover	G1329-68718
Door replacement kit for G1329A Includes transparent front and side doors	G1329-68727





Sample loop, 01078-87302

1100/1200 Series LC System Metering Device Supplies

Infrequently, the metering device seal and piston may need replacement if you see loss in injection volume precision or metering device leaking.

1100/1200 Series LC System Metering Device Supplies

Description	Part No.
Sapphire Piston	5063-6586
Piston Seals, graphite filled PTFE (reversed phase), 2/pk	5063-6589
Metering valve seal, 900 µL	0905-1294
Sapphire piston assembly, 900 µL	5062-8587
Capillary to metering device	G1313-87301
Multidraw upgrade kit for G1313A/G1327A/G1329A autosamplers Includes 500 µL capillary, 1500 µL capillary, and ZDV union	G1313-68711
Seat capillary, 500 µL, 0.5 mm ID	G1313-87307
Seat capillary, 1500 µL, 0.9 mm ID	G1313-87308
1/16 in. union, zero dead volume, stainless steel	0100-0900
Sample loop, 100 µL	01078-87302
Sample loop, 900 µL	G1313-87303





Autosampler trays

G1313/27/29A 1100/1200 Series Autosampler Supplies

Description	Part No.
100 position tray for 2 mL vials, thermostattable	G1329-60011
100 position tray for 2 mL vials	G1313-44510
40 position tray for 2 mL vials	G1313-44512
15 position tray for 6 mL vials	G1313-44513
External vial tray for 17 vials (disposal position)	G1313-60004
Disposal Tube for external vial tray	G1313-27302
Needle assembly, standard autosampler	G1313-87201
Standard needle seat, 0.17 mm ID capillary, 2.3 µL	G1313-87101
Standard needle seat, 0.12 mm ID capillary, 1.2 µL	G1313-87103
Needle seat PEEK, for standard autosampler, 0.17 mm ID capillary, 2.3 µL	G1313-87102
Needle assembly for use with PEEK seat	G1313-87203
Needle seat PEEK without capillary, G1313A	G1313-87104
PEEK seat tubing, 0.17 mm ID, 100 mm, 2.3 µL	G1313-87302
PEEK capillary, 0.25 mm ID, 160 mm connecting valve with metering device of G1313 autosampler	G1313-87306
PEEK loop capillary for 100 µL sample	G1313-87309
Extended loop capillary, 0.25 mm, 180 cm	G1329-87302
Needle arm kit	G1313-68713
Sample loop, 900 µL	G1313-87303
Finger Caps, 15/pk	5063-6506
Waste adapter, 1100 Series autosamplers	G1313-43206
Waste adapter, 1200 Series autosamplers, gray	G1313-43216
Waste tube	G1313-87300
Waste tubing, 5 m, 6.5 mm ID, corrugated polypropylene	5062-2463
Post column reaction kit for 1100 LC	G1313-68712
Seat adapter	G1313-43204

Tips & Tools

6 mL high recovery screw top vials are recommended for G2258 Dual Loop and G1367 Well Plate Autosamplers only. 5 mL high recovery screw top vials can be used with all autosamplers.

6 mL Vials, Caps and Septa for 1100/1200 Series Autosampler

Description	Unit	Part No.
Clear screw vial, 16 mm cap size	100/pk	9301-1377
Screw caps, 16 mm	100/pk	9301-1379
PTFE/silicone septa, 16 mm	100/pk	9301-1378
Clear crimp vial, 20 mm cap size	100/pk	9301-1419
Crimp caps, PTFE/silicone septa, 20 mm	100/pk	9301-1425
Clear, 6 mL extreme high recovery screw top vials	30/pk	5188-2757
PTFE/silicone septa, pre-slit, 16 mm	100/pk	5188-2758
Clear, 5 mL high recovery screw top vials	30/pk	5188-5369



6 mL vials, caps, and septa

G1387A 1100/1200 Series Micro Autosampler

Description	Part No.
Capillary sampler accessories kit	G1329-68715
2 Position/6 Port Micro Injection Valve	0101-1050
Rotor seal, Vespel, 2 grooves	0100-2088
Stator	0100-2089
6 fittings, 2 plugs, PEEK	5065-4410
Sapphire piston, 2 mm	5064-8293
Piston seal, 2 mm	5022-2175
Seal support assembly	G1377-60002
Seat assembly, 100 µm ID, 1.2 µL	G1329-87101
Seat assembly, 50 µm ID, 0.3 µL	G1329-87103
Needle assembly for µ-LC autosampler	G1329-80001
Waste tube, FEP, 1.6 mm OD, 0.8 mm ID	G1375-87326
Stainless steel capillary, pump-ALS 90 cm, 0.17 mm ID	G1329-87300



G1367A well plate autosampler

G1367A/B 1100/1200 Series High Performance Autosampler

Description	Part No.
Well plate sampler accessories kit Includes 100/pk 2 mL screw top vials & caps, 10/pk 0.5 mL 96 well plates, tools, 380 mm 0.17 mm capillary, CAN cable	G1367-68705
PM Kit for well plate autosamplers includes Vespel rotor seal, needle, needle seat, peristaltic pump cartridge and seal tight nut	G1367-68730
Needle assembly, well plate autosampler (green)	G1367-87200
Needle assembly, well plate autosampler (new, for SN greater than DE21001534)	G1367-87201
Seat assembly, 0.17 mm ID, 2.3 µL	G1367-87101
Seat assembly, 0.12 mm ID, 1.2 µL	G1367-87102
Seat assembly for G1367C well plate autosampler without capillary	G1367-87104
Seat capillary 0.17 x 100 mm, 0.8 mm OD, use with G1367-87104 seat	G1367-87302
Seat capillary, 0.12 x 100 mm, 0.8 mm OD, use with G1367-87104 seat	G1367-87303
Stainless steel capillary, 210 x 0.12 mm, male to male, pre-swaged	G1316-87328
Stainless steel capillary, 250 x 0.17 mm, male to male, pre-swaged	G1367-87304
Stainless steel capillary, 250 x 0.12 mm, 1 fitting	G1373-87300
Loop capillary, 100 µL	G1367-87300
Peristaltic pump	5065-4445
Well plate tray, 2 well plates, 10 vials (supports 50 mm plates)	G2258-60011

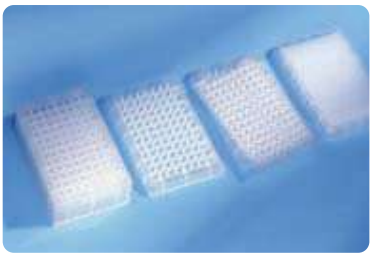
G1367C 1200 Series High Performance Autosampler SL (600 bar)

Description	Part No.
Needle assembly, well plate autosampler	G1367-87201
Seat assembly for G1367C well plate autosampler without capillary	G1367-87104
Seat capillary 0.17 x 100 mm, 0.8 mm OD	G1367-87302
Seat capillary 0.12 x 100 mm, 0.8 mm OD	G1367-87303

For other standard parts, refer to G1367A/B table.

G1367D 1200 Series High Performance Autosampler SL Plus

Description	Part No.
Seat assembly, PEEK	G1367-87105
Needle assembly, well plate autosampler (black)	G1367-87202
Seat capillary 0.17 x 100 mm, 0.8 mm OD	G1367-87302
Seat capillary 0.12 x 100 mm, 0.8 mm OD	G1367-87303
Micro analytical head	G1377-60023
Seal support back up assembly	G1377-60012
PEEK back up ring	G1377-24001



Micro well plates

G1377A 1100/1200 Series Micro Well Plate Autosampler

Description	Part No.
Micro well plate sampler accessories kit Includes 100/pk 2 mL screw top vials & caps, 10/pk 0.5 mL 96 well plates, tools, 40 µL loop, 50 cm 50 µm fused silica/PEEK capillary, 75 µm seat capillary, CAN cable	G1377-68705
Needle seat, micro well plate autosampler (without seat capillary)	G1377-87101
Seat capillary, 50 µm, 150 mm, fused silica/PEEK with fittings	G1375-87300
Seat capillary, 100 µm, 150 mm, fused silica/PEEK with fittings	G1375-87317
Seat capillary, 75 µm, 150 mm, fused silica/PEEK with fittings	G1375-87316
Needle assembly, micro well plate sampler	G1377-87201
Loop capillary, 8 µL	G1375-87315
Loop capillary, 40 µL	G1377-87300
SS capillary, 0.25 mm ID, 12 cm long Connecting Rheodyne valve - waste	G1377-87301
Tool for Micro seal capillary mounting	G1377-44900

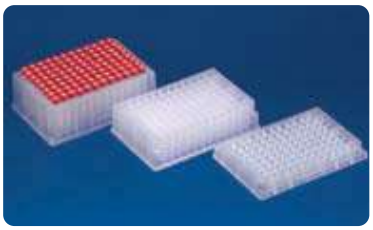




G2255-68700



Vial plate, 5022-6539



Well plate racks

Well Plates

Description	Unit	Part No.
96 well plates, 0.5 mL, polypropylene	120/pk	5042-1385
96 well plates, 0.5 mL, polypropylene	10/pk	5042-1386
96 deep well plates, 1 mL, polypropylene	50/pk	5042-6454
Closing mats for 96 well plates, silicone	50/pk	5042-1389
96 well plates, 150 µL, conical, polypropylene	25/pk	5042-8502
384 well plates, 90 µL, polypropylene	30/pk	5042-1388
96 deep well plate with glass inserts, 0.35 mL, caps/septa	1/ea	5065-4402
Glass inserts, 350 µL	1000/pk	5188-5321
Caps/septa for glass inserts	1000/pk	5188-5322
Vial plate for 54 x 2 mL vials	6/pk	G2255-68700
Tray for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL	1/ea	5022-6538
Vial plate for 15 x 6 mL vials		5022-6539

G2257A 1100/1200 Series Well Plate Handler

Description	Part No.
8.5 in. well plate rack, 2/pk For 16 shallow well plate, 4 deep well plates (max 48 mm height) or 6 vial racks	G2255-68709
10 in. well plate rack, 2/pk For 20 shallow well plate (max height 16 mm), not compatible with deep well plates	G2255-68710
8.5 in. well plate rack extension Includes 3 racks for 3 x 16 shallow well plates, 2 x 4 deep well plates (max 48 mm height) or 3 x 6 vial racks	G2255-68720
10 in. well plate rack extension Includes 3 racks for 3 x 20 shallow well plates (max height 16 mm), not compatible with deep well plates	G2255-68730

G2250A 1100/1200 Series Micro Plate Sampler

Description	Part No.
205H rack, two 96 deep well plates	G2250-04504
200 rack, 13 x 100 mm tubes (9 ml), 96	G2250-04503
207 rack, 16 x 100 mm tubes (12 ml), 75	G2250-04502
209 rack, 12 x 32 mm tubes (12 ml), 96	G2250-04501
94A special holding 1100 tray	G2250-04500
100 µl syringe	G2250-24501
1000 µl syringe	G2250-24500
5 µl loop	1535-4860
20 µl loop	0101-0377
50 µl loop	0101-0378
100 µl loop	0101-0379
500 µl loop	0101-0282
Beveled tip needle	G2250-23200
Injection port seal	G2250-47100
Capillary, 1 m, 0.17 mm ID, 1/16 in. male	G2250-87300



Twin needle seat, G2258-87102



Fitting screws, 5065-9948



PEEK ferrules and SS rings, 5065-9950

G2258A 1100/1200 Series Dual Loop Autosampler

Description	Part No.
Needle assembly, dual loop autosampler	G2258-68710
Well plate tray, 2 well plates, 10 vials (supports 50 mm plates), 1100	G2258-60001
Well plate tray, 2 well plates, 10 vials (supports 50 mm plates)	G2258-60011
Twin needle seat, dual loop autosampler	G2258-87102
Front seat tube, SS, 0.5 mm ID, 10 cm long	G2258-87316
Back seat tube, SS, 0.5 mm ID, 12 cm long	G2258-87315
Front seat tube, PTFE, 0.2 mm ID, 10 cm long, 5 µL	G2258-87312
Back seat tube, PTFE, 0.25 mm ID, 12 cm long, 6 µL	G2258-87313
Waste tube, 0.8 mm ID, 15 cm long	G2258-87310
Waste tube, 0.8 mm ID, 10 cm long	G2258-87311
Buffer loop extension assembly	G2258-60002
Buffer loop tubing assembly, PTFE, 1.4 mm ID, 2.0 mm OD	G2258-87300
Drawing tube assembly for flush solvent with filter and bottle cap	G2258-87307
Tubing assembly, solvent flush	G2258-87314
Fitting screws, SS, 10-32, 4 mm, 5/pk	5065-9948
PEEK ferrule and stainless steel ring for 2 mm tube, 5/pk	5065-9950
Union, PEEK for 1/8 in. OD tubing, 1/4-28 internal threads	0100-2410
10 Port, dual loop valve	0101-1385
Rotor seal, Vespel, 10 port valve	0101-2415
Stator, DuraLife, 10 port valve	0101-1390
Vial plate for 15 x 6 mL vials	5022-6539
Vial plate for 54 x 2 mL vials, 6/pk	G2255-68700
Frit adapter, PTFE for 1/8 in. OD tubing	G2258-23201
Piston for G2258A Dual Loop ALS, 5 mL	G2258-60003
Piston guide, PEEK for G2258A ALS	G2258-23101
Piston seal for G2258A Dual loop ALS	0905-1599



G2260A 1100/1200 Series Preparative Autosampler

Description	Part No.
Accessory kit Prep autosampler (G2260A) Includes stainless steel connecting capillaries, hex keys, wrenches, 100/pk 2 mL screw cap vials and caps, tray for 6 mL vials, stainless steel union, and other parts	G2260-68705
MBB Injection valve for G2260A sampler	0101-1267
PEEK rotor seal and stator face	0101-1268
Stator head for 0101-1267 valve	0100-2195
Needle seat for G2260A autosampler, 0.5 mm ID, 20 µL	G2260-87101
Needle assembly for G2260-87101 needle seat	G2260-87201
Capillary injection valve to preparative head, SS, 16 cm, 0.5 mm	G2258-87301
Capillary sampler to column, SS, 60 cm, 0.5 mm	G2260-87300
Capillary pump to sampler, SS, 40 cm, 0.5 mm	G2260-87301
Multi draw loop for use with G2260A, recommended for injection volumes up to 5 mL	G2260-68711





Tray, 5022-6538

1100/1200 Series Fraction Collector

Collecting Tubes and Trays

Tray Part No.	Hole Diameter (mm)	No. of Tubes	Tube Dimensions	Tube Part No.	Unit
G1364-84523	30	40	30 x 48 mm	5042-6470	100/pk
G1364-84524	25	60	25 x 100 mm	5042-6459	100/pk
G1364-84525	16	126	16 x 48 mm	5022-6533	100/pk
G1364-84516	12	215	12 x 48 mm	5022-6534	100/pk
G1364-84532	Funnel tray	40	Any size		

Well Plate Trays

Description	Part No.
Tray for 4 well plates, cooled	G1364-84521
Tray for 4 plates, adjustable, cooled	G1364-84531
Tray for 2 well plates, 10 funnels cooled	G1364-84522
Tray for 2 well plates, 10 vials, 2 mL	G1367-60001

Well Plates

Description	Unit	Part No.
96 well plates, 0.5 mL, polypropylene	120/pk	5042-1385
96 well plates, 0.5 mL, polypropylene	10/pk	5042-1386
96 deep well plates, 1 mL, polypropylene	50/pk	5042-6454
Closing mats for 96 well plates, silicone	50/pk	5042-1389
96 well plates, 150 µL, conical, polypropylene	25/pk	5042-8502
384 well plates, 90 µL, polypropylene	30/pk	5042-1388
384 well plates, max 45 µL, skirted	25/pk	5188-5375
96 deep well collection plates with glass inserts, caps, and septa, pre-assembled, 0.35 mL		5065-4402
Glass inserts, 350 µL	1000/pk	5188-5321
Caps/septa for glass inserts	1000/pk	5188-5322
Vial plate for 54 x 2 mL vials	6/pk	G2255-68700
Tray for 27 Eppendorf safe lock tubes, 0.5/1.5/2 mL		5022-6538
Vial plate for 15 x 6 mL vials		5022-6539
Plate for 24 tubes with 18 mm diameter		5042-8544

1100/1200 Series Fraction Collector Capillary Kits and Needles

1100/1200 Module	Max Flow Rate	Tubing ID (mm)	Tubing Kit	Needle Length	Needle	Typical Use
G1364B	100 mL/min	0.8 mm ID	G1364-68711		G1364-87201	Tubes (max 100 mm)
G1364C	1 mL/min	0.15 mm ID	G1364-68723	50 mm	G1367-87200	Tubes (max 48 mm), well plates, vials
	10 mL/min	0.25 mm ID	G1364-68712	50 mm	G1367-87200	
	10 mL/min	0.25 mm ID	G1364-68712	20 mm	G1364-87202	Funnel tray (tubes max 75 mm)
	100 mL/min	0.8 mm ID	G1364-68711	20 mm	G1364-87202	
G1364D	max 4 µL/min	25 µm ID	G1364-87304			MALDI targets, well plates
	4-30 µL/min	50 µm ID	G1364-87305			
	30-100 µL/min	100 µm ID	G1364-87306			



MALDI spotting adapter, G1364-83205



Well plate adapter assembly, G1364-60021



MALDI plate carrier Bruker, 5022-6541



Calibration plate Bruker, 5023-0208

G1364D 1100/1200 Series Micro Fraction Collector

Description	Part No.
MALDI spotting adapter for G1364D Micro fraction collector	G1364-83205
Well plate adapter assembly for G1364C/D	G1364-60021
Flap septum, PEEK, for internal tray	G1364-27107
Tray for 4 plates, adjustable, cooled for use with G1364D Micro fraction collector	G1364-84511
Fused silica/PEEK capillary, 25 µm, 50 cm	G1364-87304
Fused silica/PEEK capillary, 50 µm, 50 cm	G1364-87305
Fused silica/PEEK capillary, 100 µm, 50 cm	G1364-87306
Waste tube, PTFE, 20 cm, 1.4 mm ID, 2.0 mm OD	G1364-86711
MALDI plate carrier Bruker	5022-6541
MALDI plate carrier Bruker PAC	5022-6546
MALDI plate carrier ABI	5022-6542
MALDI plate carrier ABI Opti-TOF	5023-0238
MALDI plate carrier Agilent	5022-6543
MALDI plate carrier Micromass	5022-6544
Target Plate for AP-MALDI LC/MS	G1972-60025
Calibration Plate Bruker	5023-0208
Calibration Plate ABI 192	5023-0209
Calibration Plate ABI 10x10 & 20x20	5023-0213
Calibration Plate Agilent	5023-0214
Calibration Plate Micromass	5023-0215
On-line matrix Kit for MALDI spotting Includes BCD board/cable, syringe, needles, adapters, connector, capillary	G1364-68706
Adapter, female to female 1/4-28	5042-8517
Adapter, male luer to female 1/4-28	5042-8518
Syringe, glass, 1 mL, 1/4-28 connector	5181-1541
Micro T-connector, PEEK, swept vol 29 nL	5042-8519
MALDI Spotting tips, PTFE, 10/pk	G1364-81701

1100/1200 Series Thermostated Column Compartment

Switching Valve Replacement Parts

Use With	Description	Part No.	RheBuild Kit Part No.	Rotor Seal Part No.	Stator Part No.
G1316A Option 055	2 Position / 6 Port Column Switching Valve, 400 bar	0101-0920	0101-1258	0100-1855 (Vespel) 0100-1854 (Tefzel) 0100-2233 (PEEK)	0100-1850 Stator head 0100-1851 Stator face 0100-1852 5023-0241 Isolation seal
G1316B Option 055, SL	2 Position / 6 Port Column Switching Valve, 600 bar	0101-1420		0101-1409 (HP PEEK blend)	0101-1417
G1316A Option 056	2 Position / 6 Port Micro Column Switching Valve, 400 bar	0101-1051		0100-2087 (Vespel)	0100-2089
G1316A Option 057	2 Position / 10 Port Switching Valve, 400 bar	0101-1343	0101-1360	0101-1361	5023-0236
G1316B Option 057, SL	2 Position / 10 Port Switching Valve, 600 bar	0101-1419		0101-1415 (HP PEEK blend)	0101-1421



Heat exchanger/cooler, G1316-80004



Column identification module, 5062-8588

1100/1200 Series Thermostated Column Compartment

Description	Part No.
Capillary System for 0.12 mm ID use	G1316-68744
Rapid Resolution High Throughput capillary kit	5065-9947
1200 capillary kit for 0.12 mm ID	G1316-68716
High temperature heat exchanger, 1.6 µL, 0.12 mm ID, "R"	G1316-80002
High temperature heat exchanger, 1.6 µL, 0.12 mm ID, "L"	G1316-80003
Heat exchanger/cooler, 1.5 µL, 0.12 mm ID	G1316-80004
Carrier for heat exchanger TCC SL	G1316-83200
Column Identification Module (CIM), 3/pk	5062-8588
Column clamp, 6/pk	5063-6526
Column holder for µ-LC columns	5001-3702
Column connecting capillary with fittings, 7 cm, 0.12 mm ID, 1/16 in. male/male	G1316-87303
Column connecting capillary with fittings, 9 cm, 0.17 mm ID, 1/16 in. male/male	G1316-87300
Column connecting capillary with fittings, 18 cm, 0.12 mm ID, 1/16 in. male/male	G1313-87304
Column connecting capillary with fittings, 18 cm, 0.17 mm ID, 1/16 in. male/male	G1313-87305
PEEK tubing, 1/32 in. OD, 0.4 mm ID, 450 mm, Micro valve to waste	5022-6503
2 position, 10 port column switching valve kit, 400 bar, for use with 1100/1200 LC systems	G1316-68709

1200 Series LC Solution Kits

Capillary Kits for Column Selection

Description	Part No.
Method development capillary kit, low dispersion, short columns Contains capillaries (0.12 mm ID), fittings and low dispersion heat exchanger for up to 8 columns of up to 100 mm length	5067-1595
Method development capillary kit, general purpose Contains capillaries (0.17 mm ID) and fittings for up to 6 columns of up to 250 mm length	5067-1596
Method development capillary kit, low dispersion, long columns Contains capillaries (0.12 mm ID), fittings and low dispersion heat exchanger for up to 6 columns of up to 250 mm length	5067-1597

Solvent Selection Supplies

Description	Part No.
Solvent selection tubing kit, 4 solvents	5067-4601
Cover kit for binary pump	5067-1567
Cover kit for quaternary pump	5042-9912
Solvent cabinet	5065-9981

Biocompatibility Kit

Description	Part No.
Biocompatibility kit	5065-9972
Needle seat PEEK without capillary, G1313A	G1313-87104
Needle assembly, for use with PEEK seat	G1313-87203
PEEK seat tubing, 0.17 mm ID, 100 mm, 2.3 µL	G1313-87302
PEEK capillary, 0.25 mm ID, 160 mm connecting valve with metering device of G1313 autosampler	G1313-87306
PEEK loop capillary for 100 µL sample	G1313-87309
Rotor seal, PEEK, 2-groove for G1367B, 400 bar	0100-2231
ZDV union, PEEK with fittings	0100-2441
PEEK RheFlex 2-piece fittings, 5/pk	0100-1631
PEEK Tubing, 0.25 mm ID, 15. m	0890-1762
PEEK Tubing, 0.18 mm ID, 1.5 m	0890-1763
Solvent inlet filter, PTFE, 10 µm pore stepped tubing connector, metal free	3150-0958
1/16 in. finger-tight PEEK fittings, beige	5063-6591

1100/1200 Series LC System Connection Capillaries

Generic Connecting Capillaries for Capillary LC System

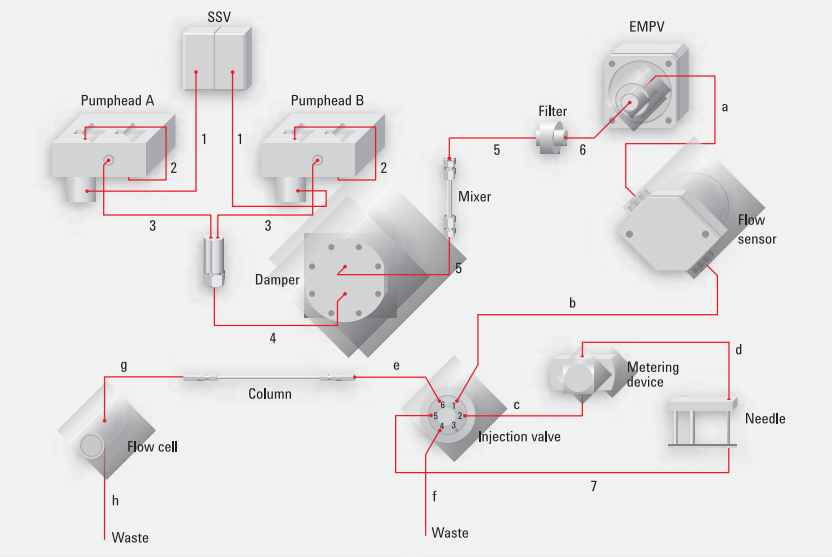
Item	From	To	Fitting	Part No.
1	SSV	AIV		G1311-67304
2	OBV	Piston 2	A/A	G1312-67300
3	Pump	Restriction capillary	A/A	G1312-67302
4	Mixing capillary	Damper	A/A	G1312-67304
5	Damper	Mixer	A/A	01090-87308
6	Mixer	Filter	A/A	01090-87308
7	Filter	EMPV	A/A	G1375-87400
8	Needle seat	Injection valve	-C	G1329-87101

PEEK Coated Fused Silica Capillaries for use with 20 µL/min Flow Range

Item	From	To	Fitting	ID (µm)	Part No.
a	EMPV	Flowsensor	B/B	50	G1375-87301
b	Flowsensor	Injection valve	B/C	50	G1375-87310
c	Injection valve	Metering device	B/C	50	G1375-87302
d	Metering device	Needle	B/B	100	G1375-87303
e	Injection valve	Column	C/D	50	G1375-87304
f	Injection valve	Waste	C/-	100	G1375-87307
g	Column	Detector	D/E	50	G1315-68703
h	Detector	Waste	E/-	75	G1315-68708
	µ-switching valve	Column	C/D	50	G1375-87309

PEEK Coated Fused Silica Capillaries for use with 100 µL/min Flow Range

Item	From	To	Fitting	ID (µm)	Part No.
a	EMPV	Flowsensor	B/B	100	G1375-87305
b	Flowsensor	Injection valve	B/C	100	G1375-87306
c	Injection valve	Metering device	B/C	100	G1375-87312
d	Metering device	Needle	B/B	100	G1375-87303
e	Injection valve	Column	C/D	75	G1375-87311
f	Injection valve	Waste	C/-	100	G1375-87307
g	Column	Detector	D/E	75	G1375-87308
h	Detector	Waste	E/-	75	G1315-68708
	µ-switching valve	Column	C/D	50	G1375-87309



Replacement Fittings and Ferrules for Capillary and Nano Flow System

Graphic	Description	Type	Part No.
	1/16 in. stainless steel fittings, front and back ferrules, 10/pk	A	5062-2418
	1/16 in. stainless steel fittings, male, 4 mm, 10/pk	B	5063-6593
	1/32 in. ferrule and stainless steel lock ring, 10/pk	B	5065-4423
	6 fittings, 2 plugs, PEEK for µ-valves	C	5065-4410
	Double winged PEEK nuts and 1/32 in. ferrules, 10/pk	D	5065-4422
	PEEK fitting long for 1/32 in. OD capillary	D	5022-6536

PEEK Coated Fused Silica Capillaries for Nano LC

Description	Part No.
25 µm ID, 10 cm long, connecting valve-column	G1375-87320
25 µm ID, 22 cm long, connecting EMPV-flow sensor	G1375-87321
25 µm ID, 35 cm long, connecting flow sensor-injection valve	G1375-87322
25 µm ID, 55 cm long, connecting valve-flow sensor or column	G1375-87323
25 µm ID, 70 cm long, connecting valve-column	G1375-87324
50 µm ID, 10 cm long, connecting valve-column	G1375-87325
75 µm ID, 65 cm long, connecting valve-injector seat or 2nd pump	G1375-87327
Nanoflow LC start-up kit Includes PEEK coated fused silica capillaries, column and fittings to start up a Nanoflow LC system	G2228-68700



1200 Rapid Resolution Connection Capillaries

From	To	ID (mm)	Length (mm)	Connection	Fittings	Part No.
Absorber capillary, 500 µL		0.17	1770	Male to male	Pre-swaged	G1312-87300
Pump	Autosampler	0.17	400	Male to male	Pre-swaged	G1312-87303
	Cooled Autosampler	0.17	700	Male to male	Pre-swaged	G1312-87304
Damper	Pressure sensor	0.17	150	Male to male	Pre-swaged	G1312-87305
Damper Mixer	Mixer Outlet Valve	0.17	105	Male to male	Pre-swaged	G1312-87306
Column	Flow cell	0.17	150	Male to female	Non-swaged	G1315-87303
Cell out	MS	0.12	500	Male to male	1 end pre-swaged	G1315-87307
DAD heat exchanger capillary		0.17	310	Male to male	1 end pre-swaged	G1315-87319
DAD heat exchanger capillary		0.12	310	Male to male	1 end pre-swaged	G1315-87339
Valve	Valve	0.12	100	Male to male	Non-swaged	G1316-27301*
Micro Valve	Regeneration Pump	0.12	130	Male to female	Non-swaged	G1316-87304*
WPS	Micro valve	0.12	340	Male to male	1 end pre-swaged	G1316-87305*
Micro valve	Heat exchanger	0.12	75	Male to male	Non-swaged	G1316-87306*
TCC VWD	MS	0.12	500	Male to male	1 end pre-swaged	G1316-87309
Column	DAD cell	0.12	50	Male to female	Non-swaged	G1316-87312
		0.12	70	Male to female	Non-swaged	G1316-87313
		0.12	90	Male to female	Non-swaged	G1316-87314
		0.12	130	Male to female	Non-swaged	G1316-87315
		0.17	150	Male to female	Non-swaged	G1315-87303
WPS	TCC	0.12	170	Male to male	Non-swaged	G1316-87316
		0.12	210	Male to male	Non-swaged	G1316-87317
Cooled WPS	TCC	0.12	300	Male to male	Non-swaged	G1316-87318
		0.12	340	Male to male	Non-swaged	G1316-87319
Column	Cooler (50-150 mm column)	0.17	105	Male to male	Non-swaged	G1316-87321
	Cooler (20-30 mm column)	0.17	170	Male to male	Non-swaged	G1316-87323
Micro valve	Detector	0.12	75	Male to female	Non-swaged	G1316-87326*
Column	DAD cell	0.12	170	Male to female	Non-swaged	G1316-87327
WPS	10 port valve	0.12	210	Male to male	Pre-swaged	G1316-87328*
10 port valve	Column	0.12	100	Male to male	Non-swaged	G1367-87303*
WPS	TCC	0.17	250	Male to male	Pre-swaged	G1367-87304

*0.8 mm OD stainless steel capillaries—use 0.8 mm ID fittings



Variable Wavelength Detector (VWD)



Deuterium lamp, G1314-60100

1100/1200 Series Variable Wavelength Detector (VWD)

Replacement Parts

Description	Part No.
G1314A VW detector accessory kit Includes 1/4 in. waste tubing, 2 hex keys, 2 wrenches, outlet tubing, 1/16 in. PEEK male fitting	G1314-68705
Deuterium lamp (1000 hours)	G1314-60100
Deuterium lamp, RFID	G1314-60101
Deuterium longlife lamp*	2140-0813
VWD inlet tubing with fitting, 0.18 x 40 mm, PEEK	5062-8522
VWD outlet tubing with fitting, 0.25 x 48 mm, PEEK	5062-8535

*Check manual for proper setting of detector

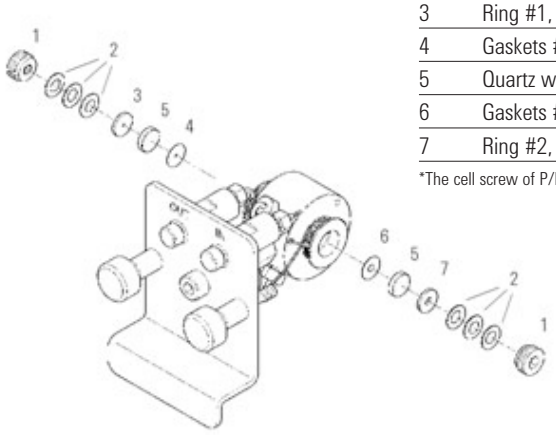
VWD Flow Cell Selection

Typical Column Length (cm)	Typical Peak Width	Recommended Flow Cell				
< = 5	0.025	Micro Flow Cell				High Pressure Flow Cell For Pressure Above 100 bar
10	0.05	0.05 - 0.2 mL/min	Semi-micro Flow Cell			
20	0.1			Standard Flow Cell		
> = 40	0.2					
Typical Flow Rate		0.05 - 0.2 mL/min	0.2 - 0.4 mL/min	0.4 - 0.8 mL/min	1 - 2 mL/min	0.05 - 5 mL/min
Internal Column Diameter		1.0 mm	2.1 mm	3.0 mm	4.6 mm	

Standard Flow Cell Replacement Parts

Item	Description	Unit	Part No.
	Standard "D" type flow cell, 10 mm, 14 µL, 40 bar		G1314-60086
	Standard flow cell, RFID, 10 mm, 14 µL		G1314-60186
	Standard "D" flow cell kit Includes 2 windows, 2 gaskets #1, 2 gaskets #2		G1314-65061
1	Cell screws*	2/pk	G1314-65062
2	Conical spring, "D" version	10/pk	79853-29100
3	Ring #1, PEEK	2/pk	G1314-65065
4	Gaskets #1, Kapton	10/pk	G1314-65063
5	Quartz windows, "D" version	2/pk	79853-68742
6	Gaskets #2, Kapton	10/pk	G1314-65064
7	Ring #2, PEEK	2/pk	G1314-65066

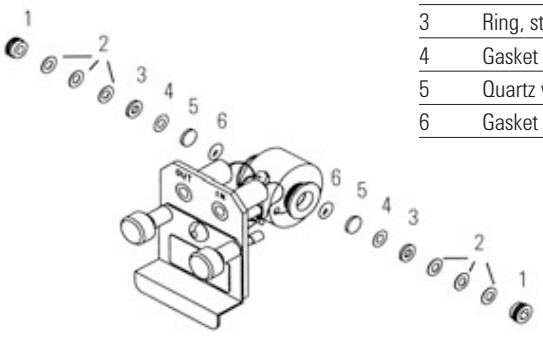
*The cell screw of P/N G1314-60086 is painted black to differentiate flow cell types.



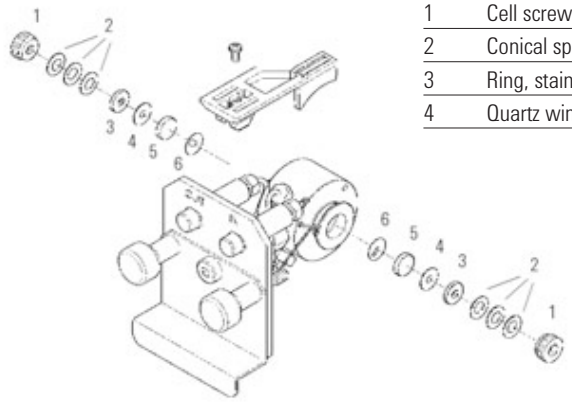
Standard flow cell

Standard Flow Cell Replacement Parts (old design)

Item	Description	Unit	Part No.
	Standard "D" flow cell kit Includes 2 windows, 2 gaskets #1, 2 gaskets #2		G1314-65050
1	Cell screw		79853-27200
2	Conical spring, "D" version	10/pk	79853-29100
3	Ring, stainless steel, "D" version	2/pk	79853-22500
4	Gasket #1, PTFE, "D" version	10/pk	79853-68743
5	Quartz windows, "D" version	2/pk	79853-68742
6	Gasket #2, PTFE	10/pk	G1314-65051



Standard flow cell



Semi-micro flow cell

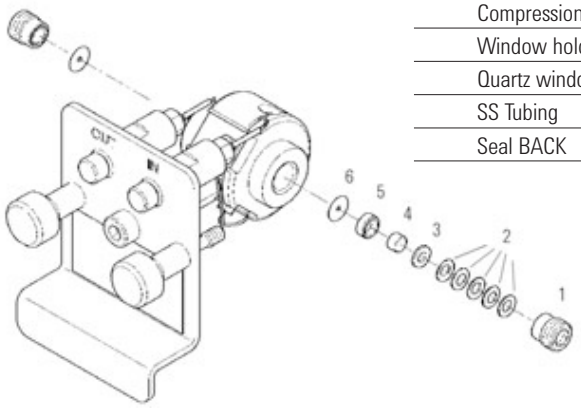
Semi-micro Flow Cell Replacement Parts

Item	Description	Unit	Part No.
	Semi-micro flow cell, RFID 6 mm, 5 µL		G1314-60183
	Semi-micro flow cell assembly 6 mm, 5 µL, 40 bar		G1314-60083
	Semi-micro flow cell kit Includes 2 windows, 4 gaskets: 2 standard #1, 1 semi-micro #1, 1 semi-micro #2		G1314-65056
1	Cell screw		79853-27200
2	Conical spring, "D" version	10/pk	79853-29100
3	Ring, stainless steel, "D" version	2/pk	79853-22500
4	Quartz windows, "D" version	2/pk	79853-68742



Micro Flow Cell Replacement Parts

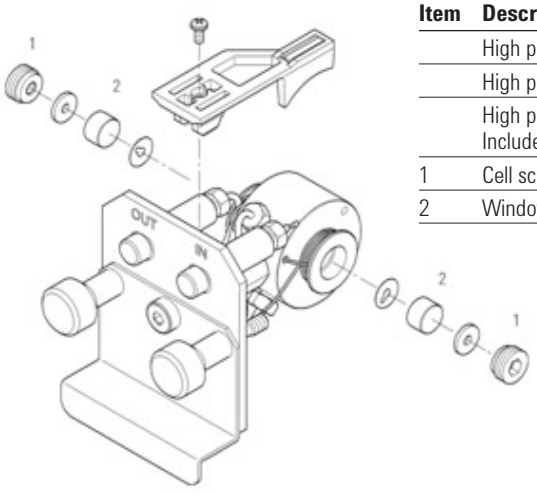
Item	Description	Unit	Part No.
	Micro flow cell, 3 mm, 2 µL, 120 bar, for use with 1200 SL		G1314-60087
	Micro flow cell, RFID, 3 mm, 2 µL		G1314-60187
	Micro flow cell, 5 mm, 1 µL, 40 bar		G1314-60081
	Micro flow cell kit Includes 2 windows, 2 gaskets #1, 2 gaskets #2		G1314-65052
	Cell repair kit, semi-micro Includes window screw kit, 4 mm hexagonal wrench and seal kits		G1315-68713
1	Cell screw		79853-27200
2	Conical spring, "D" version	10/pk	79853-29100
3	Ring, stainless steel, "D" version	2/pk	79853-22500
4	Quartz windows, "D" version	2/pk	79853-68742
5	Gasket #1, PTFE, "D" version	10/pk	79853-68743
6	Gasket #2, PTFE	10/pk	G1314-65053
	Window screw		79883-22402
	Spring washers	10/pk	5062-8553
	Compression washer		79883-28801
	Window holder		79883-22301
	Quartz window		1000-0488
	SS Tubing		5021-1823
	Seal BACK	12/pk	79883-68702



Micro flow cell

High Pressure Flow Cell Replacement Parts

Item	Description	Part No.
	High pressure flow cell, 10 mm, 14 µL, 400 bar	G1314-60082
	High pressure flow cell, RFID, 10 mm, 14 µL	G1314-60182
	High pressure flow cell kit Includes 2 windows, 2 Kapton gaskets, 2 PEEK rings	G1314-65054
1	Cell screw	79853-27200
2	Window, UHP, 2/pk	79853-68734



High pressure flow cell



1100/1200 Series Diode Array Detector (DAD)/ Multiple Wavelength Detector (MWD)

The innovative design of the Agilent 1100/1200 Series DAD lamp features:

- Lifetime durability, approximately 2000 hours
- Precise alignment
- Thermal stability
- Easy handling during installation and removal

Cleaning or Replacing DAD/MWD Flow Cells

- A decrease in detector performance or unusual noise levels may mean you have dirty flow cell windows.
- Clean and reassemble one side of the flow cell before beginning the other side to prevent mixing the front and rear gaskets which have different hole diameters.
- When you clean or replace flow cell windows, if the washers fall out of the window assembly, they must be inserted in the correct order with a Teflon ring to prevent any leaks from the flow cell window.
- Clean the cell body with water or isopropanol.
- After opening the cell you should always use a new gasket.

DAD/MWD Flow Cell Selection

Typical Column Length (cm)	Typical Peak Width	Recommended Flow Cell				
< = 5	0.025	80/500 nL Flow Cell				High Pressure Flow Cell
10	0.05		Semimicro Flow Cell			
20	0.1			Standard Flow Cell		
> = 40	0.2					
Typical Flow Rate		0.05 - 0.2 mL/min	0.2 - 0.4 mL/min	0.4 - 0.8 mL/min	1 - 2 mL/min	0.05 - 5 mL/min
Internal Column Diameter		0.3 - 1 mm	2.1 mm	3.0 mm	4.6 mm	



Deuterium longlife lamp, 2140-0813



Standard flow cell, G1315-60012



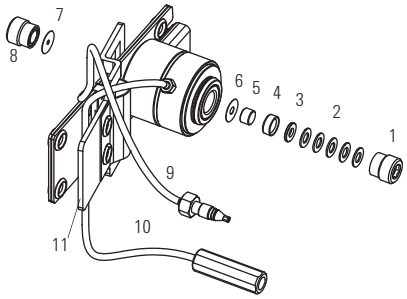
Tungsten lamp assembly, G1103-60001

Replacement Parts

Description	Part No.
Deuterium lamp	2140-0590
Deuterium longlife lamp	2140-0813
Deuterium longlife lamp, with ID tag For G1315C DAD and G1365C MWD	2140-0820
Deuterium longlife lamp For G1315A/B DAD and G1365A/B MWD	5181-1530
Tungsten lamp assembly For G1315A/B DAD and G1365A/B MWD	G1103-60001
Universal ZDV union, stainless steel, no fittings, Capillary/Nano/Standard LC	5022-2184
Holmium Oxide filter	79880-22711
Lever for Holmium Oxide Filter	G1315-45001
Column connecting capillary with fittings, 380 x 0.17 mm	G1315-87311
Column connecting capillary with fittings, 150 x 0.12 mm	G1315-87312
Column connecting capillary with fittings, 150 x 0.17 mm	G1315-87303

Standard Flow Cell and Replacement Parts

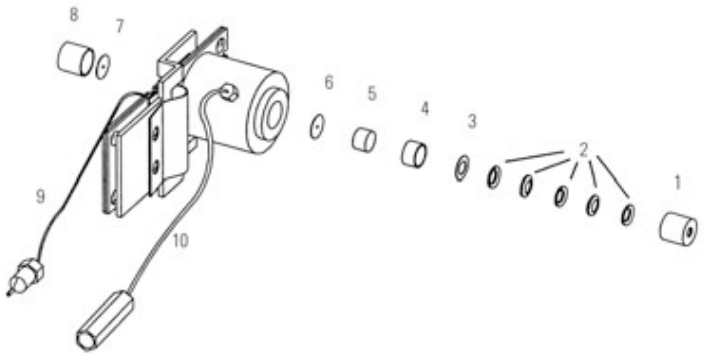
Item	Description	Part No.
	Standard flow cell, 10 mm, 13 µL, 120 bar	G1315-60012
	Standard flow cell, 10 mm, 13 µL, 120 bar, RFID tag	G1315-60022
1	Window screw	79883-22402
2	Spring washers, 10/pk	5062-8553
3	Compression washer	79883-28801
4	Window holder	79883-22301
5	Quartz window	1000-0488
6	Seal BACK , 12/pk	G1315-68711
7	Seal FRONT, 12/pk	G1315-68710
	Window assembly (includes items 1 through 5)	79883-68703
9	Inlet capillary with heat exchanger, 0.17 mm ID	G1315-87321
10	Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
11	Clamp unit	G1315-84901
	1/16 in. union, zero dead volume, stainless steel	0100-0900
	Cell repair kit Includes window screw kit, 4 mm hexagonal wrench and seal kit	G1315-68712



Standard flow cell

Semi-Micro Flow Cell and Replacement Parts

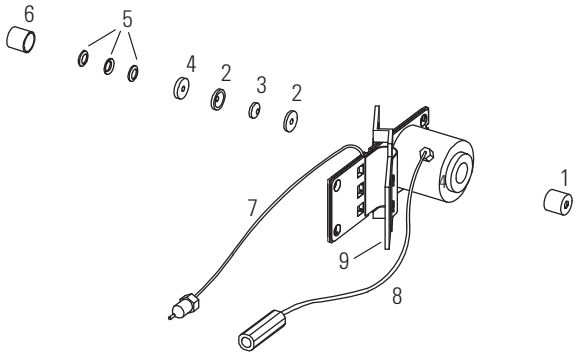
Item	Description	Part No.
	Semi-micro flow cell, 6 mm, 5 µL, 120 bar	G1315-60011
	Semi-micro flow cell with ID tag, 6 mm, 5 µL, 120 bar	G1315-60025
	Micro flow cell with ID tag, 3 mm, 2 µL, 120 bar	G1315-60024
1	Window screw	79883-22402
2	Spring washers, 10/pk	5062-8553
3	Compression washer	79883-28801
4	Window holder	79883-22301
5	Quartz window	1000-0488
6	Seal BACK, 12/pk	79883-68702
7	Seal FRONT, 12/pk	G1315-68710
8	DAD heat exchanger capillary, 310 x 0.12 mm	G1315-87339
9	Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306
	Outlet capillary, 0.17 mm ID, 200 mm long	G1315-87302
10	Clamp unit	G1315-84901
	Screw M 2.5, 4 mm long for cell body/clamp	0515-1056
	Cell repair kit, semi-micro Includes window screw kit, 4 mm hexagonal wrench and seal kits	G1315-68713



Semi-micro flow cell

Micro High-Pressure Flow Cell and Replacement Parts

Item	Description	Part No.
	Micro high-pressure flow cell, 6 mm, 1.7 µL, 400 bar	G1315-60015
1	Window assembly Includes 2 window holders assembled with windows and washers	79883-68703
2	Seal ring	79883-27101
3	Quartz window, high pressure	1000-0953
4	Compression washer, high pressure	79883-28802
5	Spring washers, 10/pk	5062-8553
6	Window screw	79883-22404
7	Inlet capillary with heat exchanger, 0.12 mm ID, 290 mm long for G1315-60011	G1315-87325
8	Outlet capillary, 0.12 mm ID, 200 mm long	G1315-87306
9	Clamp unit	G1315-84901
	Screw M 2.5, 4 mm long for cell body/clamp	0515-1056
	Column connecting capillary with fittings, 150 x 0.12 mm	G1315-87312
	Column connecting capillary with fittings, 380 x 0.17 mm	G1315-87311
	High pressure cell repair kit Includes 1 quartz window, 5 spring washers, 2 seal rings	79883-68700



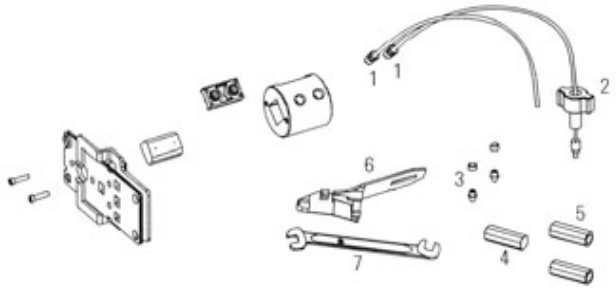
Micro high-pressure flow cell



1100/1200 Series DAD/MWD Nano Flow Cells

Nano Flow Cell Replacement Parts

Item	Description	Unit	Part No.
	500 nL Flow Cell Contains quartz flow cell with 10 mm path length and 500 nL volume, connecting capillaries, max 50 bar pressure		G1315-68724
	80 nL Flow Cell Contains quartz flow cell with 6 mm path length and 80 nL volume, connecting capillaries, max 50 bar pressure		G1315-68716
1	Fitting screw	10/pk	5063-6593
2	Double winged nuts and 1/32 in. ferrules	10/pk	5065-4422
3	1/32 in. ferrule and SS lock ring, lite touch	10/pk	5063-6592
4	Union Adjustment Tool	2/pk	5022-2146
5	Universal ZDV union, stainless steel, no fittings	2/pk	5022-2184
6	Torque wrench adapter		G1315-45003
7	Open end wrench, 4 mm		8710-1534



500 nL flow cell and replacement parts

Parts for the G1315-68724 500 nL Flow Cell

Description	Part No.
Fused silica/PEEK capillary, 100 µm ID, 30 cm long, Inlet	G1315-87333
Fused silica/PEEK capillary, 50 µm ID, 40 cm long, Inlet	G1315-87323
Fused silica/PEEK capillary, 100 µm ID, 12 cm long, Outlet	G1315-87338
Fused silica/PEEK capillary, 50 µm ID, 12 cm long, Outlet	G1315-87328
Sealing kit Includes torque adapter, 2 cell seal assemblies, 5 litetouch front and back ferrules	G1315-68715
Cell seal assembly, 500 nL	G1315-87101
Quartz cell body, 10 mm	G1315-80001

Parts for the G1315-68716 80 nL Flow Cell

Description	Part No.
Fused silica/PEEK capillary, 50 µm ID, 40 cm long, Inlet	G1315-87323
Fused silica/PEEK capillary, 50 µm ID, 12 cm long, Outlet	G1315-87328
Fused silica/PEEK capillary, 25 µm ID, 20 cm long, Inlet	G1315-87313
Fused silica/PEEK capillary, 25 µm ID, 60 cm long, Outlet	G1315-87318
Sealing kit for 80 nL flow cell Includes torque adapter, 2 cell seal assemblies, 5 litetouch front and back ferrules, 5 sleeves for 360 µm OD capillaries	G1315-68725
Quartz cell body, 80 nL, 6 mm path length	G1315-80002

G1315-60017/18 Preparative Flow Cells and Replacement Parts

Description	Part No.
Prep Flow Cell Quartz, 0.3 mm, 20 bar	G1315-60017
Prep Flow Cell Quartz, 0.06 mm, 20 bar	G1315-60018
PTFE tubing, 0.8 mm ID, 2 m	G1315-67301
PTFE tubing, 0.5 mm ID, 0.8 m	G1315-67302
Cell housing	G1315-27705
1/16 in. finger-tight PEEK fittings, beige	0100-1516
Quartz body, 0.3 mm	G1315-80004
Quartz body, 0.06 mm	G1315-80003
Prep Flow Cell SS, 3 mm, 120 bar	G1315-60016
Stainless steel connecting capillary, 0.5 mm, 250 mm	G1315-87305



G4218A 1200 Series Evaporating Light Scattering Detector

The Agilent 1200 Series Evaporative Light Scattering Detector (ELSD) is a powerful tool for sensitive detection of any compound that is less volatile than the mobile phase. It provides an essentially universal measurement under isocratic and gradient conditions not dependent on a compound's absorbance, fluorescence, or electroactivity. Low temperature evaporation technology enables detection of semi-volatile and thermo-sensitive compounds at low levels.

G4218A 1200 Series Evaporating Light Scattering Detector Replacement Parts

Description	Part No.
Standard flow nebulizer	G4218-20000
Semi-micro flow nebulizer	G4218-20001
Large flow nebulizer	G4218-20002
Micro flow nebulizer	G4218-20003
RRLC nebulizer	G4218-20004
Nebulization chamber, glass	G4218-40000
Black plastic nut, 13 mm diameter, glassware	G4218-40010
Black plastic nut, 22 mm diameter, glassware	G4218-40011
Black exhaust tube, 2.5 m	G4218-40110
Bulkhead	G4218-40130
Cartridge, 0.01 µm for gas regulator	G4218-40150
Pneumatic tube with stainless steel fitting	G4218-40220
Drain tube with stainless steel fitting	G4218-40100
Gas regulator with 0.01 µm filter and manometer	G4218-60100
Seal kit for nebulization chamber	G4218-68010
Caffeine standard, 250µg/mL	G4218-85000

Other LC Detectors

G1362A 1100/1200 Series Refractive Index Detector (RID)

Description	Part No.
Tubing kit Includes 300 mm recycle valve to recycle port, 200 mm recycle valve to waste port, 120 mm purge valve to recycle valve, 270 mm purge valve to sample cell, 170 mm purge valve to reference cell	G1362-68709
Interface tubing kit Includes 1/8 in. ferrule, 1/3 in. nut, Teflon tubing	G1362-68706
Interface Capillary, 400 mm, 0.17 mm ID	G1362-87300
Restriction Capillary, 3000 mm, 0.17 mm ID	G1362-87301



Stainless steel front ferrules, 5180-4108

G1321A 1100/1200 Series Fluorescence Detector (FLD)

Description	Unit	Part No.
Xenon flash Detector lamp		2140-0600
Flow cell		G1321-60005
Cuvette kit, 8 µl, 20 bar Includes tubing, SS fitting, front and back ferrule, PEEK fitting, syringe needle, syringe		G1321-60007
Cut-off filter kit:		
389, 408, 450, 500, 550 nm		5061-3327
380, 399, 418, 470, 520 nm		5061-3328
280, 295, 305, 335, 345 nm		5061-3329
Corrugated tubing, polypropylene, 6.5 mm ID, 5 m		5062-2463
Teflon tubing, FEP, 0.7 mm ID, 5 m		5062-2462
1/16 in. finger-tight PEEK fittings, beige	2/pk	0100-1516
Column connecting capillary with fittings, 380 x 0.17 mm		G1315-87311
1/16 in. front ferrule, stainless steel	10/pk	5180-4108
1/16 in. back ferrule, stainless steel	10/pk	5180-4114
1/16 in. male fittings, stainless steel	10/pk	5061-3303
Hex key, 4.0 mm, 10 cm long straight handle		5965-0027
Hex key, 2.5 mm, 10 cm long straight handle		5965-0028
Fluorescence Detector Calibration Sample, 1 g glycogen		5063-6597
Hex key set, 1-5 mm		8710-0641
Open end wrench, 1/4 and 5/16 in.		8710-0510
Glass syringe		9301-1446
Syringe needle		9301-0407

1100/1200 Series Chip LC

Description	Part No.
Rotor, inner valve, 3 grooves, Chip LC	G4240-23705
Rotor, outer valve, 5 grooves, Chip LC	G4240-25206
PEEK fitting, special for Chip-LC	G4240-43200
Fused silica/PEEK capillary, 15 µm, 90 cm Nano pump to chip cube	G4240-87300
Fused silica/PEEK capillary, 25 µm, 105 cm Micro well plate sampler to chip cube	G4240-87301
Fused silica/PEEK capillary, 100 µm, 100 cm Chip cube to waste	G4240-87302
Fused silica/PEEK capillary, 75 µm, 100 cm Syringe pump to chip cube	G4240-87303
Fused Silica/PEEK capillary, 50 µm, 50 cm	G4240-87304
Inline micro filter kit, 0.5 µm, PEEK Use with Chip Cube LC system	5067-1582
Fitting with 0.5 µm PEEK frit, 10/pk	5067-1584
PEEK fitting for use with 1/32 in. OD, 10/pk	5067-1585



Caffeine Standards Kit, 8500-6762

LC and LC/MS Standards

Description	Part No.
Caffeine Standards Kit for LC OQ/PV Includes one 10 mL ampoule: 125.0 µg/ml; four 5 mL ampoules: 5.0, 25.0, 250.0 and 500.0 µg/ml caffeine in water	8500-6762
Caffeine Standards Kit for LC/MS OQ/PV Includes 5 ampoules, 5 mL each: 0.5, 1.0, 5.0, 25.0, and 50.0 µg/mL in water	8500-6917
Caffeine Standards Kit for Capillary OQ/PV Includes 5 ampoules, 5 mL: 2.0, 4.0, 20.0, 100.0, 200.0 µg/mL caffeine in water	5065-4420
Caffeine Standards Kit for LC/MS-Trap OQ/PV Includes 5 ampoules, 5 ml each: 0.1, 0.5, 1.0, 5.0, 10.0, µg/ml caffeine in water	5065-9908
Caffeine OQ/PV sample for dissolution test, 150 mg/L caffeine in water, 500 mL	5042-6476
Caffeine standard, 250µg/mL	G4218-85000
Fluorescence detector calibration sample, 1 g glycogen	5063-6597
RI Detector OQ/PV Test Sample Includes 5 ampoules, 5ml: 5, 10, 15, 25, and 50 mg/ml glycerin in water	5064-8220
Sulfa Drug LC/MS OQPV standards kit 5 x 2 mL ampoules with 4 sulfa drugs in water/methanol 70:30	5188-6523
Isocratic and Gradient Standards Contains 0.15% diethylphthalate, 0.01% biphenyl, and 0.03% terphenyl in MeOH (w/w). The gradient standard includes 0.32% dioctyl phthalate as well. Two 0.5 ml ampoules of each.	01080-68702
Isocratic Standard, 0.5 mL ampoule	01080-68704
Capillary, SS, 2 m, 0.12 mm ID, ferrule	5022-2159
OQ/PV capillary for prep LC system, SS, 4 m long, 0.25 mm ID	5065-4493
RRLC Check out sample, 1 mL ampoule	5188-6529
Chip cube high mass reference (HP-1221), 0.5 mL	G1982-85001
Chip cube high mass solvent (FC-70), 25 mL Fluorinert	G1982-85002
Chip cube low mass reference sample, 1 g Methyl stearate	G1982-85003
ESI+APCI LC demo sample Contains 5 x 1 mL ampoules with 033 ng/uL Crystal violet, 77ng/uL Carbazole, 300ng/uL 9-Phenanthrol, 1ng/uL 1-Hexanesulfonic acid sodium salt in Water/Methanol 60:40	G1978-85000
ES-TOF Biopolymer reference standard kit Contains 7 x 2 ml ampoules with 5mM Purine 1 M Ammonium forate, 0.5 mM HP-0285, 0.1 mM HP-0321,0.2mM HP-1221, 0.2 mM HP-1821,0.5 mM HP-2421	G1969-85003
HSA peptide standard mix kit 2 vials with 6 lyophilized peptides	G2455-85001



1120 Compact LC Parts and Supplies

Solvent Preparation and Tubing

Description	Part No.
Solvent filtration system	5067-0215
Regenerated Cellulose filter membranes 47/45	3150-0576
Solvent reservoir, 1L	9301-1420
Solvent reservoir, amber, 1L	9301-1450
Bottle head assembly, for screw bottle	G1311-60003
Glass filter, solvent inlet, 20 µm	5041-2168
Filter frit adapter, 3 mm	5062-8517
Corrugated tubing, polypropylene	5062-2463
Teflon Solvent tubing	5062-2483
Tubing, PTFE, 5m, 0.057in. ID	5062-2461



Piston seals, 5063-6589



PTFE frits, 01018-22707

Pump Supplies

Description	Part No.
Sapphire Piston	5063-6586
Piston Seals, graphite filled PTFE (reversed phase)	5063-6589
Passive inlet valve	G4280-60005
Piston Seals, polyethylene (normal phase)	0905-1420
Outlet ball valve, (quaternary, isocratic)	G1311-60012
PTFE frits	01018-22707
Gold seal, outlet	5001-3707
Outlet caps	5062-2485
SS Tubing	G1312-67305
SS capillary, damper 1, 0.6 mm ID	G4280-81300
SS capillary, damper 2, 0.6 mm ID	G4280-81301
Tubing, PTFE, 16 cm with fittings, 3 mm OD Degasser to dual channel gradient valve	G4280-60034
LC pump connecting tubing, PTFE Gradient valve to pump	G4280-67304
Dual channel gradient valve	G4280-60004
Solvent selection valve kit	G4280-68708
Solvent selection valve	G4280-60029
Purge valve assembly	G4280-60031



PEEK rotor seals, 5067-4102

Manual Injection Valves

Description	Part No.
Manual injection valve kit Includes 20 µL loop and needle port	5067-4102
Manual injection valve	5067-4104
Bearing ring for switching valves	1535-4859
Rotor seal, PEEK	5067-4105
Stator head	0100-1850
Needle port	5067-1581



Sample loop, 01078-87302

Autosampler Supplies

Description	Part No.
100 position tray for 2 mL vials	G1313-44510
15 position tray for 6 mL vials	G1313-44513
40 position tray for 2 mL vials	G1313-44512
Needle assembly, standard autosampler	G1313-87201
Standard needle seat	G1313-87101
2 Position/6 Port Injection Valve	0101-0921
Rotor seal, Vespel, 400 bar	0100-1853
Rotor seal, Tefzel	0100-1849
Stator face, ceramic	0100-1851
Stator head	0100-1850
Isolation seal	0100-1852
Sample loop, 100 µL	01078-87302
Rotor seal, 3 grooves, max 600 bar	0101-1416
Sapphire Piston	5063-6586
Piston Seals, graphite filled PTFE (reversed phase)	5063-6589

Tips & Tools

The 1120 Compact LC System uses the same sample loops as the 1200 Series manual injection valve.



Deuterium lamp, G1314-60100

Variable Wavelength Detector (VWD)

Description	Part No.
Deuterium lamp (1000 hours)	G1314-60100
Standard "D" type flow cell	G1314-60086
Cell screws	G1314-65062
Conical spring, "D" version	79853-29100
Ring #1, PEEK	G1314-65065
Gaskets #1, Kapton	G1314-65063
Quartz windows, "D" version	79853-68742
Gaskets #2, Kapton	G1314-65064
Ring #2, PEEK	G1314-65066
Semi-micro flow cell assembly	G1314-60083
Micro flow cell	G1314-60087
High pressure flow cell	G1314-60082

Miscellaneous 1120 Compact LC Supplies

Description	Part No.
Caffeine standard, 250µg/mL	G4218-85000
PM kit, manual injector	G4280-68710
PM kit, auto injector	G4280-68730

LC/MS Supplies

Combined with Agilent's industry-leading LC systems, our single quadrupole, ion trap, triple quadrupole, TOF and Q-TOF LC/MS solutions combine world-class performance with legendary reliability and ease-of-use. This section contains all of the mass spectrometry supplies you need to keep your LC mass spectrometer running at peak performance.

NEW! LC/MS Preventive Maintenance Kit

For your convenience, the LC/MS Preventive Maintenance Kit has the recommended common supplies needed for most Agilent LC/MS systems. Unique source parts should be ordered separately.

LC/MS Preventive Maintenance Kit

Description	Part No.
LC/MS Preventive Maintenance Kit	5190-1443
Foreline pump oil, Inland 45, 1 L	6040-0834
Oil mist filter element for E2M18	1535-4970
Filter element, 5 µm, box of 5	0100-2051
Spring canted coil	1460-2571
Rotor seal, Vespel, pH 0 to 10	0100-1855



6100 Series Single Quadropole LC/MS

Description	Part No.
Instrument Parts	
APCI nebulizer needle	G1946-20097
APCI nebulizer needle replacement kit	G2428A
Corona needle APCI	G1947-20029
API-ES nebulizer needle	G1946-20177
API-ES nebulizer needle replacement kit	G2427A
Foreline pump oil, Inland 45, 1 L	6040-0834
Filter element, 5 µm, box of 5	0100-2051
Distributor disk	0100-2050
Electron multiplier replacement horn	05971-80103
Fuse, 8.0 amp, 2 required	2110-0969
Big hydrocarbon trap, 1/4 in. fittings	BHT-4
Ion Optics and Octopole Assembly	
Screw, M3 x 0.5 x 8 T10	0515-0372
Screw pin	G1946-20211
Octopole cable assembly	G1946-60080
O-ring, 2-033, for skimmer	0905-1471
High throughput skimmer, 2 mm	G1969-20302
Strain relief block	G1946-20172
Lens 1	G1946-20029
Lens 2	G1946-20030

6100 Series Single Quadropole LC/MS

Description	Part No.
Ion Optics and Octopole Assembly	
Lens spacer, Vespel	G1946-20143
O-ring, 2-153, for skimmer spacer	0905-1468
Capillary (G1946A/B/C and G1956A), 0.5 mm ID	G1946-80009
Capillary (G1946D, G1956B), 0.6 mm ID	59987-20040
Capillary cap (G1946D and G1956A/B)	G1946-20301
Spring canted coil	1460-2571
Capillary mount sleeve, PTFE	G1946-20151
Capillary mount, PTFE	G1946-20150
Tubing, Fittings and Ferrules	
1/16 in. finger-tight PEEK fittings, beige	0100-1516
Tubing, PTFE, 1/4 in., for N_2 supply and drying gas	0890-1793
Copper tubing, 1/8 in., 50 ft	5180-4196
PEEK tubing	0890-1915
Waste drain hose, PTFE, 6 ft	0890-1962
Vacuum Accessories	
Foreline exhaust adapter	59980-20134
Hose clamp	1400-0563
Oil mist filter kit for E2M18	3162-1056
Oil mist filter element for E2M18	1535-4970
Oil return kit	3162-1057
KF25 clamp, stainless steel	0100-0549
KF25 coseal (inside clamp)	0100-1597
Exhaust tubing, 1/2 in. ID x 3/4 in. OD	0890-1727
Pump oil drip pan	G1946-00034
Foreline pump oil, Inland 45, 1 L	6040-0834



6100 Series Single Quadropole LC/MS

Description	Part No.
Chemicals	
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	G2423A
ESI tuning mix, 100 mL	G2421A
APCI/APPI calibrant solution, 100 mL	G2432A
ES-TOF tuning mix, 100 mL	G1969-85000
APCI-L low concentration tuning mix, 100 mL	G1969-85010
Electrospray LC demo sample (Sulfamix)	59987-20033
ESI+APCI LC demo sample	G1978-85000
MMI-L low concentration tuning mix, 100 mL	G1969-85020
ES Negative Ion Performance Standard, 5 x 1 mL ampoules	G2424A
APCI Negative Ion Performance Standard, 5 x 1 mL ampoules	G2425A
ES/APCI Positive Ion Performance Standard	G1946-85004
Multiple-charge compound performance evaluation sample (horse heart myoglobin)	G2426A
Caffeine Standards Kit for LC/MS OQ/PV	8500-6917
Flushing solvent	G1969-85026
High purity water, 4 L	8500-2236
Methyl alcohol, 1 L	8500-1867
Ammonium formate	G1946-85021
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	G2423A
Tools	
Capillary cleaning wire for dip tube, 500 ft spool	G1946-80054
Big hydrocarbon trap	BHT-4
Abrasive mesh, 4000 grit	8660-0827
LC/MSD tool kit	G1946-60157
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
3 mm wrench for nebulizer needle adjustment	8710-2699
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Needle nose pliers, pointed serrated jaws	8710-0004



6200 Series TOF LC/MS Supplies

Description	Part No.
Instrument Parts	
ES nebulizer assembly	G1946-60098
API-ES nebulizer needle replacement kit	G2427A
Spray shield	G1946-20157
End plate	G1946-20156
Inlet filter assembly	G1946-60180
Filter element, 5 µm, box of 5	0100-2051
Rotor seal, Vespel, pH 0 to 10	0100-1855
Rotor seal, Tefzel, pH 0 to 14	0100-1854
SSV long drain tubing assembly	G1969-60086
Capillary cap (G1946D and G1956A/B)	G1946-20301
Spring canted coil	1460-2571
Capillary (G1946D, G1956B)	59987-20040
1/6 in. tee, low dead volume, stainless steel	0100-0969
1/16 in. finger-tight PEEK fittings, beige	0100-1516
Female luer to female 10/32 adapter	0100-2304
PEEK tubing, 1/16 in., 0.13 mm ID, 1.5 m	0890-1915
Gas-tight syringe, Teflon luer lock, 1.0 mL	5182-9710
High throughput skimmer, 2 mm	G1969-20302
Vacuum Accessories	
Oil mist filter kit for E2M18	3162-1056
Oil return kit	3162-1057
Foreline pump oil, Inland 45, 1 L	6040-0834
Rotary pump oil, 4 L	6040-0798

6200 Series TOF LC/MS Supplies

Description	Part No.
Chemicals	
ES-TOF tuning mix, 100 mL	G1969-85000
APCI-L low concentration tuning mix, 100 mL	G1969-85010
MMI-L low concentration tuning mix, 100 mL	G1969-85020
ES-TOF reference mix, 6 x 2 mL ampoules	G1969-85001
ES-TOF Biopolymer reference standard kit	G1969-85003
Flushing solvent	G1969-85026
High purity water, 4 L	8500-2236
Methyl alcohol, 1 L	8500-1867
Acetonitrile, 1 L	G2453-85050
Formic acid, 5 mL	G2453-85060
Ammonium formate	G1946-85021
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	G2423A
Tools	
Capillary cleaning wire for dip tube, 500 ft spool	G1946-80054
Big hydrocarbon trap	BHT-4
Abrasive mesh, 4000 grit	8660-0827
LC/MSD tool kit	G1946-60157
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
3 mm wrench for nebulizer needle adjustment	8710-2699
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Needle nose pliers, pointed serrated jaws	8710-0004



6300 Series Ion Trap LC/MS Supplies

Description	Part No.
Instrument Parts	
ES nebulizer assembly Used for analytical sprayer	G1946-60098
API-ES nebulizer needle replacement kit	G2427A
Vented standoff for mesh assembly	G1946-20163
APCI nebulizer assembly	G1946-60037
APCI nebulizer needle replacement kit	G2428A
Corona needle holder	G1947-60103
Corona needle APCI	G1947-20029
Syringe adapter	9301-1291
Syringe pump	3162-0178
1/16 in. finger-tight PEEK fittings, beige	0100-1516
Female luer to female 10/32 adapter	0100-2304
PEEK tubing, 1/16 in., 0.13 mm ID, 1.5 m	0890-1915
Gas-tight syringe, Teflon luer lock	5182-9710
Capillary cap (G1946D and G1956A/B)	G1946-20301
Spring canted coil	1460-2571
Capillary (G1946A/B/C and G1956A), 0.5 mm ID	G1946-80009
Capillary (G1946D, G1956B), 0.6 mm ID	59987-20040
Replacement horn and dynode	G2441-80010
Chemicals	
ESI Tuning Mix for Ion Trap, 100 mL	G2431A
APCI/APPI calibrant solution, 100 mL	G2432A





6400 Series Triple Quadropole LC/MS Supplies

Description	Part No.
Instrument Parts	
ES nebulizer assembly	G1946-60098
API-ES nebulizer needle replacement kit	G2427A
Spray shield	G1946-20157
End plate	G1946-20156
Inlet filter assembly	G1946-60180
Filter element, 5 µm, box of 5	0100-2051
Rotor seal, Vespel, pH 0 to 10	0100-1855
Rotor seal, Tefzel, pH 0 to 14	0100-1854
SSV long drain tubing assembly	G1969-60086
Capillary cap (G1946D and G1956A/B)	G1946-20301
Spring canted coil	1460-2571
Capillary (G1946D, G1956B)	59987-20040
1/6 in. tee, low dead volume, stainless steel	0100-0969
1/16 in. finger-tight PEEK fittings, beige	0100-1516
Female luer to female 10/32 adapter	0100-2304
PEEK tubing, 1/16 in., 0.13 mm ID, 1.5 m	0890-1915
Gas-tight syringe, Teflon luer lock, 1.0 mL	5182-9710
High throughput skimmer, 2 mm	G1969-20302
Vacuum Accessories	
Oil mist filter kit for E2M18	3162-1056
Oil return kit	3162-1057
Foreline pump oil, Inland 45, 1 L	6040-0834
Rotary pump oil, 4 L	6040-0798
Ion Optics and Octopole Assembly	
Screw, M3 x 0.5 x 8 T10	0515-0372
O-ring, 2-153, for skimmer spacer	0905-1468
Octopole cable assembly	G1946-60080
O-ring, 2-033, for skimmer	0905-1471
High throughput skimmer, 2 mm	G1969-20302
Strain relief block	G1946-20172
Lens 1	G1946-20029
Lens spacer, Vespel	G1946-20143
Lens 2	G1946-20030
Screw pin	G1946-20211

6400 Series Triple Quadropole LC/MS Supplies

Description	Part No.
Chemicals	
ES-TOF tuning mix, 100 mL	G1969-85000
APCI/APPI calibrant solution, 100 mL	G2432A
MMI-L low concentration tuning mix, 100 mL	G1969-85020
Flushing solvent	G1969-85026
High purity water, 4 L	8500-2236
Methyl alcohol, 1 L	8500-1867
Acetonitrile, 1 L	G2453-85050
Formic acid, 5 mL	G2453-85060
Ammonium formate	G1946-85021
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	G2423A
Tools	
Capillary cleaning wire for dip tube, 500 ft spool	G1946-80054
Big hydrocarbon trap	BHT-4
Abrasive mesh, 4000 grit	8660-0827
LC/MSD tool kit	G1946-60157
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
3 mm wrench for nebulizer needle adjustment	8710-2699
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Needle nose pliers, pointed serrated jaws	8710-0004





6500 Series Accurate-Mass Q-TOF LC/MS Supplies

Description	Part No.
Instrument Parts	
ES nebulizer assembly	G1946-60098
API-ES nebulizer needle replacement kit	G2427A
Spray shield	G1946-20157
End plate	G1946-20156
Inlet filter assembly	G1946-60180
Filter element, 5 µm, box of 5	0100-2051
Rotor seal, Vespel, pH 0 to 10	0100-1855
Rotor seal, Tefzel, pH 0 to 14	0100-1854
SSV long drain tubing assembly	G1969-60086
Capillary cap (G1946D and G1956A/B)	G1946-20301
Spring canted coil	1460-2571
Capillary (G1946D, G1956B)	59987-20040
O-ring, size 2-320, flourocarbon, for angled adapter	0905-1592
NW20/25 hinged clamp with wing nut	0100-1398
Ion Optics and Octopole Assembly	
Screw, M3 x 0.5 x 8 T10	0515-0372
O-ring, 2-153, for skimmer spacer	0905-1468
Octopole cable assembly	G1946-60080
O-ring, 2-033, for skimmer	0905-1471
High throughput skimmer, 2 mm	G1969-20302
Strain relief block	G1946-20172
Lens 1	G1946-20029
Lens spacer, Vespel	G1946-20143
Lens 2	G1946-20030
Screw pin	G1946-20211
Vacuum Accessories	
Oil mist filter kit for E2M18	3162-1056
Oil return kit	3162-1057
Foreline pump oil, Inland 45, 1 L	6040-0834
Rotary pump oil, 4 L	6040-0798

6500 Series Accurate-Mass Q-TOF LC/MS Supplies

Description	Part No.
Chemicals	
ES-TOF tuning mix, 100 mL	G1969-85000
APCI-L low concentration tuning mix, 100 mL	G1969-85010
MMI-L low concentration tuning mix, 100 mL	G1969-85020
ES-TOF reference mix, 6 x 2 mL ampoules	G1969-85001
ES-TOF Biopolymer reference standard kit	G1969-85003
Flushing solvent	G1969-85026
High purity water, 4 L	8500-2236
Methyl alcohol, 1 L	8500-1867
Acetonitrile, 1 L	G2453-85050
Formic acid, 5 mL	G2453-85060
Ammonium formate	G1946-85021
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	G2423A
Tools	
Capillary cleaning wire for dip tube, 500 ft spool	G1946-80054
Big hydrocarbon trap	BHT-4
Abrasive mesh, 4000 grit	8660-0827
LC/MSD tool kit	G1946-60157
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
3 mm wrench for nebulizer needle adjustment	8710-2699
Open end wrench, 1/4 and 5/16 in.	8710-0510
Wrench, 1/2 and 7/16 in.	8710-0806
Needle nose pliers, pointed serrated jaws	8710-0004



LC/MS Source Supplies

Description	Part No.
Electrospray Nebulizer	
API-ES nebulizer needle replacement kit	G2427A
Nebulizer needle ferrule	G1946-20213
API-ES nebulizer needle	G1946-20177
Needle holder	G1946-20174
Hex nut	2740-0001
Curved spring washer	3050-1167
Screw, M2 x 0.4	0515-1602
Square nut	G1946-20175
O-ring retainer	G1946-20202
G1947 A/B APCI Source	
APCI nebulizer assembly	G1946-60037
APCI nebulizer needle replacement kit	G2428A
Corona needle holder	G1947-60103
Contact spring, BeCu Use with G1947A source only	1460-2717
Locking spring, stainless Use with G1947A source only	1460-2716
Corona needle APCI	G1947-20029
Nebulizer adjustment fixture	G1946-20215
Nebulizer 25X magnifier	G1946-80049
APCI Nebulizer	
APCI Nebulizer Needle	G2428A
Nebulizer needle ferrule	G1946-20213
APCI nebulizer needle	G1946-20097
Needle holder	G1946-20174
Hex nut	2740-0001
Curved spring washer	3050-1167
Screw, M2 x 0.4	0515-1602
Square nut	G1946-20175
O-ring retainer	G1946-20202
G1948 A/B Electrospray Source	
ES nebulizer assembly	G1946-60098
API-ES nebulizer needle replacement kit	G2427A
Vented standoff for mesh assembly	G1946-20163
Nebulizer adjustment fixture	G1946-20215
Nebulizer 25X magnifier	G1946-80049



Quiet Cover

Quiet Cover

Agilent has a solution to the frequent maintenance and inherent noise of LC/MS rough pumps. The Quiet Cover II was designed for easy movement, maintenance, and better living with rough pumps used with Agilent and other LC/MS systems.

- Locking castors to move heavy pump for maintenance
- No tools necessary to remove sectioned cover for easy access to pump
- Built in Lift and Tilt lever raises end of pump to drain oil
- Removable drip pan with well and hand holds to collect and transport oil
- Sound absorbing cabinet with resistant foam insulation to reduce pump noise
- Pump mounted on cushioned grommets to minimize vibration
- 2 Integrated fans maintain temperature inside cover
- LEDs and audible alarm if temperature exceeds 35°C limit
- Maximum ambient temperature of 35° when airflow is neither restricted nor recycled
- Standard one-year warranty. Installation and familiarization included with new LC/MS orders

The Quiet Cover II is compatible with these Agilent LC/MS systems:

- 6100 Single Quads: G6110AA, G6120AA, G6130AA, G6140AA
- 6300 Traps: G2440DA, G2451AA, G4533AA, G2474SS
- 6410 QQQ: G6410AA
- 6210 TOF: G3250AA, G3252A
- 6510AA Q-TOF: G6510AA

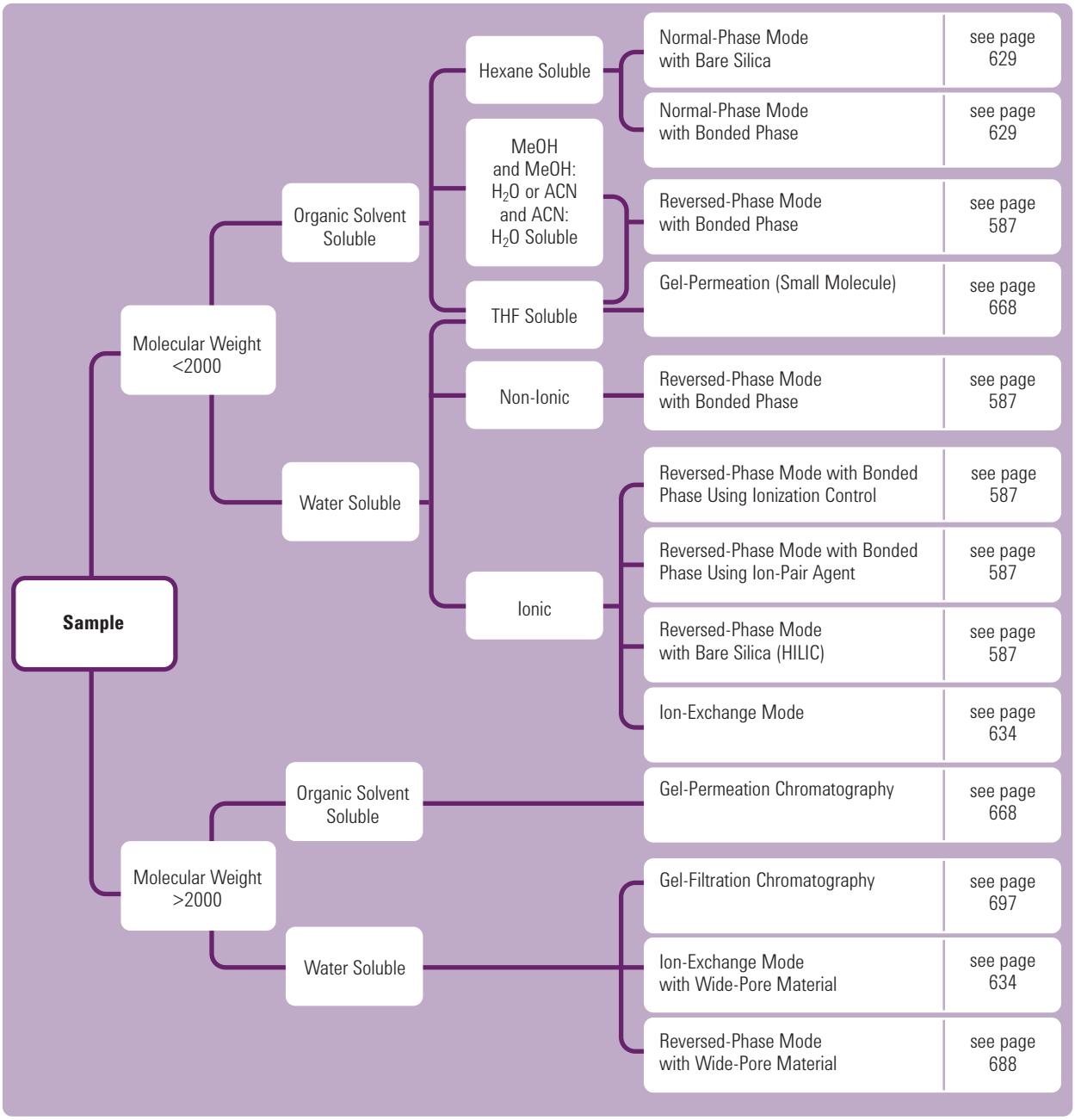
Or any analytical system using BOC Edwards pumps (lbs/kg): E2M28, E2M18, E1M18.

Description	Part No.
Quiet Cover II for Agilent LC/MS Systems 12.5 W x 17.3 H x 33.5 L	G3199B

LC and LC/MS Columns

Column Selection

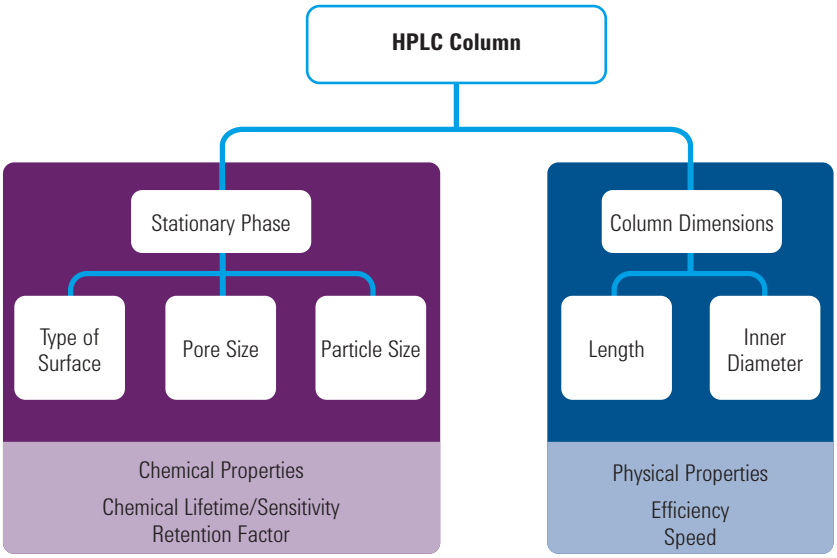
To use the column selection guide diagram below, simply follow the path for your analyte and mobile phase. At the far right, follow your final column selection to the pages indicated.



Adapted with permission from "Practical HPLC Methodology and Applications," Brian A. Bidlingmeyer, John Wiley & Sons, Inc., New York, p. 109

Column and Mobile Phase Guidelines: Reversed Phase

HPLC columns consist of two parts, the column chemistry and hardware. For the proper column chemistry, consult the catalog section for each type of bonded phase. For choosing column hardware and particle sizes, consult the section on column sizes and rapid separations, including Agilent ZORBAX Rapid Resolution and Rapid Resolution HT columns, as well as Solvent Saver and Capillary columns and PrepHT columns.



Pore Size Selection

Choose a column packing with small pore (60-120Å) if the solute molecular weight is less than about 5000. Otherwise, use column packing with the 300Å pore size.

Particle Size Selection

The standard particle size for HPLC columns is 5 µm with 3.5 µm now dominant for method development. If high-speed analyses or higher resolution analyses are required, packing with 1.8 µm and 3.5 µm particles can be used. Shorter columns with these particles can produce faster high-resolution separations, with the 1.8 µm particle size in Rapid Resolution HT columns, providing the highest efficiency. The 3.5 µm particle size operates at a routine operating pressure and can be used on all LC's. Short (50 mm and shorter) 1.8 µm RRHT columns can be used on optimized standard LC's, while the longer columns may require a higher pressure LC (one supporting pressures greater than 400 bar).

Column Configuration

The column sizes most often recommended for analytical method development are 4.6 x 150 mm or 4.6 x 75 mm. If more resolution is needed, use a longer column, 4.6 x 250 mm or the same size column with a smaller particle size. During method development, choose the column internal diameter (e.g., 2.1, 3.0 mm) to accommodate additional application objectives (e.g., sensitivity, solvent usage) or compatibility with certain instrument types (capillary, nano, or prep).

Silica Type and Bonded Phase

Silica Type

Agilent ZORBAX reversed phase columns use three different types of porous silica microspheres, the original ZORBAX SIL, ZORBAX Rx-SIL and modified ZORBAX Rx-SIL. ZORBAX Rx-SIL and modified ZORBAX Rx-SIL are highly purified and less acidic than the original ZORBAX SIL. Less acidic silica means less potential for interaction between the analyte and silanol groups on the silica surface, especially if the solutes are basic, and contributes to improved peak shape. For new method development, we strongly recommend using reversed-phase products based on modified ZORBAX Rx-SIL (Eclipse Plus) and ZORBAX Rx-SIL (Eclipse, StableBond etc.). However, many excellent methods have been developed on reversed phase columns based on ZORBAX SIL and we continue to manufacture these high quality, reliable products.

Bonded Phase

A good first choice for bonded phase is C18 or C8. If the sample solutes of interest are not adequately separated on these columns, CN and Phenyl columns may offer significant differences in selectivity from the straight-chain alkyl phases to effect the separation.

In general, larger solutes, such as proteins, are best separated on short-chain reversed-phase columns (C3, CN) and peptides and small molecules are separated on longer-chain columns (C8, C18). There are many cases, however, where this conventional wisdom does not apply. For example, peptides can also be effectively separated using short-chain columns, and hydrophobic peptides can show better recovery on longer-chain phases. Therefore, it is best to initially select a phase in the middle of the hydrophobic spectrum (e.g., C8), then change to a more hydrophobic phase or more hydrophilic phase depending on initial results and solubility properties of your sample.

pH and Mobile Phase

The choice of mobile phase for a reversed-phase system starts with selecting the organic modifier. Selectivity differences and sample retention will vary significantly among mobile phases containing acetonitrile, methanol, and tetrahydrofuran (THF). Sample solubility is likely to differ in such solvents and dictate use of a specific solvent or solvents. UV detection at certain wavelengths is not possible with certain modifiers (e.g., methanol at 200 nm).

Both pH and ionic strength of the aqueous portion of mobile phases are important parameters in developing rugged methods that are not sensitive to small variations in conditions. With ionic compounds, retention of typical species shows significant changes with pH. It is very important to control pH in such reversed-phase systems to stabilize retention and band spacing. A pH set between 2 and 4 generally provides the most stable conditions for retention vs. small changes in pH and this pH is recommended for starting method development for most samples, including basic compounds and typical weak acids.

Column Choice Relative to Application Objective

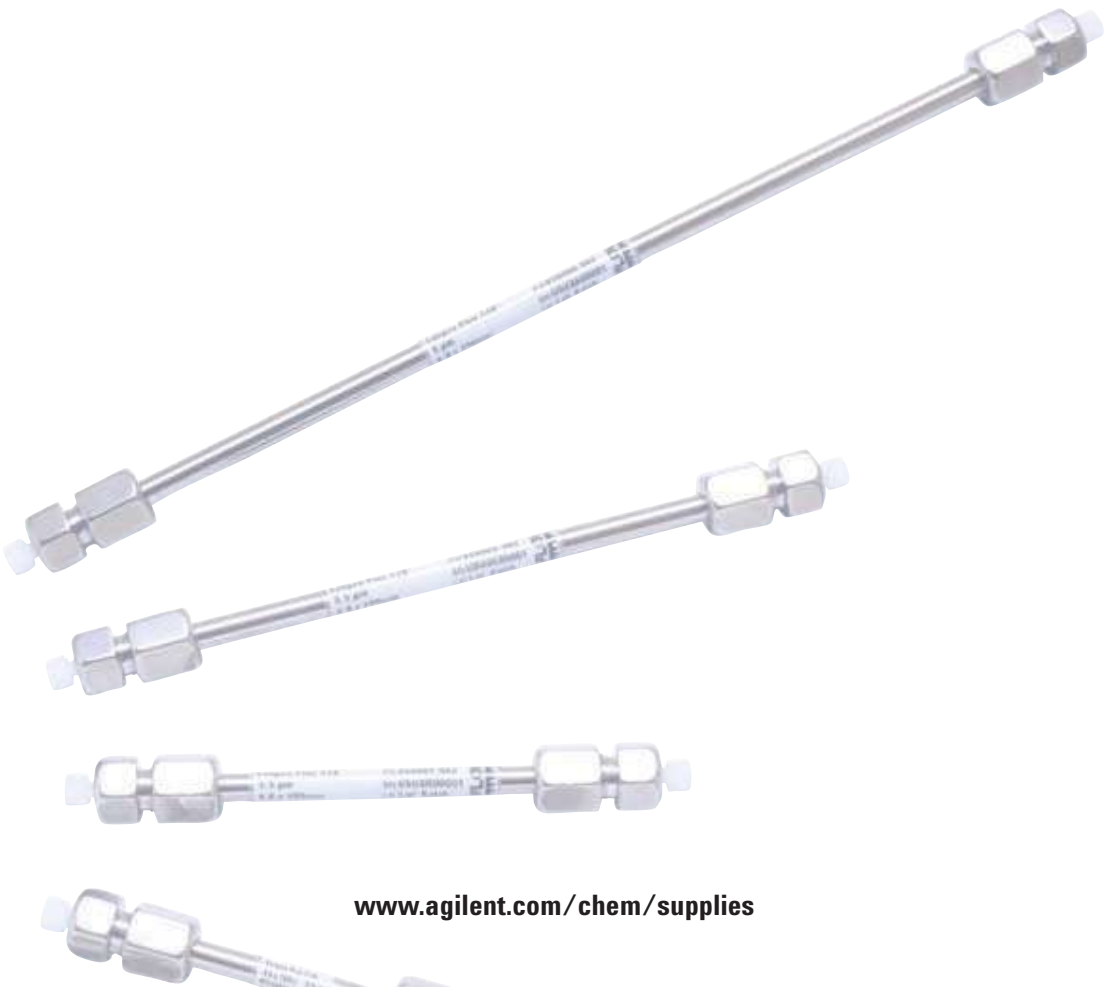
Application	Objective Column Diameter (mm)
Very high sensitivity, LC/MS, peptides and proteins	0.1, 0.075
Very high sensitivity, limited sample, LC/MS, peptides and proteins	0.3, 0.5
High sensitivity, limited sample, LC/MS	1.0
Save solvent; special low-volume instrumentation is available	2.1
Special detectors, e.g., mass spec	2.1
High sensitivity, limited sample	2.1
Save solvent; standard HPLC equipment available, LC/MS	3.0
Standard separations	4.6
Small-scale (mg) preparative separations	9.4
Large-scale preparative separations (100 mg-gram)	21.2
Large-scale preparative separations (up to 100 mg-gram)	30, 50

Consult the Column Hardware section for guard column configurations

Method Development from pH 1-12

Chromatographic resolution between two or more peaks depends upon three factors – column efficiency, selectivity, and retention. With ionizable analytes – bases and acids – all of these factors change dramatically with pH. For example, retention can be improved by changing the separation pH, so that analytes are separated in their non-ionized form. Changes in mobile phase pH also improve column efficiency because the ionization of the analyte and the residual silanols can both be altered. This minimizes secondary interactions between analytes and the silica surface that cause poor peak shape. Achieving optimum resolution can also require changing the mobile phase pH. The following method development strategy explains how this is done with superior column lifetime.

Low, mid, and high pH are the three general regions for chromatographic separations as defined in Figure 1. This figure highlights the benefits of performing separations of ionizable analytes in each pH region. Method development proceeds by investigating chromatographic separations first at low pH and then at higher pH until optimum results are achieved. The ideal column is available for each pH region.



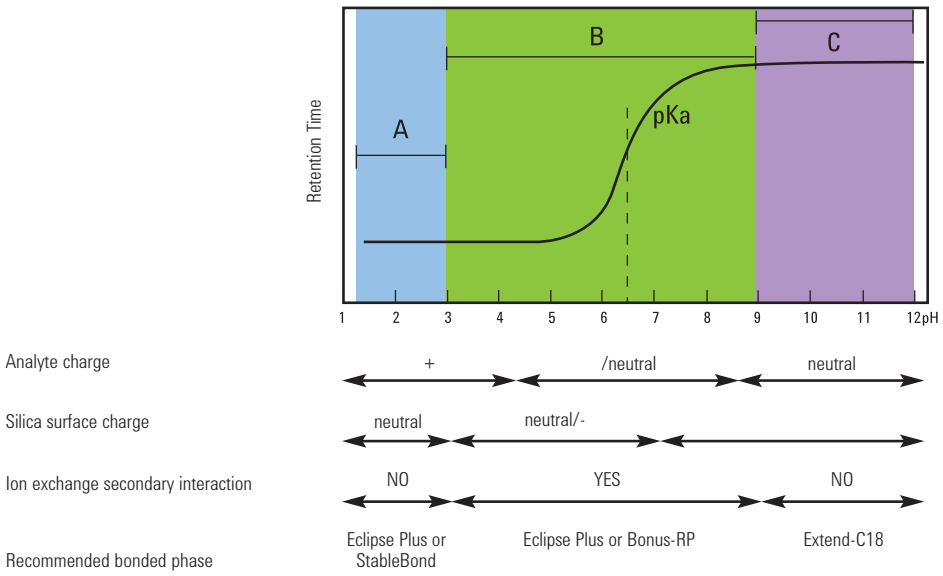


Figure 1: Three pH Regions for HPLC Separations of Basic Compounds
This figure represents the retention behavior of one basic analyte with respect to pKa and pH. Analyte pKa is 6.5

Low pH < 3 – Region A	Mid pH 7 – Region B	High pH > 9 – Region C
• Start method development at low pH, where silanols on a RP-HPLC column are protonated. This minimizes peak tailing by eliminating silanol/base interactions. • At low pH, basic compounds are positively charged and their retention may be reduced. • Acidic compounds may be protonated and have increased retention. • Retention times are usually stable with small changes in pH, producing a robust method. • Volatile mobile phase additives, such as formic acid or trifluoroacetic acid (TFA), are often used at low pH with LC/MS.	• Develop methods at pHs at least 1 pH unit above or below the pKa to minimize changes in retention with small changes in pH. • Some silica surface SiOH groups become SiO^- above pH 4 to 5; tailing interactions may be possible. • Minimize interactions by selecting a well designed and endcapped column, using additives such as TEA (triethylamine) (less desirable) or using "polar-linked" bonded phases. • Silica breakdown is prevented by innovative bonding chemistry, heavy endcapping, and use of Rx-SIL.	• In this region, basic compounds may be in their free base form. • Increased retention and resolution of basic compounds are likely. • Retention changes little in this region, thus robust methods can be developed. • Silica breakdown is prevented by innovative bidentate column chemistry, heavy endcapping, use of Rx-SIL, and optimum mobile phase. • Ammonium hydroxide is an excellent volatile mobile phase modifier at high pH.

Start method development at low pH (pH 2-3)

With so many column choices available, how do you know where to start your method development? The recommended starting point for method development is using a buffered low pH mobile phase – around pH 2-3. Using a low pH mobile phase most often results in the best peak shape for basic compounds on silica-based columns. At low pH, the silanols on the silica are fully protonated so positively charged basic compounds do not interact strongly. The result is good peak shape. Many acidic compounds are non-charged, maximizing their retention at low pH. These observations are key advantages to method development at low pH.

For standard analytical work, start method development with acetonitrile as the mobile phase organic modifier and 20-50 mM phosphate buffer (pH 2-3) as the aqueous component for non-LC/MS applications. These conditions provide good pH control, necessary for the most reproducible analyses of ionizable compounds. For LC/MS applications formic acid or TFA are good mobile phase additives for low pH.

Choose Agilent ZORBAX Eclipse Plus first for best peak shape

Select ZORBAX Eclipse Plus C18 or C8 columns first for method development at low pH. Eclipse Plus columns are the newest addition to the Eclipse family and use improved silica and bonding technologies to provide good peak shape for basic compounds. Eclipse Plus columns can be used from pH 2-9 providing method development flexibility. They are stable down to pH 2 making them an ideal choice for initial method development.

Optimize solvents and bonded phases at low pH

The initial method development steps may lead very quickly to a satisfactory separation. But if more optimization is needed, acetonitrile can be replaced by methanol or tetrahydrofuran and the separation re-optimized. This step may lead to a satisfactory solution, but if still more selectivity optimization is needed, the column bonded phase can be changed.

At low pH there are many bonded phase choices available for optimization. These include the Eclipse Plus phases as well as the Eclipse XDB family with C18, C8, Phenyl and CN. Alternate choices include six different StableBond bonded phases: SB-C18, SB-C8, SB-Phenyl, SB-CN, SB-C3, and SB-Aq.

It may be necessary at low pH to improve the retention of acidic compounds. For these situations, lower the pH even further, down to pH 1-2, and use StableBond columns. These columns provide the greatest stability at very low pH and provide many selectivity options for achieving the highest resolution separations.

Method development at mid pH (4-9)
Agilent ZORBAX Eclipse Plus

There are some samples that may not be resolved at low pH or may have better solubility and stability at mid pH. While still using the Eclipse Plus C18 column, the mid pH range can be used for method development. The Eclipse Plus column is stable up to pH 9 so it is equally reliable at mid pH. These double endcapped columns have two key advantages – good peak shape at low and mid pH, as well as sufficient bonded phase density to protect the column from silica degradation from pH 6-9.

At mid pH, basic compounds (e.g., amines) may still have a positive charge and the silanols on the silica surface may have a negative charge. Therefore covering as many silanols as possible leads to the best peak shape at mid pH. This makes the Eclipse Plus C18 the best starting choice for a column at mid pH. Phosphate buffer is usually the first choice for mobile phase modifier at pH 7 because its buffer range is pH 6.1-8.1. A second choice for mid pH is acetate buffer since it buffers from pH 3.8-5.8 and its volatility makes it a good choice for LC/MS compatibility.

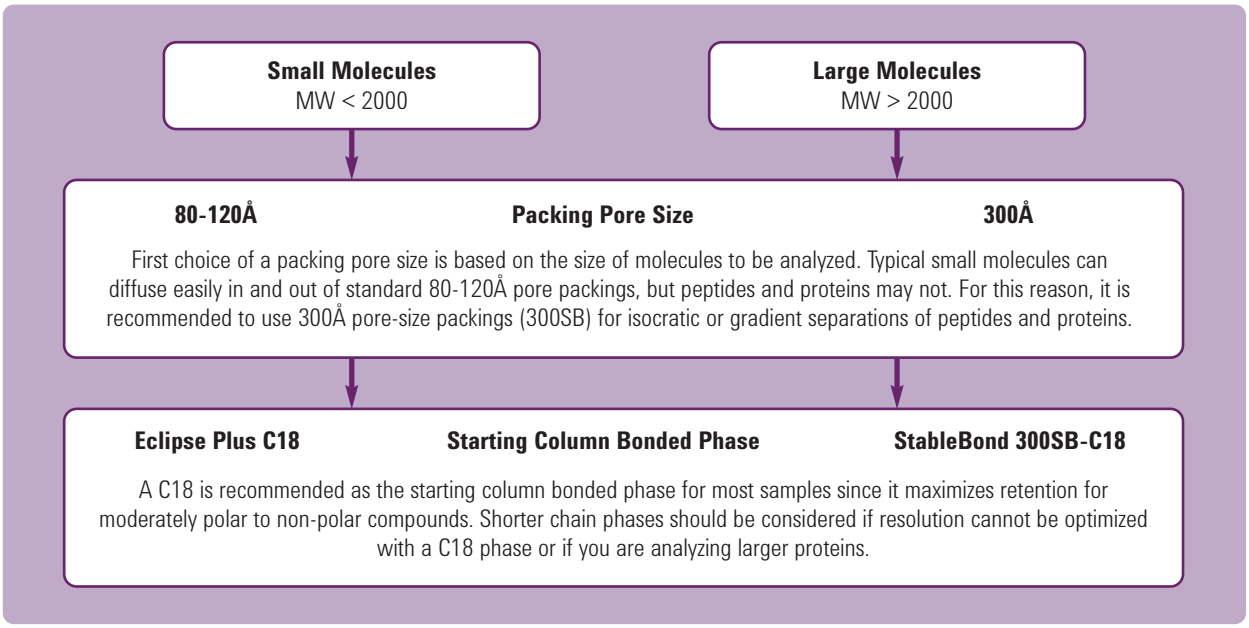
Alternate selectivities – Agilent ZORBAX Eclipse Plus Phenyl-Hexyl, Eclipse XDB-Phenyl, CN and Bonus-RP

The method development process at mid pH mimics the process at low pH with optimization of the organic modifier and selecting an alternate bonded phase if resolution is not achieved after that step. The alternate bonded phases at mid pH are the Eclipse Plus Phenyl-Hexyl, Eclipse XDB-Phenyl, Eclipse XDB-CN and Bonus-RP. They provide very different selectivities for many samples and the method development process is followed again. The Bonus-RP column has a polar embedded amide group that provides different selectivity for many samples, provides good peak shape for basic compounds and allows the column to be used with up to 100% aqueous mobile phases.

Method development at high pH (pH 9-12)
Choose Agilent ZORBAX Extend-C18 columns

At low or mid pH, some separations of basic compounds may still not have enough retention or the desired selectivity. For these samples, high pH separations may be appropriate. Until recently, high pH separations on silica-based columns were avoided because of short column lifetimes, due to dissolution of the underlying silica gel. Newer column technologies, i.e. the ZORBAX Extend-C18, can protect the silica from dissolution, so that a reasonable column lifetime can be achieved and the selectivity advantages of high pH can be explored.

The mobile phase buffer choices at high pH with the Extend-C18 column are organic buffers like triethylamine and ammonium hydroxide. These buffers are best used with methanol as the organic modifier to extend the column lifetime at high pH.



Starting Column Choices

Small Molecules

Standard Analysis

Eclipse Plus C18

4.6 x 150 mm, 5 µm

959993-902

4.6 x 150 mm, 3.5 µm

959963-902

Fast Analysis

Eclipse Plus C18

4.6 x 75 mm, 3.5 µm

959933-902

Rapid Resolution HT, 600 bar

4.6 x 50 mm, 1.8 µm

959941-902

Large Molecules

Standard Analysis

ZORBAX 300SB-C18

4.6 x 150 mm, 5 µm

883995-902

Fast Analysis

ZORBAX 300SB-C18

4.6 x 50 mm, 3.5 µm

865973-902

Poroshell 300SB-C18

2.1 x 75 mm, 5 µm

660750-902

USP Designations

The US Pharmacopeia (USP) is a standard source for many pharmaceutical methods. The USP specifies columns by packing materials rather than by manufacturer. Listed below are the recommended Agilent Technologies HPLC columns suitable for most LC methods listed with the USP.

USP Designations	USP Packing Materials	Columns	Particle Size (µm)	Pore Size (Å)	Page No.
L1	Octadecyl silane chemically bonded to porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter	ZORBAX Eclipse Plus C18	1.8, 3.5 and 5	95	590
		ZORBAX Eclipse XDB-C18	1.8, 3.5, 5 and 7	80	596
		ZORBAX SB-C18	1.8, 3.5, 5 and 7	80, 300	604
		ZORBAX Rx-C18	3.5 and 5	80	622
		ZORBAX Extend-C18	1.8, 3.5, 5 and 7	80, 300	617
		ZORBAX ODS	3.5, 7 and 5	70	624
		ZORBAX ODS classic	5	70	624
		LiChrosorb RP-18	5 and 10	100	626
		LiChrospher RP-18	5	100	625
		Purospher RP-18/-e	5	80	627
		Superspher RP-18/-e	4	100	628
		Nucleosil 100-5 C18	5	100	626
L2	Octadecyl silane chemically bonded to porous silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 to 50 µm in diameter	N/A			
L3	Porous silica particles, 5 to 10 µm in diameter	ZORBAX SIL	5	70	629-630
		ZORBAX Rx-Sil	3.5 and 5	80, 300	622
		LiChrospher 60 Si	5	60	625
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter	Custom Order			
L5	Alumina of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter	N/A			
L6	Strong cation-exchange packing: sulfonated fluorocarbon polymer coated on a solid spherical core, 30 to 50 µm in diameter	N/A			
L7	Octyl silane chemically bonded to totally porous microsilica particles, 1.5 to 10 µm in diameter	ZORBAX Eclipse Plus C8	1.8, 3.5 and 5	95	590
		ZORBAX Eclipse XDB-C8	1.8, 3.5, 5 and 7	80	596
		ZORBAX SB-C8	1.8, 3.5, 5 and 7	80, 300	604
		ZORBAX Rx-C8	1.8, 3.5, 5 and 7	80	622
		ZORBAX C8	5	70	624
		LiChrosorb RP-8	5	100	626
		LiChrospher RP-8	5	100	625
		LiChrospher RP select B	5	60	625

USP Designations	USP Packing Materials	Columns	Particle Size (µm)	Pore Size (Å)	Page No.
L8	An essentially monomolecular layer of aminopropyl-silane chemically bonded to totally porous silica gel support, 10 µm in diameter	ZORBAX NH_2 LiChrospher NH_2	5 5	70 100	629-630 633
L9	10 µm irregular, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating	ZORBAX SCX SynChropak SCX	5 spherical 6.5	300 300	634 700-701
L10	Nitrile groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX CN ZORBAX SB-CN ZORBAX Eclipse XDB-CN LiChrospher CN	5 3.5 and 5 3.5 and 5 5	70 80, 300 80 100	629-630 604 596 633
L11	Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter	ZORBAX Phenyl ZORBAX SB-Phenyl ZORBAX Eclipse XDB Phenyl ZORBAX Eclipse Plus Phenyl-Hexyl	5 3.5 and 5 3.5 and 5 3.5 and 5	70 80 80 95	624 604 596 590
L12	Strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter	Accubond Bulk SAX, 25 g bottle			
L13	Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX TMS	5	70	
L14	Silica gel 10 µm in diameter with a chemically bonded, strongly basic quaternary ammonium anion-exchange coating	ZORBAX SAX SynChropak SAX	5 6.5	70 300	634 700-701
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	N/A			
L16	Dimethyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	N/A			
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 µm in diameter	N/A			
L18	Amino and cyano groups chemically bonded to porous silica particles, 5 to 10 µm in diameter	N/A			
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 9 µm in diameter	N/A			
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	LiChrospher Diol	5	100	633
L21	A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10 µm in diameter	N/A			
L22	A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm in size	N/A			

USP Designations	USP Packing Materials	Columns	Particle Size (µm)	Pore Size (Å)	Page No.
L23	An ion exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10 µm in size	N/A			
L24	A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface, 32 to 63 µm in diameter	N/A			
L25	Packing having the capacity to separate compounds with a MW range from 1000 to 5000 da (as determined by the polyethylene oxide), applied to neutral, anionic and cationic water-soluble polymers	PL aquagel-OH		N/A	676
L26	Butyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter				
L27	Porous silica particles, 30 to 50 µm in diameter	SampliQ Bulk Silica, 25 g bottle			
L28	A multifunctional support, which consists of a high purity, 100Å, spherical silica substrate that has been bonded with anionic (amine) functionality in addition to conventional reversed-phase C8 functionality	N/A			
L29	Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm diameter with a pore diameter of 80Å	N/A			
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3 to 10 µm in diameter	N/A			
L31	A strong anion-exchange resin-quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000Å and consisting of ethylvinylbenzene cross-linked with 55% divinylbenzene	N/A			
L32	A chiral ligand-exchange packing L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter	N/A			
L33	Packing having the capacity to separate proteins by molecular size over a range of 4,000 to 400,000 da. It is spherical, silica-based, and processed to provide pH stability	ZORBAX GF-250	4	150	697
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 9 µm in diameter	N/A			
L35	A zirconium-stabilizes spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase	ZORBAX GF-250 ZORBAX GF-450	4 6	150 300	697

USP Designations	USP Packing Materials	Columns	Particle Size (µm)	Pore Size (Å)	Page No.
L36	L-Phenylgylcine-3,5-dinitrobenzoyl on 5 µm amino propyl silica	N/A			
L37	Polymethacrylate gel packing having the capacity to separate proteins by molecular size over a range of 2,000-4,000 da MW	N/A			
L38	Methacrylate-based size exclusion packing for water solubles	N/A			
L39	Hydrophilic polyhydroxymeth-acrylate gel of totally porous spherical resin	N/A			
L40	Cellulose tris-3,5-dimethylphenylcarb-amate coated porous silica particles, 5 to 20 µm in diameter	N/A			
L41	Immobilized alpha-acid glyco-protein on spherical silica particles, 5 µm in diameter	N/A			
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles	N/A			
L43	Pentafluorophenyl groups chemically bonded to silica particles 5 to 10 µm in diameter	N/A			
L44	A multifunctional support, which consists of a high purity, 60Å spherical silica substrate, that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed phase C8 functionality	N/A			
L45	Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter	ChiraDex Chiral	5		668
L46	Polystyrene/divinylbenzene substrate agglomerated with quaternary amine functionalized latex beads, 10 µm in diameter	N/A			
L47	High capacity anion exchange microporous substrate, fully functionalized with a trimethyl-amine group, 8 µm in diameter	N/A			
L48	Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion-exchange microbeads, 15 µm in diameter	N/A			
L49	Amylose tris-3,5-dimethylphenyl-carabamate-coated, porous, spherical, silica particles, 5 to 10 µm in diameter	N/A			
L50	A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µm in diameter	ZORBAX 300SCX SynChropak SCX	5 5	300 300	634 700-701
L51	A reversed-phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter	N/A			

USP Designations	USP Packing Materials	Columns	Particle Size (µm)	Pore Size (Å)	Page No.
L52	Multifunction resin with reversed-phase retention and strong anion-exchange functionalities. The resin consists of ethylvinyl-benzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350m^2/g, substrate is coated with quaternary ammonium functionalized latex particles consisting of styrene cross-linked with divinylbenzene.	N/A			
L53	An anion-exchange resin consisting of rigid, spherical styrene-divinylbenzene copolymer with trimethylammonium groups at a loading of about 2 meq per g, 3 to 29 µm in diameter	N/A			
L54	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 7 to 11 µm diameter	N/A			
L55	Weak cation-exchange resin consisting of ethylvinylbenzene, 55% cross-linked with divinylbenzene copolymer, 3 to 15 µm diameter. Substrate is surface grafted with carboxylic acid and/or phosphoric acid functionalized monomers. Capacity not less than 500 µeq/column	N/A			
L56	Propyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	SB-C3	3.5 and 5	80	604
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120 angstroms.	Ultron ES-OVM	5	120	666
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	N/A			
L59	Packing having the capacity to separate proteins by molecular weight over the range of 5 to 7000 kDa. It is spherical (5 - 10 µm), silica-based, and processed to provide hydrophilic characteristics and pH stability.	N/A			
L60	Spherical, porous silica gel, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped.	Bonus-RP	1.8, 3.5 and 5	80	612

Cartridge Column Systems

Cartridge Selection Guide

Icon*	Type of Cartridge	Features	Benefits
AC	Agilent HPLC Cartridge	Can reverse collets in the end fitting to add guard cartridges	Inexpensive Extends column lifetime Permits rapid column changes Can use 2, 3, 4 and 4.6 mm cartridges
		Cartridges have a unique filter and sieve at each end	Helps prevent blockage
ZGC	ZORBAX Guard Cartridge: Stand alone system	High efficiency, stand-alone, low dead volume cartridge	Seals up to 400 bar
		Polymeric cartridge designed for leak-tight seals against metal surfaces	No gaskets required More solvent-resistant than PEEK
		Reusable fittings	Adapt for connections to 1/16 in. LC fittings
RR	ZORBAX Rapid Resolution and Rapid Resolution HT Cartridge Columns: 3.5 µm and 1.8 µm packings, stand alone system	For high throughput LC/MS, LC/MS/MS and combinatorial separations	
		Packed with Eclipse XDB for pH use from 2-9 Packed with StableBond for low pH use	For all analyte types Low bleed
		Sold individually or as three-packs	
P	ZORBAX Semi-Preparative Guard HPLC Hardware Kit: Stand alone system	Easy low-dead-volume assembly	Seals up to 2000 psi (135 bar, 13.5 MPa)
		Tubing (polyphenylene sulfone) designed for leak-tight seals against metal surfaces	No gaskets required
		Reusable fittings	Adapt for connections to 1/16 in. LC fittings
PI	ZORBAX and Agilent Prep Preparative Cartridge Column and Guard HPLC System: Stand alone and integral hardware options	Easy low-dead-volume assembly	Extends column lifetime
		Reusable fittings	Permits rapid column changes
		Hardware options for integral and external guards	Can use with 21.2 and 30 mm ID columns

*Look for these icons on subsequent pages to help you select the proper guard cartridges and columns.

Cartridge/Guard Cartridge Systems Compatibility Guide*

Icon	Column Type	Guard Cartridge Holder	ID (mm)	Phases
AC	Cartridge column cartridge holder 5021-1845 	Guard cartridge (internal system) cartridge holder 5021-1845 	2.0 3.0 4.0 4.6	Asahipak LiChrospher Nucleosil Purospher Superspher ZORBAX
ZGC	Standard fitting 	Column guard cartridge (stand-alone) cartridge holder 820888-901 	2.1 3.0 4.6	ZORBAX
RR	Rapid Resolution cartridge holder 820555-901 	No guard cartridge holder	4.6	ZORBAX
P	Semi preparative column 	Semi prep guard cartridge (stand-alone) cartridge holder 840140-901 	9.4	ZORBAX
PL	PrepHT	Guard cartridge 820444-901 	21.2	ZORBAX Agilent Prep

*Stand-alone guard cartridges fit to all catridge and standard fitting columns available from Agilent. All columns without icons are standard fitting columns.

Look for this icon identifying Agilent cartridge columns in column ordering tables.

Cartridge Column Systems

Agilent offers a variety of popular HPLC packing materials in economical, easy-to-use cartridge configurations.



Guard Cartridge installed

Agilent Cartridge System

Agilent's flexible cartridge system has been thoroughly tested to ensure that the design and hardware meet Agilent's standards of quality. Finger-tight connections allow rapid column changes without removing the capillaries from the end fittings. The same convenient, easy-to-use cartridge holder accommodates 2, 3, 4 and 4.6 mm diameter cartridges of varying lengths. The cartridge columns have a unique filter and sieve at each end that help prevent blockage.

By reversing the collets in the end fitting, an inexpensive guard cartridge can be added to further extend column lifetime.



No guard cartridge installed

Hardware

Description	Unit	Part No.
Cartridge holder for 2, 3, 4 and 4.6 mm ID cartridges	2/pk	5021-1845
Replacement filters for 4 and 4.6 mm ID cartridges	10/pk	5063-6574
Replacement filters for 2 and 3 mm ID cartridges	10/pk	5063-6519
Mounting tool for replacement filters		5021-1846
Replacement collets	2/pk	5021-1849

ZGC

This icon identifies stand-alone guard cartridges for ZORBAX analytical columns.



ZORBAX High Performance Guard Cartridge

The ZORBAX High Performance Guard Cartridge series has been developed to provide convenient, cost-effective protection for high performance analytical columns. The cartridge components assemble quickly and easily to provide a high efficiency, low dead volume column that seals, with hand tightening, up to 5000 psi (340 bar) or 3000 psi with a PEEK fitting.

The reusable guard column end fitting with integrated 1/16-inch OD tubing adapts the cartridge guard column for direct connection to standard 1/16-inch LC fittings and provides a stand-alone guard column system for 2.1-4.6 mm ID columns. There are two different end fitting options to allow the use of other connecting tubing.

The polymeric guard cartridges used in this holder are specifically designed to make leak-tight seals against metal surface without requiring gaskets. This polymeric material (polyphenylenesulfone) is also more solvent resistant than PEEK.

Guard cartridges are available for almost every ZORBAX bonded phase and can be found in the ordering information for each type of column.

Hardware

Description	Part No.
Guard fittings kit Includes low-volume guard holder, inlet end fitting (2), outlet end fitting with integrated column connector, and PEEK fingertight fitting	820888-901
Inlet end fitting, also used as alternate outlet end fitting	820340-001
Exit end fitting with integrated column connector	820345-001
1/16 in. finger-tight PEEK fittings, beige, 2/pk	0100-1516
Perfluoro-Elastomer Seals, 2/pk	820370-901

Rapid Resolution and Rapid Resolution HT Cartridge Columns are marked with this icon.



Rapid Resolution and Rapid Resolution HT Cartridge Column System (400 bar)

For fast, clean high throughput LC/MS, LC/MS/MS and combinatorial separations, we recommend the ZORBAX Rapid Resolution (3.5 µm) and Rapid Resolution HT (1.8 µm) Cartridge Columns. These cartridges are packed with ZORBAX Eclipse and StableBond bonded phases that provide excellent separations.

Cartridge dimensions are 4.6 x 15 mm, 4.6 x 30 mm or 4.6 x 50 mm and 2.1 x 15 mm, 2.1 x 30 mm or 2.1 x 50 mm. All 15 and 30 mm cartridges are available in both Eclipse and StableBond phases in both the 3.5 µm and the very high efficiency 1.8 µm particles. The 1.8 µm particles are available as 50 mm cartridges and as 50 mm columns with fixed endfittings. Choose the Eclipse XDB bonded phases for most methods and when using LC/MS mobile phase additives such as formic acid or acetic acid. The StableBond phases are ideal for different selectivity and for long lifetime with TFA containing mobile phases. Additional bonded phases can be packed upon request.

These economical and easy-to-use cartridge columns are offered individually and as a convenient three pack.

One cartridge holder kit will provide all the pieces to use with either Rapid Resolution or Rapid Resolution HT columns.

Hardware

Description	Part No.
Hardware Kit for RR and RRHT Cartridges Includes cartridge holder 15 mm, cartridge holder 30 mm, cartridge holder 50 mm (1ea), and end fitting assemblies (2)	820555-901
Cartridge holder, 15 mm	820315-015
Cartridge holder, 30 mm	820330-030
Cartridge holder, 50 mm	820320-050
Perfluoro-Elastomer Seals, 2/pk	820370-901
End fitting assembly, need two for one system	820311-001

P

This icon identifies preparative guard-columns.



Preparative guard system

ZORBAX Semi-Preparative Guard-Column Hardware Kit

The ZORBAX Semi-Preparative Guard-Column has been developed to provide convenient, cost-effective protection for high-performance lab-scale semi-preparative columns. The cartridge components assemble quickly and easily to provide a high-efficiency, low-dead-volume column that seals at pressures up to 2000 psi (135 bar, 13.5 MPa).

The guard-column housing made from polyphenylene sulfone is specifically engineered to make leak-tight seals against metal surfaces, without requiring gaskets. The reusable guard-column end fittings adapt the cartridge guard column for connection to standard 1/16 in. LC fittings and provide a stand-alone guard column system. The ZORBAX materials used in preparative cartridges are matched with chemistry chosen for compatibility with a wide range of applications.

Hardware

Description	Part No.
Preparative guard-column hardware kit* Includes inlet fitting, outlet end fitting, column connector	840140-901

*The semi-preparative guard-column hardware is available only as a kit.



This icon identifies prep preparative cartridge and guard-columns.



Guard Cartridge, 820444-901



Assembled 420420-901
Preparative External Guard Hardware Kit.

ZORBAX PrepHT and Agilent Prep Preparative Cartridge and Guard-Column Hardware

The ZORBAX PrepHT and Agilent Prep Preparative Cartridge and Guard-Column hardware kits have been developed to provide a convenient preparative 21.2 mm ID cartridge design. The 21.2 mm ID preparative cartridge columns (actual ID 17 mm to fit into holder) are reusable and allow rapid change of column lengths from 50-250 mm for optimizing sample loadability. This easy-to-use cartridge hardware design is used for both ZORBAX PrepHT and Agilent Prep materials and can be finger-tightened up to 5000 psi (350 bar).

The cartridge hardware can be used stand-alone or with an integral guard column. The integral guard column holder is a stainless steel body and is used with a Teflon sealing gasket to assure a tight, leak-free and extremely low-dead-volume seal against the 21.2 mm ID cartridge body. The external guard system seals fingertight up to 2000 psi (135 bar). The reusable guard holder is ready to use with standard 1/16 in. LC fittings. Both ZORBAX and Agilent Prep guard cartridges are available to use with this holder and are selected to match the preparative column used in the application.

The 21.2 mm ID guard columns can be used with the 30 mm ID Agilent Prep columns. For this application, select the external preparative guard-column hardware kit.

PrepHT Columns are easy to use



PrepHT cartridge columns have a unique design that makes them easy to install and seal finger tight up to 5000 psi. The cartridge design allows for an integral guard column to be used, which prolongs the life of the purification column. This cartridge configuration is economical to use since the column cartridge and/or the guard cartridges are replaced independently. The endfittings are used many times.

Hardware

Description	Part No.
PrepHT cartridge column hardware Includes cartridge column end fittings (2), polymeric seals (2)	820400-901
PrepHT guard-column hardware kit Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)	820444-901
Agilent Prep external guard hardware kit, Includes guard holder, guard column end fitting, polymeric seal (2), seal insertion tool, and connector tubing	420420-901
Replacement polymeric seals, 2/pk	820385-901

HPLC Column Protection

Column Protection

Guard columns and in-line filters are inexpensive and easy-to-use tools for column protection. They can improve the accuracy of the results and improve analytical column lifetime while enhancing reliability. Column protection is available for all sizes of columns with any particle size packed into the column.

Guard Columns

Guard columns provide protection against contamination with minimal impact on column efficiency. Prepacked ZORBAX cartridge columns are available for most types of ZORBAX material. Guard cartridges are available in different internal diameters to provide high efficiency protection to all types of columns. Guard columns are also available for many of the non-Zorbax columns. See the respective column listings for the available guard columns.

Low Volume In-line Filters

Low volume in-line filters are recommended for every column and provide column protection from particulate materials. An in-line filter will increase analytical column lifetime by preventing particulates (from unfiltered samples and/or eluents) from plugging the analytical column frit. Using guard columns can compromise the efficiency of very low volume columns and/or columns with very small particle sizes. For these columns, low volume in-line filters are strongly encouraged. A small, 0.5 µm frit should be used to maximize column efficiency.

Replacement Column Inlet Frits

If HPLC columns are used without a guard column on in-line precolumns filter; the analytical column may become plugged. Due to the high efficiency packing processes used today replacing the column inlet frit is discouraged. Column efficiency may be compromised if the frit is replaced. PEEK-encapsulated replacement frits are available for ZORBAX columns packing in 2.1 mm, 3.0 mm, 4.6 mm, and 9.4 mm standard column hardware.

Replacement Inlet Frits (PEEK Encapsulated) for Standard Hardware Columns

Description	Diameter (mm)	Unit	Part No.
Narrow Bore	2.1	10/pk	280959-904
Solvent Saver	3.0	1/ea	280959-006
Analytical	4.6	10/pk	280959-905
Semi-Preparative	9.4	1/ea	280959-001

Agilent ZORBAX Silica

ZORBAX Silica Manufacturing Process – the Making of a Rugged, High-Purity Silica

All Agilent ZORBAX columns are built from porous silica microspheres (PSM) based on silica sols. The silica particle is made of tiny, solid sol microparticles agglutinated in a patented polymerization process, then fused together at very high temperatures to form the final particle (Figure 1). These strong, durable silica particles are called ZORBAX Rx-SIL or ZORBAX SIL and are the base silicas for ZORBAX columns.

The ZORBAX Rx-SIL process produces ultra-pure (99.995%) particles, with very low metal content. The final silica particle is fully hydroxylated and of low acidity. The Rx-SIL process also allows careful and reproducible control of pore size and particle size. These key features – purity (low acidity), strength, and careful control of pore and particle size – are critical to excellent chromatographic results and are the building blocks of superior ZORBAX bonded phases.

The table below compares the process used to make the ZORBAX Rx-SIL particles to a second process – the Xerogel process – commonly used to make silica particles for HPLC columns. To produce silica with the key features that maximizes chromatographic performance – purity, strength, controlled pore and particle size, plus higher pH resistance – the Agilent ZORBAX process is an excellent choice.

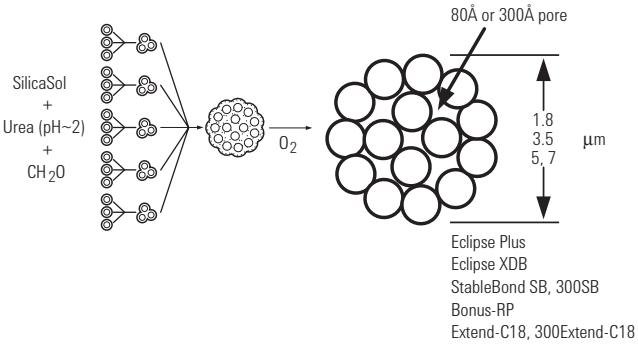
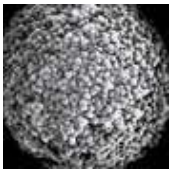
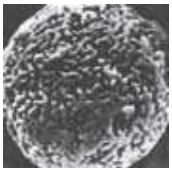


Figure 1. Formation of ZORBAX porous silica particles



ZORBAX Rx-SIL uniform sub particles



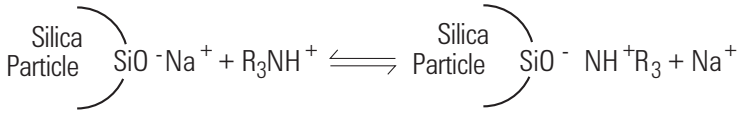
Xerogel "sponge-like" polymeric network

Characteristics of ZORBAX Rx-SIL and a Contrasting Type of Silica

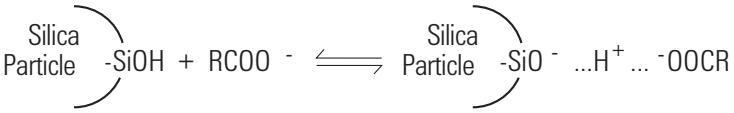
Structure	ZORBAX Rx-SIL (Sol-type)	Xerogel (SIL-type)
Purity	High (99.995%)	Low to High
Strength	High	Moderate
Pore Size, Particle Size Distribution	Narrow	Broad
Pore Size/Surface Area	80Å/180m^2/g	100Å/300m^2/g
Porosity (%)	60	70
High pH Resistance	Good	Poor

The Benefit of Silica Purity – Reduced Peak Tailing

Peak tailing of basic compounds can be a major chromatographic problem. Peak tailing reduces chromatographic efficiency and the accuracy and precision of results. The major cause of peak tailing is interactions between analytes and the silica surface (Figure 2). Typically the presence of acidic silanol sites on the silica surface cause this type of peak tailing. Trace metals in silica increase silanol acidity and peak asymmetry. These silanol interactions are reduced or eliminated by choosing a less acidic, ultrapure (99.995%) silica, such as ZORBAX Rx-SIL. The improvement in chromatography is dramatic. Figure 3 shows the reduction in peak tailing for a basic analyte using ZORBAX Rx-SIL versus a more acidic silica.



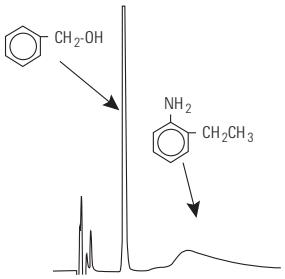
1. Ionized silanols (SiO^-) will ion-exchange with protonated bases (R_3NH^+) which can cause tailing and method variability



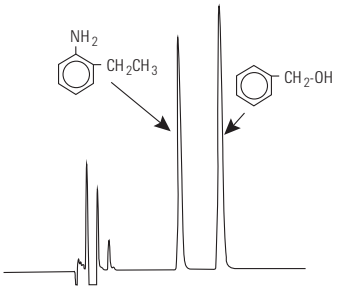
2. Unprotonated acids can compete for H^+ with protonated silanols.

Figure 2. Potential secondary interactions with silica silanols and ionizable compounds

Original ZORBAX SIL (1973)



Highly Purified ZORBAX Rx-SIL



Mobile Phase: 5% Propanol in Heptane
Flow Rate: 2.0 mL/min

Figure 3. Chromatographic improvement using highly purified ZORBAX Rx-SIL

The Benefits of Strong Particles – Greater Efficiency and Durability

During the silica manufacturing process, the agglutinated sol particles are sintered for increased strength. This improved mechanical stability allows ZORBAX columns to be packed at high pressures when needed – up to 14,000 - 15,000 psi. This results in a packed column with an exceptionally stable column bed that will not compress under normal or even high operating pressures – up to 9000 psi (600 bar). This packed bed stability increases column lifetime using ZORBAX 1.8, 3.5, 5 or 7 um particles. When ZORBAX Rapid Resolution HT 1.8 µm and Rapid Resolution 3.5 µm silica particles are used as the underlying support, high speed, high efficiency chromatography is possible without compromising column lifetime.

The Benefits of Careful Pore Size and Particle Size Control – High Efficiency and Better Reproducibility with More Column Choices

Accurate and closely monitored particle and pore size control for ZORBAX Rx-SIL produces reproducible retention behavior from column-to-column and lot-to-lot. The narrow, consistent particle size distribution of ZORBAX Rx-SIL particles maximizes efficiency and column bed stability. Column pressure is never unusually high due to "fines" – smaller particles at the low end of the particle size distribution. Accurate and precise control of particle size allows specific 1.8, 3.5, 5 and 7 µm particles to be produced. The small 3.5 µm and 1.8 µm particle sizes are the basis for the Rapid Resolution and Rapid Resolution HT, high-speed analysis columns designed to maximize resolution in shorter column lengths – ideal for LC/MS or any application demanding shorter analysis times. The 5 µm particles are an industry standard and provide high resolution in a wide variety of column dimensions. This particle size also provides high efficiency in a short preparative configuration – the PrepHT column – because careful particle size control means consistent pressure expectations within normal operating limits. The 7 µm particle size provides the ideal balance between efficiency and operating pressure for longer preparative columns.

ZORBAX Rx-SIL – The Foundation for Many Bonded Phases

With such strong performance characteristics, ZORBAX Rx-SIL particles have been developed into many effective bonded phases for solving key analytical problems. These include columns that can be used at extremes of pH, unmatched by any other silica-based columns. Because silica-based columns have different limitations at low and high pH, specific bonded-phase chemistries are required to provide longer column life over different pH ranges. As a result, Agilent ZORBAX RP-HPLC bonded phases are designed to give extended column lifetime and reproducibility in the pH ranges that provide optimum and long lasting resolution, all starting with high performance ZORBAX Rx-SIL.

ZORBAX Reversed-Phase Columns

The following table summarizes the unique bonding chemistry of ZORBAX RP-HPLC columns. Each is designed for long column lifetime and resolution that lasts in their optimal pH range.

ZORBAX RP-HPLC Column Chemistry

Modern ZORBAX Columns*	Silica Type	Particle Type	Endcapping	Side Group Structure on Silane	Polar Group	Page No.
Eclipse Plus	B	Totally porous	Double	Dimethyl	None	590
Poroshell SB	B	Superficially porous	None	Diisobutyl	None	589, 637
Poroshell EC	B	Superficially porous	Double	Dimethyl	None	589, 637
Eclipse XDB	B	Totally porous	Double	Dimethyl	None	596
StableBond	B	Totally porous	None	Diisopropyl (C8, C3, CN, phenyl), diisobutyl (C18)	None	604
Rx-C18	B	Totally porous	None	Dimethyl	None	622
Bonus-RP	B	Totally porous	Triple	Diisopropyl	Amide	612
Extend-C18	B	Totally porous	Double	Unique bidentate structure	None	617
Original ZORBAX Columns**						
ZORBAX	A	Totally porous	Single	Dimethyl	None	624
ZORBAX ODS Classic	A	Totally porous	None	Dimethyl	None	624

*Type B silica: low acidity, low metal content; these bonded phases use ZORBAX Rx-SIL

**Type A silica: more acidic, higher metal content; these bonded phases use ZORBAX SIL



Quick Guide to ZORBAX Reversed-Phase Bonded Phases

Modern ZORBAX RP-HPLC Columns	Recommended Uses and Applications	Page No.
Eclipse Plus	• Excellent first choice for method development • Long life from pH 2-9 for reliable separations of basic, acidic and neutral compounds • Superior peak shape with basic compounds • High resolution and efficiency with 1.8, 3.5 and 5 µm columns • Rigorous QA/QC testing for greater long-term reproducibility	590
Poroshell 120	• Superficially porous particles for high efficiency at low pressure • Sub 2-micron like efficiency with a 2.7 µm particle • Endcapped and non-endcapped C18 phases for selectivity optimization • Compatible with 400 bar and 600 bar LC's	589, 637
Eclipse XDB	• Four selectivity choices for flexible method development • High performance over a wide pH range, pH 2-9 • Good peak shape for acids, bases and neutrals • Long lifetime with extra dense bonding and double endcapping • Fast, ultra-fast, and high resolution separations using 1.8 and 3.5 µm columns • Choices from capillary to prep	596
StableBond (SB)	• Basic, acidic, neutral compounds • Exceptional stability at low pH • Use of high temperature (up to 90°C for C18, 80°C for C8, C3, Phenyl, CN, and Aq) and low pH as an added selectivity tool • Widest selection of bonded phases for different selectivity (C18, C8, C3, CN, Phenyl, Aq) • Uses mobile phases for LC/MS with formic acid, acetic acid, or TFA • Uses mobile phases with TFA for peptide and protein separation • Rapid separations using 1.8 and 3.5 µm columns	604
ZORBAX Rx	• General separation of basic, acidic and neutral compounds at low pH with different selectivity than SB columns • Rx-C8 is the same as SB-C8	622
Bonus-RP	• Separating basic compounds in higher aqueous mobile phases • General separation of basic, neutral, acidic compounds at mid-range pH or low pH; especially stable at low pH • Separating peptides for different selectivity • Rapid separations using 3.5 µm columns	612
Extend-C18	• Separating basic compounds above their pKa in free base form; separation of basic, acidic, neutral compounds at high pH; up to pH 11.5 • Uses ammonium hydroxide as mobile phase additive with LC/MS with small molecules or peptides • Separating at high, mid-range and low pH for selectivity changes • Rapid separations using 3.5 µm columns	617
Original ZORBAX Columns	**Recommended Uses and Applications**	**Page No.**
ZORBAX	• General separation of basic, acidic, neutral compounds at low pH with different selectivity than SB columns; higher number of active silanols than SB • "Mixed mode" separation at more neutral pH values	624
ZORBAX ODS Classic (non-end capped)	• General separation of basic, acidic, neutral compounds at mid-range to low pH with different selectivity than SB or XDB columns	624



Poroshell 120

- High efficiency and high resolution
- 50% less pressure than sub 2-micron columns
- Compatible with 400 bar and 600 bar LC's
- Two bonded phases with excellent selectivity and peak shape

Agilent Poroshell 120 columns are a 2.7 µm particle with a 1.7 µm solid core and 0.5 µm porous outer layer. This small particle size provides high efficiency, similar to sub 2-micron columns, but with 40-50% less pressure. These high efficiency, high resolution columns can be used on any type of LC. The porous outer layer and solid core limit diffusion distance and improve separation speed while the narrow particle size distribution improves efficiency and resolution. The solid core limits diffusion distance and improves separation speed. The columns can support high pressure and multiple columns can be used for the highest resolution and efficiency possible. The same principles are used in the Poroshell 300 columns ideal for the fast, high resolution separations of biomolecules.

Column Specifications

Bonded Phase	Pore Size	Temp. Limits	pH Range	Endcapped	Carbon Load
EC-C18	120Å	60°C	2.0-8.0	Double	8%
SB-C18	120Å	90°C	1.0-8.0	No	7%

Specifications represent typical values only.

Poroshell 120

Description	Size (mm)	Particle Size (µm)	SB-C18	EC-C18
Analytical	4.6 x 150	2.7	683975-902	693975-902
Analytical	4.6 x 100	2.7	685975-902	695975-902
Analytical	4.6 x 75	2.7	687975-902	697975-902
Analytical	4.6 x 50	2.7	689975-902	699975-902
Analytical	4.6 x 30	2.7	681975-902	691975-902
Solvent Saver	3.0 x 150	2.7	683975-302	693975-302
Solvent Saver	3.0 x 100	2.7	685975-302	695975-302
Solvent Saver	3.0 x 75	2.7	687975-302	697975-302
Solvent Saver	3.0 x 50	2.7	689975-302	699975-302
Solvent Saver	3.0 x 30	2.7	681975-302	691975-302
Narrow Bore	2.1 x 150	2.7	683775-902	693775-902
Narrow Bore	2.1 x 100	2.7	685775-902	695775-902
Narrow Bore	2.1 x 75	2.7	687775-902	697775-902
Narrow Bore	2.1 x 50	2.7	689775-902	699775-902
Narrow Bore	2.1 x 30	2.7	681775-902	691775-902



ZORBAX Eclipse Plus

- Excellent peak shape for basic compounds
- High level of performance – peak shape, efficiency, resolution, and lifetime – with all sample types: acids, bases and neutrals
- Superior reproducibility with more rigorous QA/QC testing
- Improved, patented silica manufacturing with start-to-finish product control
- Available in 1.8, 3.5 and 5 µm particle sizes for all analytical, high resolution, and fast LC analyses

New Agilent ZORBAX Eclipse Plus columns provide the ultimate in performance for silica-based columns. Peak shape is excellent for the most challenging basic compounds, improving efficiency and resolution with these sample types. These results are achieved by improvements in the silica manufacturing and bonding technology, which is completely controlled by Agilent.

Because of their high level of performance, Eclipse Plus columns are the ideal first choice for method development of all samples. If you need to achieve fast method development and superior productivity, then choose a column with high-resolution 1.8 µm particles. For standard methods, conventional 5 µm and Rapid Resolution 3.5 µm columns are your best choice. With all particle sizes, easy method transfer is possible.

With more rigorous QA and QC testing, column lot-to-lot reproducibility is also improved, resulting in long-term reliable results for all analyses.

Column Specifications

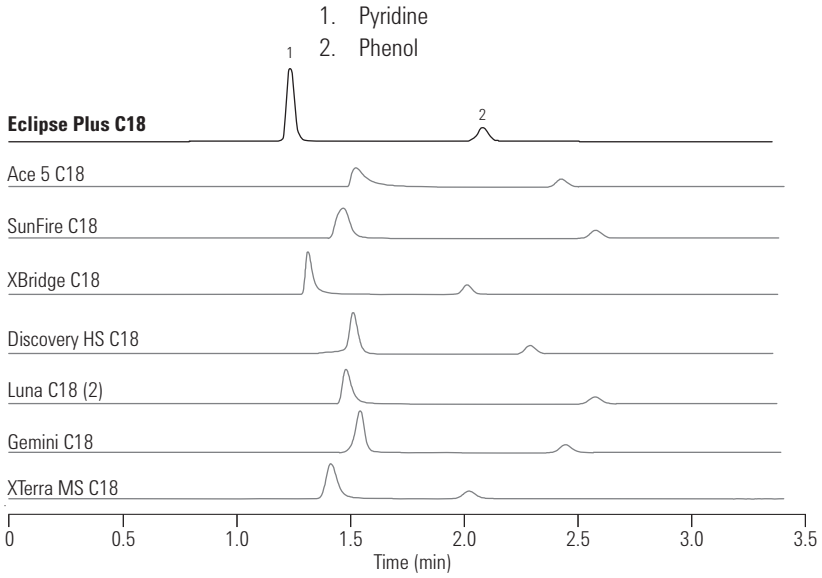
Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
ZORBAX Eclipse Plus C18	95Å	160 m^2/g	60°C	2.0-9.0	Double	9%
ZORBAX Eclipse Plus C8	95Å	160 m^2/g	60°C	2.0-9.0	Double	7%
ZORBAX Eclipse PAH	95Å	160 m^2/g	60°C	2.0-8.0	Double	14%
ZORBAX Eclipse Plus Phenyl-Hexyl	95Å	160 m^2/g	60°C	2.0-8.0	Double	9%

Specifications represent typical values only.

*Column lifetime will be reduced significantly at pH > 7 and temperature > 40°C. At pH 6-9, highest column stability for all silica based columns is obtained by operating at temperatures < 40°C and using lower buffer concentrations in range of 0.01 – 0.02M, especially with phosphate and carbonate buffers.

ZORBAX Eclipse Plus: Best Peak Shape in the Industry Without Tailing

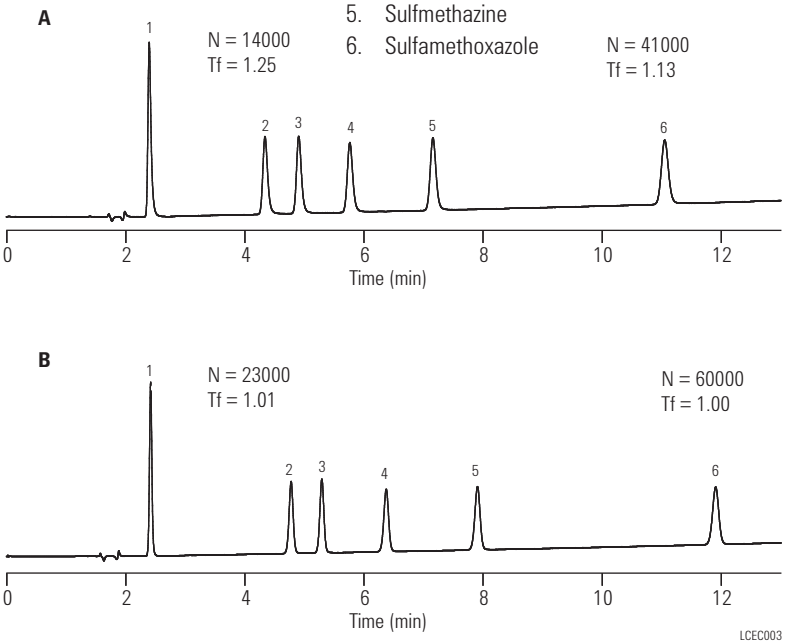
Column: **Eclipse Plus C18**
959996-902
4.6 x 100 mm, 5 µm
Mobile Phase: A: 60% Water
B: 40% Acetonitrile
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 254 nm
Publication: 5989-4934EN
Sample: Pyridine, Phenol



Peak Shape and Efficiency are Better with ZORBAX Eclipse Plus

Column A: **XBridge C18, 4.6 x 150mm, 5µm**
Column B: **Eclipse Plus C18**
959993-902
4.6 x 150 mm, 5 µm
Mobile Phase: A: 0.1% formic acid
B: 0.1% formic acid in ACN
Flow Rate: 1.0 mL/min
Gradient: 0.0 min 10% B
15 min 30% B
Temperature: 40°C
Detector: UV 254 nm
Publication: 5989-4934EN
Sample: Sulfonamides

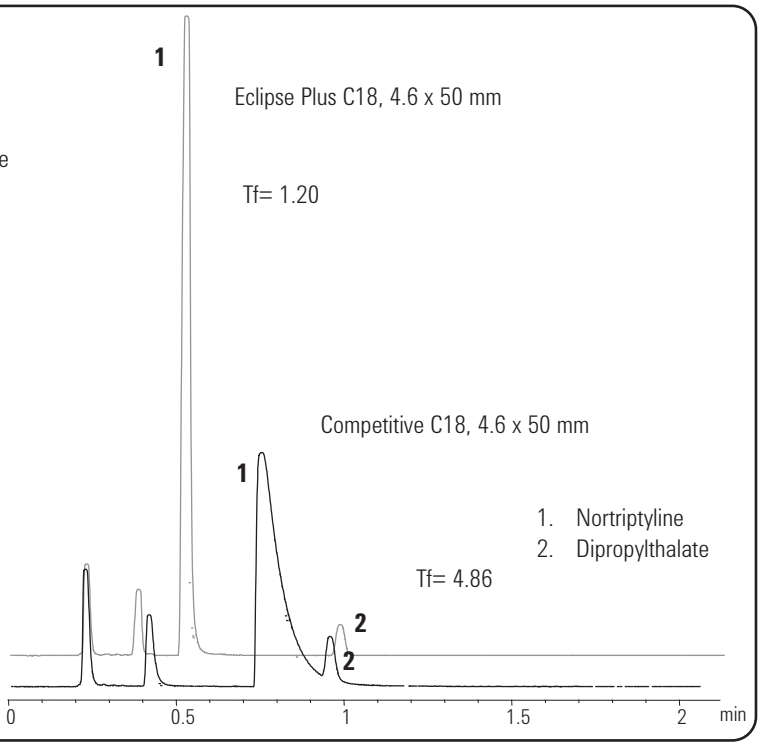
1. Sulfanilamide
2. Sulfadiazine
3. Sulfathiazole
4. Sulfamerazine
5. Sulfmethazine
6. Sulfamethoxazole



Eliminate Tailing and Maximize Resolution with Eclipse Plus Columns

Column A:	**Eclipse Plus C18, 4.6 x 50 mm**
Column B:	Competitive C18, 4.6 x 50 mm
Mobile Phase:	65% ACN: 35% 25 mM phosphate buffer (pH 7.4)

Superior peak shape and better selectivity with Eclipse Plus means more resolution, easier quantitation and better results in your separations.



ZORBAX Eclipse Plus

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl Hexyl USP L11	Eclipse PAH USP L1
	Analytical	4.6 x 250	5	959990-902	959990-906	959990-912	959990-918
	Analytical	4.6 x 150	5	959993-902	959993-906	959993-912	959993-918
	Analytical	4.6 x 100	5	959996-902	959996-906	959996-912	959996-918
	Analytical	4.6 x 50	5	959946-902	959946-906		
	Rapid Resolution	4.6 x 150	3.5	959963-902	959963-906	959963-912	959963-918
	Rapid Resolution	4.6 x 100	3.5	959961-902	959961-906	959961-912	959961-918
	Rapid Resolution	4.6 x 75	3.5	959933-902	959933-906	959933-912	
	Rapid Resolution	4.6 x 50	3.5	959943-902	959943-906	959943-912	959943-918
	Rapid Resolution	4.6 x 30	3.5	959936-902	959936-906	959936-912	
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-902	959964-906	959964-912	959964-918
	Rapid Resolution HT, 600 bar	4.6 x 75	1.8	959951-902			
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-902	959941-906	959941-912	959941-918
	Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-902	959931-906	959931-912	959931-918
	Solvent Saver	3.0 x 250	5				959990-318
	Solvent Saver	3.0 x 150	5	959993-302	959993-306		
	Solvent Saver Plus	3.0 x 150	3.5	959963-302	959963-306	959963-312	
	Solvent Saver Plus	3.0 x 100	3.5	959961-302	959961-306	959961-312	
	Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312	
	Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312	
	Narrow Bore	2.1 x 250	5				959790-918
	Narrow Bore	2.1 x 150	5	959701-902	959701-906	959701-912	959701-918
	Narrow Bore	2.1 x 50	5	959746-902	959746-906		
	Narrow Bore RR	2.1 x 150	3.5	959763-902	959763-906	959763-912	
	Narrow Bore RR	2.1 x 100	3.5	959793-902	959793-906	959793-912	959793-918
	Narrow Bore RR	2.1 x 50	3.5	959743-902	959743-906	959743-912	
	Narrow Bore RR	2.1 x 30	3.5	959733-902	959733-906	959733-912	
	Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-902	959764-906	959764-912	959764-918
	Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-902	959741-906	959741-912	959741-918
	Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	959731-902	959731-906	959731-912	
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-936	820950-937	820950-938	820950-939
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-936	821125-937	821125-938	821125-939
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901



ZORBAX Eclipse PAH

- High resolution separation of 16 PAHs in EPA 610.
- Extensive range of particle sizes (1.8, 3.5 and 5 µm) and sizes for fast and high resolution separations.
- Each batch of material is specifically tested with PAHs for maximum reproducibility under expected operating conditions.
- Excellent performance using the high, quality, improved silica of the Eclipse Plus columns.
- Good for applications requiring "shape selectivity" or the separation of geometric isomers.

Agilent ZORBAX Eclipse PAH columns are recommended for the separation of polycyclic aromatic hydrocarbons. PAHs are considered priority pollutants and the analysis of these potentially carcinogenic compounds in water, soil and food is of major importance. The Eclipse PAH columns separate all of the 16 PAHS in EPA method 610 quickly with high resolution.

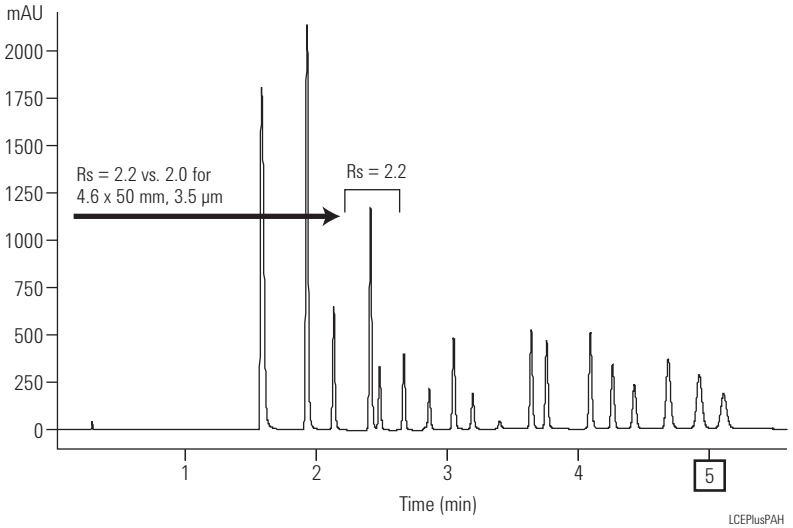
Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range	Endcapped	Carbon Load
ZORBAX Eclipse PAH	95Å	160 m^2/g	60°C	2.0-8.0	No	14%

Specifications represent typical values only.

High Resolution and Fast Analysis on RRHT Eclipse PAH Column

Column:	**959941-918 4.6 x 50 mm, 1.8 µm**	
Mobile Phase:	A = Water; B = Acetonitrile	
Gradient:	Time (Min)	% B
	0.00	40
	3.5	100
	5.2	100
	5.5	40
	6.5	40
Flow Rate:	2.0 mL/min	
Temperature:	25° C	
Detector:	DAD 220,4 nm No Ref.	
	DAD Stop Time = 6.0 min	
Stop Time = 7.0		

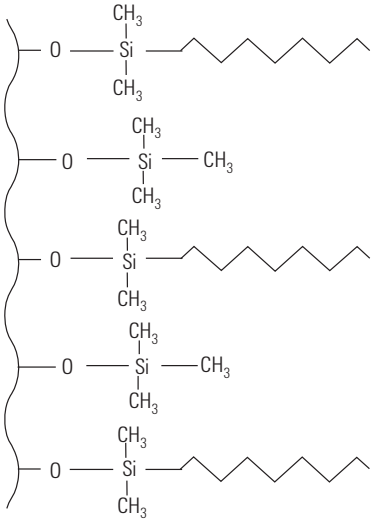


ZORBAX Eclipse PAH

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse PAH USP L1
	Analytical	4.6 x 250	5	959990-918
	Analytical	4.6 x 150	5	959993-918
	Analytical	4.6 x 100	5	959996-918
	Rapid Resolution	4.6 x 150	3.5	959963-918
	Rapid Resolution	4.6 x 100	3.5	959961-918
	Rapid Resolution	4.6 x 50	3.5	959943-918
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-918
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-918
	Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-918
	Solvent Saver	3.0 x 250	5	959990-318
	Narrow Bore	2.1 x 250	5	959790-918
	Narrow Bore	2.1 x 150	5	959701-918
	Narrow Bore RR*	2.1 x 100	3.5	959793-918
	Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-918
	Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-918
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-939
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-939
ZGC	Guard Hardware Kit			820888-901

*RR: Rapid Resolution 3.5 µm





eXtra Densely Bonded and Double Endcapped Eclipse XDB Bonded Phase

ZORBAX Eclipse XDB

- Four selectivity choices for method development optimization
- Good peak shape for basic, acidic and neutral compounds
- High performance over a wide pH range – pH 2-9
- Particle sizes from 1.8 µm to 7 µm
- Long lifetime with extra dense bonding and double endcapping

Agilent ZORBAX Eclipse XDB columns – C18, C8, Phenyl and CN – provide four bonded phase choices for method development optimization. These columns provide good peak shape over a wide pH range (2-9) for additional method development flexibility with one family of columns. Eclipse XDB columns can be used for method development at low pH (2-3) and the same column can be used for method development in the mid pH (6-8) region. In the mid pH region residual silanols are more active and tailing interactions are more likely. To overcome these interactions, Eclipse XDB columns are eXtra Densely Bonded and double endcapped through a proprietary process to cover as many active silanols as possible. The result is superior peak shape of basic compounds from pH 2-9. Eclipse XDB columns are available in 1.8, 3.5, 5 and 7 µm particle sizes for high speed, high resolution, analytical and prep scale separations.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
ZORBAX Eclipse XDB-C18	80Å	180 m^2/g	60°C	2.0-9.0	Double	10%
ZORBAX Eclipse XDB-C8	80Å	180 m^2/g	60°C	2.0-9.0	Double	7.6%
ZORBAX Eclipse XDB-Phenyl	80Å	180 m^2/g	60°C	2.0-9.0	Double	7.2%
ZORBAX Eclipse XDB-CN	80Å	180 m^2/g	60°C	2.0-8.0	Double	4.3%

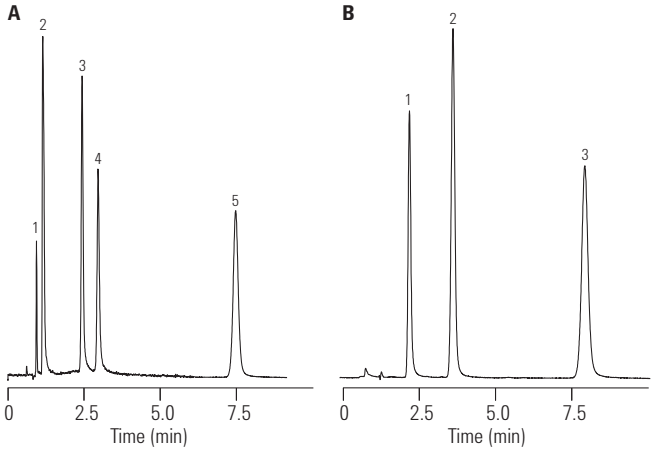
Specifications represent typical values only.

*Eclipse XDB columns are designed for operation over a wide pH range. At pH 6-9, highest columns stability for all silica based columns is achieved by operating at temperatures < 40°C and using low buffer concentrations in the range of 0.01 – 0.02M.

Good Peak Shape Over a Wide pH Range with ZORBAX Eclipse XDB

Column:	**Eclipse XDB-C8** **993967-906** **4.6 x 150 mm, 5 µm**
Mobile Phase:	A: pH 3.0 75% 25 mM phosphate buffer pH 3.0: 25% ACN B: pH 7.0 90% 20 mM phosphate pH 7.0 10% ACN
Flow Rate:	1.5 mL/min
Temperature:	40°C
Sample:	A: 1. Maleate 2. Doxylamine 3. Chlorpheniramine 4. Triprolidine 5. Diphenhydramine B: 1. Procainamide 2. N-acetylprocainamide 3. N-propionylprocainamide





ZORBAX Eclipse XDB columns provide good peak shape over a wide pH range and are an excellent choice for method development from pH 2-9.

Column Stability Testing at pH 3 and 60°C

Column: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

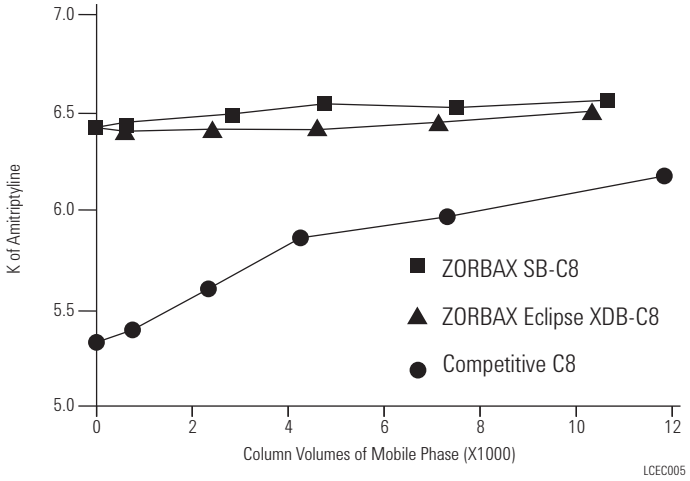
Column: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: Purge Conditions:
70% 50 mM NaAc-HCl, pH 3.0
30% ACN
Retention Test Conditions:
65% Methanol
35% Water

Flow Rate: 1.0 mL/min

Temperature: 60°C

Sample: Tricyclic Antidepressants



Eclipse XDB columns are stable over a wide pH range. At low pH, Eclipse, an end capped column is extremely stable and shows equivalent stability to a non-endcapped column, SB-C8, at pH 3. The columns were purged with a pH 3 mobile phase at 60°C. Then they were tested with a strongly basic compound to determine if the endcapping or bonded phase had been hydrolyzed from the silica surface. The Eclipse XDB column was very stable, as shown by the consistency of the retention of amitriptyline over the 12,000 column volumes of the test. Another endcapped column shows less stability under these same conditions.

Column Stability Testing at pH 7.0

Column A: **Competitive C8**
SIL-type
After 1826 Column Volumes

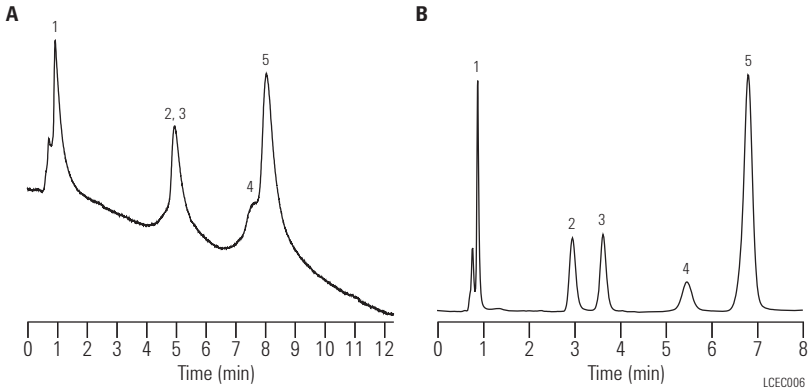
Column B: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm
Sol-type
After 1843 Column Volumes

Mobile Phase: 60% ACN
40% 250 mM Phosphate Buffer, pH 7.0

Flow Rate: 1.5 mL/min

Temperature: 60°C

Sample: Tricyclic Antidepressants



1. Uracil
2. Nortriptyline
3. Doxepin
4. Amitriptyline
5. Trimipramine

Double endcapping, dense bonding and the durable Rx-Sil particles (sol-type) combine to provide long lifetime at pH 7 when compared to single endcapped sil-gel columns used here. The conditions used for this test—high temperature (60°C) and high salt concentration (250 mM), accelerate the dissolution of silica, causing premature failure of the sil-gel type column.

Selectivity Changes for Basic Compounds with Eclipse XDB and StableBond

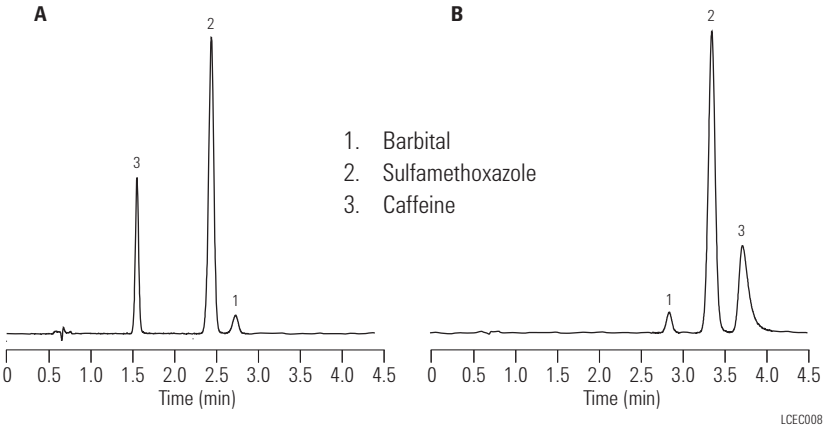
Column A: **Eclipse XDB-C8**
966967-906
4.6 x 75 mm, 3.5 µm

Column B: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 70% 25 mM NaH_2PO_4, pH 3.0
30% Methanol

Flow Rate: 1.0 mL/min

Temperature: 35°C



Eclipse XDB and StableBond columns are based on the same silica but have different bonding and endcapping. Therefore, they can have very different selectivity for the same sample under the same conditions, as this example shows.

Optimize Separations with Eclipse XDB Selectivity Options: Analysis of Sunscreens

Column A: **Eclipse XDB-Phenyl**
963967-912
4.6 x 150 mm, 3.5 µm

Column B: **Eclipse XDB-C8**
963967-906
4.6 x 150 mm, 3.5 µm

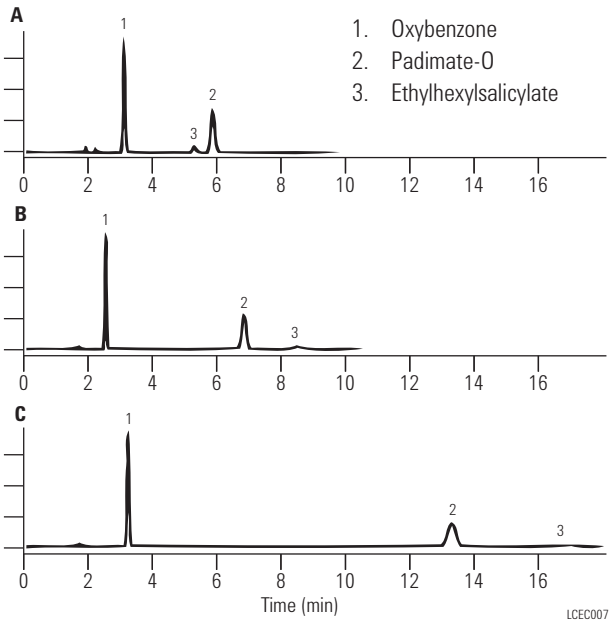
Column C: **Eclipse XDB-C18**
963967-902
4.6 x 150 mm, 3.5 µm

Mobile Phase: 15% H_20: 85% MeOH

Flow Rate: 1.0 mL/min

Temperature: 35°C

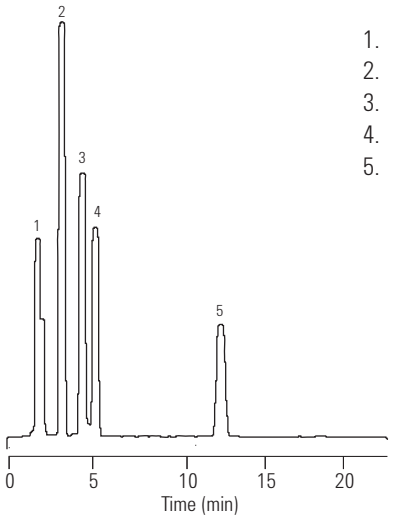
Sample: Sunscreens



This separation of sunscreens on all three Eclipse XDB bonded phases – C18, C8 and Phenyl – shows that different bonded phases can be used to optimize a separation. While all three bonded phases provide an adequate separation, the Eclipse XDB-Phenyl provides a different peak elution order and a much shorter overall analysis time. All three bonded phases also provide excellent peak shape with no mobile phase additives.

Separation of Cephalosporins on Eclipse XDB-C8

Column:	**Eclipse XDB-C8** **993967-906** **4.6 x 150 mm, 5 µm**
Mobile Phase:	85% 25 mM Na_2HPO_4 pH 7: 15% ACN
Flow Rate:	1.0 mL/min
Temperature:	35°C
Sample:	Cephalosporins

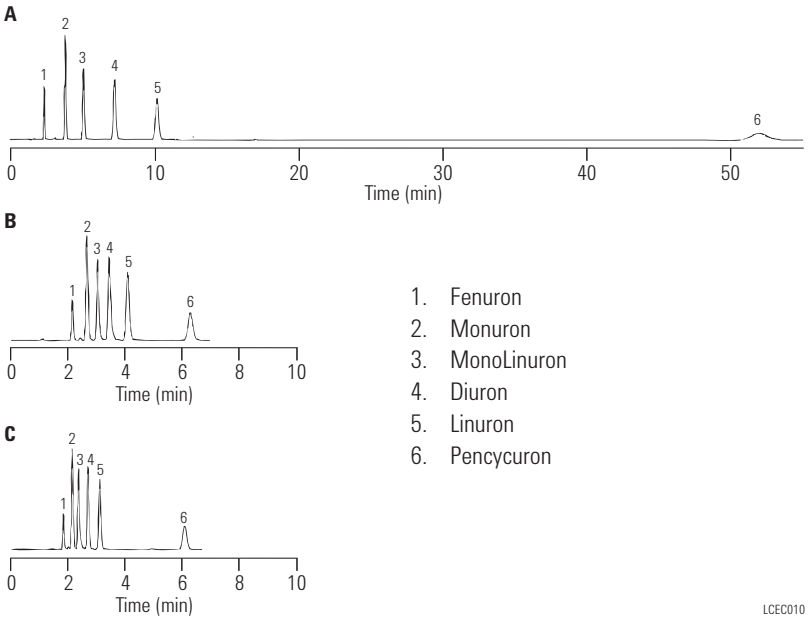


1. Ceftazidine
2. Cefachlor
3. Cefoxatime
4. Cefoxitin
5. Cephalothin

Cephalosporins are a type of antibiotic and many compounds in this family are well separated on the Eclipse XDB-C8 column.

Selectivity for Urea Pesticides

Column A:	**Eclipse XDB-C18** **993967-902** **4.6 x 150 mm, 5 µm**
Column B:	**Eclipse XDB-CN** **993967-905** **4.6 x 150 mm, 5 µm**
Column C:	**Eclipse XDB-C18** **993967-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	A. 60:40 MeOH:Water B. 60:40 MeOH:Water C. 77:23 MeOH:Water
Flow Rate:	1.0 mL/min
Temperature:	25°C
Sample:	Urea pesticides



1. Fenuron
2. Monuron
3. MonoLinuron
4. Diuron
5. Linuron
6. Pencycuron

The Eclipse XDB-CN column reduces retention time and provides good selectivity for Urea pesticides when compared to an Eclipse XDB-C18 column.

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
Standard Columns (no special hardware required)							
	Semi-Preparative	9.4 x 250	5	990967-202	990967-206		
	Analytical	4.6 x 250	5	990967-902	990967-906	990967-912	990967-905
	Analytical	4.6 x 150	5	993967-902	993967-906	993967-912	993967-905
	Analytical	4.6 x 50	5	946975-902	946975-906		
	Rapid Resolution	4.6 x 150	3.5	963967-902	963967-906	963967-912	963967-905
	Rapid Resolution	4.6 x 100	3.5	961967-902	961967-906		961967-905
	Rapid Resolution	4.6 x 75	3.5	966967-902	966967-906	966967-912	966967-905
	Rapid Resolution	4.6 x 50	3.5	935967-902	935967-906	935967-912	
	Rapid Resolution	4.6 x 30	3.5	934967-902	934967-906		
	Rapid Resolution	4.6 x 20	3.5	932967-902	932967-906		
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	928975-902	928975-906		
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	927975-902	927975-906		
	Rapid Resolution HT, 600 bar	4.6 x 30	1.8	924975-902	924975-906		
	Rapid Resolution HT, 600 bar	4.6 x 20	1.8	926975-902	926975-906		
	Solvent Saver	3.0 x 250	5	990967-302	990967-306	990967-312	990967-305
	Solvent Saver	3.0 x 150	5	993967-302	993967-306	993967-312	993967-305
	Solvent Saver Plus	3.0 x 150	3.5	963954-302	963954-306	963954-312	963954-305
	Solvent Saver Plus	3.0 x 100	3.5	961967-302	961967-306	961967-312	
	Solvent Saver Plus	3.0 x 75	3.5	966954-302			
	Solvent Saver HT, 600 bar	3.0 x 100	1.8	928975-302	928975-306		
	Solvent Saver HT, 600 bar	3.0 x 50	1.8	927975-302	927975-306		
	Solvent Saver HT, 600 bar	3.0 x 30	1.8	924975-302	924975-306		
	Solvent Saver HT, 600 bar	3.0 x 20	1.8	926975-302	926975-306		
	Narrow Bore	2.1 x 150	5	993700-902	993700-906	993700-912	993700-905
	Narrow Bore	2.1 x 50	5	960967-902	960967-906	960967-912	960967-905
	Narrow Bore RR*	2.1 x 150	3.5	930990-902	930990-906		
	Narrow Bore RR*	2.1 x 100	3.5	961753-902	961753-906		961753-905
	Narrow Bore RR*	2.1 x 75	3.5	966735-902			
	Narrow Bore RR*	2.1 x 50	3.5	971700-902	971700-906		
	Narrow Bore RR*	2.1 x 30	3.5	974700-902	974700-906		
	Narrow Bore RR*	2.1 x 20	3.5	972700-902	972700-906		
	Narrow Bore RRHT, 600 bar**	2.1 x 100	1.8	928700-902	928700-906		
	Narrow Bore RRHT, 600 bar**	2.1 x 50	1.8	927700-902	927700-906		
	Narrow Bore RRHT, 600 bar**	2.1 x 30	1.8	924700-902	924700-906		
	Narrow Bore RRHT, 600 bar**	2.1 x 20	1.8	926700-902	926700-906		
	MicroBore RR*	1.0 x 150	3.5	963600-902	963600-906		
	MicroBore RR*	1.0 x 50	3.5	965600-902	965600-906		
	MicroBore RR*	1.0 x 30	3.5	961600-902	961600-906		
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5921	5185-5921		
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-925	820950-926	820950-927	820950-935
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-926	821125-926	821125-926	821125-935
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
PrepHT Cartridge Columns (require endfittings kit 820400-901)							
PL	PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106		
PL	PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106		
PL	PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906		
PL	PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906		
PL	PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906		
PL	PrepHT Guard Cartridge	17 x 7.5	5	820212-925	820212-926		
PL	Guard Cartridge Hardware			820444-901	820444-901		
PL	PrepHT endfittings, 2/pk			820400-901	820400-901		

Unless indicated, column pressure limit is 400 bar.

*RR: Rapid Resolution 3.5 µm

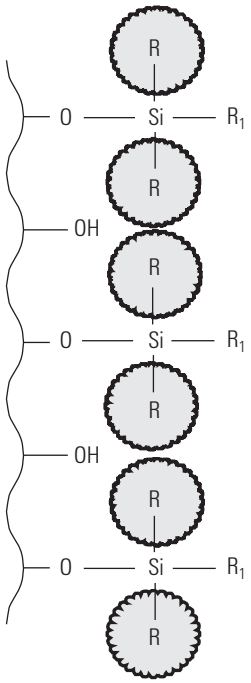
**RRHT: Rapid Resolution HT 1.8 µm

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
Agilent Cartridge Columns (require hardware kit 5021-1845)					
AC	Analytical	4.6 x 250	5	7995118-585	7995108-585
AC	Analytical	4.6 x 150	5	7995118-595	7995108-595
AC	Rapid Resolution	4.6 x 75	3.5	7995118-344	7995108-344
AC	Solvent Saver Plus	3.0 x 75	3.5	7995230-344	
	Guard Cartridges, 10/pk	4.0 x 4	5	7995118-504	7995118-504
	Cartridge Holder			5021-1845	5021-1845
Standard Columns (no special hardware required)					
	Rapid Resolution HT	4.6 x 50	1.8	922975-902	922975-906
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	922975-932	
	Narrow Bore RRHT	2.1 x 50	1.8	922700-902	
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	922700-932	
Rapid Resolution HT Cartridges (require hardware kit 820555-901)					
RR	Rapid Resolution Cartridge	4.6 x 30	3.5	933975-902	933975-906

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
Rapid Resolution HT Cartridges (require hardware kit 820555-901)					
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 30	3.5	933975-932	933975-936
RR	Rapid Resolution Cartridge	4.6 x 15	3.5	931975-902	931975-906
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 15	3.5	931975-932	931975-936
RR	Rapid Resolution Cartridge	2.1 x 30	3.5	973700-902	973700-906
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 30	3.5	973700-932	973700-936
RR	Rapid Resolution Cartridge	2.1 x 15	3.5	975700-902	975700-906
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 15	3.5	975700-932	975700-936
RR	Rapid Resolution HT Cartridge	4.6 x 50	1.8	925975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	925975-932	
RR	Rapid Resolution HT Cartridge	4.6 x 30	1.8	923975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	923975-932	
RR	Rapid Resolution HT Cartridge	4.6 x 15	1.8	921975-902	
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	921975-932	
RR	Rapid Resolution HT Cartridge	2.1 x 50	1.8	925700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	925700-932	
RR	Rapid Resolution HT Cartridge	2.1 x 30	1.8	923700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	923700-932	
RR	Rapid Resolution HT Cartridge	2.1 x 15	1.8	921700-902	
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	921700-932	
RR	Hardware Kit for RR and RRHT Cartridges			820555-901	
Capillary Glass-lined Columns					
	Capillary	0.5 x 250	5	5064-8286	
	Capillary	0.5 x 150	5	5064-8287	
	Capillary RR	0.5 x 150	3.5	5064-8288	
	Capillary RR	0.5 x 35	3.5	5064-8298	
	Capillary	0.3 x 250	5	5064-8269	
	Capillary	0.3 x 150	5	5064-8291	
	Capillary RR	0.3 x 150	3.5	5064-8271	
	Capillary	0.5 x 35	5	5064-8296	
	Capillary	0.3 x 35	5	5064-8297	



Sterically Protected StableBond Bonded Phase

ZORBAX 80Å StableBond

- Longest column lifetime and best reproducibility for low pH separations – down to pH 1
- Patented stable column chemistry allows use at high temperature and low pH without degradation
- Six different bonded phases provide broad selectivity – SB-C18, SB-C8, SB-CN, SB-Phenyl, SB-C3, SB-Aq
- High purity (Type B) silica for good peak shape

Agilent ZORBAX StableBond columns use patented, unique, nonfunctional silanes with bulky diisobutyl (SB-C18) or diisopropyl (SB-C8, SB-C3, SB-Phenyl, SB-CN, and SB-Aq) side chain groups that sterically protect the key siloxane bond to the silica surface from hydrolytic attack at low pH. StableBond packing materials are not endcapped in order to provide exceptional stability and to maximize lifetime and reproducibility under acidic mobile phase conditions. The high purity, low acidity silica provides excellent peak shape with acidic, basic and neutral compounds so that StableBond columns are an excellent choice for low pH method development. ZORBAX StableBond columns are compatible with all common mobile phases, including very high aqueous mobile phases.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range*	Endcapped	Carbon Load
ZORBAX SB-C18	80Å	180 m^2/g	90°C	0.8-8.0	No	10%
ZORBAX SB-C8	80Å	180 m^2/g	80°C	1.0-8.0	No	5.5%
ZORBAX SB-C3	80Å	180 m^2/g	80°C	1.0-8.0	No	4%
ZORBAX SB-Phenyl	80Å	180 m^2/g	80°C	1.0-8.0	No	5.5%
ZORBAX SB-CN	80Å	180 m^2/g	80°C	1.0-8.0	No	4%
ZORBAX SB-Aq	80Å	180 m^2/g	80°C	1.0-8.0	No	proprietary

Specifications represent typical values only.

*StableBond columns are designed for optimal use at low pH. At pH 6-8, highest column stability for all silica-based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in the range of 0.01-0.02M. At mid-range pH, Eclipse XDB and Bonus-RP are recommended.

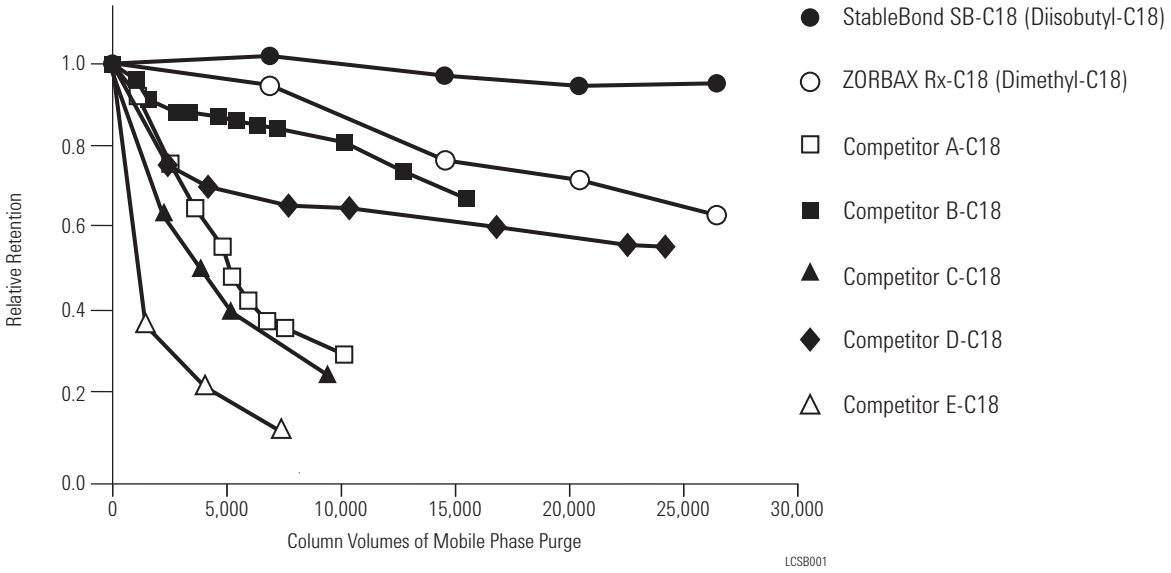
StableBond SB-C18 Shows Excellent Stability at Low pH and High Temperature (pH 0.8, 90°C)

Column: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

Column: **ZORBAX Rx-C18**
883967-902
4.6 x 150 mm, 5 µm

Mobile Phase: 50% Methanol/50% Water with 1.0% TFA
Test Solute: Toluene

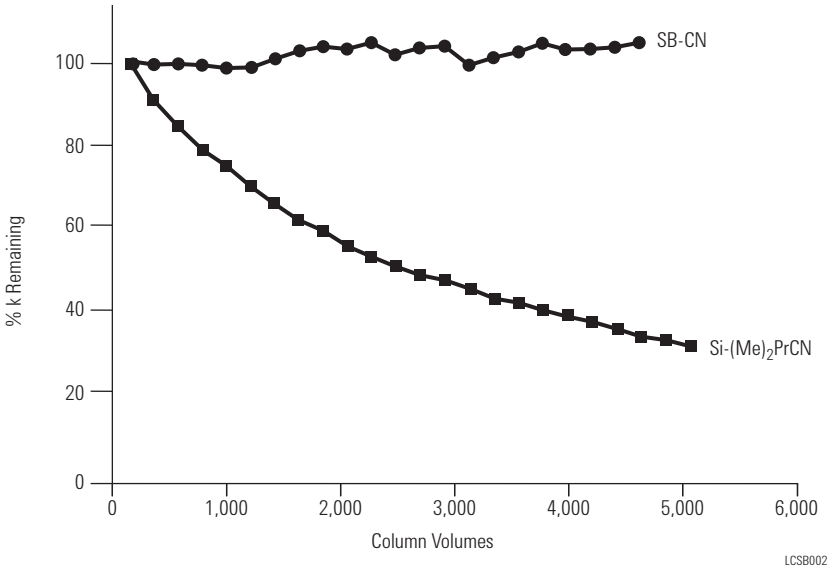
Temperature: 90°C



As an indicator of column breakdown, retention time of toluene was measured after purging the column with mobile phase. Only the StableBond SB-C18 is unchanged after three working months of use under these very low pH (0.8) and high temperature (90°C) conditions. ZORBAX Rx-C18 also provides a stable matrix, and can be used as an alternative selectivity to StableBond SB-C18.

Shorter Chain ZORBAX SB-CN is also Stable at Low pH (pH 2.0, 50°C)

Column:	**ZORBAX SB-CN 883975-905 4.6 x 150 mm, 5 µm**
Mobile Phase:	0.1% TFA, pH 2: ACN
Flow Rate:	1 mL/min
Gradient:	0-100% ACN
Temperature:	50°C
Sample:	1-phenylheptane @ 50% AC/50% Water with 0.1% TFA

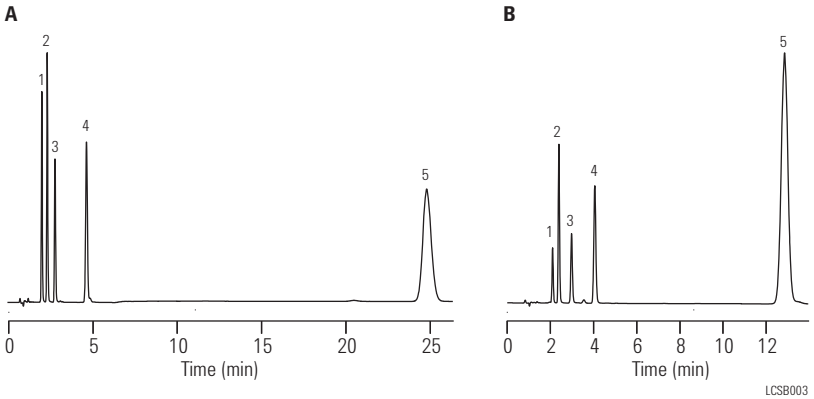


ZORBAX StableBond SB-CN and the other short chain StableBond bonded phases are also exceptionally stable at low pH. Conventional dimethyl CN and similar bonded phases lack this stability.

SB-CN Optimizes Retention and Resolution

Column A:	**ZORBAX SB-C18 866953-902 4.6 x 75 mm, 3.5 µm**
Column B:	**ZORBAX SB-CN 866953-905 4.6 x 75 mm, 3.5 µm**
Mobile Phase:	30% ACN 70% 25mM NaH_2PO_4, pH 2.5
Flow Rate:	1.0 mL/min
Temperature:	35°C

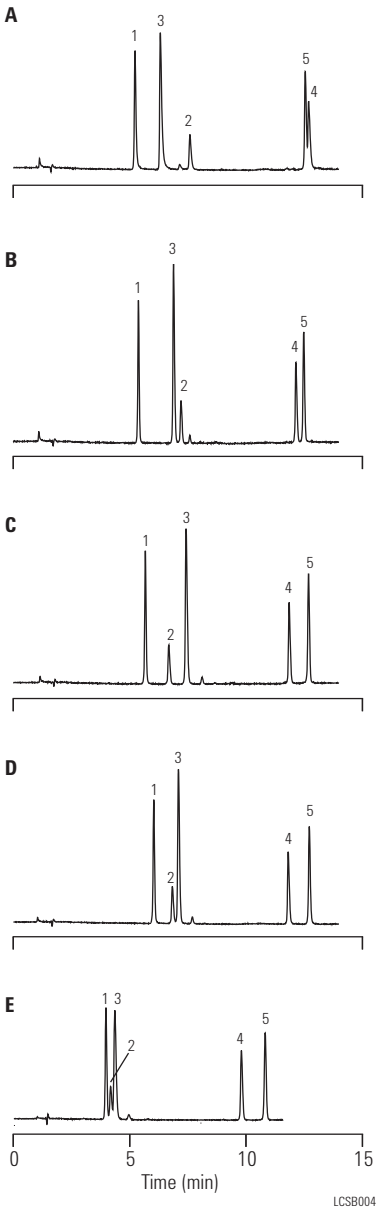
1. Estriol
2. Daidzen
3. Quercetin
4. Genistein
5. Diethylstilbestrol



The SB-CN column is used here to reduce analysis time by 50%. The retention of the most hydrophobic analyte is cut in half. At the same time retention of the more polar, early eluting peaks increases slightly.

Five Different Bonded Phases Provide Selectivity Options

Column A:	**ZORBAX SB-C18** **883975-902** **4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX SB-C8** **883975-906** **4.6 x 150 mm, 5 µm**
Column C:	**ZORBAX SB-C3** **883975-909** **4.6 x 150 mm, 5 µm**
Column D:	**ZORBAX SB-Phenyl** **883975-912** **4.6 x 150 mm, 5 µm**
Column E:	**ZORBAX SB-CN** **883975-905** **4.6 x 150 mm, 5 µm**
Mobile Phase:	0-100% B in 18.8 min A: 50 mM NaH2PO4, pH 2.5 in 95% H2O / 5% ACN B: 50 mM NaH2PO4, pH 2.5 in 47% H2O / 53% ACN
Flow Rate:	1.0 mL/min
Temperature:	26°C
Detector:	254 nm
Sample:	1. Procaine 2. Lidocaine 3. d-Cinchonine 4. Butacaine 5. Tetracaine



SB-C3 is just one of the five different StableBond selectivity choices. In this example, optimum resolution is obtained with SB-C3. All are based on the same high purity Rx-SIL. Selectivity changes are therefore dependent only on the bonded phases, making method development more reliable.

ZORBAX 80Å StableBond

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-C3 USP L56	SB-Phenyl USP L11	SB-Aq
Standard Columns (no special hardware required)									
	Semi-Preparative	9.4 x 250	5	880975-202	880967-201	880975-205	880975-209	880975-212	
	Semi-Preparative	9.4 x 150	5	883975-202					
	Semi-Preparative	9.4 x 100	5	884975-202					
	Semi-Preparative	9.4 x 50	5	846975-202					
	Analytical	4.6 x 250	5	880975-902	880975-906	880975-905	880975-909	880975-912	880975-914
	Analytical	4.6 x 150	5	883975-902	883975-906	883975-905	883975-909	883975-912	883975-914
	Analytical	4.6 x 50	5	846975-902	846975-906				846975-914
	Rapid Resolution	4.6 x 250	3.5	884950-567					
	Rapid Resolution	4.6 x 150	3.5	863953-902	863953-906	863953-905		863953-912	863953-914
	Rapid Resolution	4.6 x 100	3.5	861953-902	861953-906	861953-905		861953-912	861953-914
	Rapid Resolution	4.6 x 75	3.5	866953-902	866953-906	866953-905		866953-912	866953-914
	Rapid Resolution	4.6 x 50	3.5	835975-902	835975-906	835975-905		835975-912	835975-914
	Rapid Resolution	4.6 x 30	3.5	834975-902	834975-906				
	Rapid Resolution	4.6 x 20	3.5	832975-902	832975-906				
	Rapid Resolution HT, 600 bar	4.6 x 150	1.8	829975-902	829975-906	829975-905		829975-912	829975-914
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-902	828975-906	828975-905		828975-912	828975-914
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-902	827975-906	827975-905		827975-912	827975-914
	Rapid Resolution HT, 600 bar	4.6 x 30	1.8	824975-902	824975-906	824975-905		824975-912	824975-914
	Rapid Resolution HT, 600 bar	4.6 x 20	1.8	826975-902	826975-906				
	Solvent Saver	3.0 x 250	5	880975-302	880975-306	880975-305	880975-309	880975-312	880975-314
	Solvent Saver	3.0 x 150	5	883975-302	883975-306	883975-305	883975-309	883975-312	883975-314
	Solvent Saver Plus	3.0 x 150	3.5	863954-302	863954-306	863954-305		863954-312	863954-314
	Solvent Saver Plus	3.0 x 100	3.5	861954-302	861954-306	861954-305	861954-309	861954-312	861954-314
	Solvent Saver Plus	3.0 x 75	3.5	866953-302					
	Solvent Saver HT, 600 bar	3.0 x 150	1.8	829975-302	829975-306	829975-305		829975-312	
	Solvent Saver HT, 600 bar	3.0 x 100	1.8	828975-302	828975-306	828975-305	828975-309	828975-312	828975-314
	Solvent Saver HT, 600 bar	3.0 x 50	1.8	827975-302	827975-306	827975-305			
	Solvent Saver HT, 600 bar	3.0 x 30	1.8	824975-302	824975-306	824975-305		827975-312	827975-314
	Solvent Saver HT, 600 bar	3.0 x 20	1.8	826975-302	826975-306				
	Narrow Bore	2.1 x 150	5	883700-922	883700-906	883700-905	883700-909	883700-912	
	Narrow Bore	2.1 x 50	5	860975-902	860975-906	860975-905	860975-909	860975-912	860975-914
	Narrow Bore RR*	2.1 x 150	3.5	830990-902	830990-906				830990-914
	Narrow Bore RR*	2.1 x 100	3.5	861753-902	861753-906	861753-905		861753-912	861753-914
	Narrow Bore RR*	2.1 x 75	3.5	866735-902					
	Narrow Bore RR*	2.1 x 50	3.5	871700-902	871700-906				871700-914
	Narrow Bore RR*	2.1 x 30	3.5	874700-902	874700-906				
	Narrow Bore RR*	2.1 x 20	3.5	872700-902	872700-906				
	Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	820700-902	820700-906	820700-905		820700-912	

ZORBAX 80Å StableBond

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-C3 USP L56	SB-Phenyl USP L11	SB-Aq
Standard Columns (no special hardware required)									
	Narrow Bore RR*	2.1 x 75	3.5	866735-902					
	Narrow Bore RR*	2.1 x 50	3.5	871700-902	871700-906				871700-914
	Narrow Bore RR*	2.1 x 30	3.5	874700-902	874700-906				
	Narrow Bore RR*	2.1 x 20	3.5	872700-902	872700-906				
	Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	820700-902	820700-906	820700-905		820700-912	
	Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828700-902	828700-906	828700-905		828700-912	828700-914
	Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827700-902	827700-906	827700-905		827700-912	827700-914
	Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	824700-902	824700-906	824700-905		824700-912	824700-914
	Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	826700-902	826700-906				
	MicroBore RR*	1.0 x 150	3.5	863600-902	863600-906	863600-905			
	MicroBore RR*	1.0 x 50	3.5	865600-902	865600-906				
	MicroBore RR*	1.0 x 30	3.5	861600-902	861600-906				
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920				
P	Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-124	820675-124	820675-115	
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-920	820950-915	820950-916	820950-922	820950-917	820950-933
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915	821125-924	821125-924	821125-915	821125-933
P	Guard Hardware Kit	9.4 x 15		840140-901	840140-901	840140-901	840140-901	840140-901	
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901	820888-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)									
PI	PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-105		877250-112	877250-114
PI	PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106				877150-114
PI	PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906				870150-914
PI	PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906				870100-914
PI	PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906				870050-914
PI	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-920	820212-915	820212-915		820212-915	820212-933
	Guard Cartridge Hardware			820444-901	820444-901	820444-901	820444-901	820444-901	820444-901
	PrepHT Endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901	820400-901	820400-901

Unless indicated, column pressure limit is 400 bar.

*RR: Rapid Resolution 3.5 µm

**RRHT: Rapid Resolution HT 1.8 µm

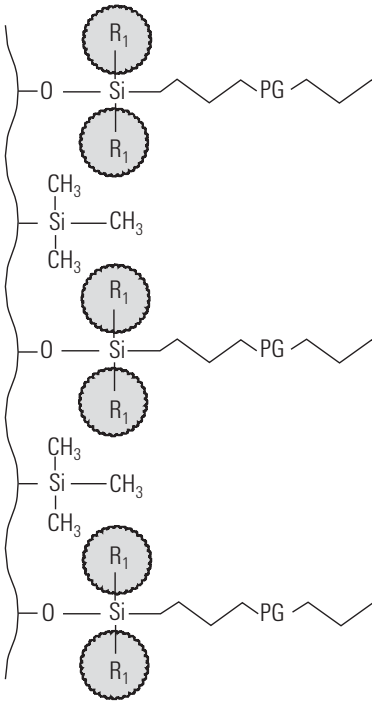
ZORBAX 80Å StableBond

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11
Agilent Cartridge Columns (require hardware kit 5021-1845)						
AC	Analytical	4.6 x 250	5	7995218-585	7995208-585	
AC	Analytical	4.6 x 150	5	7995218-595	7995208-595	
AC	Rapid Resolution	4.6 x 75	3.5	7995218-344	7995208-344	
AC	Guard Cartridges, 10/pk	4.0 x 4	5	7995118-504	7995118-504	
AC	Cartridge Holder			5021-1845	5021-1845	
Standard Columns (no special hardware required)						
	Rapid Resolution HT	4.6 x 50	1.8	822975-902	822975-906	
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	822975-932		
	Narrow Bore RRHT	2.1 x 50	1.8	822700-902		
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	822700-932		
Rapid Resolution Cartridges (require hardware kit 820555-901)						
RR	Rapid Resolution Cartridge	4.6 x 30	3.5	833975-902	833975-906	833975-912
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 30	3.5	833975-932	833975-936	
RR	Rapid Resolution Cartridge	4.6 x 15	3.5	831975-902	831975-906	
RR	Rapid Resolution Cartridge, 3/pk	4.6 x 15	3.5	831975-932	831975-936	
RR	Rapid Resolution Cartridge	2.1 x 30	3.5	873700-902	873700-906	
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 30	3.5	873700-932	873700-936	
RR	Rapid Resolution Cartridge	2.1 x 15	3.5	875700-902	875700-906	
RR	Rapid Resolution Cartridge, 3/pk	2.1 x 15	3.5	875700-932	875700-936	
Rapid Resolution HT Cartridges (require hardware kit 820555-901)						
RR	Rapid Resolution HT Cartridge	4.6 x 50	1.8	825975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	825975-932		
RR	Rapid Resolution HT Cartridge	4.6 x 30	1.8	823975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	823975-932		
RR	Rapid Resolution HT Cartridge	4.6 x 15	1.8	821975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	821975-932		
RR	Rapid Resolution HT Cartridge	2.1 x 50	1.8	825700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	825700-932		
RR	Rapid Resolution HT Cartridge	2.1 x 30	1.8	823700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	823700-932		
RR	Rapid Resolution HT Cartridge	2.1 x 15	1.8	821700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	821700-932		
RR	Hardware Kit for RR and RRHT Cartridges			820555-901		

ZORBAX 80Å StableBond

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1
Capillary Glass-lined Columns			
Capillary	0.5 x 250	5	5064-8258
Capillary	0.5 x 150	5	5064-8256
Capillary	0.5 x 35	5	5064-8254
Capillary RR	0.5 x 150	3.5	5064-8262
Capillary RR	0.5 x 35	3.5	5064-8260
Capillary	0.3 x 250	5	5064-8257
Capillary	0.3 x 150	5	5064-8255
Capillary	0.3 x 35	5	5064-8253
Capillary RR	0.3 x 150	3.5	5064-8261





Unique, Polar Alkyl Bonus-RP Bonded Phase

ZORBAX Bonus-RP

- Excellent peak shape for challenging basic compounds at low and mid pH
- Unique reversed-phase selectivity
- Novel bonding technology with embedded polar group and steric protection
- Usable in 100% aqueous mobile phases

The Agilent ZORBAX Bonus-RP column has a polar amide group embedded in a long alkyl chain. This novel bonding reduces interactions between basic compounds and the silica support, improving peak shape for the most difficult basic compounds. Peak shape and column lifetime are further improved by triple endcapping. In addition, diisopropyl side groups provide steric protection against acid hydrolysis for good lifetime at low pH. The Bonus-RP column provides an alternate selectivity to C18 and C8 alkyl bonded phases.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range	Endcapped	Carbon Load
ZORBAX Bonus-RP	80Å	180 m^2/g	60°C	2.0-9.0	Triple	9.5%

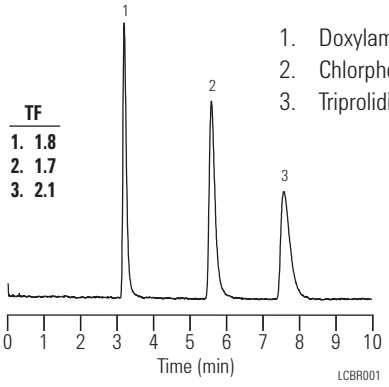
Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-9.



Improved Peak Shape of Basic Compounds Using Bonus-RP

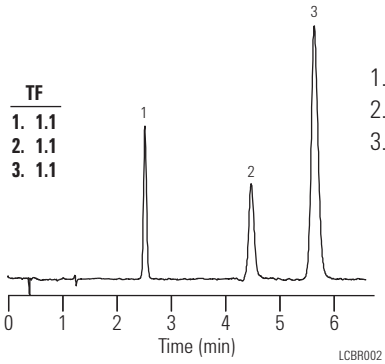
Column: **Alkyl-C8**
4.6 x 150 mm, 5 µm
Mobile Phase: 75% 25 mM NH_4OAc, pH 5.5
25% ACN
Flow Rate: 1.5 mL/min
Temperature: 40°C
Detector: 254 nm



1. Doxylamine
2. Chlorpheniramine
3. Triprolidine



Column: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm
Mobile Phase: 80% 25 mM NH_4OAc, pH 5.5
20% ACN
Flow Rate: 1.5 mL/min
Temperature: 40°C
Detector: 254 nm

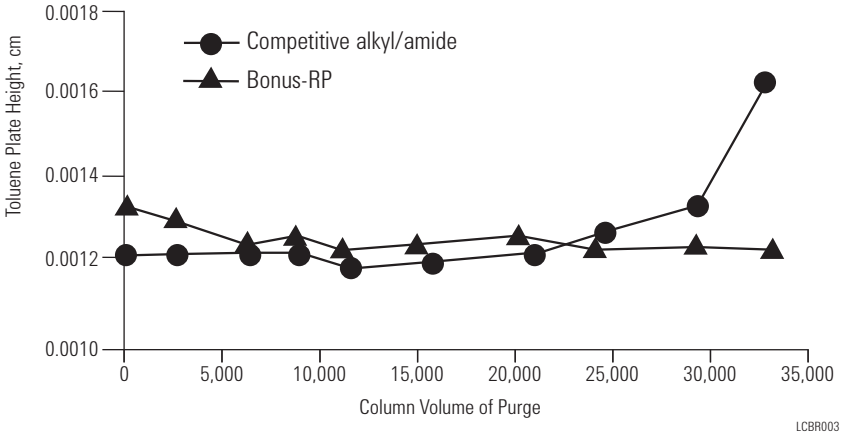


1. Doxylamine
2. Chlorpheniramine
3. Triprolidine

Bonus-RP eliminates peak tailing of these basic compounds in comparison to a typical alkyl C8 bonded phase. In the mid-pH region, residual silanols can interact more strongly with basic compounds to cause peak tailing. The polar group in the Bonus-RP bonded phase eliminates peak tailing of these basic compounds by reducing interactions with residual silanols.

ZORBAX Bonus-RP is Stable at Low and Mid pH

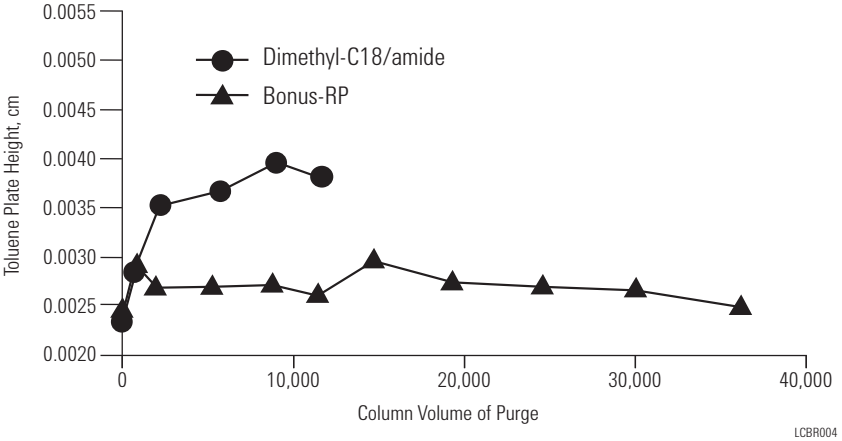
Column:	**ZORBAX Bonus-RP** **883668-901** **4.6 x 150 mm, 5 µm**
Mobile Phase:	60% 25 mM Phosphate Buffer, pH 7.0: 40% ACN
Flow Rate:	1.5 mL/min
Temperature:	23°C



Triple endcapping of Bonus-RP enhances stability at pH 7. Each 10,000 column volumes is equivalent to approximately one working month.

Dimethyl-C18/amide, Bonus-RP

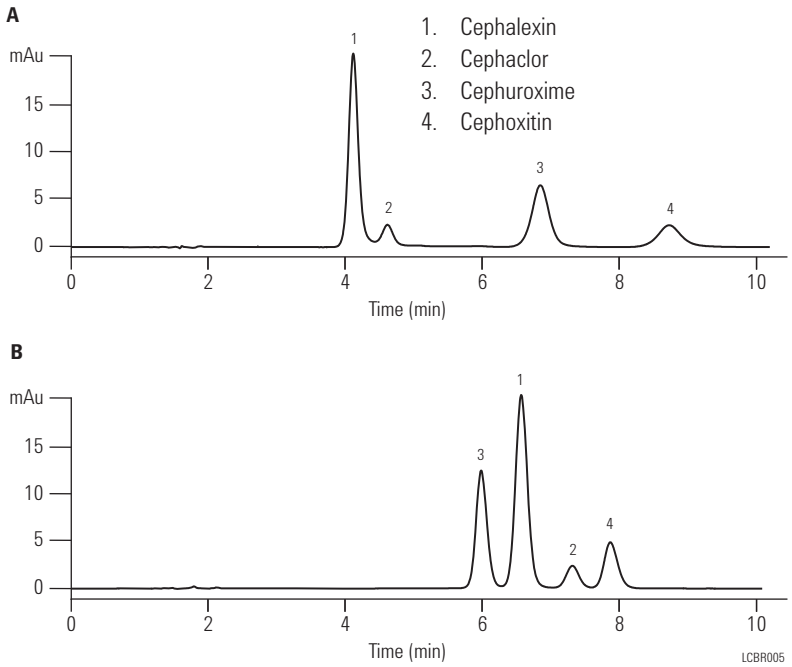
Column:	**ZORBAX Bonus-RP** **883668-901** **4.6 x 150 mm, 5 µm**
Mobile Phase:	Aging: 50% MeOH 50% 0.1% TFA Test: 80% MeOH 20% H2O
Flow Rate:	1.0 mL/min
Temperature:	Aging: 60°C Test: 23°C



Sterically protecting side groups provide good low pH stability and longer column lifetime than similar polar alkyl bonded phases.

ZORBAX Bonus-RP Provides Unique Selectivity

Column A:	**ZORBAX Bonus-RP 883668-901 4.6 x 150 mm, 5 µm**
Column B:	**Eclipse XDB-C8 993967-906 4.6 x 150 mm, 5 µm**
Mobile Phase:	75% 25 mM Na Citrate, pH 6 25% MeOH
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	254 nm
Sample:	3 µL Cephalosporins



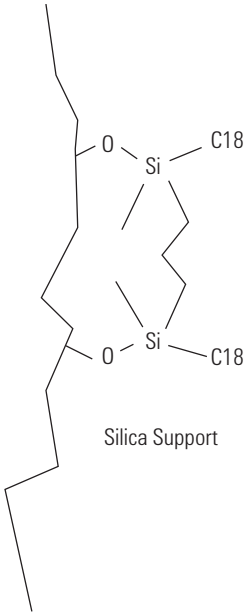
Peak elution order can change dramatically when using Bonus-RP. In this example, the elution order of the first three peaks change.

ZORBAX Bonus-RP

Hardware	Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60
Standard Columns (no special hardware required)				
	Analytical	4.6 x 250	5	880668-901
	Analytical	4.6 x 150	5	883668-901
	Rapid Resolution	4.6 x 250	3.5	884950-577
	Rapid Resolution	4.6 x 150	3.5	863668-901
	Rapid Resolution	4.6 x 100	3.5	864668-901
	Rapid Resolution	4.6 x 75	3.5	866668-901
	Rapid Resolution	4.6 x 50	3.5	835668-901
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828668-901
	Rapid Resolution HT, 600 bar	4.6 x 75	1.8	830668-901
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827668-901
	Solvent Saver	3.0 x 250	5	880668-301
	Solvent Saver	3.0 x 150	5	883668-301
	Solvent Saver Plus	3.0 x 150	3.5	863668-301
	Solvent Saver Plus	3.0 x 100	3.5	864668-301
	Solvent Saver HT, 600 bar	3.0 x 100	1.8	828668-301
	Solvent Saver HT, 600 bar	3.0 x 50	1.8	827668-301
	Narrow Bore	2.1 x 150	5	883725-901
	Narrow Bore	2.1 x 50	5	861971-901
	Narrow Bore RR*	2.1 x 150	3.5	863700-901
	Narrow Bore RR*	2.1 x 100	3.5	861768-901
	Narrow Bore RR*	2.1 x 50	3.5	861700-901
	Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828768-901
	Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827768-901
	MicroBore RR*	1.0 x 150	3.5	863608-901
	MicroBore RR*	1.0 x 50	3.5	865608-901
	MicroBore RR*	1.0 x 30	3.5	861608-901
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5922
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-928
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-928
ZGC	Guard Hardware Kit			820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)				
PT	PrepHT Cartridge	21.2 x 250	7	878250-101
PT	PrepHT Cartridge	21.2 x 150	7	878150-101
PT	PrepHT Cartridge	21.2 x 150	5	868150-901
PT	PrepHT Cartridge	21.2 x 100	5	868100-901
PT	PrepHT Cartridge	21.2 x 50	5	868050-901
PT	PrepHT endfittings, 2/pk			820400-901
PT	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-928
PT	Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.

*RR: Rapid Resolution 3.5 µm



Novel Bidentate C18-C18 Bonding for Extend C-18 Bonded Phase

ZORBAX 80Å Extend-C18

- High efficiency and long life at high pH – up to pH 11.5
- Unique bidentate bonding and double endcapping provides high pH stability
- More efficiency and better peak shape than polymer-based columns
- Improve retention, resolution and peak shape of basic compounds
- High sensitivity for LC/MS separations of peptides

The Agilent ZORBAX Extend-C18 column uses a novel bidentate C18-C18 bonding technology to make it possible to develop high-resolution separations at high pH with a silica-based column. At high pH, non-charged basic compounds will not interact with the underlying silica. The result is high efficiency separations with superior peak shape and improved resolution. High pH separations are also the best choice for compounds that are more stable or more soluble in high pH solutions. Some of the mobile phase buffer options for high pH include triethylamine, pyrrolidine, glycine, borate and ammonium hydroxide. Ammonium hydroxide at pH 10.5 is an excellent mobile phase modifier for the LC/MS of peptides and small molecules with improved sensitivity compared with TFA containing mobile phase at low pH. The Extend-C18 column is stable from pH 2-11.5 with good peak shape for all types of compounds. Extend-C18 columns also provide an additional selectivity choice at low pH.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range**	Endcapped	Carbon Load
ZORBAX Extend-C18	80Å	180 m^2/g	60°C	2.0-11.5	Double	12.5%

Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-11.5.

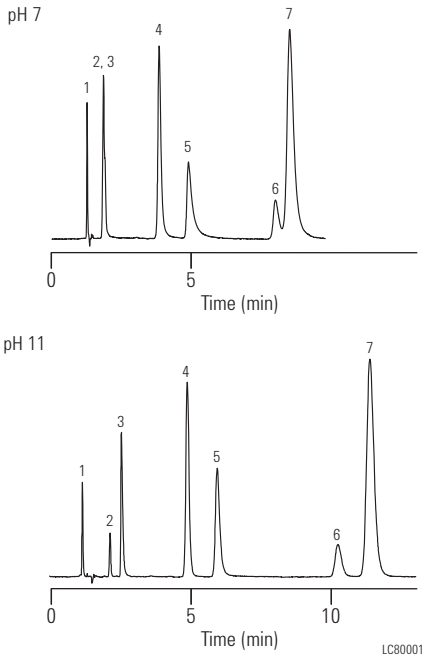
**Above pH 6 highest column stability for all silica based column is obtained by reducing the operating temperature to 40°C or below and using lower buffer concentrations (0.01 - 0.02M) or organic buffers.



Basic Antihistamines on Extend-C18 at High pH

Column:	**ZORBAX Extend-C18** **773450-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	pH 7: 30% 20 mM Na_2HPO_4 70% MeOH pH 11: 30% 20 mM TEA 70% MeOH
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	254 nm
Sample:	Antihistamines

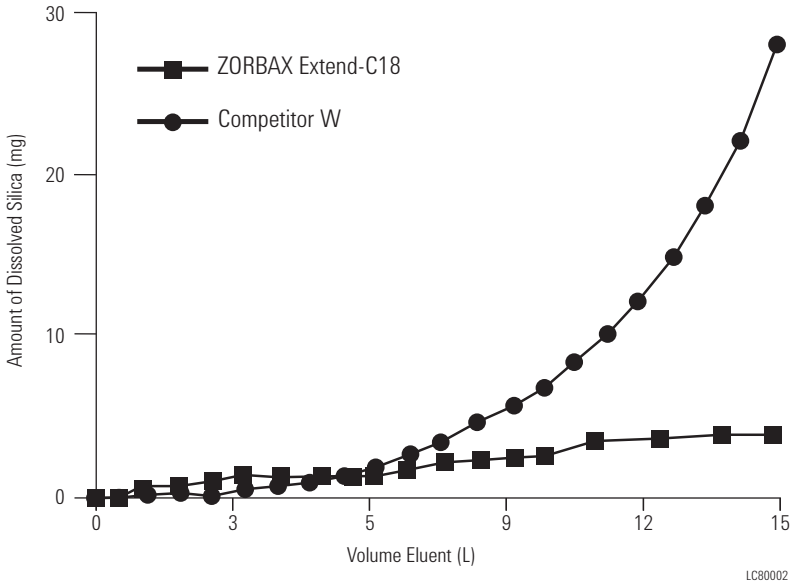
Pseudoephedrine and scopolamine are difficult to retain at low and mid pH. Pseudoephedrine is often analyzed by ion exchange methods. The Extend-C18 column retains these compounds in a noncharged form at high pH and improves resolution.



1. Maleate
2. Scopolamine
3. Pseudoephedrine
4. Doxylamine
5. Chlorpheniramine
6. Triprolidine
7. Diphenhydramine

Long Life at High pH with Extend-C18

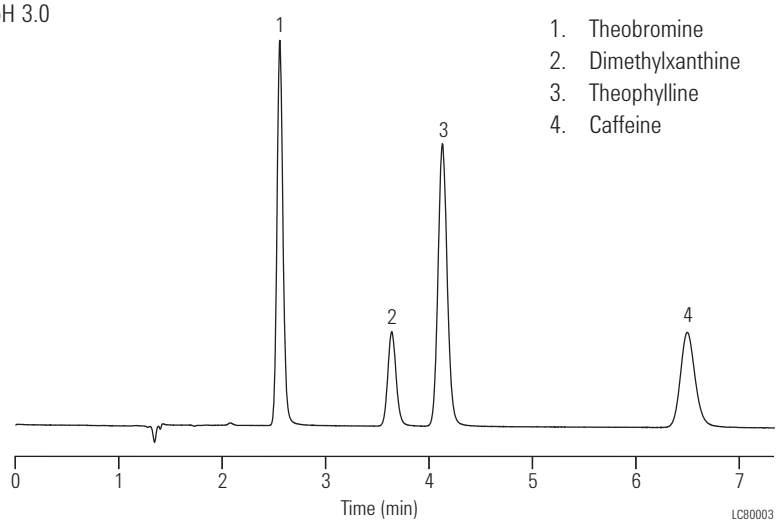
Column:	**ZORBAX Extend-C18** **773450-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	20% Methanol 80% 0.1 M Carbonate Buffer, pH 10.0
Flow Rate:	1.0 mL/min
Temperature:	Ambient



At high pH, columns will fail due to silica dissolution. The example here shows extended lifetime of ZORBAX Extend-C18 at high pH in comparison to competitor W. This was measured by the amount of dissolved silica.

Extend-C18 Provides Good Peak Shape at Low pH

Column:	**ZORBAX Extend-C18** **773450-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	80% 25 mM NaH_2PO_4, pH 3.0 20% Methanol
Flow Rate:	1.0 mL/min
Temperature:	35°C
Detector:	254 nm
Sample:	Basic Compounds



1. Theobromine
2. Dimethylxanthine
3. Theophylline
4. Caffeine

These basic compounds are separated on the Extend-C18 at low pH with excellent peak shape. The Extend-C18 column can be used at high and low pH.



ZORBAX 80Å Extend-C18

Hardware Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Standard Columns (no special hardware required)			
Analytical	4.6 x 250	5	770450-902
Analytical	4.6 x 150	5	773450-902
Analytical	4.6 x 50	5	746450-902
Rapid Resolution	4.6 x 150	3.5	763953-902
Rapid Resolution	4.6 x 100	3.5	764953-902
Rapid Resolution	4.6 x 75	3.5	766953-902
Rapid Resolution	4.6 x 50	3.5	735953-902
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	728975-902
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	727975-902
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	724975-902
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	726975-902
Solvent Saver	3.0 x 250	5	770450-302
Solvent Saver	3.0 x 150	5	773450-302
Solvent Saver Plus	3.0 x 150	3.5	763954-302
Solvent Saver Plus	3.0 x 100	3.5	764953-302
Solvent Saver Plus	3.0 x 50	3.5	735954-302
Solvent Saver HT, 600 bar	3.0 x 100	1.8	728975-302
Solvent Saver HT, 600 bar	3.0 x 50	1.8	727975-302
Solvent Saver HT, 600 bar	3.0 x 30	1.8	724975-302
Solvent Saver HT, 600 bar	3.0 x 20	1.8	726975-302
Narrow Bore	2.1 x 150	5	773700-902
Narrow Bore	2.1 x 50	5	760450-902



ZORBAX 80Å Extend-C18

Hardware	Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Standard Columns (no special hardware required)				
	Narrow Bore RR*	2.1 x 100	3.5	761753-902
	Narrow Bore RR*	2.1 x 50	3.5	735700-902
	Narrow Bore RRHT, 600 bar**	2.1 x 100	1.8	728700-902
	Narrow Bore RRHT, 600 bar**	2.1 x 50	1.8	727700-902
	Narrow Bore RRHT, 600 bar**	2.1 x 30	1.8	724700-902
	Narrow Bore RRHT, 600 bar**	2.1 x 20	1.8	726700-902
	MicroBore RR*	1.0 x 150	3.5	763600-902
	MicroBore RR*	1.0 x 50	3.5	765600-902
	MicroBore RR*	1.0 x 30	3.5	761600-902
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5923
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-930
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-930
ZGC	Guard Hardware Kit			820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)				
PH	PrepHT Cartridge	21.2 x 150	5	770150-902
PH	PrepHT	21.2 x 100	5	770100-902
PH	PrepHT	21.2 x 50	5	770050-902
PH	PrepHT endfittings, 2/pk			820400-901
PH	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-930
PH	Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.

*RR: Rapid Resolution 3.5 µm

**RRHT: Rapid Resolution HT 1.8 µm

ZORBAX Rx

- Rx-C18 is recommended for alternate selectivity at low pH relative to Eclipse XDB-C18 and StableBond SB-C18; for higher temperature applications, StableBond is recommended. This column has a higher carbon load than SB-C18 columns (12% vs. 10%).
- Rx-C18 offers high stability and good peak shape for low pH applications.
- Rx-C18 is manufactured using dimethyloctadecylsilane, is non-endcapped and provides excellent stability up to pH 8.
- Rx-C8 is the same product as SB-C8.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
ZORBAX Rx-C18	80Å	180 m^2/g	60°C	2.0-8.0	No	12%
ZORBAX Rx-C8	80Å	180 m^2/g	80°C	1.0-8.0	No	5.5%

Specifications represent typical values only.

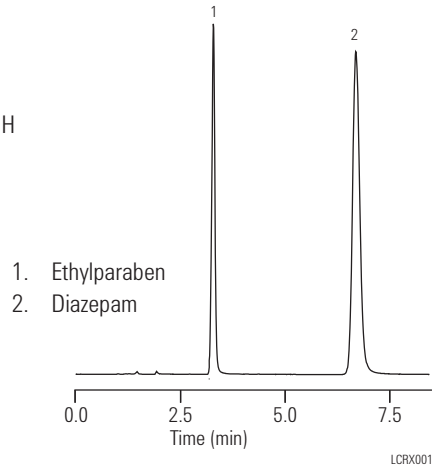
*At pH 6-9 highest column stability for all silica based columns is obtained by operating at temperatures < 40°C and using lower buffer concentrations in the range of 0.01 - 0.02M.

Analysis of Diazepam on Rx-C18

Column: **ZORBAX Rx-C18**
880967-302
3.0 x 250 mm, 5 µm

Mobile Phase: 35% H_2O: 65% MeOH

Flow Rate: 0.5 mL/min



An Rx-C18 column is used for this USP analysis of diazepam and the internal standard ethylparaben. The Solvent Saver 3.0 mm i.d. Rx-C18 column reduces solvent usage by 60% over what would be used if the analysis were done on a 4.6 x 250 mm column.

ZORBAX Rx

Hardware	Description	Size (mm)	Particle Size (µm)	Rx-C18 USP L1	Rx-C8 USP L7**
	Semi-Preparative	9.4 x 250	5	880967-202	880967-201
	Analytical	4.6 x 250	5	880967-902	880967-901
	Analytical	4.6 x 150	5	883967-902	883967-901
	Rapid Resolution	4.6 x 150	3.5	863967-902	863953-906
	Rapid Resolution	4.6 x 100	3.5	861967-902	861953-906
	Rapid Resolution	4.6 x 75	3.5	866967-902	866953-906
	Solvent Saver	3.0 x 250	5	880967-302	880975-306
	Solvent Saver	3.0 x 150	5	883967-302	883975-306
	Solvent Saver Plus	3.0 x 150	3.5	863967-302	863954-306
	Solvent Saver Plus	3.0 x 100	3.5	861967-302	861954-306
	Narrow Bore	2.1 x 150	5	883700-902	883700-906
	Narrow Bore RR*	2.1 x 100	3.5	861767-902	861753-906
P	Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-914	820950-913
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915
P	Guard Hardware Kit	9.4 x 15		840140-901	840140-901
ZGC	Guard Hardware Kit			820888-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)					
PH	PrepHT Cartridge	21.2 x 250	7	877967-102	877250-106
PH	PrepHT Cartridge	21.2 x 150	7		877150-106
PH	PrepHT Cartridge	21.2 x 150	5		870150-906
PH	PrepHT Cartridge	21.2 x 100	5		870100-906
PH	PrepHT Cartridge	21.2 x 50	5		870050-906
PH	PrepHT Guard Cartridge, 2/pk			820212-914	820212-915
PH	Guard Cartridge Hardware			820444-901	820444-901
PH	PrepHT endfittings, 2/pk			820400-901	820400-901

*RR: Rapid Resolution 3.5 µm

**Rx-C8 is the same product as SB-C8

ZORBAX Original Reversed Phase Columns

Agilent Original ZORBAX columns are made with Type A silica and are useful for many applications of acidic or neutral compounds. These columns have a higher activity level and are therefore useful for separating isomers (e.g. cis-trans, geometric) or other compounds where silanol activity enhances selectivity. These columns are used in many established methods.

Hardware	Description	Size (mm)	Particle Size (µm)	ODS (C18) USP L1	C8 USP L7	Phenyl USP L11	CN USP L10	TMS USP L13
Standard Columns (no special hardware required)								
	Semi-Preparative	9.4 x 250	5	880952-202	880952-206			
	Analytical (Endcapped)	4.6 x 250	5	880952-702	880952-706	880952-712	884950-507	880952-710
	Analytical (Non-endcapped)	4.6 x 250	5	884950-543				
	Analytical	4.6 x 150	5	883952-702	883952-706	883952-712	884950-526	883952-710
	Solvent Saver	3.0 x 250	5	880952-302				
	Solvent Saver	3.0 x 150	5	883952-302				
Guard Columns (hardware required)								
P	Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-115	820675-124	
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-902	820950-906	820950-912	820950-905	820950-924
P	Guard Hardware Kit			840140-901	840140-901	840140-901	840140-901	840140-901
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)								
PL	PrepHT Cartridge	21.2 x 250	7	877952-102	877952-106		877952-105	
PL	PrepHT Endfittings, 2/pk			820400-901	820400-901		820400-901	



Additional HPLC Columns

In addition to ZORBAX brand HPLC columns, Agilent packs columns with a variety of excellent sorbents from other manufacturers. These packings have been carefully evaluated by Agilent to meet rigorous quality assurance standards. Agilent's automated and optimized column packing stations and ISO-regulated procedures guarantee high reproducibility.

LiChrospher Reversed-Phase Cartridge Columns

LiChrospher silica columns are made with spherical "sil-gel" type porous silica particles. LiChrospher 60 RP-select B starts with 60Å pore size silica optimized for symmetrical peak shapes of basic compounds. LiChrospher 100Å is offered in both C8 and C18, as well as an endcapped C18. These columns are noted for high sample capacity and efficiency. The popular LiChrospher packings are offered in the convenient and economical Agilent cartridge configuration.

LiChrospher Reversed-Phase Cartridge Columns

Hardware	Description	Size (mm)	Particle Size (µm)	RP-18	RP-18 Endcapped	RP-8	RP-Select B	CN
	Cartridge Column	3.0 x 125	5	7992518-563			79925SB-563	
	Cartridge Column	3.0 x 250	5	7992518-583			79925SB-583	
	Cartridge Column	4.0 x 125	5		79925ODE-564		79925SB-564	79925CN-564
	Cartridge Column, 3/pk	4.0 x 125	5	79925OD-564-3		79925MO-564-3	79925SB-56K	
	Cartridge Column	4.0 x 250	5	79925OD-584	79925ODE-584	79925MO-584	79925SB-584	79925CN-584
	Cartridge Column, 3/pk	4.0 x 250	5	79925OD-58K	79925OE-58K	79925MO-58K	79925SB-58K	
	Guard Cartridge, 10/pk	4.0 x 4.0	5	79925OD-504		79925MO-504	79925SB-504	79925CN-504
	Cartridge Holder			5021-1845	5021-1845	5021-1845	5021-1845	5021-1845

LiChrosorb Reversed-Phase Columns

LiChrosorb is a widely used silica packing material manufactured by E. Merck. The irregularly shaped porous silica particles are made by grinding and sifting coarse silica particles into narrow particle size ranges. Agilent offers LiChrosorb columns in C8 and C18 phases and in both 5 and 10 µm particle sizes. These standard fitting columns are packed by Agilent using ISO-regulated, automated packing procedures to ensure high quality column-to-column reproducibility.

LiChrosorb Reversed-Phase Columns

Description	Dimensions	Particle Size (µm)	RP-18	RP-8
Standard Fitting Column	4.6 x 200	5	79915OD-574	79915MO-574
Standard Fitting Column	4.6 x 200	10	79915OD-174	79915MO-174

Nucleosil Reversed-Phase Columns

Nucleosil is a spherical porous "sil-gel" type silica packing material from Machery/Nagel. Agilent packs Nucleosil columns using tight ISO-regulated production control procedures to guarantee consistent quality. Nucleosil 100-5, C18 is used for non-polar to moderately polar compounds in reversed-phase applications.

Nucleosil Reversed-Phase Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Cartridge column	4.0 x 125	5	7992718-564
	Cartridge column	4.0 x 250	5	7992718-584
	Guard catridge, 10/pk	4 x 4	5	7992718-504
	Cartridge Holder			5021-1845

Asahipak Reversed-Phase Columns

Asahipak ODP-50 is a microparticulate, macroporous polyvinylalcohol based polymeric packing. Designed for analysis of basic substances. Asahipak ODP-50 columns provide high separation efficiency with buffered and alkaline solutions at high pH. These polymeric columns can be used up to pH 13 with a variety of solvents with minimal mechanical swelling or shrinkage. Asahipak ODP-50 is offered in Agilent's convenient cartridge column configuration.

Asahipak Reversed-Phase Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
AC	Cartridge column	4.0 x 250	5	79923OP-584
AC	Cartridge column	4.0 x 125	5	79923OP-564
AC	Cartridge column	2.0 x 125	5	7992318-562
AC	Cartridge Holder			5021-1845

Purospher Reversed-Phase Columns

An ultrapure spherical silica support, deactivated by an efficient bonding process, makes Purospher an excellent packing for basic compounds. Multistep bonding and deactivating processes provide high surface coverage, blocking residual silanol groups and reducing peak tailing.

Purospher Reversed-Phase Columns

Hardware	Description	Size (mm)	Particle Size (µm)	RP-18	RP-18 Endcapped
AC	Cartridge column	4.0 x 125	5	79925PU-564	79925PE-564
AC	Cartridge column	4.0 x 250	5	79925PU-584	79925PE-584
AC	Guard cartridge, 10/pk	4.0 x 4.0	5	79925PU-504	79925PE-504
AC	Cartridge Holder			5021-1845	5021-1845

Superspher Reversed-Phase Columns

Superspher is a high performance 4 µm silica support. It offers excellent pressure/performance ratio for analysis of complex mixtures requiring high peak capacity. Superspher columns are available as two C18 phases; one endcapped for best peak and one non-endcapped for alternate selectivity. It is also available in a C8 phase as the RP-Select B.

Superspher Reversed-Phase Columns

Hardware	Description	Size (mm)	Particle Size (µm)	RP-Select B	RP-18	RP-18 Endcapped
	Cartridge column	4.0 x 250	4	79925SB-484	7992518-484	
	Cartridge column	4.0 x 125	4	79925SB-464	799250D-464	
	Cartridge column	2.0 x 250	4	79925SB-482		79925EC-482
	Cartridge column	2.0 x 125	4	79925SB-462		79925EC-462
	Guard Cartridge, 3/pk	2.0 x 10	4	79925SB-402	7992518-402	
	Cartridge Holder			5021-1845	5021-1845	5021-1845

ZORBAX Normal Phase Columns

For normal-phase chromatography, the Agilent ZORBAX product line offers a choice of bonded and non-bonded silica packings.

ZORBAX Rx-SIL

- Made from highly pure (>99.995%) porous silica microspheres (pore size is the space between the solid silica microparticles)
- Available in 1.8 and 5 µm particle sizes
- Stronger than other silica types
- Less acidic than ZORBAX-SIL, lower metal content
- Low acidity and low metal content make ZORBAX Rx-SIL ideal for normal-phase separation of polar compounds that exhibit poor peak symmetry on more acidic silica
- Useful for very hydrophilic compounds with high organic mobile phases in HILIC mode

ZORBAX Eclipse XDB-CN

- Made from highly pure Rx-SIL
- Excellent choice for normal phase applications with basic compounds
- Equilibrates more rapidly than ZORBAX Rx-SIL and is used for many of the same normal-phase applications

ZORBAX CN

- Cyanopropyldimethylsilane monolayer bonded to ZORBAX SIL
- Equilibrates more rapidly than ZORBAX SIL, and used for many of the same normal-phase applications
- Less prone to fouling and less water sensitive than silica

ZORBAX NH_2

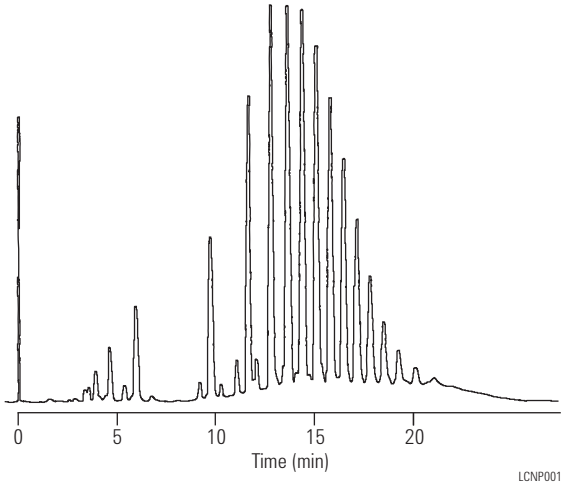
- Amino-propyl silane phase bonded to ZORBAX SIL
- Used for normal phase and weak anion-exchange, and reversed-phase HPLC of polar compounds
- Vitamins A and D are separated in the normal-phase mode
- Carbohydrates and sugars are separated in the reversed-phase mode

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon Load
ZORBAX Rx-SIL	80Å	180 m^2/g	0-8.0	No	
ZORBAX Eclipse XDB-CN	80Å	180 m^2/g	2.0-8.0	Yes	4.3%
ZORBAX SIL	70Å	300 m^2/g	0-8.0	No	
ZORBAX CN	70Å	300 m^2/g	2.0-7.0	Yes	7%
ZORBAX NH_2	70Å	300 m^2/g	2.0-7.0	Yes	4%

High Resolution Normal Phase Separation of Octylphenoxy Ethanol Surfactant on ZORBAX CN

Column:	**ZORBAX CN** **880952-705** **4.6 x 250 mm, 5 µm**
Mobile Phase:	Primary: Heptane Secondary: 2-Methoxyethanol/Isopropanol (50/50)
Flow Rate:	2 mL/min
Gradient:	2-20% Secondary in 10 min., Linear Hold at 20%
Temperature:	50°C
Detector:	278 nm
Sample:	Octylphenoxy (polyethylene oxy) Ethanol Surfactant (n= 10)



Normal Phase Columns Based on ZORBAX Rx-SIL

Hardware	Description	Size (mm)	Particle Size (µm)	Rx-SIL USP L3	Eclipse XDB-CN USP L10
Standard Columns (no special hardware required)					
	Semi-Prep	9.4 x 250	5	880975-201	
	Analytical	4.6 x 250	5	880975-901	990967-905*
	Analytical	4.6 x 150	5	883975-901	993967-905*
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-901	
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-902	
	Rapid Resolution HT, 600 bar	3.0 x 100	1.8	828975-301	
	Rapid Resolution HT, 600 bar	3.0 x 50	1.8	827975-301	
	Narrow Bore	2.1 x 150	5	883700-901	993700-905*
	Rapid Resolution HT, 600 bar	2.1 x 100	1.8	828700-901	
	Rapid Resolution HT, 600 bar	2.1 x 50	1.8	827700-901	
Guard Columns (hardware required)					
P	Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-919	820950-935
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-919	821125-935
P	Guard Hardware Kit	9.4 x 15		840140-901	
ZGC	Guard Hardware Kit			820888-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)					
PI	PrepHT Cartridge	21.2 x 250	7	877250-101	
PI	PrepHT Cartridge	21.2 x 250	7		
PI	PrepHT endfittings, 2/pk			820400-901	
PI	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-919	
PI	Guard Cartridge Hardware			820444-901	

*These columns ship containing reversed phase solvents. Flush with isopropanol before using normal phase solvents.

Normal Phase Columns Based on ZORBAX Original SIL

Hardware	Description	Size (mm)	Particle Size (µm)	SIL USP L3	CN USP L10	NH2 USP L8	Carbohydrate Analysis
Standard Columns (no special hardware required)							
	Semi-Prep	9.4 x 250	5	880952-201	880952-205	880952-208	
	Analytical	4.6 x 250	5	880952-701	880952-705	880952-708	840300-908
	Analytical	4.6 x 150	5	883952-701	883952-705	883952-708	843300-908
	Narrow Bore	2.1 x 50	5			860700-708	
Guard Columns (hardware required)							
P	Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	820675-111	820675-111	
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-901	820950-905	820950-908	820950-908
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5				
P	Guard Hardware Kit	9.4 x 15		840140-901	840140-901	840140-901	
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)							
PI	PrepHT Cartridge	21.2 x 250	7	877952-101			
PI	PrepHT Cartridge	21.2 x 250	7		877952-105	877952-108	
PI	PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	
PI	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5				
PI	Guard Cartridge Hardware						

*These columns ship containing reversed phase solvents. Flush with isopropanol before using normal phase solvents.

LiChrospher Normal-Phase Cartridge Columns

For normal phase chromatography, Agilent supplies silica and polar modified silica gel phases including LiChrospher Si, LiChrospher NH_2, LiChrospher DIOL and LiChrospher CN as convenient cartridge columns.

LiChrospher Si

- Spherical silica for acidic, neutral and basic compounds
- Great batch-to-batch reproducibility

LiChrospher CN, Diol, NH_2

- Polar-modified silica-gel phases have both polar and hydrophobic properties
- Applicable for reversed-phase and normal-phase separations

Hardware	Description	Size (mm)	Particle Size (µm)	Si	CN	Diol	NH_2
	Cartridge Column	4.0 x 250	5	79925SI-584	79925CN-584	79925DI-584	79925AP-584
	Cartridge Column	4.0 x 125	5	79925SI-564	79925CN-564	79925DI-564	79925AP-564
	Guard Cartridge	4.0 x 4.0	5	79925SI-504	79925CN-504		79925AP-504
	Cartridge Holder			5021-1845	5021-1845	5021-1845	5021-1845

ZORBAX Ion Exchange Columns – SAX and SCX

- ZORBAX SAX and 300SCX columns are based on rugged ZORBAX silica
- Stable from pH 2-7
- Provide high efficiency, rapid separations
- Compatible with organic mobile phase modifiers

Agilent ZORBAX Strong Ion Exchange columns are available as both Strong Anion Exchange (SAX) and Strong Cation Exchange (300SCX) columns. Each column is packed with bonded, 5 µm, spherical silica particles for optimum efficiency.

ZORBAX SAX packing has a permanently bonded quaternary amine. A trifunctional organo-silane reagent is used in producing this packing to maximize its stability with aqueous mobile phases. This column is ideal for separation of water-soluble compounds such as aromatic and aliphatic carboxylic acids and sulfonic acids.

ZORBAX SCX packing has 300Å pore size silica particles chemically bonded to an aromatic sulfonic acid group. This column is used for separations of basic, water-soluble compounds and bio-molecules.

Column Specifications

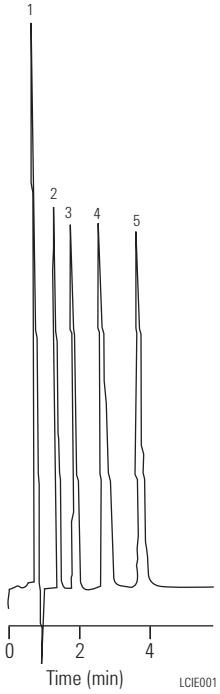
Bonded Phase	Pore Size	Surface Area	pH Range	Functionality	Max Pressure
ZORBAX SAX	70Å	300 m^2/g	2.0-7.0	Quaternary amine	350 bar
ZORBAX 300SCX	300Å	50 m^2/g	2.0-7.0	Sulfonic acid	350 bar

Specifications represent typical values only.

Cough-Cold Remedies - ZORBAX 300SCX

Column: **ZORBAX 300ÅSCX**
880952-704
4.6 x mm, 5 µm

Mobile Phase: 100 mM NaH_2PO_4 (pH 6.5)
Flow Rate: 3 mL/min
Temperature: 20° C
Detector: 210 nm
Sample: Cold remedies



1. Pyrilamine
2. Theophylline
3. Glyceryl Guaicolate
4. Caffeine
5. Phenylephrine

ZORBAX Ion Exchange Columns – SAX and SCX

Description	Size (mm)	Particle Size (µm)	SAX	300SCX
Semi-preparative	9.4 x 250	5	880952-203	880952-204
Analytical	4.6 x 250	5	880952-703	880952-704
Analytical	4.6 x 150	5	883952-703	883952-704
Analytical	4.6 x 50	5		846952-704
Solvent Saver	3.0 x 50	5		860700-304
Narrow Bore	2.1 x 150	5		883700-704
Narrow Bore	2.1 x 50	5		860700-704
Capillary	0.3 x 35	3.5		
Capillary	0.8 x 50	3.5		
Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-903	820950-904
Guard Hardware Kit			820888-901	820888-901

ZORBAX Columns for LC/MS, High Throughput and High Resolution HPLC

- Fast analysis for high speed LC/MS with Rapid Resolution (3.5 µm) and Rapid Resolution HT (1.8 µm) columns
- Poroshell 120 columns for high resolution at 40-50% lower pressure than 1.8 µm
- High resolution with 1.8 µm RRHT columns
- Many column choices for LC/MS compatibility – from nano to analytical
- Narrow bore columns for improved sensitivity
- Transfer methods from longer columns with 5 µm particles with no loss in resolution

Column choices for LC/MS are wide ranging, depending on the sample to be studied. For simple analytical samples, column choices focus on finding short columns with high resolution to reduce analysis time for high throughput LC/MS. For these applications short Rapid Resolution and Rapid Resolution HT columns are the best choice. For higher resolution, longer columns, including new Poroshell 120 columns and 100 and 150mm RRHT columns, can be used.

Column choice is also guided by the desired flow rate. LC/MS systems operate at flow rates from 1 µL/min to 1 mL/min. This makes smaller internal diameter columns good choices for high sensitivity and fast flow rates. Choices include Solvent Saver (3.0 mm ID), Narrow Bore (2.1 mm ID), and MicroBore (1.0 mm ID) columns. The right choice is available for your single quad, QQQ or TOF detector.

Columns are available in the new high performance ZORBAX Eclipse Plus bonded phases (C18, C8, Phenyl-Hexyl) for best peak shape and highest efficiency, ideal for maximizing resolution. Other ZORBAX columns are also available including popular Eclipse XDB and StableBond bonded phases. These bonded phases are compatible with the typical volatile mobile phase additives used for LC/MS, including TFA, formic acid, and acetic acid.

On the next few pages you will see columns good for LC/MS:

- Poroshell 120, 2.7 µm columns for high resolution in 2.1 - 4.6 mm ID columns.
- Rapid Resolution HT (1.8 µm) columns from 2.1 - 4.6 mm ID for LC/MS
- Rapid Resolution (3.5 µm) columns for good resolution at lower pressure
- Solvent Saver 3.0 mm ID columns ideal for LC/MS at 0.5 - 1.0 mL/min with high sensitivity
- MicroBore columns for maximum sensitivity



Poroshell 120

- High efficiency and high resolution
- 50% less pressure than sub 2-micron columns
- Compatible with 400 bar and 600 bar LC's
- Two bonded phases with excellent selectivity and peak shape

Agilent Poroshell 120 columns are a 2.7 µm particle with a 1.7 µm solid core and 0.5 µm porous outer layer. This small particle size provides high efficiency, similar to sub 2-micron columns, but with 40-50% less pressure. These high efficiency, high resolution columns can be used on any type of LC. The porous outer layer and solid core limit diffusion distance and improve separation speed while the narrow particle size distribution improves efficiency and resolution. The solid core limits diffusion distance and improves separation speed. The columns can support high pressure and multiple columns can be used for the highest resolution and efficiency possible. The same principles are used in the Poroshell 300 columns ideal for the fast, high resolution separations of biomolecules.

Column Specifications

Bonded Phase	Pore Size	Temp. Limits	pH Range	Endcapped	Carbon Load
EC-C18	120Å	60°C	2.0-8.0	Double	8%
SB-C18	120Å	90°C	1.0-8.0	No	7%

Specifications represent typical values only.

Poroshell 120

Description	Size (mm)	Particle Size (µm)	SB-C18	EC-C18
Analytical	4.6 x 150	2.7	683975-902	693975-902
Analytical	4.6 x 100	2.7	685975-902	695975-902
Analytical	4.6 x 75	2.7	687975-902	697975-902
Analytical	4.6 x 50	2.7	689975-902	699975-902
Analytical	4.6 x 30	2.7	681975-902	691975-902
Solvent Saver	3.0 x 150	2.7	683975-302	693975-302
Solvent Saver	3.0 x 100	2.7	685975-302	695975-302
Solvent Saver	3.0 x 75	2.7	687975-302	697975-302
Solvent Saver	3.0 x 50	2.7	689975-302	699975-302
Solvent Saver	3.0 x 30	2.7	681975-302	691975-302
Narrow Bore	2.1 x 150	2.7	683775-902	693775-902
Narrow Bore	2.1 x 100	2.7	685775-902	695775-902
Narrow Bore	2.1 x 75	2.7	687775-902	697775-902
Narrow Bore	2.1 x 50	2.7	689775-902	699775-902
Narrow Bore	2.1 x 30	2.7	681775-902	691775-902



ZORBAX Rapid Resolution High Throughput 1.8 µm

- High pressure (600 bar) columns for ultra high speed or maximum resolution analyses with Rapid Resolution HT columns packed with totally porous, 1.8 µm packings
- Carefully engineered particles deliver maximum resolution at 25% less pressure than other sub 2-micron materials
- Reduce analysis time by up to 95%
- Develop HPLC methods more quickly
- Securely transfer conventional methods with over 140 RRHT column choices
- Analyze complex samples on shorter columns faster and maximize peak capacity
- Matching selectivity in 3.5, 5 and 7 µm particle sizes for complete method scalability.
- Short (50 mm long and less) column can be used on some conventional LCs

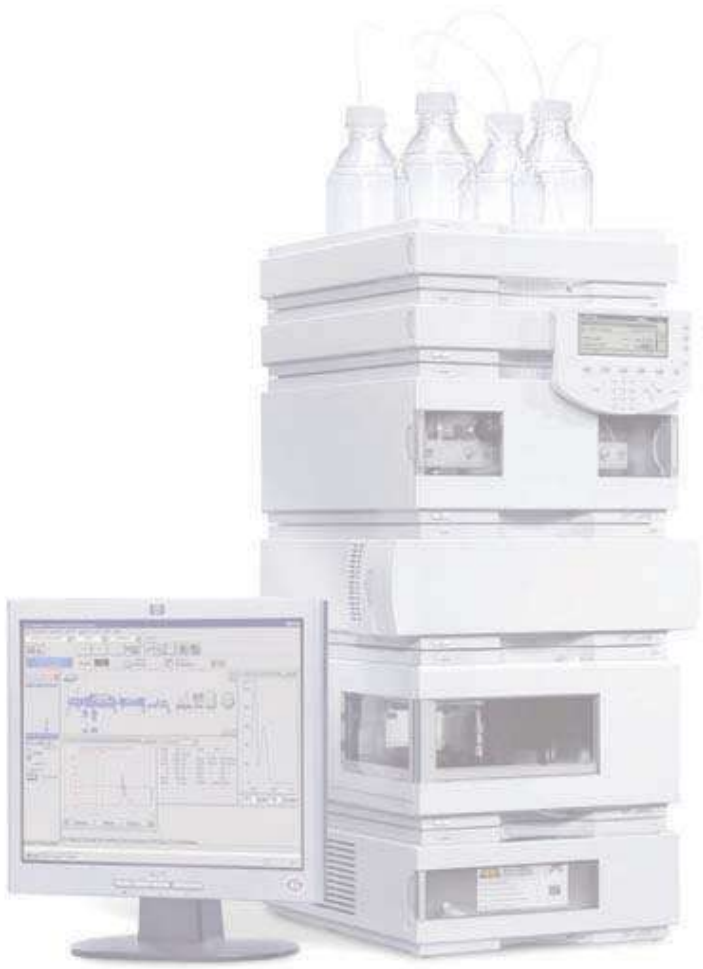
Agilent ZORBAX Rapid Resolution HT (1.8 µm) columns use a totally porous, 1.8 µm particle to provide maximum resolution in fast, ultra-fast and high resolution analyses. You can reduce analysis time by up to 95% in comparison to 250 mm length columns. With more than 140 RRHT column choices, including the new high performance ZORBAX Eclipse Plus and many other ZORBAX column choices (Eclipse XDB, StableBond, Extend, Bonus-RP), methods can be developed quickly or securely transferred to a smaller particle size column with no loss in resolution. The small particle size provides double the efficiency of a 3.5 µm column in the same column length providing the highest efficiency and resolution possible. This permits the analysis of complex samples on shorter column with the highest resolution and peak capacity. The 1.8 µm Rapid Resolution HT columns take high-speed, high-resolution HPLC to a new level.

The 600 bar columns can be used with the Agilent 1200 Rapid Resolution LC up to this high pressure limit. In addition, the shorter columns can be used on many other LC's, including the Agilent 1200 and 1100 by using the RRHT-1100 conversion kits to maximize performance.

1100 Series Conversion Kits for Fast LC

These kits make it easy to convert your Agilent 1100 system with a binary pump to a lower-volume system for RRHT LC columns. Each kit contains all capillaries, a flow cell, starter columns, and detailed instructions for system conversion. Note: you will still be able to use your converted 1100 for standard methods and columns.

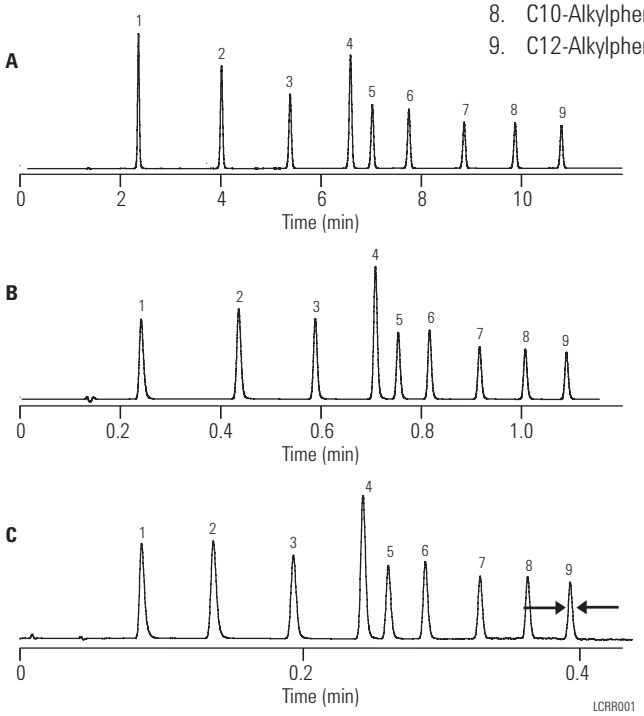
Kit Selection	Description	Part No.
For Variable Wavelength Detectors (VWD)	Columns: 4.6 x 50 mm, 1.8 µm (3) Flow Cell for VWD, 5 µl capillaries, µ-LC inline filter	5188-5323
For Diode Array Detectors (DAD & DAD SL) and Multiple Wavelength Detectors (MWD)	Columns: 4.6 x 50 mm, 1.8 µm (2) Flow Cell for DAD, 5 µl capillaries, µ-LC inline filter	5188-5324
For Diode Array Detector and Mass Spec	Columns: 2.1 x 50 mm, 1.8 µm (2) Flow Cell for DAD, 1.7 µl capillaries, ZDV union	5188-5328



Rapid Resolution HT: Up to 20X Faster

Column A:	**ZORBAX SB-C18** **883975-902** **4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX SB-C18** **827700-902** **2.1 x 50 mm, 1.8 µm**
Column C:	**ZORBAX SB-C18** **827700-902** **2.1 x 50 mm, 1.8 µm**
Mobile Phase:	A: H_2O
	B: ACN
Gradient:	0.0 min 50% B
	A: 11 min 100%B
	B: 1.2 min 100%B
	C: 0.4 min 100%B
Flow Rate:	A: 1.2 mL/min
	B: 1.0 mL/min
	C: 2.4 mL/min
Temperature:	A: 40°C
	B: 40°C
	C: 95°C
Detector:	UV 254 nm
Sample:	Alkylphenones

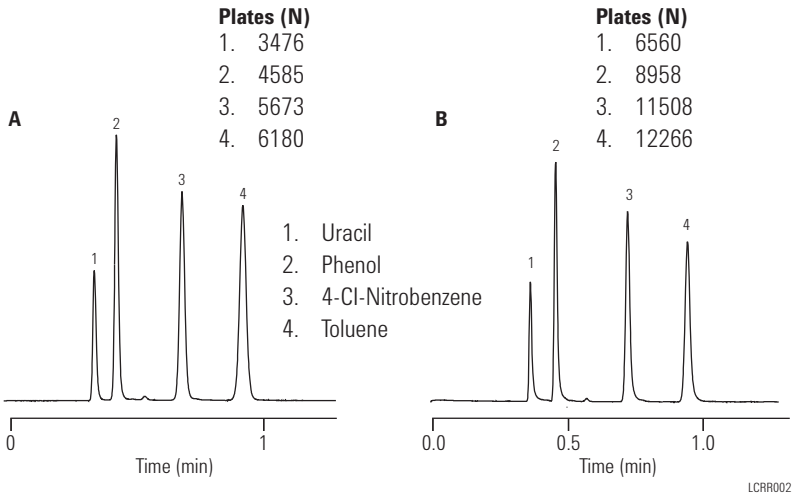
1. C3-Alkylphenone
2. C4-Alkylphenone
3. C5-Alkylphenone
4. C6-Alkylphenone
5. C7-Alkylphenone
6. C8-Alkylphenone
7. C9-Alkylphenone
8. C10-Alkylphenone
9. C12-Alkylphenone





Rapid Resolution HT Provides Double the Efficiency of Rapid Resolution Columns

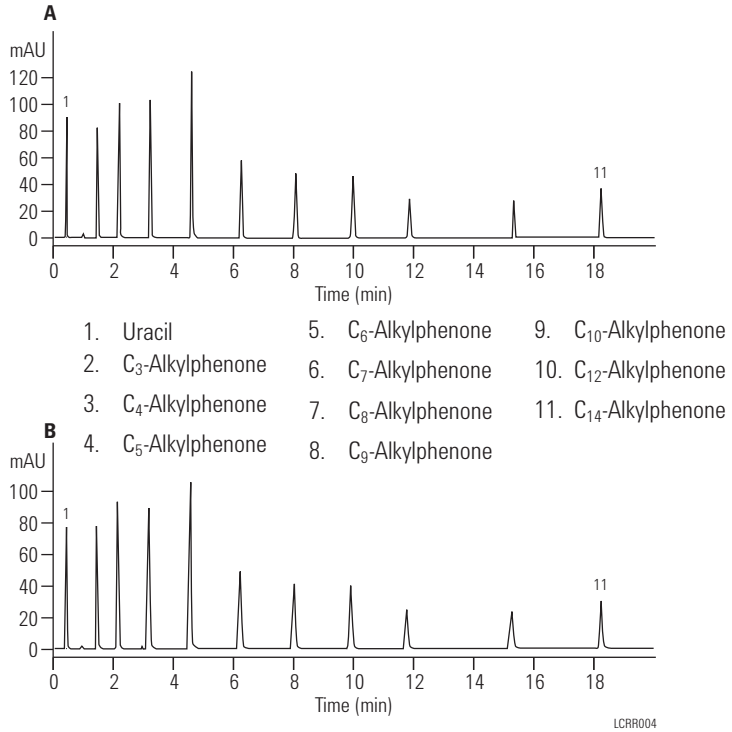
Column A:	**ZORBAX SB-C18** **835975-902** **4.6 x 50 mm, 3.5 µm**
Column B:	**ZORBAX SB-C18** **827975-902** **4.6 x 50 mm, 1.8 µm**
Mobile Phase:	25% Water, 75% MeOH
Flow Rate:	1.5 mL/min
Temperature:	Ambient
Detector:	254 nm



This figure shows that Rapid Resolution HT columns can provide double the efficiency of a 3.5 µm column in the same column length. This high efficiency can be used for very high-resolution, high throughput analyses.

Increase Peak Capacity with RRHT Columns

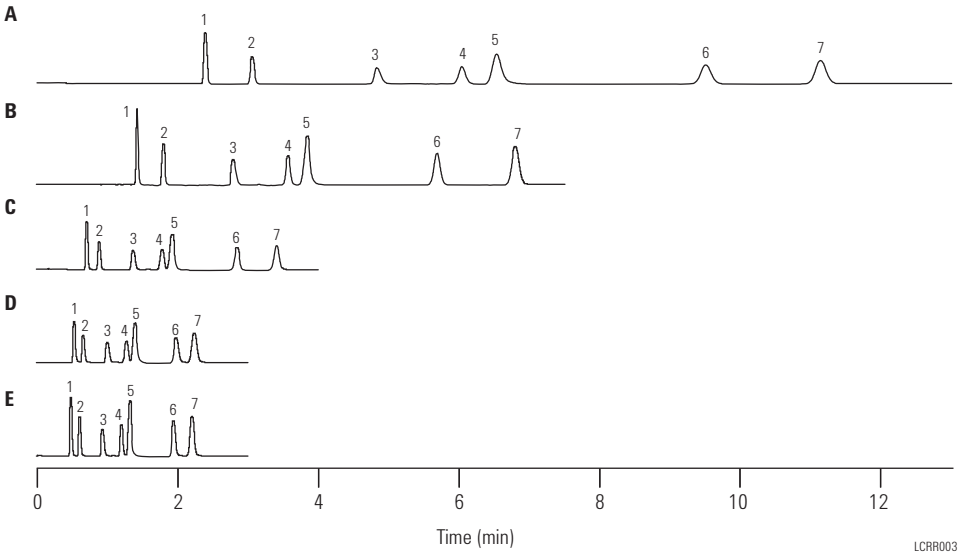
Column A:	**Eclipse XDB-C8** **928700-906** **2.1 x 100 mm, 1.8 µm**
Column B:	**Eclipse XDB-C18** **961753-902** **2.1 x 100 mm, 3.5 µm**
Mobile Phase:	A: H_2O B: ACN
Peak capacity:	A: 461 B: 343
Flow Rate:	0.5 mL/min
Gradient:	0.0 min 50% B 20.0 min 100% B
Temperature:	40°C
Detector:	UV 254 nm
Sample:	Alkylphenones



Reduce Analysis Time Dramatically with Rapid Resolution HT Columns

Column A:	**Eclipse XDB-C18** **990967-902** **4.6 x 250 mm, 5 µm**
Column B:	**Eclipse XDB-C18** **963967-902** **4.6 x 150 mm, 3.5 µm**
Column C:	**Eclipse XDB-C18** **966967-902** **4.6 x 75 mm, 3.5 µm**
Column D:	**ZORBAX Eclipse XDB-C18** **935967-902** **4.6 x 50 mm, 3.5 µm**
Column E:	**Eclipse XDB-C18** **925975-902** **4.6 x 50 mm, 1.8 µm**
Mobile Phase:	73% MeOH: 27% 20 mM Phosphate Buffer, pH 7.0
Flow Rate:	1 mL/min
Temperature:	Ambient
Detector:	254 nm

1. Uracil
2. Naproxen
3. Mefanamic Acid
4. Butyl Paraben
5. Propranolol
6. Napthalene
7. Dipropyl Phthalate

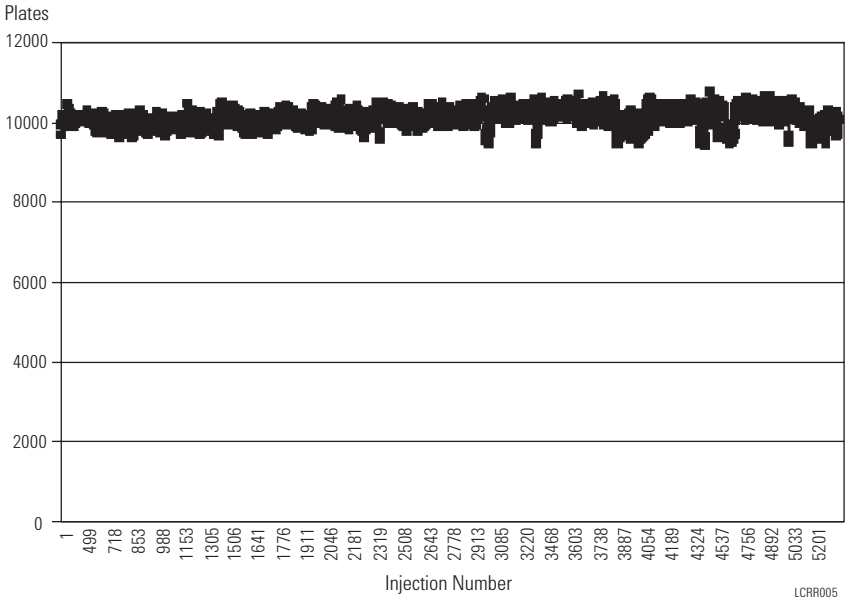


This figure shows the dramatic reduction in analysis time possible by using Rapid Resolution HT columns. Chromatogram A shows a separation that takes 11.5 minutes on a 25 cm, 5 µm column. Rapid Resolution (3.5 µm) columns, shown in chromatogram B and C, reduce analysis time substantially, but with a slight compromise in resolution. The Rapid Resolution HT column reduces analysis time to 2.2 minutes, an 80% reduction, while still maintaining baseline resolution.

Long Lifetime of RRHT Columns at Elevated Temp.

Column: **SB-C18**
827700-902
2.1 x 50 mm, 1.8 µm

Mobile Phase: A: 60% H_2O
B: 40% ACN
Flow Rate: 1 mL/min
Temperature: 80°C
Detector: UV 254 nm
Sample: QC Test Mix



Comparison of Efficiencies – RRHT (1.8 µm) and Rapid Resolution (3.5 µm) Columns

Column Length	Resolving Power N (3.5 µm)*	Resolving Power N (1.8 µm)
High Resolution		
150	21,000	32,500
100	14,000	24,000
75	10,500	17,000**
Ultra Fast		
50	7000	12,000
30	4200	6000
20	—	3500
15	2100	2500
Resolution α $N^{1/2}$		

*5 µm HPLC columns of the same length have 40% fewer plates (N-value); 4.6 mm ID

**Available as a custom column

Rapid Resolution HT Columns for High Pressure Use (Maximum Pressure: 600 bar, 9000 psi)

Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl Hexyl USP L11	Eclipse PAH USP L1	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Extend-C18 USP L1
Rapid Resolution HT, 600 bar	4.6 x 150	1.8	959994-902						
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-902	959964-906	959964-912	959964-918	928975-902		728975-902
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-902	959941-906	959941-912	959941-918	927975-902	927975-906	727975-902
Rapid Resolution HT, 600 bar	4.6 x 75	1.8	959951-902						
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-902	959931-906	959931-912	959931-918	924975-902	924975-906	724975-902
Rapid Resolution HT, 600 bar	4.6 x 20	1.8					926975-902	926975-906	726975-902
Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312		928975-302		728975-302
Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312		927975-302	927975-306	727975-302
Solvent Saver HT, 600 bar	3.0 x 30	1.8					924975-302	924975-306	724975-302
Solvent Saver HT, 600 bar	3.0 x 20	1.8					926975-302	926975-306	726975-302
Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	959794-902						
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-902	959764-906	959764-912	959764-918	928700-902	928700-906	728700-902
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-902	959741-906	959741-912	959741-918	927700-902	927700-906	727700-902
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	959731-902	959731-906	959731-912		924700-902	924700-906	724700-902
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8					926700-902	926700-906	726700-902



Rapid Resolution HT Columns for High Pressure Use (Maximum Pressure: 600 bar, 9000 psi)

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11	SB-CN USP L10	SB-Aq	Rx-SIL USP L3	Bonus-RP
Rapid Resolution HT, 600 bar	4.6 x 150	1.8	829975-902	829975-906	829975-912	829975-905	829975-914		
Rapid Resolution HT, 600 bar	4.6 x 100	1.8	828975-902	828975-906	828975-912	828975-905	828975-914	828975-901	828668-901
Rapid Resolution HT, 600 bar	4.6 x 75	1.8		830975-906					830668-901
Rapid Resolution HT, 600 bar	4.6 x 50	1.8	827975-902	827975-906	827975-912	827975-905	827975-914	827975-901	827668-901
Rapid Resolution HT, 600 bar	4.6 x 30	1.8	824975-902	824975-906	824975-912	824975-905	824975-914		
Rapid Resolution HT, 600 bar	4.6 x 20	1.8	826975-902	826975-906					
Solvent Saver HT, 600 bar	3.0 x 150	1.8	829975-302	829975-306	829975-312	829975-305			
Solvent Saver HT, 600 bar	3.0 x 100	1.8	828975-302	828975-306	828975-312	828975-305	828975-314	828975-301	828668-301
Solvent Saver HT, 600 bar	3.0 x 50	1.8	827975-302	827975-306	827975-312	827975-305	827975-314	827975-301	827668-301
Solvent Saver HT, 600 bar	3.0 x 30	1.8	824975-302	824975-306		824975-305			
Solvent Saver HT, 600 bar	3.0 x 20	1.8	826975-302	826975-306					
Narrow Bore RRHT, 600 bar	2.1 x 150	1.8	820700-902	820700-906	820700-912	820700-905			
Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	828700-902	828700-906	828700-912	828700-905	828700-914	828700-901	828768-901
Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	827700-902	827700-906	827700-912	827700-905	827700-914	827700-901	827768-901
Narrow Bore RRHT, 600 bar	2.1 x 30	1.8	824700-902	824700-906	824700-912	824700-905	824700-914		
Narrow Bore RRHT, 600 bar	2.1 x 20	1.8	826700-902	826700-906					

Rapid Resolution HT Columns and Cartridges (Maximum Pressure: 400 bar, 6000 psi)

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	SB-C18 USP L1	SB-C8 USP L7	Extend-C18 USP L1
	Rapid Resolution HT	4.6 x 50	1.8	922975-902	922975-906	822975-902	822975-906	722975-902
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	922975-932		822975-932		
	Narrow Bore RRHT	2.1 x 50	1.8	922700-902		822700-902		
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	922700-932		822700-932		
Rapid Resolution HT Cartridges (require hardware kit 820555-901)								
RR	Rapid Resolution HT Cartridge	4.6 x 50	1.8	925975-902		825975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	925975-932		825975-932		
RR	Rapid Resolution HT Cartridge	2.1 x 50	1.8	925700-902		825700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	925700-932		825700-932		
RR	Rapid Resolution HT Cartridge	4.6 x 30	1.8	923975-902		823975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	923975-932		823975-932		
RR	Rapid Resolution HT Cartridge	2.1 x 30	1.8	923700-902		823700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	923700-932		823700-932		
RR	Rapid Resolution HT Cartridge	4.6 x 15	1.8	921975-902		821975-902		
RR	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	921975-932		821975-932		
RR	Rapid Resolution HT Cartridge	2.1 x 15	1.8	921700-902		821700-902		
RR	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	921700-932		821700-932		
RR	Hardware Kit for RR and RRHT Cartridges			820555-901		820555-901		

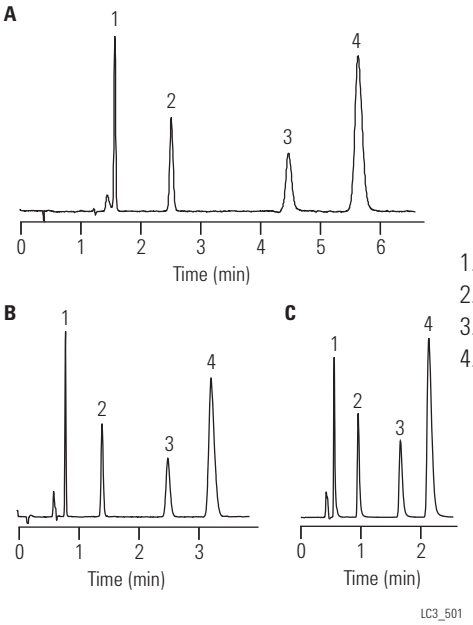
ZORBAX Rapid Resolution 3.5 µm

- Ideal choice for initial method development
- Reduce analysis time and solvent usage and increase sample throughput
- High efficiency in short and ultra-short column lengths
- Available in analytical (4.6 mm) and narrow-bore (2.1 mm) ID
- Comparable lifetime to 5 µm columns

Agilent ZORBAX Rapid Resolution columns, with a 3.5 µm particle size, reduce analysis time and increase sample throughput for any application when compared to 5 µm columns. Rapid Resolution columns are available from 15-150 mm, in 1-4.6 mm IDs, so the best configurations are available for high throughput, LC/MS, combinatorial chemistry and rapid analytical applications. Rapid Resolution 3.5 µm particles have superior mechanical strength, so every column has an extremely stable packed bed and provides a comparable lifetime to 5 µm columns. These are available in most ZORBAX bonded phases.

Rapid Resolution Columns Reduce Analysis Time While Maintaining Resolution

Column A:	**ZORBAX Bonus-RP 883668-901 4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX Bonus-RP 866668-901 4.6 x 75 mm, 3.5 µm**
Column C:	**ZORBAX Bonus-RP 861700-901 2.1 x 50 mm, 3.5 µm**
Mobile Phase:	80% 25 mM NH_4Ac, pH 5.5 20% ACN
Flow Rate:	1.5 mL/min 1.5 mL/min 0.3 mL/min
Temperature:	40°C
Detector:	254 nm



1. Caffeine
2. Doxylamine
3. Chlorpheniramine
4. Triprolidine

Rapid Resolution 3.5 µm columns are available in narrow bore configurations for great compatibility with LC/MS.

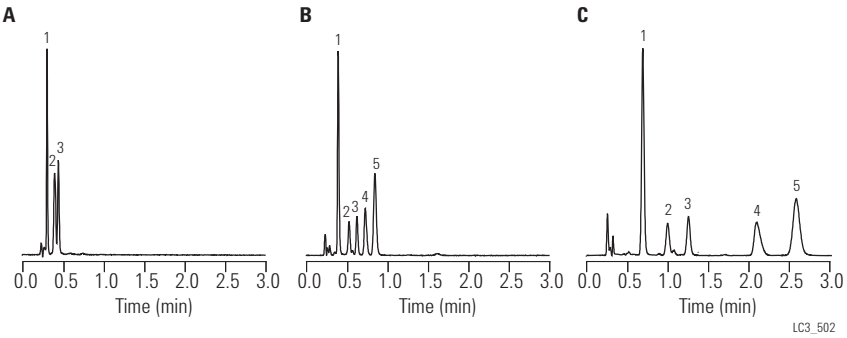
Run Method Development Chromatograms on Rapid Resolution Columns

Column: **ZORBAX SB-C18**
866953-902
4.6 x 75 mm, 3.5 µm

Mobile Phase: A: 25 mM NaH_2PO_4, pH 3.0
B: MeOH
A: 20:80
B: 30:70
C: 40:60

Flow Rate: 2.0 mL/min
Temperature: 35°C
Detector: 254 nm

1. Diltiazem
2. Dipyridamole
3. Nifedipine
4. Lidoflazine
5. Flunarizine



Rapid Resolution 4.6 x 75 mm, 3.5 µm columns are a good choice for initial method development because they allow you to quickly determine if a given column and mobile phase combination can produce the desired separation.

ZORBAX Rapid Resolution 3.5 µm Eclipse Plus Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl Hexyl USP L11
	Rapid Resolution	4.6 x 150	3.5	959963-902	959963-906	959963-912
	Rapid Resolution	4.6 x 100	3.5	959961-902	959961-906	959961-912
	Rapid Resolution	4.6 x 75	3.5	959933-902	959933-906	959933-912
	Rapid Resolution	4.6 x 50	3.5	959943-902	959943-906	959943-912
	Rapid Resolution	4.6 x 30	3.5	959936-902	959936-906	959936-912
	Solvent Saver Plus	3.0 x 150	3.5	959963-302	959963-306	959963-312
	Solvent Saver Plus	3.0 x 100	3.5	959961-302	959961-306	959961-312
	Narrow Bore RR*	2.1 x 150	3.5	959763-902	959763-902	959763-912
	Narrow Bore RR*	2.1 x 100	3.5	959793-902	959793-906	959793-912
	Narrow Bore RR*	2.1 x 50	3.5	959743-902	959743-906	959743-912
	Narrow Bore RR*	2.1 x 30	3.5	959733-902	959733-906	959733-912
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-936	820950-937	
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-936	821125-937	
ZGC	Guard Hardware Kit			820888-901	820888-901	

*RR: Rapid Resolution 3.5 µm

ZORBAX Rapid Resolution 3.5 µm Eclipse XDB Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
	Rapid Resolution	4.6 x 150	3.5	963967-902	963967-906	963967-912	963967-905
	Rapid Resolution	4.6 x 100	3.5	961967-902	961967-906		961967-905
	Rapid Resolution	4.6 x 75	3.5	966967-902	966967-906	966967-912	966967-905
	Rapid Resolution	4.6 x 50	3.5	935967-902	935967-906	935967-912	
	Rapid Resolution	4.6 x 30	3.5	934967-902	934967-906		
	Rapid Resolution	4.6 x 20	3.5	932967-902	932967-906		
	Solvent Saver Plus	3.0 x 150	3.5	963954-302	963954-306	963954-312	963954-305
	Solvent Saver Plus	3.0 x 100	3.5	961967-302	961967-306	961967-312	
	Solvent Saver Plus	3.0 x 75	3.5	966954-302			
	Narrow Bore RR*	2.1 x 150	3.5	930990-902	930990-906		
	Narrow Bore RR*	2.1 x 100	3.5	961753-902	961753-906		961753-905
	Narrow Bore RR*	2.1 x 75	3.5	966735-902			
	Narrow Bore RR*	2.1 x 50	3.5	971700-902	971700-906		
	Narrow Bore RR*	2.1 x 30	3.5	974700-902	974700-906		
	Narrow Bore RR*	2.1 x 20	3.5	972700-902	972700-906		
	MicroBore RR*	1.0 x 150	3.5	963600-902	963600-906		
	MicroBore RR*	1.0 x 50	3.5	965600-902	965600-906		
	MicroBore RR*	1.0 x 30	3.5	961600-902	961600-906		
	MicroBore Guard Cartridges, 3/pk	1.0 x 17	5	5185-5921	5185-5921		
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-925	820950-926	820950-927	820950-935
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-926	821125-926	821125-926	821125-935
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901

*RR: Rapid Resolution 3.5 µm

ZORBAX Rapid Resolution 3.5 µm StableBond Columns

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-Phenyl USP L11	SB-C3 USP L56	SB-Aq
	Rapid Resolution	4.6 x 150	3.5	863953-902	863953-906	863953-905	863953-912		863953-914
	Rapid Resolution	4.6 x 100	3.5	861953-902	861953-906	861953-905	861953-912		861953-914
	Rapid Resolution	4.6 x 75	3.5	866953-902	866953-906	866953-905	866953-912		866953-914
	Rapid Resolution	4.6 x 50	3.5	835975-902	835975-906	835975-905	835975-912		835975-914
	Rapid Resolution	4.6 x 30	3.5	834975-902	834975-906				
	Rapid Resolution	4.6 x 20	3.5	832975-902	832975-906				
	Solvent Saver Plus	3.0 x 150	3.5	863954-302	863954-306	863954-305	863954-312		863954-314
	Solvent Saver Plus	3.0 x 100	3.5	861954-302	861954-306	861954-305	861954-312	861954-309	861954-314
	Solvent Saver Plus	3.0 x 75	3.5	866953-302					

ZORBAX Rapid Resolution 3.5 µm StableBond Columns

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-Phenyl USP L11	SB-C3 USP L56	SB-Aq
	Narrow Bore RR*	2.1 x 150	3.5	830990-902	830990-906				830990-914
	Narrow Bore RR*	2.1 x 100	3.5	861753-902	861753-906	861753-905	861753-912		861753-914
	Narrow Bore RR*	2.1 x 75	3.5	866735-902					
	Narrow Bore RR*	2.1 x 50	3.5	871700-902	871700-906				871700-914
	Narrow Bore RR*	2.1 x 30	3.5	874700-902	874700-906				
	Narrow Bore RR*	2.1 x 20	3.5	872700-902	872700-906				
	MicroBore RR*	1.0 x 150	3.5	863600-902	863600-906				
	MicroBore RR*	1.0 x 50	3.5	865600-902	865600-906				
	MicroBore RR*	1.0 x 30	3.5	861600-902	861600-906				
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920				
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-920	820950-915	820950-916	820950-917	820950-922	820950-933
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-915	821125-915	821125-924	821125-915	821125-924	821125-933
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901	820888-901	820888-901

*RR: Rapid Resolution 3.5 µm

ZORBAX Rapid Resolution 3.5 µm Rx, Bonus-RP, and Extend-C18 Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Rx-C18 USP L1	Rx-C8 USP L7	Bonus-RP USP L60	Extend-C18 USP L1
	Rapid Resolution	4.6 x 250	3.5			884950-577	
	Rapid Resolution	4.6 x 150	3.5	863967-902	863953-906	863668-901	763953-902
	Rapid Resolution	4.6 x 100	3.5	861967-902	861953-906	864668-901	764953-902
	Rapid Resolution	4.6 x 75	3.5	866967-902	866953-906	866668-901	766953-902
	Rapid Resolution	4.6 x 50	3.5				735953-902
	Solvent Saver Plus	3.0 x 150	3.5	863967-302	863954-306	863668-301	763954-302
	Solvent Saver Plus	3.0 x 100	3.5	861967-302	861954-306	864668-301	764953-302
	Narrow Bore RR	2.1 x 150	3.5		830990-906	863700-901	
	Narrow Bore RR*	2.1 x 100	3.5	861767-902	861753-906	861768-901	761753-902
	Narrow Bore RR*	2.1 x 50	3.5			861700-901	735700-902
	MicroBore RR*	1.0 x 150	3.5			863608-901	763600-902
	MicroBore RR*	1.0 x 50	3.5			865608-901	765600-902
	MicroBore RR*	1.0 x 30	3.5			861608-901	761600-902
	MicroBore Guard Cartridge, 3/pk	1.0 x 17	5			5185-5922	5185-5923
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-914	820950-913	820950-928	820950-930
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915	821125-928	821125-930
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901

*RR: Rapid Resolution 3.5 µm



ZORBAX Solvent Saver

- Provide 60% reduction in mobile phase usage and waste generation compared to a 4.6 mm ID column
- Provide 2- to 3-fold signal-to-noise (S/N ratio) improvement
- Deliver optimal LC/MS performance at intermediate flow rates
- Can be used with most conventional LC instrument configurations without modification
- Solvent Saver columns are available in 1.8, 3.5 and 5 µm particle sizes

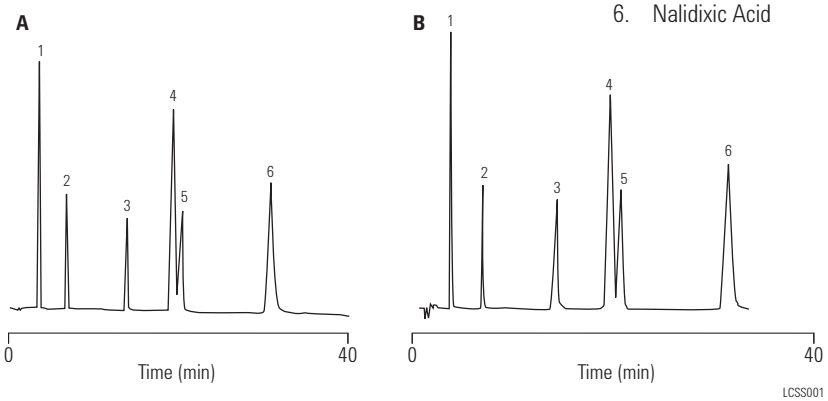
Agilent ZORBAX Solvent Saver columns have a 3.0 mm internal diameter. This is ideal for reducing solvent usage by 50% over 4.6 mm ID columns. Solvent Saver columns are also ideal for LC/MS. With a typical flow rate of 0.5 ml/min, these columns are compatible with almost all LC interfaces. These columns also improve sensitivity 2 to 3 times over 4.6 mm ID columns. Solvent Saver columns can be used with conventional HPLC instruments and are a good choice for cost effective analyses.

Solvent Saver Columns Provide up to 60% Reduction in Solvent Use and Waste

Column A:	**ZORBAX SB-C18** **883975-902** **4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX SB-C18** **883975-302** **3.0 x 150 mm, 5 µm**
Mobile Phase:	20% ACN: 80% 0.2 M Na_2HPO_4 + 0.1 M Citric Acid, pH 2.6
Temperature:	Ambient
Sample:	Antibacterials

Less solvent consumption, less waste

1. Sulfamerazine
2. Furazolidone
3. Oxolinic Acid
4. Sulfadimethoxine
5. Sulfaquinoxaline
6. Nalidixic Acid



This separation of antibacterials on a 4.6 and 3.0 mm ID columns, shows that solvent use is reduced by 50% just by changing to the Solvent Saver column with no change in the chromatography. This reduces the cost of analyses dramatically.

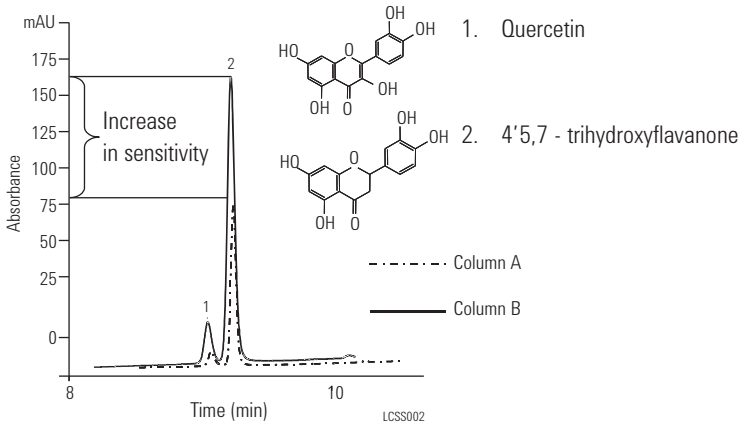
Solvent Saver Columns Increase Sensitivity

Column A: **ZORBAX SB-C18**
863953-902
4.6 x 150 mm, 3.5 µm

Column B: **ZORBAX SB-C18**
863954-302
3.0 x 150 mm, 3.5 µm

Mobile Phase: 25% Methanol:
75% 0.4% Formic Acid

Detector: 254 nm



This figure shows sensitivity is increased 2-3 times with Solvent Saver columns compared to 4.6 mm ID columns when the same mass sample is injected. No change in the HPLC instrumentation is required to see the sensitivity improvements.

Solvent Saver Columns are Ideal for LC/MS

Column: **ZORBAX SB-C18**
861954-302
3.0 x 100 mm, 3.5 µm

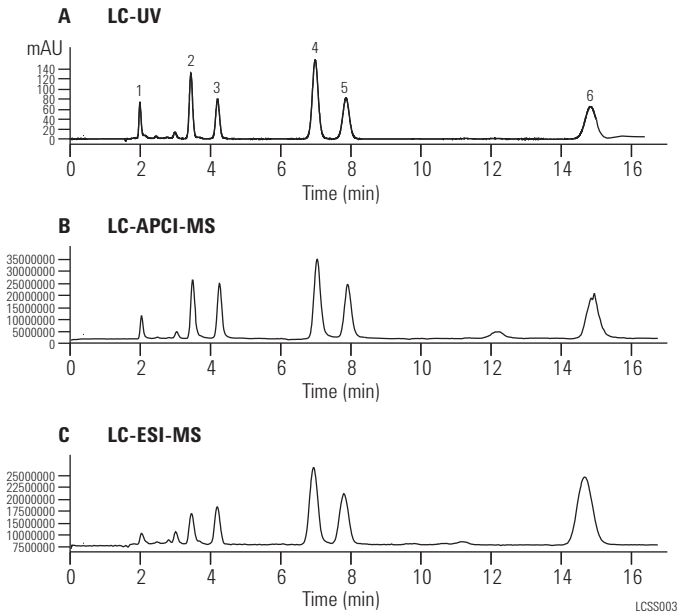
Mobile Phase: A: 70% Methanol+0.4% Formic Acid
B: 30% Water+0.4% Formic Acid

Flow Rate: 0.425 mL/min

Detector: A: UV 254 nm
B: Positive Ion APCI
C: Positive Ion Electrospray

Sample: Steroids

1. Triamcinolone
2. Hydrocortisone
3. Cortisone acetate
4. Deoxycorticosterone
5. Hydroxyprogesterone
6. Progesterone



Solvent Saver columns are ideal for LC/MS because the typical 0.5 mL/min flow rate allows samples to be evaluated and analyzed without changing columns when the MS interface is changed from electrospray to APCI.

ZORBAX Eclipse Plus

Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	Eclipse Plus Phenyl Hexyl USP L11	Eclipse PAH USP L1
Solvent Saver	3.0 x 250	5				959990-318
Solvent Saver	3.0 x 150	5	959993-302	959993-306		
Solvent Saver Plus	3.0 x 150	3.5	959963-302	959963-306	959963-312	
Solvent Saver Plus	3.0 x 100	3.5	959961-302	959961-306	959961-312	
Solvent Saver HT, 600 bar	3.0 x 100	1.8	959964-302	959964-306	959964-312	
Solvent Saver HT, 600 bar	3.0 x 50	1.8	959941-302	959941-306	959941-312	

ZORBAX 80Å StableBond

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-C3 USP L56	SB-Phenyl USP L11	SB-Aq
Solvent Saver	3.0 x 250	5	880975-302	880975-306	880975-305	880975-309	880975-312	880975-314
Solvent Saver	3.0 x 150	5	883975-302	883975-306	883975-305	883975-309	883975-312	883975-314
Solvent Saver Plus	3.0 x 150	3.5	863954-302	863954-306	863954-305	863954-309	863954-312	863954-314
Solvent Saver Plus	3.0 x 100	3.5	861954-302	861954-306	861954-305	861954-309	861954-312	861954-314

ZORBAX 300Å StableBond

Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
Solvent Saver Plus	3.0 x 150	3.5	863974-302	863974-306	863974-309	863974-309
Solvent Saver Plus	3.0 x 100	3.5		861973-306		
Solvent Saver Plus	3.0 x 75	3.5	866953-302			

ZORBAX 80Å Eclipse XDB

Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Eclipse XDB-Phenyl USP L11	Eclipse XDB-CN USP L10
Solvent Saver	3.0 x 250	5	990967-302	990967-306	990967-312	990967-305
Solvent Saver	3.0 x 150	5	993967-302	993967-306	993967-312	993967-905
Solvent Saver Plus	3.0 x 150	3.5	963954-302	963954-306	963954-312	963954-305
Solvent Saver Plus	3.0 x 100	3.5	961967-302	961967-306	961967-312	
Solvent Saver Plus	3.0 x 75	3.5	966954-302			

ZORBAX 80Å Bonus-RP, and Rx

Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60	Rx-C18 USP L1	Rx-C8 USP L7
Solvent Saver	3.0 x 250	5	880668-301	880967-302	880975-306
Solvent Saver	3.0 x 150	5	883668-301	883967-302	883975-306
Solvent Saver Plus	3.0 x 150	3.5	863668-301	863967-302	863954-306
Solvent Saver Plus	3.0 x 100	3.5	864668-301	861967-302	861954-306

ZORBAX 80Å Extend-C18

Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Solvent Saver	3.0 x 250	5	770450-302
Solvent Saver Plus	3.0 x 150	3.5	763954-302
Solvent Saver	3.0 x 150	5	773450-302
Solvent Saver Plus	3.0 x 100	3.5	764953-302
Solvent Saver Plus	3.0 x 50	3.5	735954-302



ZORBAX MicroBore (1.0 mm ID)

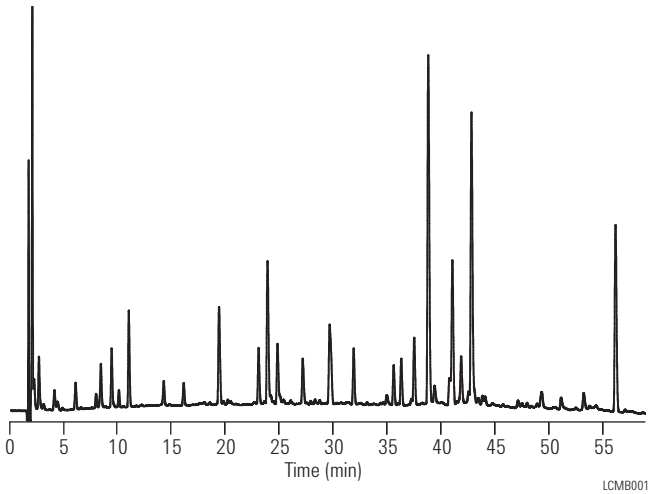
- High sensitivity for small sample sizes
- Compatible with LC/MS interfaces
- Wide variety of bonded phases

Agilent ZORBAX MicroBore (1.0 mm ID) columns are often a good choice when sample sizes are limited. They can improve detection limits 5 times over 2.1 mm ID columns when the same sample mass is used. This increase in sensitivity can be critical. MicroBore columns use low flow rates (typically ~ 50 µL/min). Therefore, these columns are ideal for use with detectors requiring low flow rates such as some mass spectrometers and with capillary LC systems.

MicoBore columns perform optimally with HPLC systems purchased or modified for microbore use. A wide variety of bonded phases are available for use up to 400 bar including StableBond SB-C18, SB-C8, 300SB-C18; Eclipse XDB-C18 and XDB-C8; Bonus RP, Extend C-18; and Poroshell columns. Guard columns are also now available with an adjustable tube stop depth to provide a perfect zero dead volume connection every time.

Separation of a Tryptic Digest on ZORBAX MicroBore 300SB-C18

Column:	**ZORBAX 300SB-C18** **863630-902** **1.0 x 150 mm, 3.5 µm**
Mobile Phase:	Gradient: 2-60% B in 60 Min. A: 0.1% TFA B: 0.075% TFA/80% ACN
Flow Rate:	50 µL/min
Temperature:	50°C
Detector:	215 nm
Sample:	2 µL Tryptic Digest of rhGH



This example of a tryptic digest separated on a MicroBore column demonstrates the high sensitivity and resolution possible with 1.0 mm ID columns.

ZORBAX MicroBore (1.0 mm ID)

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	300SB-C18 USP L1	300SB-C8 USP L7	SB-CN USP L10
MicroBore	1.0 x 250	5			861630-902		
MicroBore RR*	1.0 x 150	3.5	863600-902	863600-906	863630-902	863630-906	
MicroBore RR*	1.0 x 50	3.5	865600-902	865600-906	865630-902	865630-906	
MicroBore RR*	1.0 x 30	3.5	861600-902	861600-906			
MicroBore RRHT**	1.0 x 50	1.8	822600-902	822600-906			822600-905
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920	5185-5920	5185-5920	

Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7	Bonus-RP USP L60	Extend-C18 USP L1
MicroBore RR*	1.0 x 150	3.5	963600-902	963600-906	863608-901	763600-902
MicroBore RR*	1.0 x 50	3.5	965600-902	965600-906	865608-901	765600-902
MicroBore RR*	1.0 x 30	3.5	961600-902	961600-906	861608-901	761600-902
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5921	5185-5921	5185-5922	5185-5923

Description	Size (mm)	Particle Size (µm)	Poroshell 300SB-C18	Poroshell 300SB-C8	Poroshell 300SB-C3	Poroshell 300Extend-C18
MicroBore	1.0 x 75	5	661750-902	661750-906	661750-909	671750-902
MicroBore Guard, 3/pk	1.0 x 17	5	5185-5968	5185-5968	5185-5968	

*RR: Rapid Resolution 3.5 µm

**RRHT: Rapid Resolution HT 1.8 µm



ZORBAX PrepHT

- Easy scale-up from analytical to preparative scale with ZORBAX phases
- Fast preparative separations, up to 2000 mg
- 5 to 7 µm particles for high efficiency and high yield
- Easy to install finger tight connections seal up to 5000 psi/350 bar

High purity, high recovery and high throughput can be easily achieved with Agilent ZORBAX PrepHT columns. These are available in a variety of bonded phases – Eclipse XDB, StableBond, Bonus-RP, and Extend-C18 – for optimized resolution and loadability under any conditions.

ZORBAX PrepHT columns are packed with 5 and 7 µm particle sizes for very high resolution. The high resolution allows high loadability, high yield, and high purity of compounds. The larger diameter columns and mechanically stronger ZORBAX particles allow for flow rates up to 100 ml/min, thus increasing throughput.

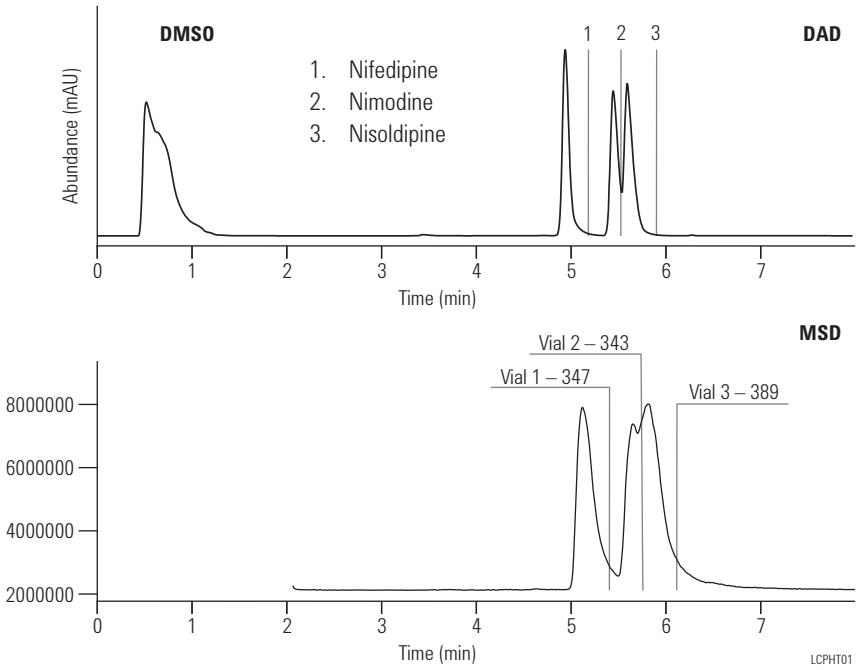
ZORBAX PrepHT columns are designed for rapid scale-up from analytical to preparative scale without losing resolution. For complex separations on larger columns (21.2 mm ID, 150 mm length and longer), Agilent has carefully chosen the 7 µm particle size to achieve a balance between high efficiency and high loadability.



High Purity and High Recovery with ZORBAX PrepHT Columns

Sample: Antianginal drugs

Mass-based fraction collection using ZORBAX SB-C18 column shows high purity and high recovery of each compound (Application Note publication number 5988-7113EN). The separation of the three antianginal drugs was successfully done in a single run with high recovery and >90% purity. Separations up to 2000 mg are possible depending on the complexity of separation.



	Amount Nifedipin [mg]	Amount Nifmodipin [mg]	Amount Nifsoldipin [mg]		
Fraction 1	18.90	0.11	0.16	Purity Nifedipin	98.6%
Fraction 2	0.29	17.66	0.77	Purity Nifmodipin	94.4%
Fraction 3	0.49	1.66	18.36	Purity Nifsoldipin	89.5%
Recovery [mg]	19.68	19.43	19.29		
Recovery [%]	101.3	102.0	101.9		

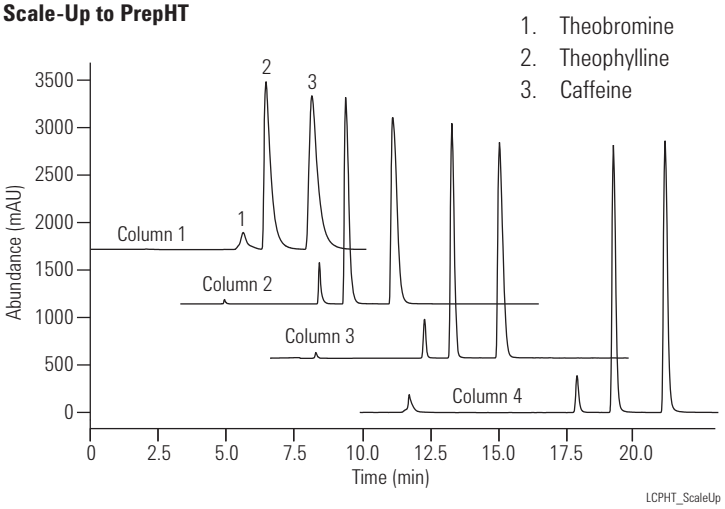
ZORBAX PrepHT columns are designed for rapid scale-up from analytical to preparative scale without losing resolution. For complex separations for larger columns (21.2 mm ID and higher), 150 mm length and higher), Agilent has carefully chosen the 7 µm particle size to achieve a balance between high efficiency and high loadability.

Scale-Up from Analytical to Prep ZORBAX SB-C18 Columns Using the Same Pump

Column	Size	Flow (mL/min)	Injection (µL)	Detector Cell	Part No.
Column 1	50 x 150 mm	100	2200	0.3 mm quartz	Custom Column
Column 2	21.2 x 150 mm	18	400	0.3 mm quartz	877150-102
Column 3	9.4 x 150 mm	3.5	80	0.3 mm quartz	883975-202
Column 4	4.6 x 150 mm	0.85	2.0	3 mm SST	883975-902

Using the same 1100 pump, a scale-up from 4.6 mm to 50 mm ID was possible without any loss of resolution. This increase throughput by reducing the time required for redeveloping and adjusting the method.

Scale-Up to PrepHT



ZORBAX PrepHT 80ÅStableBond (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Aq	SB-CN USP L10	SB-Phenyl USP L11
PL	PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-114	877250-105	877250-112
PL	PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106	877150-114		
PL	PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906	870150-914		
PL	PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906	870100-914		
PL	PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906	870050-914		
PL	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-920	820212-915	820212-933	820212-933	820212-915

ZORBAX PrepHT 300ÅStableBond (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-C3 USP L56	300SB-CN USP L10
PL	PrepHT Cartridge	21.2 x 250	7	897250-102	897250-106	897250-109	897250-105
PL	PrepHT Cartridge	21.2 x 150	7	897150-102	897150-106	897150-109	
PL	PrepHT Cartridge	21.2 x 150	5	895150-902	895150-906	895150-909	
PL	PrepHT Cartridge	21.2 x 100	5	895100-902	895100-906	895100-909	
PL	PrepHT Cartridge	21.2 x 50	5	895050-902	895050-906	895050-909	
PL	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-921	820212-918	820212-924	820212-924
	Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901	820444-901	820444-901
	PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901

ZORBAX PrepHT Original (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	ODS (C18) USP L1	C8 USP L7	CN USP L10	NH2 USP L8	SIL USP L3
PL	PrepHT Cartridge	21.2 x 250	7	877952-102	877952-106	877952-105	877952-108	877952-101
	PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901	820400-901

ZORBAX PrepHT Eclipse XDB (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
PI	PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106
PI	PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106
PI	PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906
PI	PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906
PI	PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906
PI	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-925	820212-926
	Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
	PrepHT endfittings, 2/pk			820400-901	820400-901

ZORBAX PrepHT Bonus-RP and Extend-C18 (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60	Extend-C18 USP L1
PI	PrepHT Cartridge	21.2 x 250	7	878250-101	
PI	PrepHT Cartridge	21.2 x 150	7	878150-101	
PI	PrepHT Cartridge	21.2 x 150	5	868150-901	770150-902
PI	PrepHT Cartridge	21.2 x 100	5	868100-901	770100-902
PI	PrepHT Cartridge	21.2 x 50	5	868050-901	770050-902
PI	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-928	820212-930
	Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
	PrepHT endfittings, 2/pk			820400-901	820400-901

ZORBAX PrepHT Rx-SIL (require hardware 820400-901)

Hardware	Description	Size (mm)	Particle Size (µm)	Rx-SIL USP L3	Rx-C18 USP L1
PT	PrepHT Cartridge	21.2 x 250	7	877250-101	
PT	PrepHT Cartridge	21.2 x 250	7		877967-102
PT	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-919	820212-914
	Guard Cartridge Hardware Includes guard column end fitting, polymeric seal, and seal insertion tool (seal holder and seal pusher)			820444-901	820444-901
	PrepHT endfittings, 2/pk			820400-901	820400-901

ZORBAX PrepHT Accessories

Hardware	Description	Part No.
PT	Guard Cartridge Hardware	820444-901
PT	PrepHT Endfittings, 2/pk	820400-901
PT	Replacement Seals	820385-901



Agilent Prep LC Columns

- High loadability for maximum sample purification
- Easy scalability from 4.6 mm ID up to 50 mm ID for rapid method development
- High throughput 21.2 mm ID cartridges for fast purification
- Exceptional column stability and loadability up to pH 10

Agilent Prep LC columns are designed for high loadability to purify milligram to gram quantities of products. Preparative sized columns are available in 21.2, 30, and 50 mm internal diameters with lengths ranging from 50-250 mm. Columns are available in 5 and 10 µm particle sizes with very high efficiency in every dimension. These column choices accommodate almost every preparative sample.

Agilent Prep 21.2 mm ID columns are available with Agilent's Preparative Cartridge Hardware. This reliable cartridge hardware makes it simple to use columns with different lengths to increase sample load. Guard columns are easily integrated onto these columns providing superior protection of the analysis column. Analytical sized 4.6 mm ID scalar columns are available for method development and optimization prior to scaling up to larger columns. Bulk material is also available.

Agilent Prep columns are available in a C18 bonded phase suitable for purification of a wide variety of non-polar and polar compounds. Unbonded silica columns are also available.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range	Endcapped	Carbon Load
C18	100Å	400 m^2/g	60°C*	2.0-10.0	Single	24%
Silica	100Å	400 m^2/g	**	1.0-8.0	N/A	N/A

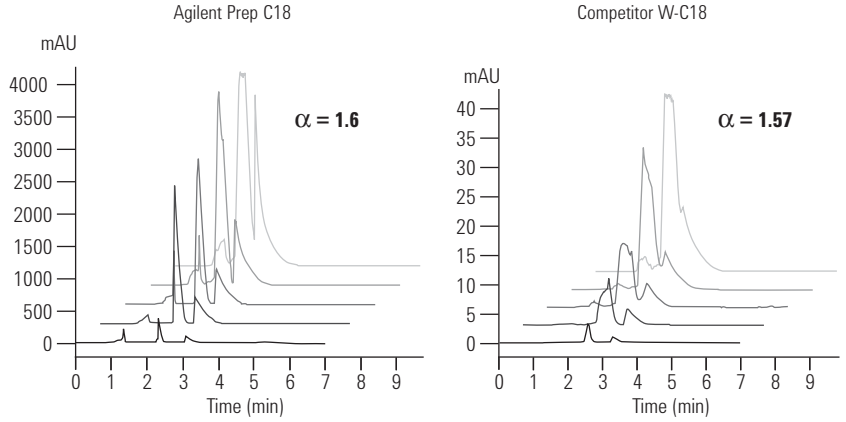
Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-10.

**Temperature limits for bare silica are determined by the pH of the mobile phase.

Superior Loadability on Agilent Prep C18 with Basic Compounds

Column:	**Agilent Prep-C18 443905-902 4.6 x 150 mm, 5 µm**
Mobile Phase:	50% 0.1%TFA: 50% ACN
Flow Rate:	1 mL/min
Sample:	10 µL Doxepin/ Amitriptyline 0.5–50 mg/mL

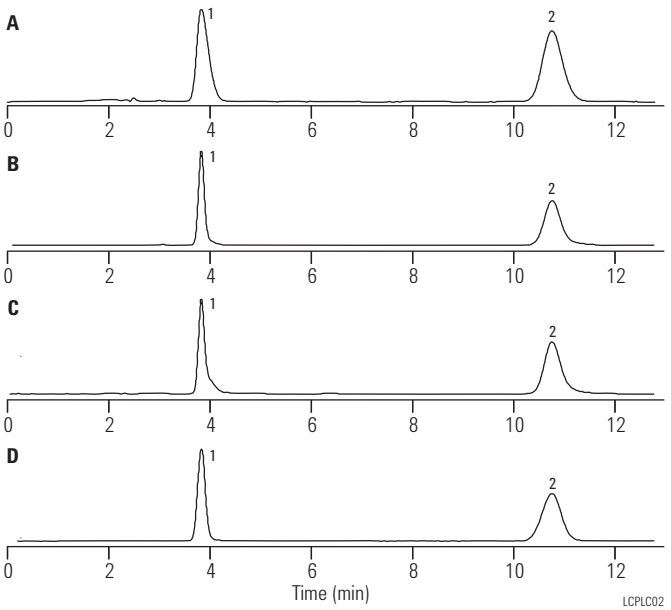


Agilent Prep Columns show better resolution and loadability than competitor columns.

Steroids: Easy Scalability Using Agilent Prep Columns

Column A:	**Agilent Prep-C18 443905-902 4.6 x 150 mm, 5 µm**
Column B:	**443905-102 21.2 x 150 mm, 5 µm**
Column C:	**413910-302 30 x 150 mm, 10 µm**
Column D:	**413910-502 50 x 150 mm, 10 µm**
Mobile Phase:	55% Water:45% ACN
Flow Rate:	0.7 mL/min 14.87 mL/min 29.77 mL/min 85.37 mL/min
Temperature:	Ambient
Detector:	240 nm
Sample:	2 µL 42.4 µL 170 µL 488 µL

1. Hydrocortisone
2. Testosterone (in MeOH @ 1mg/mL)



Agilent Prep-C18 shows excellent scalability making method transfer simple and predictable.

Agilent Prep LC Columns

Hardware	Description	Size (mm)	Particle Size (µm)	C18	Silica
Standard Columns (no special hardware required)					
	Scalar	4.6 x 250	10	440910-902	440910-901
	Scalar	4.6 x 150	10	443910-902	443910-901
	Scalar	4.6 x 100	10	449910-902	
	Scalar	4.6 x 250	5	440905-902	440905-901
	Scalar	4.6 x 150	5	443905-902	443905-901
	Scalar	4.6 x 100	5	449905-902	449905-901
	Scalar	4.6 x 50	5	446905-902	446905-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)*					
PI	PrepHT	21.2 x 250	10	410910-102	410910-101
PI	PrepHT	21.2 x 150	10	413910-102	413910-101
PI	PrepHT	21.2 x 50	10	446910-102	
PI	PrepHT	21.2 x 150	5	443905-102	443905-101
PI	PrepHT	21.2 x 100	5	449905-102	449905-101
PI	PrepHT	21.2 x 50	5	446905-102	446905-101
PI	PrepHT endfittings, 2/pk			820400-901	820400-901
Standard Columns (no special hardware required)					
	Prep 30	30 x 250	10	410910-302	410910-301
	Prep 30	30 x 150	10	413910-302	413910-301
	Prep 30	30 x 100	10	419910-302	419910-301
	Prep 30	30 x 100	5	449905-302	449905-301
	Prep 30	30 x 50	5	446905-302	446905-301
	Prep 50	50 x 250	10	410910-502	410910-501
	Prep 50	50 x 150	10	413910-502	413910-501
	Prep 50	50 x 100	10	419910-502	419910-501
	Prep 50	50 x 100	5	449905-502	449905-501
Guard Columns (hardware required)					
PI	PrepHT Guard Cartridges, 2/pk	21.2 x 10	10	420212-902	420212-901
PI	Guard Cartridge Hardware			820444-901	820444-901
PI	PrepHT External Guard Hardware Kit			420420-901	420420-901
	Bulk Packing (1kg)		10	420910-902	420910-901

*All PrepHT cartridge columns require hardware kit 820400-901. If a guard column is desired for the 21.2 mm ID columns then the PrepHT Guard Hardware Kit, 820444-901, is also required. If the guard column is used on a 30 mm ID column then the external guard column hardware kit, 420420-901, is required.



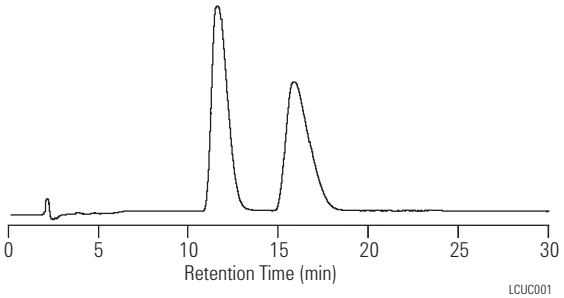
Ultron Chiral Columns

- Direct racemic separations without derivatization
- Use Ultron ES-OVM to separate enantiomers of acidic and basic pharmaceuticals, such as hexobarbital, ibuprofen, and profenamine
- Ultron ES-Pepsin Chiral columns are best suited to separate basic compounds that are difficult to separate with other chiral columns
- ES-OVM and ES-Pepsin columns contain 120Å, 5 µm silica particles bonded with an ovomucoid protein and pepsin protein, respectively
- Both types of chiral columns are usable with reversed-phase mobile phases such as acetonitrile or ethanol and phosphate buffer

Ultron Chiral columns are immobilized protein columns that feature numerous chiral recognition sites for enantiomeric separations of dozens of chiral compounds. They are engineered with two complementary protein-based chiral stationary phases, making them an excellent choice for the HPLC separation of enantiomers without derivatization – including a growing number of drug substances of interest.

Separation of Enantiomers of Fluoxetine (Prozac)

Column:	**Ultron ES-OVM Chiral** **702111651** **4.6 x 150 mm, 5 µm**
Mobile Phase:	25:75 (v/v) EtOH / 20 mM KH_2PO_4, pH 5.5 (adjusted with NaOH)
Temperature:	Ambient
Detector:	UV (225 nm)
Sample:	Mixture Fluoxetine (Prozac) entantiomers

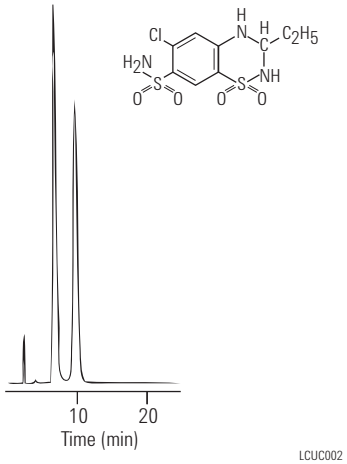


Courtesy of D. S. Risley and V. S. Sharp of Lilly Research Laboratories, Eli Lilly and Co.

Separation of Ethiazide (diuretic drug) on ULTRON ES-OVM Column

Column: **Ultron ES-OVM Chiral 702111651 4.6 x 150 mm, 5 µm**

Mobile Phase: 20 mM KH_2PO_4 (pH 4.6)
Flow Rate: 1 mL/min
Temperature: 25°C
Detector: 220 nm

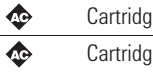


Ultron Chiral Columns

Description	Size (mm)	Particle Size (µm)	ES-OVM	ES-Pepsin
Semi-Prep	10 x 150	5	722111723	
Analytical	4.6 x 250	10	724111653	
Analytical	4.6 x 150	5	702111651	822111651
Analytical, with Guard	4.6 x 150	5	702111651A	822111631A
Narrow Bore	2.0 x 150	5	702111610	
Guard Column	4.0 x 10	5	712111630	832111630

ChiraDex Chiral Columns

- For routine separation of enantiomers
- Available as ChiraDex cartridge columns
- Novel manufacturing process bonds β-cyclodextrin to spherical 5 µm silica gel by means of a chemical spacer
- Enantiomeric separations have been achieved with ChiraDex using simple nonchiral solvent systems such as MeOH/water, MeOH/buffer, and ACN/TEAA

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Cartridge Column	4.0 x 250	5	79925CB-584
	Cartridge Holder			5021-1845

Polymer Analysis

Gel Permeation Chromatography (GPC) – also referred to as Size Exclusion Chromatography (SEC) – is widely used for characterizing polymers in quality control and research laboratories. The technique has applications in many areas because of its ease of automation and quality of the results it produces. It provides average molecular weights and molecular weight distributions, which are calculated from the chromatogram.

Agilent Technologies is a leading supplier of equipment for GPC-SEC, offering a wide range of supplies.

- GPC-SEC start-up kits to get you up and running quickly and easily
- EasyCal Vial calibration standards for rapid and convenient calibration
- Certified/proven columns for organic and aqueous GPC-SEC

GPC-SEC in Quality Control
Quality control of PVC, polystyrenes, and polycarbonates
Monitoring resin quality in paint
Testing polyamide-6, 6
Measuring synthetic polymers such as polyacrylic acids, polyacrylamides, and polystyrenesulfonates
Analysis of biopolymers such as dextran sulfate, starch, and humic acids
Quality control of insulin



GPC-SEC start-up kit

GPC-SEC Start-up Kits

Agilent has developed two GPC-SEC start-up kits – one for organic-soluble polymers and one for water-soluble polymers – to make your entry into the world of GPC-SEC as quick, simple, and trouble-free as possible. The kits contain everything you need to get started: a highly efficient PLgel column, nine vials of ready-to-use mixtures of polymer standards, three vials of a test sample and a manual with step-by-step instructions. The manual includes troubleshooting hints in case things should go wrong.

Organic GPC Start-up Kit

- High performance PLgel Mixed-C column, giving a linear calibration up to at least 3 million Da
- Three mixtures of ready-to-use EasyCal Vial calibration standards, based on narrow molecular weight distribution polystyrene and covering a wide MW range (three vials each)
- Broad MW polystyrene test sample (three vials)
- Certificates of analysis for column and calibration standards
- Instruction manual

Aqueous GPC Start-up Kit

- High efficiency PL aquagel-OH Mixed column for water-soluble polymers up to at least 10 million Da
- Three mixtures of ready-to-use EasyCal Vial calibration standards based on narrow molecular weight distribution polyethylene oxide and covering a wide MW range (three vials each)
- Broad MW dextran test sample (three vials)
- Certificates of analysis for column and calibration standards
- Instruction manual

GPC-SEC Start-up Kits

Description	Part No.
Organic GPC Start-up Kit Includes PLgel Mixed-C column 7.5 x 300 mm, standards, text sample, and manual	5064-8251
Aqueous GPC Start-up Kit Includes PL aquagel-OH Mixed column 7.5 x 300 mm, standards, test sample, and manual	5064-8252

GPC-SEC Calibration Standards

The EasyCal Vial calibration standards are ready to use and do not require any special preparation – simply add solvent to the 2 mL vial. These standards consist of the most widely-used polystyrene and polyethylene oxide standards for GPC-SEC calibration. The polymers are specially prepared to ensure an extremely narrow molecular weight distribution, providing accurate GPC-SEC calibration. In addition, the polymer molecular weights are extremely well characterized using multiple characterization techniques. All standards come with a certificate to give you the assurance of Agilent quality.

The EasyCal kits contain three vials with three different standards. Each vial contains four carefully-selected molecular weight polymers. Each EasyCal Vial calibration standard covers a different molecular weight range. Naturally, you can use all three standards to cover the entire range from low to highest molecular weight polymers.

Each EasyCal kit includes an appropriate test sample to check the effectiveness of your calibration. The kits contain three vials of each standard mixture and test sample, sufficient for several weeks of work. And each standard mixture is available off-the-shelf when you need it.

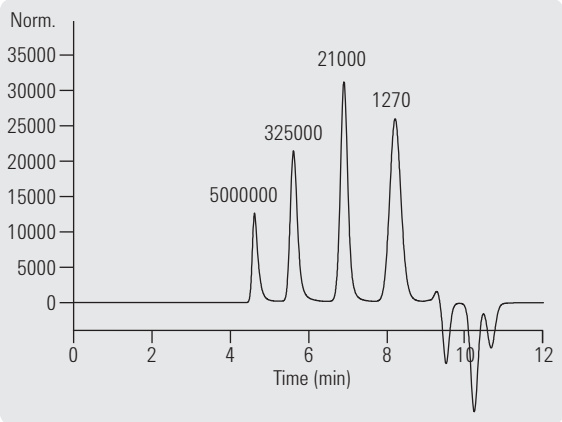
GPC-SEC Calibration Standards

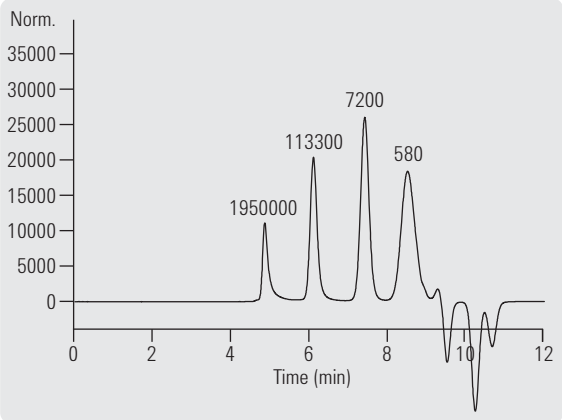
Description	Unit	Part No.
Polystyrene EasyCal Vial standards kit	10 x 3 vials	5064-8281
Polyethylene Oxide EasyCal Vial standards kit	10 x 3 vials	5064-8280
Low molecular weight (mol wt) range, 10 standards; 162-20 K (0.5 g/ea)		79911-60500
Medium mol wt range, 10 standards; 580-3 M (0.5 g/ea)		79911-60501
High mol wt range, 10 standards; 300 K-15 M (0.5 g/ea)		79911-60502

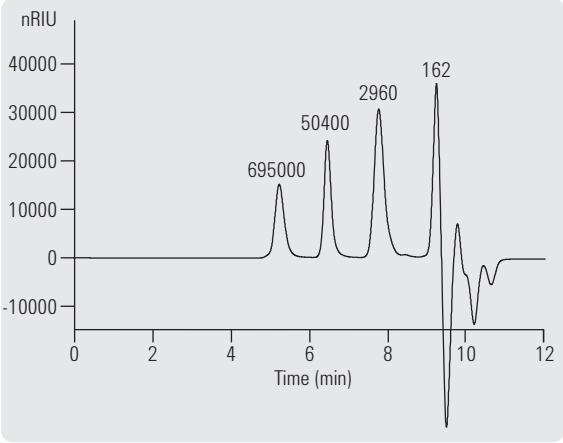
GFC Calibration Standards

Description	Part No.
Polysaccharides: 10 individual 0.2 g standards in mol wt range 180-788 K	1535-4546
PEG Standards: 10 individual 0.5 g standards in mol wt range 100-23 K	1535-4545

Organic Standard Chromatograms

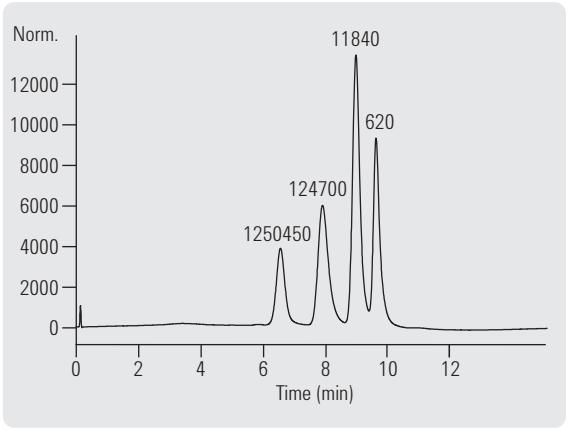


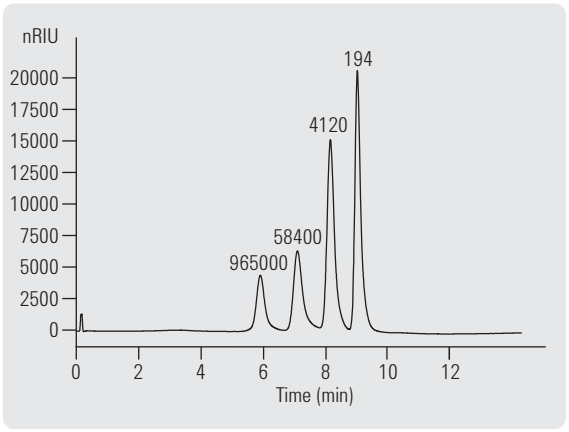


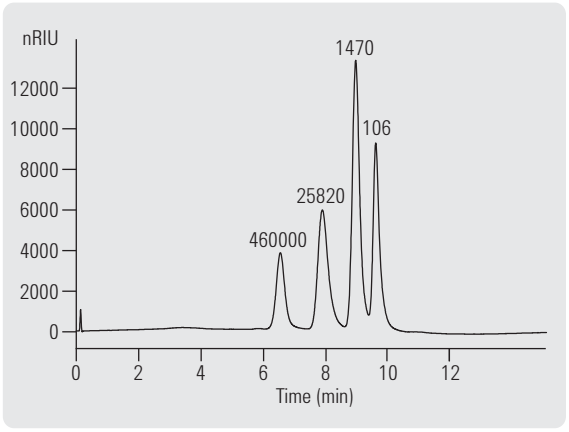


LCGPC_OSC

Aqueous Standard Chromatograms







LCGPC_ASC

ZORBAX PSM GPC-SEC Columns

Agilent ZORBAX PSM Size Exclusion Columns can be used for molecular size separations on most synthetic and natural polymers. The ZORBAX PSM columns are packed with small (5 µm) porous silica microspheres (PSM) and are available in two versions. The deactivated version has been silanized for use with non-polar to relatively polar polymers in nonaqueous or partially aqueous solvents and is denoted by an S following the column name. The untreated version is for use with both nonaqueous and aqueous mobile phases. These rigid, siliceous PSM packings have high mechanical strength and are not swelled or dissolved by any common organic or aqueous (pH 2-7) mobile phases. For samples of wide molecular weight distribution, it is useful to couple columns of one or more pore sizes in series, employing Bimodal Kits. Alternatively, Bimodal columns contain an optimized mixed bed in one column.

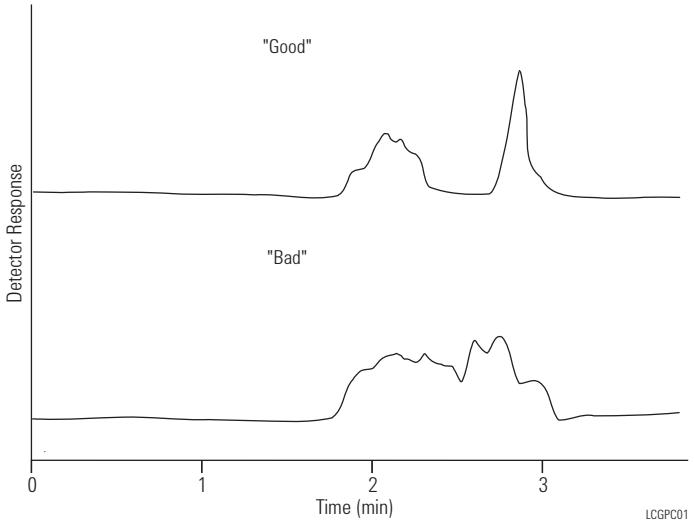
ZORBAX PSM GPC-SEC Columns 6.2 mm x 250 mm (5 µm)

Description	MW Range	Silanized	Part No.
PSM 60	5×10^2 - 1×10^4	No	880957-801
PSM 60S	5×10^2 - 1×10^4	Yes	880957-802
PSM 300	3×10^3 - 3×10^5	No	880957-805
PSM 300S	3×10^3 - 3×10^5	Yes	880957-806
PSM 1000	1×10^4 - 1×10^6	No	880957-807
PSM 1000S	1×10^4 - 1×10^6	Yes	880957-808
ZORBAX PSM Bimodal-S	5×10^2 - 1×10^6	Yes	880957-814
PSM Bimodal Kit, 2 columns	5×10^2 - 1×10^4	No	880949-903
Bimodal-S Kit, 2 columns	5×10^2 - 1×10^4	Yes	880949-904

Polyurethane Resin Quality

Column: **ZORBAX SIL PSM 60S**
880957-802
6.2 x 250 mm, 5 µm

Mobile Phase: Dimethyl Formamide
Flow Rate: 1.9 mL/min
Temperature: Ambient
Detector: RID
Sample: Polyurethane Resins



Rapid GPC analysis provides measure of performance characteristics of polyurethane resins.

PLgel Columns

Agilent Technologies offers a wide range of columns for organic and aqueous GPC-SEC analysis. The PLgel columns, for polymer analysis with organic eluents, are based on a highly crosslinked polystyrene/divinylbenzene matrix and are available with different particle and pore sizes to cover a wide range of polymer molecular weight distributions in organic eluents. The organic GPC start-up kit contains a PLgel Mixed-C column, which is the column of choice for general purpose MW distribution. This column is recommended for initial polymer screening: if greater resolution is required, simply add another PLgel column.

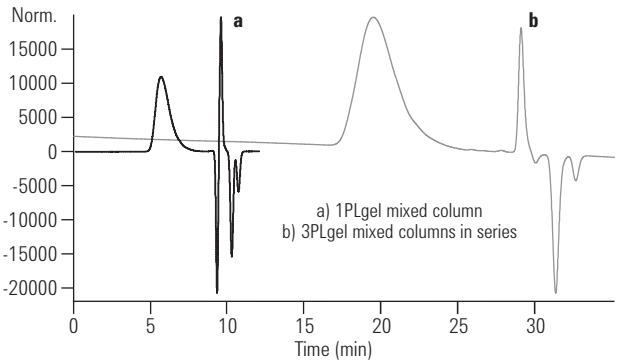
The PLgel Mixed-C column is packed with 5 µm particles of different pore sizes and thus enables the separation of polymers over a wide molecular weight range (from about 200 to 3 million). Such wide ranges usually require sets of several columns, typically between 2 to 3 (up to 6).

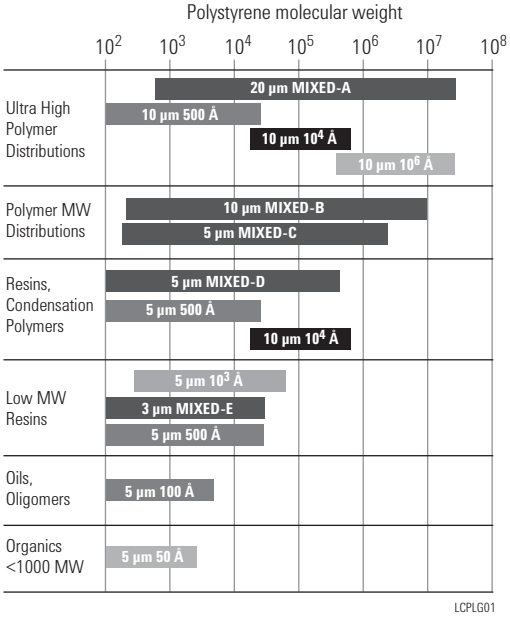
PLgel Columns

Dimensions	Particle Size (µm)	Pore Size Å	MW Range	Part No.
7.5 x 300	5	50	< 1000	79911GP-500
		100	< 4000	79911GP-501
		500	500-20K	79911GP-502
		1000	1K-40K	79911GP-503
		10000	4K-400K	79911GP-504
		100000	40K-40M	79911GP-505
7.5 x 300	10	50	< 1000	79911GP-100
		100	< 4000	79911GP-101
		500	500-20K	79911GP-102
		1000	1K-40K	79911GP-103
		10000	4K-400K	79911GP-104
		100000	40K-4M	79911GP-105
		1000000	400K-40M	79911GP-106
PLgel Mixed Bed Columns				
7.5 x 300	3	Mixed-E	up to 30K	79911GP-MXE
	5	Mixed-D	200-400K	79911GP-MXD
	5	Mixed-C	200-3M	79911GP-MXC
	10	Mixed-B	500-10M	79911GP-MXB
	20	Mixed-A	1000-40M	79911GP-MXA
PLgel Guard Columns				
7.5 x 50	5			79911GP-510
7.5 x 50	10			79911GP-110

Broad Polystyrene with 1 and 3 PLgel Mixed columns

Column:	**PLgel Mixed-C** **79911GP-MXC** **7.5 x 300 mm, 5 µm** (3 in series)
Mobile Phase:	Tetrahydrofuran (THF)
Flow Rate:	1 mL/min
Temperature:	25°C
Detector:	RID
Sample:	Polystyrene EasyCal standards in vials for calibration





The chromatogram shows the analyses of a broad technical polystyrene: part a) with one PLgel Mixed-C column and part b) with a set of three PLgel Mixed-C columns. Due to the better separation of the column set and the reduced influence of band broadening, the calculated molecular weight averages are in the latter case closer to the values determined with reference methods, e.g. light scattering (see table).

Molecular Weight Averages Determined by Reference Methods

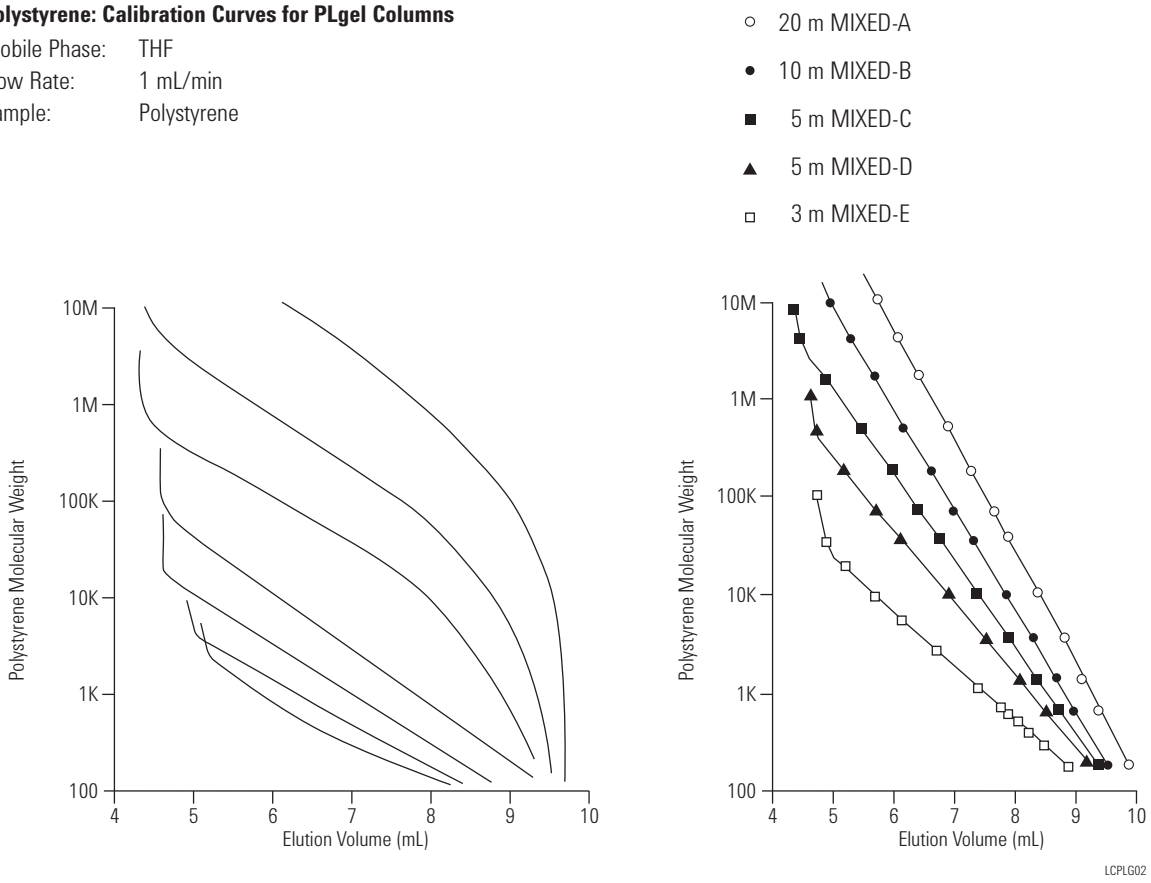
Reference Data	**M_n 86000***	**M_w 246000****	**D 2.86**
Difference [%] (1 x PLgel mixed)	9	15	27
Difference [%] (3 x PLgel mixed)	3.1	4.8	2.0

*Measured by GPC

**Measured by light scattering

Polystyrene: Calibration Curves for PLgel Columns

Mobile Phase: THF
Flow Rate: 1 mL/min
Sample: Polystyrene



PL aquagel-OH Columns

The PL aquagel-OH mixed column, with its extremely hydrophilic polyhydroxyl surface, is suitable for the aqueous SEC analysis of water-soluble polymers over a wide range of molecular weights. The PL aquagel-OH column can handle most neutral hydrophilic polymers, and its capability extends to the analysis of high molecular weight polymers including polyacrylamides and polyethlylene oxides. The aqueous SEC start-up kit contains a PL aquagel-OH mixed column, with 8 µm particles, which is the column of choice for MW distribution in aqueous eluents. This column is recommended for first polymer screening: if greater resolution is required, simply add another PL aquagel-OH column.

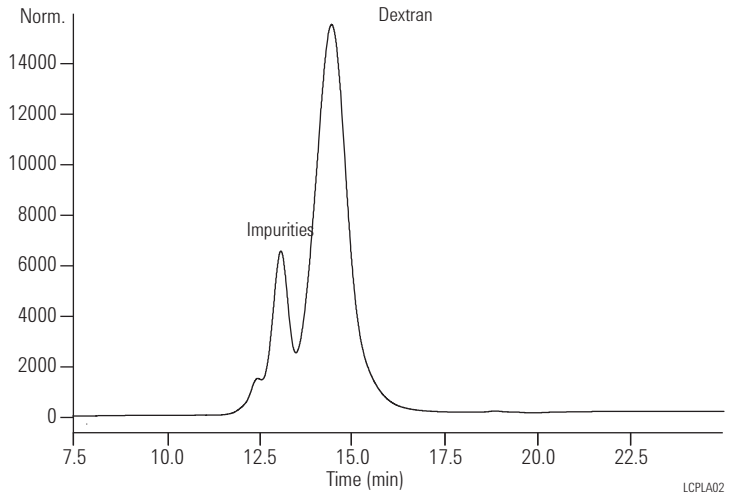
PL aquagel-OH Columns

Size (mm)	Particle Size (µm)	Designation	MW Range	Part No.
7.5 x 300	8	30	100-30K	79911GF-083
		40	10K-200K	79911GF-084
		50	50K-1M	79911GF-085
		60	200K-10M	79911GF-086
		Mixed	100-10M	79911GF-MXA
PL aquagel-OH Guard Columns				
7.5 x 50	8			79911GF-080

Polymer Standards

Column: **PL aquagel-OH, 7.5 x 300 mm, 8 µm P/N 79911GF-MXA in series with PL aquagel-OH 30, 7.5 x 300 mm, 8 µm P/N 79911GF-083**

Mobile Phase: Water
Flow Rate: 1 mL/min
Temperature: 25°C
Detector: RID
Calibrant: Polyethylene oxide EasyCal standards in vials for calibration



ZORBAX Carbohydrate Analysis Columns

- Reproducible – each lot of this application specific aminopropyl column packing material is use-tested for specific monosaccharide and disaccharide separations.
- Efficient – uses ZORBAX porous silica microsphere technology. Silica manufacturing, bonding and packing are all performed in Agilent's ISO 9001 facilities.
- Flexible – can handle high volume injections, as much as 50 µL on a 4.6 x 150 mm column.
- Recommended for use with refractive index dectors (RID).

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon Load
ZORBAX Carbohydrate	70Å	300 m^2/g	2.0-8.0	No	3.5%

Specifications represent typical values only.

ZORBAX Carbohydrate Analysis Columns

Description	Size (mm)	Particle Size (µm)	Part No.
ZORBAX Carbohydrate Analysis column	4.6 x 250	5	840300-908
ZORBAX Carbohydrate Analysis column	4.6 x 150	5	843300-908
ZORBAX NH_2 Guard Catridges, 4/pk	4.6 x 12.5	5	820950-908
Guard Hardware Kit			820888-901

Separation of Simple-Sugar and Sugar-Alcohol Standards

Column: **ZORBAX Carbohydrate Analysis 843300-908 4.6 x 150 mm, 5 µm**

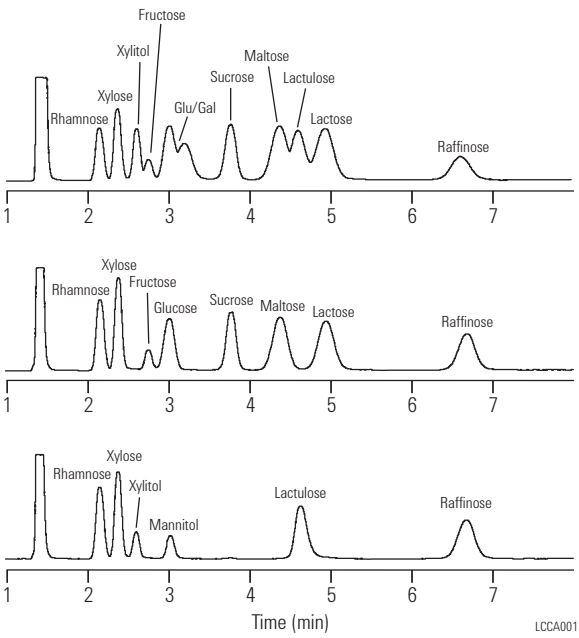
Mobile Phase: 75% ACN/25% H_2O

Flow Rate: 2 mL/min

Temperature: 30°C

Detector: RID
Det. Temp: 30°C

Sample: Rhamnose, Xylose, Xylitol, Lactulose, Raffinose (54 µg each) Fructose (10 µg), Glucose, Sucrose (36 µg each)
Maltose, Lactose (6 µg each), Inj. = 6.3 µL
Rhamnose, Xylose, Raffinose (54 µg each), Fructose (10 µg) Glucose, Sucrose (36 µg each), Maltose, Lactose (60 µg each) Inj. = 6.3 µL
Sample: (54 µg each), Inj. = 6.3 µL



Amino Acid Standards

Each amino acid standards contains the following amino acids:

- Glycine
- L-cystine
- L-histidine
- L-tyrosine
- L-leucine
- L-methionine
- L-serine
- L-alanine
- L-phenylalanine
- L-glutamic acid
- L-proline
- L-isoleucine
- L-arginine
- L-threonine
- L-valine
- L-lysine
- L-aspartic acid

Amino Acid Analysis (AAA) Columns and Supplies

ZORBAX Eclipse Amino Acid Analysis (AAA) Columns

- High resolution and rapid analysis of 24 amino acids
- Use tested for amino acid analysis
- Uses well known OPA and FMOC precolumn derivatization chemistry
- Easily automated using a detailed online, derivatization protocol available for use with Agilent 1100/1200 Autosampler

The Agilent ZORBAX Eclipse AAA high efficiency column rapidly separates amino acids following an updated and improved protocol. Total analysis from injection to injection can be achieved in as little as 14 min. (9 min. analysis time) on shorter, 7.5 cm length columns and 24 min. (18 min. analysis time) on the 15 cm column length. Exceptional sensitivity (5-50 pmol with DAD, FLD) and reliability are achieved using both OPA and FMOC derivatization chemistries in one fully automated procedure using the Agilent 1100/1200 HPLC instrument.

ZORBAX Eclipse Amino Acid Analysis (AAA) Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Analytical routine sensitivity	4.6 x 150	5	993400-902
	Analytical routine sensitivity, high-resolution using FLD	4.6 x 150	3.5	963400-902
	Analytical routine sensitivity, high-throughput	4.6 x 75	3.5	966400-902
	Solvent Saver high sensitivity, high resolution	3.0 x 150	3.5	961400-302
ZGC	Guard Catridges, 4/pk	4.6 x 12.5	5	820950-931
ZGC	Guard Hardware Kit			820888-901

Amino Acid Standards, 10 x 1 mL ampoules*

Description	Part No.
1 nmol/µL	5061-3330
250 pmol/µL	5061-3331
100 pmol/µL	5061-3332
25 pmol/µL	5061-3333
10 pmol/µL	5061-3334
Amino acids supplement kit Includes 1 g each of norvaline, sarcosine, asparagine, glutamine, tryptophan, and 4-hydroxyproline	5062-2478

*Consider shelf-life and buy limited quantities, 5062-2478 ships as 1 g vials

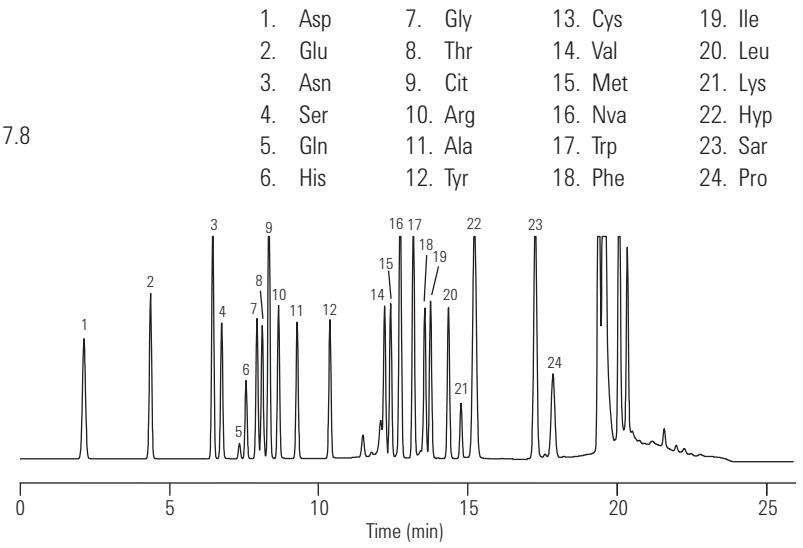
Amino Acid Separations Reagents

Description	Part No.
OPA reagent, 10 mg/mL each in 0.4 M borate buffer o-phthalaldehyde (OPA) and 3-mercaptopropionic acid, 6 x 1 mL ampoules	5061-3335
FMOC reagent, 2.5 mg/mL in acetonitrile, 9-fluorenylmethylchloroformate, 1 mL, 10 ampoules	5061-3337
Borate buffer, 100 mL	5061-3339
DTDPA (Dithiodiproprionic) reagent, for analysis of cysteine, 5 g	5062-2479

High Resolution of 24 Amino Acids Using ZORBAX Eclipse-AAA Protocol

Column:	**ZORBAX Eclipse AAA 963400-902 4.6 x 150 mm, 3.5 µm**
Mobile Phase:	A: 40 mM Na_2HPO_4, pH 7.8 B: ACN : MeOH : Water, 45:45:10 v/v
Flow Rate:	2 mL/min
Temperature:	40°C
Detector:	Fluorescence
Sample:	24 Amino Acids

This high resolution separation of 24 amino acids is done in 18 minutes. If the Rapid Resolution 4.6 x 75 mm Eclipse AAA column is selected, these amino acids are resolved in 9 minutes.



PAH and Anion Separations

ZORBAX Eclipse PAH

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse PAH USP L1
	Analytical	4.6 x 250	5	959990-918
	Analytical	4.6 x 150	5	959993-918
	Analytical	4.6 x 100	5	959996-918
	Rapid Resolution	4.6 x 150	3.5	959963-918
	Rapid Resolution	4.6 x 100	3.5	959961-918
	Rapid Resolution	4.6 x 50	3.5	959943-918
	Rapid Resolution HT, 600 bar	4.6 x 100	1.8	959964-918
	Rapid Resolution HT, 600 bar	4.6 x 50	1.8	959941-918
	Rapid Resolution HT, 600 bar	4.6 x 30	1.8	959931-918
	Solvent Saver	3.0 x 250	5	959990-318
	Narrow Bore	2.1 x 250	5	959790-918
	Narrow Bore	2.1 x 150	5	959701-918
	Narrow Bore RR	2.1 x 100	3.5	959793-918
	Narrow Bore RRHT, 600 bar	2.1 x 100	1.8	959764-918
	Narrow Bore RRHT, 600 bar	2.1 x 50	1.8	959741-918
ZGC	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-939
ZGC	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-939
ZGC	Guard Hardware Kit			820888-901

LiChrospher PAH

Description	Size (mm)	Particle Size (µm)	Part No.
LiChrospher PAH	4.6 x 250	5	79925PA-584
LiChrospher PAH	3.0 x 250	5	79925PA-583
LiChrospher PAH	2.0 x 250	5	79925PA-582
Polynuclear aromatic hydrocarbon standard			8500-6035

Anion Chromatography

Hardware	Description	Dimensions	Particle Size (µm)	Part No.
AC	Asahipak ODP-50	4.0 x 125	5	79923OP-564
AC	Cartridge Holder			5021-1845
	Mobile phase additive			5062-2480
	Inorganic anion test mixture Includes 1000 ppm each of fluoride, chloride, bormide, nitrite, sulfate and 2000 ppm phosphate			5062-8524



ZORBAX Method Development Kits

Agilent offers a series of kits that allow for fast method development at an attractive price. Each kit contains 3 columns. Six new kits have been added and are recommended for use with the new Agilent Automated Method Development LC. Several of these kits contain Rapid Resolution HT (1.8 µm) columns in a variety of bonded phases for easy method optimization and several kits contain Rapid Resolution (3.5 µm) columns in the same variety of bonded phases. These kits contain some of the Eclipse Plus family of columns for excellent peak shape and optimum performance with a wide variety of compounds.

ZORBAX Method Development Kits
Recommended for use with the Agilent Automated Method Development LC System

Description	Part No.
Rapid Resolution HT (RRHT) Selectivity Method Development Kit, 2.1 mm ID Includes 2.1 x 50 mm, 1.8 µm, 600 bar columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1431
Rapid Resolution HT (RRHT) pH Method Development Kit, 2.1 mm ID Includes 2.1 x 50 mm, 1.8 µm, 600 bar columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1432
Rapid Resolution HT (RRHT) Selectivity Method Development Kit, 4.6 mm ID Includes 4.6 x 50 mm, 1.8 µm, 600 bar columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1433
Rapid Resolution HT (RRHT) pH Method Development Kit, 4.6 mm ID Includes 4.6 x 50 mm, 1.8 µm, 600 bar columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1434
Rapid Resolution Selectivity Method Development Kit, 4.6 mm ID Includes 4.6 x 100 mm, 3.5 µm columns: one each Eclipse Plus C18, Eclipse Plus Phenyl-Hexyl and Bonus-RP	5190-1435
Rapid Resolution pH Method Development Kit, 4.6 mm ID Includes 4.6 x 100 mm, 3.5 µm columns: one each Eclipse Plus C18, SB-C18 and Extend-C18	5190-1436

ZORBAX Method Development Kits

Description	Part No.
StableBond Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-C18, SB-CN and SB-Phenyl phases	5183-4624
Fast StableBond Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-C18, SB-CN and SB-Phenyl phases	5183-4625
Eclipse XDB Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: XDB-C18, XDB-C8, XDB-Phenyl phases	5183-4626
Fast Eclipse XDB Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: XDB-C18, XDB-C8 and XDB-Phenyl phases	5183-4627
pH Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-C18, XDB-C18 and Extend-C18 phases	5185-5807
Fast pH Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-C18, XDB-C18 and Extend-C18 phases	5185-5808
Aqueous Method Development Kit Includes 4.6 x 150 mm, 5 µm columns; one each: SB-Aq, Bonus RP and SB-C18	5185-5809
Fast Aqueous Method Development Kit Includes 4.6 x 75 mm, 3.5 µm columns; one each: SB-Aq, Bonus RP and SB-C18	5185-5810

ZORBAX Cartridge Column Starter Kits

Hardware	Description	Part No.
	ZORBAX C18 Kit Includes one 4.6 x 150 mm, 5 µm Eclipse XDB-C18 column; one 4.6 x 150 mm, 5 µm StableBond C18 column; cartridge holder; mounting tool; replacement filter (2/pk); and open-end wrench	5183-2021
	ZORBAX C8 Kit Includes one 4.6 x 150 mm, 5 µm Eclipse XDB-C8 column; one 4.6 x 150 mm, 5 µm StableBond C8 column; cartridge holder; mounting tool; replacement filter (2/pk); and open-end wrench	5183-2022

ZORBAX Method Validation Kits

ZORBAX Method Validation Kits are supplied to customers who need the same HPLC column type (bonded phase, particle size, configuration) but from different manufacturing lots. To request columns from different lots, contact Agilent Technologies or your local Agilent Authorized Distributor using the following procedure.

- Request Validation Kits (columns from different lots) by using Part Number 899999-888
- Indicate the Part Number of the current column you are using
- Indicate the Lot Number of the current column you are using
- Indicate the number of additional columns needed from different lots (example: you have a current column and may need two additional lots)
- Please fax your request to (302) 993-5354 or email to custom_columns@agilent.com. You will receive a quote from your Customer Service Agent within 1-2 business days. Delivery for your custom column is usually 3 weeks or less from the time your order is placed, depending on lot availability.

Custom HPLC Column Ordering

Columns not listed can easily be ordered by the following procedure:

- Request a Special Products Quotation (SPQ) using Part Number 899999-999
- Indicate column dimensions (example: 4.6 x 50 mm); bonded phase type (example: StableBond C3); particle size (example: 5 µm); and pore size (example: 80Å)
- Please fax your request to (302) 993-5354 or email to custom_columns@agilent.com. You will receive a quote from your Customer Service Agent within 1-2 business days. Delivery for your custom column is usually 3 weeks or less from the time your order is placed, depending on lot availability.

Custom columns are priced with a minimal surcharge over the price of stocked columns.



Tips & Tools

Request custom LC columns online at **www.agilent.com/chem/customlccol**



Agilent LC Columns for Analytical BioSeparations

Identify, quantify or characterize peptides, proteins, antibodies and other bio-molecules with Agilent's analytical bio-columns.

The number of biologics continues to grow at an unprecedented rate, making the need for high resolution and highly sensitive analytical bio-separations critical. Agilent's durable and reproducible bio-columns can help you meet your lab's evolving needs for performance, selectivity and speed.

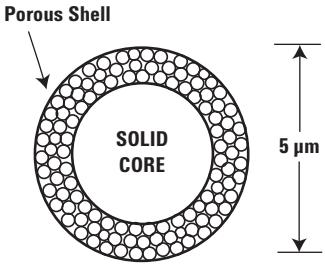
On the following pages, you will find valuable information and specifications about columns and tools for proteomics sample preparation, HPLC columns for reversed-phase bio-separations, size exclusion chromatography, including:

- **Poroshell 300** – feature a unique, powerful particle for fast, high-resolution separations of proteins, polypeptides and antibodies.
- **ZORBAX 300Å StableBond** – deliver long lifetime, high resolution and good peak shape for peptides and proteins, compatible with common mobile phase containing TFA.
- **ZORBAX 300Å Extend** – Rugged, high and low pH separations of polypeptides and peptides from pH 2-11.5, ideal for LC/MS analysis of proteins and peptides at pH 10.
- **ZORBAX GF-250/450 Size Exclusion** – a rugged, reproducible column specifically designed for size separations of proteins, compatible with organic modifiers and mobile phase denaturants, allowing you to eliminate protein aggregation for proper size determination.
- **ZORBAX Capillary and Nano** – Highest sensitivity separations for your smallest sample sizes, packings/phases for both small and large molecules (80Å and 300Å pore sizes), compatible with all LC/MS interfaces, ideal for 1-D and 2-D (proteomics) applications.
- **Multiple Affinity Removal System (MARS)** – LC columns and spin cartridges designed to chromatographically remove interfering high-abundant proteins from serum, plasma and other human biological fluids, improving LC/MS and electrophoretic analysis of low-abundant proteins by effectively expanding the dynamic range of the analysis.
- **Macroporous Reversed-Phase (mRP) High Recovery Protein** – C18 columns designed for high recovery, high resolution protein separation, fractionation and simultaneous desalting of complex protein samples (like immunodepleted serum or plasma proteins).



Poroshell 300

- High-resolution separations of biomolecules with superficially porous particles
- High efficiency and recovery with proteins (up to 1,000 kDa) and monoclonal antibodies
- Achieve long lifetime at low pH with Poroshell 300SB; at high pH with 300Extend-C18
- Optimize recovery and selectivity with four different bonded phases – 300SB-C18, 300SB-C8, 300SB-C3, and 300Extend-C18



Agilent Poroshell 300 columns are ideal for fast separations of proteins and peptides because the superficially porous particle allows for fast flow rates to be used while maintaining sharp, efficient peaks. Peptides and proteins are typically separated slowly to reduce the potential peak broadening of these slow diffusing analytes. But Poroshell columns use a superficially porous particle made with a thin layer of porous silica on a solid core of silica. This reduces the diffusion distance for proteins making practical rapid HPLC separations of peptides and proteins up to 500-1,000 kDA. Poroshell columns bonded with StableBond bonded phases provide excellent stability and selectivity choices with TFA and formic acid mobile phases. The Poroshell 300Extend-C18 column can be used from pH 2-10 for unique separations. These columns can be used for analytical protein separations as well as LC/MS separations.

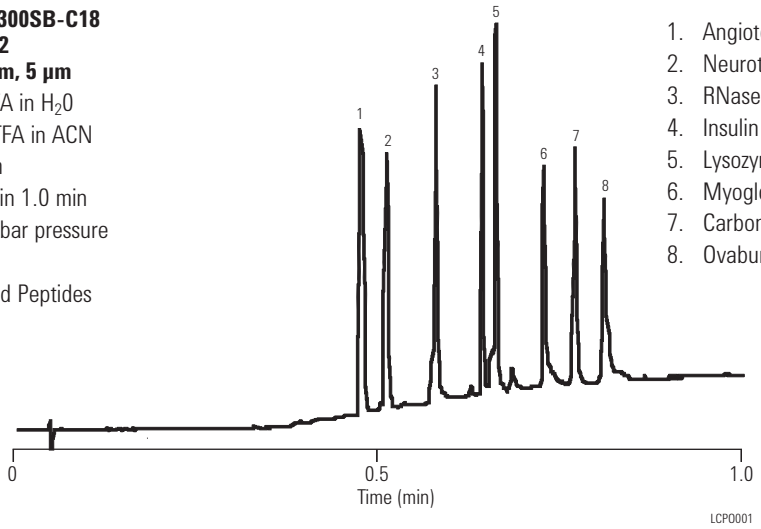
Column Specifications

Bonded Phase	Pore Size	Temp. Limits*	pH Range	Endcapped
Poroshell 300 SB-C18, C8, C3	300Å	90°C	1.0-8.0	No
Poroshell 300 Extend	300Å	40°C above pH 8 60°C below pH 8	2.0-11.0	Yes

Specifications represent typical values only.

Poroshell 300 Columns Can Separate Proteins and Peptides in Seconds

Column:	**Poroshell 300SB-C18** **660750-902** **2.1 x 75 mm, 5 µm**
Mobile Phase:	A: 0.1% TFA in H_20
	B: 0.07% TFA in ACN
Flow Rate:	3.0 mL/min
Gradient:	5-100% B in 1.0 min
Temperature:	70°C, 260 bar pressure
Detector:	215 nm
Sample:	Proteins and Peptides

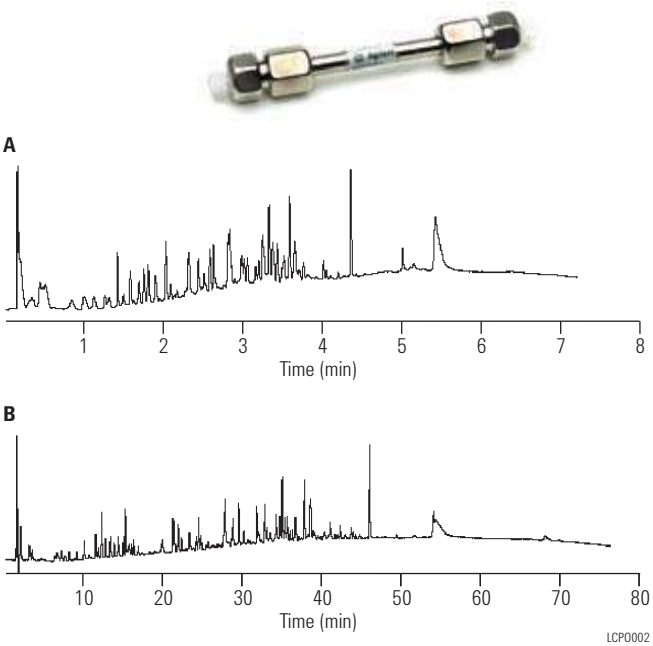


1. Angiotensin II
2. Neurotensin
3. RNase
4. Insulin
5. Lysozyme
6. Myoglobin
7. Carbonic Anhydrase
8. Ovabumin

This separation of eight polypeptides and proteins is completed in less than 60 seconds. Each peak is sharp and efficient.

Reduce Peptide Map Analysis Time by 90% with Poroshell 300SB

Column A:	**Poroshell 300SB-C18** **660750-902** **2.1 x 75 mm, 5 µm**
Column B:	**ZORBAX 300SB-C18** **883750-902** **2.1 x 150 mm, 5 µm**
Mobile Phase:	A: 95% H_2O, 5% ACN, 0.1% TFA
	B: 5% H_2O, 95% ACN, 0.07% TFA
Flow Rate:	1 mL/min
	0.208 mL/min
Gradient:	0-100%B = 12 min
	0-100%B = 120 min
Temperature:	70°C
Sample:	20 µL (0.22 µg/1 µL)
	BSA Tryptic Digest
	(15 hours, 70 pmol)



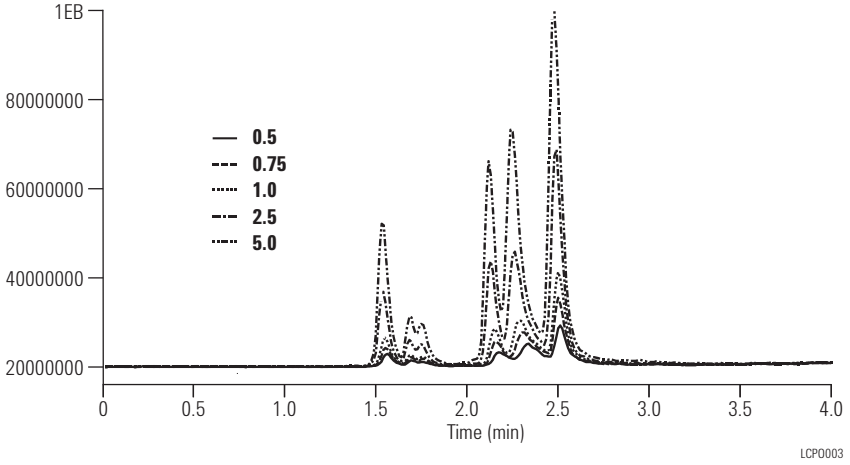
A single chromatographic run of a protein tryptic digest can require an hour or more to complete. With ZORBAX Poroshell columns, the same complex separation can be completed in 1/10th the time.

MicroBore Poroshell 300 Columns
Provide Maximum Sensitivity for LC/MS

Column: **Poroshell 300SB-C18**
661750-902
1.0 x 75 mm, 5 µm

Mobile Phase: A: Water + 0.1% Formic Acid
B: ACN + 0.1% Formic Acid
Flow Rate: 600 µL/min
Gradient: 20-100% B in 5.5 min
Temperature: 80°C

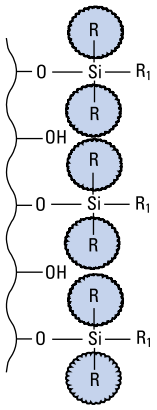
MS Conditions: LC/MS: Pos. Ion ESI – Vcap 6000 V
Drying Gas Flow: 12 Liters/min
Drying Gas Temperature: 350°C
Nebulizer: 45 psi
Fragmentor Voltage: 140 V
Scan: 600-2500
Stepsize: 0.15 amu
Peakwidth: 0.06 min
Sample: 1 µL



With narrow bore diameters like 2.1 mm, 1.0 mm, and 0.5 mm, ZORBAX Poroshell columns make an ideal LC/MS partner. When the sample is very limited, the 1.0 mm or 0.5 mm ID Poroshell columns are an excellent choice for high sensitivity LC/MS analyses. Sensitive MS molecular weight determinations are possible with as little as 0.5 to 5 pmole of protein on Poroshell columns. Poroshell columns have also been used for rapid MS identification of intact proteins even in the presence of stabilizers and tissue culture media.

Poroshell 300

Hardware	Description	Size (mm)	Particle Size (µm)	Poroshell 300SB-C18	Poroshell 300SB-C8	Poroshell 300SB-C3	Poroshell 300Extend-C18
	Narrow Bore	2.1 x 75	5	660750-902	660750-906	660750-909	670750-902
	MicroBore	1.0 x 75	5	661750-902	661750-906	661750-909	671750-902
	Capillary	0.5 x 75	5		5065-4468		
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821075-920	821075-918	821075-924	
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	
	MicroBore Guard Cartridge, 3/pk	1.0 x 17	5	5185-5968	5185-5968	5185-5968	5185-5968



Sterically Protected 300StableBond Bonded Phase

ZORBAX 300Å StableBond

Agilent ZORBAX 300StableBond columns are an ideal choice for the reproducible separations of proteins and peptides for two key reasons. First, wide-pore, 300Å columns are necessary for an efficient separation of proteins and peptides, or other large molecules, in order to allow these analytes to completely access the bonded phase. Second, 300StableBond columns are unmatched in their durability at low pH, such as with the TFA containing mobile phases typically used for protein and peptide separations. For LC/MS separations at low pH, 300StableBond columns can also be used with formic acid and acetic acid mobile phase modifiers. These columns are available in four different bonded phases (C18, C8, C3, and CN) for selectivity and recovery optimization of proteins and polypeptides. To further increase sample recovery and improve efficiency for difficult proteins, 300StableBond columns can be used up to 80-90°C. 300SB-C18 and 300SB-C8 columns are an ideal choice for complex protein and protein digest separations. These columns are available in capillary (0.3, 0.5 mm ID) and nano (0.075 and 0.10 mm ID) dimensions for reversed-phase LC/MS separations of these protein digests. Capillary and nano columns can be used for either 1-D or 2-D proteomics separations.

Column Specifications

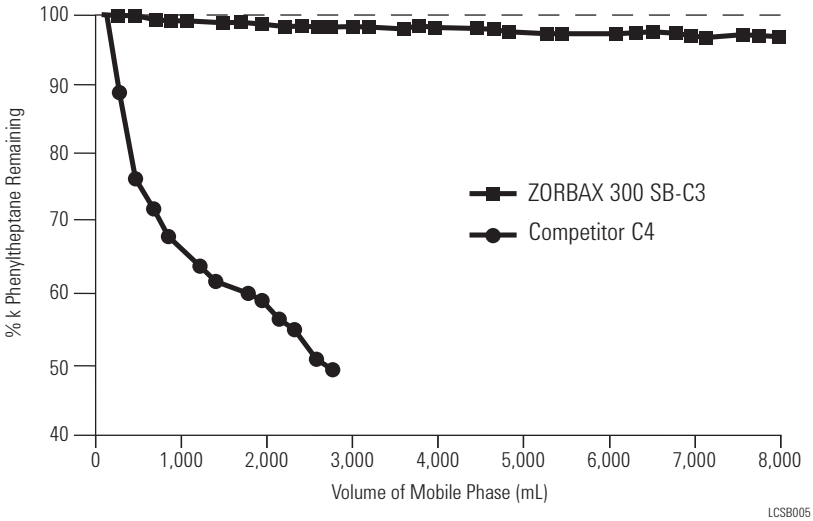
Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range*	Endcapped	Carbon Load
ZORBAX 300SB-C18	300Å	45 m^2/g	90°C	1.0-8.0	No	2.8%
ZORBAX 300SB-C8	300Å	45 m^2/g	80°C	1.0-8.0	No	1.5%
ZORBAX 300SB-C3	300Å	45 m^2/g	80°C	1.0-8.0	No	1.1%
ZORBAX 300SB-CN	300Å	45 m^2/g	80°C	1.0-8.0	No	1.2%

Specifications represent typical values only.

*300 StableBond columns are designed for optimal use at low pH. At pH 6-8, highest column stability for all silica-based columns is obtained by operating at temperatures <40°C and using low buffer concentrations in the range of 0.01-0.02 M. At mid or high pH, 300Extend-C18 is recommended.

Short-Chain ZORBAX 300SB-C3 is Stable at Low pH, High Temperature

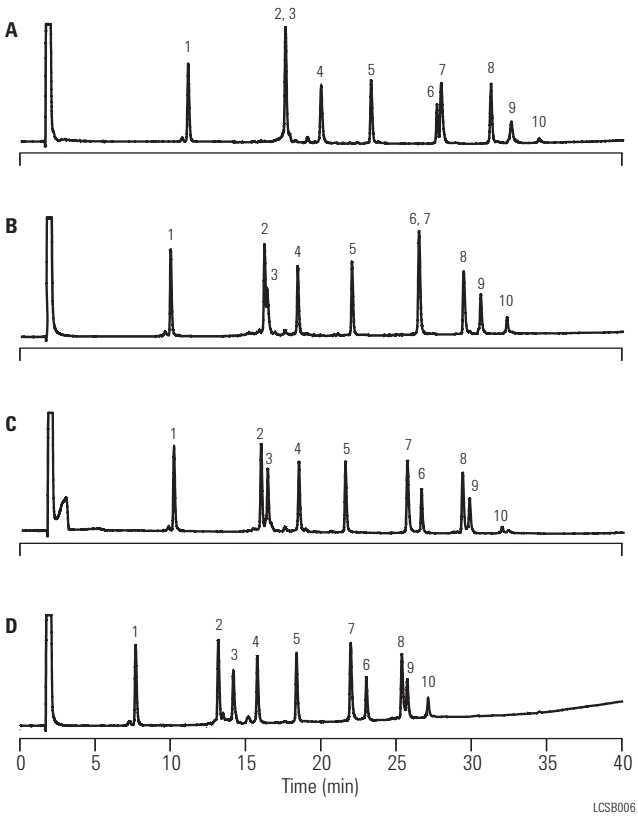
Column:	**ZORBAX 300SB-C3** **883995-909** **4.6 x 150 mm, 5 µm**
Mobile Phase:	Gradients 0-100% B in 80 min A: 0.5% TFA in Water B: 0.5% TFA in Acetonitrile Isocratic Retention Test Conditions: 1-phenylheptane 50% A, 50% B
Flow Rate:	1.0 mL/min
Temperature:	60°C



Four Different 300SB Bonded Phases Optimize Separation of Large Polypeptides

Column A:	**ZORBAX 300SB-C18** **883995-902** **4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX 300SB-C8** **883995-906** **4.6 x 150 mm, 5 µm**
Column C:	**ZORBAX 300SB-C3** **883995-909** **4.6 x 150 mm, 5 µm**
Column D:	**ZORBAX 300SB-CN** **883995-905** **4.6 x 150 mm, 5 µm**
Mobile Phase:	Linear Gradient, 25 - 70% B in 40 min A: 0.1% TFA in Water B: 0.09% TFA in 80% Acetonitrile/20% Water
Flow Rate:	1.0 mL/min
Temperature:	60°C
Sample:	3 µg each protein

1. RNase
2. Insulin
3. Cytochrome C
4. Lysozyme
5. Parvalbumin
6. CDR
7. Myoglobin
8. Carbonic Anhydrase
9. S-100β
10. S-100α

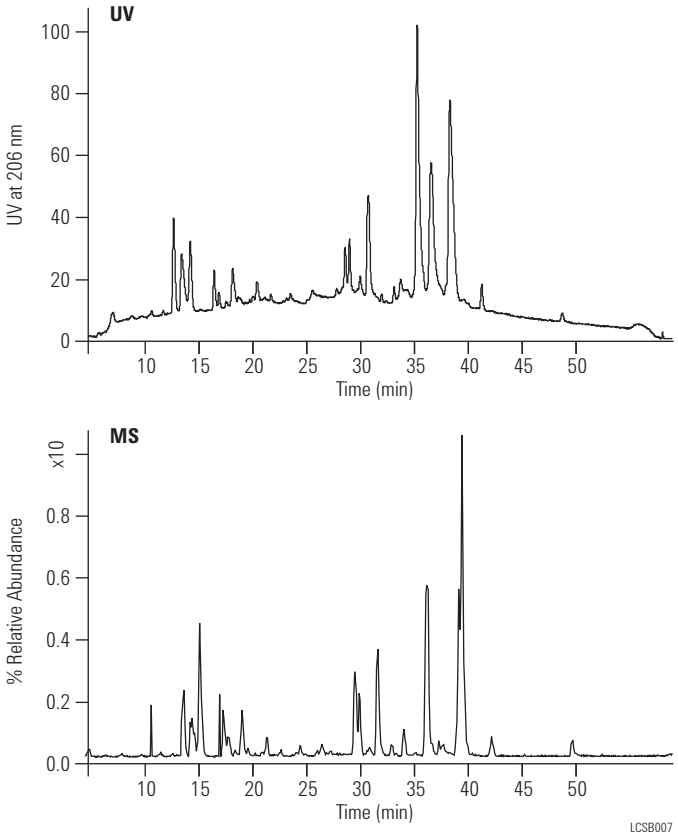


The 300SB-C18, C8, C3, and CN bonded phases all provide a different separation of this group of polypeptides. This adds an important parameter for quickly optimizing protein separations. The 300SB-CN column offers unique selectivity for more hydrophilic polypeptides.

Capillary Columns for HPLC Analyses with UV and MS Detection

Column:	**ZORBAX 300SB-C18** **5064-8263** **0.3 x 150 mm, 5 µm**
Mobile Phase:	5-55% B in 50 min, to 85% B from 55-57 min A: 0.1% Formic Acid in Water B: 0.1% Formic Acid in ACN
Flow Rate:	5.5 µL/min
Detector:	206 nm
MS Conditions:	LC/MS: Pos. Ion ESI with LC/MSD trap-Vcap 4000 V Drying Gas Flow: 7 L/min Drying Gas Temperature: 250°C Nebulizer: 15 psi Capillary Exit Volt: 50 V Max Accum Time: 300 ms Total Averages: 3 Isolation Width: 3 m/z Frag Ampitude: 1.0 V
Sample:	100 nL Beta Casein Digest (4 pmol)

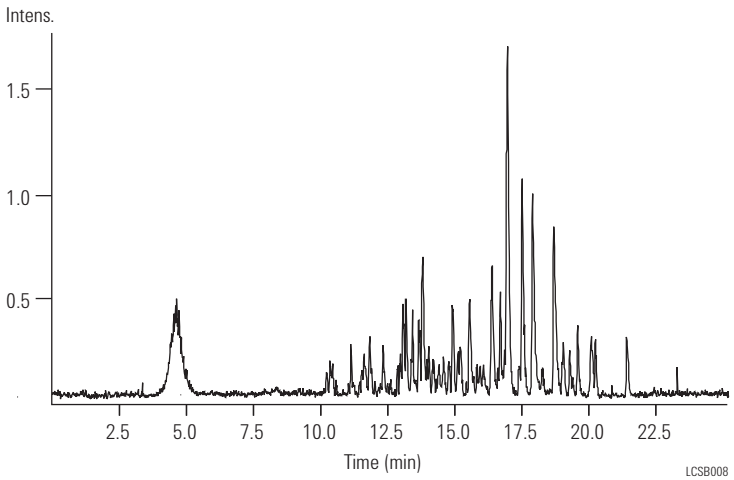
A ZORBAX 300SB-C18 capillary column (0.3 mm ID) is used for the separation of the protein digest. Detection is by both UV and Electrospray MS. MS detection can be used for identification of peptide fragments.



ZORBAX Nano Columns For High Sensitivity Protein Digest Analysis by LC/MS

Column:	**ZORBAX 300SB-C18** **5065-9911** **0.075 x 150 mm, 3.5 µm**
Mobile Phase:	A: Water + 0.1% Formic Acid, B: ACN + 0.1% Formic Acid
Flow Rate:	600 nl/min
Gradient:	2% B to 52% B in 25 min
Detector:	Positive Ion Nano Electrospray MS
Sample:	100 fm (1 µl) Digest of 8 Proteins

A ZORBAX nano HPLC column, 0.075 mm ID, is used for high sensitivity LC/MS analysis of a protein digest sample.



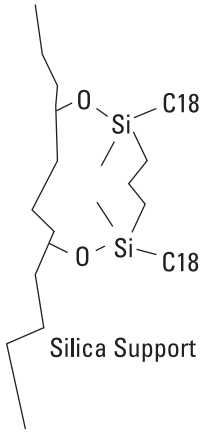
ZORBAX 300Å StableBond

Hardware	Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
Standard Columns (no special hardware required)							
	Semi-Preparative	9.4 x 250	5	880995-202	880995-206	880995-205	880995-209
	Analytical	4.6 x 250	5	880995-902	880995-906	880995-905	880995-909
	Analytical	4.6 x 150	5	883995-902	883995-906	883995-905	883995-909
	Analytical	4.6 x 50	5	860950-902	860950-906	860950-905	860950-909
	Rapid Resolution	4.6 x 150	3.5	863973-902	863973-906	863973-905	863973-909
	Rapid Resolution	4.6 x 100	3.5	861973-902	861973-906		
	Rapid Resolution	4.6 x 50	3.5	865973-902	865973-906	865973-905	865973-909
	Solvent Saver Plus	3.0 x 150	3.5	863974-302	863974-306		863974-309
	Solvent Saver Plus	3.0 x 100	3.5		861973-306		
	Narrow Bore	2.1 x 250	5	881750-902			
	Narrow Bore	2.1 x 150	5	883750-902	883750-906	883750-905	883750-909
	Narrow Bore RR*	2.1 x 150	3.5		863750-906		
	Narrow Bore RR*	2.1 x 100	3.5	861775-902	861775-906		
	Narrow Bore RR*	2.1 x 50	3.5	865750-902	865750-906		
	MicroBore	1.0 x 250	5	861630-902			
	MicroBore RR*	1.0 x 150	3.5	863630-902	863630-906		
	MicroBore RR*	1.0 x 50	3.5	865630-902	865630-906		
	MicroBore Guard, 3/pk	1.0 x 17	5	5185-5920	5185-5920		
P	Guard Cartridge, 2/pk	9.4 x 15	7	820675-124	820675-124	820675-124	820675-124
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-921	820950-918	820950-923	820950-924
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-918	821125-918	821125-924	821125-924
P	Guard Hardware Kit			840140-901	840140-901	840140-901	840140-901
ZGC	Guard Hardware Kit			820888-901	820888-901	820888-901	820888-901

ZORBAX 300Å StableBond

Hardware	Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7	300SB-CN USP L10	300SB-C3 USP L56
PrepHT Cartridge Columns (require endfittings kit 820400-901)							
PL	PrepHT Cartridge	21.2 x 250	7	897250-102	897250-106	897250-105	897250-109
PL	PrepHT Cartridge	21.2 x 150	7	897150-102	897150-106		897150-109
PL	PrepHT Cartridge	21.2 x 150	5	895150-902	895150-906		895150-909
PL	PrepHT Cartridge	21.2 x 100	5	895100-902	895100-906		895100-909
PL	PrepHT Cartridge	21.2 x 50	5	895050-902	895050-906		895050-909
PL	PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	820400-901
PL	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-921	820212-918	820212-924	820212-924
PL	Guard Cartridge Hardware			820444-901	820444-901	820444-901	820444-901
Capillary Glass-lined Columns							
	Capillary	0.5 x 250	5	5064-8266			
	Capillary	0.5 x 150	5	5064-8264			
	Capillary	0.5 x 35	5	5064-8294			
	Capillary RR*	0.5 x 150	3.5	5064-8268			
	Capillary RR*	0.5 x 35	3.5	5065-4459			
	Capillary	0.3 x 250	5	5064-8265			
	Capillary	0.3 x 150	5	5064-8263			
	Capillary	0.3 x 35	5	5064-8295			
	Capillary RR*	0.3 x 150	3.5	5064-8267	5065-4460		
	Capillary RR*	0.3 x 100	3.5	5064-8259	5065-4461		
	Capillary RR*	0.3 x 35	3.5	5064-8270	5065-4462		
	Capillary RR*	0.3 x 50	3.5	5064-8300	5065-4463		
Nano Columns (PEEK fused silica)							
	Nano RR*	0.1 x 150	3.5	5065-9910			
	Nano RR*	0.075 x 150	3.5	5065-9911			
	Nano RR*	0.075 x 50	3.5	5065-9924	5065-9923		
	Trap/Guard, 5/pk	0.3 x 5	5	5065-9913	5065-9914		
	Trap/Guard Hardware kit			5065-9915	5065-9915		

*RR: Rapid Resolution 3.5 µm



Novel Bidentate C18-C18 Bonding for Extend-C18 Bonded Phase

ZORBAX 300Å Extend-C18

- Rugged, high and low pH separations of polypeptides and peptides from pH 2-11.5
- Different selectivity possible at high and low pH
- High efficiency and good recovery of hydrophobic peptides at high pH
- Ideal for LC/MS with ammonium hydroxide-modified mobile phase

Agilent ZORBAX 300Extend C-18 is a wide-pore HPLC column for high efficiency separations of peptides from pH 2-11.5. The unique, bidentate bonded phase provides excellent lifetime and reproducibility at high and low pH. At high pH, retention and selectivity of peptides and polypeptides can change dramatically as a result of changes in charge on molecules. Excellent recoveries of hydrophobic polypeptides have been achieved at room temperature and high pH. LC/MS sensitivity of peptides and polypeptides can also be improved at high pH using a simple ammonium hydroxide-containing mobile phase.

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits*	pH Range	Endcapped	Carbon Load
ZORBAX 300Extend-C18	300Å	45 m^2/g	60°C	2.0-11.5	Double	4%

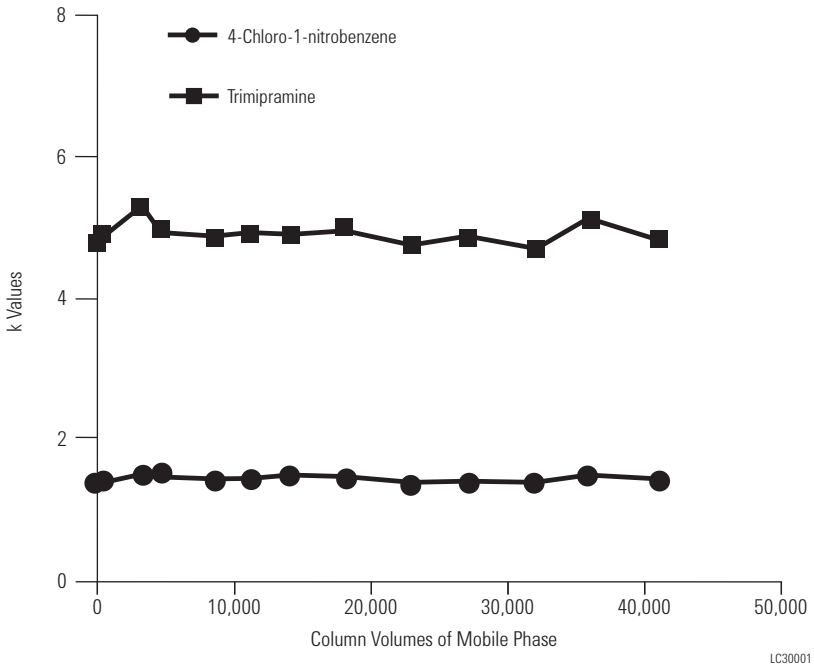
Specifications represent typical values only.

*Temperature limits are 60°C up to pH 8, 40°C from pH 8-11.5.

Long Life at High pH with 300Extend-C18

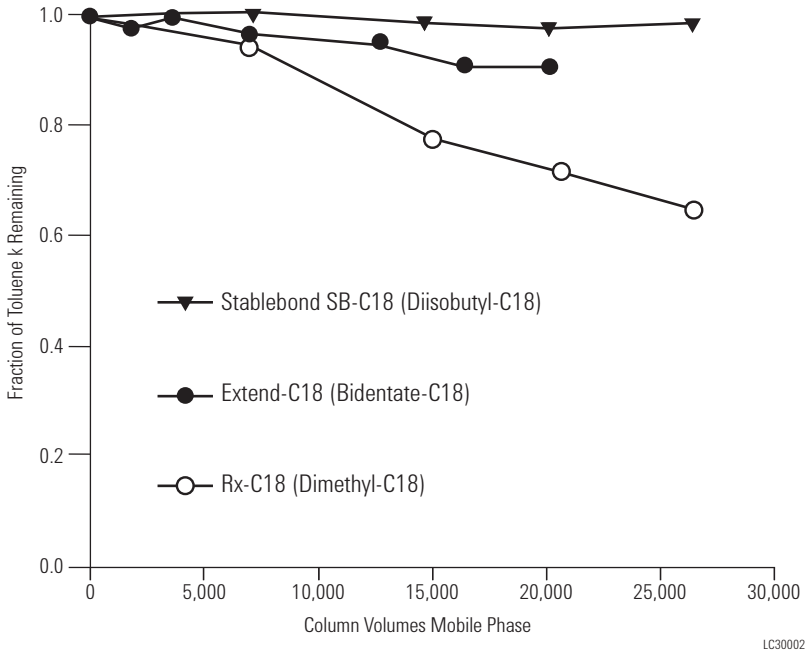
Column:	**ZORBAX Extend-C18** **773450-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	20% 20 mM NH_4OH, pH 10.5 80% Methanol
Flow Rate:	1.5 mL/min
Temperature:	Aging 24°C Tests 40°C

Each 10,000 column volume is approximately one working month.



Extend-C18 and StableBond SB-C18 Are Stable at Low pH

Column A:	**ZORBAX SB-C18** **883975-902** **4.6 x 150 mm, 5 µm**
Column B:	**ZORBAX Extend-C18** **773450-902** **4.6 x 150 mm, 5 µm**
Column C:	**ZORBAX Rx-C18** **883967-902** **4.6 x 150 mm, 5 µm**
Mobile Phase:	Column Aging: 50% Methanol : 50% Water + 1% TFA Column Test: 60% Methanol : 40% Water Test Solute: Toluene
Flow Rate:	1.5 mL/min, continuous
Temperature:	Aging: 90°C Test: Ambient



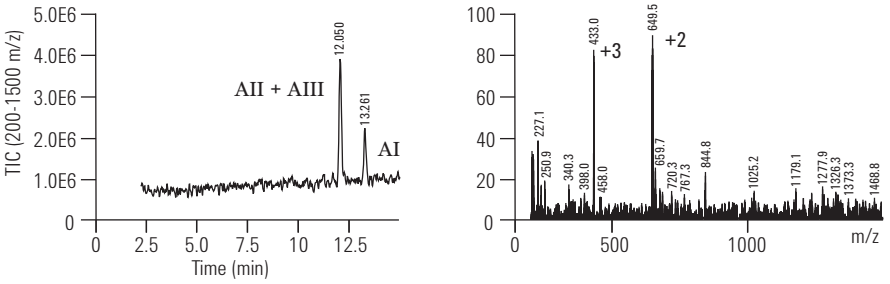
The 300Extend-C18 column can be used at high and low pH—from pH 2-11.5. This chart shows that the 300Extend-C18 has the needed stability at low pH for long-term reproducible separations. Therefore, one wide-pore column can be used for selectivity optimization at low and high pH with both TFA and ammonium hydroxide mobile phases.

LC/MS Analysis of Angiotensin on Extend-C18

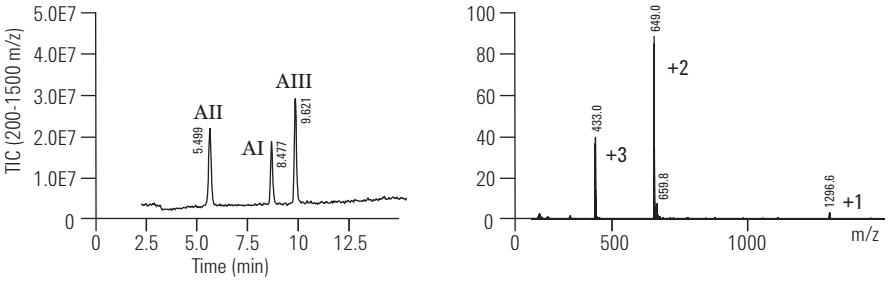
Column:	**ZORBAX Extend-C18** **773700-902** **2.1 x 150 mm, 5 µm**
Mobile Phase:	Acidic Conditions: A: 0.1% TFA in water B: 0.085% TFA in 80% acetonitrile (ACN) Basic Conditions: A: 10 mM NH_4OH in water B: 10 mM NH_4OH in 80% ACN
Flow Rate:	0.2 mL/min
Gradient:	15-50% B in 15 min
Temperature:	35°C
MS Conditions:	Pos. Ion ESI- Vf 70V, Vcap 4.5 kV, N2- 35 psi, 12 L/min., 325°C
Sample:	2.5 µL sample (50 pmol each) Angiotensin I, II, III



A.
Angiotensin I
Max: 10889
Low pH



B.
Angiotensin I
Max: 367225



LC30003

Reference: B.E. Boyes. Separation and Analysis of Peptides at High pH Using RP-HPLC/ESI-MS, 4th WCBP, San Francisco, CA Jan 2000.

Both small and large peptides demonstrate selectivity changes at high and low pH. At high pH, due to a change in charge, all three Angiotensins can be resolved. In addition, the spectral clarity of Angiotensin I is dramatically improved at high pH with the ammonium hydroxide mobile phase. The Extend-C18 column can be used for the analysis of small peptides at high pH as well.

ZORBAX 300Å Extend-C18

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	Analytical	4.6 x 250	5	770995-902
	Analytical	4.6 x 150	5	773995-902
	Rapid Resolution	4.6 x 150	3.5	763973-902
	Rapid Resolution	4.6 x 100	3.5	761973-902
	Rapid Resolution	4.6 x 50	3.5	765973-902
	Narrow Bore RR*	2.1 x 150	3.5	763750-902
	Narrow Bore RR*	2.1 x 100	3.5	761775-902
	Narrow Bore RR*	2.1 x 50	3.5	765750-902
ZGC	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-932
ZGC	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-932
ZGC	Guard Hardware Kit			820888-901
Capillary Glass-lined Columns				
	Capillary RR*	0.3 x 150	3.5	5065-4464
	Capillary RR*	0.3 x 100	3.5	5065-4465
	Capillary RR*	0.3 x 75	3.5	5065-4466
	Capillary RR*	0.3 x 50	3.5	5065-4467

*RR: Rapid Resolution 3.5 µm

ZORBAX GF-250 and GF-450 Gel Filtration Columns

- High efficiency and reproducibility with short analysis time
- Hydrophilic diol bonded phase for good protein recovery
- Compatible with organic modifiers and denaturants
- Wide usable pH range (pH 3-8)

Agilent ZORBAX GF-250 and GF-450 size exclusion (gel filtration) columns are ideal for the size separations of proteins and other biomolecules. The separation range is 4,000-900,000 for globular proteins when using GF-250 and GF-450 columns in series. The GF-250/GF-450 size exclusion columns have a hydrophilic diol bonded phase for high recovery of proteins (typically >90%) and a unique zirconia modification of the silica to extend the pH range from 3-8. The GF-250 and GF-450 columns are packed with precisely sized porous silica microspheres with narrow pore size and particle size distributions. The result is a highly efficient, rugged and reproducible size exclusion column for separations of proteins with flow rates of up to 3 mL/min. These columns are compatible with organic modifiers (<25%) and denaturants in the mobile phase to eliminate protein aggregation for proper size determination. Some common applications include separations of protein monomers, dimers and aggregates, desalting, protein molecular weight estimation and separations of modified proteins.

Column Specifications

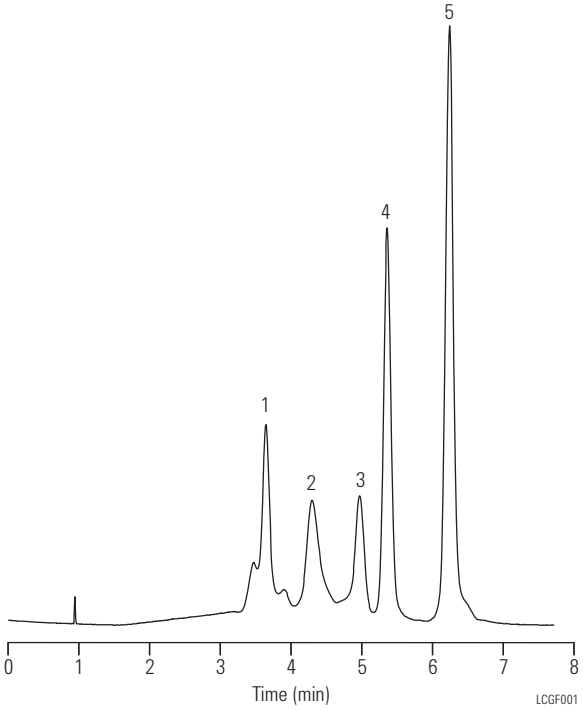
Bonded Phase	Pore Size	Particle Size	MW Range	Surface Area	pH Range	Flow Rate	Max Pressure
ZORBAX GF-250	150Å	4 µm	4,000-400,000	140 m^2/g	3.0-8.0	<3.0 mL/min	350 bar
ZORBAX GF-450	300Å	6 µm	10,000-900,000	50 m^2/g	3.0-8.0	<3.0 mL/min	350 bar

Specifications represent typical values only.

Separation of Protein Standards on the ZORBAX GF-250 SEC Column

Column:	**ZORBAX GF-250** **884973-901** **9.4 x 250 mm, 4 µm**
Mobile Phase:	200 mM Sodium Phosphate, pH 7.0
Flow Rate:	2 mL/min
Temperature:	Ambient
Detector:	254 nm
Sample:	BioRad Gel Filtration Standards for Size Exclusion 1. Thyroglobulin 670,000 Da 2. Bovine Gamma Globulin 158,000 Da 3. Chicken Ovalbumin 44,000 Da 4. Equine Myoglobin 17,000 Da 5. Vitamin B-12 1,350 Da

The protein standards separated here are a commonly selected set of standards. The ZORBAX GF-250 column shows excellent resolution for this sample. Additional resolution of the thyroglobulin can be obtained by adding the GF-450 column in series.

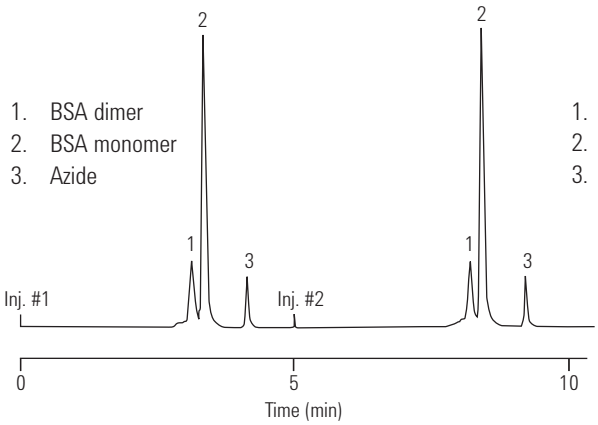


High-Speed Size Exclusion Separations

Column:	**ZORBAX GF-450** **884973-902** **9.4 x 250 mm, 6 µm**
Mobile Phase:	PBS (phosphate buffered saline), pH 7.4
Flow Rate:	3 mL/min
Temperature:	Ambient
Detector:	220 nm
Sample:	BSA and BSA Dimers

A: BSA and BSA Dimers (duplicate injections)

1. BSA dimer
2. BSA monomer
3. Azide

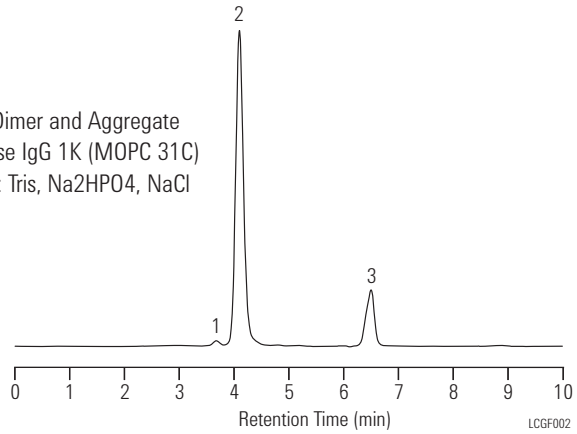


High-Speed Size Exclusion Separations 2

Column:	**ZORBAX GF-450** **884973-902** **9.4 x 250 mm, 6 µm**
Mobile Phase:	200 mM Na Phosphate Monobasic pH 7.0/0.1% Azide
Flow Rate:	2 mL/min
Detector:	225 nm
Sample:	10 µg in 50 mM Sodium Phosphate pH 7.0

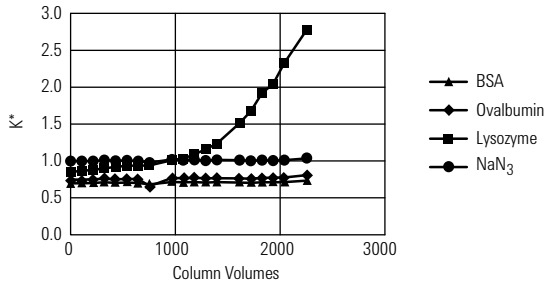
B. Antibody Separation

1. IgG Dimer and Aggregate
2. Mouse IgG 1K (MOPC 31C)
3. Salts: Tris, Na2HPO4, NaCl

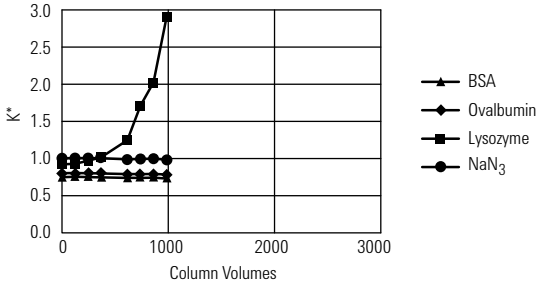


ZORBAX GF-250 Shows Extended Column Lifetime

Stability of GF-250: K* of Standard Proteins



Stability of Competitor Column: K* of Standard Proteins



LCGF004

ZORBAX GF-250 and GF-450 Gel Filtration Columns

Hardware	Description	Size (mm)	Particle Size (µm)	Part No.
	GF-250, 150Å	9.4 x 250	4	884973-901
	GF-250, 150Å	4.6 x 250	4	884973-701
	GF-450, 300Å	9.4 x 250	6	884973-902
Guard Columns (hardware required)				
P	GF-250 Diol, Guard Cartridge, 2/pk	9.4 x 15	6	820675-111
ZGC	GF-250 Diol, Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-911
P	GF-450 Diol, Guard Cartridge, 2/pk	9.4 x 15	6	820675-111
ZGC	GF-250 Diol, Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-911
P	Guard Hardware Kit			840140-901
ZGC	Guard Hardware Kit			820888-901
PrepHT Columns				
PH	PrepHT GF-250, 150Å	21.2 x 250	6	877974-901
PH	PrepHT GF-450, 300Å	21.2 x 250	6	877974-910
PH	PrepHT Endfittings, 2/pk			820400-901
PH	PrepHT GF-250, Guard Cartridge, 2/pk	17 x 7.5	6	820212-911
PH	PrepHT GF-450, Guard Cartridge, 2/pk	17 x 7.5	6	820212-911
PH	Guard Cartridge Hardware			820444-901

Ion Exchange Columns

For your convenience, Agilent provides silica based SynChropak ion exchange columns for additional choices for ion exchange separations.

SynChropak Columns

Size (mm)	Particle Size (µm)	pH Range	SynChropak WAX	SynChropak SAX
Anion Exchange Columns				
4.6 x 100	6.5	2-8	79919DE-754	79919QA-754
4.6 x 250	6.5	2-8	79919DE-784	79919QA-784
Size (mm)	**Particle Size (µm)**	**pH Range**	**SynChropak WCX**	**SynChropak SCX**
Cation Exchange Columns				
4.6 x 100	6.5	2-8	79919CM-754	79919SP-754
4.6 x 250	6.5	2-8	79919CM-784	79919SP-784

ZORBAX Bio-SCX Series II

ZORBAX has Bio-SCX Series II columns designed for optimized 2-D separations of peptides and proteins using LC/MS. This packing is based on ultra-pure 3.5 µm Zorbax silica particles, bonded with a bio-friendly polymer that is functionalized with sulfonic acid groups. This gives strong retention and good peak shape in the ion exchange step of 2-D analysis of peptides and proteins.

Column Specifications

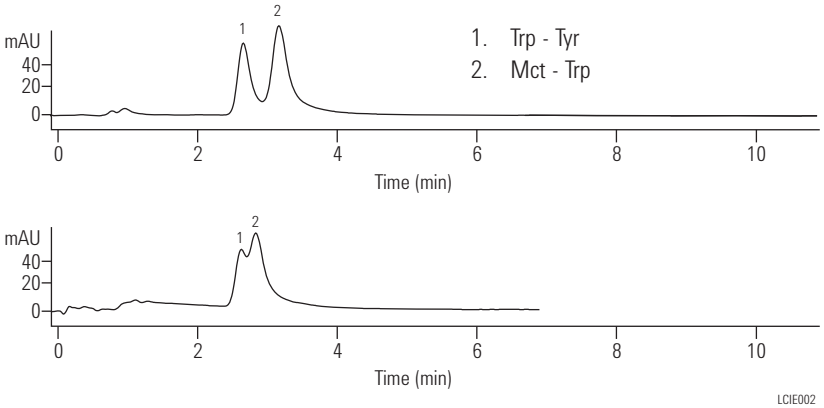
Bonded Phase	Pore Size	Surface Area	pH Range	Functionality	Max Pressure
ZORBAX Bio-SCX Series II	300Å	90 m^2/g	2.5-8.5	Sulfonic acid	350 bar

ZORBAX Bio-SCX Series II

Description	Size (mm)	Particle Size (µm)	Bio-SCX Series II
Capillary	0.3 x 35	3.5	5065-9912
Capillary	0.8 x 50	3.5	5065-9942
Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-903
Guard Hardware Kit			820888-901

ZORBAX Bio-SCX Series II Provides More Retention of Small Peptides

Column: **ZORBAX Bio SCX Series II 5065-9912 0.3 x 35 mm, 3.5 µm**
Mobile Phase: 95% 40 mM NaCl: 5% ACN, 0.3% Formic Acid
Flow Rate: 5 µL/min
Detector: 230 nm
Sample: Synthetic Dipeptides



The new ZORBAX Bio-SCX Series II column retains smaller peptides more strongly than some other SCX columns. The result is increased resolution of more hydrophilic peptides fragments and more accurate identification when these columns are used in 2D-HPLC analysis.



ZORBAX Capillary and Nano

- Highest sensitivity for your smallest sample sizes
- Compatible with all LC/MS interfaces
- Internal diameters of 0.5, 0.3, 0.1, and 0.075 mm
- Packings/phases for both small and large molecules (80Å and 300Å pore sizes, respectively)
- Ideal for 1-D and 2-D (proteomics) applications

Agilent ZORBAX Capillary (0.5, 0.3 mm ID) and Nano (0.1, 0.075 mm ID) columns are now available in a wide variety of phases, pore sizes, and dimensions. These columns are ideal for very sample-limited applications because they provide enhanced sensitivity by reducing on-column sample dilution. This high sensitivity can be provided with exceptional reproducibility using Agilent columns and low dispersion HPLC instruments. The fastest growing application for capillary and nano columns is 2-D LC/MS for complex proteomics samples. Agilent provides all the columns needed for the 2-D separation – the SCX columns for the first dimension, the reversed-phase trapping column, and the reversed-phase column for the second dimension.

Separation of Peptides on Capillary Columns

Column A: **ZORBAX 300SB-C8**
5065-4460
0.3 x 150 mm, 3.5 µm

Column B: **ZORBAX Eclipse XDB-C18**
5064-8291
0.3 x 150 mm, 5 µm

Column C: **ZORBAX Eclipse XDB-C18**
5064-8291
0.3 x 150 mm, 5 µm

Column D: **ZORBAX SB-C18**
5064-8255
0.3 x 150 mm, 5 µm

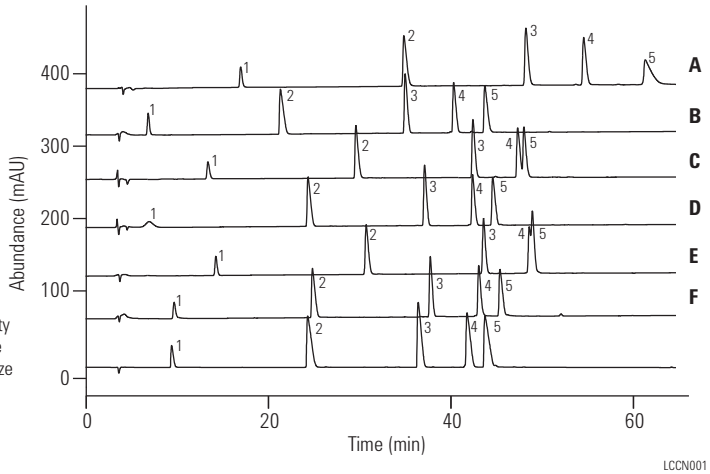
Column E: **ZORBAX 300SB-C18**
5064-8267
0.3 x 150 mm, 3.5 µm

Column F: **ZORBAX 300Extend-C18**
5065-4464
0.3 x 150 mm, 3.5 µm

1. Gly-Tyr, 5 ng/100 nL
2. Val-Tyr-Val, 20 ng/100 nL
3. Met Enkephalin, 28 ng/100 nL
4. Low Enkephalin, 20 ng/100 nL
5. Angiotensin II, 20 ng/100 nL

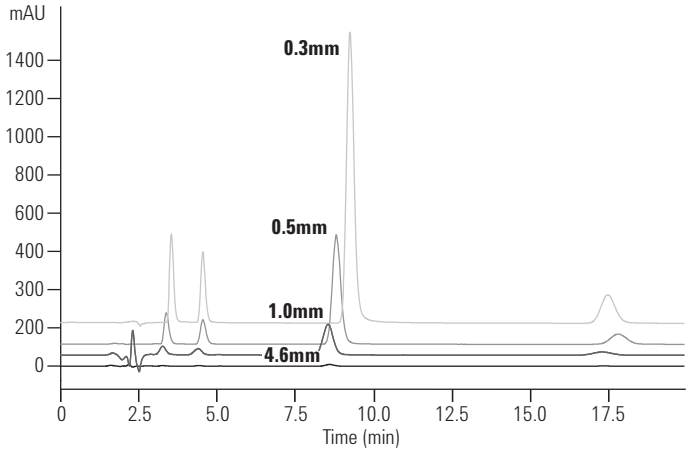
This example shows a peptide standard mixture separated on a variety of the ZORBAX capillary columns. These chromatograms demonstrate the wide range of selectivities available, which can be used to optimize your specific separation.

Mobile Phase: Water + 0.05% TFA, pH = 2.2 = A
Acetronitrile + 0.045% TFA = B
Gradient 0.5% B/min: at 0 min = 1% B,
at 60 min = 31% B, at 70 min = 50% B, at 75 min = 85% B,
at 80 min = 85% B, at 81 min = 1% B, at 110 min = 1% B
Flow Rate: 5.5 µl/min
Low Solvent Consumption:
200-500 µl/min
Temperature: 30°C
Detector: 206/10 nm, ref 450/80 nm
Sample: 0.1 µl, automatic delay volume reduction was activated
Peptides



High Sensitivity with Capillary Columns

Column:	**ZORBAX SB-C18** **5064-8255** **0.3 x 150 mm, 5 µm**
Column:	**ZORBAX SB-C18** **5064-8256** **0.5 x 150 mm, 5 µm**
Column:	**ZORBAX SB-C18** **863600-902** **1.0 x 150 mm, 3.5 µm**
Column:	**ZORBAX SB-C18** **883975-902** **4.6 x 150 mm, 5 µm**
Sample:	200 ng Biphenyl

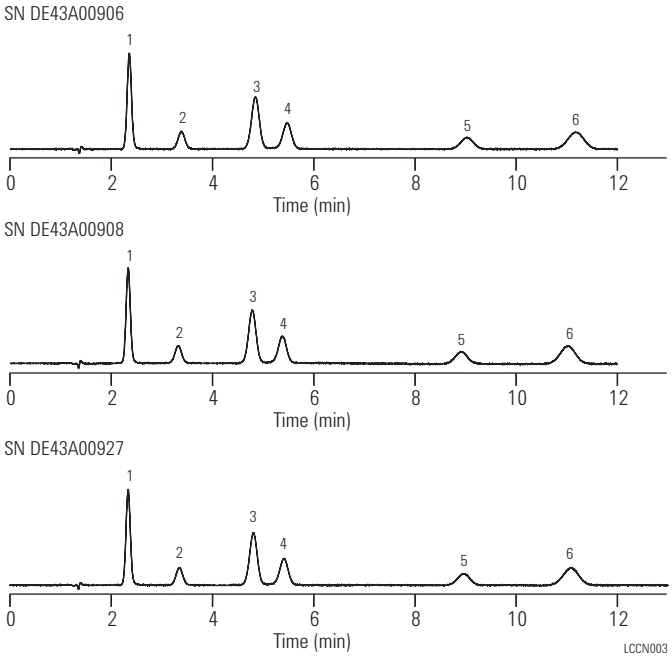


Sample-limited applications require capillary column dimensions to minimize on-column sample dilution and to enhance sensitivity. The 0.3 mm capillary in this example provides 100 times more sensitivity than the standard 4.6 mm column. Nanobore (0.1 mm-0.075 mm ID) columns can provide up to 2000 times more sensitivity for your most limited sample applications.

Excellent Column-to-Column Reproducibility with Agilent Capillary Columns

Column:	**ZORBAX SB-C18** **5064-8256** **0.5 x 150 mm, 5 µm**
Mobile Phase:	A: 75% H_2O with 0.4% formic acid B: 25% MeOH with 0.4% formic acid
Flow Rate:	20 µL/min
Temperature:	25°C
Sample:	0.1 µL Polar organic acids

1. Protocatechuic acid
2. Chlorogenic acid
3. Caffeic acid
4. Syringic acid
5. p-coumaric acid
6. Ferulic acid

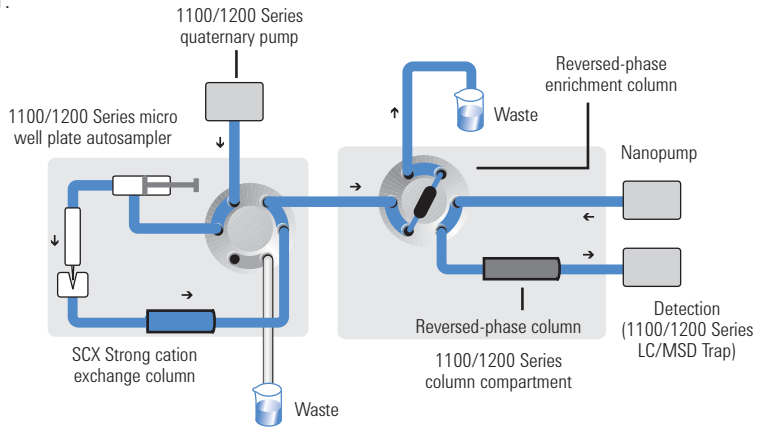


Excellent reproducibility is seen for a separation of polar organic acids on three different StableBond-C18, 0.5 x 150 mm, 5 µm columns. Retention (k) varied less than 0.8% RSD and selectivity (α) varied less than 0.4% RSD.

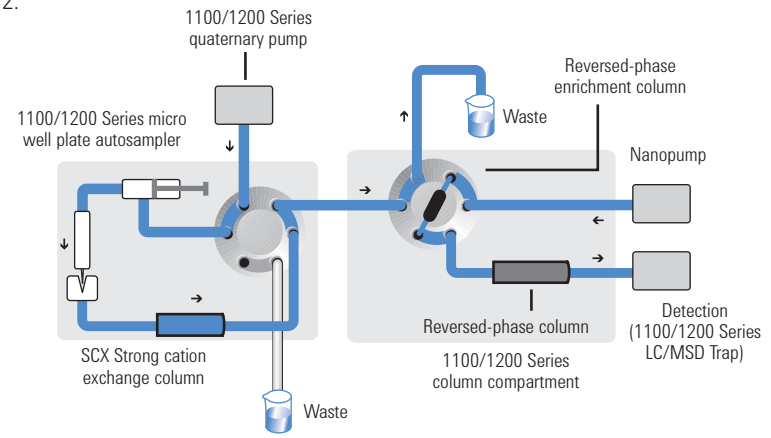
2D LC/MS Analyses Using ZORBAX Capillary and Nano LC Columns

Typical Column Configuration for 2D HPLC

1.



2.



Flow path of the Agilent 1100 Series Nanoflow Proteomics Solution system.
1. Sample loading, elution from SCX and trapping on enrichment column
2. Valve switch in column compartment, elution from enrichment column; separation on RP, and MS anaylsis

Proteins in a Complex Sample
by 2-D HPLC with Nano HPLC Columns

Column: **ZORBAX 300SB-C18**
5065-9913
0.3 x 5 mm, 5 µm

Column: **ZORBAX 300SB-C18**
5065-9911
0.075 x 150 mm, 3.5 µm

Mobile Phase: Quaternary Pump: 3% Acetonitrile/ 0.1% Formic Acid
Nanopump: A = Water, 0.1% Formic Acid, B = ACN, 0.1% Formic Acid

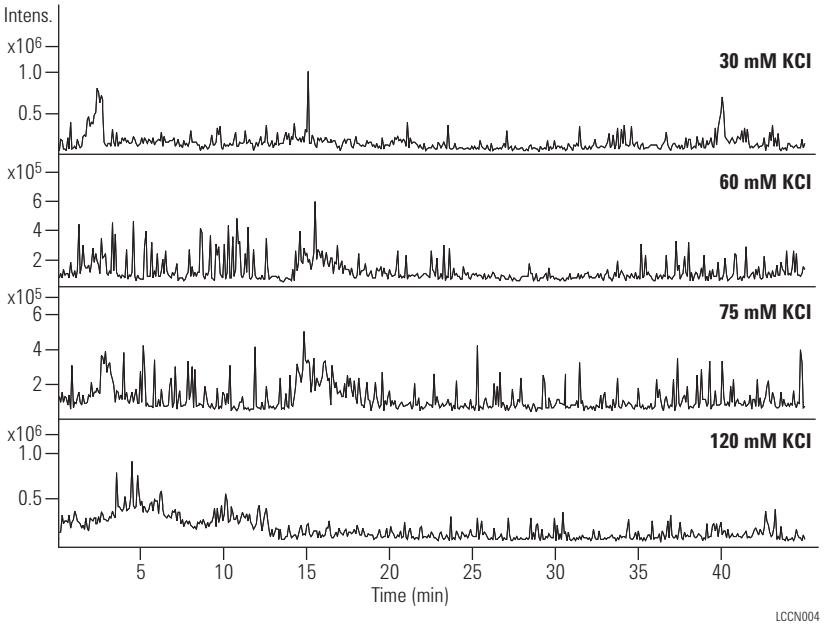
Flow Rate: Quaternary Pump: 30 µL/min
Nanopump: 300 nL/min

Gradient: Quaternary Pump: Isocratic
Nanopump:
6 min = 3% B, 120 min = 60% B,
125 min = 80% B,
130 min = 80% B, 131 min = 3% B,
140 min = 3% B



MS Conditions: Source: Nano ESI, drying gas flow: 5L/min, drying gas temp: 225°C.
Ion Trap: Skim: 1:35 V, cap exit offset: 115 V, octopole 1:12 V,
octopole 2:3.5 V, trap drive: 80 V. ICC: on, averages: 4, max accu time: 150 ms; target 60.000,
ion mode positive, MS/MS mode.

Sample: Tryptic Digest of bovine serum albumin
Volume: 1 to 8 µL
Salt Step Elution: 8 mL of 10 mM-100 mM KCl (10 mM increments), 125 mM,
150 mM, 200 mM, 300 mM, 500 mM, 1M.



Tryptic digest of bovine serum albumin (BSA). The base peak chromatograms show a selection of fractions from a 2-dimensional HPLC separation. Single chromatograms represent peptides from BSA eluting at a given salt concentration followed by enrichment and reversed phase chromatography.

ZORBAX HPLC Capillary Columns (glass-lined stainless steel)

Description	Size (mm)	Particle Size (µm)	SB-C18	Eclipse XDB-C18	300SB-C18	300SB-C8	Poroshell 300SB-C8	300Extend C18	Bio-SCX Series II
Capillary	0.8 x 50	3.5							5065-9942
Capillary	0.5 x 250	5	5064-8258	5064-8286	5064-8266				
Capillary	0.5 x 150	5	5064-8256	5064-8287	5064-8264				
Capillary	0.5 x 75	5					5065-4468		
Capillary	0.5 x 35	5	5064-8254	5064-8296	5064-8294				
Capillary RR*	0.5 x 35	3.5	5064-8260	5064-8298	5065-4459				
Capillary	0.3 x 250	5	5064-8257	5064-8269	5064-8265				
Capillary	0.3 x 150	5	5064-8255	5064-8291	5064-8263				
Capillary	0.3 x 35	5	5064-8253	5064-8297	5064-8295				
Capillary	0.3 x 35	3.5							5065-9912
Capillary RR*	0.3 x 150	3.5	5064-8261	5064-8271	5064-8267	5065-4460		5065-4464	
Capillary RR*	0.3 x 100	3.5			5064-8259	5065-4461		5065-4465	
Capillary RR*	0.3 x 75	3.5			5064-8270	5065-4462		5065-4466	
Capillary RR*	0.3 x 50	3.5			5064-8300	5065-4463		5065-4467	
Replacement Screens, 10/pk			5065-4427	5065-4427	5065-4427	5065-4427	5065-4427	5065-4427	

*RR: Rapid Resolution 3.5 µm

ZORBAX Nano HPLC Columns (PEEK)

Description	Size (mm)	Particle Size (µm)	300SB-C18 USP L1	300SB-C8 USP L7
Nano RR*	0.1 x 150	3.5	5065-9910	
Nano RR*	0.075 x 150	3.5	5065-9911	
Nano RR*	0.075 x 50	3.5	5065-9924	5065-9923
Trap/Guard, 5/pk	0.3 x 5	5	5065-9913	5065-9914
Trap/Guard Hardware kit			5065-9915	5065-9915

*RR: Rapid Resolution 3.5 µm

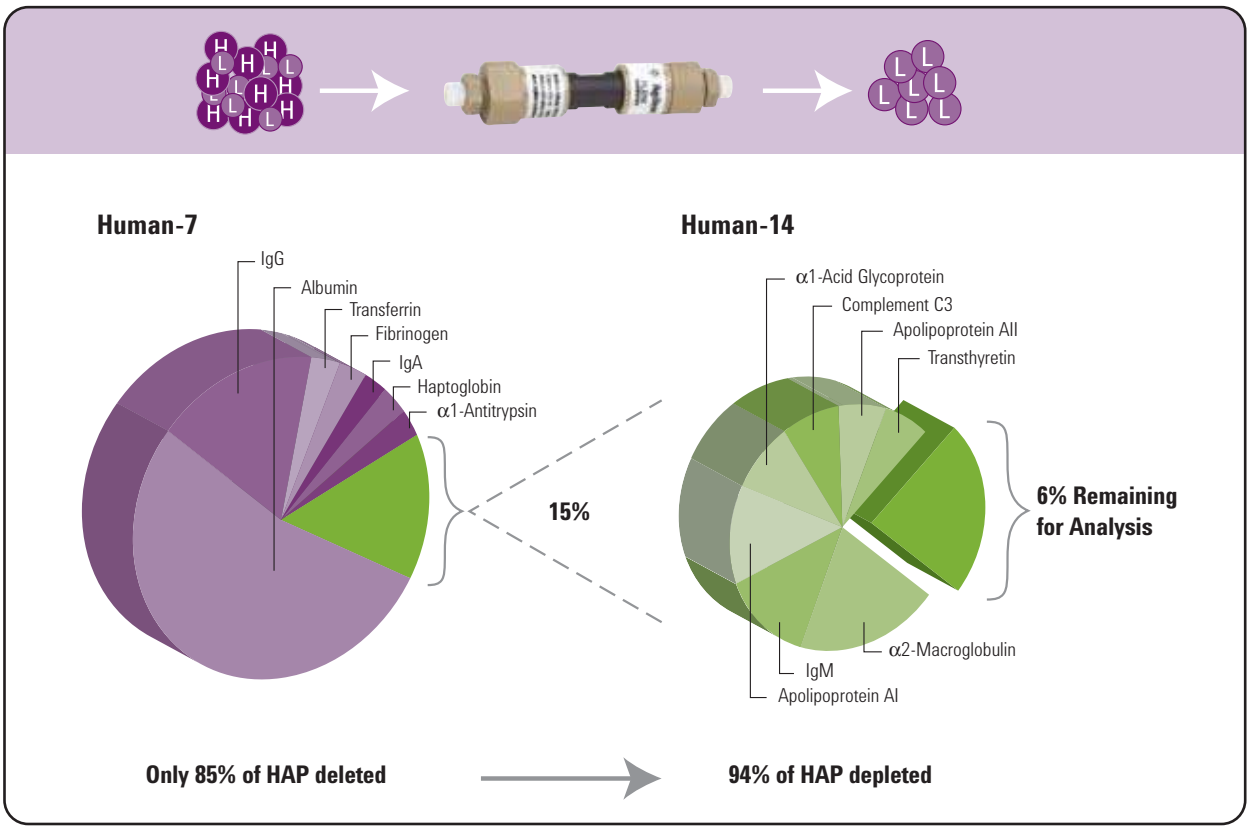


Multiple Affinity Removal System – Human 14 LC Columns

To more easily isolate and identify proteins in human biological fluids, the Agilent Human-14 Multiple Affinity Removal Column is designed to chromatographically remove fourteen interfering high-abundant proteins from serum, plasma and other human biological fluids.

- Eliminates 98% or greater of each of the 14 targeted high-abundant human proteins
- Sample loss minimized with rapid, single injection protocols and optimized buffers
- Two buffer system allows for re-use of the columns for over 200 injections
- Compatible with most FPLC or HPLC pumps or instruments, including Agilent 1100/1200 Series

Human 14 LC column removes 98% or greater of the 14 targeted proteins



Load capacities based on pooled normal human plasma standard.

Column Specifications	
Dimensions (Custom sizes available)	• 4.6 x 50 mm (0.83 mL bed volume) • 4.6 x 100 mm (1.66 mL bed volume) • 10 x 100 mm (7.8 mL bed volume)
Body material	PEEK (polyetheretherketone)
End fitting material	PEEK with 2 µm frits
Injections/Column	> 200
Total serum/plasma processed per lifetime	• 4.6 x 50 mm: 4,000 µL • 4.6 x 100 mm: 8,000 µL • 10 x 100 mm: 50,000 µL
Maximum pressure	120 bar
Operating temperature	18 - 25°C
Packing material	Affinity resin
Immobilized ligands	Affinity ligands to human high abundant proteins (albumin, IgG, antitrypsin, IgA, transferrin, haptoglobin, fibrinogen, alpha2-macroglobulin, alpha1-acid glycoprotein, IgM, apolipoprotein AI, apolipoprotein AII, complement C3 and transthyretin)
Flow rate range	0.125 - 3.0 mL/min
Shipping solution	Buffer A with 0.02% sodium azide
Shipping temperature	2 - 8°C
Storage temperature	2 - 8°C

Tips & Tools

The LC Column Reagent Starter Kit includes all the required supplies to use with Multiple Affinity Removal System LC columns. Order this convenient kit using part number 5185-5986.

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Multiple Affinity Removal System – Human 14 LC Columns

Description	Serum Capacity Per Injection	Part No.
Hu-14, 4.6 x 50 mm	20 µL	5188-6557
Hu-14, 4.6 x 100 mm	40 µL	5188-6558
Hu-14, 10 x 100 mm	250 µL	5188-6559

Load capacities based on pooled normal human plasma standard.



Multiple Affinity Removal System – Human 7 LC Columns

The Multiple Affinity Removal System - Human 7 LC Column removes seven interfering high-abundant proteins from human serum, plasma and other biological fluids, which improves LC/MS and electrophoretic analysis.

- Eliminates 98% or greater of each of the 7 targeted high-abundant human proteins
- Sample loss minimized with rapid, single injection protocols and optimized buffers
- Two buffer system allows re-use of the columns for over 200 injections
- Compatible with most FPLC or HPLC pumps or instruments, including Agilent 1100/1200 Series

Column Specifications	
Dimensions	• 4.6 x 50 mm (0.83 mL bed volume) • 4.6 x 100 mm (1.66 mL bed volume) • 10 x 100 mm (7.8 mL bed volume) • Custom sizes available
Body material	PEEK (polyetheretherketone)
End fitting material	PEEK with 2 µm frits
Injections/Column	> 200
Total serum/plasma processed per lifetime	• 4.6 x 50 mm: 7,000 µL • 4.6 x 100 mm: 14,000 µL • 10 x 100 mm: 60,000 µL
Maximum pressure	120 bar
Operating temperature	18 - 25°C
Packing material	Affinity resin
Immobilized ligands	Affinity ligands to human (albumin, IgG, IgA, transferrin, haptoglobin, antitrypsin, and fibrinogen)
Flow rate range	0.25 - 3.0 mL/min
Shipping solution	Buffer A with 0.02% sodium azide
Shipping temperature	2 - 8°C
Storage temperature	2 - 8°C

Multiple Affinity Removal System – Human 7 LC Columns

Description	Serum Capacity Per Injection	Part No.
Hu-7, 4.6 x 50 mm	30 - 35 µL	5188-6409
Hu-7, 4.6 x 100 mm	60 - 70 µL	5188-6410
Hu-7, 10 x 100 mm	250 - 300 µL	5188-6411

Load capacities based on pooled normal human plasma standard.



Multiple Affinity Removal System – Human 6 LC Columns

The Multiple Affinity Removal System - Human 6 LC Column removes six interfering high-abundant proteins from human serum, plasma and other biological fluids.

- Eliminates 98% or greater of each of the 6 targeted high-abundant human proteins
- Sample loss minimized with rapid, single injection protocols and optimized buffers
- Two buffer system allows for re-use of the columns for over 200 injection
- Compatible with most FPLC or HPLC pumps or instruments, including Agilent 1100/1200 Series

Column Specifications	
Dimensions	• 4.6 x 50 mm (0.83 mL bed volume) • 4.6 x 100 mm (1.66 mL bed volume) • 10 x 100 mm (7.8 mL bed volume)
Body material	PEEK (polyetheretherketone)
End fitting material	PEEK with 2 µm frits
Injections/Column	> 200
Total serum/plasma processed per lifetime	• 4.6 x 50 mm: 4,000 µL • 4.6 x 50 mm HC: 8,000 µL • 4.6 x 100 mm: 8,000 µL • 4.6 x 100 mm HC: 16,000 µL • 10 x 100 mm: 68,000 µL
Maximum pressure	120 bar
Operating temperature	18 - 25°C
Packing material	Affinity resin
Immobilized ligands	Affinity ligands to human (albumin, IgG, IgA, transferrin, haptoglobin, and antitrypsin)
Flow rate range	0.25 - 1.0 mL/min
Shipping solution	Buffer A with 0.02% sodium azide
Shipping temperature	2 - 8°C
Storage temperature	2 - 8°C

Multiple Affinity Removal System – Human 6 LC Columns

Description	Serum Capacity Per Injection	Part No.
Hu-6, 4.6 x 50 mm	15 - 20 µL	5185-5984
Hu-6, 4.6 x 100 mm	30 - 40 µL	5185-5985
High Capacity		
Hu-6HC, 4.6 x 50 mm	30 - 40 µL	5188-5332
Hu-6HC, 4.6 x 100 mm	60 - 80 µL	5188-5333
Hu-6HC, 10 x 100 mm	up to 340 µL	5188-5336

Load capacities based on pooled normal human plasma standard.



Multiple Affinity Removal System – Mouse 3 LC Columns

The Multiple Affinity Removal System – Mouse 3 LC column removes three interfering high-abundant proteins from mouse serum, plasma and other murine biological fluids. Research use only.

- Eliminates 98% or greater of each of the 3 targeted high-abundant mouse proteins
- Sample loss minimized with rapid, single injection protocols and optimized buffers
- Two buffer system allows for highly reproducible re-use of the columns for over 200 injections
- Compatible with most FPLC or HPLC pumps or instruments, including Agilent 1100/1200 Series

Column Specifications	
Dimensions	• 4.6 x 50 mm (0.83 mL bed volume) • 4.6 x 100 mm (1.66 mL bed volume) • Custom sizes available
Body material	PEEK (polyetheretherketone)
End fitting material	PEEK with 2 µm frits
Injections/Column	> 200
Total serum/plasma processed per lifetime	• 4.6 x 50 mm: 10,000 µL • 4.6 x 100 mm: 20,000 µL
Maximum pressure	120 bar
Operating temperature	18 - 25°C
Packing material	Affinity resin
Immobilized ligands	Affinity ligands to mouse (albumin, IgG, and transferrin)
Flow rate range	0.25 - 1.0 mL/min
Shipping solution	Buffer A with 0.02% sodium azide
Shipping temperature	2 - 8°C
Storage temperature	2 - 8°C

Multiple Affinity Removal System – Mouse 3 LC Columns

Description	Serum Capacity Per Injection	Part No.
Ms-3, 4.6 x 50 mm	37 - 50 µL	5188-5217
Ms-3, 4.6 x 100 mm	75 - 100 µL	5188-5218

Load capacities based on pooled normal mouse serum standard.



LC Column Reagent Starter Kit

The LC Column Reagent Starter Kit includes all the required supplies to use with Multiple Affinity Removal System LC columns. These buffers provide optimal conditions for column longevity and sample reproducibility.

- The kit provides enough Buffer A and Buffer B for approximately 200 sample depletions using the 4.6 x 50 mm LC columns and approximately 100 sample depletions using the 4.6 x 100 mm LC columns.
- Buffer A, the loading buffer, minimizes protein-protein interactions, allowing low abundant proteins often bound to high abundant proteins to pass through the column, while the targeted high abundant proteins bind to their associated antibodies.
- Buffer B, the elution buffer, then disrupts the antibody-protein interaction eluting the high abundant proteins off the column.
- The kit also contains spin filters to remove particulates from your starting samples and eliminate clogging of the column inlet frit.
- Should you need to buffer exchange the flow-through, this kit includes 5kDa MWCO filters.

LC Column Reagent Starter Kit

Description	Part No.
Starter Reagent Kit Includes:	5185-5986
Buffer A, 1 L, for loading, washing, and equilibrating	5185-5987
Buffer B, 1 L, for eluting	5185-5988
Spin filters, 0.22 µm cellulose acetate, 25/pk	5185-5990
Spin concentrators, 5K MWCO, 4 mL, 25/pk	5185-5991
PEEK end fitting, 2 µm frit	5185-5995

Multiple Affinity Removal Spin Cartridges – Human 14

In order to more easily isolate and identify proteins in human biological fluids, the Agilent Human 14 Multiple Affinity Removal Spin Cartridge is designed to chromatographically remove fourteen interfering high-abundant proteins from human serum, plasma and other biological fluids. Removal of these abundant proteins improves LC/MS and electrophoretic analysis of these biological samples by effectively expanding the dynamic range of the analysis.

- Eliminates 98% or greater of each of the 14 targeted high-abundant human proteins (albumin, IgG, antitrypsin, IgA, transferrin, haptoglobin, fibrinogen, alpha2-macroglobulin, alpha1-acid glycoprotein, IgM, apolipoprotein AI, apolipoprotein AII, complement C3 and transthyretin)
- Optimized 2 buffer system allows for highly reproducible re-use of the columns for over 200 injections
- Compatible with standard benchtop microcentrifuges and Luer-Lok syringes

Multiple Affinity Removal Spin Cartridges – Human 14

Description	Serum Capacity Per Injection	Part No.
Hu-14, 0.45 mL	8 - 10 µL	5188-6560

Load capacities based on pooled normal human plasma standard.

Tips & Tools

The Spin Cartridge Reagent Starter Kit includes all the required supplies to use with Multiple Affinity Removal System Spin Cartridges. Order this convenient kit using part number 5188-5254.

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Multiple Affinity Removal Spin Cartridges – Human 7

The Multiple Affinity Removal Spin Cartridge – Human 7 removes seven interfering high-abundant proteins from human serum, plasma and other human biological fluids. Removal of these abundant proteins improves LC/MS and electrophoretic analysis of the serum sample by effectively expanding the dynamic range of the analysis.

- Eliminates 98% or greater of each of the 7 targeted high-abundant human proteins (albumin, IgG, IgA, transferrin, haptoglobin, antitrypsin, and fibrinogen)
- Optimized 2 buffer system allows for highly reproducible re-use of the columns for over 200 injections
- Compatible with standard benchtop microcentrifuges and Luer-Lok syringes

Multiple Affinity Removal Spin Cartridges – Human 7

Description	Serum Capacity Per Injection	Part No.
Hu-7, 0.45 mL	12 - 14 µL	5188-6408

Load capacities based on pooled normal human plasma standard.



Multiple Affinity Removal Spin Cartridges – Human 6

The Multiple Affinity Removal Spin Cartridge – Human 6 (standard or high-capacity) removes six interfering high-abundant proteins from human serum, plasma and other human biological fluids. Removal of these abundant proteins improves LC/MS and electrophoretic analysis of the serum sample by effectively expanding the dynamic range of the analysis.

- Eliminates 98% or greater of each of the 6 targeted high-abundant human proteins (albumin, IgG, IgA, transferrin, haptoglobin, and antitrypsin)
- Optimized 2 buffer system allows for highly reproducible re-use of the columns for over 200 injections
- Compatible with standard benchtop microcentrifuges and Luer-Lok syringes

Multiple Affinity Removal Spin Cartridges – Human 6

Description	Serum Capacity Per Injection	Part No.
Hu-6, 0.45 mL	7 - 10 µL	5188-5230
High Capacity		
Hu-6HC, 0.45 mL	14 - 16 µL	5188-5341

Load capacities based on pooled normal human plasma standard.

Multiple Affinity Removal Spin Cartridges – Mouse 3

The Multiple Affinity Removal Spin Cartridge – Mouse 3 removes three interfering high-abundant proteins from mouse serum, plasma and other mouse biological fluids. Removal of these abundant proteins improves LC/MS and electrophoretic analysis of the serum sample by effectively expanding the dynamic range of the analysis.

- Eliminates 98% or greater of each of the 3 targeted high-abundant mouse proteins (albumin, IgG, and transferrin)
- Optimized 2 buffer system allows for highly reproducible re-use of the columns for over 200 injections
- Compatible with standard benchtop microcentrifuges and Luer-Lok syringes

Multiple Affinity Removal Spin Cartridges – Mouse 3

Description	Serum Capacity Per Injection	Part No.
Ms-3, 0.45 mL	25 - 30 µL	5188-5289

Load capacities based on pooled normal mouse serum standard.



Luer-Lok syringe, 5188-5250

Luer-Lok adapters, 5188-5249

Luer-Lok needles, 5188-5253

Spin Cartridge Reagent Starter Kit

The Spin Cartridge Reagent Starter Kit includes all the required supplies to use with Multiple Affinity Removal System Spin Cartridges. These buffers provide optimal conditions for spin cartridge longevity and sample reproducibility.

- Provides enough Buffer A and Buffer B for approximately 200 sample depletions using the spin cartridges
- Buffer A, the loading buffer, minimizes protein-protein interactions allowing low abundant proteins often bound to high abundant proteins to pass through the column, while the targeted high abundant proteins bind to their associated antibodies
- Buffer B, the elution buffer, then disrupts the antibody-protein interaction eluting the high abundant proteins off the column
- Contains spin filters to remove particulates from your starting samples, Luer-Lok syringes and adapters.
- The flow through fraction of the depleted sample is compatible with common downstream analytical techniques, including 2D gel electrophoresis and LC/MS
- Should you need to buffer exchange the flow through, this kit includes 5kDa MWCO filters

Spin Cartridge Reagent Starter Kit

Description	Part No.
Starter Reagent Kit Includes:	5188-5254
Buffer A, 1 L, for loading, washing, and equilibrating	5185-5987
Buffer B, 1 L, for eluting	5185-5988
Spin filters, 0.22 µm cellulose acetate, 25/pk	5185-5990
Spin concentrators, 5K MWCO, 4 mL, 25/pk	5185-5991
Luer-Lok adapters, 2/pk	5188-5249
Plastic syringe, 5 mL, Luer-Lok, 2/pk	5188-5250
Microtube, 1.5 mL, screw top, 100/pk	5188-5251
Caps and plugs, 6/pk	5188-5252
PTFE needles, Luer-Lok, 10/pk	5188-5253



mRP-C18 High Recovery Protein Columns

The mRP (macroporous reverse phase) C18 High-Recovery Protein Column is designed for high recovery, high resolution separation, fractionation and simultaneous desalting of complex protein samples (like immunodepleted serum or plasma proteins).

- Greater than 95-99% protein sample recovery has been observed with immunodepleted serum using the Agilent Multiple Affinity Removal System - LC Column.
- Can load up to 380 µg of total protein mass without reducing chromatographic resolution of the proteins
- Column packed with macroporous C18-bonded ultrapure 5 µm particle silica designed to reduce or eliminate strong adsorption of proteins
- Maximum operating pressure of 250 bar (4000 psi)
- Compatible with water and all common organic solvents

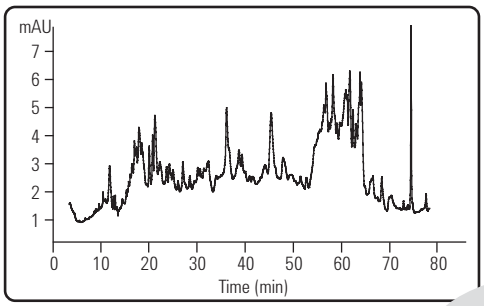


mRP-C18 High Recovery Protein Columns

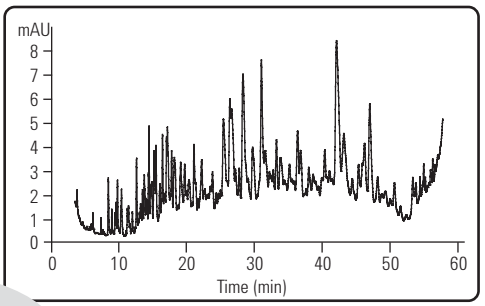
Description	Protein Load Capacity	Part No.
mRP-C18, 0.5 x 100 mm	10 ng - 5 µg	5188-6510
mRP-C18, 2.1 x 75 mm	8 - 85 µg	5188-6511
mRP-C18, 4.6 x 50 mm	40 -380 µg	5188-5231

Protein Fractionation of Complex Samples on the mRP Column

4.6 x 50 mm mRP-C18

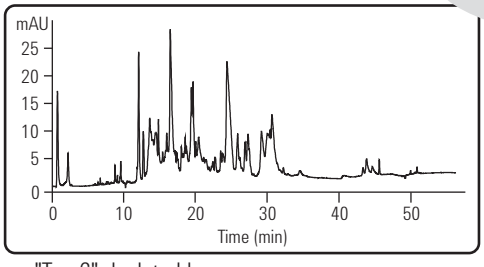


HeLa Membrane Prep

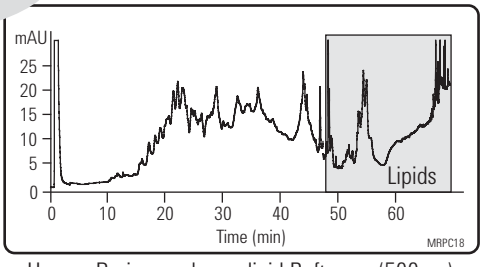


HeLa cell lysate (352 µg)

Highest Recovery



"Top-6" depleted human serum



Human Brain membrane lipid Raft prep (500 µg)



Protein In-gel Tryptic Digestion Kit

The Protein In-gel Tryptic Digestion Kit contains a complete set of reagents to perform tryptic digestions on colloidal Coomassie or fluorescent dye-stained protein bands excised from polyacrylamide gels.

- Process approximately 150 samples
- Easy-to-follow, 7-step protocol produces accurate and reproducible digestions in suitable form for mass spectrometric analysis
- Designed to function with a wide range of protein band concentrations, greater than ~20 ng/band
- Includes all buffers and six reagents, including Trypsin, needed for protocol

Protein In-gel Tryptic Digestion Kit

Description	Part No.
Protein in-gel tryptic digestion kit	5188-2749



Spin Filters

Spin Filters are polypropylene spin tubes with cellulose acetate filter membranes that can be used to remove particulate matter from samples such as serum, plasma, or protein samples diluted in aqueous buffers through low-speed centrifugation of samples through the filter.

- 50 - 500 µL sample volume capacity
- 2 mL sample receiver volume capacity
- Sample holdup volume is < 5 µL
- Contains a cellulose acetate membrane with a 0.22 µm pore size
- Designed to be used with standard benchtop microcentrifuge at maximum 16,000 g

Spin Filters

Description	Unit	Part No.
0.22 µm cellulose acetate	25/pk	5185-5990

Accessories

Description	Part No.
Buffer A, 1 L, for loading, washing, and equilibrating	5185-5987
Buffer B, 1 L, for eluting	5185-5988
PEEK end fitting, 2 µm frit	5185-5995



Spin Concentrators

Spin concentrators are devices used to concentrate protein samples via low-speed centrifugation through MWCo filters into a collection tube.

- 4 mL and 15 mL sample volume capacities
- Contains a polyethersulfone (PES) membrane that is compatible with biological fluids and most aqueous solutions with pore sizes of 5kDa, 30kDa, or 50kDa
- Active membrane area of 2.0 cm^2 or 4.0 cm^2
- Constructed with polycarbonate concentrator bodies and PES vertical membranes which are durable and designed to minimize membrane fouling and allow fast concentration, even with particles in the solution
- Fits standard 15 mL conical collection tube or a 50 mL collection tube (not provided with concentrator)
- Designed for either swing-bucket or fixed angle rotor centrifuge equipment at maximum 5,000 g or 2,000 g

Spin Concentrators

Description	Unit	Part No.
5K MWCO, 4 mL	25/pk	5185-5991
30K MWCO, 4 mL	25/pk	5188-5201
50K MWCO, 4 mL	25/pk	5188-5202
5K MWCO, 15 mL	10/pk	5188-2798
50K MWCO, 15 mL	10/pk	5188-2800



Peptide Cleanup Pipette Tips

Peptide Cleanup Pipette Tips are packed with ZORBAX SB-C18 silica used for purification and concentration of peptide, protein digests, proteins, or oligonucleotide samples by pipetting sample through the tip. Typical applications include sample preparation for analysis using ESI and MALDI-MS.



- 10 µL pipette tip
- 1 - 20 µL sample volume capacities
- C18-silica solid phase extraction material is embedded into the wall of the pipette tip (no glue or polymer matrix is used), maximizing surface area in contact with the sample and providing excellent flow properties
- Uses an easy-to-follow protocol that provides highly reproducible recoveries of peptides from in-gel digests with low interferences for mass spectrometry (MS) analysis
- Recommended one-time use only
- Available in rack of 96
- Fits all standard 10 µL adjustable pipettes

Peptide Cleanup Pipette Tips

Description	Part No.
Peptide cleanup pipette tips, rack of 96	5188-5239



Peptide Cleanup Spin Tubes

Peptide cleanup spin tubes are packed with C18 reverse phase resin used for purification and concentration of peptide, protein digests, proteins, or oligonucleotide samples by centrifuging sample through spin tube packing. Typical applications include sample preparation for analysis using ESI and MALDI-MS.

- 10 - 250 µL sample volume capacities: 10 - 150 µL
- Each tube can process a digest from ≥ 20 ng of protein or ≤ 30 µg of total peptide
- Packed with 8 mg proprietery C18 resin
- Easy-to-follow, 6-step protocol that enables purification of peptide samples in less than 30 minutes
- Recommended one-time use only
- Designed to be used with standard benchtop microcentrifuge at 1,500 g

Peptide Cleanup Spin Tubes

Description	Part No.
Peptide cleanup spin tubes, 50/pk	5188-2750

HPLC Troubleshooting

Symptom Type	Possible Cause	Solution
Baseline disturbance at void time	Positive/negative - Difference in refractive index of injection solvent	Use mobile phase for sample solvent
Detector leaks	Plugged inlet frit	Replace seals/gaskets
Drifting baseline	Positive direction - Contaminant buildup/elution	Flush column, cleanup sample, use pure solvents
	Positive/negative - Difference in refractive index of injection solvent	Use mobile phase for sample solvent
	Negative direction (gradient) - Absorbance of "A" mobile phase solvent	Use non-absorbing or HPLC-grade solvent
	Positive direction (gradient) - Absorbance of "B" mobile pahse solvent	Use non-absorbing or HPLC-grade solvent
	Random - Temperature changes	Insulate column and tubing
	Random - Temperature changes	Thermostat column and tubing
	Wavy or undulating - Temperature changes in room	Monitor room temperature and control
Ghost peaks	Peaks from previous injection	Flush column to remove contaminants
	Contamination	Sample cleanup or pre-fractionation
	Unknown interferences in samples	Sample cleanup or pre-fractionation
	Ion pair - Upset equilibrium	Prepare sample in actual mobile phase to minimize disturbance
	Peptide mapping - Oxidation of TFA	Prepare fresh daily; use anti-oxidant
	Reversed phase - Contaminated water	Check suitablity of water by running different amount through reversed phase column and measure peak height with elution; use HPLC grade solvents
	Spikes - Bubbles in solvent	De-gas solvents
High column backpressure	Column blockage with irrev, adsorbed sample	Better sample cleanup; use guard column
	Too high mobile phase viscosity	Use lower viscosity solvents or higher temperature
	Particle size too small	Use larger d_p packing
	Plugged inlet frit	Replace and fitting
	Plugged inlet frit	Reverse solvent flow
Leak	Subtle; white powder at fitting - loose fitting	Tighten fitting, cut tubing, or replace ferrule
Leak, injection valve	Catastrophic - Worn valve rotor	Replace rotor in valve
Leak, column or other fittings	Catastrophic - Loose fittings	Tighten or replace fitting
Leak, pump	Catastrophic - Pump seal failure	Replace pump seal
Negative peaks	RI-Detector - solute refractive index less than solvent	No problem; reverse polarity to make positive
	UV detector - solute absorbance less than mobile phase	Use mobile phase with lower UV absorbance; do not recycle solvent too long

HPLC Troubleshooting

Symptom Type	Possible Cause	Solution
Noisy baseline	Random - Contaminant buildup	Flush column; cleanup sample; use HPLC-grade solvent
	Continuous - Detector lamp problem	Replace UV lamp (lasts 1000 hrs)
	Occasional - External electrical interference	Use voltage stabilizer for LC system
	Sample volume too large	Injection volume should be 1/6 when mobile phase used for injection
Peak doubling	Sample volume too large	Injection volume should be 1/6 when mobile phase used for injection
	Injection solvent too strong	Use weaker injection solvent or mobile phase
	Block frit	Replace and use 0.5 µm porosity in-line filter
	Column void or channeling	Fill in void with glass beads or packing; repack column
	Unswept injector flowpath	Replace injector rotor
	Void at head of column	Top of column with packing or glass beads
	Column overloaded with sample	Use higher capacity stationary phase Increase column diameter Decrease sample size
	Single peak - interfering components	Sample cleanup; prefractionation
Peak tailing	Beginning of peak doubling	See peak doubling
	Unswept dead volumes	Minimize number of connections Ensure injector seal is tight Ensure fittings are properly seated
	Basic compounds - Silanol interactions	Switch to polymeric phase
	Basic substances - Silanol interactions	Use stronger mobile phase or add competing base (e.g. TMA)
	Silica-based - Column degradation	Use speciality column; polymeric column or sterically protected
Peaks are broad	Injection volume too large	Decrease solvent strength of injection solvent to focus solute
	Peak dispersion in injector valve	Introduce air bubble in front/back of sample to decrease dispersion
	Sampling rate of data system too slow	Increase frequency of sampling
	Slow detector time constant	Adjust time constant to match peak width
	Mobile phase viscosity too high	Increase column temperature
	Detector cell volume too large	Use smallest possible cell volume with no heat exchanger in system
	Injector volume too large	Decrease injection volume
	Long retention times	Use gradient elution or stronger mobile phase

HPLC Troubleshooting

Symptom Type	Possible Cause	Solution
Pressure fluctuation	Leaky check valve	Replace check valve
	Pump seal leaks	Replace pump seals
	Buildup of particulates	Filter sample; in-line filter; filter mobile phase
Pressure increasing	Buildup of particulates	Filter sample; in-line filter; filter mobile phase
	Water/organic systems - buffer precipitation	Test buffer-organic mixtures; ensure compatibilty
Retention beyond total permeation volume	Size exclusion- Specific interactions	Add mobile phase modifiers or change solvent
Retention times are changing	Column temperature varying	Thermostat column; insulate column; ensure lab temperature constant
	Equilibration time insufficient with gradient run or changes in isocratic mobile phase	Make sure at least 10 column volumes pass through column after solvent change or gradient conclusion
	Selective evaporation of mobile phase component	Less vigorous helium sparging; keep solvent reservoirs covered; prepare fresh mobile phase
	Buffer capacity insufficient	Use >20 mM concentration of buffer
	Inconsistent on-line mobile phase mixing	Ensure gradient system delivering constant composition; check vs. manual prep of mobile phase
	Contamination buildup	Flush column occasionally to remove contaminants
	First few injections – Adsorption on active sites	Condition column by initial injection of concentrated sample
Retention times are decreasing	Flow rate increasing	Check pump to make sure correct; if not, reset
	Column overloaded with sample	Decrease sample size
	Loss of bonded stationary phase	Keep mobile phase pH between 2 and 8.5
Retention times are increasing	Flow rate is slowing	Fix leaks in liquid lines, replace pump seals, check for pump cavitation or air bubbles
	Active sites on silica packing	Use mobile phase modifier
	Loss of bonded stationary phase	Keep mobile phase pH between 2 and 8.5
	Mobile phase composition changing	Make sure mobile phase container is covered
	Active sites on silica packing	Add competing base to mobile phase
	Active sites on silica packing	Use higher coverage packing for stationary phase
Sensitivity problem	Peaks are outside of linear range of detector	Dilute/concentrate to bring into linear region
	First few sample injections – Absorption of sample in loop or column	Condition loop/column with concentrated sample
	Autosampler flow lines blocked	Check flow and make sure no blockages
	Injector sample loop underfilled	Make sure that loop is overfilled with sample
	Sample-related losses during preparation	Use internal standard during sample prep; optimize sample prep method
Slow column equilibration times (ion pairing)	Equilibration time slow for long-chain ion pairing reagents	Use shorter alkyl chain reagent

LC/MS Troubleshooting

Symptom Type	Solution
No peaks	Spray from the nebulizer
	Make sure capillary voltage is set correctly
	Make sure LC/MSD is tuned correctly
	Make sure LC/MSD pressures are within normal ranges
	Check drying gas flow and temperature
	Make sure fragmentor is set correctly
Poor mass accuracy	Recalibrate the mass axis
	Make sure ions used for tuning span mass range of sample ions and show strong stable signals
Low signal	Check the solution chemistry. Make sure solvent is appropriate for sample.
	Make sure sample is fresh and has been stored correctly
	Make sure LC/MSD is tuned correctly
	Check the nebulizer condition
	Clean the capillary entrance
	Check the capillary for damage and contamination
Unstable signal	Make sure drying gas flow and temperature are correct for the solvent flow
	Make sure solvent is throroughly degassed
	Make sure LC backpressure is steady; this indicates a steady solvent flow
High spectral noise	Use appropriate mass filter values
	Check spray shape; nebulizer may be damaged or set incorrectly
	Make sure drying gas flow and temperature are correct for the solvent flow
	Make sure solvent is throroughly degassed
	Make sure LC backpressure is steady; this indicates a steady solvent flow
	If you are using water as part of the mobile phase, make sure it is de-ionized (>18MW)
Droplets, not spray, exiting the nebulizer	Make sure nebulizing gas pressure is set high enough for the LC flow
	Check position of needle in nebulizer
	Stop solvent flow and remove nebulizer assembly
	Examine end of nebulizer for damage
No flow	Make sure LC is on and there is sufficient solvent in correct bottle
	Check for LC error messages
	Check for blockages
	Repair or replace any blocked components
	Check for leaks
	Make sure MS stream selector valve is set to LC to MSD
Undesired fragmentation	(APCI vs. Electrospray)
	APCI temperature is too high
	Fragmentor voltage is set too high

BioPharmaceutical Applications

Nucleosides, Purines and Pyrimidines

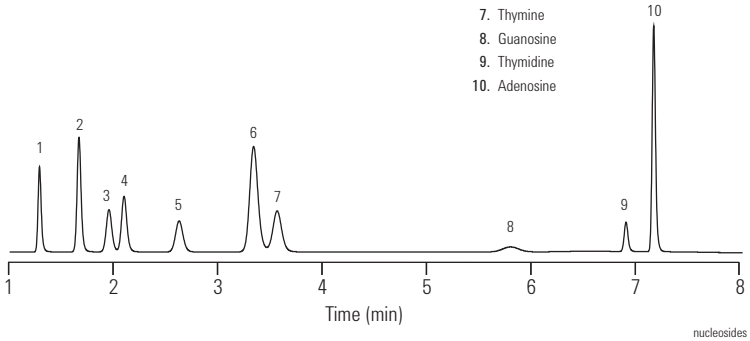
Column: **Eclipse Plus Phenyl Hexyl**
959993-912
4.6 x 150 mm, 5 µm

Mobile Phase: 1% MeOH: 99% 20 mm Ammonium Acetate, pH 4.5

Flow Rate: 1 mL/min

Detector: UV 254 nm

1. Cytosine
2. Uracil
3. Cytodine
4. Guanine
5. Uridine
6. Adenine
7. Thymine
8. Guanosine
9. Thymidine
10. Adenosine



nucleosides

Amino Acid Standard Separation Eclipse Plus

Column: **Eclipse Plus C18**
959763-902
2.1 x 150 mm, 3.5 µm

Mobile Phase: A: 10 mM Na_2HPO_4, 10 mM $Na_2B_4O_7$, 0.5mM NaN_3, pH 8.2
B: acetonitrile: methanol: water (45:45:10) (v/v/v)

Flow Rate: 0.42 mL/min

Temperature: 40°C

Detector: UV 338nm, then switch to 280nm at 15.7 min

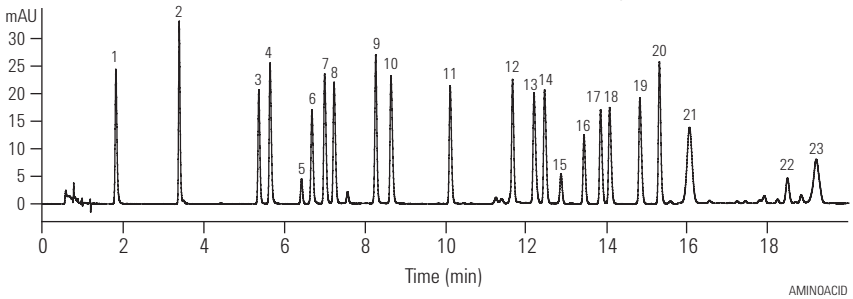
Sample: 900 pmol Amino Acids with extended Amino Acids and Internal Standards (500 pmol)

Derivatization: automated, online, OPA / FMOC

1. ASP
2. GLU
3. ASN
4. SER
5. GLN
6. HIS
7. GLY
8. THR
9. ARG
10. ALA
11. TYR
12. CY2
13. VAL
14. MET
15. NVA
16. TRP
17. PHE
18. ILE
19. LEU
20. LYS
21. HYP
22. SAR
23. PRO

Gradient

Time (min)	% B
0	2
0.5	2
20	57
20.1	100
23.5	100
23.6	2
25	stop

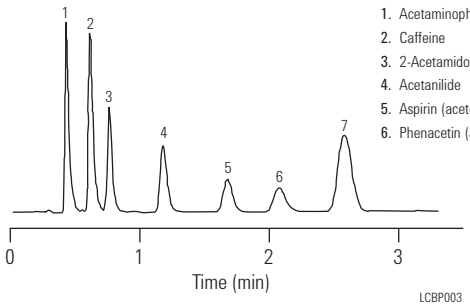


AMINOACID

Analgesics: High-Speed PrepHT Isocratic Separation

Column: **PrepHT, ZORBAX SB-C18**
870050-902
21.2 x 50 mm, 5 µm

Mobile Phase: 14% ACN / 1% Formic Acid
Flow Rate: 40 mL/min
Temperature: 70°C
Detector: 275 nm
Sample: 50 µL inj., 0.158 µg/ µL each (caffeine 0.053 µg/ µL)



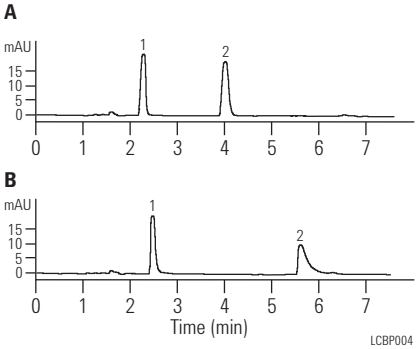
1. Acetaminophen (4-acetamidophenol)
2. Caffeine
3. 2-Acetamidophenol
4. Acetanilide
5. Aspirin (acetosalicylic acid)
6. Phenacetin (acetophenetidin)

Separation of Small Molecule Anorectics on Bonus-RP and Traditional Alkyl Phase

Column A: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm

Column B: **Traditional Alkyl C8 Phase**

Mobile Phase: 25 mM K_2HPO_4, pH 7.2/MeOH: ACN (50:50), 45/55
Flow Rate: 1 mL/min.
Temperature: Ambient
Detector: UV 254 nm
Sample: Anorectics "Fen-phen", 5 µL

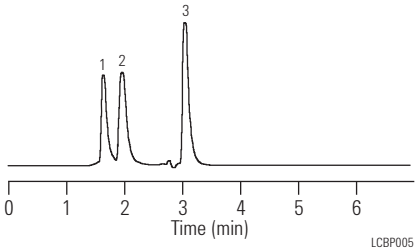


1. Phentermine
2. Fenfluramine

Antibodies: Fast Separation of IgM and IgG Antibodies

Column: **ZORBAX GF-250**
884973-701
4.6 x 250 mm, 4 µm

Mobile Phase: 200 mM Sodium Phosphate (pH 7), 0.01% Azide
Flow Rate: 0.94 mL/min
Temperature: Ambient
Detector: UV 230 nm
Sample: 2.5 µl (1mg/mL)

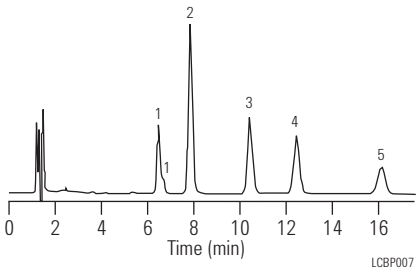


1. IgM, MOPC-104E
2. IgG2a, I HOPC-1
3. Buffer Solution

Separation of Highly Basic Antidepressants above their pKa in Free Base Form (pKa 9.5-9.7)

Column: **ZORBAX Extend-C18**
773450-902
4.6 x 150 mm, 5 µm

Mobile Phase: 75% Methanol / 25% 50 mM Pyrrolidine Buffer, pH 11.5
Flow Rate: 0.5 mL/min.
Temperature: 40°C
Detector: UV 215 nm



1. Doxepin
2. Imipramine
3. Nortriptyline
4. Amitriptyline
5. Trimipramine

Glycosylated proteins: Large Molecules on Poroshell 300SB-C18 and 300SB-C8

Column A: **Poroshell 300SB-C18**
661750-902
1.0 x 75 mm, 5 µm

Column B: **ZORBAX Poroshell 300SB-C8**
661750-906
1.0 x 75 mm, 5 µm

Column C: **ZORBAX 300SB-C18**
865630-902
1.0 x 50 mm, 3.5 µm

Mobile Phase: a: 0.1% TFA in H_20
b: 0.07% TFA in ACN

Flow Rate: a, b: 0.454 mL/min
c: 0.071 mL/min

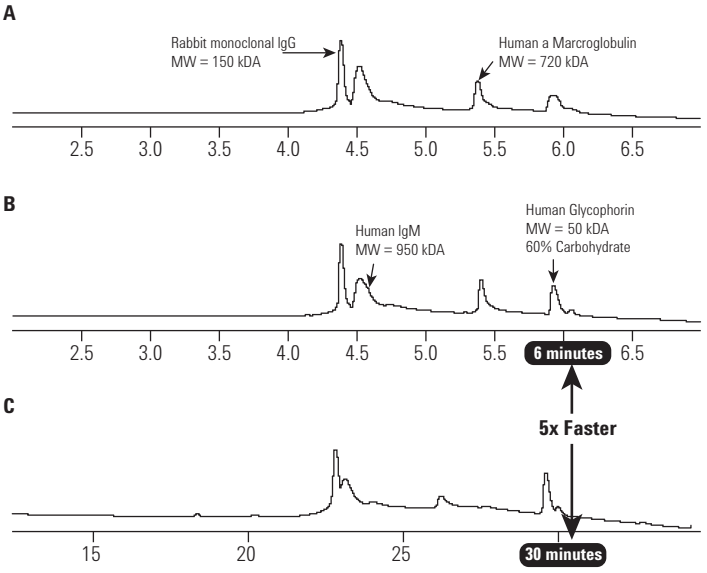
Gradient: a, b:
0 min 5% B
10 min 100% B
c:
0 min 5% B
50 min 100% B

Temperature: 70°C

Detector: DAD 212nm, 1. 7 µL flow cell, <0.01 min peak width

Sample: Large Glycosylated Proteins

Courtesy of:
Novartis Parma,
Biotechnology, Basel
Dr. Kurt Forrer
Patrik Roethlisberger



LCBP008

Antidepressants, Tricyclic: Comparative Separation

Column A: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm

Column B: **Brand A Polar-linked C8**

Column C: **Brand B Polar-linked C18**

Mobile Phase: ACN: 20 mM Na Citrate, pH 6 (60:40)

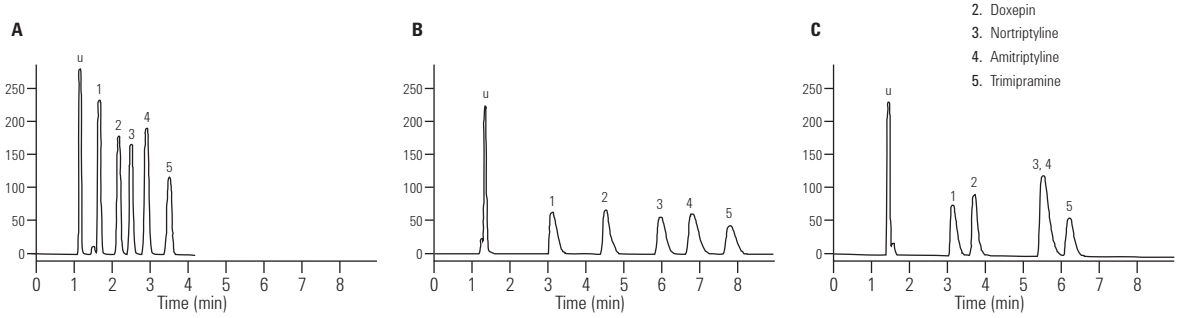
Flow Rate: 1.0 mL/min.

Temperature: Ambient

Detector: UV 254 nm

Sample: Tricyclic antidepressants (u= uracil)

1. Propanolol
2. Doxepin
3. Nortriptyline
4. Amitriptyline
5. Trimipramine



LCBP011

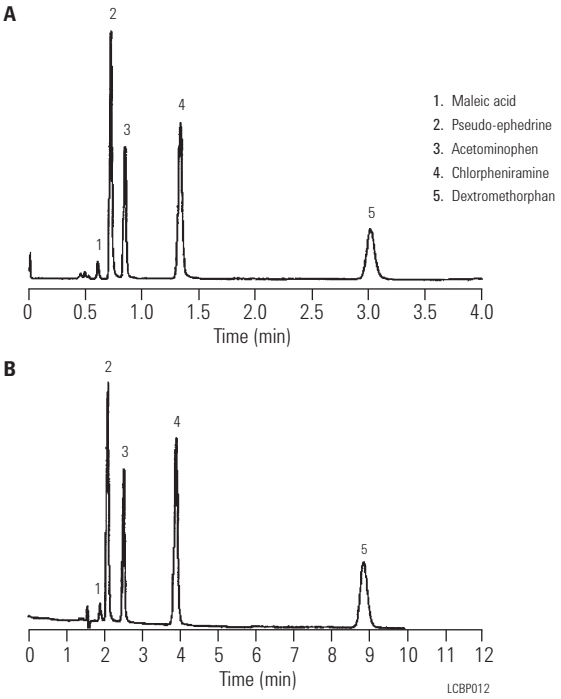
LC and LC/MS

Cough Formula Mixture: Fast and Efficient Separation

Column A: **ZORBAX SB-CN**
866953-905
4.6 x 75 mm, 3.5 µm

Column B: **ZORBAX SB-CN**
883975-905
4.6 x 150 mm, 5 µm

Mobile Phase:	20/80, Acetonitrile/150 mM NaCitrate, pH 2.6
Flow Rate:	1.5 mL/min, 1.0 mL/min
Temperature:	35°C
Detector:	UV 270 nm
Sample:	2 µL, Cough Formula

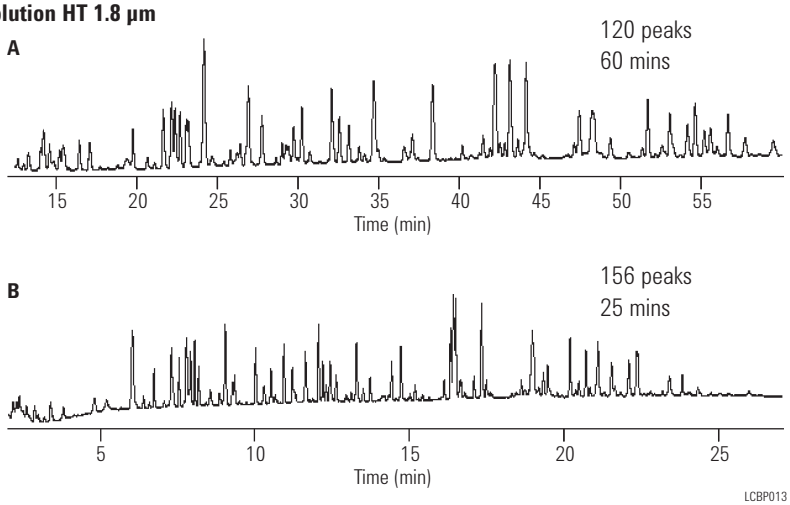


HSA Tryptic Digest on ZORBAX Rapid Resolution HT 1.8 µm

Column A: **ZORBAX SB-C18**
883700-922
2.1 x 150 mm, 5 µm

Column B: **ZORBAX SB-C18**
822700-902
2.1 x 50 mm, 1.8 µm

Mobile Phase:	A: Water w/ 0.1% TFA B: ACN w/0.1% TFA
Flow Rate:	a: 0.2 mL/min b: 0.5mL/min
Gradient:	a: 2 to 50% B in 70min b: 2 to 50% B in 30min
Temperature:	50°C
Detector:	UV 214 nm
Sample:	HSA Tryptic Digest, 8 µL of 15pmol/µL (120 pmol on column)



Human Serum: Low Abundance Protein Isolation and Identification by LC/MS

Column: **ZORBAX 300SB-C18**
Trap: 0.3 x 5 mm, 5 µm, 5065-9913
Analytical: 0.3 x 150 mm, 5 µm, 5064-8263

Mobile Phase: A: Water + 0.1% Formic acid
B: Acetonitrile + 0.1% Formic acid

Flow Rate: 6 µL/min

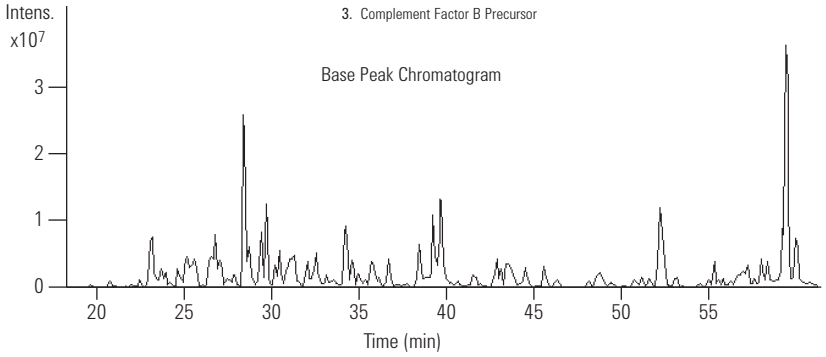
Gradient: 0 min 3% B
5 min 3% B (loading)
50 min 45% B
52 min 80% B
57 min 80% B
60 min 3% B

Sample: Band from 1-D in gel digest

Sample Preparation of Human Serum:
Major serum proteins removed using
Multiple Affinity Removal Column:
4.6 x 100 mm, P/N 5185-5985
Followed by 1-D gel digest

Proteins Identified

1. Alpha-1-Antichymotrypsin
2. Antithrombin-III Precursor
3. Complement Factor B Precursor



LCBP014

Monoclonal IgG1 Chains: Separation on Poroshell 300SB-C8

Column: **ZORBAX Poroshell 300SB-C8**
660750-906
2.1 x 75 mm, 5 µm

Mobile Phase: a: 90% water: 10% ACN + 3 mL/L of MW 300 PEG
b: 10% water: 90% ACN + 3 mL/L of MW 300 PEG

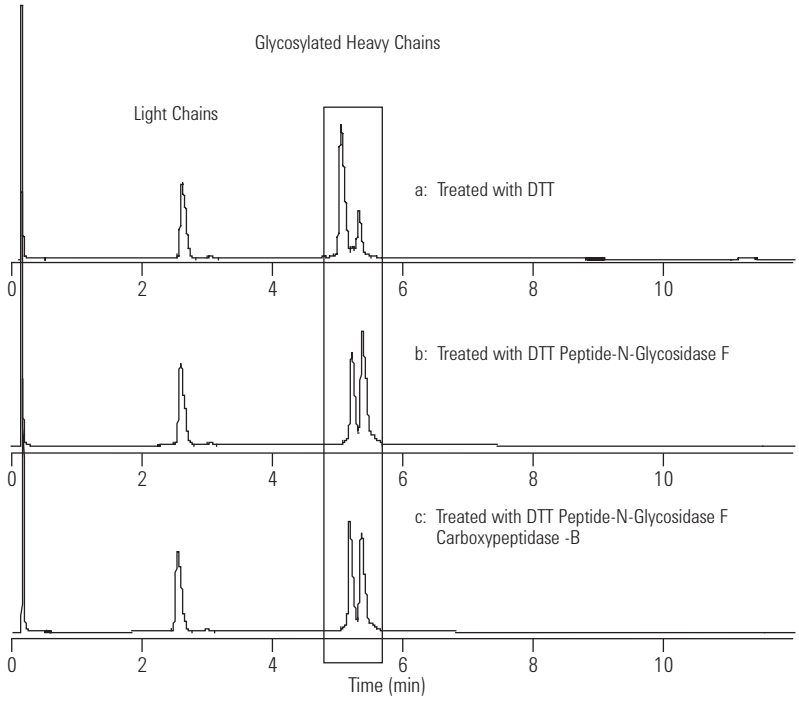
Flow Rate: 1.0 mL/min

Gradient: 0 min 25% B
10 min 40% B
10.1 min 25% B
12 min 25% B

Temperature: 70°C

Sample: Monoclonal IgG1

Courtesy of:
Novartis Pharma,
Biotechnology, Basel
Dr. Kurt Forrer
Patrik Roethlisberger



LCBP015

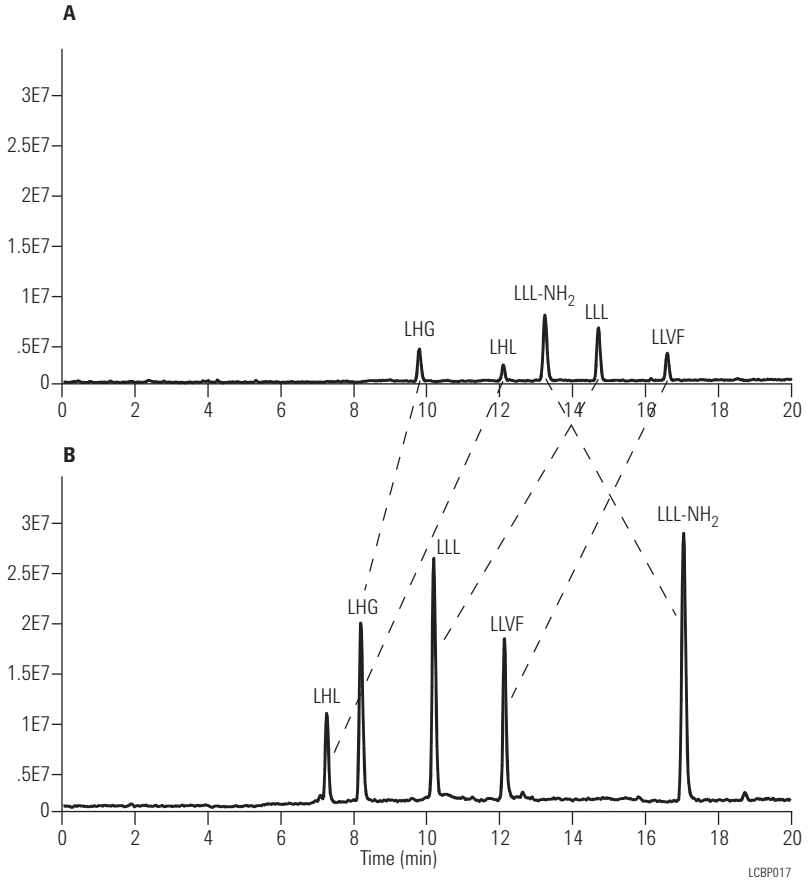
Use ZORBAX Extend-C18 for Alternate Selectivity at High pH

Column: **ZORBAX Extend-C18**
773700-902
2.1 x 150 mm, 5 µm

Mobile Phase: A-0.1% TFA in Water
B-0.085% TFA in 80% ACN

A-20 mM NH_4OH in Water
B-20 mM NH_4OH in 80% ACN

Flow Rate: 0.25 mL/min
Gradient: 5-60% B in 20 min
Temperature: 25°C
MS Conditions: Pos. Ion ESI-Vf 70V, Vcap 4.5 kV
N_2-35 psi, 12L/min, 300°C
4 µL (50 ng each peptide)

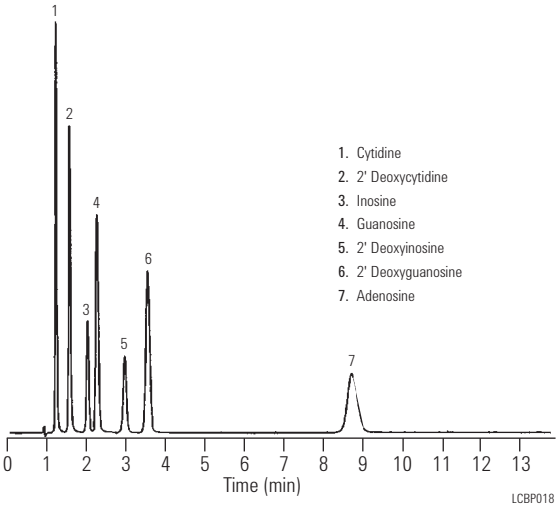


The Extend column can be used for high pH separations of peptides. At high and low pH, very different selectivity can result. Just by changing pH, a complimentary method can be developed and it is possible to determine if all peaks are resolved. The Extend column can be used at high and low pH, so the complimentary separation can be investigated with one column. Better MS sensitivity for this sample is also achieved at high pH.

Nucleosides: Separation of Deoxy and Ribonucleosides

Column: **ZORBAX SB-C3**
883975-909
4.6 x 150 mm, 5 µm

Mobile Phase: 4mM Ammonium Phosphate (pH 4.0 with Phosphoric Acid)
Flow Rate: 2.0 mL/min
Temperature: 35°C
Detector: UV 254 nm
Sample: 2 µL (1.6 µg each)

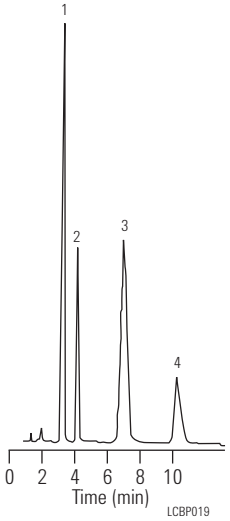


1. Cytidine
2. 2' Deoxycytidine
3. Inosine
4. Guanosine
5. 2' Deoxyinosine
6. 2' Deoxyguanosine
7. Adenosine

Nucleotides: Separation of Mononucleotides

Column: **ZORBAX SAX**
880952-703
4.6 x 250 mm, 5 µm

Mobile Phase: 0.1 M $NH_4H_2PO_4$
Flow Rate: 2.0 mL/min
Temperature: Ambient
Detector: UV 254 nm
Sample: Orotic Acid, UMP, GMP, XMP



1. Orotic Acid
2. UMP
3. GMP
4. XMP

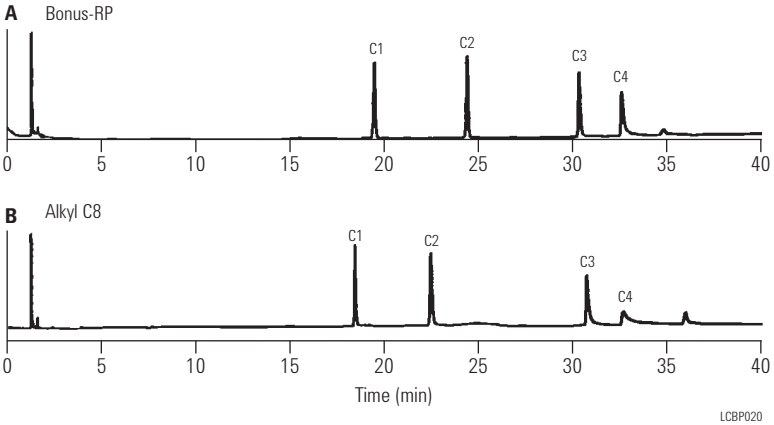
Separation of Basic Peptides on Bonus-RP versus Traditional Alkyl Phase

Column A: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm

Column B: **Alkyl C8**

Mobile Phase: A: 0.010 M ammonium phosphate, pH 7 / 0.050 M sodium perchlorate
B: 0.010 M ammonium phosphate / 0.050 M sodium perchlorate in 50% ACN
Flow Rate: 1.0 mL/min
Gradient: 0-100% B in 50 min.
Temperature: 40°C
Detector: 215 nm
Sample: Basic 11-residue peptides with net +1, +2, +3, +4 positive charges at neutral pH

C1: Ac-Gly-Gly-Gly-Leu-Gly-Gly-Ala-Gly-Gly-Leu-Lys-amide
C2: Ac-Lys-Tyr-Gly-Leu-Gly-Gly-Ala-Gly-Gly-Leu-Lys-amide
C3: Ac-Gly-Gly-Ala-Leu-Lys-Ala-Leu-Lys-Gly-Leu-Lys-amide
C4: Ac-Lys-Tyr-Ala-Leu-Lys-Ala-Leu-Lys-Gly-Leu-Lys-amide



Peptides: Effect of TFA Concentration

Column: **ZORBAX 300SB-C8**
883995-906
4.6 x 150 mm, 5 µm

Mobile Phase: A = Water and TFA
B = ACN and TFA

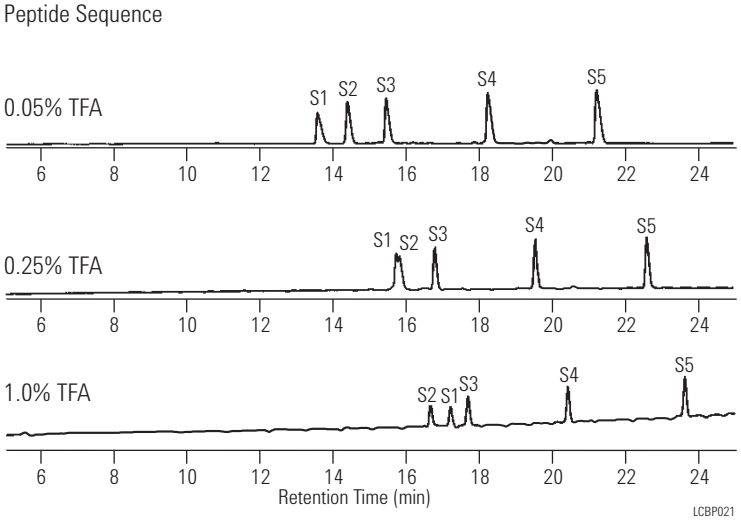
Flow Rate: 1.0 mL/min

Gradient: 0 min 0% B
30 min 30% B

Temperature: 40°C

Detector: UV 254 nm

Sample: Peptide Standards S1-S5, decapeptides differing slightly in hydrophobicity, 6 µL



Peptides: Separation of Antiotensins I, II, III with TFA and NH_4OH

Column: **ZORBAX Extend-C18**
773700-902
2.1 x 150 mm, 5 µm

Mobile Phase: A: Acidic Conditions
A - 0.1% TFA in water
B - 0.085% TFA in 80% ACN
B: Basic Conditions
A - 10 mM NH_4OH in water
B - 10 mM NH_4OH in 80% ACN

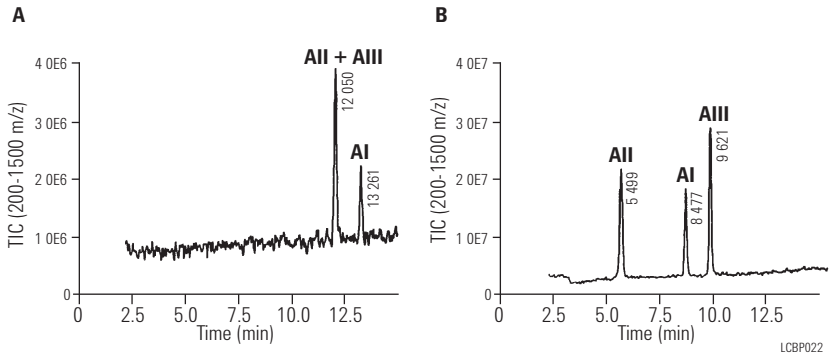
Flow Rate: 0.2 mL/min

Gradient: 15-50% B in 15 min

Temperature: 35°C

MS Conditions: Pos. Ion ESI - Vf 70V, Vcap 4.5 kV
N_2-35 psi, 12 L/min, 325°C

Sample: 2.5 µL sample (50 pmol each)



Peptides: Comparison of Mass Spectra of Angiotensin I with TFA and NH_4OH Mobile

Column: **ZORBAX Extend-C18**
773700-902
2.1 x 150 mm, 5 µm

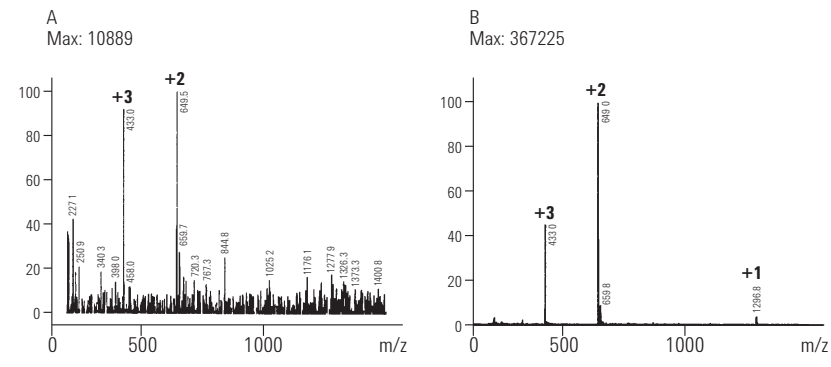
Mobile Phase: A: Acidic Conditions
A-0.1% TFA in water
B-0.085% TFA in 80% ACN
B: Basic Conditions
A-10 mM NH_4OH in water
B-10 mM NH_4OH in 80% ACN

Flow Rate: 0.2 mL/min

Temperature: 35°C: 15-50% B in 15 min

MS Conditions: Pos. Ion ESI-Vf 70V, Vcap
4.5 kV, N_2-35 psi, 12 L/min, 325°C

Sample: 2.5 µL Angiotensin I (50 pmol)

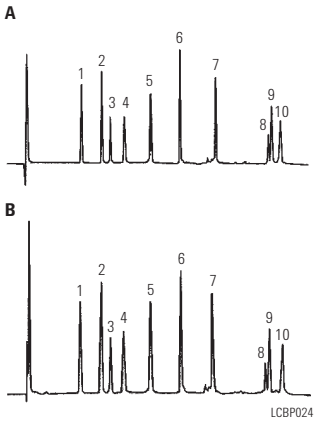


Peptides/Proteins: Equivalent Gradient Separations

Column: **ZORBAX 300SB-C8**
883995-906
4.6 x 150 mm, 5 µm

Column: **ZORBAX 300SB-C8**
883750-906
2.1 x 150 mm, 5 µm

Mobile Phase:	A = 95% Water: 5% ACN with 0.1% TFA B = 5% Water: 95% ACN with 0.085% TFA
Flow Rate:	a: Analytical 1 mL / min b: Narrow Bore 0.2 mL / min
Gradient:	10-60% B in 30 min.
Temperature:	35°C
Detector:	UV 215 nm
Sample:	10 µL injection, Concentration 2-6 µg



LCBP024

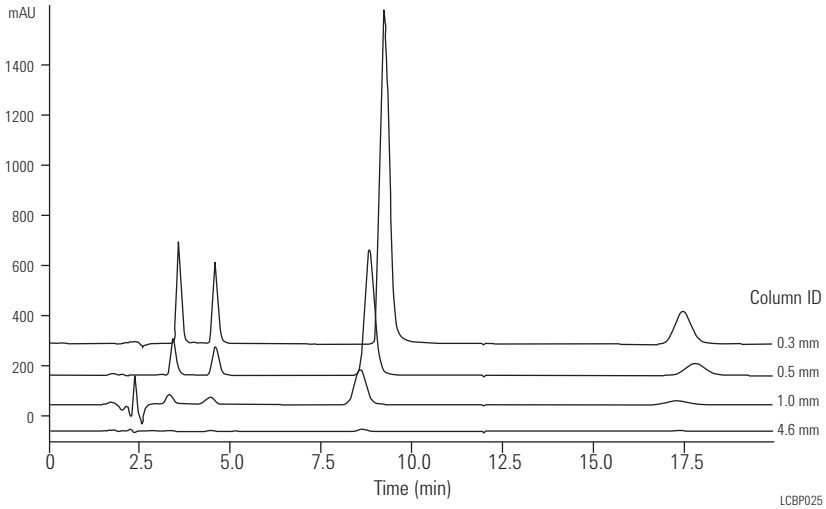
1. Met-enkephalin
2. Leu-enkephalin
3. Angiotensin II
4. Neurontensin
5. RNase
6. Insulin (BOV)
7. Lysozyme
8. Calmodulin
9. Myoglobin
10. Carbonic anhydrase

Reducing Capillary ID to Improve Sensitivity for Concentration-Limited Samples

Column: **ZORBAX SB-C18**
5064-8255
0.3 x 150 mm, 5 µm

Column: **ZORBAX SB-C18**
5064-8256
0.5 x 150 mm, 5 µm

Mobile Phase:	60% ACN/40% H_2O
Flow Rate:	0.3 mm ID - 4 µL/min. 0.5 mm ID - 10 µL/min. 1.0 mm ID - 50 µL/min. 4.6 mm ID - 1.0 mL/min.
Temperature:	Ambient
Detector:	254 nm
Sample:	200 ng Biphenyl (100 nL)



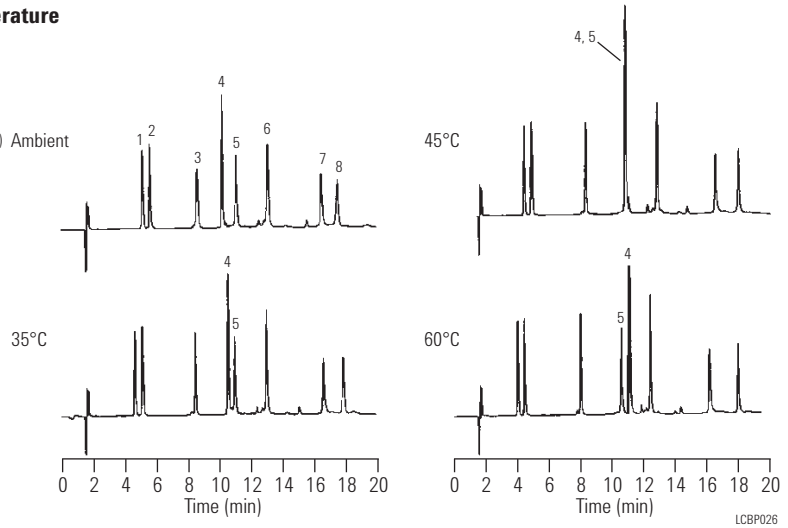
LCBP025

Peptides/Proteins: Effect of Elevated Temperature

Column: **ZORBAX 300SB-C3**
883995-909
4.6 x 150 mm, 5 µm

Mobile Phase:	A = 5:95 ACN:Water with 0.10% TFA (v/v%) B = 95:5 ACN:Water with 0.085% TFA (v/v%)
Flow Rate:	1.0 mL/min
Gradient:	15-53% in 20 min., posttime 12 min.
Temperature:	Ambient - 60°C
Detector:	UV 215 nm
Sample:	Polypeptides

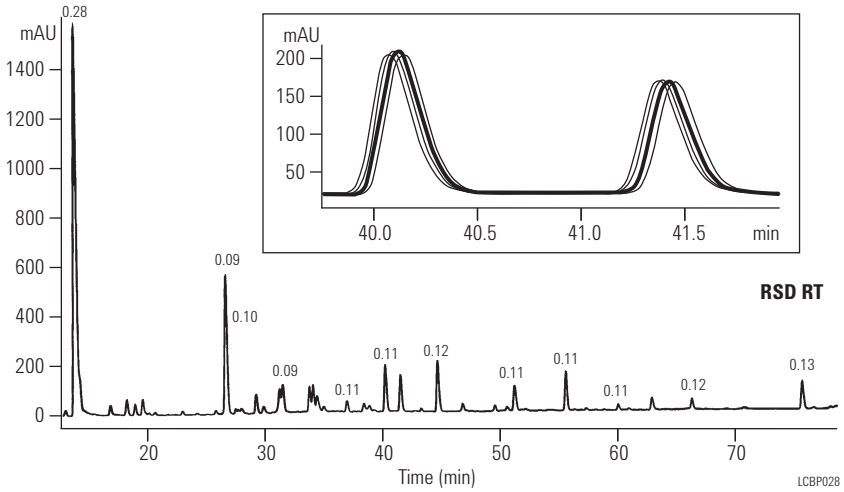
1. Leucine Enkephalin
2. Angiotensin II
3. RNase A
4. Insulin (BOV)
5. Cytochrome C
6. Lysozyme
7. Myoglobin
8. Carbonic anhydrase



LCBP026

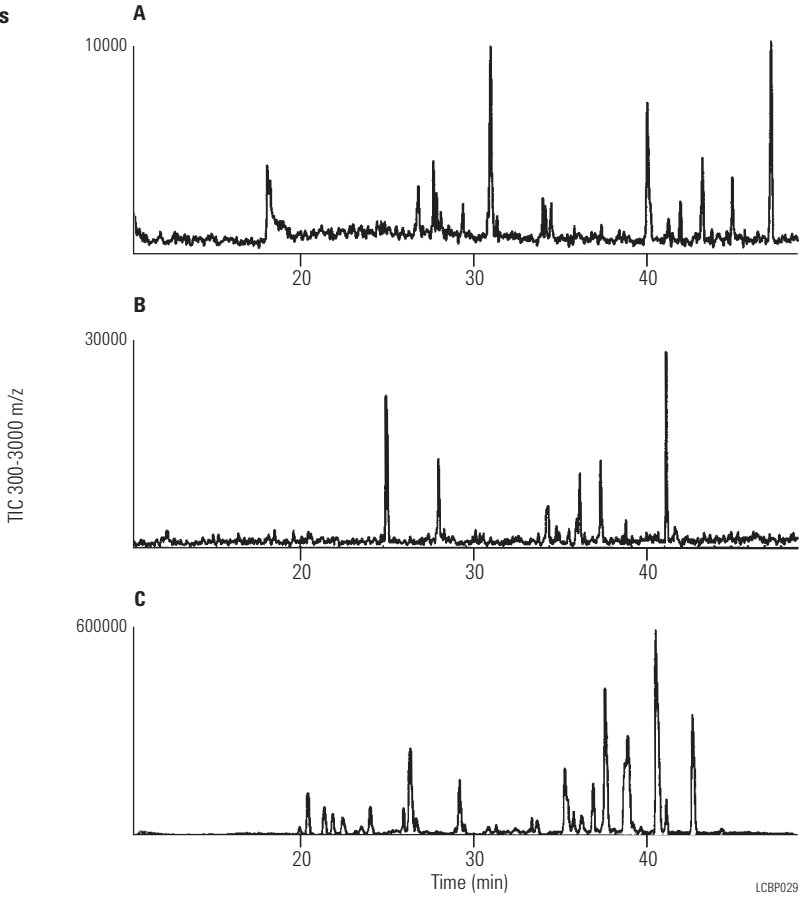
Peptide Map – Electronic Flow Control Reproducibility of 10 Injections on Capillary LC Column

Column:	**ZORBAX 300SB-C18 5064-8265 0.3 x 250 mm, 5 µm**
Mobile Phase:	A - 0.05% TFA in Water B - 0.045% TFA in Acetonitrile
Flow Rate:	5.5 µL/min.
Gradient:	0.5% B/min.
Temperature:	30°C
Detector:	UV 206/10 nm, 450/80 nm
Sample:	1.3 µL (myoglobin tryptic digest, 7.5 pmol/µL)



Capillary LC/ESI-MS Concentration Effects on Detection of a Protein Digest

Column A:	**ZORBAX 300SB-C18 881750-902 2.1 x 250 mm, 5 µm**
Column B:	**ZORBAX 300SB-C18 861630-902 1.0 x 250 mm, 5 µm**
Column C:	**ZORBAX 300SB-C18 5064-8265 0.3 x 250 mm, 5 µm**
Mobile Phase:	A– 0.1% TFA in water B– 0.1% TFA in ACN
Flow Rate:	
Gradient:	0-60% B/60 min.
Temperature:	
Detector:	
MS Conditions:	TIC 300-3000 m/z
Publication:	
Sample:	6.6 pmol (5 µL) of LysC digest of DSPA



Separation of Polypeptides in Under 1 Minute

Column: **ZORBAX Poroshell 300SB-C18**
660750-902
2.1 x 75 mm, 5 µm

Mobile Phase: A=0.1% TFA, H_2O
B=0.07% TFA, ACN

Flow Rate: 3 mL/min.

Gradient: 0-100%B in 1.33 min

Temperature: 70°C

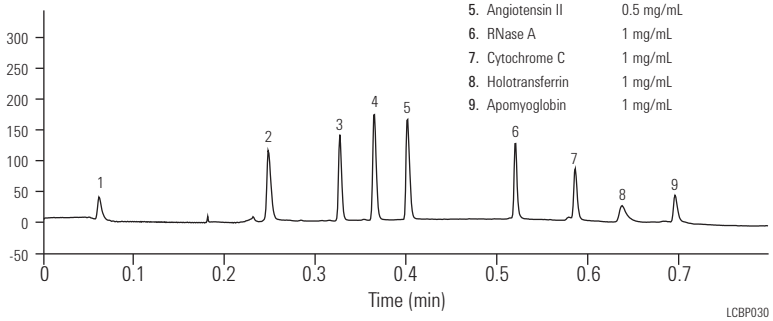
Detector: DAD 215/16 nm, ref = 310/10 nm

Sample: peptides/proteins, 0.5 µL

Mixer bypassed with P/N G1312-67301; Loop-bypass program

Sample (peptides/proteins)

1.	gly-tyr	0.125 mg/mL
2.	Val-tyr-val	0.5 mg/mL
3.	Met-enkephalin	0.5 mg/mL
4.	Leu-enkephalin	0.5 mg/mL
5.	Angiotensin II	0.5 mg/mL
6.	RNase A	1 mg/mL
7.	Cytochrome C	1 mg/mL
8.	Holotransferrin	1 mg/mL
9.	Apomyoglobin	1 mg/mL



LCBP030

Fast, High-Resolution Separation of Peptides and Proteins with Poroshell 300SB-C18

Column: **Poroshell 300SB-C18**
660750-902
2.1 x 75 mm, 5 µm

Mobile Phase: A– 0.1% TFA
B– 0.07% TFA in ACN

Flow Rate: 3.0 mL/min (360 bar pressure)

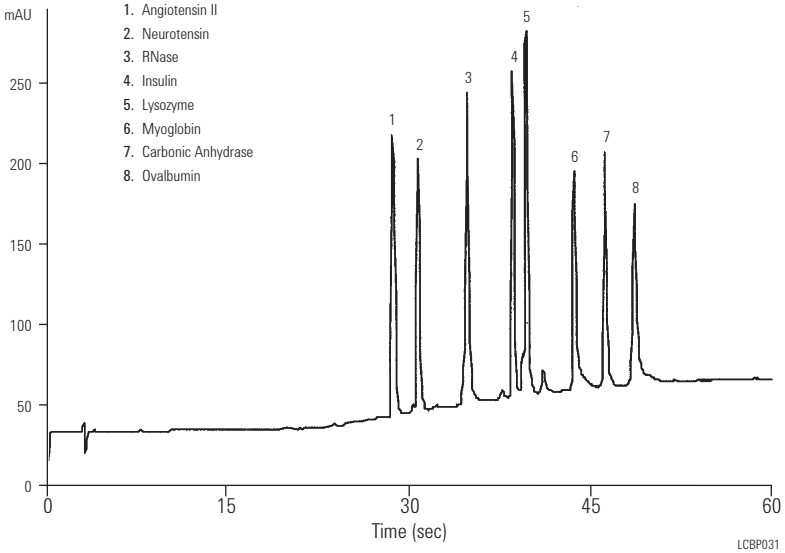
Gradient: 5-100% B in 1.0 min.

Temperature: 70°C

Detector: UV 215 nm

Spaces between solutes indicate good peak capacity for rapidly separating complex samples.

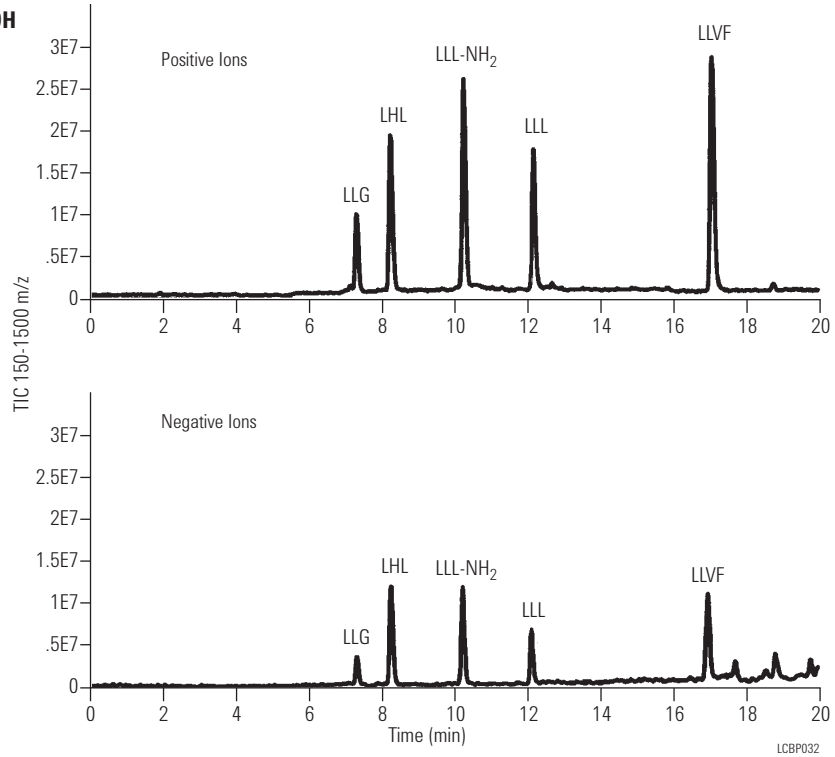
1. Angiotensin II
2. Neurotensin
3. RNase
4. Insulin
5. Lysozyme
6. Myoglobin
7. Carbonic Anhydrase
8. Ovalbumin



LCBP031

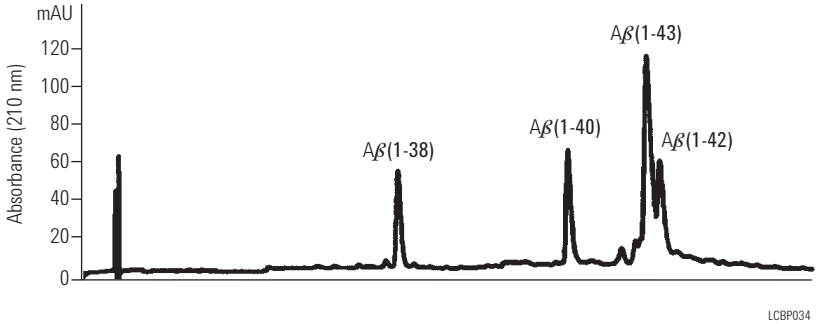
Peptide RP-HPLC/ESI-MS Using NH_4OH Mobile Phase Yields Both Positive and Negative Ion Spectra

Column:	**ZORBAX Extend-C18 773700-902 2.1 x 150 mm, 5 µm**
Flow Rate:	0.25 mL/min.
Gradient:	5-60% B in 20 min.
Temperature:	25°C
MS Conditions:	Pos. Ion ESI- Vf 70V, Vcap 4.5 kV, N_2- 35 psi, 12 L/min., 300°C TIC 150-1500 m/z
Sample:	4 µL (50 ng each peptide)



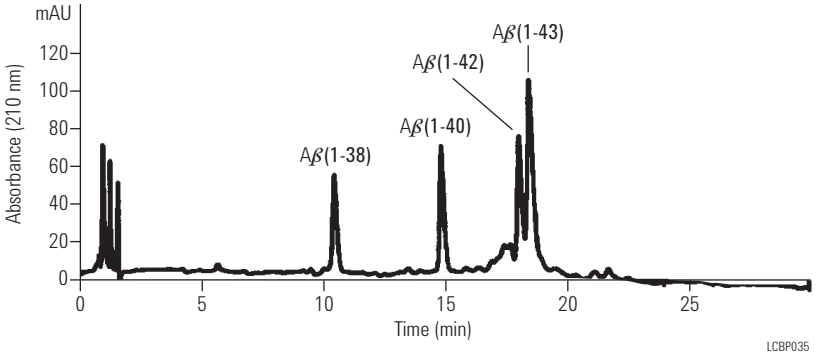
Comparison of Aβ Peptide RP-HPLC Separations at Low and High pH

Column:	**ZORBAX Extend-C18 773700-902 2.1 x 150 mm, 5 µm**
Mobile Phase:	A- 0.1% TFA in water B- 0.085% TFA in 80% AcN
Flow Rate:	0.25 mL/min.
Gradient:	29-41% B in 30 min.
Temperature:	80°C
Detector:	UV 210 nm
Sample:	5 µL sample (100 pmol each)



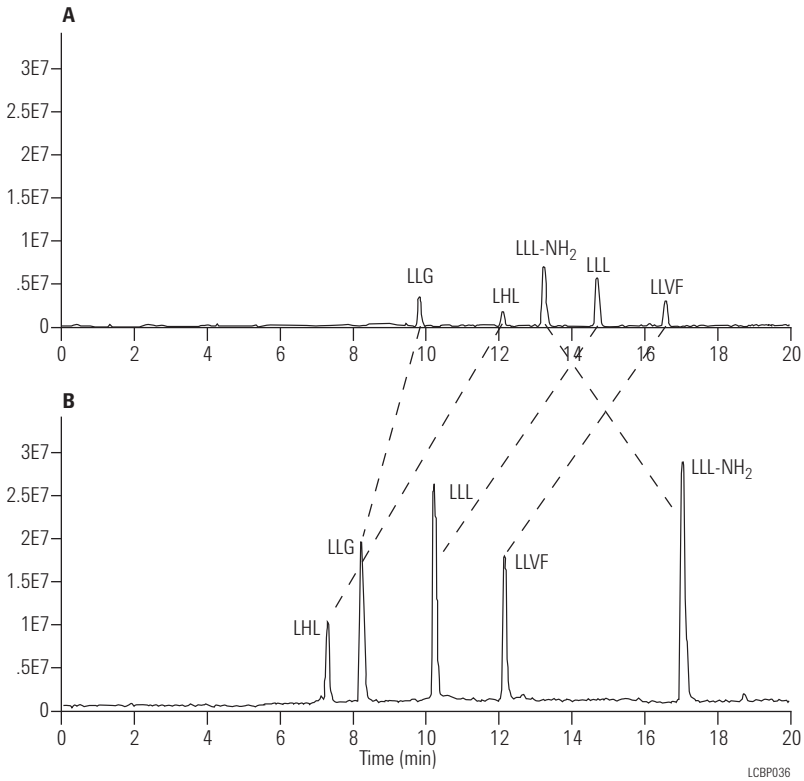
Comparison of Aβ Peptide RP-HPLC Separations at Low and High pH

Column:	**ZORBAX Extend-C18 773700-902 2.1 x 150 mm, 5 µm**
Mobile Phase:	A- 20 mM NH_4OH in water B- 20 mM NH_4OH in 80% AcN
Flow Rate:	0.25 mL/min.
Gradient:	26-38% B in 30 min.
Temperature:	25°C
Detector:	UV 210 nm
Sample:	5 µL sample (100 pmol each)



Selectivity Comparison of TFA and NH_4OH for Peptide RP-HPLC\ESI-MS Analysis

Column:	**ZORBAX Extend-C18 773700-902 2.1 x 150 mm, 5 µm**
Mobile Phase:	TFA Conditions: A– 0.1% TFA in water B– 0.085% TFA in 80% AcN NH_4OH Conditions: A– 20 mM NH_4OH in water B– 20 mM NH_4OH in 80% AcN
Flow Rate:	0.25 mL/min.
Gradient:	5-60% B in 20 min.
Temperature:	25°C
MS Conditions:	Pos. Ion ESI- Vf 70V, Vcap 4.5 kV, N_2 - 35 psi, 12 L/min., 300°C TIC 150-1500 m/z
Sample:	4 µL (50 ng each peptide)



Catecholamines/Biogenic Amines: Rapid Separation using Ion Pair Reagents

Column: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 0.14 M sodium phosphate, 20 mM EDT A, 0.75 mM octyl sulfonate, 9% methanol pH 3.5

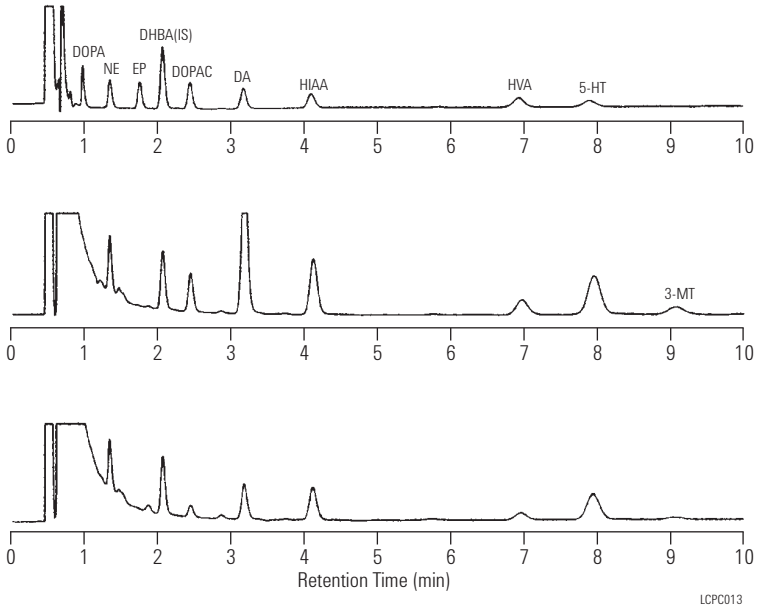
Flow Rate: 1.5 mL/min

Temperature: 26°C

Detector: 0.75 V vs Ag/AgCl with electro-chemical detection

Sample: 10 µg/mL each standard; volume 20 µL (2 g tissue sample)
A. Standards (2pmol; DHBA 5pmol)
B. Mouse Sriatum
C. Mouse Neocortex

1. DOPA-Dihydroxyphenylalanine
2. DHBA-Dihydroxybenzyl amine
3. DOPAC-Dihydroxyphenyl acetic acid
4. NE-Norepinephrine
5. DA-Dopamine
6. HIAA-Hydroxyindoleaacetic acid
7. EP-Epinephrine
8. AVA-Homovanillic acid
9. 5HT-Hydroxytryptamine
10. 3MT-Methaxytyrosine



LCPC013

Peptide Phosphorylation Sites LC and LC/MS using Capillary LC Columns

Column: **ZORBAX 300SB-C18**
5064-8268
0.5 x 150 mm, 3.5 µm

Mobile Phase: A: 0.1% formic acid in water
B: 0.1% formic acid in ACN

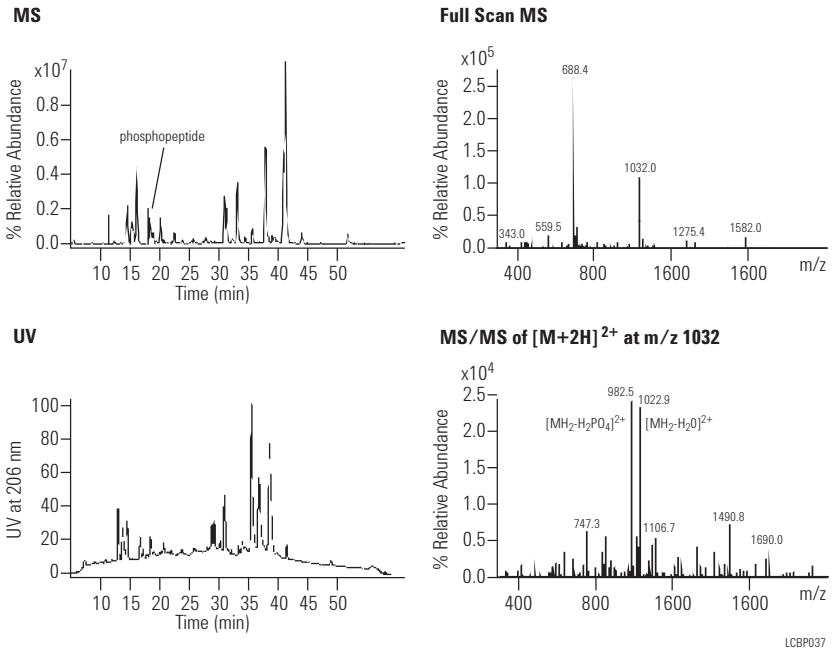
Flow Rate: 5.5 µL/min

Gradient: 5-55%B in 50 min, to 85% B from 55-57 min

Detector: UV 206 nm

MS Conditions: LC/MS: Pos. Ion ESI with LC/MSD trap
Vcap: 4000 V
Drying gas flow: 7L/min
Drying gas temperature: 250°C
Nebulizer: 15 psi
Capillary Exit Volt: 50 V Max
Accum Time: 300 ms
Total Averages: 3
Isolation Width: 3 m/z
Frag Ampitude: 1.0 V

Sample: Beta casein digest, 100 nL (4 pmol)



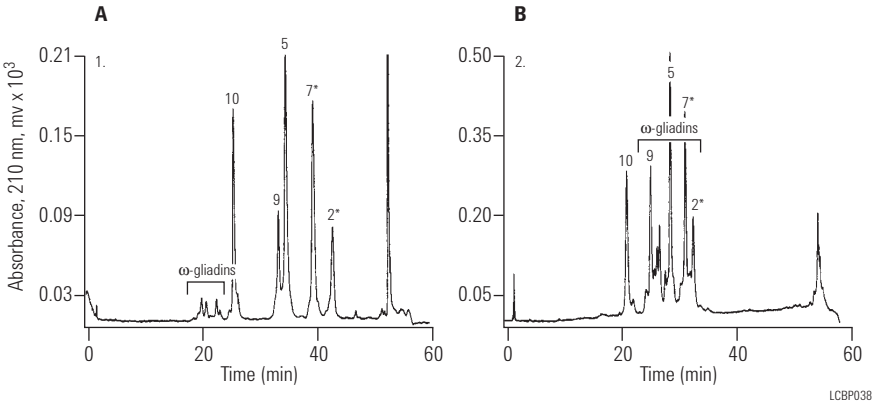
LCBP037

Proteins: Effect of Bonded Phase, RP

Column A: **ZORBAX 300SB-C8**
883995-906
4.6 x 150 mm, 5 µm

Column B: **ZORBAX 300SB-CN**
883995-905
4.6 x 150 mm, 5 µm

Mobile Phase:	A = 0.1% TFA in Water, B = 0.1% TFA in 50/50 ACN/Water
Flow Rate:	1.0 mL/min
Gradient:	1. 46-96% B in 60 min. 23-48% ACN 2. 50-86%B in 60 min. 25-43% ACN
Temperature:	50°C
Detector:	UV 210 nm
Sample:	Wheat Proteins, including w-gliadins



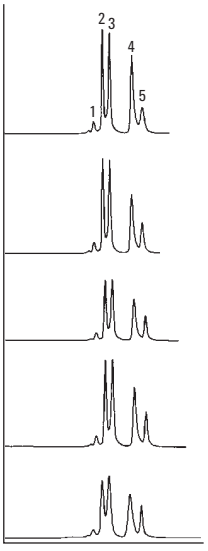
LCBP038

Proteins: Effect of Flow Rate in SEC

Column: **ZORBAX GF-250**
884973-901
9.4 x 250 mm, 4 µm

Mobile Phase:	200 mM Sodium Phosphate, pH 7.0
Flow Rate:	As indicated
Temperature:	Ambient
Detector:	UV 225 nm
Sample:	1 mg/mL each protein, 0.1 mg/mL azide, 10 µL

1. BSA - dimer
2. BSA
3. Ovalbumin
4. Lysozyme
5. Sodium Azide



Rs = 2.3
N = 15,680
Run Time = 60 min
Flow = 0.25 mL/min

Rs = 2.1
N = 11,939
Run Time = 30 min
Flow = 0.5 mL/min

Rs = 1.9
N = 8,913
Run Time = 15 min
Flow = 1 mL/min

Rs = 1.7
N = 6,623
Run Time = 7.5 min
Flow = 2 mL/min

Rs = 1.4
N = 3,588
Run Time = 3.5 min
Flow = 25 mL/min

LCBP040

Proteins: Effect of Bonded Phase

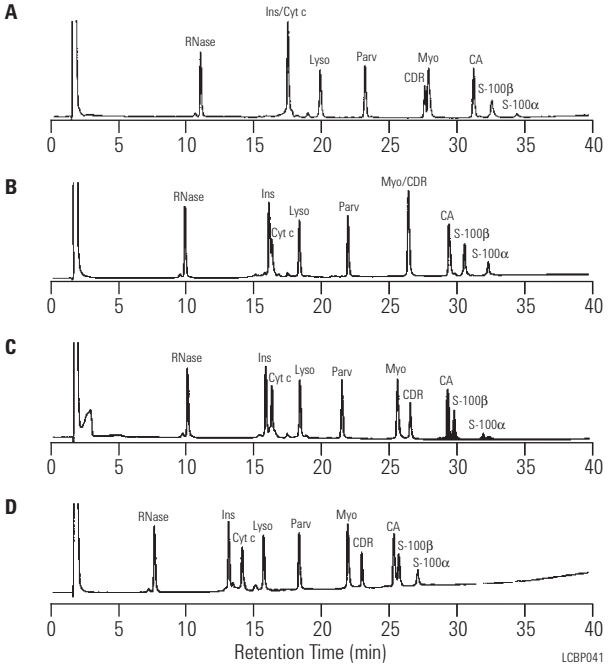
Column A: **ZORBAX 300SB-C18**
883995-902
4.6 x 150 mm, 5 µm

Column B: **ZORBAX 300SB-C8**
883995-906
4.6 x 150 mm, 5 µm

Column C: **ZORBAX 300SB-C3**
883995-909
4.6 x 150 mm, 5 µm

Column D: **ZORBAX 300SB-CN**
883995-905
4.6 x 150 mm, 5 µm

Mobile Phase:	A = 0.1% TFA in H_2O, B = 0.09% TFA in 80% ACN/20% Water
Flow Rate:	1.0 mL/min
Gradient:	25-70% B in 40 min
Temperature:	60°C
Detector:	UV 210 nm
Sample:	Polypeptides, 3 µg each

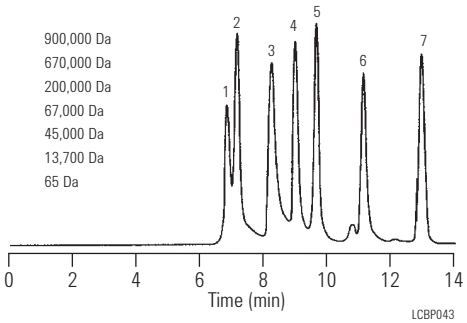


Proteins: Separation by SEC

Column: **ZORBAX GF-250**
884973-901
9.4 x 250 mm, 4 µm

Mobile Phase:	130 mM NaCl, 20 mM KCl, 50 mM sodium phosphate, pH 7.0
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	UV 210 nm
Sample:	Proteins

1.	Mouse IgM	900,000 Da
2.	Bovine thyroglobin	670,000 Da
3.	Sweet potato β-amylase	200,000 Da
4.	Bovine serum albumin	67,000 Da
5.	Chicken albumin	45,000 Da
6.	Bovine RNAase	13,700 Da
7.	Azide	65 Da

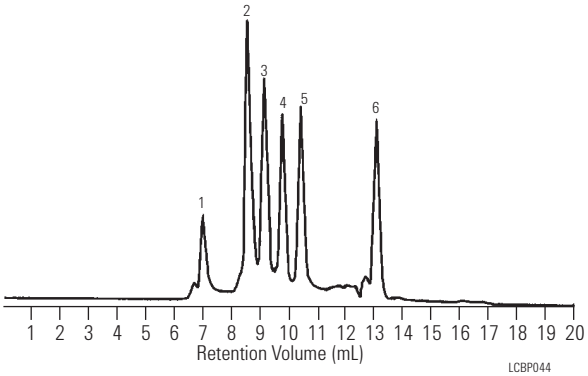


Proteins: Calibration Standard Mix of Proteins GF-250

Column: **ZORBAX GF-250**
884973-901
9.4 x 250 mm, 4 µm

Mobile Phase:	0.2M sodium phosphate, pH 6.8
Flow Rate:	1.0 mL/min
Temperature:	Ambient (21°C)
Detector:	UV 230 nm
Sample:	Lyophilized proteins

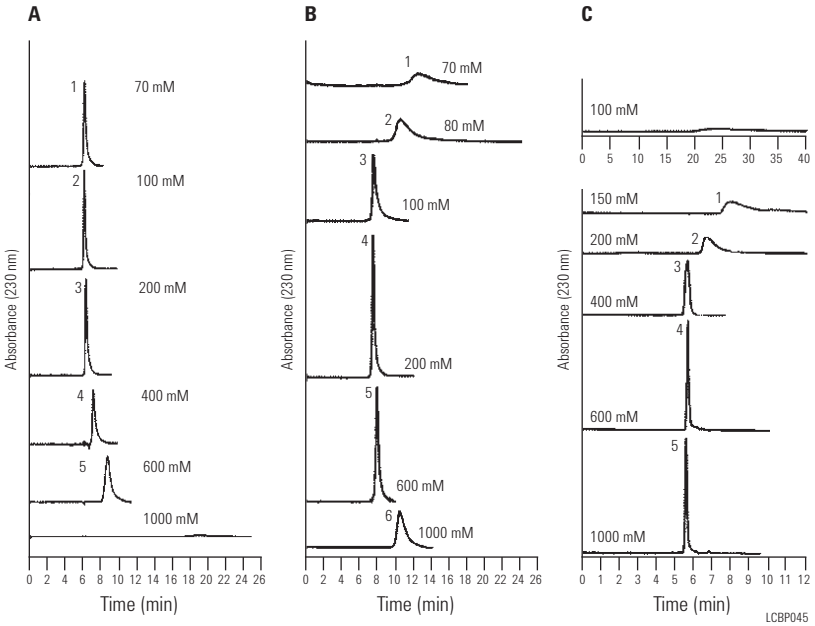
1.	Thyroglobin	6.69 kDa
2.	Alcohol Dehydrogenase (ADH)	150 kDa
3.	BSA	67 kDa
4.	Ovalbumin	43 kDa
5.	Myoglobin	17.8 kDa
6.	Azide	0.045 kDa



Proteins: SEC Characteristic Elution Profiles of Basic and Hydrophobic Proteins

Column: **ZORBAX GF-250**
884973-901
9.4 x 250 mm, 4 µm

Mobile Phase: Sodium Phosphate, pH 7.0 concentration as indicated
Flow Rate: 2 mL/min
Temperature: Ambient
Detector: UV 230 nm
Sample:
a: Hydrophobic Protein (Bovine Insulin)
b: Basic & Hydrophobic Protein (Lysozyme)
c: Basic Protein (Cytochrome C)

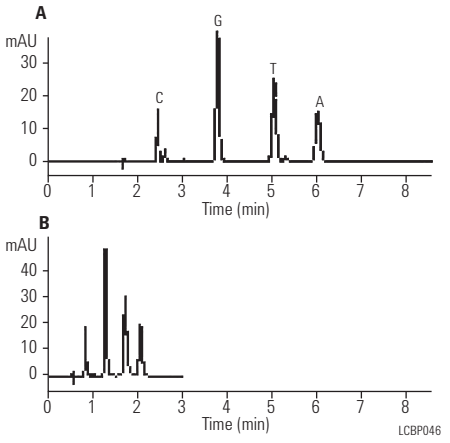


Deoxynucleosides: Using Rapid Resolution 3.5 µm Columns

Column A: **ZORBAX SB-CN**
883975-905
4.6 x 150 mm, 5 µm

Column B: **ZORBAX SB-CN**
835975-905
4.6 x 50 mm, 3.5 µm

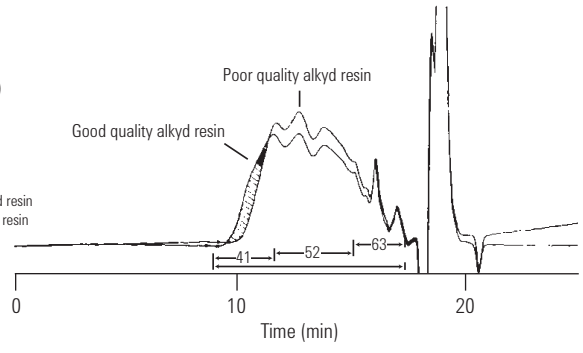
Mobile Phase: A: 0.1% TFA
B: 90/10 v/v Methanol/Water (0.1% TFA)
Isocratic, 97.5% A, 2.5% B
Flow Rate: 1.0 mL/min.
Temperature: 30°C
Detector: UV 254 nm



Alkyd Resin: Gel Permeation Chromatography using PLgel Columns

Column: **3 PLgel columns in series**
79911GP-501
7.5 x 300 mm, 5 µm
79911GP-502
7.5 x 300 mm, 5 µm
79911GP-504
7.5 x 300 mm, 5 µm

Mobile Phase: Tetrahydrofuran (THF)
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detector: RI
Sample: Alkyd Resins
A: Good quality alkyd resin
B: Poor quality alkyd resin



BSA Tryptic Digest on RRHT

Column: **ZORBAX SB-C18**
820700-902
2.1 x 150 mm, 1.8 µm

Mobile Phase: A: 0.1% TFA, 5% ACN
B: 0.08% TFA, 95% ACN

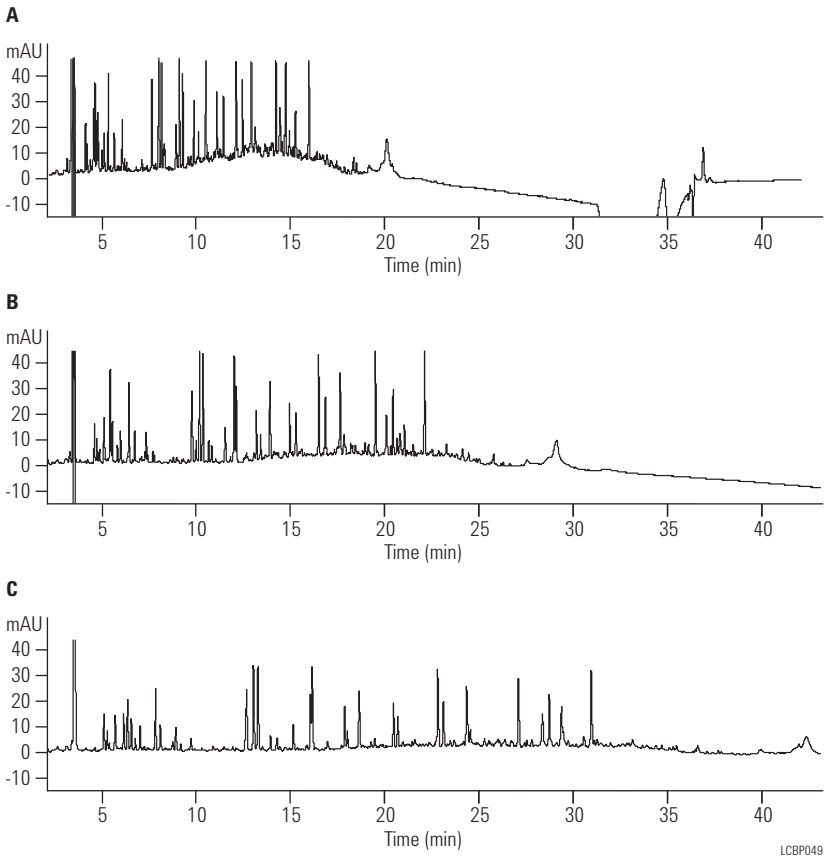
Flow Rate: 0.5 mL/min

Gradient: A: Time 0 %B 5, Time 30 %B 60
B: Time 0 %B 5, Time 45 %B 60
C: Time 0 %B 5, Time 67.5 %B 60

Temperature: 80°C

Detector: UV 214 nm

Sample: BSA Tryptic Digest



Dextrans Characterization using GPC

Column: **ZORBAX SIL PSM 60**
880957-801
6.2 x 250 mm, 5 µm

Column: **ZORBAX SIL PSM 300**
880957-805
6.2 x 250 mm, 5 µm

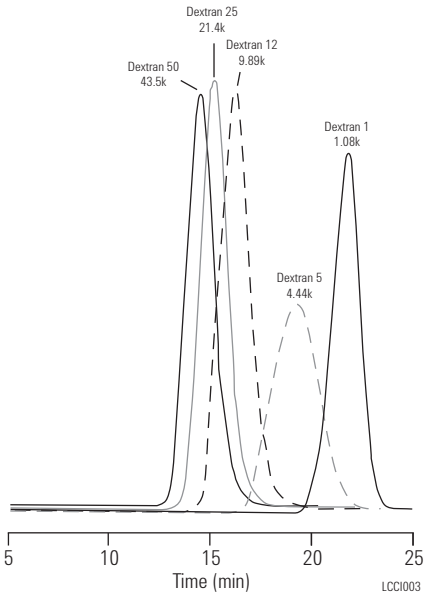
Mobile Phase: 100 mM Sodium Acetate (pH 6.0-6.5) with H_3PO_4

Flow Rate: 0.5 mL/min

Temperature: 30°C

Detector: RI

Sample: Dextrans



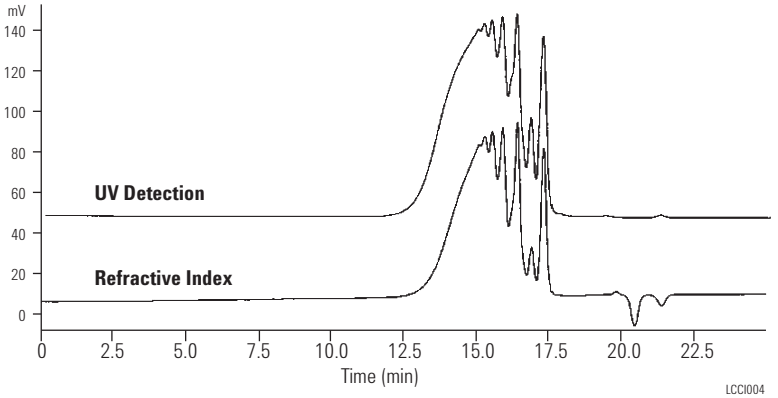
Chemical/Industrial Applications

Epoxy Resins: Detection Comparison

Column: **PLgel mixed D**
79911GP-MXD
7.5 x 300 mm, 5 µm

Mobile Phase: Tetrahydrofuran (THF)
Flow Rate: 1.0 mL/min
Temperature: 20°C
Detector: DAD 254/100 nm, ref = 360/100 nm, & RI
Sample: Epoxy Resin Sample dissolved in 1 mL THF

Epoxy Resin	Mw data	Mn data	Polydispersity
Epikote 1001	3468	1101	3.149
Epikote 1004	5928	2042	2.901
Epikote 1007	10896	3851	2.829



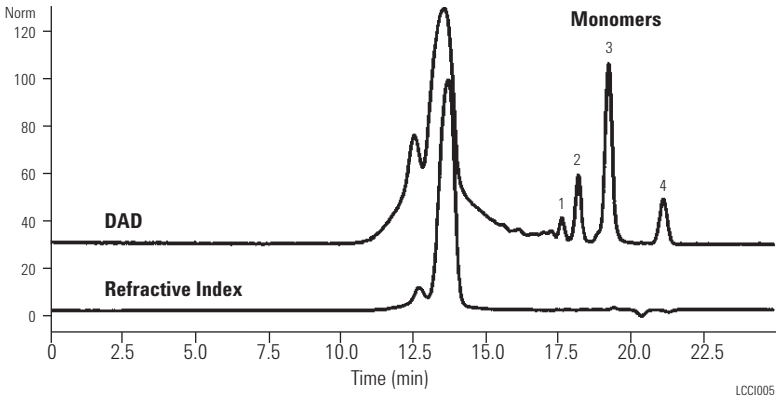
Polybutadiene: GPC using UV and Refractive Index

Column: **PLgel mixed D**
79911GP-MXD
7.5 x 300 mm, 5 µm

Mobile Phase: Tetrahydrofuran (THF)
Flow Rate: 1.0 mL/min
Temperature: 20°C
Detector: DAD (254/100 vs. 360/100 reference)
Refractive Index
Mp = 10283
Mn = 6567
Mw = 13565
Polydispersity = 2.066
Mz = 22037
Mz+1 = 35784
Mv = 12579

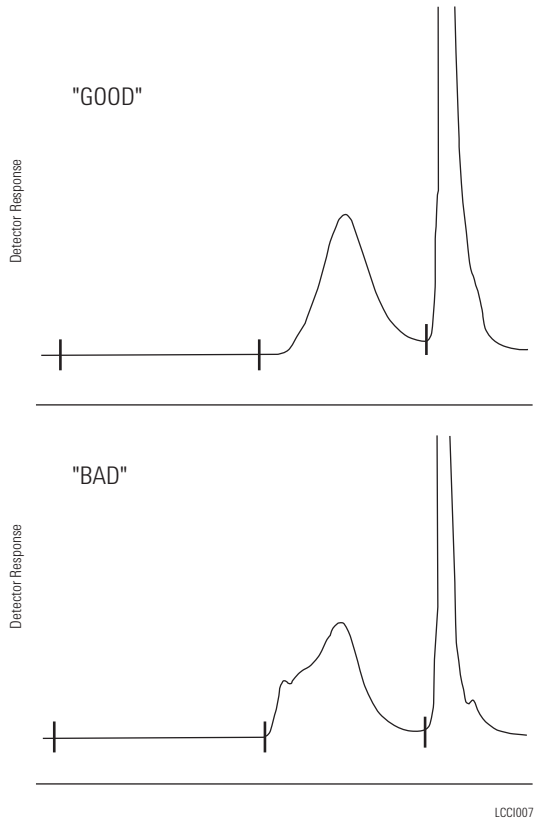
UV Detection
Mp = 10000
Mn = 10543
Mw = 12054
Polydispersity = 1.143
Mz = 14804
Mz+1 = 21860
Mv = 11780

Sample: 33 mg Polybutadiene sample dissolved in 1 mL THF, 20 µ L/injection



Polymethacrylate: GPC Separation

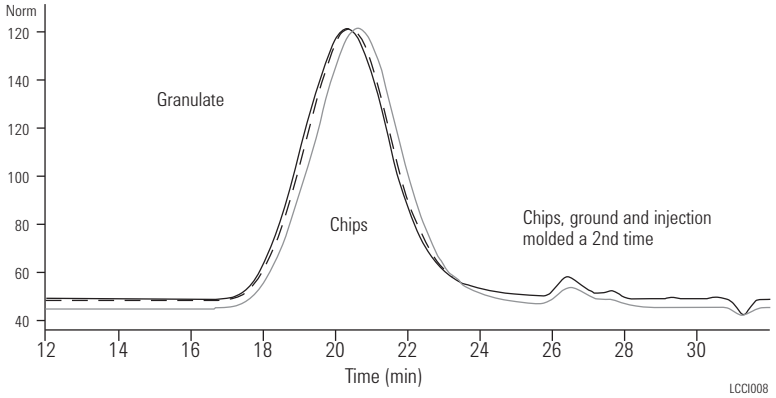
Column:	**ZORBAX PSM Bimodal-S** **880957-814** **6.2 x 250 mm, 5 µm**
Mobile Phase:	Tetrahydrofuran (THF)
Flow Rate:	1.0 mL/min
Temperature:	35°C
Detector:	UV 254 nm
Sample:	33 mg Polymethacrylate sample dissolved in 1 mL THF





Polystyrenes, Differently Processed: GPC Analysis

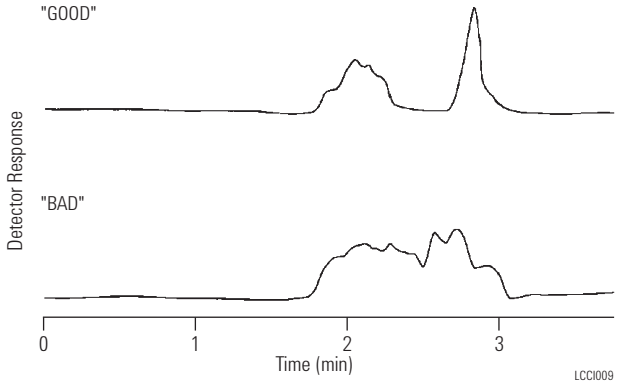
Column:	**PLgel mixed B 79911GP-MXB 7.5 x 300 mm, 10 µm**
Mobile Phase:	Tetrahydrofuran (THF)
Flow Rate:	1.0 mL/min
Temperature:	20°C
Detector:	RI
Sample:	Polystyrenes dissolved in 1 mL THF, 10 µL /injection A: Granulate B: Chips C: Chips ground and injection molded a 2nd time"



MWdata	Granulate	Chips	Chips, ground and injection molded a 2nd time
Mp	109776	87563	103049
Mn	59152	49062	55036
Mw	159590	133565	149385
Polydispersity	2.698	2.722	2.714
Mz	327846	297500	311084
Mz+1	545718	539583	533941
Mv	141380	117205	132243

Polyurethane Resins

Column:	**ZORBAX PSM 60S 880957-802 6.2 x 250 mm, 5 µm**
Mobile Phase:	Dimethyl Formamide
Flow Rate:	1.9 mL/min
Temperature:	Ambient
Detector:	RI
Sample:	Polyurethane Resins

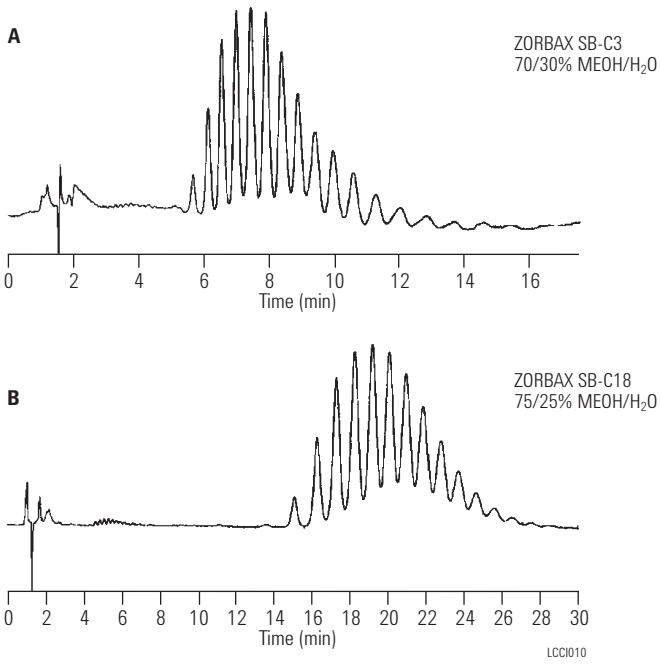


Triton X-114: Decreasing Run-time by Changing Bonded Phase

Column A: **ZORBAX SB-C3**
883975-909
4.6 x 150 mm, 5 µm

Column B: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

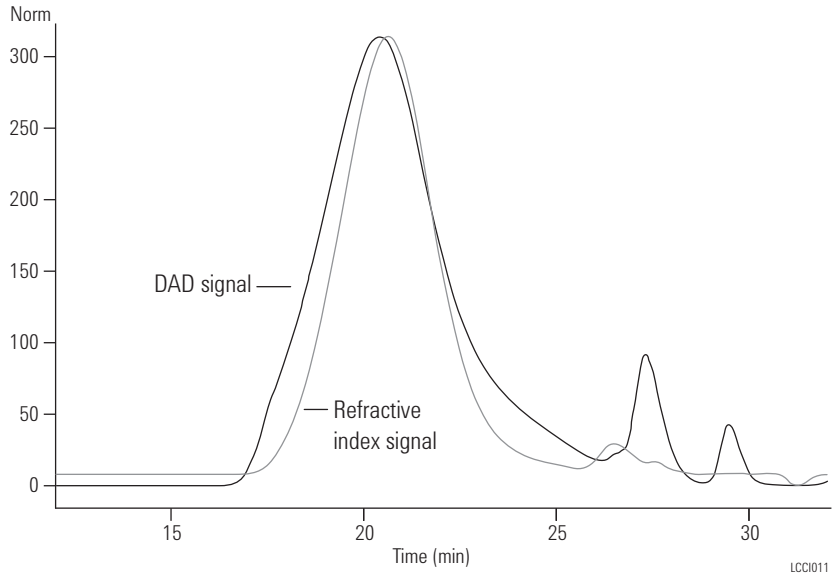
Mobile Phase: MeOH and H_2O (as indicated)
Flow Rate: 1.0 mL/min
Temperature: 50°C
Detector: UV 225 nm
Sample: Triton X-114



PMMA Polymer with MW = 316000

Column: **PLgel mixed C**
79911GP-MXC
7.5 x 300 mm, 5 µm

Mobile Phase: Tetrahydrofuran (THF)
Flow Rate: 1.0 mL/min
Temperature: 20°C
Detector: RI and DAD
Sample: 26 mg dissolved in 1 mL THF, 10 µL
Calibrant: Polystyrene EasyCal Vial standard (5064-8281)

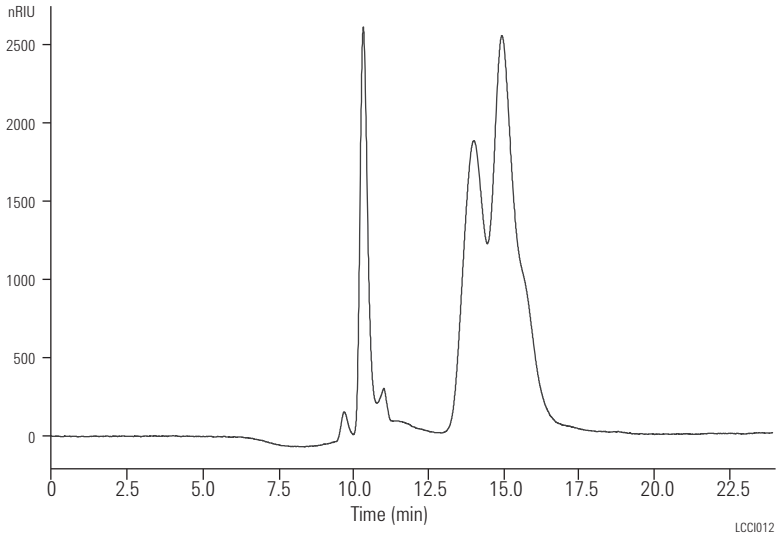


Polyethoxylates

Column: **PL aquagel-OH in series**
79911GF-MXA
7.5 x 300 mm, 8 µm

Column: **PL aquagel-OH**
79911GF-083
7.5 x 300 mm, 8 µm

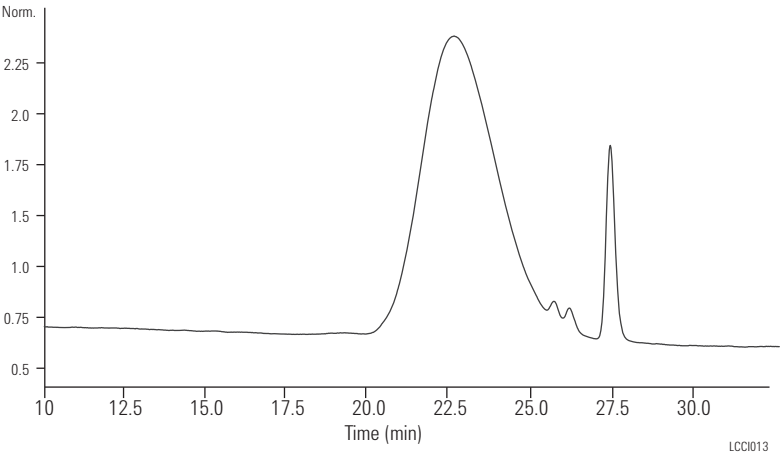
Mobile Phase: Water
Flow Rate: 1.0 mL/min
Temperature: 25°C
Detector: RI
Sample: Polyethoxylates
Calibrant: Polyethylene Oxide
EasyCal Vial standard (5064-8280)



Polyvinyl Alcohol

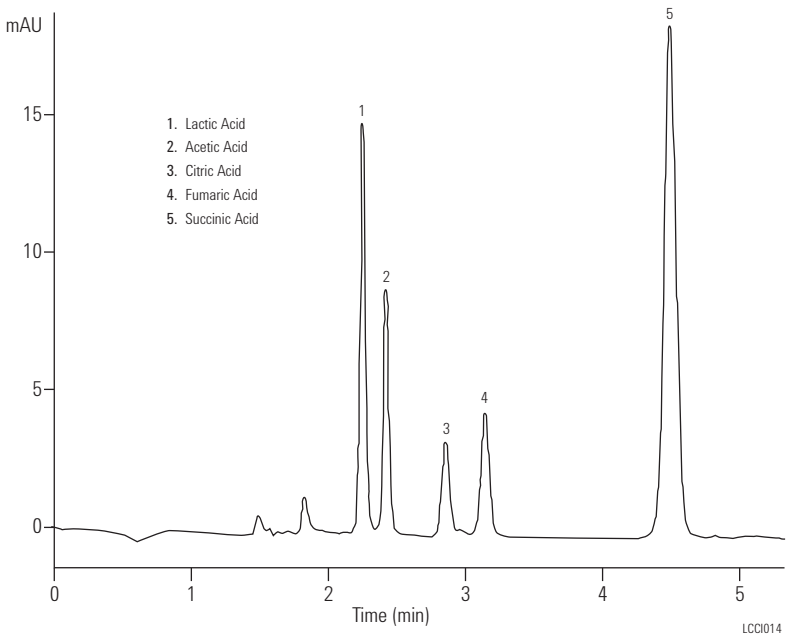
Column: **PL aquagel-OH**
79911GF-083
7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M $NaNO_3$, NaH_2PO_4, pH 7
Flow Rate: 1.0 mL/min
Temperature: 25°C
Detector: RI



Organic Acids Separated on ZORBAX SB-Aq

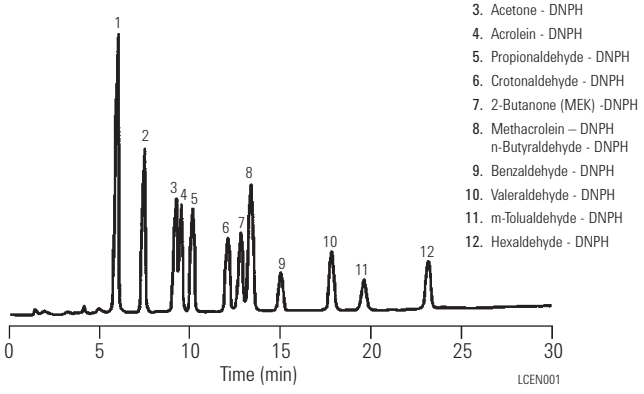
Column:	**ZORBAX SB-Aq 883975-914 4.6 x 150 mm, 5 µm**
Mobile Phase:	99% 20 mM NaH_2PO_4, pH2, 1% ACN
Flow Rate:	1.0 mL/min
Temperature:	35°C
Detector:	UV 210 nm



Environmental Applications

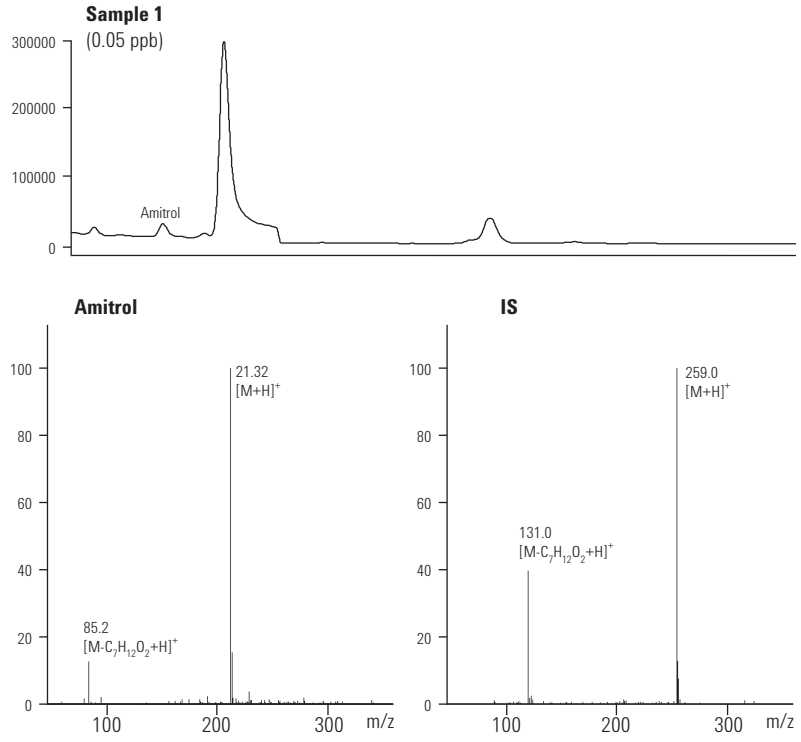
DNPH-Derivatized Aldehydes Obtained from Air

Column:	**ZORBAX ODS 884950-543 4.6 x 250 mm, 5 µm**
Mobile Phase:	A = 100% Water, B = 100% ACN
Flow Rate:	1.0 mL/min
Gradient:	60-75%B in 30 min; Wash: From 75 -100%B in 5 min, after 5 min return to 60% B
Temperature:	35°C
Detector:	UV 230 nm
Sample:	DNPH -Derivatized Aldehydes



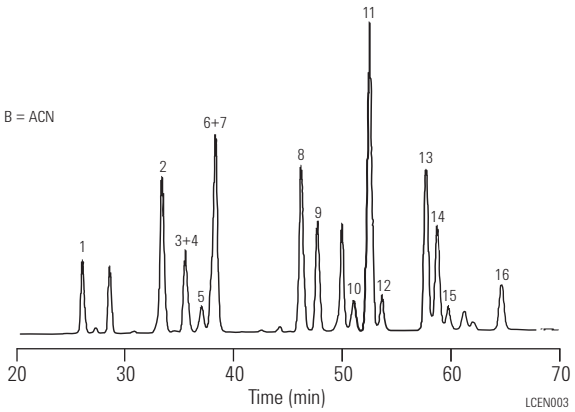
Amitrol in Water by LC/MS, 0.05 ppb

Column:	**ZORBAX SB-C18** **863954-302** **3.0 x 150 mm, 3.5 µm**
Mobile Phase:	A: 10 mM ammonium acetate B: MeOH
Flow Rate:	0.4 mL/min
Gradient:	0 min, 65%B; 10 min, 65% B; 15 min, 100%B; 20 min, 65% B
Temperature:	30 °C
MS Conditions:	Ionization Mode: APCI, positive polarity SIM parameters: Ion: 213 Amitrol Ion: 259 IS Fragmentor: 100V SIM Resolution: Low Vaporizer: 325°C Drying Gas (N2): 5.0 L/min Gas Temperature: 350°C Nebulizer pressure: 60 psig Vcap: 4000V Corona: 4.0 uA
Sample:	Amitrol in water, 100 µL



Amines, Substituted

Column:	**ZORBAX SB-C18** **880975-302** **3.0 x 250 mm, 5 µm**
Mobile Phase:	A = 2.0 mM Potassium Acetate, pH 6.5, B = ACN
Flow Rate:	0.35 mL/min
Gradient:	0 min 10% B 2 min 10% B 70 min 45% B 85 min 45% B 86 min 90% B 93 min 95% B
Temperature:	Ambient
Detector:	UV 254 nm, ref 460 nm
Sample:	Anilines

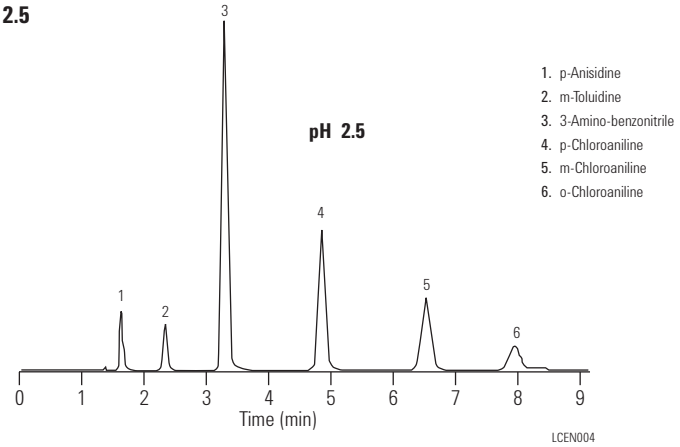


1. 3-Cl-4-methoxyaniline
2. 4-Chloroaniline
3. 3-Chloroaniline
4. 2-Chloroaniline
5. 2,6-Dimethylaniline
6. 3-Cl-4-Fluoroaniline
7. 4-Bromoaniline
8. 2-Cl-2-methylaniline
9. 3-Cl-4-methylaniline
10. 2-Ethyl-6-methylaniline
11. 3,4-Dichloroaniline
12. 4-Isopropylaniline
13. 2,4-Dichloroaniline
14. 2,5-Dichloroaniline
15. 2,6-Dichloroaniline
16. 2,6-Diethylaniline

Anilines, Separation of Substituted Anilines at pH 2.5

Column: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

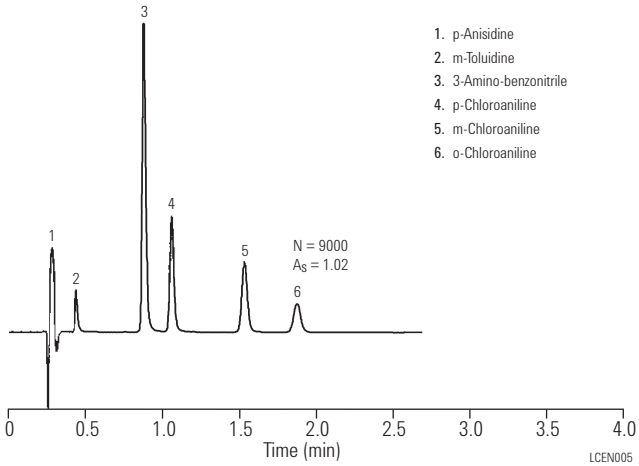
Mobile Phase: 42% methanol/58% 25 mM phosphate buffer
Flow Rate: 1.0 mL/min
Temperature: 22°C
Detector: UV 254 nm
Sample: Anilines



Anilines, Substituted: Rapid Separation

Column: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

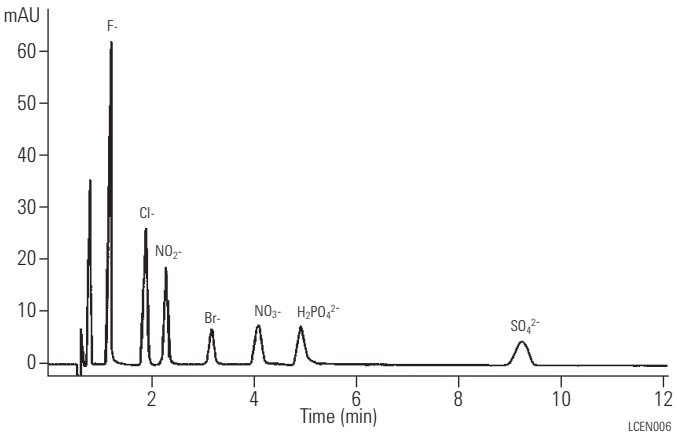
Mobile Phase: 20% ACN/80% 25 mM phosphate buffer, pH 2.5
Flow Rate: 3.0 mL/min
Temperature: 60°C
Detector: UV 254 nm
Sample: Anilines



Anions With Agilent HPLC Column and Mobile Phase Additive (Indirect UV)

Column: **Asahipak ODP-50**
7992JOP-564
4.0 x 125 mm, 5 µm

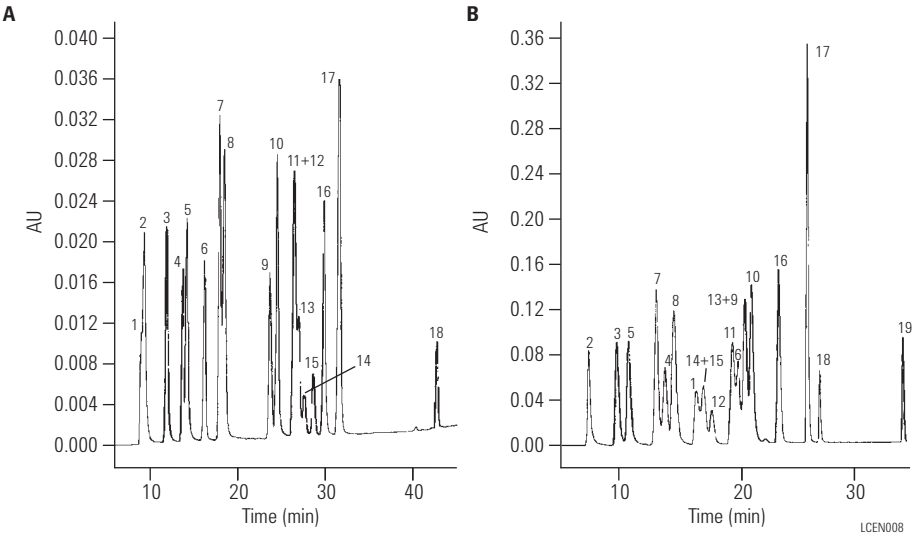
Mobile Phase: Water/acetonitrile, 86/14% + modifier (P/N: 5062-2480) adjusted to pH 8.6 with carbonate free NaOH
Flow Rate: 1.5 mL/min
Temperature: 40°C
Detector: UV 266 nm
Sample: Anions



Explosives and Related Compounds: Qualitative and Quantitative Analysis

Column A:	**ZORBAX SB-C18** **883700-922** **2.1 x 150 mm, 5 µm**
Column B:	**ZORBAX SB-CN** **883700-905** **2.1 x 150 mm, 5 µm**
Mobile Phase:	A = ACN + 5% H_2O + 5 mM CF_3COONH_4 B = H_2O + 5% ACN + 5 mM CF_3COONH_4, pH 2.7 (CF_3COOH)
Flow Rate:	0.23 mL/min
Gradient:	a: 0 min. 80%B 2 min. 80%B 10 min. 70%B 20 min. 65%B 25 min. 60%B 35 min. 30%B 40 min. 30%B 42 min. 80%B b: 0 min. 80%B 1 min. 80%B 15 min. 70%B 30 min. 20%B 35 min. 20%B 37 min. 80%B
Temperature:	18°C
Detector:	UV 210, 240, 360 nm, wavelength switching for each compound
Sample:	10 µL of 19 explosive compounds in ACN/H_2O (20/80)

1. Picric acid
2. 4-Amino-2-nitrotoluene
3. 2-Amino-6-nitrotoluene
4. RDX
5. 2-Amino-4-nitrotoluene
6. HMX
7. 1,3-Dinitrobenzene
8. 1,3,5-Trinitrobenzene
9. 2-Amino-4,6-dinitrotoluene
10. 2,4-Dinitrotoluene
11. 4-Amino-4,6-dinitrotoluene
12. 2-Nitrotoluene
13. 2,6-Dinitrotoluene
14. 4-Nitrotoluene
15. 3-Nitrotoluene
16. 2,4,6-Trinitrotoluene
17. Tetryl
18. Diphenylamine
19. Hexyl

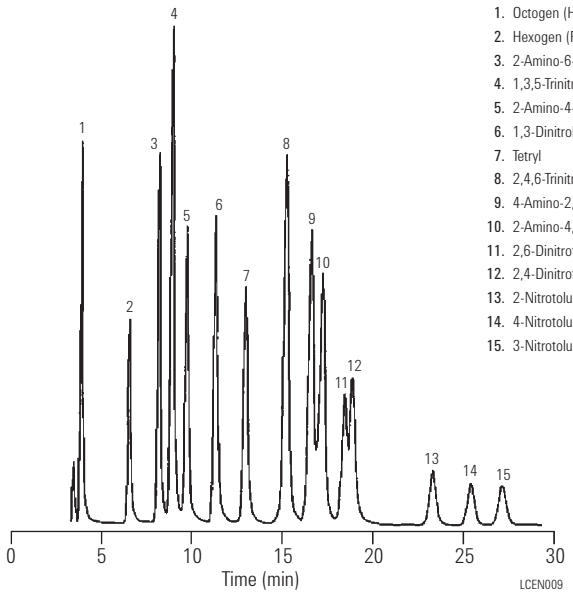




Explosives from Soil Extract

Column: **ZORBAX SB-C18**
880975-302
3.0 x 250 mm, 5 µm

Mobile Phase: Methanol/Water (50/50) (v/v)
Flow Rate: 0.3 mL/min
Temperature: Ambient
Detector: UV 230 nm
Sample: 10 µL Explosives Mix



1. Octogen (HMX)
2. Hexogen (RDX)
3. 2-Amino-6-nitrotoluene
4. 1,3,5-Trinitrobenzene
5. 2-Amino-4-nitrotoluene
6. 1,3-Dinitrobenzene
7. Tetryl
8. 2,4,6-Trinitrotoluene
9. 4-Amino-2,6-dinitrotoluene
10. 2-Amino-4,6-dinitrotoluene
11. 2,6-Dinitrotoluene
12. 2,4-Dinitrotoluene
13. 2-Nitrotoluene
14. 4-Nitrotoluene
15. 3-Nitrotoluene

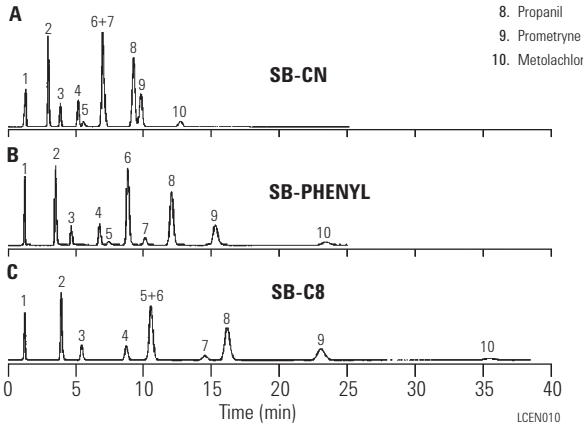
Herbicides on Different Bonded Phases

Column A: **ZORBAX SB-CN**
883975-905
4.6 x 150 mm, 5 µm

Column B: **ZORBAX SB-Phenyl**
883975-912
4.6 x 150 mm, 5 µm

Column C: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

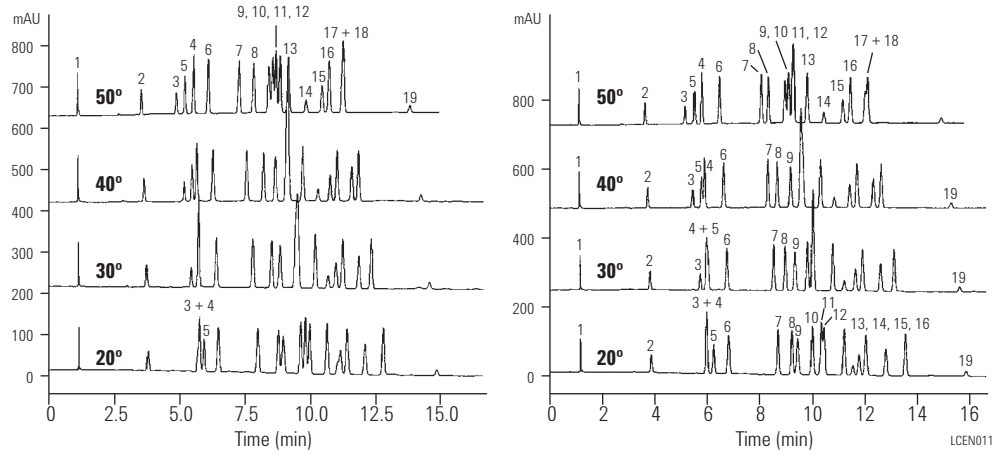
Mobile Phase: 35% ACN, 65% Water
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 254 nm
Sample: Herbicides



1. Bentazon
2. Tebuthiuron
3. Simazine
4. Atrazine
5. Prometron
6. Diuron
7. Propazine
8. Propanil
9. Prometryne
10. Metolachlor

Herbicide/Pesticide Standards: Effect of Bonded Phase

Column:	**Eclipse XDB-C8 993967-906 4.6 x 150 mm, 5 µm**	**Column:**	**Eclipse XDB-C18 993967-902 4.6 x 150 mm, 5 µm**
Mobile Phase:	Water/Acetonitrile	Mobile Phase:	Water/Acetonitrile
Flow Rate:	1.0 mL/min	Flow Rate:	1.0 mL/min
Gradient:	20-60% in 15 min.	Gradient:	20-60% in 15 min.
Temperature:	50°C 40°C 30°C 20°C	Temperature:	50°C 40°C 30°C 20°C
Detector:	DAD 240/30	Detector:	DAD 240/30
Sample:	Herbicide & Pesticide Standards	Sample:	Herbicide & Pesticide Standards



1. Desethyldesisopropylatrazine
2. Desethylatrazine
3. Benzthiazuron
4. Hexazinon
5. Metoxuron
6. Simazine
7. Methabenzthiazuron
8. Simazine
9. Atrazine
10. Isoproturon
11. Diuron
12. Monlinuron
13. Metobromuron
14. Metazachlor
15. Propazine
16. Sebutylazine
17. Terbutylazine
18. Linuron
19. Metolachlor

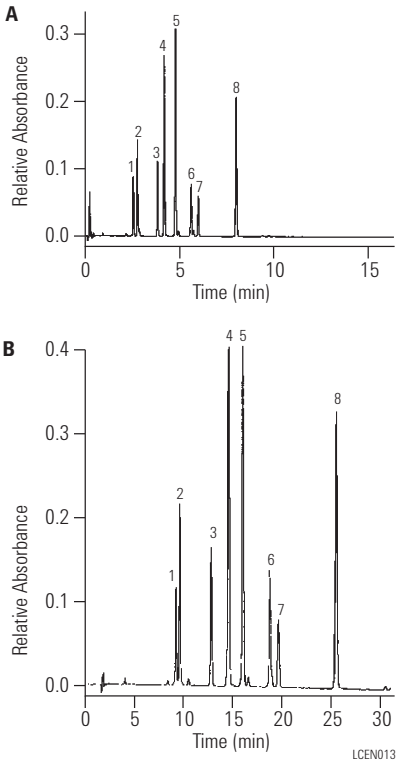


Herbicides: Use of Short, Small Particle Columns for Fast and Efficient Separation

Column A: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Column B: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

Mobile Phase:	A = Water to pH 2.0 with TFA; B = ACN
Flow Rate:	2.0 mL/min, 1.0 mL/min
Temperature:	35°C
Detector:	UV 254 nm
Sample:	0.5 µg each

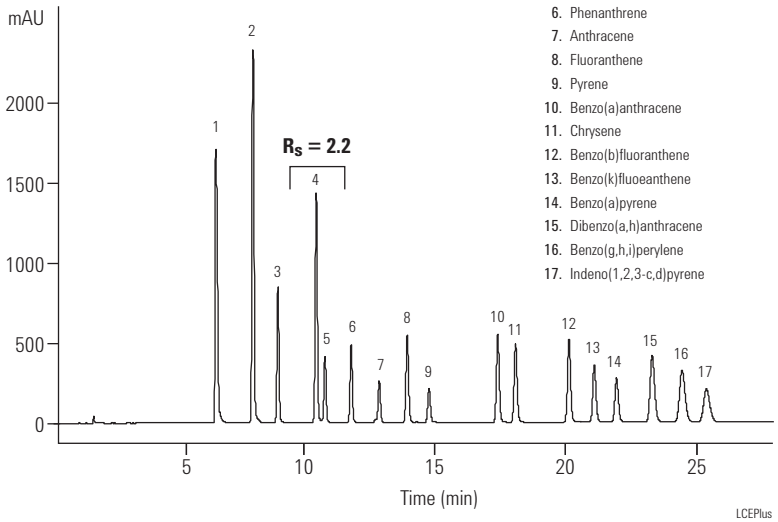


1. Tebuthiuron
2. Prometon
3. Prometryne
4. Atrazine
5. Bentazon
6. Propanil
7. Propazine
8. Metolachlor

Separation of EPA 610 PAH Mix on 3.0 x 250 mm, 5 µm Eclipse PAH Column

Column: **Eclipse PAH**
959990-318
3.0 x 250 mm, 5 µm

Mobile Phase:	A = Water B = Acetonitrile Initial %B = 40
Flow Rate:	0.85 mL/min
Gradient:	Time (Min) %B 0.00 45 17.5 100 24.0 100 25.5 40 27.5 40 Stop Time = 25.0
Temperature:	25° C
Detector:	220,4 nm No Ref.; Stop time = 26.0 min



1. Toluene
2. Naphthalene
3. Acenaphthylene
4. Acenaphthene
5. Fluorene
6. Phenanthrene
7. Anthracene
8. Fluoranthene
9. Pyrene
10. Benzo(a)anthracene
11. Chrysene
12. Benzo(b)fluoranthene
13. Benzo(k)fluoeanthene
14. Benzo(a)pyrene
15. Dibenzo(a,h)anthracene
16. Benzo(g,h,i)perylene
17. Indeno(1,2,3-c,d)pyrene

Separation of 20 PAHs on Eclipse PAH

Column: **Eclipse PAH**
959964-918
4.6 x 100 mm, 1.8 µm

Mobile Phase: A = Water; B = Acetonitrile

Flow Rate: 1.8 mL/min

Gradient:

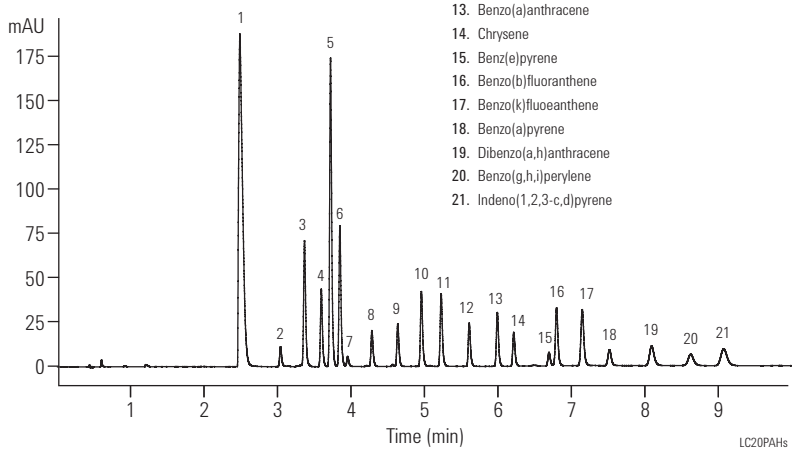
Time (Min)	% B
0	40
6	100
9.5	100
10	40

Stop Time = 12

Temperature: 25°C

Detector: 230,8 nm No Ref.; Data rate 0.2 s, micro flow cell

1. Toluene
2. Naphthalene
3. Acenaphthylene
4. 1-methyl naphthalene
5. 2-methyl naphthalene
6. Acenaphthene
7. Fluorene
8. Phenanthrene
9. Anthracene
10. Fluoranthene
11. Pyrene
12. Terphenyl-d14
13. Benzo(a)anthracene
14. Chrysene
15. Benz(e)pyrene
16. Benzo(b)fluoranthene
17. Benzo(k)fluoeanthene
18. Benzo(a)pyrene
19. Dibenzo(a,h)anthracene
20. Benzo(g,h,i)perylene
21. Indeno(1,2,3-c,d)pyrene



Herbicides: Rapid Separation

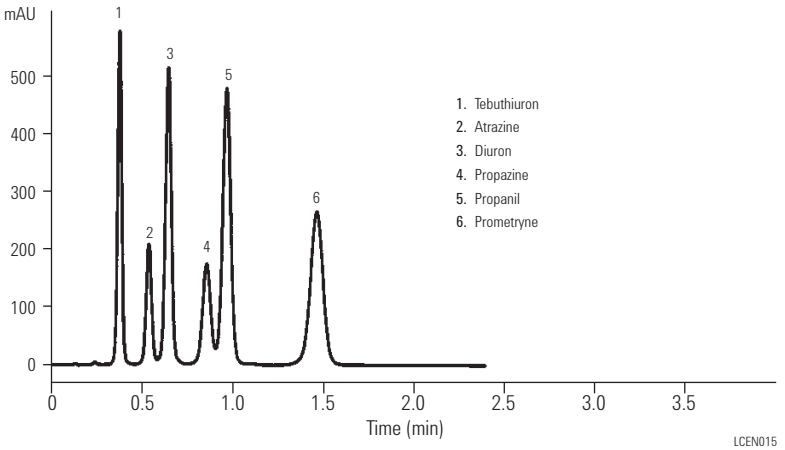
Column: **Eclipse XDB-C18**
933975-902
4.6 x 30 mm, 3.5 µm

Mobile Phase: MeOH and H_2O (60:40)

Flow Rate: 2 mL/min

Temperature: Ambient

1. Tebuthiuron
2. Atrazine
3. Diuron
4. Propazine
5. Propanil
6. Prometryne

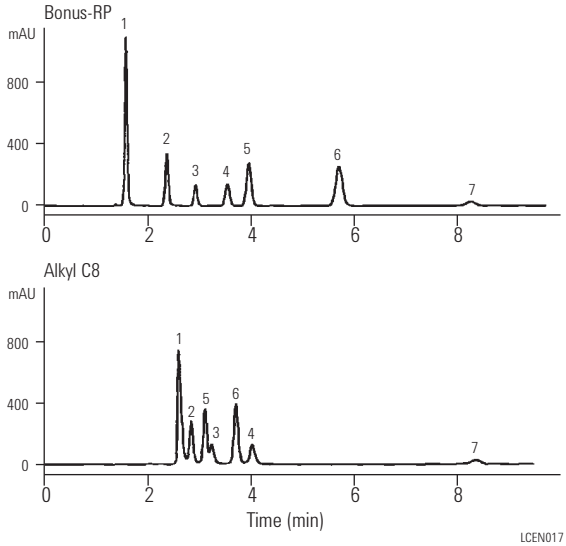


Triazine Pesticides on Bonus-RP and Alkyl C8 Phase

Column: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: MeOH: 0.1% TFA (70:30)*
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: 254 nm
Sample: Triazine pesticides, 2 µL
1. Prometryne
2. Tebuthion
3. Atrazine
4. Propazine
5. Diuron
6. Propanil
7. Dacthal

* For low pH work with Bonus-RP, a TFA mobile phase is often preferred over phosphate, and is compatible with LC/MS.



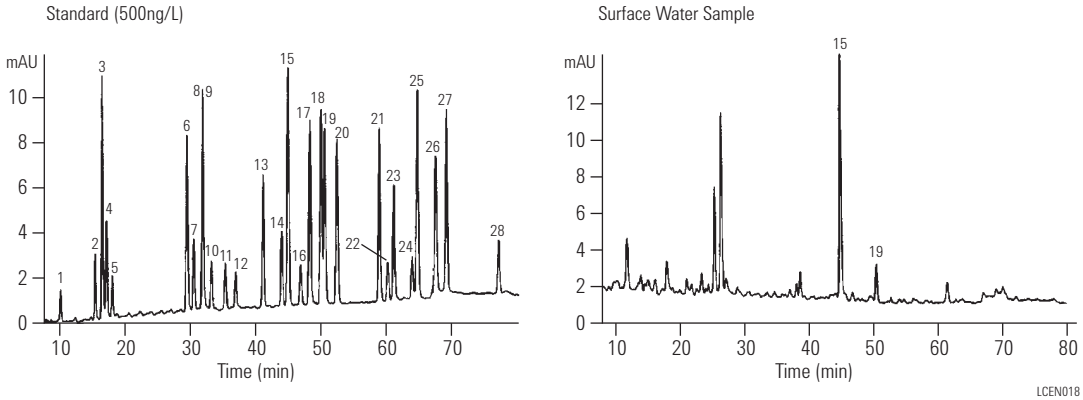
LCEN017

Pesticides Analysis of Pesticides in Drinking Water

Column: **ZORBAX SB-C18**
880975-302
3.0 x 250 mm, 5 µm

Mobile Phase: A = 2 mM Sodium Acetate (pH 6.5) with 5% ACN
B = 100% Acetonitrile (ACN)
Flow Rate: 0.35 mL/min
Gradient: 2 min, 10% B; 10 to 45% B in 70 min.
Temperature: 40°C
Detector: UV 245 nm
Sample: Pesticides

1. Desisopropylatrazine
2. Metamitron
3. Fenuron
4. Chloridazon
5. Desethylatrazine
6. Metoxuron
7. Carbetamid
8. Bromacil
9. Hexazinon
10. Simazine
11. Metribuzin
12. Desethylterbutylazine
13. Carbutilat
14. Methabenzthiazuron
15. Chlortoluron
16. Atrazine
17. Monolinuron
18. Diuron
19. Isoproturon
20. Metobromuron
21. Metazachlor
22. Buturon
23. Propazine
24. Dimefuron
25. Terbuthylazine
26. Linuron
27. Chlorbromuron
28. Chloroxuron

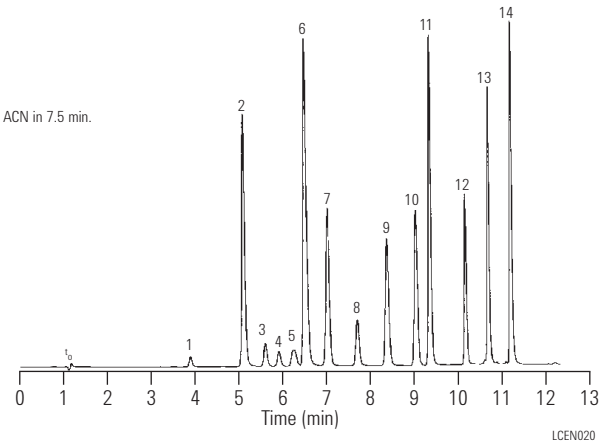


LCEN018

Phenols, Substituted

Column: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

Mobile Phase: 20% ACN/80% 0.01 M H_3PO_4 to 45% ACN in 7.5 min.
Flow Rate: 1.5 mL/min
Gradient: 80% ACN in 2.0 min.
Temperature: 35°C
Detector: UV 254 nm
Sample: Phenols

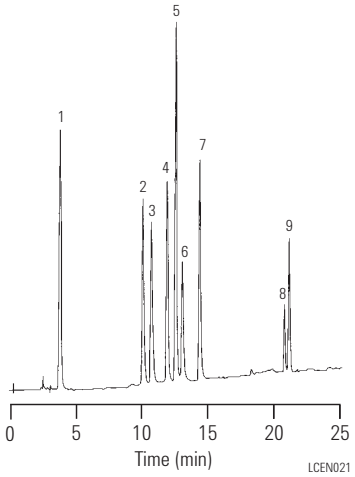


1. Phenol
2. 4-Nitrophenol
3. m-Cresol
4. o-Cresol
5. 2-Chlorophenol
6. 2,4-Dinitrophenol
7. 2-Nitrophenol
8. 2,4-Nimethylphenol
9. 4-Chloro-3-methylphenol
10. 2,4-Dichlorophenol
11. 2-Methyl-4,6-dinitrophenol
12. 2,4,6-Trichlorophenol
13. 2,3,4,6-Tetrachlorophenol
14. Pentachlorophenol

Phenoxycarboxylic Acids

Column: **ZORBAX SB-C18**
880975-902
4.6 x 250 mm, 5 µm

Mobile Phase: A = 20mM KH_2PO_4 , B = ACN
Flow Rate: 1.0 mL/min
Gradient: 0 min 10% B
2 min 10% B
25 min 65% B
Temperature: 40°C
Detector: UV 245 nm
Sample: Phenoxycarboxylic Acids



1. Dicamba
2. 2,4-D
3. MCPA
4. 2,4-DP
5. MCPP
6. 2,4,5-T
7. 2,4,5-TP
8. 2,4-DB
9. MCPB



Plant Hormones: Rapid Gradient Elution Separation

Column: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

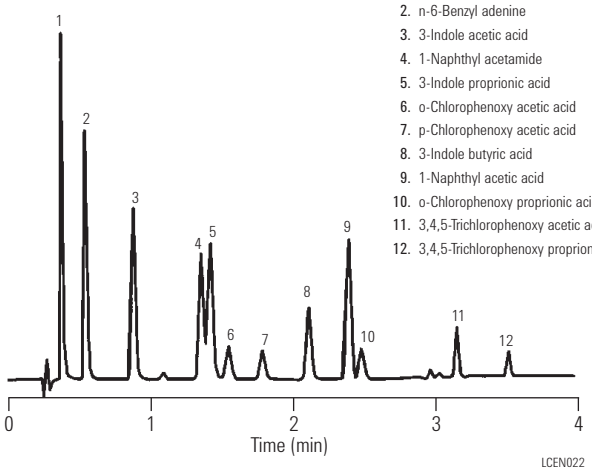
Mobile Phase: A = water with 0.1% TFA
B = Acetonitrile with 0.1% TFA

Flow Rate: 3.0 mL/min

Temperature: 60°C

Detector: UV 245 nm

Sample: Plant hormones



1. Kinetin
2. n-6-Benzyl adenine
3. 3-Indole acetic acid
4. 1-Naphthyl acetamide
5. 3-Indole proprionic acid
6. o-Chlorophenoxy acetic acid
7. p-Chlorophenoxy acetic acid
8. 3-Indole butyric acid
9. 1-Naphthyl acetic acid
10. o-Chlorophenoxy proprionic acid
11. 3,4,5-Trichlorophenoxy acetic acid
12. 3,4,5-Trichlorophenoxy proprionic acid

LCEN022

VX Nerve Agent Metabolites by LC/MS-IS Standard (C13 labeled)

Column: **ZORBAX NH2**
860700-708
2.1 x 50 mm, 5 µm

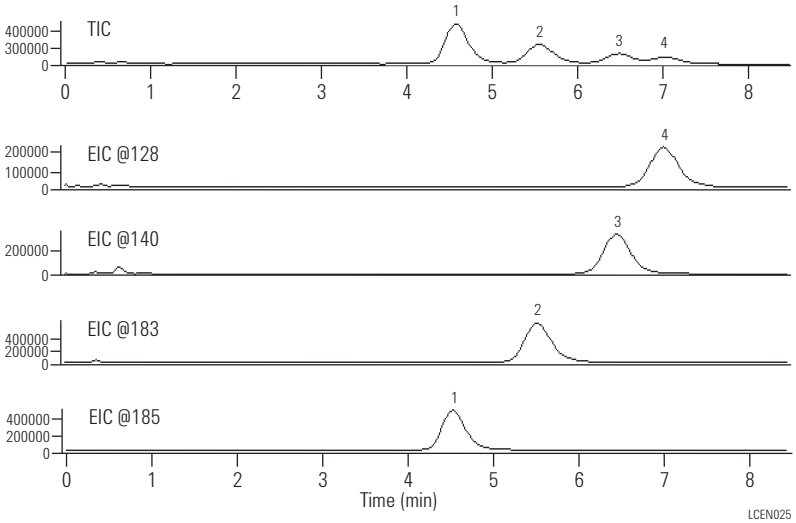
Mobile Phase: 1:1 (20 mM Ammonium Actetate pH 4.5 / Acetonitrile)

Flow Rate: 0.5 ml/min, 1 µl injection (prepared std in ACN)

Temperature: 350 °C

Detector: ESI-Negative Ion, Gas Flow 12 l/min, Nebulizer 60 psi

Sample: MW
1. Cyclohexyl methylphosphonic acid 178
2. Pinacolyl methylphosphonic acid 180
3. Isopropyl methylphosphonic acid 138
4. Ethyl methylphosphonic acid 124



LCEN025

Food and Consumer Product Applications

Separation of Azo Dyes on Eclipse Plus Phenyl-Hexyl

Column: **Eclipse Plus Phenyl Hexyl**
959996-912
4.6 x 100 mm, 5 µm

Mobile Phase: A: 10 mM Ammonium Acetate, pH 4,7
B: MeOH

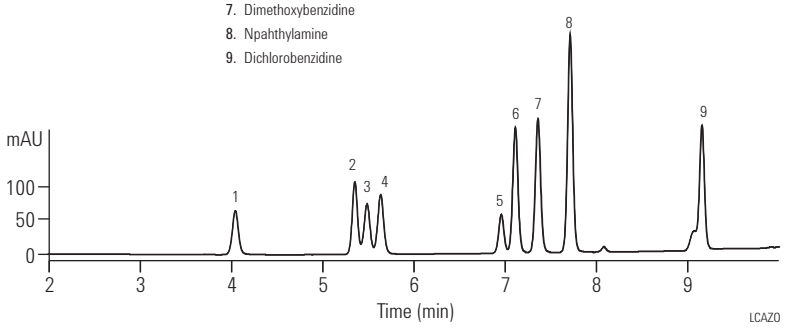
Flow Rate: 1.5 mL/min

Gradient:

Time (Min):	%B:
0	25
5	50

Detector: UV 254 nm

1. Aniline
2. o-Toluidine
3. Anisidine
4. Benzidine
5. Chloroaniline
6. o-Tolidine
7. Dimethoxybenzidine
8. Npahthylamine
9. Dichlorobenzidine



Anthocyanins from Blueberries: High-Efficiency High-Speed Separation

Column A: **ZORBAX SB-C18**
880975-902
4.6 x 250 mm, 5 µm

Column B: **ZORBAX SB-C18**
863953-902
4.6 x 150 mm, 3.5 µm

Column C: **ZORBAX SB-C18**
866953-902
4.6 x 75 mm, 3.5 µm

4.6 x 250 mm, 5 µm
4.6 x 150 mm, 3.5 µm
4.6 x 75 mm, 3.5 µm

Mobile Phase: A = 3% Phosphoric acid, B = 100% MeOH

Flow Rate: 1.0 mL/min
Gradient: As shown
Temperature: 30°C
Detector: UV 525 nm
Sample: Natural Anthocyanins

A

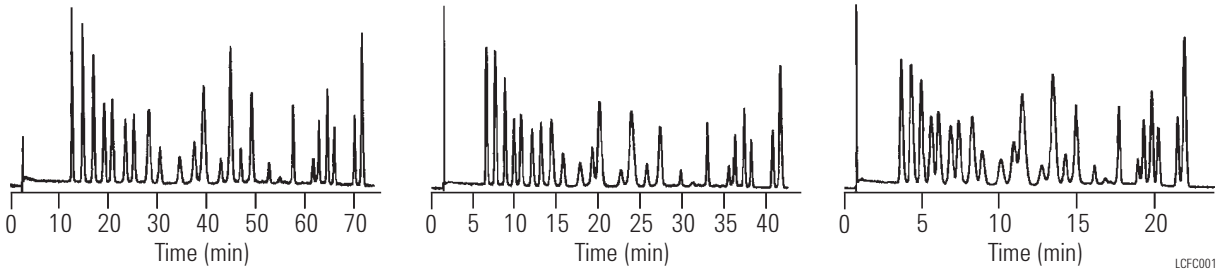
Time	Percent B
0 min	23% B
35 min	26% B
97 min	60% B

B

Time	Percent B
0 min	23% B
21 min	26% B
58.2 min	60% B

C

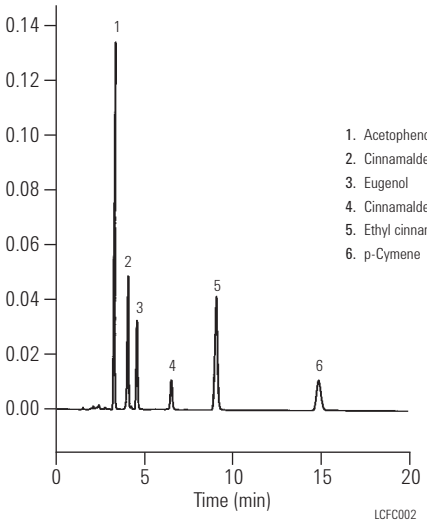
Time	Percent B
0 min	23% B
10.5 min	26% B
29.1 min	60% B



Aromatic Flavorings

Column: **Eclipse XDB-Phenyl**
963967-912
4.6 x 150 mm, 3.5 µm

Mobile Phase: H_2O: MeOH, 40:60
Flow Rate: 1.0 mL/min
Temperature: 35°C
Detector: 254 nm
Publication: FD13
Sample: Aromatic Sample

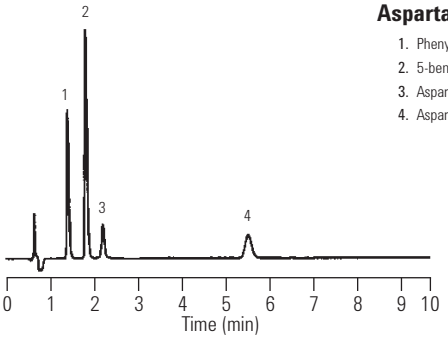


1. Acetophenone
2. Cinnamaldehyde
3. Eugenol
4. Cinnamaldehyde Impurity
5. Ethyl cinnamate
6. p-Cymene

Aspartame: Metabolites and Applications

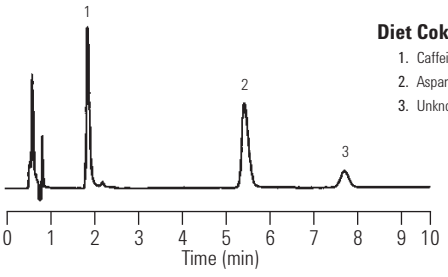
Column: **ZORBAX SB-C18**
866953-902
4.6 x 75 mm, 3.5 µm

Mobile Phase: 85/15, 0.1% TFA/ACN
Flow Rate: 1.0 mL/min
Temperature: 35°C
Detector: UV 210 nm
Sample: Aspartame



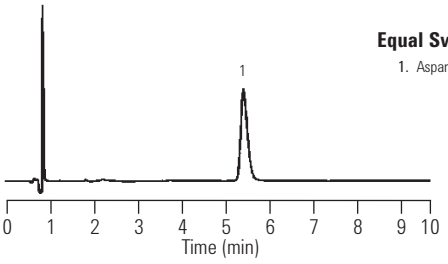
Aspartame and Its Metabolites

1. Phenylalanine
2. 5-benzyl-3,6-dioxo-2-piperazineacetic acid
3. Aspartic acid-phenylalanine dipeptide
4. Aspartame



Diet Coke

1. Caffeine
2. Aspartame
3. Unknown



Equal Sweetener

1. Aspartame

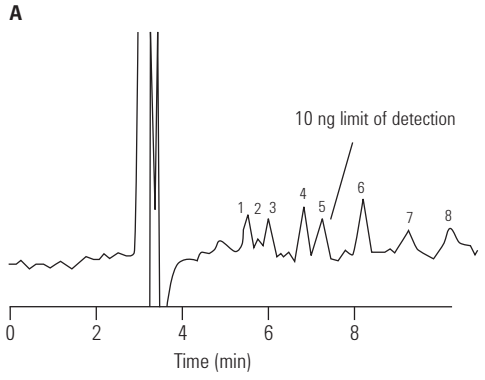
LCFC003

Carbohydrates: Carbohydrate Standards

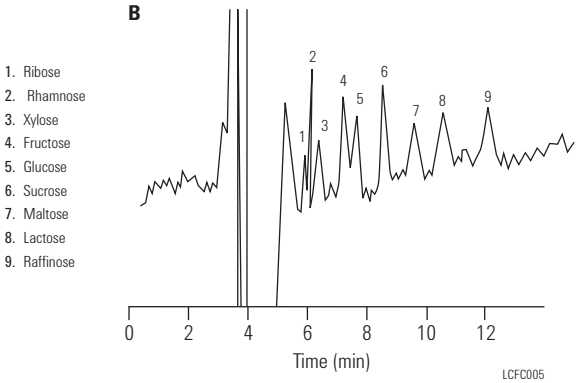
Column: **ZORBAX Carbohydrate Analysis**
843300-908
4.6 x 150 mm, 5 µm

Mobile Phase: 63% CH_3CN/H_2O
Flow Rate: 0.5 mL/min.
Detector: Agilent RID
Sample: Carbohydrate standard:
A: 25 ng/ L, 1 µL injected
B: 500 pg/ L, 50 µL injected

Carbohydrates: Separation Showing High Sensitivity



Sensitivity of High Injection Volume (50 µL)



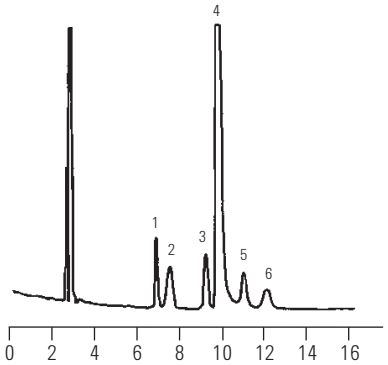
LCFC005

Carbohydrates: Effect of Mobile Phase Strength

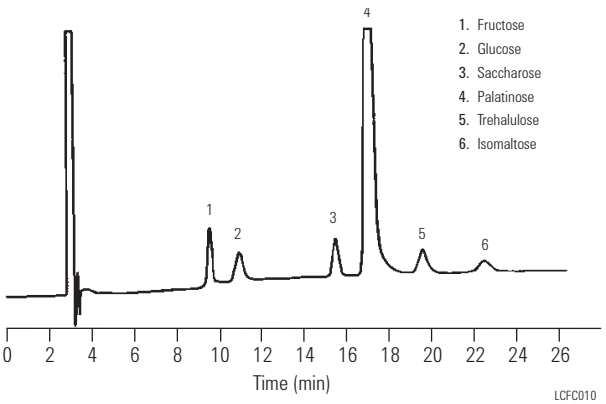
Column: **ZORBAX NH2**
880952-708
4.6 x 250 mm, 5 µm

Mobile Phase: ACN/Water, as indicated
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: RI
Sample: Mono- and Disaccarides

ACN/H_2O: 70/30



ACN/H_2O: 75/25

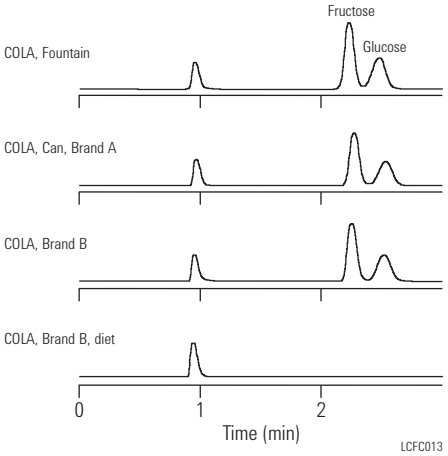


LCFC010

Carbohydrates in Colas

Column: **ZORBAX Carbohydrate Analysis 843300-908 4.6 x 150 mm, 5 µm**

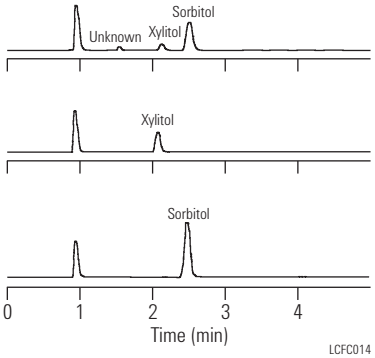
Mobile Phase: 75% ACN:25% H20
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: No dilution



Carbohydrates: Sugar Alcohols

Column: **ZORBAX Carbohydrate Analysis 843300-908 4.6 x 150 mm, 5 µm**

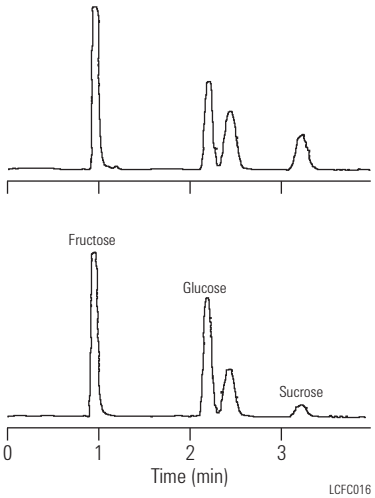
Mobile Phase: 75% ACN:25% H_2O
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: Chewing gum, sugar-free



Carbohydrates in Juices

Column: **ZORBAX Carbohydrate Analysis 843300-908 4.6 x 150 mm, 5 µm**

Mobile Phase: 75% ACN/25% H_2O
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: diluted to 0.1X in 50:50 ACN:H_2O



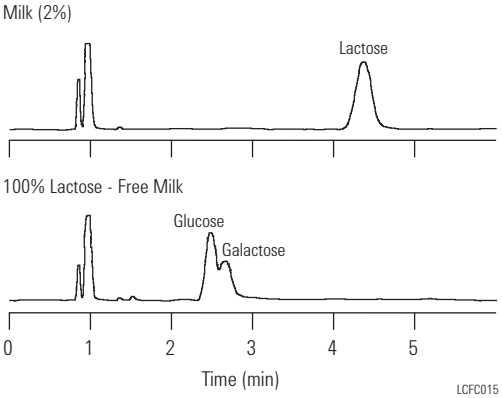
Apple Juice
58.7% Fructose
9.9% Sucrose
33.4% Glucose

Apple Drink
36.8% Fructose
24.9% Sucrose
38.3% Glucose

Carbohydrates in Milk

Column: **ZORBAX Carbohydrate Analysis**
843300-908
4.6 x 150 mm, 5 µm

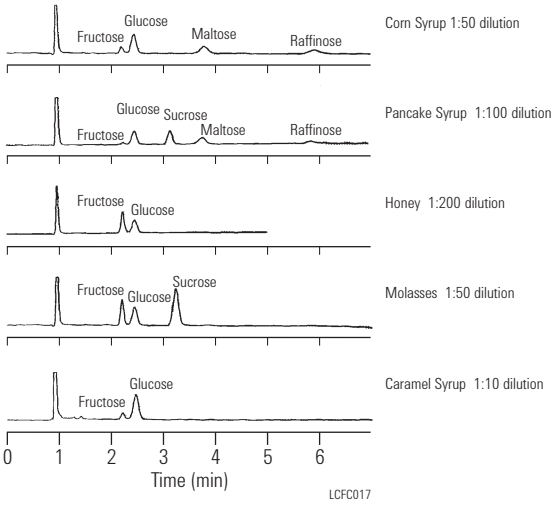
Mobile Phase: 75% ACN/25% H_20
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID
Sample: Partitioned between MeCl2: H_20



Carbohydrates: Syrups and Honey

Column: **ZORBAX Carbohydrate Analysis**
843300-908
4.6 x 150 mm, 5 µm

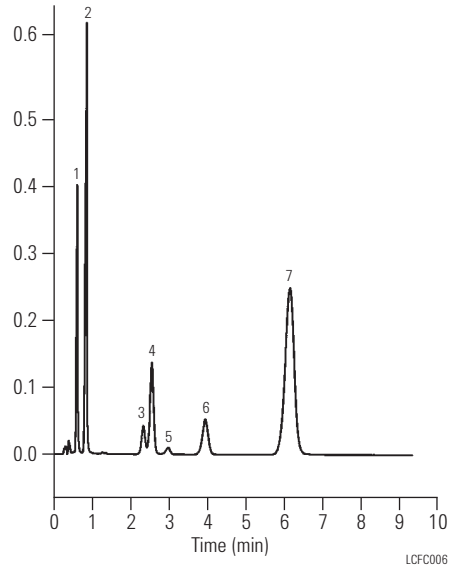
Mobile Phase: 75% ACN/25% H_20
Flow Rate: 2.0 mL/min
Temperature: 30°C
Detector: RID



Flavoring Agents

Column: **ZORBAX SB-Phenyl**
860975-912
2.1 x 50 mm, 5 µm

Mobile Phase: 0.3% TFA: ACN, 65:35
Flow Rate: 0.3 mL /min.
Temperature: Ambient
Detector: UV 254 nm
Sample: Cool Mint Listerine Sample

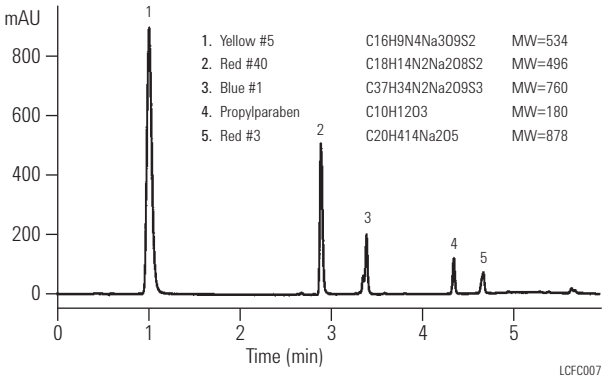


1. Unknown
2. Benzoic acid
3. Methyl salicylate
4. Carvone
5. Unknown
6. Thymol
7. Anethole

Food Colors, FD&C

Column: **ZORBAX Eclipse XDB-C18**
935967-902
4.6 x 50 mm, 3.5 µm

Mobile Phase: A: 0.1% TF A, pH to 4.4 with TEA, B: MeOH
Flow Rate: 1.0 mL/min
Gradient: 17 to 100% B/4 min
Temperature: Ambient
Detector: UV 254 nm
Publication: LI FD16

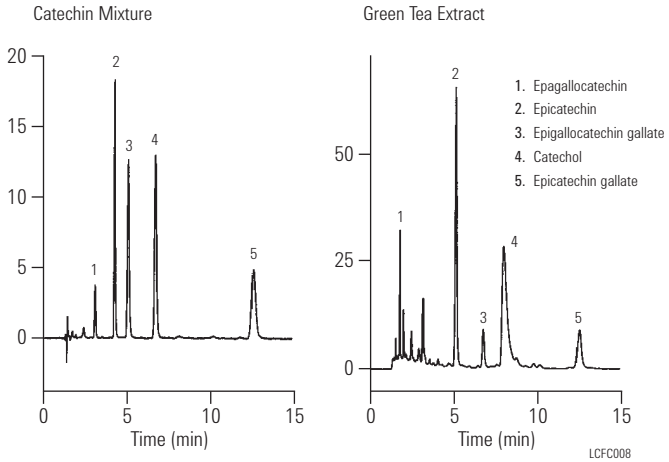


1. Yellow #5	$C_{16}H_9N_4Na_3O_9S_2$	MW=534
2. Red #40	$C_{18}H_{14}N_2Na_2O_8S_2$	MW=496
3. Blue #1	$C_{37}H_{34}N_2Na_2O_9S_3$	MW=760
4. Propylparaben	$C_{10}H_{12}O_3$	MW=180
5. Red #3	$C_{20}H_{14}Na_2O_5$	MW=878

Neutraceuticals: Extract from Green Tea

Column: **ZORBAX SB-C8**
863953-906
4.6 x 150 mm, 3.5 µm

Mobile Phase: 75% 0.1% Trifluoroacetic acid: 25% Methanol
Injection: 1 mL/min
Temperature: 40°C
Detector: UV 280 nm
Sample: Green tea extract, 5 µL

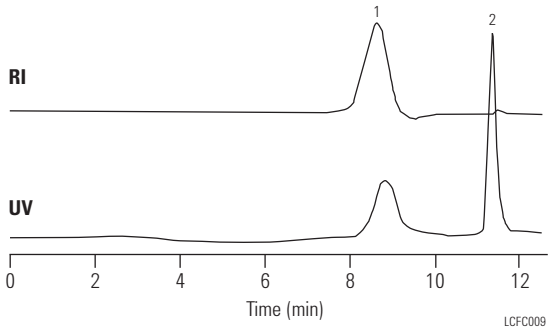


1. Epagallocatechin
2. Epicatechin
3. Epigallocatechin gallate
4. Catechol
5. Epicatechin gallate

Polysaccharide: Size Separation

Column: **ZORBAX PSM Bimodal Kit, 2 columns**
880949-903
6.2 x 250 mm, 5 µm

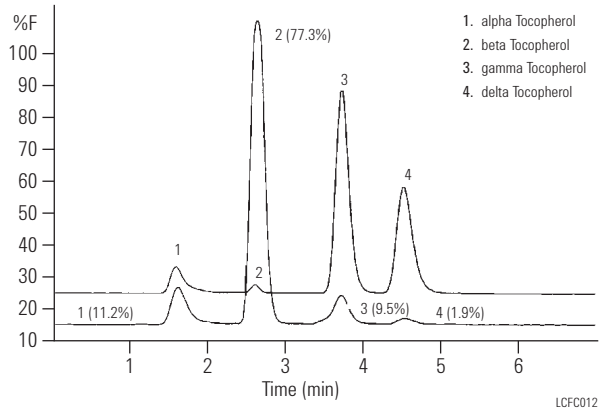
Mobile Phase:	8.5 g NaCl per liter water
Flow Rate:	2.0 mL/min
Temperature:	35°C
Detector:	UV 205 nm and RI
Sample:	1. MW = 40,000 polysaccharide (Rheomacrodex) 2. Glucose



Tocopherols: Analysis of Margarine with Fluorescence Detection

Column: **LiChrospher 100 Diol**
79925DI-564
4 x 125 mm, 5 µm

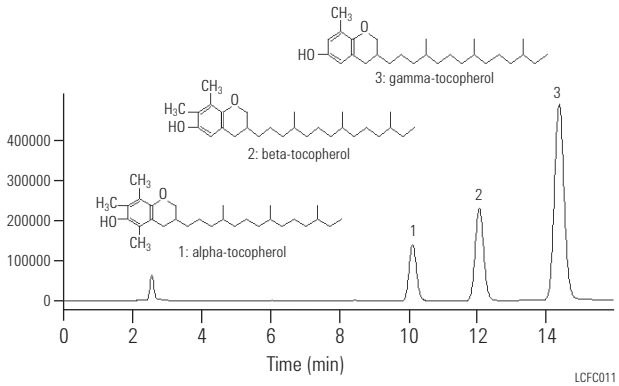
Mobile Phase:	Hexane + 2% Isopropanol
Flow Rate:	1.0 mL/min
Temperature:	25°C
Detector:	Fluorescence, Ex = 295, Em = 330
Sample:	a: Standard b: Margarine



Tocopherols by LC/MS with APPI

Column: **Eclipse XDB-C18**
993967-302
3.0 x 150 mm, 5 µm

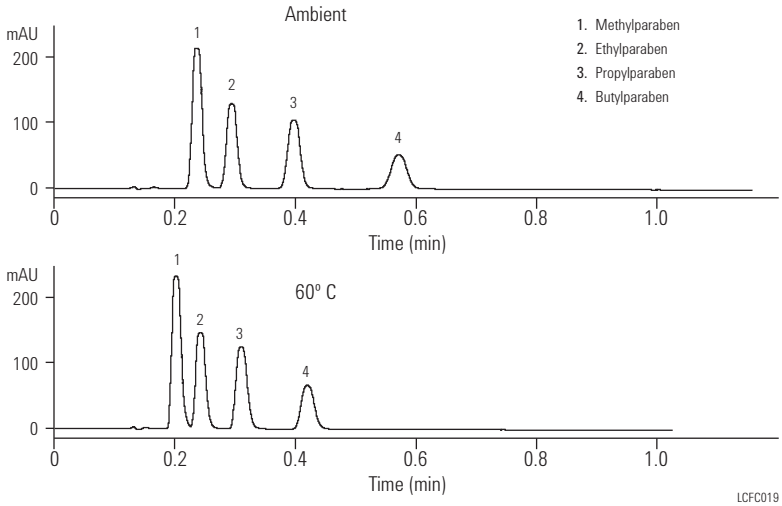
Mobile Phase:	97% MeOH: 3% 10mM CH_3COONH_4
Flow Rate:	0.5ml/min
Temperature:	40°C
MS Conditions:	MS: Agilent 1100MSD SL Ionization: APPI(Positive) Scan range: m/z 100-500 Vcap: 1500 V SIM ion: base peak Drying gas: 7 l/min at 350°C Nebulizer gas: 60psi Vaporizer temp: 350°C Fragmentor: 140 V EM gain: 4
Sample Volume:	10 µl



Parabens: High Speed Separation

Column: **ZORBAX SB-C18**
Rapid Resolution Cartridge
833975-902
4.6 x 30 mm, 3.5 µm

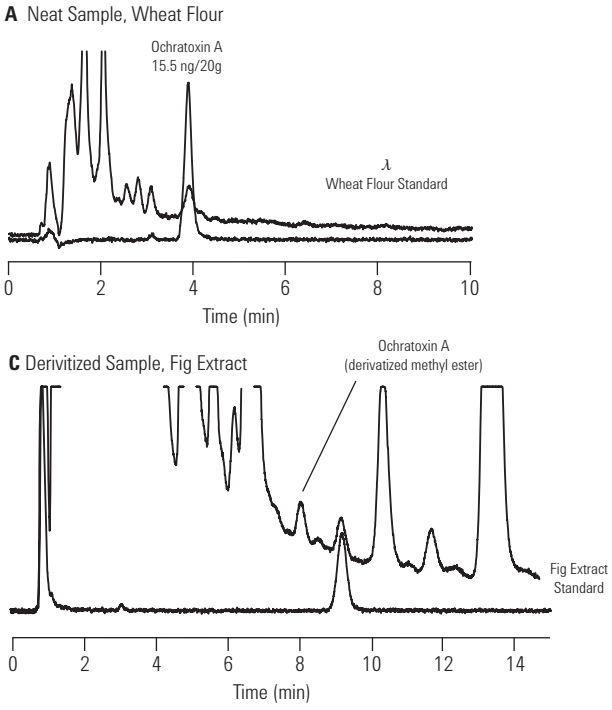
Mobile Phase:	0.1% H_3PO_4: ACN, (50:50)
Flow Rate:	2 mL/ min
Temperature:	top: ambient, bottom: 60°C
Detector:	UV 254 nm with standard flow cell (13 µL)
Sample:	Parabens, 1 µL



Ochratoxin: Analysis in Wheat Flour, Analysis with Derivatization in Fig Extract

Column: **LiChrospher 100 RP-18**
799250D-564-3
4.0 x 125 mm, 5 µm

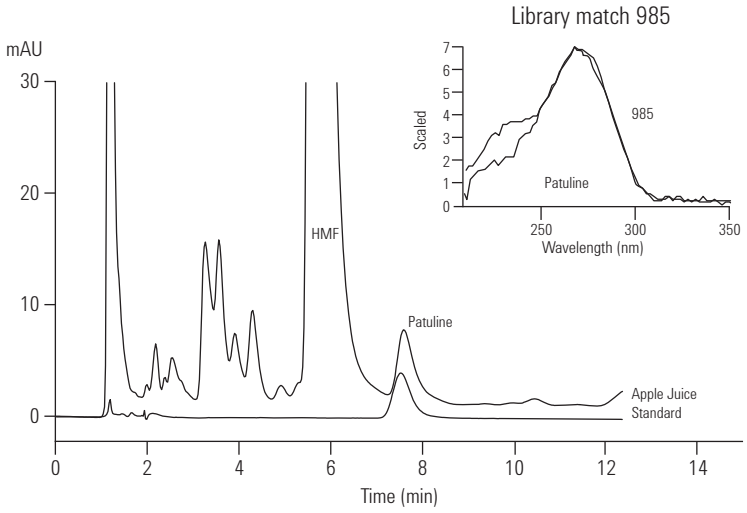
Mobile Phase:	Water with 2% acetic acid/Acetonitrile, 1:1
Flow Rate:	1.0 mL/min
Temperature:	40°C
Detector:	Fluorescence λ ex 247 nm, λ ex 480 nm
Sample:	Ochratoxin in Wheat Flour & Fig Extract (as indicated) A. Neat sample, wheat flour B. Standard C. Derivatized sample, fig extract



Patuline in Apple Juice

Column: **LiChrospher 100 Diol**
79925DI-564
4 x 125 mm, 5 µm

Mobile Phase: Hexane-isopropanol 95:5 as isocratic mixture
Flow Rate: 0.6 mL/min
Temperature: 30°C
Detector: DAD 270/20 nm
Confirmation: spectral information and retention times
Sample: a: Apple juice
b: Standard



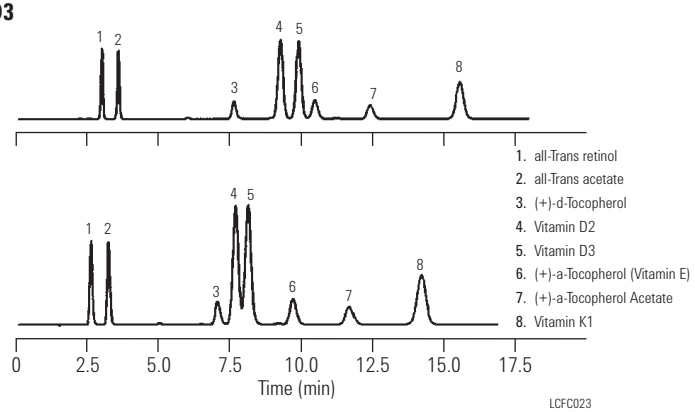
LCFC021

Fat-Soluble Vitamins: Separation of Vitamin D2 from D3

Column A: **ZORBAX ODS**
884950-543
4.6 x 250 mm, 5 µm

Column B: **ZORBAX ODS**
883952-702
4.6 x 150 mm, 5 µm

Mobile Phase: 75/25 ACN/MeOH
Flow Rate: 1.0 mL/min
Temperature: 40°C
Detector: UV 325 nm for 4 min, 280 nm after
Sample: 5 µL (10 µg/µL), Fat Soluble Vitamin Standard

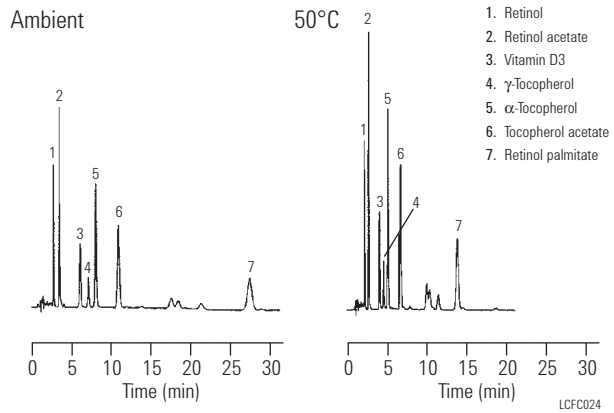


LCFC023

Fat-Soluble Vitamins on ZORBAX Eclipse XDB-C8

Column: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: 5/95 Water/MeOH
Flow Rate: 1.0 mL/min
Temperature: a: Ambient
b: 50°C
Detector: UV 280 nm
Sample: Fat Soluble Vitamins

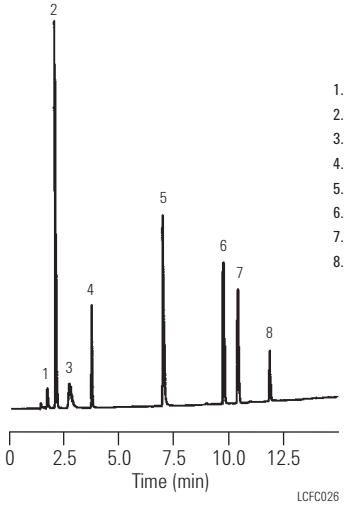


LCFC024

Water-Soluble Vitamins

Column: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

Mobile Phase: A = 50 mM Sodium Phosphate, pH 2.5/MeOH (90/10)
B = 50 mM Sodium Phosphate, pH 2.5/MeOH (10/90)
Flow Rate: 1.0 mL/min
Gradient: 0-70% B in 18 min
Temperature: Ambient
Detector: UV 245 nm
Sample: Water soluble vitamins

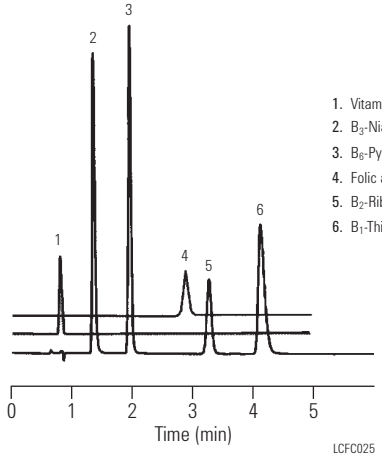


1. B_1-Thiamine
2. Vitamin C
3. B_3-Niacin
4. B_6-Pyridoxine
5. Pantothenic acid
6. Folic acid
7. B_{12}-Cyanocobalamin
8. B_2-Riboflavin

Water-Soluble Vitamins: High Speed Separation using Ion-Pairing

Column: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 10 mM Hexane Sulfonate with 0.1% Phosphoric Acid: MeOH (74:26)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 245 nm
Sample: Water soluble vitamins

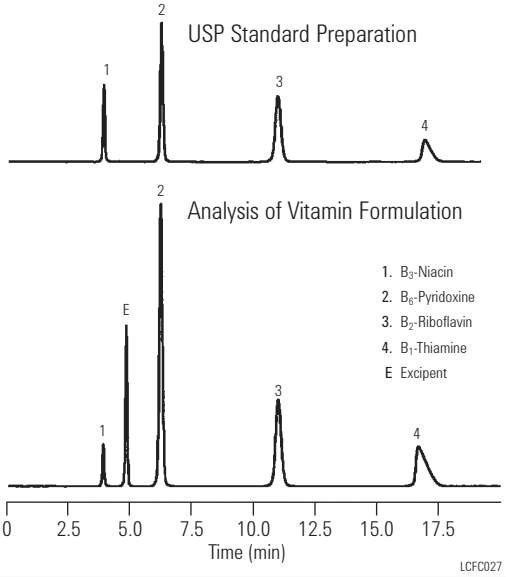


1. Vitamin C
2. B_3-Niacin
3. B_6-Pyridoxine
4. Folic acid
5. B_2-Riboflavin
6. B_1-Thiamine

Water-Soluble Vitamins using the USP 23 Method

Column: **ZORBAX SB-C18**
880975-902
4.6 x 250 mm, 5 µm

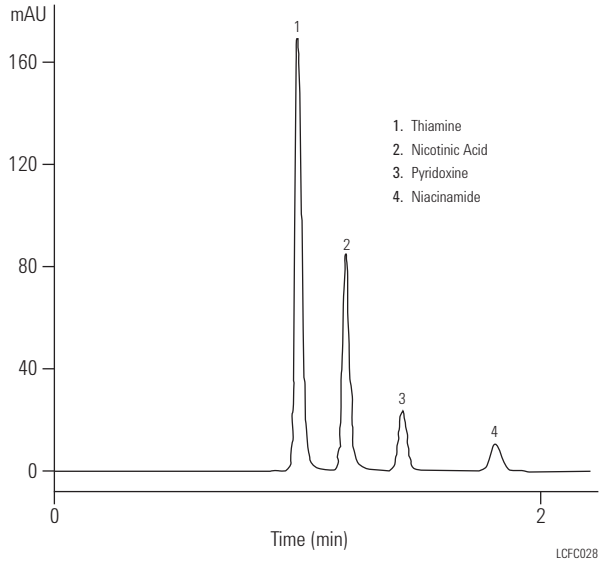
Mobile Phase: 7.2 mM Hexane Sulfonate/MeOH/Acetic Acid (73/27/1) (ratio to 101)
Flow Rate: 1.0 mL/min
Temperature: 30° C
Detector: UV 280 nm
Sample: Water soluble vitamins



1. B_3-Niacin
2. B_6-Pyridoxine
3. B_2-Riboflavin
4. B_1-Thiamine
E Excipent

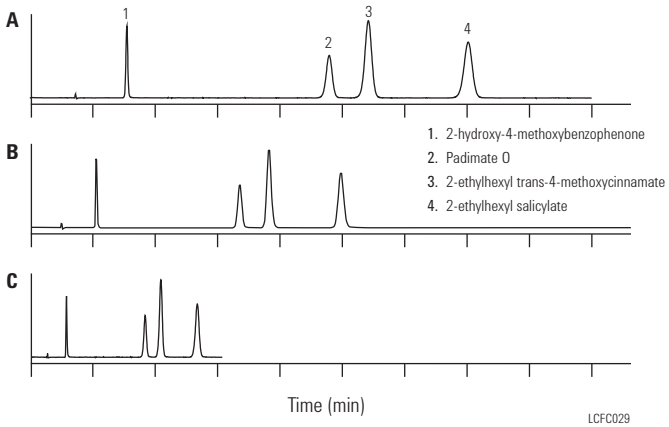
Water Soluble B Vitamins Separated on ZORBAX SB-Aq

Column:	**ZORBAX SB-Aq** **883975-914** **4.6 x 150 mm, 5 µm**
Mobile Phase:	5% MeOH/95% TFA (0.1%)
Flow Rate:	2.0 mL/min
Temperature:	35°C
Detector:	UV 254 nm



Sunscreen Ingredients: Perform conventional, fast and ultra-fast separations on the same column family

Column A:	**Eclipse XDB-C18** **993967-902** **4.6 x 150 mm, 5 µm** **6 µl inj**
Column B:	**Eclipse XDB-C18** **961967-902** **4.6 x 100 mm, 3.5 µm** **4 µl inj**
Column C:	**Eclipse XDB-C18** **927975-902** **4.6 x 50 mm, 1.8 µm** **2 µl inj**
Mobile Phase:	A: 15% water B: 85% MeOH
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Publication:	5989-4721EN
Sample:	Sunscreens



Fast Vitamin E Analysis on Rapid Resolution HT

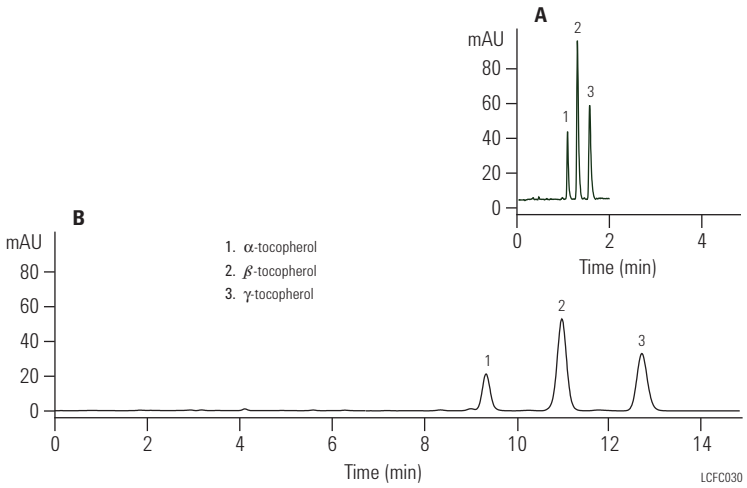
Column A: **Eclipse XDB-C18**
927975-902
4.6 x 50 mm, 1.8 µm

Column B: **Eclipse XDB-C18**
993967-902
4.6 x 150 mm, 5 µm

Mobile Phase: A: 5% water
B: 95% MeOH

Flow Rate: 3 mL/min, 1 mL/min

Temperature: Ambient



Theobromine in Beverages

Column: **SB-C18**
827975-902
4.6 x 50 mm, 1.8 µm

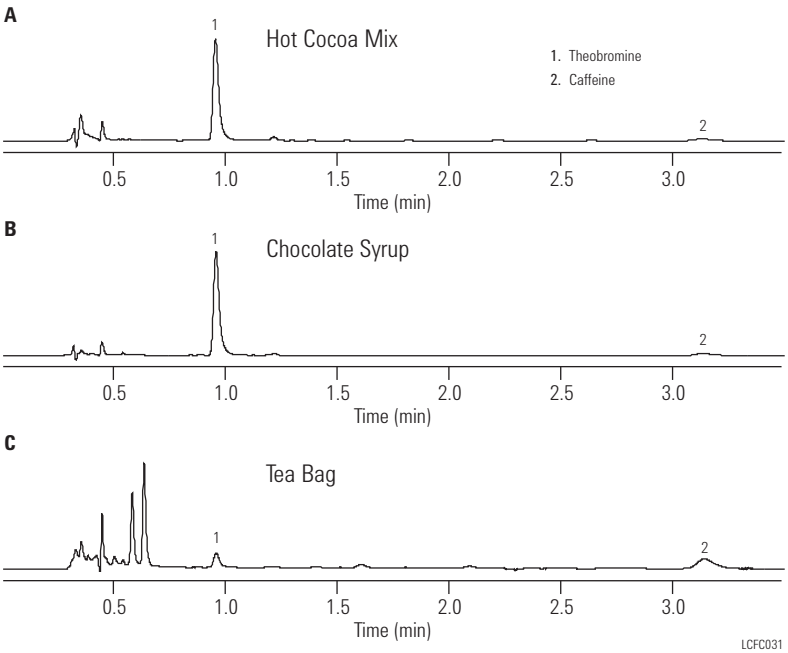
Mobile Phase: A: 92% 0.1% formic acid
B: 8% 0.1% formic acid in ACN

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV 254 nm, flow cell 2 µl,
3 mm flow path

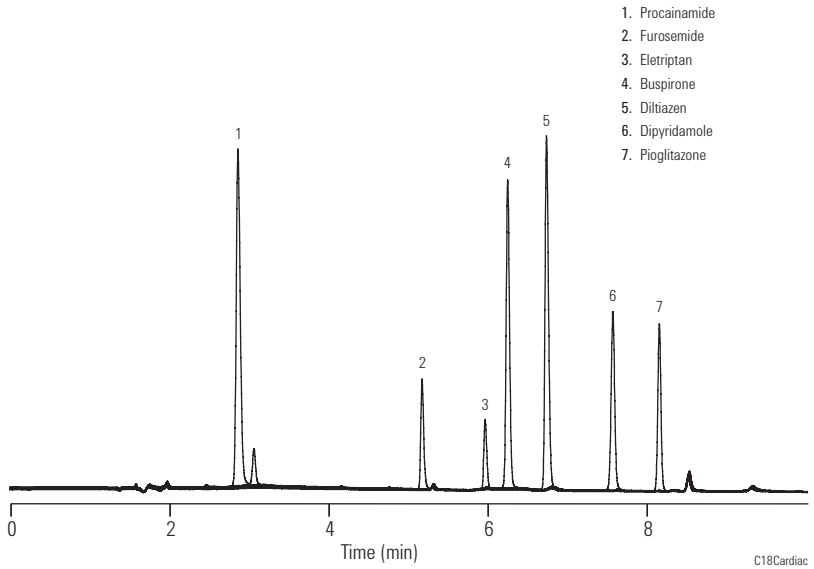
Sample: Theobromine



Pharmaceutical Applications

Separation of Pharmaceutical Cardiac Drugs on Eclipse Plus C18

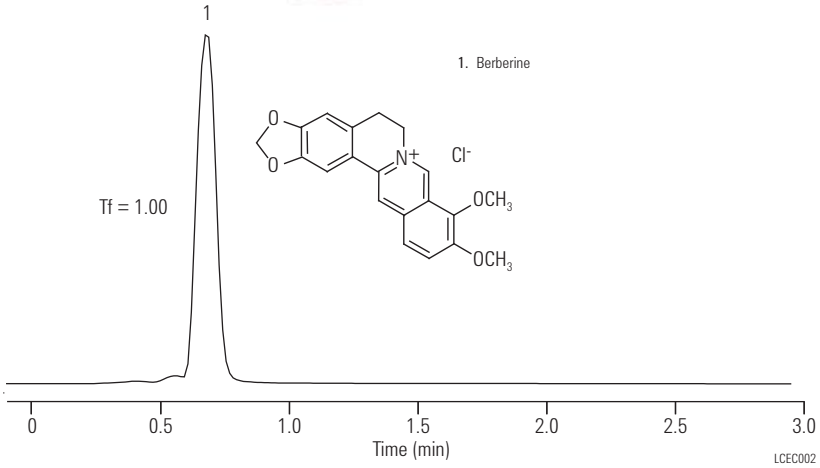
Column:	**Eclipse Plus C18** **959996-902** **4.6 x 100 mm, 5 µm**
Mobile Phase:	A: 20 mM Ammonium Acetate, pH 4.8: B: ACN
Flow Rate:	1 mL/min
Gradient:	10 – 90% in 10 minutes
Detector:	UV 254 nm



Fast and Ultra-Fast Analysis of Basic Compounds on Eclipse Plus

Column:	**Eclipse Plus C18** **959941-902** **4.6 x 50 mm, 1.8 µm**
Mobile Phase:	A: 50% 8 mM K_2HPO_4, pH 7 B: 50% ACN
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Publication:	5989-4934EN
Sample:	Berberine, 0.4 mg/mL, 2 µL





Xanthines: Higher Resolution, Same Selectivity with RRHT

Column A: **ZORBAX SB-C18**
846975-902
4.6 x 50 mm, 5 µm

Column B: **SB-C18**
827975-902
4.6 x 50 mm, 1.8 µm

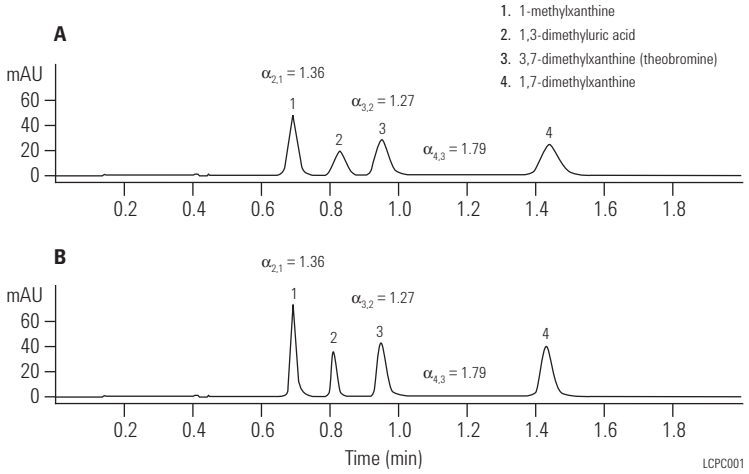
Mobile Phase: A: 92% 0.1% formic acid
B: 8% 0.1% formic acid in ACN

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Xanthines



Antihistamines: Fast Separations on RRHT Extend-C18

Column A: **ZORBAX Extend-C18**
773450-902
4.6 x 150 mm, 5 µm

Column B: **ZORBAX Extend-C18**
727975-902
4.6 x 50 mm, 1.8 µm

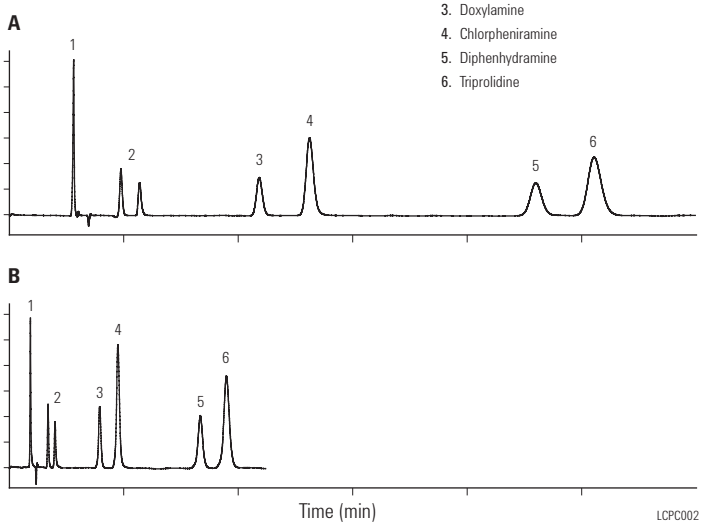
Mobile Phase: A: 30% 50 mM pyrrolidine buffer
B: 70% MeOH

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV 220 nm

Sample: Antihistamines



Ibuprofen: Optimizing Selectivity with RRHT Columns

Column A: **SB-C8**
827975-906
4.6 x 50 mm, 1.8 µm

Column B: **Eclipse XDB-C8**
927975-906
4.6 x 50 mm, 1.8 µm

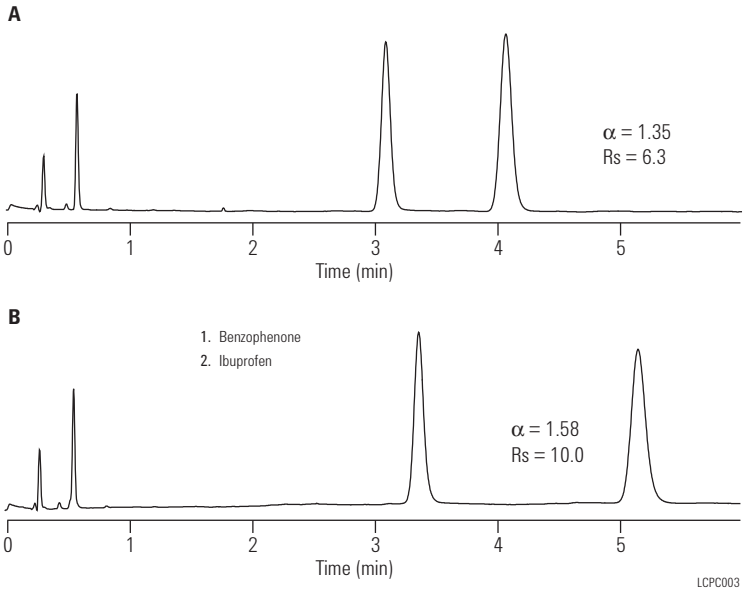
Mobile Phase: A: 63% water
B: 37% acetonitrile + 1.8 mL H_3PO_4

Flow Rate: 2.0 mL/min

Temperature: Ambient

Detector: UV 254 nm

Sample: Ibuprofen Oral Suspension



LCPC003

Analgesics: High Speed Separation

Column: **ZORBAX SB-C18**
833975-902
4.6 x 30 mm, 3.5 µm

Mobile Phase: 1 mM octane sulfonic acid, Na salt, pH 2.5, or 1% formic acid: ACN (80:20)

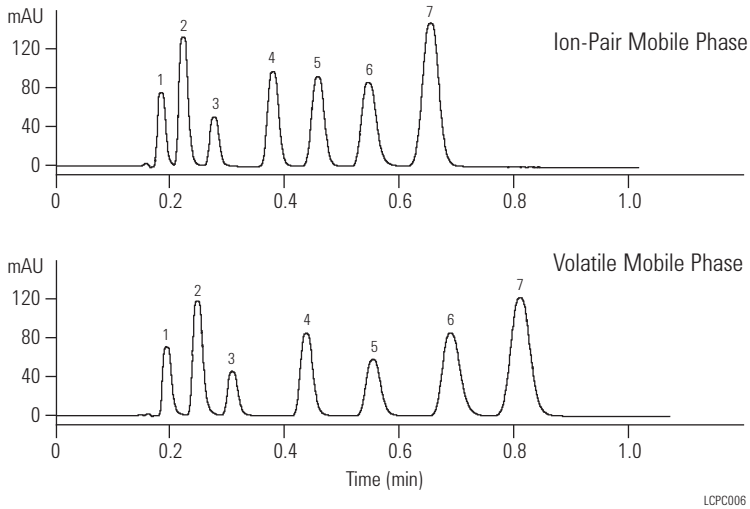
Flow Rate: 2 mL/min

Temperature: 70°C

Detector: UV 275 nm with standard flow cell (13 µL)

Sample: Analgesics, 1 µL

1. Acetaminophen (4-acetamidophenol)
2. Caffeine
3. 2-acetamidophenol
4. Acetanilide
5. Aspirin (acetosalicylic acid)
6. Salicylic acid
7. Phenacetin (acetophenetidin)



LCPC006

Anesthetics, Local: Bonded Phase Selectivity

Column A: **ZORBAX SB-C18**
883975-902
4.6 x 150 mm, 5 µm

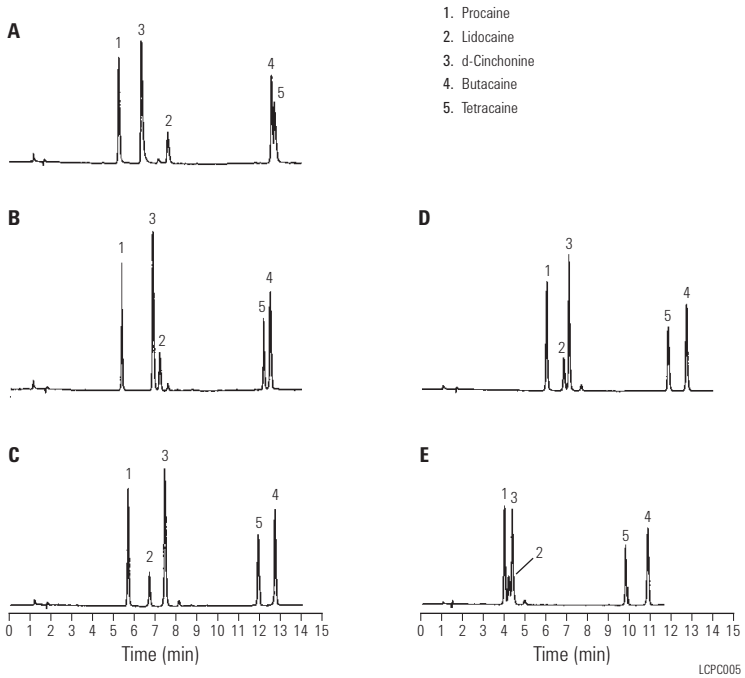
Column B: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

Column C: **ZORBAX SB-C3**
883975-909
4.6 x 150 mm, 5 µm

Column D: **ZORBAX SB-Phenyl**
883975-912
4.6 x 150 mm, 5 µm

Column E: **ZORBAX SB-CN**
883975-905
4.6 x 150 mm, 5 µm

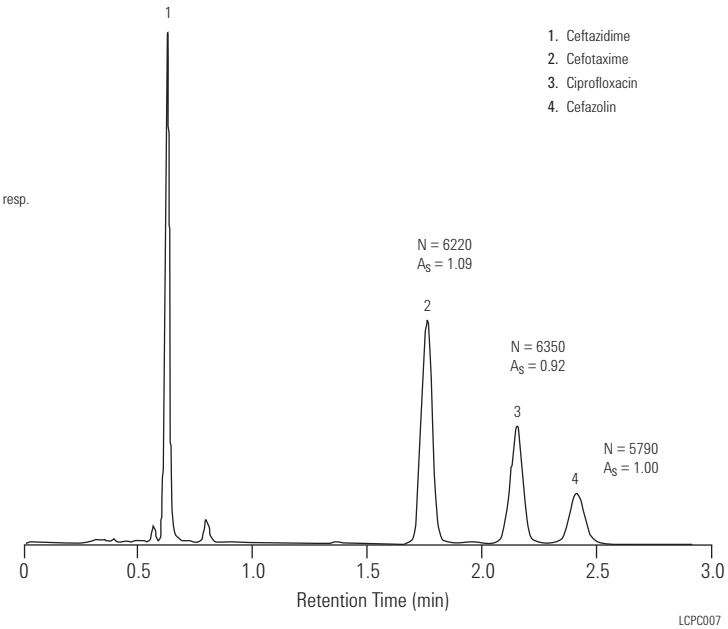
Mobile Phase:	A = 50 mM NaH_2PO_4 pH 2.5 in 95% H_2O/ 5% ACN B = 50 mM NaH_2PO_4 pH 2.5 in 47% H_2O/53% ACN
Flow Rate:	1.5 mL/min
Gradient:	0-100% B in 18.8 min
Temperature:	26°C
Detector:	UV 254 nm
Sample:	10 µL, 10 ug/mL



Antibiotics: High Speed Separation

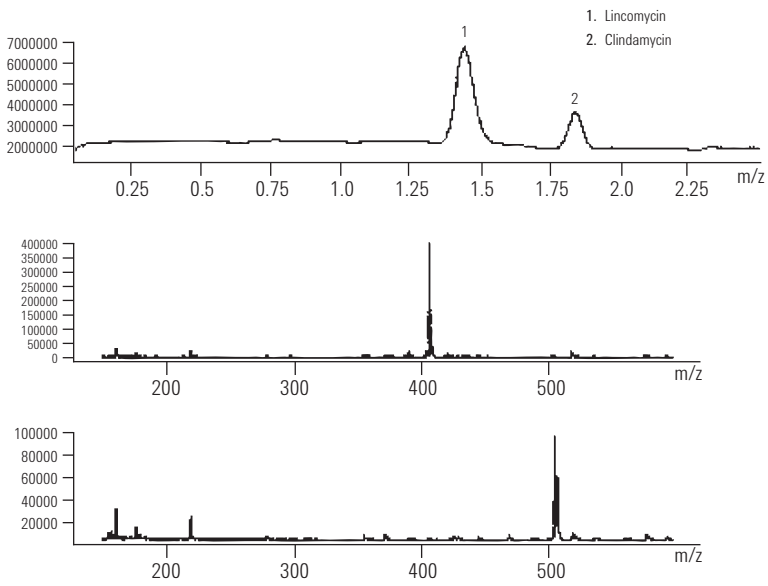
Column: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase:	8.0% acetonitrile/92% 0.1% aqueous TFA
Flow Rate:	3.0 mL/min
Gradient:	45-70%B in 35 min.
Temperature:	60° C
Detector:	UV 260 nm
Sample:	1 µL containing 0.40, 0.36, 0.10 and 0.37 µg ea. of 1-4 resp.



Antiobiotics: Lincomycin and Clindamycin by LC-APCI-MS LC-TIC

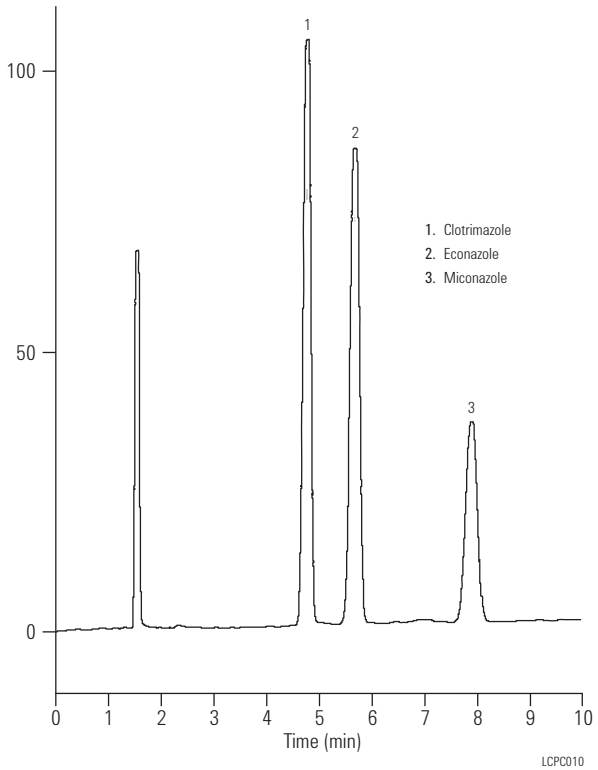
Column:	**ZORBAX SB-C18 cartridge 823700-902 2.1 x 30 mm, 1.8 µm**
Mobile Phase:	Gradient: 15-50% B in 1 min, hold for 1.5 min, A: 0.2% formic acid pH, 2.8 B: ACN + 0.2% formic acid
Flow Rate:	0.5 mL/min
Gradient:	Post time: 1.5 min
Temperature:	Ambient
Detector:	APCI, Positive ion
MS Conditions:	MS Conditions: Peakwidth: 0.10 min Scan: 150-600 Da, step 0.1 Fragmentor: 70 Gas Temp: 350° C Vaporizer: 350° C Drying gas: 12 l/min Nebulizer pres: 50 psi Vcap +3000V Corona: 4.0 µA
Sample:	Antibiotics, 1 µL



LCPC008

Antifungal Medications

Column:	**ZORBAX Bonus-RP 883668-901 4.6 x 150 mm, 5 µm**
Mobile Phase:	35% 25 mM NaH_2PO_4 , Dibasic (pH 6.5 with H_3PO_4): 65% ACN
Flow Rate:	1 mL/min
Temperature:	Ambient
Detector:	UV 220 nm
Publication:	LI PH46
Sample:	Antifungals, 2 µL



LCPC010

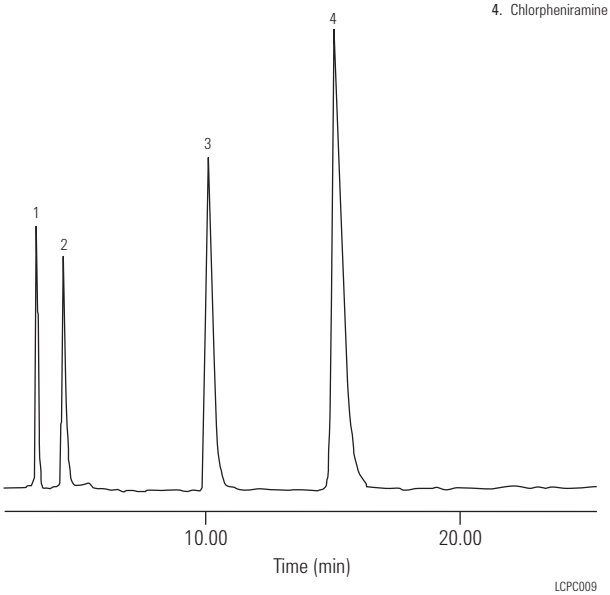
Antihistamines

Column: **ZORBAX Rx-C8**
883967-901
4.6 x 150 mm, 5 µm

Column: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

Mobile Phase: 10% ACN, 90% 50 mM, KH_2PO_4, pH 2.5
Flow Rate: 2.0 mL/min
Temperature: 25°C
Detector: UV 254 nm
Sample: Antihistamines

1. Pseudoephedrine
2. Scopolamine
3. Pyrilamine
4. Chlorpheniramine



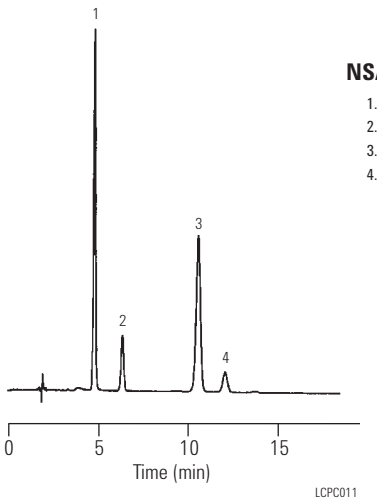
LCPC009

Analgesics: Non-steroidal Anti-inflammatory Drugs: Narrow Bore Separation

Column: **Eclipse XDB-C8**
993700-906
2.1 x 150 mm, 5 µm

Mobile Phase: 50/50, 25 mM Sodium Phosphate (pH 7.0 with Phosphoric Acid), MeOH
Flow Rate: 0.2 mL/min
Temperature: 35°C
Detector: UV 254 nm
Sample: 2 µL, 10 ug/mL

NSAID	pK_a
1. Phenacetin	2.2
2. Tolmetin	3.5
3. Phenylbutazone	4.4
4. Fenoprofen	4.5



LCPC011

Aromatic Acids/Benzoic Acids–Selectivity Differences

Column A: **ZORBAX SB-C8**
880975-906
4.6 x 250 mm, 5 µm

Column B: **ZORBAX SB-Phenyl**
880975-912
4.6 x 250 mm, 5 µm

Column C: **ZORBAX SB-CN**
880975-905
4.6 x 250 mm, 5 µm

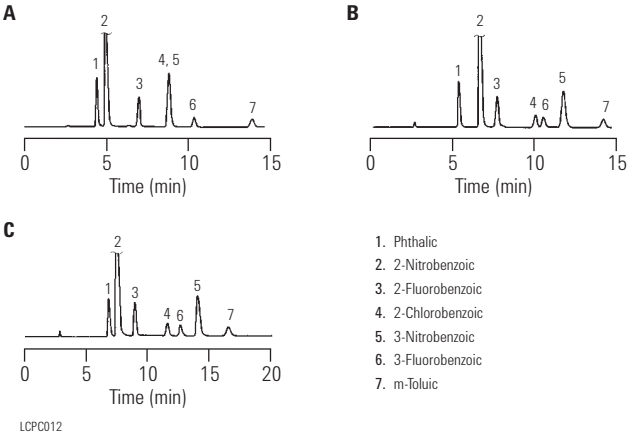
Mobile Phase: 30-45% methanol (above) in 25 mM Na Phosphate, pH 2.5
a: 45% Methanol
b: 40% Methanol
c: 30% Methanol

Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: UV 254 nm

Sample: Benzoic acids



1. Phthalic
2. 2-Nitrobenzoic
3. 2-Fluorobenzoic
4. 2-Chlorobenzoic
5. 3-Nitrobenzoic
6. 3-Fluorobenzoic
7. m-Toluic

LCPC012

Chiral Ethiazide (Diuretic Drug) Separation on Ultron ES-OVM

Column: **Ultron ES-OVM Chiral**
702111651
4.6 x 150 mm, 5 µm

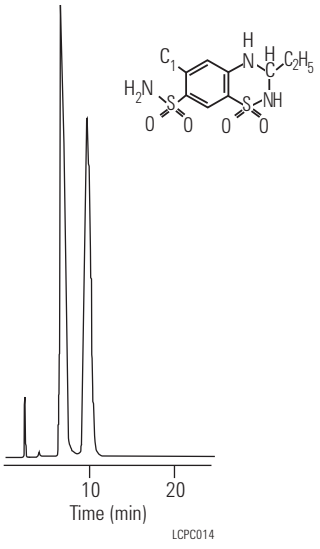
Mobile Phase: 20 mM KH_2PO_4 (pH 4.6)

Flow Rate: 1.0 mL/min

Temperature: 25° C

Detector: UV 220 nm

Sample: 20 µL containing 0.35 µg Ethiazide

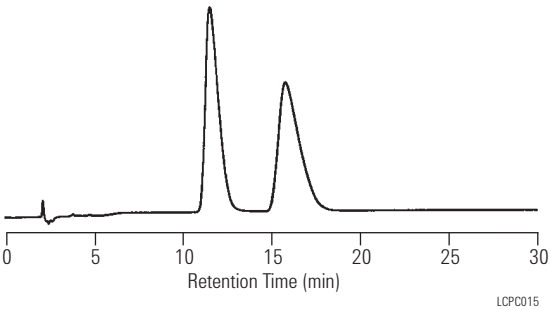


LCPC014

Chiral Separation of Fluoxetine Enantioners (Prozac) using Ultron ES-OVM

Column:	**Ultron ES-OVM Chiral** **702111651** **4.6 x 150 mm, 5 µm**
Mobile Phase:	25/75 (v/v) EtOH / 20 mM KH_2PO_4, pH 5.5 (adjusted with NaOH)
Flow Rate:	0.8 mL/min
Temperature:	Ambient
Detector:	UV 225 nm
Sample:	Mixture Fluoxetine (Prozac) enantiomers

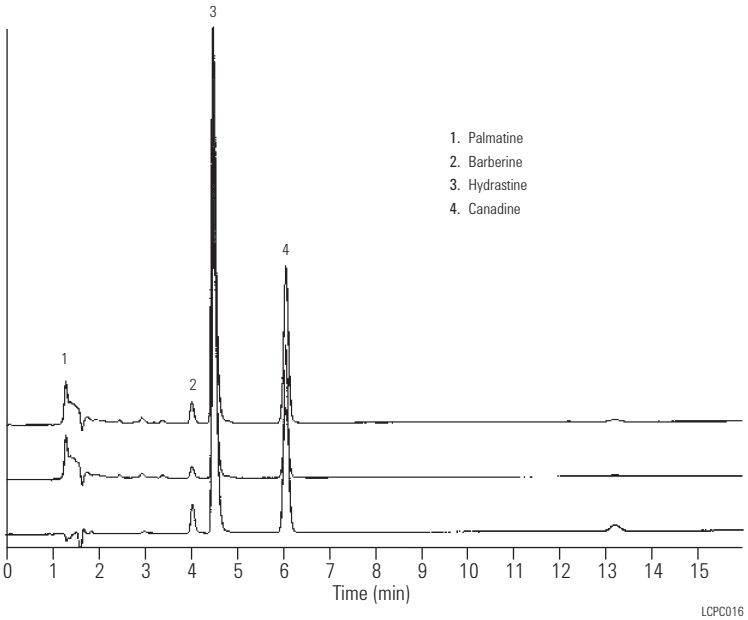
Courtesy of D.S. Ristry and V.S. Sharp, Eli Lilly and Co.



Goldenseal and Related Alkaloids on a Rapid Resolution Eclipse XDB-C18 Column

Column:	**Eclipse XDB-C18** **963967-902** **4.6 x 150 mm, 3.5 µm**
Mobile Phase:	68% 30 mM ammonium acetate, 14 mM TEA, pH ~4.85 32% Acetonitrile
Flow Rate:	1.0 mL/min
Temperature:	30°C
Detector:	230 nm
Sample:	Goldenseal and related Alkaloids

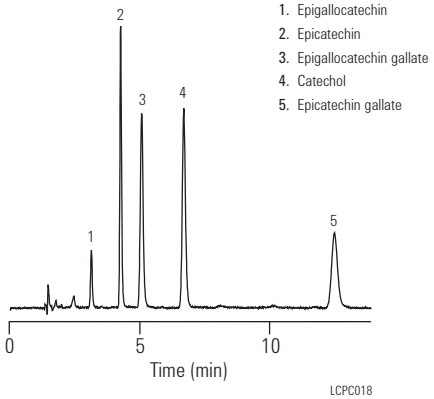
Alkaloids, such as the active components in Goldenseal and other related plants, are quickly and accurately separated using isocratic conditions on an Eclipse XDB-C18 Rapid Resolution column.



Components of Green Tea Separated on a Rapid Resolution StableBond SB-C8 Column

Column:	**ZORBAX SB-C8** **863953-906** **4.6 x 150 mm, 3.5 µm**
Mobile Phase:	75% 0.1% TFA : 25% MeOH
Flow Rate:	1.0 mL/min
Temperature:	40°C
Detector:	280 nm
Sample:	Green tea

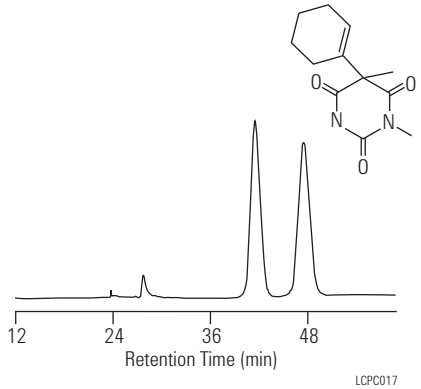
Nutraceuticals, such as the components of green tea, are quickly separated on a StableBond SB-C8 Rapid Resolution column.



Chiral Separation of Hexobarbitol

Column: **Chiradex**
79925CB-584
4.0 x 250 mm, 5 µm

Mobile Phase: Methanol/water, 20:80
Flow Rate: 1.0 mL/min
Detector: UV 220 nm
Sample: Hexobarbitol

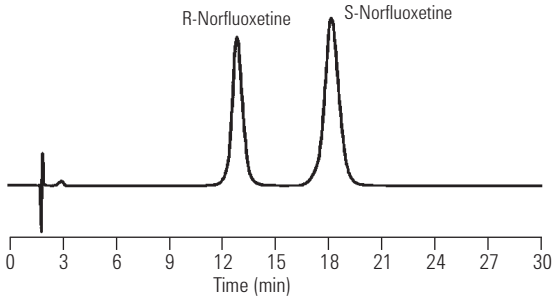


Chiral Separation of S- and R-Norfluoxetine using Ultron ES-Pepsin

Column: **Ultron ES-OVM Chiral**
724111653
4.6 x 250 mm, 10 µm

Mobile Phase: 6/94 (v/v) MeOH / 20 mM KH_2PO_4
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 225 nm
Sample: 50 µg/mL of 2:3 mixture R- : S-Norfluoxetine

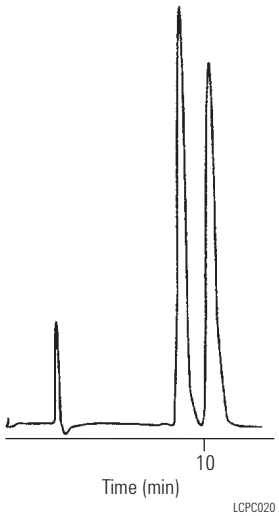
Courtesy of D.S. Ristry and V.S. Sharp, Eli Lilly and Co.



Chiral Separation of Salbutamol on Ultron ES-Pepsin

Column: **Ultron ES-Pepsin**
822111631A
4.6 x 150 mm, 5 µm

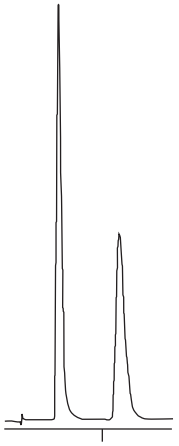
Mobile Phase: 20 mM phosphate buffer, pH 6.0
Flow Rate: 1.0 mL/min
Temperature: 25° C
Detector: UV 220 nm
Sample: 20 µL containing 0.35 µg Salbutamol Mixture



Chiral Separation of Tolperison Enantiomers on Ultron ES-OVM

Column: **Ultron ES-OVM Chiral**
702111651
4.6 x 150 mm, 5 µm

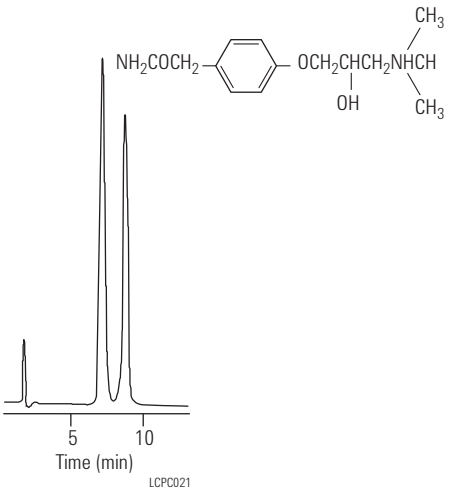
Mobile Phase: 20 mM KH_2PO_4 (pH 5.5), C_2H_5OH (100/4 v/v)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 220 nm, 0.04 AUFS
Sample: Tolperison, 5 µL



Chiral Separation of Atenolol on Ultron ES-Pepsin

Column: **Ultron ES-Pepsin**
822111631A
4.6 x 150 mm, 5 µm

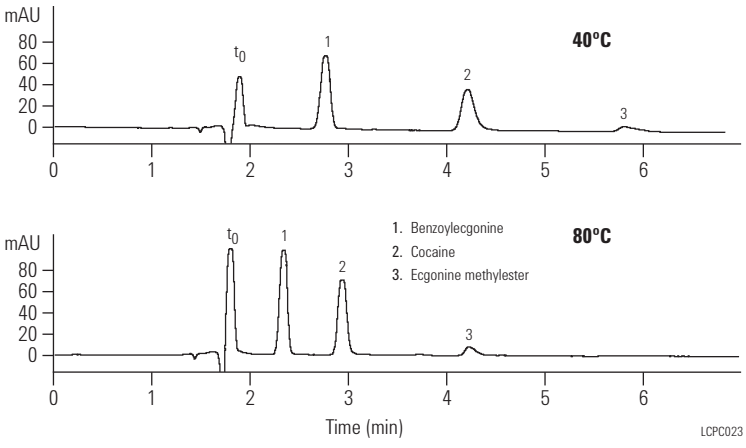
Mobile Phase: 20 mM phosphate buffer, pH 6.0/Ethanol (99/1)
Flow Rate: 1.0 mL/min
Temperature: 25° C
Detector: UV 220 nm, 0.04 AUFS
Sample: 1.5 µL, 0.25 mg/mL, Atenolol Racemic Mixture



Cocaine and Metabolites

Column: **ZORBAX Rx-SIL**
883975-901
4.6 x 150 mm, 5 µm

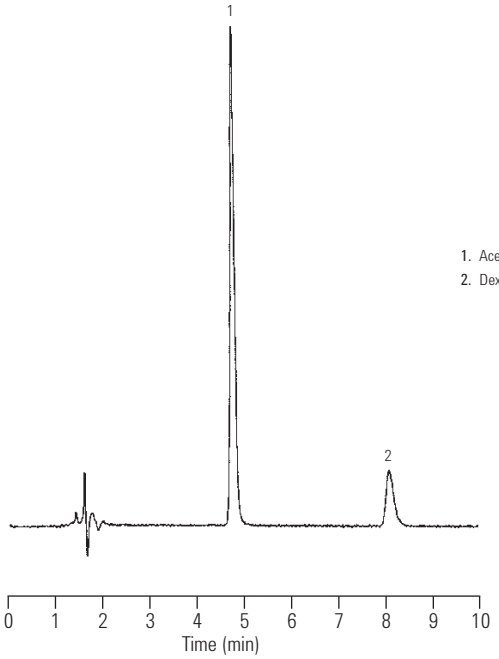
Mobile Phase: MeOH: NH_4 Acetate, 25 mM, pH 6 (70:30)
Flow Rate: 1.0 mL/min
Temperature: 40 and 80°C
Detector: UV 210 nm
Publication: LI PH42



Aspirin and Cough Remedy on ZORBAX Eclipse XDB-C8

Column: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: (75:25) 25 mM Na_2HPO_4 (pH 3.0): ACN
Flow Rate: 1.0 mL/min
Temperature: 40°C
Detector: UV 254 nm
Sample: 5 µL, 10 µg/mL

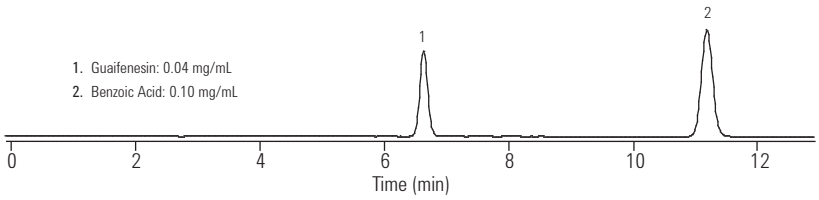


Guaifenesin: USP Analysis of Guaifenesin

Mobile Phase: 40% Methanol:60% Water:1.5% Glacial Acetic Acid
Flow Rate: 1.0 mL/min
Temperature: 25°C
Sample: Guaifenesin
a: 8 µL
b: 2mL

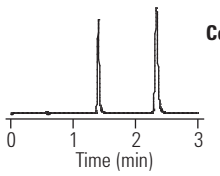
Column: **Eclipse XDB-C18**
990967-902
4.6 x 250 mm, 5 µm

Peak	TR	N	Rs
1	6.63	12,737	0
2	11.19	18,552	15.8



Column: **Eclipse XDB-C18**
922975-902
4.6 x 50 mm, 1.8 µm

Peak	TR	N	Rs
1	1.4	11,421	0
2	2.33	12,909	12.3



Minimum Resolution Required = 3.0

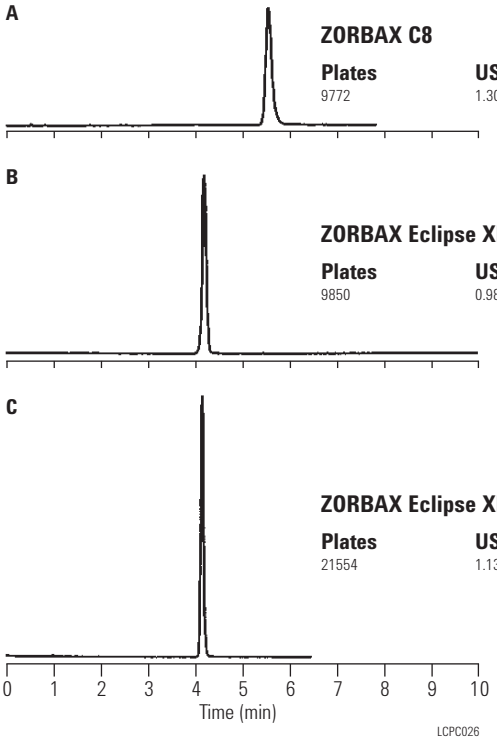
Metronidazole: Updating USP Methods

Column A: **ZORBAX C8**
883952-706
4.6 x 150 mm, 5 µm

Column B: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Column C: **Eclipse XDB-C8**
963967-906
4.6 x 150 mm, 3.5 µm

Mobile Phase: 80/20, Water/Methanol
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 254 nm
Sample: Metronidazole



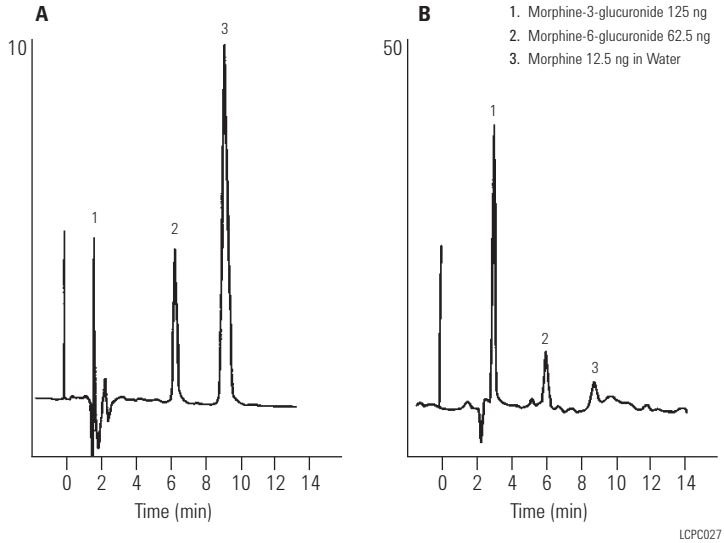
LCPC026

Morphine and Metabolites: Extracted Blood Plasma Sample Separation

Column: **ZORBAX SB-C18**
863953-902
4.6 x 150 mm, 3.5 µm

Mobile Phase: 97/3 70 mM KH_2PO_4 + 1 mM EDTA/ACN, pH 4.5
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detector: a: Electrochemical, 720 mV
b: Fluorescence, Ex = 285 nm, Em = 352 nm
Sample: 50 µL
Morphine-3-glucuronide 125 ng
Morphine-6-glucuronide 62.5 ng
Morphine 12.5 ng in Water

Courtesy of J. Visser, Center for Pharmacy Univ. Groningen, The Netherlands.



LCPC027

Opiates (Drugs of Abuse) by LC/MS

Column: **ZORBAX SB-AQ**
830990-914
2.1 x 150 mm, 3.5 µm

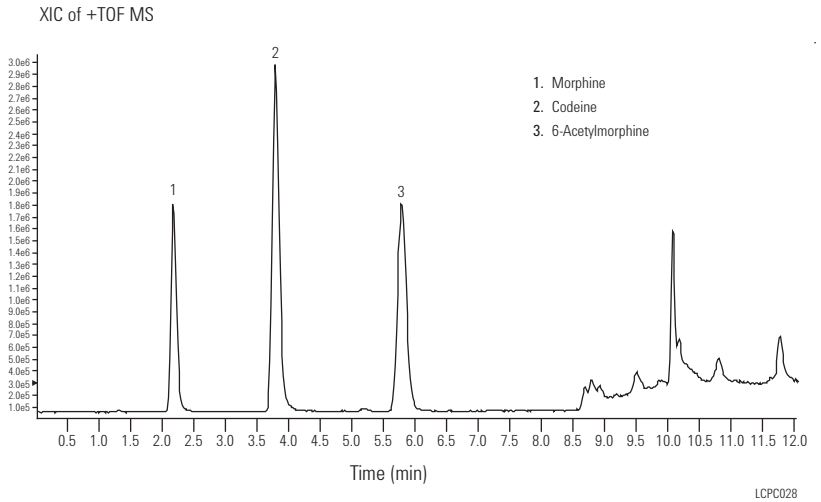
Mobile Phase: A: Acetonitrile with 0.1% formic acid
B: Water with 0.1% formic acid

Flow Rate: 0.25 mL/min

Gradient: 0 min 10% B
5 min 35% B
5.1 min 100% B

MS Conditions: Time of Flight (TOF)
Standard with calibrant delivery system providing constant low flow of ~ 2 uM purine
and HP-921 calibrant to dual ESI for continuous auto-calibration

Sample: Opiates



LCPC028

Neutraceuticals: Hypericin Separation in St. John's Wort

Column: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase: 23% 25 mM Na_2HPO_4 , Dibasic (pH 7.0 with H_3PO 4): 77% MeOH

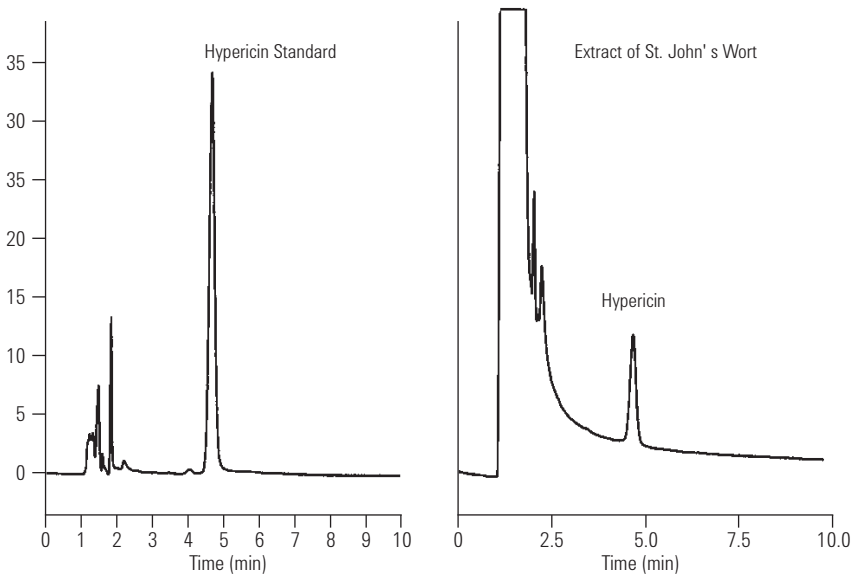
Flow Rate: 1.0 mL/min

Temperature: 35°C

Detector: 254 nm

Publication: LI PH47

Sample: Neutraceuticals



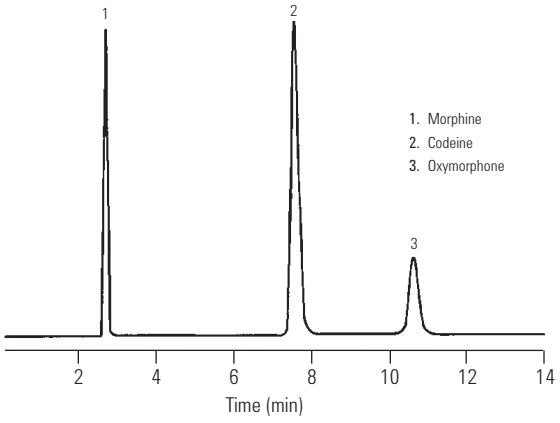
LCPC029

Opiate Drugs, Basic Compounds Showing Good Peak Shape

Column: **ZORBAX Rx-C8**
883967-901
4.6 x 150 mm, 5 µm

Column: **ZORBAX SB-C8**
883975-906
4.6 x 150 mm, 5 µm

Mobile Phase: 7% ACN / 93% 25 mM KH_2PO_4, pH 3.5
Flow Rate: 1.5 mL/min
Temperature: 25° C
Detector: UV 214 nm
Sample: Opiate Drugs



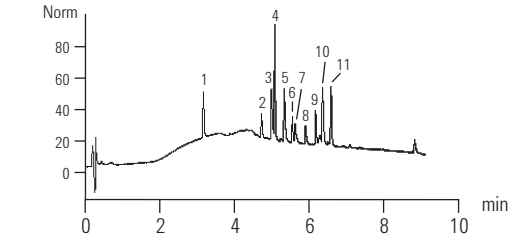
1. Morphine
2. Codeine
3. Oxymorphone

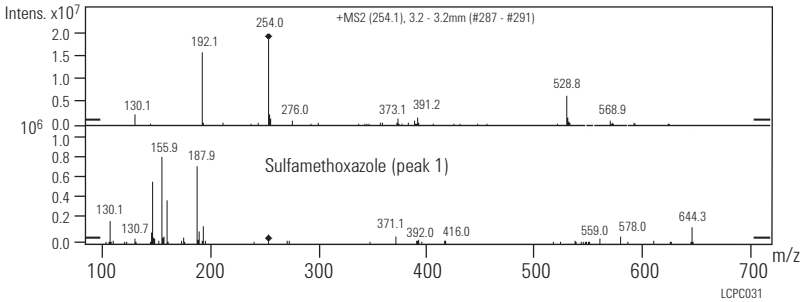
LCPC030

Pharmaceuticals: Rapid, High Sensitivity LC and LC/MS of 11 Drugs

Column A: **Eclipse XDB-C18**
925700-902
2.1 x 50 mm, 1.8 µm

Mobile Phase: A: 10mM NH_4 Formate (pH=3.6)
B: ACN with 10mM NH_4 Formate
Flow Rate: 0.6 mL/min
Gradient: 5% B to 70% B in 7.5 min,
to 95% B in 8.5 min.
Temperature: 65°C
Detector: UV 230 nm and MSD Trap SL
MS Conditions: Pos. Dry Gas: 345°C
Neb.: 45psi
HV Cap: 3500V
Range: 100-700
Average: 5 Spectra
ICC: 30000
Charge Con: On
Smart Par. Settings: Tar Mas: 250 m/z
Comp. Stab.100%
Trap Drive: 100%
Frag. Options: Smart Frag: On
Frag. Width: 10 m/z





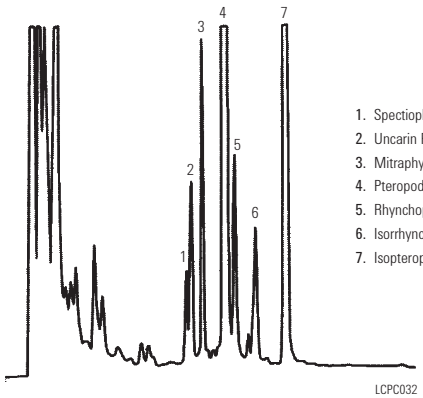
1. Sulfamethoxazole
2. Tripeleneamine
3. Prednisolone
4. Diphenhydramine
5. Carbamazepine
6. Promethazine
7. Protriptyline
8. Imipramine
9. Trimipramine
10. Perphenazine
11. Triflupromazine

LCPC031

Oxindole Alkaloids

Column: **ZORBAX Rx-C18**
880967-902
4.6 x 250 mm, 5 µm

Mobile Phase: A = 10 mM Phosphate Buffer pH 6.6
B = (1:1) MeOH :ACN
Flow Rate: 1.0 mL/min
Gradient: 45-70%B in 35 min.
Temperature: 15°C
Detector: UV 245 nm
Sample: 10 µL, Oxindole Alkaloid Mix



1. Spectiophyllin
2. Uncarin F
3. Mitraphyllin
4. Pteropodin
5. Rhynchophyllin
6. Isorrhynchophyllin
7. Isopteropodin

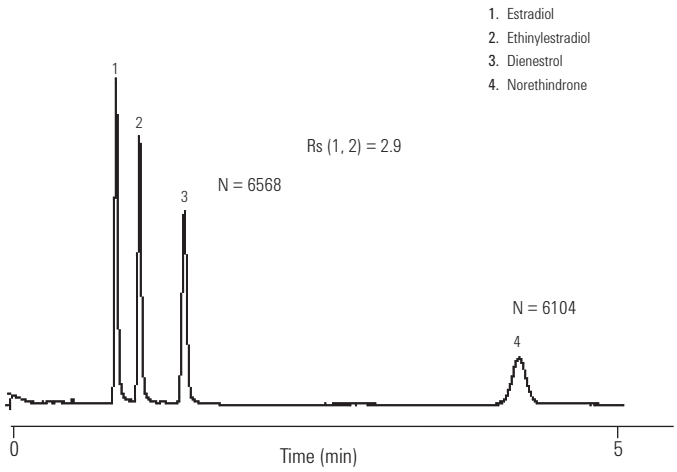
LCPC032

Courtesy of Dr. H. Stuppner, Inst. Pharmacognosy, Univ. Innsbruck, Austria.

Hormones/Steroids on ZORBAX Rapid Resolution HT SB-C18

Column: **ZORBAX SB-C18 RRHT cartridge**
823975-902
4.6 x 30 mm, 1.8 µm

Mobile Phase: 50% 20 mM NaH_2PO_4, pH 2.8: 50% ACN
Flow Rate: 1.0 mL/min
Temperature: RT
Detector: UV 230 nm
Sample: Hormones/Steroids

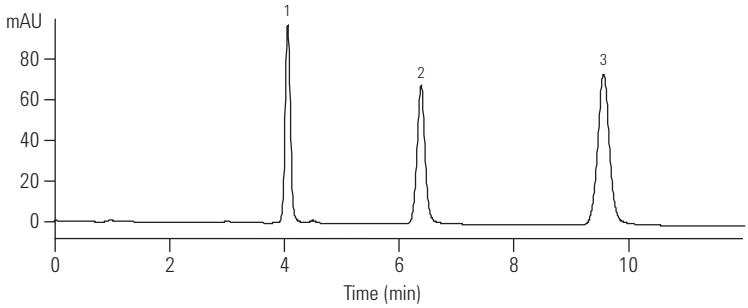


LCPC034

Steroids: Separation on Eclipse XDB-CN

Column: **Eclipse XDB-CN**
993967-905
4.6 x 150 mm, 5 µm

Mobile Phase: 40:60 ACN:Water
Flow Rate: 1.0 mL/min
Temperature: 25°C
Detector: UV 205 nm
Sample: 1. Norethindrone 0.514 mg/mL
2. Progesterone 0.407 mg/mL
3. Mestranol 0.057 mg/mL



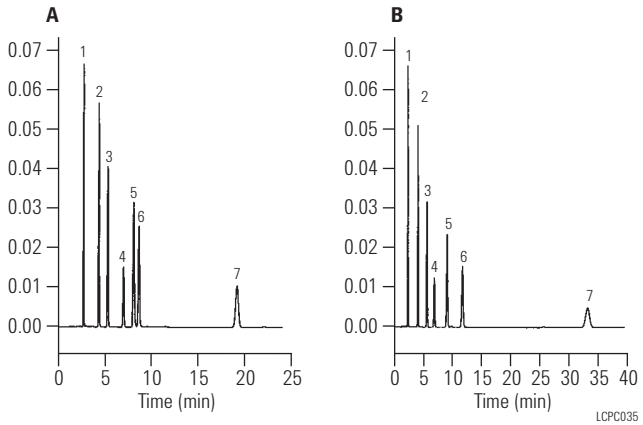
LCPC036

Steroids

Column A: **Eclipse XDB-Phenyl**
963967-912
4.6 x 150 mm, 3.5 µm

Column B: **Eclipse XDB-C18**
993967-902
4.6 x 150 mm, 5 µm

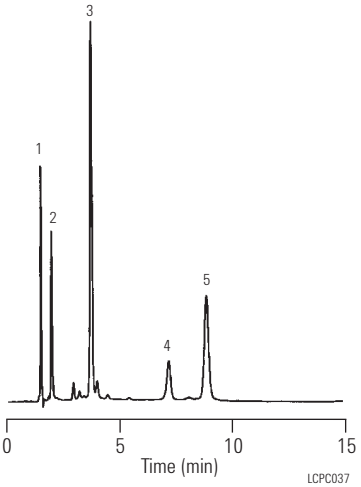
Mobile Phase:	H_2O : ACN, 60:40
Flow Rate:	1.0 mL/min
Temperature:	35°C
Detector:	254 nm
Publication:	LI PH36
Sample:	Steroid Sample 1. Prednisolone 2. Corticosterone 3. 11 -hydroxyprogesterone 4. Cortisone acetate 5. Deoxycorticosterone 6. 17 hydroxyprogesterone 7. Progesterone



Tetracyclines

Column: **ZORBAX Rx-C8**
883967-901
4.6 x 150 mm, 5 µm

Mobile Phase:	75/25 0.1% TFA/Acetonitrile
Flow Rate:	1.0 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Sample:	Tetracyclines



1. Uracil
2. Minocycline
3. Tetracycline
4. Chlortetracycline
5. Doxycycline

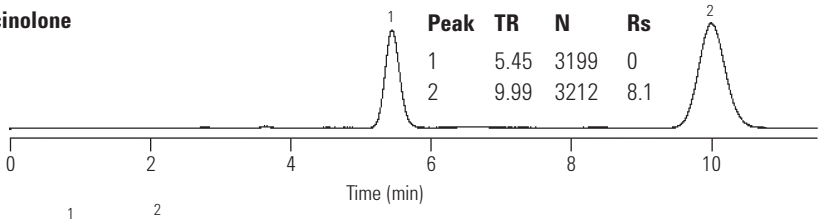
Triamcinolone - USP Analysis of Triamcinolone

Column: **Eclipse XDB-C18**
923975-902
4.6 x 30 mm, 1.8 µm

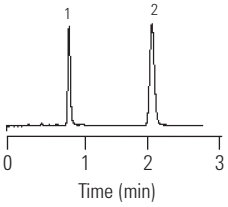
Mobile Phase:	47% Methanol:53% Water
Flow Rate:	1.5 mL/min
Temperature:	25°C
Sample:	Triamcinolone, 1 µL

1. Triamcinolone: 0.2 mg/mL
2. Hydrocortisone: 0.3 mg/mL

Minimum Resolution Required = 3.0



Peak	TR	N	Rs
1	5.45	3199	0
2	9.99	3212	8.1



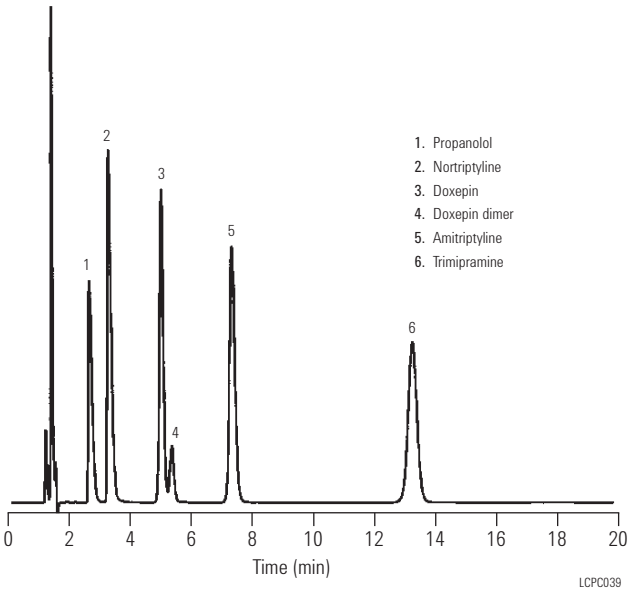
Peak	TR	N	Rs
1	0.89	3256	0
2	2.07	4851	11.8

LCPC038

Tricyclic Antidepressants

Column: **Eclipse XDB-C8**
993967-906
4.6 x 150 mm, 5 µm

Mobile Phase:	38/62 THF/25 mM Potassium Phosphate, pH7
Flow Rate:	1.0 mL/min
Temperature:	23°C
Detector:	UV 254 nm
Sample:	10 µL, Antidepressant Mix, 10 µg/mL

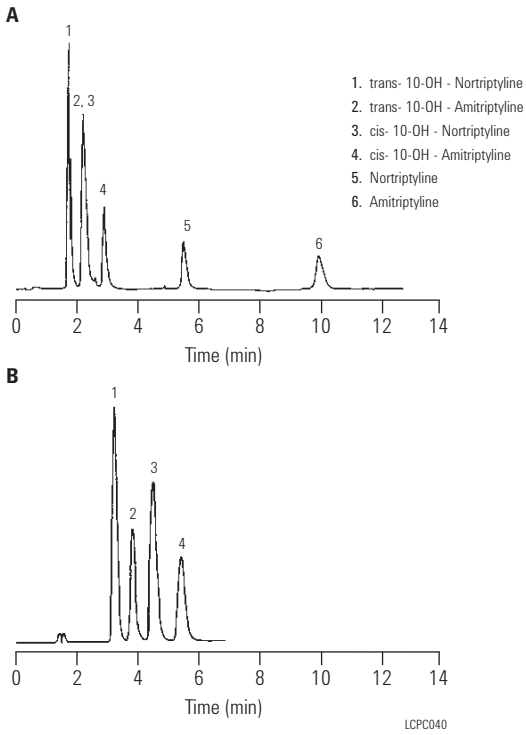


Tricyclic Antidepressants and Metabolites: Effect of Pore Size

Column A: **ZORBAX SB-C18**
863953-902
4.6 x 150 mm, 3.5 µm

Column B: **ZORBAX 300SB-C18**
883995-902
4.6 x 150 mm, 5 µm

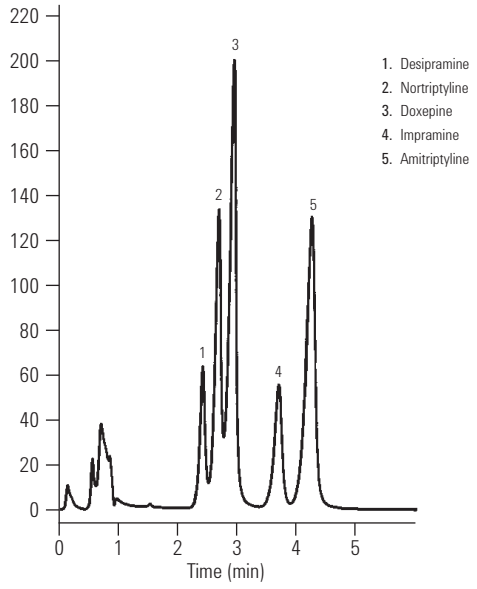
Mobile Phase:	40/60, 25 mM Phosphate Buffer, 10 mM Triethylamine, pH6.2/ACN
Flow Rate:	1.2 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Sample:	10 µL, Antidepressant Mix, 10 µg/mL



Tricyclic Antidepressants, Screening Application at High pH

Column: **Asahipak ODP-50**
7923OP-584
4.0 x 250 mm, 5 µm

Mobile Phase: Phosphate buffer pH 12, Acetonitrile
Flow Rate: 1.0 mL/min
Temperature: 50°C
Detector: UV
Sample: Tricyclic Antidepressents

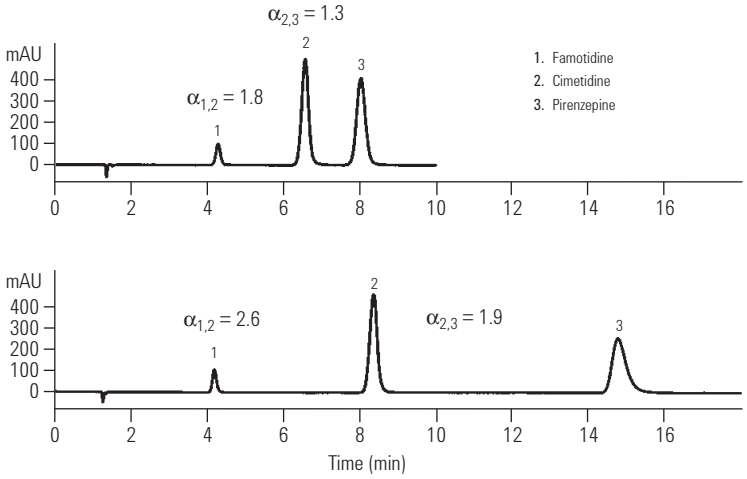


LCPC041

Ulcer Treatment Drugs at Intermediate pH

Column: **ZORBAX Bonus-RP**
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: Na citrate, 20 mM, pH 6.1: MeOH, (80:20)
Flow Rate: 1.0 mL/min
Temperature: Ambient
Detector: UV 220 nm
Sample: Ulcer treatment drugs



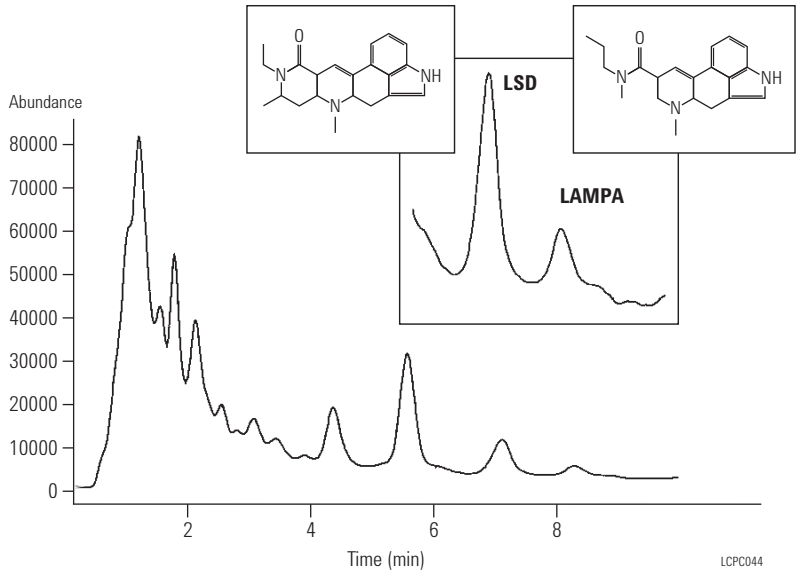
LCPC042

Urine, LSD Analysis by LC/MS

Column: **Eclipse XDB-C8**
960967-906
2.1 x 50 mm, 5 µm

Mobile Phase: 15 : 85, ACN : 10 mM Ammonium Formate, pH 3.7
Flow Rate: 0.3 mL/min
Temperature: 30° C
Detector: MS
MS Conditions: SIM mode, Ions: 324.2, 223.1, 208.1
Fragmentor (dynamically ramped)
100V at 324.2, 148V at 223.1,
170V at 208.1
Publication: LI PH35
Sample: LSD

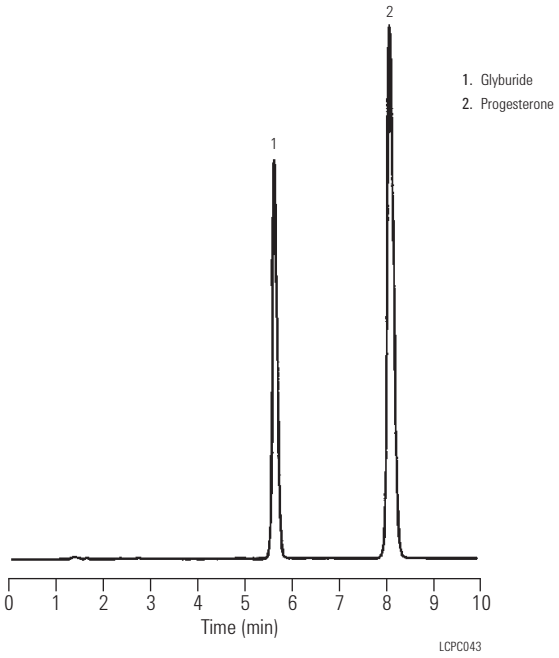
Hughes, J.M., C.A. Miller and S.M. Fischer, "Development of a Method for the Forensic Analysis of LSD in Urine", presented at the ASMS, Palm Springs, June 1997.



USP Method: Glyburide and Internal Standard, Progesterone

Column: **Eclipse XDB-C8**
990967-906
4.6 x 250 mm, 5 µm

Mobile Phase: 45/55, 50 mM Ammonium Phosphate / ACN, Final pH 5.35
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detector: UV 254 nm
Sample: 5 µ L, 10 ug/mL each of standard

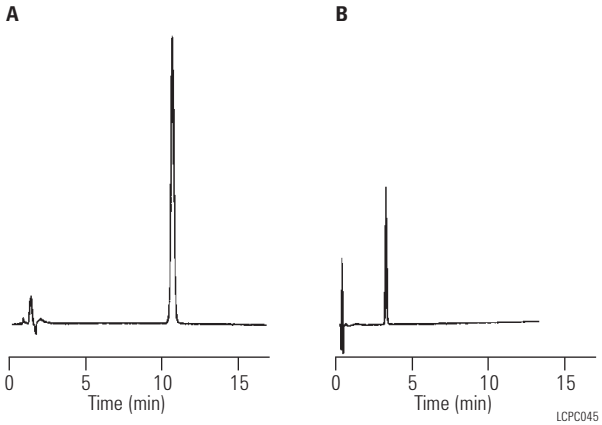


Dexamethasone, USP Method: Rapid Analysis

Column A: **ZORBAX SB-C8**
880975-906
4.6 x 250 mm, 5 µm

Column B: **ZORBAX Rx/SB-C8**
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase:	A = Water, B = ACN; Isocratic 30% B
Flow Rate:	2.0 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Sample:	Dexamethasone 10 µ L and 5 µ L, 10 ug/mL

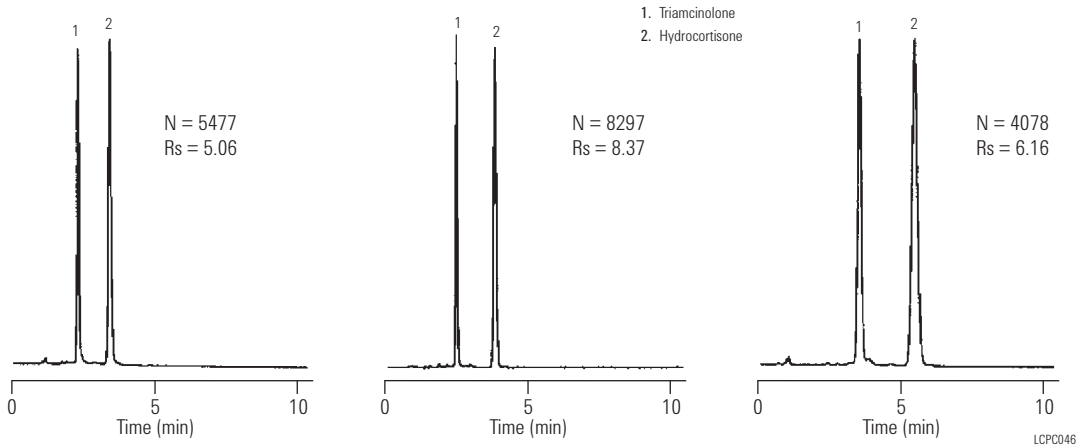


USP Method: Triamcinolone and Internal Standard, Hydrocortisone

Column: **ZORBAX Rx-C18**
880967-902
4.6 x 250 mm, 5 µm

Column: **ZORBAX SB-C18**
880975-902
4.6 x 250 mm, 5 µm

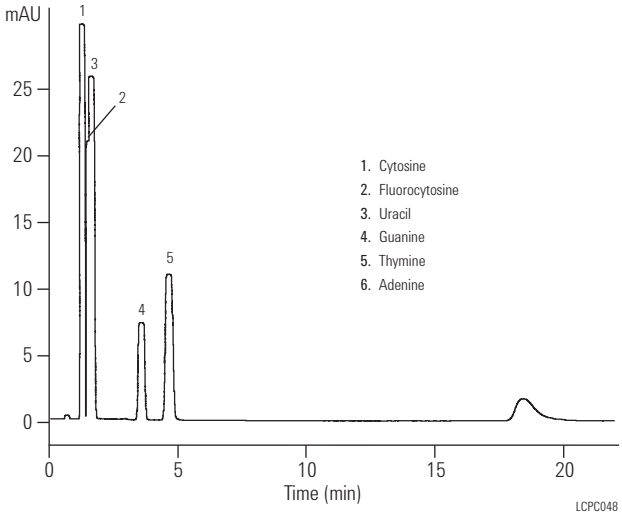
Mobile Phase:	Water: MeOH, 40/60
Flow Rate:	2.0 mL/min
Temperature:	Ambient
Detector:	UV 254 nm
Sample:	10 µ L, 10 ug/mL



Hydrophilic Purine/Pyrimidine Separation

Column: **ZORBAX SB-Aq**
883975-914
4.6 x 150 mm, 5 µm

Mobile Phase: 50 mM NaOAc, pH 4.6
Flow Rate: 2.0 mL/min
Temperature: 35°C
Detector: UV 254 nm

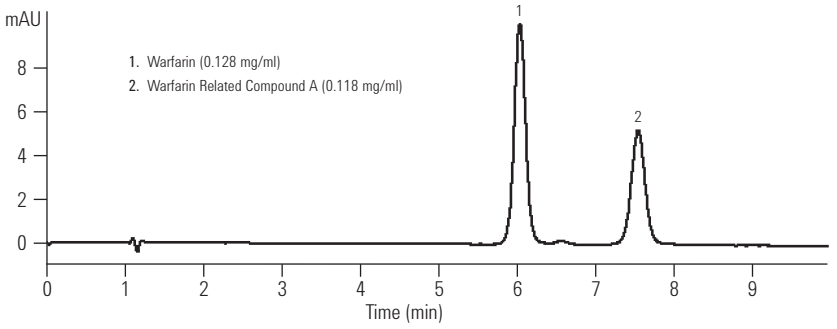


LCPC048

Warfarin: USP Chromatographic Purity Method Using Eclipse XDB-CN

Column: **Eclipse XDB-CN**
993967-905
4.6 x 150 mm, 5 µm

Mobile Phase: 32:68:1 Acetonitrile:Water:Glacial Acetic Acid
Flow Rate: 1.5 mL/min
Temperature: 25°C
Detector: UV 260 nm
Sample: Warfarin, 2 µL

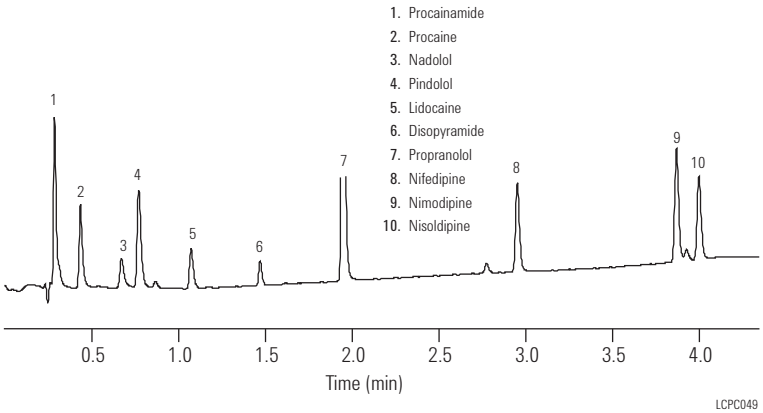


LCPC047

Ten Cardiac Drugs on Rapid Resolution HT SB-C18

Column: **SB-C18**
829975-902
4.6 x 150 mm, 1.8 µm

Mobile Phase: A: 0.1% TFA, 5% ACN
B: 0.08% TFA, 95% ACN
Flow Rate: 2 mL/min
Gradient: 0.0 min 12.5% B
10.5 min 60% B
12.0 min 60% B
Temperature: 70°C
Detector: UV 230 nm
Sample: Cardiac Drugs



LCPC049

Sulfonamides - Fast Analysis with RRHT Columns

Column: **SB-C18**
824700-902
2.1 x 30 mm, 1.8 µm
824700-902

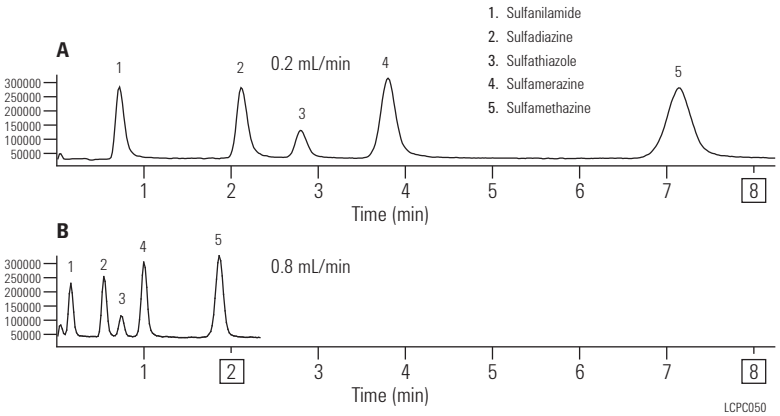
Mobile Phase: A: 90% 0.1% formic acid
B: 10% 0.1% formic acid in MeOH

Flow Rate: A: 0.2 mL/min
B: 0.8 mL/min

Temperature: 35°C

Detector: TIC, Single Quad

Sample: Sulfonamides



LCPC050

Fast Analysis of Pindolol

Column A: **ZORBAX SB-CN**
863953-905
4.6 x 150 mm, 3.5 µm

Column B: **ZORBAX SB-CN**
827975-905
4.6 x 50 mm, 1.8 µm
827975-905

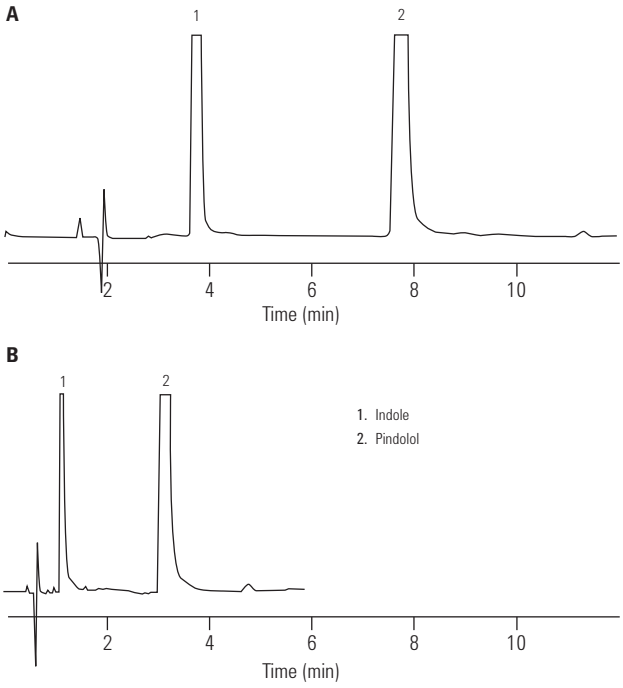
Mobile Phase: A: 70% 50 mM NaAcetate
B: 30% ACN

Flow Rate: 1 mL/min

Temperature: Ambient

Detector: UV 219 nm

Sample: Pindolol, 2 µL



LCPC051

CE and CE/MS

CE Solution Kits **794-795**

CE Capillaries **796-805**

CE Instrument Parts and Supplies **806-813**



CE and CE/MS

Achieve the sensitivity, ruggedness, and reproducibility you need for consistent results



Agilent's Capillary Electrophoresis System is a highly flexible tool for analyzing a wide range of compounds over varying applications.

Additionally, the system features a unique High-Sensitivity Detection Cell, which improves detection sensitivity ten-fold over standard capillaries, so you can generate your data more reliably than ever.

Solutions Kits for CE

Agilent Technologies CE Solutions Kits include all you need to begin your CE analysis: buffers, capillaries, conditioning solutions, test samples and methods. Each kit is designed to take advantage of the automation of the Agilent CE system to make your time in the laboratory more efficient. All kits are prepared using the same quality procedures as our buffers and are thoroughly tested and supported.

While the kits have been optimized for use with the Agilent CE system, they may be used with virtually any commercial or home-built CE system.

Inorganic Anion Solutions Kit

Description	Unit	Part No.
Inorganic Anion Solutions Kit		5063-6511
Inorganic anion buffer	250 mL	8500-6797
Ultra pure CE water	500 mL	5062-8578
0.1 N sodium hydroxide	250 mL	5062-8575
1.0 N sodium hydroxide	250 mL	5062-8576
Bare fused-silica capillary, 50 µm ID, 72 cm long	2/pk	G1600-62211
Inorganic anion test mixture Includes 1000 ppm each of fluoride, chloride, bormide, nitrite, sulfate and 2000 ppm phosphate	10 mL	5062-8524

Note: The following part should be ordered separately for use with the Agilent CE System: Alignment interface for standard 50 µm ID capillary (P/N G1600-60210)

Organic Acids Solution Kit

Description	Unit	Part No.
Organic Acids Solution Kit		5063-6510
Organic acids buffer	250 mL	8500-6785
Ultra pure CE water	500 mL	5062-8578
1.0 N sodium hydroxide	250 mL	5062-8576
Bare fused-silica capillary, 75 µm ID, 72 cm long	2/pk	G1600-62311
Organic acids test mixture Includes 1000 ppm each of malate, succinate, and lactate	20 mL	8500-6900

Note: The following part should be ordered separately for use with the Agilent CE System: Alignment interface for 75 µm ID capillary (P/N G1600-60310)

Forensic Anions Solutions Kit

Description	Unit	Part No.
Forensic Anions Solutions Kit	5 x 50 mL	5064-8208
Basic anion buffer	50 mL	5064-8209
Ultra pure CE water	500 mL	5062-8578
Bare fused silica capillary, 50 µm ID, 104 cm long	2/pk	G1600-64211
Inorganic anion test mixture Includes 1000 ppm each of fluoride, chloride, bormide, nitrite, sulfate and 2000 ppm phosphate	10 mL	5062-8524

Note: The following part should be ordered separately for use with the Agilent CE System:
Alignment interface for standard 50 µm ID capillary (P/N G1600-60210)

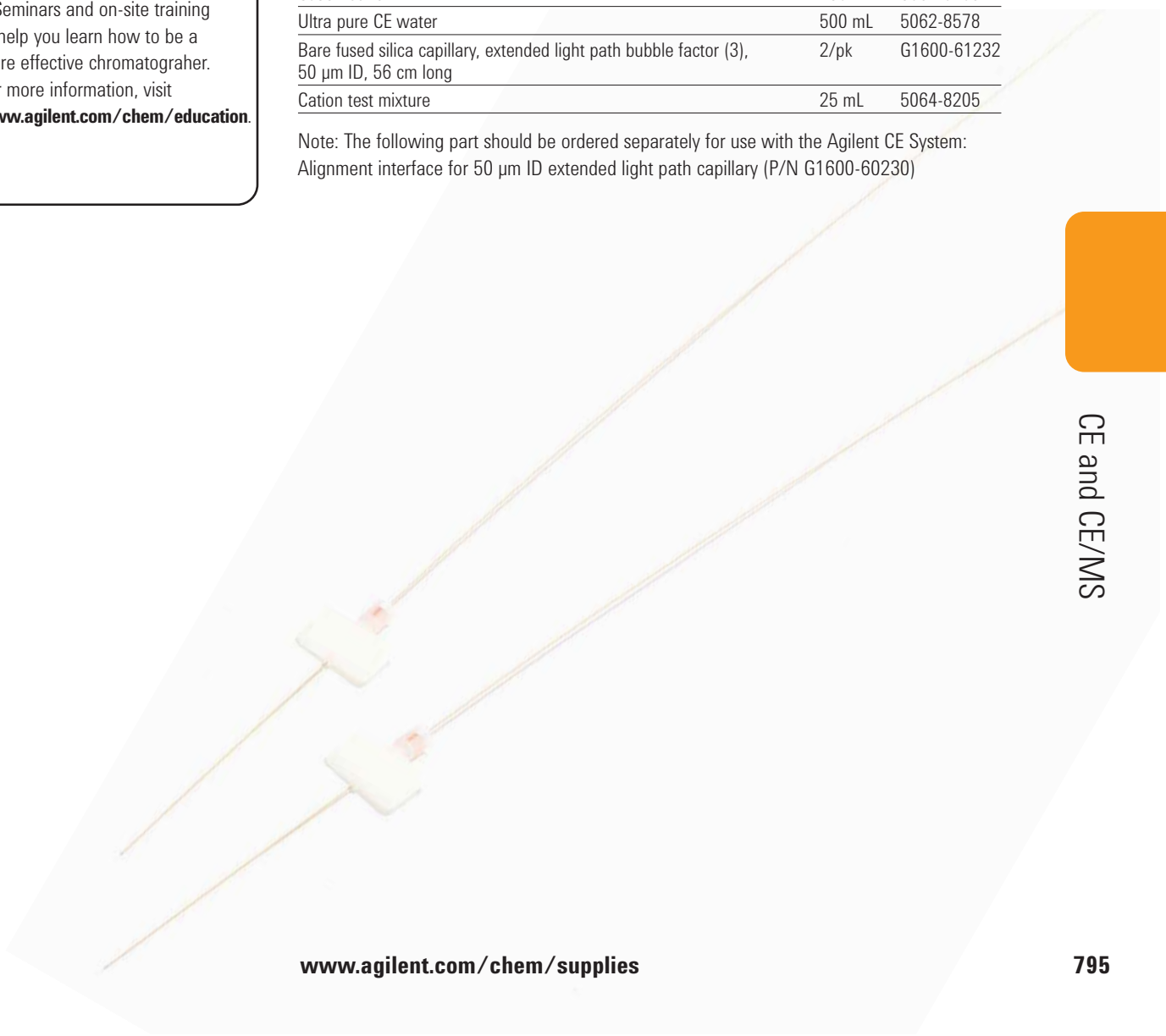
Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatograher. For more information, visit **www.agilent.com/chem/education**.

Cation Solutions Kit

Description	Unit	Part No.
Cation Solutions Kit		5064-8206
Cation buffer	250 mL	5064-8203
Ultra pure CE water	500 mL	5062-8578
Bare fused silica capillary, extended light path bubble factor (3), 50 µm ID, 56 cm long	2/pk	G1600-61232
Cation test mixture	25 mL	5064-8205

Note: The following part should be ordered separately for use with the Agilent CE System:
Alignment interface for 50 µm ID extended light path capillary (P/N G1600-60230)



µPAGE Gel-filled Capillaries for High Resolution DNA Fragments Analysis

µPAGE poly-acrylamide gel-filled capillaries are the most direct vehicles to transfer all of your applications from slab gel to CE, enjoying the automation, high speed, high resolution, and quantitative advantages of CE. The capillaries are ideal for high resolution separations of oligonucleotides, single-stranded and double-stranded DNA fragments, polymerase chain reaction (PCR) products, sequencing reaction products and oligosaccharides.

µPAGE capillaries are available in three different pore sizes. The size of the molecular sieving pores is controlled by the monomer concentration (%T) and the degree of polymer crosslinking (%C). Gels with higher %T and %C values have smaller pores and are, therefore, more effective at resolving smaller molecules. µPAGE-10 (10%T, 0%C) capillaries provide high resolution capabilities for separation of antisense therapeutic agents, primers and probes as well as oligonucleotides.

µPAGE-5 (5%T, 5%C) allows single base resolution of oligonucleotides [pd(A)] ranging from 20-150 bases while µPAGE-3 allows fast analysis of larger DNA fragments.

Three different µPAGE kits are available. For your convenience, µPAGE capillaries and µPAGE buffers can be purchased together or separately. To achieve the highest reproducibility and provide optimal capillary longevity, use µPAGE buffer with µPAGE capillaries.

µPAGE Starter Kits

Includes 3 µPAGE capillaries, 75 cm total length, 50 cm effective length
µPAGE $pd(A)_{25\text{-}30,\ 40\text{-}60}$ oligonucleotide standard for µPAGE-3 and µPAGE-5 kits
µPAGE $pd(A)_{25\text{-}30}$ oligonucleotide standard for µPAGE-10 kit
µPAGE buffer, 2 x 237 mL

µPAGE capillary in Kit

Description	ID (µm)	Part No.
µPAGE-10 (10% T, 0% C)	100	192-1311
µPAGE-5 (5% T, 5% C)	75	192-5211
µPAGE-3 (3% T, 3% C)	75	192-3211



µPAGE Basic Kits

Includes 3 µPAGE capillaries, 75 cm total length, 50 cm effective length
µPAGE pd(A)$_{25\text{-}30,\ 40\text{-}60}$ oligonucleotide standard for µPAGE-3 and µPAGE-5 kits
µPAGE pd(A)$_{25\text{-}30}$ oligonucleotide standard for µPAGE-10 kit

µPAGE capillary in Kit

Description	ID (µm)	Part No.
µPAGE-10 (10% T, 0% C)	100	191-1311
µPAGE-3 (3% T, 3% C)	75	191-3211
µPAGE-5 (5% T, 5% C)	75	191-5211

Note: The µPAGE capillaries are not pre-aligned for the P/N G1600A CE system.
To cut them to the correct length use the P/N 5183-4669 CE column cutter.

µPAGE Buffer Solutions and Oligo Standards

Description	Part No.
µPAGE Tris-borate and urea buffer for µPAGE-10, 4 x 237 mL	590-4005
µPAGE Tris-borate and urea buffer for µPAGE-3 and µPAGE-5, 4 x 237 mL	590-4001
µPAGE pd(A)25-30, 40-60 oligonucleotide standard for µPAGE-3 and µPAGE-5, 3 x 50 µL	590-4000

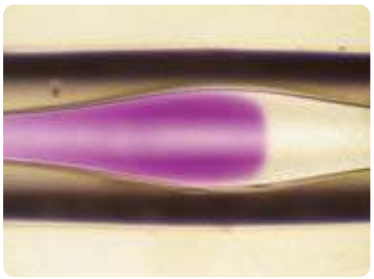


Standard Bare Fused-Silica Capillaries

Fused-silica capillaries are the heart of CE. Pre-aligned capillaries from Agilent Technologies are designed and optimized for ease of use and reliability. All capillary ends are cut to a smooth, mirror-like finish. In addition, the polyimide outer-coating is removed from the ends. These processes ensure minimal sample adsorption and help maintain sharp peak shapes. All capillaries have a pre-made detection "window" and a built-in alignment stopper which allows rapid and precise insertion in the alignment interface.

Standard Bare Fused-Silica Capillaries, 2/pk

ID (µm)	Total Length (cm)	Effective Length (cm)	Color Code	Part No.
50	33	24.5	Green	G1600-63211
	48.5	40	Green	G1600-60211
	64.5	56	Green	G1600-61211
	80.5	72	Green	G1600-62211
	112.5	104	Green	G1600-64211
75	33	24.5	Blue	G1600-63311
	48.5	40	Blue	G1600-60311
	64.5	56	Blue	G1600-61311
	80.5	72	Blue	G1600-62311
	112.5	104	Blue	G1600-64311
100	33	24.5	Gray	G1600-63411
	48.5	40	Gray	G1600-60411
	64.5	56	Gray	G1600-61411
	80.5	72	Gray	G1600-62411
	112.5	104	Gray	G1600-64411



Extended Light Path (Bubble Cell) Bare Fused-Silica Capillaries

Use Agilent Technologies extended light path capillaries ("bubble" cell capillaries) to improve sensitivity 3- to 5-fold over standard capillaries. With extended light path capillaries the inner diameter is increased only at the detection window, offering the sensitivity of a wide inner diameter capillary and the low current generation of a narrow one.

Resolution is not sacrificed when used with Agilent Technologies' matching optical alignment interfaces.

Extended Light Path (Bubble Cell) Bare Fused-Silica Capillaries, 2/pk

ID (µm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (µm)	Color Code	Part No.
25	48.5	40	5	125	Black	G1600-60132
	64.5	56	5	125	Black	G1600-61132
	80.5	72	5	125	Black	G1600-62132
50	43.5	35	3	150	Red	G1600-60233
	48.5	40	3	150	Red	G1600-60232
	64.5	56	3	150	Red	G1600-61232
	80.5	72	3	150	Red	G1600-62232
	112.5	104	3	150	Red	G1600-64232
75	48.5	40	2.7	200	Yellow	G1600-60332
	64.5	56	2.7	200	Yellow	G1600-61332
	80.5	72	2.7	200	Yellow	G1600-62332
	112.5	104	2.7	200	Yellow	G1600-64332

Universal Bare Fused-Silica Capillaries

These are capillaries with a window and 75 cm effective length and 363 µm OD, fitting into any CE instrument. To cut them to the correct length we recommend using P/N 5183-4669 CE column cutter.

Universal Bare Fused-Silica Capillaries

ID (µm)	Total Length (cm)	Effective Length (cm)	Part No.
20	100	75	190-0431
50	100	75	190-0131
75	100	75	190-0231
100	100	75	190-0331

Bulk Fused-Silica Capillaries, 363 µm OD

Capillary ID (µm)	Total Length (m)	Part No.
20	5	160-2660-5
50	5	160-2650-5
75	5	160-2644-5

Tips & Tools

Don't forget, we have special offers throughout the year. To learn more, visit **www.agilent.com/chem/specialoffers**.

Poly Vinyl Alcohol (PVA) Coated Capillaries

PVA coated capillaries contain a permanently adsorbed layer of poly(vinyl alcohol). This coating minimizes hydrophobic and electrostatic solute/wall interactions and eliminates electroosmotic flow (EOF). Using a proprietary deposition process, the PVA coating is stable over a wide pH range even under basic conditions from 2.5 to 9.5. This stability allows use of a wide range of common CE buffers. Because the silica surface is covered, many proteins and amines can be analyzed without the peak tailing found with uncoated capillaries. In addition, since EOF is eliminated, cumbersome washing procedures are unnecessary and migration time reproducibility can be improved.

Each batch of PVA coated capillaries is rigidly tested by Agilent Technologies and includes a representative electropherogram to assure quality.

The color coding of the capillary (alignment stopper) and the alignment interfaces allow you to easily combine the correct interface with the capillary. Capillaries for non-Agilent CE system users have removable alignment stoppers without color code.

PVA Coated Capillaries for Agilent CE System Users*

ID (µm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (µm)	Color Code	Part No.
50	64.5	56	0	50	Green	G1600-61219
	64.5	56	3	150	Red	G1600-61239
	125	21.5	0	50	Blue	G1600-67219
75	64.5	56	0	1200		G1600-68319
	125	21.5	0	75	Blue	G1600-67319
100	48.5	40	0	100	Gray	G1600-60419
	64.5	56	0	100	Gray	G1600-61419

*Not compatible with Borate buffers

Note: The PVA capillaries for CE/MS have a blue alignment stopper matching the blue color code of the alignment interface for MS-UV Det. The alignment stopper of the 50 µm ID PVA capillary for CE/MS has a black dot for easy identification.

PVA Coated Capillaries for Non-Agilent CE System Users*

ID (µm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (µm)	Part No.
50	71	60	0	50	G160U-61219
	71	60	3	150	G160U-61239
100	56	45	0	100	G160U-60419
	71	60	0	100	G160U-61419

*Not compatible with Borate buffers

Note: When extended pathlength capillaries are used in non-Agilent systems, loss of resolution may be found if the axial slit width is not reduced. In Agilent systems, the alignment interface contains properly matched slits to maintain resolution.

CEP Coated Capillaries

CEP capillaries contain a permanently bonded polymer coating. This CEP coating shields the silanol functionality of the capillary surface and helps prevent sample adsorption. Additionally, EOF is nearly eliminated, making the capillary ideal for applications such as DNA separations with sieving polymer buffers.

Elimination of EOF also simplifies analysis of anions and organic acids by direct UV detection. Without EOF-reduction, highly mobile ions such as nitrate can migrate in the opposite direction as the slower, longer chain acids.

The CEP coated capillary is stable from pH 2 to 7-8. It can be used with borate buffers offering a different surface functionality to help alleviate sample adsorption. Each batch of CEP coated capillaries is rigidly tested by Agilent Technologies and each capillary includes a representative electropherogram to assure quality.

CEP Coated Capillaries, 2/pk

ID (µm)	Total Length (cm)	Effective Length (cm)	Bubble Factor	Optical Path Length (µm)	Part No.
75	80.5	72	0	75	G1600-62318

Cross-linked and Bonded µSIL Capillaries

µSIL-FC and µSIL-DNA Capillaries with Windows

A series of coated capillaries specifically designed for CE which are prepared by cross-linking and bonding a novel, proprietary fluorocarbon (FC) polymer. µSIL-FC capillaries are chemically inert, hydrophobic, and stable from pH 2.5-10.0.

These capillaries are a must-have for cIEF, protein, peptide and carbohydrate separations, as well as replaceable gel CE applications such as oligonucleotides, DNA fragments, and PCR product separations.

µSIL-DNA capillaries are also coated with an FC polymer but have a 75 µm ID to accommodate the viscosity of entangled polymer solutions. All µSIL capillaries are batch tested to ensure the highest performance and reproducibility.

µSIL-WAX Capillaries with Windows

µSIL-WAX features a modified, polyethylene oxide, hydrophilic coating made through a special cross-linking and bonding process. The coating effectively masks active silanol sites, offering exceptional efficiency, resolution, peak shape and reproducibility. The highly stable coating and near-zero EOF of µSIL-WAX makes the capillary ideal for CE-MS, and protein and peptide separations from pH 2-5.

Capillary	ID (µm)	Total Length (cm)	Effective Length (cm)	Film Thickness (µm)	Unit	Part No.
µSIL-FC	50	80	50	0.075	3/pk	194-8111
µSIL-DNA	75	65	50	0.075	2/pk	199-2602
µSIL-WAX	50	100	75	0.1	2/pk	196-7203
µSIL-WAX	100	100	75	0.1	2/pk	197-7202



Bulk µSIL-DB Capillaries

The µSIL-DB coated capillaries are available as µSIL-DB-1 and µSIL-DB-17. In combination with a cellulose based buffer system, µSIL-DB coated capillaries have been widely used in cIEF applications, PCR product and DNA fragment separation and many other CE applications which require reduced EOF.

Capillary	ID (mm)	Length (m)	Film Thickness (µm)	Part No.
DB-1	0.05	10	0.05	126-1012
DB-1	0.20	10	0.05	126-1013
DB-1	0.10	10	0.10	127-1012
DB-17	0.10	10	0.05	126-1713
DB-17	0.10	10	0.10	127-1712
DB-17	0.20	10	0.10	127-1713

Capillary Electrochromatography (CEC) Capillaries

Capillary electrochromatography is a hybrid of CE and LC and can be performed in the Agilent CE system. Using CE capillaries packed with LC stationary phases, CEC offers the loadability and selectivity of LC and the high efficiency of CE.

Using the high pressure capabilities of the Agilent CE system, both ends of the CEC capillary can be pressurized. This process prevents outgassing upon application of high voltage and significantly extends capillary lifetime.

Standard Packed CEC Capillaries, 2/pk

Description	ID (µm)	Total Length (cm)	Effective Length (cm)	Color Code*	Part No.
C18, 3 µm	100	33.5	25	Gray	5063-6512
	100	48.5	40	Gray	5063-6513
C8, 3 µm	100	33.5	25	Gray	5063-6535
	100	48.5	40	Gray	5063-6540
Phenyl, 3 µm	100	33.5	25	Gray	5063-6536
	100	48.5	40	Gray	5063-6541

*The color coding of the capillary (alignment stopper) and the interface allows you to easily combine the correct alignment interface with the capillary.

Alignment Interfaces and Capillary Cassette

Agilent Technologies alignment interfaces are an integral part of the Agilent diode-array detection system. These interfaces contain optical slits which are precisely matched to the capillary inner diameter for optimized sensitivity and linear detection range.

In combination with the capillary cassette, alignment interfaces simplify capillary exchange, protect the fragile detection window and ensure exact alignment of the window in the detector. Quick-change cassette allows capillary exchange in less than a minute.

Note: The color code of the alignment interface must match with the color code of the capillary's built-in alignment stopper.



Alignment Interfaces

Alignment Interfaces

Description	ID (µm)	Color Code	Corresponding Capillary	Part No.
Alignment interface for standard capillary	50	Green	Green	G1600-60210
	75 100 150	Blue Gray Brown	Blue Gray Brown	G1600-60310
Alignment interface for Agilent Extended Light Path capillaries	25	Black	Black	G1600-60150
	50	Red	Red	G1600-60230
	75	Yellow	Yellow	G1600-60330
CE/MS alignment interface for 360 µm OD capillaries, nonmetallic		Blue	Blue Gray	G1600-60400

Note: 75, 100 and 150 µm ID standard capillaries use the same interface (color blue). PVA coated 50 and 75 µm ID capillary for CE-MS use the same nonmetallic interface with color code blue for use with standard and extended light path capillaries, and the high sensitivity detector cell.



Capillary cassette, G1600-60002

Capillary cassette

Description	Part No.
Capillary cassette	G1600-60002

Optical filter for DAD

Description	Part No.
Optical filter for DAD 260 nm, for DNA analysis with polyacrylamide filled capillaries and oligonucleotide analysis	G1600-62700



High Sensitivity Detection Cell

High Sensitivity Detection Cell

The Agilent high sensitivity detection cell – a technological leap which extends sensitivity by an order of magnitude – provides a solution to sensitivity limitations often encountered in CE. This improvement will substantially increase the utility of CE for impurity analysis of chiral drugs, biologicals, and compounds of environmental interest, among others.

The high linear range allows quantification of both <0.1% impurities and the main component in one run. This is useful for all impurity determinations and is especially useful for determining chiral excess.

The Agilent high sensitivity detection cell can be used in all Agilent CE systems.

Helpful Hint: Increased sensitivity also means increased visibility of impurities. To ensure maximum performance, use only buffers and solvents of the highest quality. All Agilent buffers and reagents are of electrophoresis grade to meet your system needs.

High Sensitivity Detection Cell

Description	Part No.
High sensitivity cell kit Includes detection cell, 75 µm ID inlet capillary (72 cm) and outlet capillary (8.5 cm) pair, capillary cassette, fittings (3 fitting screws with seals, 2 fitting caps), cleaning solution, CE Partner CD-ROM	G1600-68723
CE cell fitting kit Includes 3 fitting screws, 2 fitting caps	G1600-63200
Replacement detection cell	G1600-60027
Cell cleaning solution	5062-8529

Capillary Kits for High Sensitivity Detection Cell

Description	Effective Length (cm)	Part No.
75 µm capillary kit with 8.5 cm outlet	56	G1600-68716
	72	G1600-68715
	88	G1600-68714
PVA coated 75 µm capillary kit with 8.5 cm outlet	56	G1600-68319

CE/MS Accessories

The CE/MS adapter kit simplifies coupling the Agilent CE system with MS systems equipped with an electrospray ionization source. Integral to this kit is the CE/MS cassette which completely thermostats the capillary until it exits the CE system. The cassette offers multiple capillary paths which vary the capillary length. A methods development configuration uses on-line diode array detection and MS. For rapid or routine MS analysis the detector can be bypassed to decrease the total capillary length and reduce analysis time.

The CE/MS adapter kit can be used with the Agilent 1100 Series MSD, MSD-Trap, or virtually any electospray-MS platform.

CE/MS Adapter Kit

Description	Part No.
CE/MS Adapter Kit For interfacing the Agilent CE system with a mass spectrometer. Includes parts below, which can be ordered separately.*	G1603A
CE/MS interface cassette, metallic	G1600-60013
CE/MS alignment interface for 360 µm OD capillaries, nonmetallic	G1600-60400
Bare fused-silica, 50 µm ID, 125 cm long, 2/pk	G1600-67311

*Interfacing the capillary requires an electrospray needle which is not included in this kit.

CE-ESI-MS Nebulizer Kit

Description	Unit	Part No.
CE-ESI-MS Nebulizer Kit		G1607A
ES needle assembly		G1607-60041
CE-ESI sprayer		G1607-60001
Splitter assembly		G1607-60000
PEEK ferrule, 360 µm for CE/MS Sprayer		5022-2141
Nut, fingertight fitting and ferrule	2/pk	0100-1543
Flex loc element	2/pk	1520-0401
Gasket	1/pk	G1607-20030
Ion kit (ammonium acetate)	5 x 5 mL	8500-4410

CE/MS Capillaries

Description	Color Code	Unit	Part No.
Bare fused-silica, 50 µm ID, 125 cm long	Green	2/pk	G1600-67311
PVA coated capillary, 50 µm ID, 125 cm long	Blue	1/pk	G1600-67219
PVA coated capillary, 75 µm ID, 125 cm long	Blue	1/pk	G1600-67319



CE Standards & Reagents

Premade buffers help eliminate the time-consuming buffer preparation process. All Agilent Technologies buffers and reagents are designed to meet the stringent demands of CE. To maintain high reproducibility, all buffer solutions are standardized to 0.02 pH units under "class 10" clean room conditions. Superior quality control ensures reproducible results bottle-to-bottle and batch-to-batch.

Ultra Pure CE Water

Description	Volume (mL)	Part No.
Ultra pure CE water	500	5062-8578

Capillary Conditioning Solutions

Description	Volume (mL)	Part No.
0.1 N sodium hydroxide	250	5062-8575
1.0 N sodium hydroxide	250	5062-8576
0.1 N phosphoric acid	250	5062-8577

CZE Buffers for Charged Analytes

Description	Volume (mL)	Part No.
50 mM sodium phosphate buffer, pH 2.5	250	5062-8571
50 mM sodium phosphate buffer, pH 7.0	250	5062-8572
50 mM sodium tetraborate buffer, pH 9.3	250	5062-8573
20 mM sodium tetraborate buffer, pH 9.3	100	8500-6782

CZE Buffers for Proteins

Description	Volume (mL)	Part No.
50 mM phosphate, 0.05% hydroxyethyl cellulose buffer, pH 2.5	250	8500-6786
150 mM phosphate, 200 mM ammonium sulfate buffer, pH 7.0	250	8500-6787

MEKC Buffers for Neutral and Charged Analytes

Description	Volume (mL)	Part No.
50 mM sodium tetraborate, 100 mM sodium dodecyl sulfate buffer, pH 9.3*	250	5062-8574

*Dilute with 50 mM sodium tetraborate, pH 9.3 (P/N 5062-8573) to reduce SDS concentration without affecting the tetraborate composition or pH.

Plating Bath Analysis Buffer

Description	Volume (mL)	Part No.
Plating bath analysis buffer	250	5064-8236

µPAGE Buffer Solutions and Oligo Standards

Description	Part No.
µPAGE Tris-borate and urea buffer for µPAGE-3 and µPAGE-5, 4 x 237 mL	590-4001
µPAGE Tris-borate and urea buffer for µPAGE-10, 4 x 237 mL	590-4005
µPAGE pd(A)25-30, 40-60 oligonucleotide standard for µPAGE-3 and µPAGE-5, 3 x 50 µL	590-4000

CE System Start-up and Test Kits

Chemical test kits and validation packages are available to help comply with regulatory and quality standards. The Installation Qualification (IQ) Chemical Kit and Hardware Start-Up Kits, which are shipped with new instruments, are useful for rapidly verifying system functionality. For rigorous testing, the Operational Qualification (OQ)/Performance Verification (PV) Kit can be used to verify DAD noise, drift, linearity, and wavelength accuracy, and replenishment functionality. The OQ/PV kit is only part of the validation services available from Agilent Technologies. When implemented by qualified Agilent personnel, our service packages can be used to help validate your Agilent CE system.

CE System Start-up and Test Kits

Description	Part No.
Agilent CE Capillary Start-Up Kit Includes Extended Light Path capillary (L 64.5 cm, ID 50 µm), one standard capillary (I 56 cm, ID 50 µm), one test capillary (L 48.5 cm, I 40 cm, ID 50 µm), one alignment interface for standard capillaries (ID 50 µm), and one alignment interface for Agilent Extended Light Path capillaries (ID 50 µm)	G1600-68706
CE Installation Qualification (IQ) kit Includes buffer (20 mM borate, pH 9.3, 100 mL), test sample (4-(hydroxy)-acetophenone, 2 mL), capillary conditioning solution (0.1 N sodium hydroxide, 100 mL)	5063-6514
CE Operational Qualification Performance Verification (OQ/PV) Chemical Kit Includes buffer (20 mM borate, pH 9.3, 100ml), test samples (0.1, 0.5, 1.0, and 5.0 mM 4-(hydroxy)-acetophenone, 2 ml ea.), capillary conditioning solution (0.1 N sodium hydroxide, 100 ml), test capillary (L 48.5 cm, I 40 cm, ID 50 µm), diskette with methods, sequence, spectral library, and instruction manual.	5063-6515
CE OQ/PV Chemicals Only Kit Includes buffer (20 mM borate, pH 9.3, 100 mL), test samples (0.1, 0.5, 1.0, and 5.0 mM 4-(hydroxy)-acetophenone, 2 mL)	5063-6520

Instrument Parts and Supplies

Vials and Caps for CE

Description	Unit	Part No.
Crimp/snap top vial, 1mL, polypropylene	100/pk	5182-0567
Clear wide opening crimp/snap top vial, 2 mL	100/pk	5182-9697
Clear wide opening crimp/snap top glass vial, 2 mL	500/pk	5183-4623
Amber wide opening crimp/snap top vial, write-on spot, 2 mL	100/pk	5183-4619
Crimp/snap top vial, 250 µL	1000/pk	9301-0978
Snap caps PEO (polyethylene olefin for chemical resistance)	100/pk	5181-1507
Snap caps PEO (polyethylene olefin for chemical resistance)	500/pk	5181-1513
Snap caps PUR (polyurethane for resealing)*	100/pk	5181-1512
Snap caps PUR (polyurethane for resealing)*	500/pk	5042-6491

*PUR caps are recommended to help prevent sample or buffer evaporation even after multiple injections



Deuterium lamp, 2140-0585



Glass filter, 5041-2168

Instrument Supplies

Description	Unit	Part No.
Deuterium lamp		2140-0585
Electrode assembly, standard		G1600-60007
Electrode assembly, short		G1600-60033
Electrode O-ring, silicone	5/pk	5062-8544
Electrolyte bottle, 500 mL		9300-1748
Electrolyte bottle cap		9300-1747
Bottle sealing O-ring		0905-1163
Glass filter, solvent inlet, 20 µm		5041-2168
Filter frit adapter, 3 mm	4/pk	5062-8517
Bottle cap plug		G1600-23223
Air filter, 5 µm		3150-0619
Pre-puncher		G1600-67201
Screws for pre-puncher/insulation plate holding	10/pk	G1600-62402

Accessories

Description	Part No.
CE accessory kit Includes electrode tool, screwdriver, fuses, air filter, glass frit, vials and caps	G1600-68701
Optical filter for DAD 260 nm, for DNA analysis with polyacrylamide filled capillaries and oligonucleotide analysis	G1600-62700
Rack for 12 mm, 2 mL vials, 5/pk	9301-0722
CE column cutter	5183-4669
Diamond blade replacement kit for CE column cutter	5183-4670
Capillary tubing cutter, 4/pk	5181-8836



Window Etching Tool

The window etching tool is designed for fast, convenient and reproducible preparation of detection windows on fused silica capillaries. The polyimide coating is removed without destroying the inner polymeric coating. It contains 3 glass blocks with fine grooves controlling precisely the size of the windows.

Description	Part No.
Window etching tool, 3/pk	590-3003

ICP-MS

ICP-MS Maintenance Schedule **816**

ICP-MS Instrument Parts and Supplies **817-833**

ICP-MS Standards **834-835**



ICP-MS

The power you need for ultratrace analysis.
The flexibility you demand for every application.



In 1994, Agilent broke new ground with the world's first Benchtop ICP-MS. And now, over a decade later, our 7500-series ICP-MS continues to raise the bar on reliability, flexibility, and simplicity for both routine applications and cutting-edge research.

This section lists virtually every part or supply you will need for your Agilent ICP-MS System, including gas lines, peristaltic pump supplies, nebulizers, vacuum equipment, and interface apparatus – as well as single and multiple element reference standards. They are all readily available and competitively priced, making Agilent your single-source ICP-MS supplier.

In addition, Agilent ICP-MS parts and supplies are designed, manufactured, and tested to the most rigorous specifications – and are backed by 24-hour phone and Web support. All to make your analysis easier. And all from the experts who help you get the results you need.

ICP-MS Maintenance Schedule

Item	Actions/Comments	Typical Schedule
Argon gas	Check argon gas pressure and volume	Daily
Drain vessel	Check, empty if required	
Peristaltic pump tubing	Check for damage/deterioration	
Sampling cone, skimmer cone	Check orifice for foreign matter, deformation and enlargement. Clean if required.	Weekly
Rotary pump	Check oil level and color. Check mist filter for presence of oil.	Monthly
Nebulizer	Run nebulizer test, take appropriate action as indicated	
RF return strips and shield bar	Clean	
Cooling water	Check water level and condition	
Extraction lenses	Clean	3 - 6 Months
Extraction/Omega lenses	Clean	
Einzel/Omega lenses	Clean	6 Months
Entrance lens, exit lens, plate bias/ cell entrance, QP focus	Clean	
Rotary pump	Change oil	
Rotary pump oil mist filter	Check/replace mist filter	Annually
Penning gauge	Clean and replace when necessary	
Water strainer	Check and clean	
Octopole	Clean	
Sample introduction area, spray chamber, end cap	Clean	Periodically
Torch	Clean and replace when necessary	
Electron multiplier	Evaluate and replace when necessary	
Plasma gas, auxiliary gas tubing	Check and replace when necessary	
Argon gas filter	Replace 2 years after installation	



Gas Line Supplies

Description	Specs	Use	Unit	Part No.
Inner sleeve for carrier/aux/blend gas line	CTFE	For gas line connection to connector	5/pk	5042-0922
Inner sleeve for plasma gas line	CTFE	For gas line connection to connector	5/pk	5042-0923
Argon gas tubing assembly	1/4 in. OD, 5 m, inner sleeve, connector	For option gas line		G1820-65023
Tubing for carrier/blend gas, PTFE	3 mm ID, 4 mm OD, 35 cm	For gas line connection to nebulizer	2/pk	G1833-65414
Plasma and auxiliary gas line tubing	3.17 mm ID, 6.35 mm OD, 35 cm (plasma) 2.38 mm ID, 3.96 mm OD, 35 cm (aux)	For gas line connection to torch	2/pk	G3270-65021
Argon humidifier				G3270-80029

Gas Regulators - US only

Description	Part No.
Regulator for Helium gas	0101-1398
Regulator for Hydrogen gas	0101-1399
Regulator for Argon gas	0101-1400
Regulator for NH_3/He gas	5188-5374

Ultra Clean ICP-MS Traps

Description	Part No.
Triple filter cartridge for Super Clean Gas Purification systems, baseplate type	5182-9705
Replacement O-Rings for gas filters, 8/pk, 4 each of 2 sizes	5182-3423



Connectors for plasma/aux,
G1820-65027



Polypropylene connector,
G1820-65052



PTFE connector,
G1820-65214

Connector for blend gas line,
G1820-65119

Connectors

Description	Specs	Use	Part No.
Connector for end cap and gas line		For gas line connection to nebulizer	5063-5263
Connectors for plasma/aux gas lines, PTFE	6 mm and 4 mm	For gas line connection to torch	G1820-65027
Connector for carrier gas line, PTFE	4 mm tubing, includes ferrule and O-ring	For gas line connection to Babington Nebulizer	G1820-65214
Connector for carrier gas line, polypropylene	4 mm tubing, includes ferrule and O-ring	For gas line connection to Concentric Nebulizer	G1820-65052
Connector for blend gas line, polypropylene, 2/pk	4 mm tubing	For gas line connection to Cross Flow/Babington Nebulizer	G1820-65119
Connector for makeup gas line, polypropylene	4 mm tubing, Luer type	For gas line connection to Cross Flow/Babington Nebulizer	G1833-65477
Union fitting	4 mm tubing	For PFA Concentric Nebulizer	5064-8078

Peristaltic Pump Tubing and Supplies

Description	Specs	Use	Unit	Part No.
Peri-pump sample tubing, Tygon	1.02 mm ID, 40 cm	Standard for sample introduction	12/pk	G1833-65569
Peri-pump ISTD tubing, Tygon	0.19 mm ID, 40 cm	For online ISTD addition, replace when tubing is stretched.	12/pk	G1833-65571
Peri-pump drain tubing, Ismaprene	1.52 mm ID, 0.75 wall, 40 cm	Peri-pump tubing to drain spray chamber, replace when tubing is stretched.	12/pk	G1820-65216
Peri-pump drain tubing, Ismaprene, stronger stops	1.52 mm ID, 0.75 wall, 40 cm	Peri-pump tubing to drain spray chamber, replace when tubing is stretched.	12/pk	G1833-65570
Sample tubing, PFA	0.5 mm ID, 1.6 mm OD, 5 m	Used for standard sample introduction. Replace when tubing is bent, damaged, or when there are serious memory effects in the sample introduction area.		G1820-65105
Sample tubing, PFA	0.2 mm ID, 1.6 mm OD, 70 cm		3/pk	G1833-65573
Sample tubing, PFA	0.15 mm ID, 1.6 mm OD, 70 cm		3/pk	G1833-65572
Sample tubing with PEEK guide, PFA	0.3 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65531
Sample tubing with PEEK guide, PFA	0.2 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65527
Sample tubing with PEEK guide, PFA	0.15 mm ID, 1.6 mm OD, 70 cm		5/pk	G1820-65526
ISTD tubing, PFA	0.3 mm ID, 1.6 mm OD, 3 m	For online ISTD addition		G1820-65478
Drain tubing	4 mm ID, 250 cm	Tubing between Peri-pump tubing and drain tank		G1820-65515
Drain tank with PVC connector				G1820-65016
Drain tank for organic solvents with polypropylene connector				G1820-65505
Drain tank, polyethylene, 4L				5042-4769
Online ISTD Addition Kit		For grounding and mixing ISTD		G1833-65071
Drain tubing kit	2 connectors, 1 bushing, 1 tubing (4mm ID, 12cm)	Tubing between spray chamber and Peri-pump tubing		G1833-65411



Nebulizers and Nebulizer Supplies

Description	Specs	Use	Unit	Part No.
Sample tubing	0.25 mm ID, 700 mm, with Connector	For MicroMist Nebulizer	10/pk	G3266-80010
Sample tubing	0.5 mm ID, 700 mm, with Connector	For MicroMist Nebulizer	10/pk	G3266-80011
Carrier gas connector		For MicroMist Nebulizer		G3266-80015
MicroMist Nebulizer	Borosilicate glass	Standard on 7500cx/ce. When ordered for the 7500a, the spray chamber end cap (G1833-65475) is also required (included on the 7500cx/ce/cs).		G3266-65003
Nebulizer cleaner		For MicroMist Nebulizer		G3266-80020
Mira Mist Nebulizer	PEEK	For high solids applications such as environmental, geological, etc. Not for semiconductor use since it does not self aspirate. When ordered for the 7500a, the spray chamber end cap (G1833-65475) is also required (included with 7500cx/cs).		G3161-80001
Babington Nebulizer	Includes Viton O-ring, PTFE sample tubing, and connector	Use to introduce samples with high matrix and high total salts. Clean when contaminated or when orifices are clogged.		G1820-60453
End cap for Babington Nebulizer, polypropylene	Includes Viton O-rings	Replace when memory effects do not disappear after cleaning. Insert nebulizer in middle of end cap all the way through. Attach end cap to spray chamber with "TOP" mark facing up.		G1833-65476
Babington Nebulizer removal tool				G1820-65345
Concentric Nebulizer, Pyrex	Use with P/N G1820-65052 Argon gas connector, P/N G1820-60160 Connector kit, P/N G1820-65121 end cap	Use with clean samples only. Not resistant to hydrochloric acid. Clean with a 5% HNO_3 (v/v) bath; do not use ultrasonic bath.		G1820-65030

Nebulizers and Nebulizer Supplies

Description	Specs	Use	Unit	Part No.
Concentric Nebulizer, quartz	Use with P/N G1820-65337 Quartz spray chamber, P/N G1820-80237 Quartz connecting pipe	Recommended for trace analysis of clean samples. Lower contamination level than Pyrex. Clean using 5% HNO_3 (v/v) bath; do not use ultrasonic bath.		G1820-65138
Sample tubing with connector, PTFE	Tool included	For Babington Nebulizer, replace when heavily contaminated by high matrix samples.		G1820-65276
Sample tubing kit for Cross Flow Nebulizer	PFA tubing (0.6 mm ID, 1.1 mm OD, 15 cm) Tygon tubing (10 cm) PFA tubing (0.5 mm ID, 1.6 mm OD)	Replace when tubing is bent, damaged, or when there are serious memory effects in the sample introduction area.		G1820-65141
Sample line connector	Includes Viton O-ring	Connects Concentric Nebulizer with sample line. Port with large hole connects to nebulizer; smaller port connects with sample tubing.		G1820-60160
Connector for MicroFlow Nebulizer			2/pk	G1833-65583
Ferrule and Viton O-ring kit for carrier gas line connector		For Babington/Concentric Nebulizer		G1820-65533
O-rings for Babington Nebulizer, Viton		Used to create seal between Babington Nebulizer and end cap.	4/pk	G1820-65199
O-ring kit for Concentric Nebulizer, Viton	2 sizes, 10 each		20/pk	G1820-65491
O-rings for Concentric Nebulizer, for organic solvents (3 types)			4/pk	G1820-65520
O-rings for end cap, Viton		Use for the end cap of the Babington Nebulizer, Cross Flow Nebulizer and Concentric Nebulizer.	5/pk	G1820-65198
O-rings for end cap, for organic solvents			2/pk	G1820-65518
Cross Flow Nebulizer	Includes bushing, carrier gas line connector, blend gas line connector, sample tubing, and gas line tubings with inner sleeves	Standard nebulizer for the inert kit. Resistant to hydrofluoric acid. Set carrier gas pressure to 500 kPa (5 kg/cm^2). Clean with 5% HNO_3 (v/v) bath. Replace when memory effects remain after cleaning.		G1833-65462
End cap for Concentric Nebulizer, PTFE	Includes Viton O-rings	Connects the Concentric Nebulizer (Pyrex or Quartz) with the spray chamber. For MicroMist, MicroFlow, and other concentric nebulizers.		G1833-65475

Inert Sample Introduction Kit Supplies

Description	Part No.
Inert sample introduction kit, sapphire 2.5 mm ID Torch not included	G3285-80014
Inert sample introduction kit, platinum 2.5 mm ID Torch not included	G3285-80015
Inert sample introduction kit, sapphire 1.5 mm ID Torch not included with O_2 port	G3285-80016
Inert sample introduction kit, platinum 1.5 mm ID Torch not included with O_2 port	G3285-80017
End cap	G3285-80020
Spray chamber	G3285-80021
Drain tube	G3285-80022
Connector tube	G3285-80023
Long connector tube	G3285-80024
Sapphire injector for PFA, 2.5 mm ID	G3285-80034
Platinum injector for PFA, 2.5 mm ID	G3285-80035
Sapphire injector with O_2 port for PFA, 1.5 mm ID	G3285-80036
Platinum injector, 1.5 mm ID	G3285-80037
Torch	G3285-80050
O-ring for injection assembly, 10/pk	G3285-80085

High Matrix Introduction Kit Supplies

Description	Part No.
Plug	G3270-20067
Inner sleeve	5022-1703
Gas connector	5042-4774
End cap assembly	G3270-60207
Torch, 2.5 mm, 2 projections	G3270-67002
Connector rod, dilution	G3270-80024
Connector rod, straight	G3270-80025
Connector rod, oxygen	G3270-80026



Quartz spray chamber, G1820-65337

Spray Chambers

Description	Use	Unit	Part No.
Spray chamber, quartz	Used for Babington, Concentric, and Micro-Concentric Nebulizers. Replace when memory effects remain after cleaning.		G1820-65337
Bushing at spray chamber drain, Viton		5/pk	G1820-65482
Bushing at spray chamber drain, for organic solvents	For use with organic solvents		G1820-65504
Connector for spray chamber drainage, polypropylene			G1820-65503
Spray chamber, polypropylene (sapphire tube)	Same usage as Quartz spray chamber and is resistant to hydrofluoric acid. Replace when memory effects remain after cleaning.		G1833-65463
Spray chamber	For ultra trace B analysis		G3270-80300
Connector, quartz	Between spray chamber and torch		G1833-65426
Connector, polypropylene	Between spray chamber and torch		G1833-65464
T-Connector for Optional Gas Introduction, quartz	Between spray chamber and torch		G1833-65427
O-rings for polypropylene connector, Viton		10/pk	G1833-65480
Clamps	Used to hold connectors	2/pk	G1833-65430





Work coil, G1820-65061



Quartz torch, G3270-67002



Inert torch, G1833-65422

Torch and Components

Description	Specs	Use	Part No.
Torch, quartz	2.5 mm ID	Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G3270-67002
Torch, quartz	1.5 mm ID, taper type	Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G1833-65424
Torch, quartz	1.0 mm ID, taper type	Not suitable for samples containing hydrofluoric acid. Must be completely dried before installing and igniting the plasma. Replace if chipped, cracked, or distorted.	G1833-65425
Inert torch, quartz, without injector		Quartz torch for inert sample introduction. Resistant to hydrofluoric acid. Torch must be completely dried before installing and igniting plasma.	G1833-65422
Shield plate, long life		Use with the bonnet	G1833-65419
Bonnet (quartz ring for shield torch)		Use with shield plate (P/N G1833-65406 or P/N G1833-65419) for Shield Torch system. Replace if bonnet is cracked or damaged.	G1833-65421
Platinum Injector for Inert Torch	2.0 mm ID		G1833-65409
Platinum Injector for Inert Torch	2.5 mm ID		G1833-65415
Platinum Injector for Inert Torch	1.5 mm ID		G1833-65416
Work Coil			G1833-65432

Interface Cone Guide for Agilent ICP-MS Mainframes

Description	Part No.	7500a	7500i	7500s	7500c	7500ce/cx	7500cs	T-mode
Sampling cone								
Nickel sampling cone	G1820-65238	Std	Std	◆	Std	Std	◆	
Platinum sampling cone, 10 mm insert	G1820-65239	◆	◆	Std	◆	◆	Std	
Platinum sampling cone, 18 mm insert	G1820-65360	◆	◆	◆	◆	◆	◆	
Nickel sampling cone for T-mode	G1820-65480	T-mode	T-mode	T-mode				◆
Skimmer cone								
Nickel skimmer cone	G1820-65050	Std	Std	◆				
Nickel skimmer cone	G3270-65024					Std		
Nickel skimmer cone	G1833-65497				Std		◆	
Platinum skimmer cone	G1820-65237	◆	◆	Std				
Platinum skimmer cone	G1833-65092				◆			
Platinum skimmer cone	G1833-65132					◆	Std	
Platinum skimmer cone (Ni base)	G3270-60106						◆	
Copper skimmer cone	G3270-60643						◆	
Nickel skimmer cone for T-mode	G1820-65481	T-mode	T-mode	T-mode				◆
Skimmer base								
Stainless steel base for Nickel skimmer	G1833-65407	Std	Std	◆				◆
Stainless steel base for Nickel skimmer	G1833-65591					Std	◆	
Stainless steel base for Nickel skimmer	G1833-65498				Std			
Stainless steel base for Nickel skimmer	G1820-60376							
Brass base for Platinum skimmer	G1833-65408	◆	◆	Std				
Brass base for Platinum skimmer	G1833-65505				◆			
Brass base for Platinum skimmer	G1833-65590					◆	Std	
Brass base for Platinum skimmer	G1820-60104							

Key

◆: Compatible Part

Std: Fitted as standard when instrument shipped from factory

Notes:

- 18 mm Pt cone insert is recommended for measuring H_2SO_4 above 2%
- Pt T-mode cones are not available
- T-mode is not used with ORS models



Extraction lens 1, G1833-65417



Extraction lens 2, G1833-65413

Sampling and Skimmer Cone Supplies

Description	Part No.
Screws for skimmer base	G1820-65435
Interface wrench for skimmer cone removal	G1833-65079
O-ring for sampling cone, Viton	G1820-65025
Cone cleaning detergent, 1 gallon	5188-5359
Interface wrench for sampling cone	G1833-65405

Ion Lens System Components

Description	Part No.
7500a/i/s/c/cs	
Plate Bias (for Eagle Q-pole)	G1833-65494
Plate Bias (for Slim ring Q-pole)	G1833-65444
Polishing paper kit Waterproofed sheets, #400 and #1200, 5 of each	G1833-65404
7500a/i/s	
Extraction Lens 1	G1833-65417
Extraction Lens 2	G1833-65413
Omega Lens Assembly	G1833-65418
Screw kit for Extraction Lens	G1833-65024
Screw kit for Omega Lens	G1833-65025
7500c	
Einzel Lens 1	G1833-65500
Einzel Lens 2	G1833-65501
Einzel Lens 3	G1833-65502
Extraction Lens	G1833-65499
Octopole	G1833-65094
Octopole Assembly (includes Cell Entrance/Exit without O-ring)	G1833-65503
Screw and Spacer Kit for Extraction Einzel Lens	G1833-65578
Screw kit for Reaction Cell	G1833-65088
Tubing for Reaction Gas, 2/pk	G1833-65089

Ion Lens System Components

Description	Part No.
7500ce/cx	
O-ring for Reaction Cell	G1833-66035
Extraction Omega Lens Assembly	G3270-65023
Extraction Lens 1	G3270-65028
Extraction Lens 2	G3270-65029
Omega lens	G3270-65030
Omega bias lens	G3270-65031
Screw and Spacer kit for Extraction & Omega Lens	G3270-60639
7500cs	
Extraction Lens 1	G1833-65592
Extraction Lens 2	G1833-65593
Extraction-Omega Lenses Assembly	G1833-65596
Omega Bias Lens	G1833-65594
Omega Lens	G1833-65595
Screw and Spacer kit for Ion Lens	G1833-65125
Cell Entrance Lens	G1833-65598
Cell Exit Lens	G1833-66000
Cell Focus Lens	G1833-65597
7500cs/ce/cx	
Focus Lens for Q-pole	G1833-65599
Octopole	G1833-65133
Octopole Assembly (includes Cell Focus, Cell Entrance/Exit, and QP Focus)	G1833-65134
Reaction Cell Assembly	G1833-66001
Screw and Spacer kit for Reaction Cell	G1833-65138
Plate bias for S/N JP14100050 - JP14100313	G1833-65513
Plate bias for S/N JP14100314	G1833-65562
Reaction cell assembly, stainless steel	G3270-65060

Electron Multipliers

Description	Part No.
Electron Multiplier (ETP)	5184-1983
Electron Multiplier (HPK)	G1833-65575



Electron multiplier, 5184-1983

Rotary Pumps and Vacuum System Supplies

- The oil level on the pump should be checked every three months, when the plasma is ON.
- Maintain the oil level between the Max and Min levels on the gauge.
- Standard frequency for changing the oil is approximately every 4,500 hours.

Warning: Be careful when changing oil because the oil may have absorbed dangerous substances. The oil in the rotary pump on the interface side of a 7500 equipped with a hydrofluoric acid resisting introduction system is especially dangerous. DO NOT TOUCH THE OIL WITH BARE HANDS.

Rotary Pumps and Vacuum System Supplies

Description	Unit	Part No.
Oil mist filter element for E2M18		1535-4970
Oil mist filter kit for E2M18		3162-1056
O-Ring for Vacuum chamber, Viton		5042-0901
Odor Element for Oil Mist Filter, for E2M18	5/pk	5063-9153
Rotary pump oil, 4 L	1 gal	6040-0798
Foreline pump oil, Inland 45, 1 L	1 liter	6040-0834
Electrode Kit for Penning Gauge		G1820-81013
Tube AIM Gauge		G1820-81012
O-rings for vent valve, Viton	2/pk	G1833-65332



Integrated Autosampler Supplies

Description	Unit	Part No.
Tray A 89 Position for 6 mL vials, PP		G3160-80060
Tray B 53 Position for 19 mL vials, PP		G3160-80061
Tray C 18 Position for 50 mL vials, PP		G3160-80062
Tray D 79 x 2 mL + 10 x 18 mL positions, PP		G3160-80063
Tray E 79 x 6 mL + 10 x 18 mL positions, PP		G3160-80064
Tray F 15 Position for use in special semiconductor applications, PP		G3160-80065
PFA vial, 1.5 mL	10/pk	G3160-65317
6 mL vials	200/pk	G3160-65303
18 mL vials	55/pk	G3160-65304
50 mL vials	20/pk	G3160-65305
Polyethylene vial, 2 mL	200/pk	G3160-65315
PFA needle, 0.3 mm ID		G3160-65306
Rinsing bottle, 100 mL	6/pk	G3160-65307
Tray cover		G3160-65321
Fluid inlet/outlet tubing, fittings		G3160-65320
PFA Needle, 0.8 mm ID		G3160-65324
Tubing holder, PEEK		G3160-65325
Needle holder		G3160-80041
Holder for carry tray cover		G3160-60015
Peristaltic pump tubing set with connectors	1 set	G3160-65326
Peristaltic pump tubing set with connectors	5 sets	G3160-65327
Drain tubing, Tygon, from peristaltic pump to rinse bottle or drain bottle	2 pieces	G3160-65328
MicroFlow Nebulizer (100) with probe		G3139-65102
MicroFlow Nebulizer (20)		G3139-65106

Tips & Tools

Don't forget, we have special offers throughout the year. To learn more, visit **www.agilent.com/chem/specialoffers.**

ASX-500 Series Autosampler Supplies

Description	Part No.
Sample rack, 21 position, 50 mL vials	G3286-80103
Sample rack, 24 position, 30 mL vials	G3286-80104
Sample rack, 40 position, 20 mL vials	G3286-80105
Sample rack, 60 position, 14 mL vials	G3286-80106
Sample rack, 90 position, 8 mL vials	G3286-80107
Sample probe, 0.8 mm ID (red band)	G3286-80100
Sample probe, 0.3 mm ID (black band)	G3286-80101
Sample probe, 0.5 mm ID (blue band)	G3286-80102
Rinse/drain tubing hookup kit	G3286-80117
Drain pump tubing and connector kit (Tygon)	G3286-80118
Z-axis drive assembly	G3286-80200





ISIS Supplies

Description	Specs	Unit	Part No.
Peristalic pump tubing, Tygon	0.89 mm ID, 3 stops	12/pk	5064-8014
Peristalic pump tubing, Tygon	0.25 mm ID, 3 stops	12/pk	5064-8034
Peristalic pump tubing, Tygon	0.25 mm ID, 2 stops	12/pk	5064-8015
Peristalic pump tubing, Tygon	1.02 mm ID, 2 stops	12/pk	5064-8028
Sample tubing, ETFE	0.8 mm ID, 1.6 mm OD		5064-8016
Sample tubing, PTFE	2 mm ID, 3 mm OD		5064-8020
Sample tubing, PFA	0.5 mm ID, 1.6 mm OD, 5 m		G1820-65105
ISTD tubing, PFA	0.3 mm ID, 1.6 mm OD, 3 m		G1820-65478
Tee joint			5064-8017
Cross joint			5064-8018
Union joint			5064-8019
Teflon nut	For 3 mm OD tubing	10/pk	5064-8021
Front and back ferrule	For 3 mm OD tubing	10/pk	5064-8022
Teflon nut	For 1.6 mm OD tubing	10/pk	5064-8023
Front and back ferrule	For 1.6 mm OD tubing	10/pk	5064-8024
Peristaltic pump tubing adapter			5064-8026
Tubing adapter			G3138-65158
Tubing clamp			5064-8027
Spiral tubing, 5 m			5064-8029
Wrench for valve maintenance			5064-8032
Tag for tubing identification		10/pk	5064-8033
Joint holder			G3138-65102
Joint holder			G3138-65103
Sample line connector			G3138-65104
Rotor seal for valve			G3138-65117
Nut for valve		6/pk	G3138-65118
Ferrule for valve		6/pk	G3138-65119
Mixer			G3138-65121
Sample loop, 100 µL			G3138-65122
Plastic tray			G3138-65125
ISIS Comprehensive Spares			G3138-65006
ISIS Tubing Kit (high throughput)			G3138-65023
ISIS Tubing Kit (auto dilution)			G3138-65024
ISIS Tubing Kit (discrete sampling)			G3138-65025
ISIS Tubing Kit			G3138-65000

Hydride Generation Accessory Supplies

Description	Specs	Unit	Part No.
Inner sleeve for carrier/aux/blend gas line	CTFE	5/pk	5042-0922
Sample tubing, PFA	0.5 mm ID, 1.6 mm OD, 5 m		5064-8012
Sample tubing, PFA	0.3 mm ID, 1.6 mm OD, 5 m		5064-8013
Peristalic pump tubing, Tygon	0.89 mm ID, 3 stops	12/pk	5064-8014
Cross joint			5064-8018
Union joint			5064-8019
Sample tubing, PTFE	2 mm ID, 3 mm OD		5064-8020
Teflon nut	For 1.6 mm OD tubing	10/pk	5064-8023
Front and back ferrule	For 1.6 mm OD tubing	10/pk	5064-8024
Peristaltic pump tubing adapter			5064-8026
Peristalic pump tubing, Tygon	1.02 mm ID, 2 stops	12/pk	5064-8028
Peristaltic pump tubing, PharMed	2.54 mm ID, 2 stops	6/pk	G3138-65128
Tag for tubing identification		10/pk	5064-8033
Sample line connector			G1820-60160
Connector for carrier gas line, polypropylene	For gas line connection to Concentric Nebulizer		G1820-65052
Mixer			G3138-65121
Plug for cross joint		3/pk	G3138-65129
Gas/Liquid Separator Set Includes separator gas chamber, O-ring for the filter, separator holder, exclusive Concentric Nebulizer, O-ring for nebulizer, cyclone chamber, and filter (5/pk)			G3138-65130
Separator gas chamber			G3138-65131
O-ring for filter			G3138-65132
Separator holder			G3138-65133
Exclusive Concentric Nebulizer			G3138-65134
O-ring for nebulizer		2/pk	G3138-65135
Cyclone chamber			G3138-65136
Filter		10/pk	G3138-65137
Tubing for gas line	3 mm ID, 4 mm ID, 5 m		G3138-65138
Reducing union connector	6 x 3 mm		G3138-65139
Reducing union connector	6 x 4 mm		G3138-65140
Plug for carrier gas connector	4 mm OD	3/pk	G3138-65141
Y connector for pump tubing	2.5 mm ID	5/pk	G3138-65143
Reducing union connector	8 x 4 mm		G3138-65144

Miscellaneous Supplies

Description	Part No.
Filter for cooling water	G1820-65018
Water filter connector	G1820-80430
Gas filter	G1820-80341
LC connection kit	G1833-65200
Plastic tray for sample intro area	G1833-65412
Cooling water hose, 10 m	G1833-65429
Strainer for cooling water	G1833-66024
Inert sample introduction kit (Pt injector)	G1833-65036
Poly-clear fluid for G3292A chiller	G3292-80010
Fluid filter for G3292A chiller	G3292-80109
Air filter for G3292A chiller	G3292-80112
O-ring for water filter cartridge	G1833-66042
O-ring for reaction cell, 2/pk	G3270-65036
Ar clean gas filter	5064-8092

PFA Inert Kit (ESI) Supplies

Description	Part No.
PFA endcap	G3139-65002
PFA spray chamber	G3139-65003
PFA connector	G3139-65004
Pt injector (2 mm) with PFA base	G3139-65005
Quartz torch for Pt injector	G3139-65006
PFA Concentric Nebulizer	G3285-80000
PFA Concentric Nebulizer with probe	G3285-80001

GC Interface Supplies

Description	Part No.
Injector assembly	G3158-65001
Torch	G3158-65007
1/16 in. SS pipe (sulfinert) for GC-ICP-MS interface	G3158-65003

As and Cr Speciation Columns

Description	Part No.
As speciation column for G3154A	G3154-65001
As speciation guard column	G3154-65002
Cr speciation column for G3268A	G3268-80001

ICP-MS Standards

Installation and Checkout Standards

Description	Part No.
ICP-MS Checkout Solutions for 7500ce/cx/cs system installation kit Contains tuning solution, dual mode (1), dual mode (2), wash, and water blank solutions	5185-5850
ICP-MS Checkout Solutions for 7500s system installation kit Contains tuning solution, dual mode (1), dual mode (2), abundance sensitivity (1), abundance sensitivity (2), detection limit solution, high sensitivity tune, wash, and water blank solutions	5184-3564
ICP-MS Checkout Solutions for 7500a/i/c system installation kit Contains tuning solution, dual mode (1), dual mode (2), wash, and water blank solutions	5184-3565

Tuning Solutions

Description	Part No.
PA Tuning Solution Kit: Tuning 1: 20 ppm each of Zn, Be, Cd, As; 10 ppm each of Ni, Pb, Mg; 5 ppm each of Tl, Na, Al, U, Cu, Th, Ba, Co, Sr, V, Cr, Mn, Li6, Sc, In, Lu, Bi; 2.5 ppm each of Y, Yb; matrix 2-5% HNO_3 Tuning 2: 10 ppm each of Mo, Sb, Sn, Ge, Ru, Pd; 5 ppm of Ti, Ir; matrix 10% HCl and 1% HNO_3 with trace amounts of HF	5188-6524
Stock Tuning Solution: Li, Y, Ce, Tl and Co; 100 mL, 10 mg/L; matrix=2% HNO_3	5188-6564
Tuning Solution: Li, Y, Ce, Tl and Co; 2 x 500 mL, 10 µg/L; matrix= 2% HNO_3	5184-3566
Tuning Solution: Li, Mg, Y, Ce, Tl, Co; 2 x 500 mL, 1 µg/L; matrix= 2% HNO_3	5185-5959

Multi-Element Calibration Standards

Description	Part No.
Multi-Element Calibration Standard-1, 100 mL: 10 mg/L of Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Th, Tm, Y, Yb; matrix 5% HNO_3	8500-6944
Multi-Element Calibration Standard-2A, 100 mL: 10 mg/L of Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn; matrix 5% HNO_3	8500-6940
Multi-Element Calibration Standard-3, 100 mL: 10 mg/L of Sb, Au, Hf, Ir, Pd, Pt, Rh, Ru, Te, Sn; matrix 10% HCl/1% HNO_3	8500-6948
Multi-Element Calibration Standard-4, 100 mL: 10 mg/L of B, Ge, Mo, Nb, P, Re, S, Si, Ta, Ti, W, Zr; matrix H_20/trace HF	8500-6942

Single Element Standards

Description	Part No.
Bismuth, 100 mL, 10 mg/L	8500-6936
Cobalt, 100 mL, 10 mg/L	8500-6947
Gold, 100 mL, 10 mg/L	8500-7000
Indium, 100 mL, 10 mg/L	8500-6946
Mercury, 100 mL, 10 mg/L	8500-6941
Rhodium, 100 mL, 10 mg/L	8500-6945

Interference Check Mixes

Description	Part No.
6020 Interference Check Solution A, 100 mL: 20000 ppm of Cl; 3000 ppm of Ca; 2500 ppm each of Fe, Na; 2000 ppm of C; 1000 ppm each of Al, Mg, P, K, S; 20 ppm each of Ti, Mo; matrix 5% HNO_3 with trace amounts of HF	5188-6526
6020 Interference Check Solution B, 100 mL: 20 ppm each of Cr, Co, Cu, Mn, Ni, V; 10 ppm each of As, Cd, Se, Zn; 5 ppm of Ag; matrix 5% HNO_3	5188-6527

Environmental Standards

Description	Part No.
Environmental Calibration Standard, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg; 10 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn, Th, U; matrix 10% HNO_3	5183-4688
Initial Calibration Verification Standard, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg, Sr; 10 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn, Th, U; matrix 5% HNO_3	5183-4682
Internal Standard Mix, 100 mL: 100 ppm of ^{6}Li, Sc, Ge, Rh, In, Tb, Lu, Bi; matrix 10% HNO_3	5188-6525
Internal Standard Mix, 100 mL: 10 mg/L of ^{6}Li, Sc, Ge, Y, In, Tb, Bi; matrix 5-10% HNO_3	5183-4681
Environmental Spike Mix, 100 mL: 1,000 mg/L of Fe, K, Ca, Na, Mg; 100 mg/L of Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn, U; matrix 5% HNO_3	5183-4687

UV-Vis

Cells and Cell Accessories **838-842**

Tubing and Fittings **842**

Instrument Parts and Supplies **843-844**

Dissolution Testing Supplies **844**

Standards and Reagents **845**



UV-Vis

Keeping your system operating at peak performance with precision-engineered cells and supplies.







Ever since Hewlett-Packard (now Agilent) introduced the world's first diode-array spectrophotometer, our customers have come to expect the highest standards for quality. That is why all Agilent UV-VIS cells and supplies are manufactured in an ISO 9001-certified environment to meet the most stringent testing standards.

This section will help you identify the cells that fit your unique applications. You will also learn how to enhance your lab's productivity by choosing the correct spectrophotometer equipment, tubing, fittings, and dissolution testing supplies. All are backed by four decades of design and technical expertise, comprehensive services, and 24/7 technical support by phone or Web.

In addition, every Agilent UV-VIS cell includes a certificate of analysis, so you can be confident that they will conform to stringent protocols such as NIST, GLP, GMP and NAMAS.

Cells

Macro Cells

The macro cell, which is defined by DIN 58963 as a rectangular cell with an inner width greater than 5 mm, has emerged as the standard for photometry. The most widely used macro cell is a rectangular cell with outer dimensions of 45 x 12.5 mm (height x width). The length of the cell is dependent on the desired path length.



Macro Cell with PTFE Lid

Macro Cells with PTFE Lid

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
1	45 x 12.5 x 3.5	44.5 x 9.5	350	5063-6546	
					5061-3384
2	45 x 12.5 x 4.5	44.5 x 9.5	700	5063-6547	
					5061-3385
5	45 x 12.5 x 7.5	44.5 x 9.5	1750	5063-6548	
					5061-3386
10	45 x 12.5 x 12.5	44.5 x 9.5	3500	5063-6549	
					5061-3387
10	45 x 12.5 x 12.5	44.5 x 9.5	3500	5063-6550*	
					1000-0544*
20	45 x 12.5 x 22.5	44.5 x 9.5	7000	5063-6551	
					5063-6553
50	45 x 12.5 x 52.5	44.5 x 9.5	17500	5063-6552	
					5063-6554

*Matched pair



Macro Cell with PTFE Stopper

Macro Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
5	48 x 12.5 x 7.5	42 x 9.5	1750		5063-6557
10	48 x 12.5 x 12.5	42 x 9.5	3500	5063-6556	
					5062-2477

Spacers are required for cells with an outer depth of less than 12.5 mm to hold them securely in the cell holder.



Semi-Micro Cell with PTFE Lid

Semi-micro Cells

Semi-micro and micro cells have an inner width of 4 mm to 2 mm. The thickness of the base is 9 mm. All semi-micro and micro cells are for use with spectrophotometers having a beam height of 15 mm.

For applications with a wave length range of interest in the visible range, use our low cost Agilent optical quality glass cells, made from exceptionally pure raw materials. Quartz glass gives transmission values of >80% between 200 nm and 2500 nm for an empty cell. Optical glass gives transmission values of >80% between 320 nm and 2500 nm for an empty cell.

Semi-micro Cells with PTFE Lid

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
10	45 x 12.5 x 12.5	41.8 x 2	700		5061-3391
		36 x 4	1000	5063-6558	
					5063-6559



Semi-Micro Cell with PTFE Stopper

Semi-micro Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
10	46 x 12.5 x 12.5	37 x 4	1000	5063-6560	
					5063-6561



Agilent high-precision cells are tested to meet the highest optical standards. Every Agilent cell comes with a test certificate, ensuring that the following areas have been tested and are within specifications:

- Homogeneity of the raw material
- Dimensional and angle tolerances of the component parts
- Flatness of the optical surfaces
- Transmission of the cells



Ultra-micro cell with PTFE Stopper

Ultra-micro Cells

These cells are specifically designed for use in the µL range (down to 50 µL). These cells fit into any standard cell holder and have the advantage of requiring much smaller sample volumes than standard cells. The cells are constructed so that filling and emptying can be easily accomplished with commonly available pipette tips. Ultra-micro cells with Eppendorf pipette filling/emptying are designed to handle extremely small volumes. When only a minimum amount of sample is available, these cells provide a filling volume only slightly larger than the measuring chamber volume.

Ultra-micro Cells with PTFE Stopper

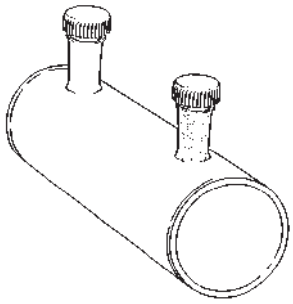
Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (µL)	Filling Volume (µL)	Part No. Quartz
2	45 x 12.5 x 12.5	2.5 x 2	15	10	20	5062-2497
10	45 x 12.5 x 12.5	2.5 x 2	15	50	70	5062-2496



Ultra-micro Cell with Eppendorf Filling

Ultra-micro Cells with Eppendorf pipette filling/emptying

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (µL)	Filling Volume (µL)	Part No. Quartz
0.1	40 x 12.5 x 12.5	1 x 5	15	0.5	5	5063-6562
1	40 x 12.5 x 12.5	1 x 5	15	5.0	10	5063-6563
5	40 x 12.5 x 12.5	0.8 round	15	2.5	5	5063-6564
10	40 x 12.5 x 12.5	0.8 round	15	5.0	10	5063-6565



Cylindrical Cell with PTFE Stoppers

Cylindrical Cells

A cylindrical cell is a cell with plane-parallel optical surfaces whose inner volume is cylindrical in shape and has a longitudinal axis parallel to the direction of the radiation beam.

Cylindrical Cells with PTFE Stopper

Path Length (mm)	Ext. Dimensions (mm)	Int. Dimensions (mm)	Volume (µL)	Part No. Glass	Part No. Quartz
100	102.5 x 22	19	28000	5063-6566	
					5061-3392



Round Aperture Flow Cell

Flow-through Cells

Until recently, flow-through cells had measuring chambers that were either rectangular or circular in shape. These shapes were dictated by limitations in the manufacturing process and did not offer the best geometry for clean flushing and reduction of contamination. Agilent has developed oval aperture cells that combine low volume with excellent flow characteristics. These oval flow cells are strongly recommended for automated analyses such as dissolution testing. Black quartz is used in the vicinity of the aperture to ensure that no light passes through the side walls of the cell.

Flow-through cells with round aperture and screw fitting connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (µL)	Part No. Quartz
10	35 x 12.5 x 12.5	2	15	30	0100-1224
10	35 x 12.5 x 12.5	3	15	80	0100-1225



Rectangular Aperture Flow Cell

Flow-through cells with rectangular aperture and screw fitting connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (µL)	Part No. Quartz
0.1	35 x 12.5 x 12.5	17.5 x 3.5	15	6.2	5188-8003
0.2	35 x 12.5 x 12.5	17.5 x 3.5	15	12.4	5188-8004
0.5	35 x 12.5 x 12.5	17.5 x 3.5	15	31	5188-8005
1	35 x 12.5 x 12.5	17.5 x 3.5	15	62	5061-3396
2	35 x 12.5 x 12.5	17.5 x 3.5	15	124	5061-3397
5	35 x 12.5 x 12.5	17.5 x 3.5	15	230	5065-9918
10	35 x 12.5 x 12.5	11 x 3.5	15	390	5061-3398
10	35 x 12.5 x 12.5	8 x 2	15	160	5062-2476



Oval Aperture Flow Cell

Flow-through cells with oval aperture and screw fitting connection

Path Length (mm)	Ext. Dimensions (mm)	Aperture (mm)	Center Height (mm)	Volume (µL)	Part No. Quartz
1	39 x 12.5 x 12.5	8 x 3	15	40	5063-6570
1	40 x 12.5 x 12.5	8 x 3	15	40	5065-9907
2	39 x 12.5 x 12.5	8 x 3	15	80	5063-6571
5	39 x 12.5 x 12.5	8 x 3	15	200	5063-6572
10	39 x 12.5 x 12.5	8 x 3	15	430	5063-6573

Note: Flow-through cells do not include tubing/fittings.

Cell Accessories

Spacers*

Description	Part No.
Spacer for 1 mm cell	5061-3388
Spacer for 2 mm cell	5061-3389
Spacer for 5 mm cell	5061-3390

*Spacers are required to hold cells with an outer depth of less than 12.5 mm in the cell holder.



Cell tray, 5063-6577

Miscellaneous

Description	Unit	Part No.
Magnetic stirring bar**	2/pk	9301-1161
Cell cleaning solution	1 L	5062-8529
Lens cleaning paper, lint free	50/pk	9300-0761
Tray for 16 Spectrophotometer cells	10 mm	5063-6577

**For use with Agilent 89054A cell-stirring multicell transport and Agilent 89090A Peltier temperature controller. Stirring bars are used with cells having internal dimensions of 10 x 10 mm (W x D) and cell holders with magnetic stirring capability.



Union, 5022-2155



Cell fittings (black), 5022-2156



Conical adapter kit, 5022-2157



Teflon nuts, 5022-2158



PEEK fittings and ferrules, 5042-1337

Tubing and Fittings

Description	Unit	Part No.
Teflon tubing, 1.6 mm OD	10 m	5041-2191
Pump tubing, 2.06 mm ID	12/pk	5041-2166
Pump tubing, 1.3 mm ID	12/pk	5041-2184
Pump tubing, 2.8 mm ID	12/pk	5041-2185
Tefzel ferrules and SS lock rings, 1/16 in.	10/pk	5022-2154
Union, 1/4 - 28 threads, Polypropylene	10/pk	5022-2155
Cell fittings, black (4 short and 4 long)	8/pk	5022-2156
Conical adapter kit Connects Teflon tubing to pump tubing	2/pk	5022-2157
Teflon nuts for 1/16 in. OD tubing	10/pk	5022-2158
Tubing, heat exchanger, FEP	12 cm	5042-1336
1/16 in. PEEK fittings and ferrules for 8-port valve	10/pk	5042-1337
Mounting tool for flangeless nut		0100-1710



Deuterium lamp assembly, 2140-0605



Tungsten lamp assembly, G1103-60001



Deuterium lamp assembly, 08452-60104

Instrument Parts and Supplies

Spectrophotometer Lamps

Description	Part No.
Deuterium lamp assembly, 8453	2140-0605
Deuterium longlife lamp	2140-0813
Tungsten lamp assembly	G1103-60001
Deuterium lamp assembly, 8452	08452-60104

Cell Holders

Description	Part No.
Standard cell holder	08451-60104
Long path-length cell holder	89076C
Thermostattable cell holder	89054A
Cell stirring module	89055A
Magnetic stirring bar for use with 10 x 10 mm (W x D) cells, 2/pk	9301-1161

G1120A 8-Position Multicell Transport Supplies

Description	Part No.
Optical filter kit Set of three optical filters to prevent photosensitive samples from being irradiated by UV light (265 and 295 nm cut-off and UV roll-off filter)	G1120-68707
Stirring module kit Stirrer is driven by circulating water from water bath (not included)	G1120-60006
Magnetic stirring bar for use with 10 x 10 mm (W x D) cells, 2/pk	9301-1161
Multicell transport adjustment tool	89075-23800
Plastic cover kit	G1120-68708

89090A Peltier Temperature Controller Supplies

Description	Part No.
Union, cell holder	5021-1870
Flow cell, 10 mm, 8 x 2 mm aperture, 160 µL	5062-2476
Quartz cuvette, 10mm, with PTFE stopper	5062-2477
Tubing, heat exchanger, FEP	5042-1336
Magnetic stirring bar	9301-1161

Autosampler Supplies

Description	Part No.
Needle, beveled edge for G1811A	G1811-23200
Test tubes, 12 x 100 mm, 250/pk	5022-6531

Sipper Supplies

Description	Part No.
Sipper tubing kit	5042-1333
Autosampler tubing and fittings kit	5042-1334
Flow cell, 10 mm, 80 µL	0100-1225
Cassette, fixed pressure	5041-2167
Cassette, variable pressure	5042-1356



Multicell tubing kit, 5042-1330



Valve tubing kit, 5042-1331

Dissolution Testing Supplies

Dissolution Testing Supplies

Description	Part No.
Multicell system tubing kit	5042-1330
Valve tubing kit for one bath	5042-1331
Dissolution probes kit, 0.9 mm ID, tubes with fittings	5042-1332
1/16 in. PEEK fittings and ferrules for 8-port valve, 10/pk	5042-1337
8 port valve for dissolution system	5063-6575
Rotor seal for 5063-6575 valve (UV-vis) dissolution system	5067-1539
Dissolution filters for 1/8 in. probe, 45 µm pore size, 1000/pk	5181-1246



UV-Vis Standards & Reagents

Our chemical standards and accessory kits provide an inexpensive and time-saving solution for operational qualification and performance verification (OQ/PV) of UV-visible spectrophotometers. The kits are designed for analysts who need to conform closely to both quality and regulatory requirements when performing UV-visible measurements.

The chemical kits can be used with any UV-visible spectrophotometer and consist of pre-prepared solutions in sealed ampoules. The solutions are those specified by the United States Pharmacopeia (USP) and European Pharmacopeia (EP) and include holmium oxide for wavelength accuracy measurement; potassium dichromate for photometric accuracy measurement; sodium nitrite, sodium iodide and potassium chloride for stray light measurements at 340, 220 and 200 nm; and toluene in hexane for resolution measurement. Each standard includes a Certificate of Analysis for traceability.

Certified Calibration Standards and Accessory Kits

Description	Part No.
OQ/PV Chemical Standards Kit I (for photometric accuracy, stray light and resolution measurements) Contains 10 ampoules 10 mL each of 2 Dichromate, 2 Sulfuric Acid, 1 Sodium Nitrite, 1 Sodium Iodide, 1 Potassium Chloride, 1 Toulene in Hexane, 2 Hexane	5063-6503
OQ/PV Chemical Standards Kit II (for wavelength accuracy) Contains two ampoules 10 mL each of 2 Perchloric Acid, 1 Holmium Oxide in Perchloric Acid	5063-6521
OQ/PV Hardware Kit Contains 2 flow cells, cell passivating fluid, tubing kit, MCT adjustment tool, temperature sensor support, syringes and OQ/PV manual	5063-6523
Tubing Kit for UV-Vis OQ/PV Test Contains tubings, fittings and adapter to flush flow cell	5063-6522
Caffeine OQ/PV sample for dissolution test, 150 mg/L caffeine in water, 500 mL	5042-6476
Hoya 056 filter, used for performance verification of 8425A	08450-60300
Multicell transport adjustment tool	89075-23800

Checkout Samples

Description	Part No.
Test sample for UV-Vis (Caffeine solution, 10 µg/mL in water)	5063-6524

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Mail: Agilent Technologies
2850 Centerville Road
Wilmington, DE 19808
Attn: Customer Service

Fax: 302-633-8901

Email: custom_columns@agilent.com
(for U.S., Canada, and Puerto Rico)

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Type I

Type of Phase _____ Length (m) _____

Internal Diameter (mm) _____ Film Thickness (µm) _____ 5" Cage or Standard Cage _____

Type II – Duraguard

Column Part Number _____ **or** **Fill in Parameters as Type I**

Guard – Front End Length (m) _____ **or** Transfer Line – Back End Length (m) _____

Type III – Guard Column or Transfer Line

Leak Free U

Column Part Number _____ **or** **Fill in Parameters as Type I**

Guard – Front End _____ **or** Transfer Line – Back End _____ **Note: Choose Guard Column or Transfer Line**

Internal Diameter (mm)	Length (m)	Internal Diameter (mm)	Length (m)

Type IV – Dual Column

Column #1
Column Part Number _____ **or** **Fill in Parameters as Type I**

Column #2
Column Part Number _____ **or** **Fill in Parameters as Type I**

Leak Free Y _____ Guard Column _____ Length (m) _____ Internal Diameter (mm) _____

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Order Date	Purchase Order or Credit Card Number & Expiration	Taxable Y or N?	Yes	No
Name:		If No, please provide Certificate #		
Title:				
Phone:		Fax:		
Company:		Email:		

	Shipping Address	Billing Address
Company:		
Street:		
Room/Bldg/Dept:		
City:		
State/Province/Country:		
Zip/Postal Code:		
Deliver to:		

Part Number	Description	Quantity	Price	Total Cost

Special Instructions:		
	Subtotal:	
	Tax:	
	Total:	

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Order Date	Purchase Order or Credit Card Number & Expiration	Taxable Y or N?	Yes	No

Name:	If No, please provide Certificate #
Title:	
Phone:	Fax:
Company:	Email:

	Shipping Address	Billing Address
Company:		
Street:		
Room/Bldg/Dept:		
City:		
State/Province/Country:		
Zip/Postal Code:		
Deliver to:		

Part Number	Description	Quantity	Price	Total Cost

Special Instructions:

Subtotal:	
Tax:	
Total:	

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City:		
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Part Number	Description	Quantity	Price	Total Cost

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	Tax:	
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