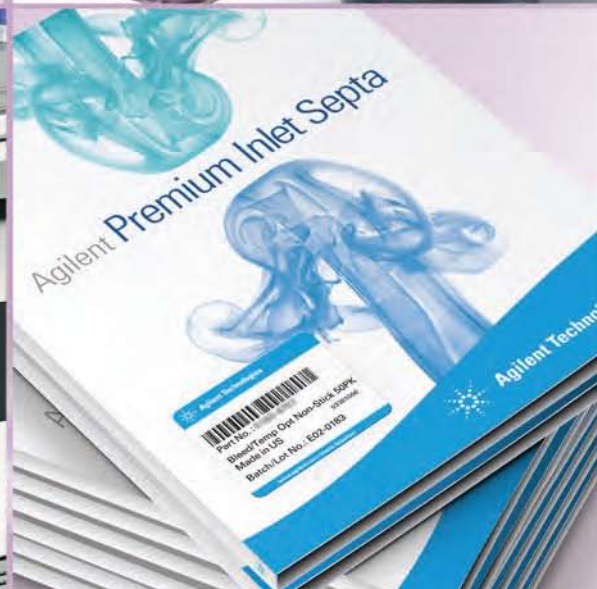
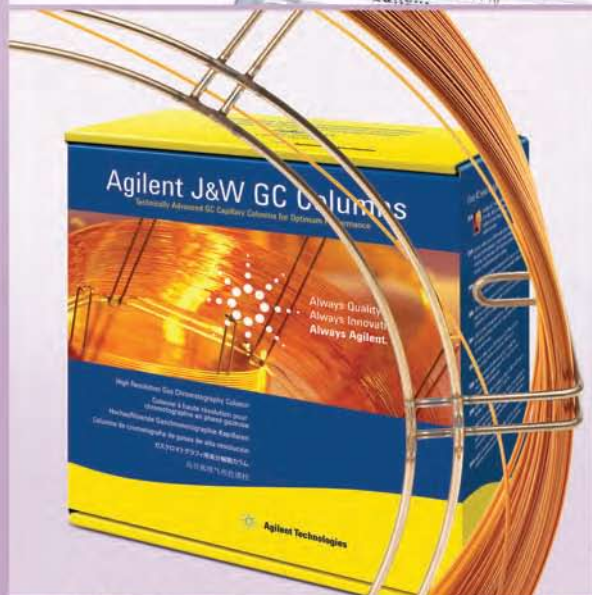


GC AND GC/MS



LC AND LC/MS



In this Chapter

252 GC and GC/MS Maintenance Schedule

~~Parts and Supplies~~

- ~~254 GC General Supplies~~
- ~~280 GC Instrument Parts and Supplies~~
- ~~318 GC/MS Parts and Supplies~~
- ~~337 GC Parts and Supplies for Varian Instruments~~

Agilent J&W GC and GC/MS Columns

- 359 Ultra Inert Columns
- 362 Guard Columns
- 364 Low-bleed GC/MS Columns
- 392 Polysiloxane Polymers Columns
- 430 Polyethylene Glycol (PEG) Columns
- 442 PLOT Columns
- 461 Special Application Columns
- 524 Packed GC Columns
- 531 Test Standards
- 532 Fused Silica Tubing
- 559 GC Column Troubleshooting and Maintenance

~~GC and GC/MS Applications~~

- ~~568 Environmental Applications~~
- ~~617 Foods, Flavors and Fragrance Applications~~
- ~~641 Industrial Chemical Applications~~
- ~~671 Life Science Applications~~
- ~~686 Petroleum Applications~~



In this Chapter

Parts and Supplies

- 712** Bio-inert Supplies
- 716** General Supplies
- 739** Pump Supplies
- 752** Autosampler Supplies
- 758** Fraction Collector Supplies
- 762** Valve Supplies
- 772** TCC Supplies
- 775** Detector Supplies
- 787** LC/MS Supplies

LC and LC/MS Columns

- 796** HPLC Column Selection
- 806** Cartridge Column Systems
- 818** Columns for Analytical HPLC
- 891** Columns for Special Applications
- 916** Preparative HPLC Columns and Flash Chromatography
- 945** GPC/SEC Columns and Calibrants
- 996** Biosolutions and Columns for Biologic Characterization

LC and LC/MS Troubleshooting

- 1052** HPLC Troubleshooting
- 1056** LC/MS Troubleshooting

LC and LC/MS Applications

- 1059** BioPharmaceutical Applications
- 1076** Chemical/Industrial Applications
- 1079** Environmental Applications
- 1088** Food and Consumer Product Applications
- 1102** Pharmaceutical Applications



GC/MS Parts and Supplies



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 dry pump diaphragm seals (MVP55)				◆
Replace the dry pump tip seals (IDP3)			◆	
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 5990-5451EN**).



MSD Contamination

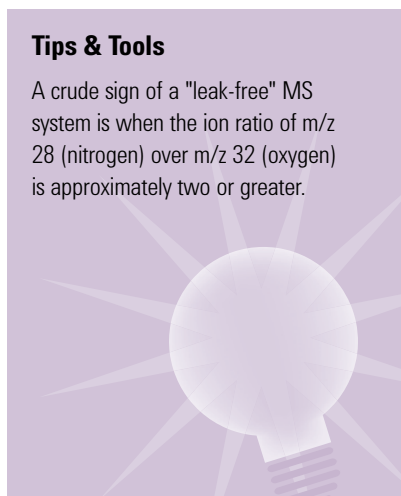
Contamination is usually identified by excessive background in the mass spectra, which can come from the GC or MSD. The source of contamination can sometimes be determined by identifying the contaminants. Some contaminants are much more likely to originate in the GC, while others are likely to originate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

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.



Common Contaminants

Ions (m/z)	Compound	Possible Source
13, 14, 15, 16	Methane	CI gas
18, 28, 32, 44 or 14, 16	H ₂ O, 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 L), filament assembly, octafluoronaphthalene (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, abrasive Alumina powder	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, 5.32 mL	8500-0656
Replacement glass bulb for PFTBA and PFDTD test sample	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
Inlet column nut for long or long two-hole ferrules	05921-21170
Universal column nut, 2/pk	5181-8830
MS interface column installation tool for 5973 and 5975	G1099-20030
Column installation tool for 5975T	G3880-20030

(Continued)



MS interface column nut, 05988-20066



Universal column nut, 5181-8830



Column installation tool, G1099-20030

Cleaning and Maintenance Supplies

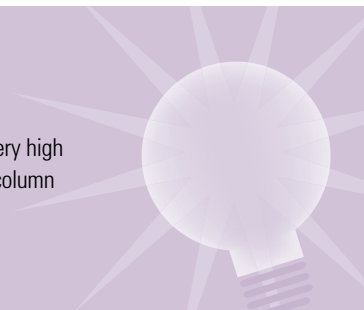
Description	Part No.
Tools	
Screwdriver, 3 in. Pozidriv shaft No. 1 pt, fits no. 2-4 screws	8710-0899
Screwdriver, 4 in. Pozidriv shaft No. 2 pt, fits no. 5-10 screws	8710-0900
Open end wrench, 1/4 and 5/16 in.	8710-0510
Hex nut driver, 5.5 mm	8710-1220
Screwdriver, Torx T20	8710-1615
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T10	5182-3466
Ferrules	
0.4 mm Vespel/Graphite ferrule for 200/250 μ m columns, 10/pk	5062-3508
0.5 mm Vespel/Graphite ferrule for 320 μ m columns, 10/pk	5062-3506
250 μ m 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
Ferrule pre-swaging tool	G2855-60200
Plug for microfluidic manifold or unions	G2855-60570



Vespel/Graphite ferrules, 5181-3323

Tips & Tools

Even preconditioned ferrules can shrink slightly at very high temperatures. 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.

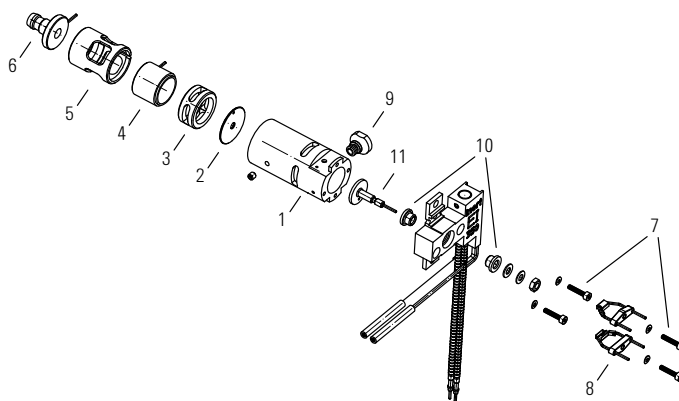
Electron Impact (EI) Ion Source

The recommended cleaning material for the EI ion source is abrasive, 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)

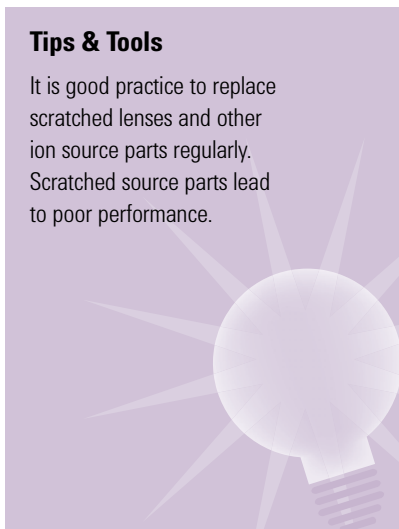
Item	Description	Part No.	Inert Part No.
1	Ion source body	G1099-20130	G2589-20043
2	Drawout plate, 3 mm	05971-20134	G2589-20100
	Drawout plate, 6 mm	G3163-20530	G2589-20045
3	Drawout cylinder	G1072-20008	G1072-20008
4	Ion focus lens	05971-20143	05971-20143
5	Lens insulator	G3170-20530	G3170-20530
6	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 regularly. 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	05971-20305

Warnings & Caution

Important: Do not abrasively or ultrasonically clean the insulators.

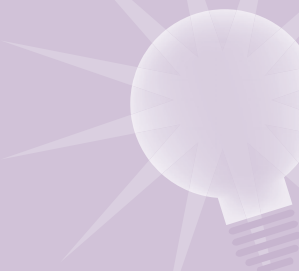
Abrasively clean the surfaces that contact the sample or ion beam. Use an abrasive slurry of alumina powder and reagent-grade methanol on a cotton swab. Use enough force to remove all discoloration. Polishing the parts is not necessary; small scratches will not harm performance. Abrasively clean discoloration where electrons from 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 put the cleaned parts on a dirty surface. Place them only on clean, lint-free cloths.



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.



Chemical Ionization (CI) Ion Source

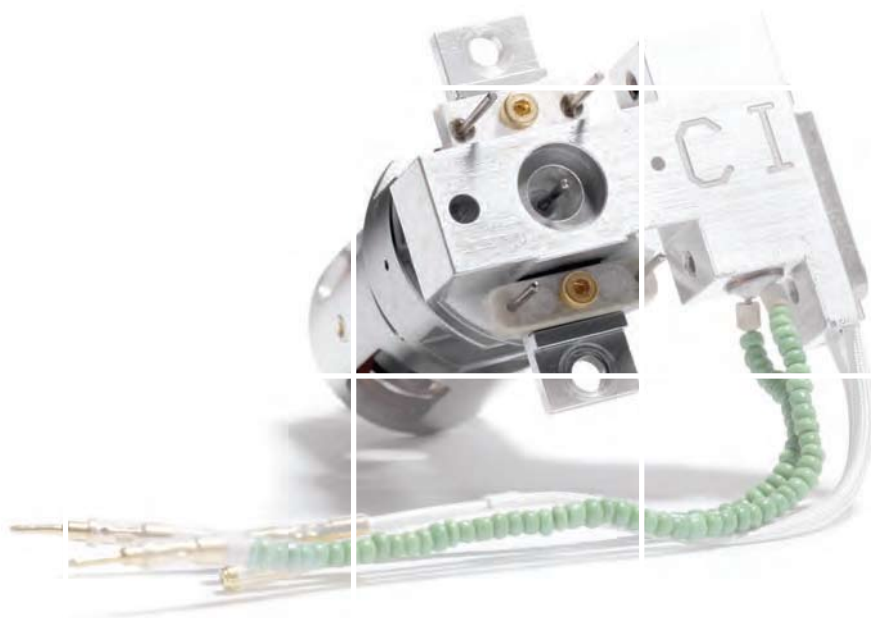
Because the CI ion source operates at much higher pressures than the EI ion source, it will probably require more frequent cleaning than the EI ion source.

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 drawout plate. Be sure to clean the 0.5 mm diameter holes in the ion source body and drawout plate.

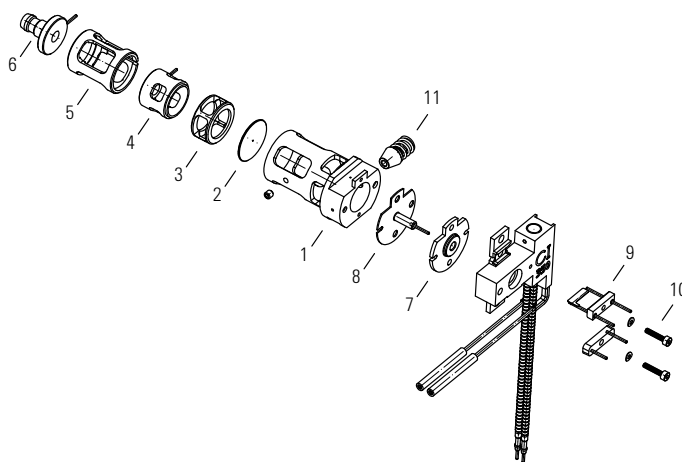
Cleaning the ion source is very similar to cleaning the EI ion source. Use the same EI cleaning procedure with the following exceptions:

- 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 drawout plate.
- Do not use halogenated solvents. Use hexane for the final rinse.



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

Item	Description	Part No.
1	Source body	G1999-20430
2	Drawout plate	G1999-20446
3	Drawout cylinder	G1999-20444
5	Ion focus lens	G1999-20443
4	Lens insulator	G3170-20540
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	G1999-60412



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

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



Filament assembly (EI), G3170-60050

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 control your MSD from the Edit Parameters screen, always select 'MS Off' before changing any of the filament parameters

MSD Filaments

Description	5975 Series	5975T Series	5973 Series	5972 Series	5971 Series
Filament assembly (EI)	G3170-60050		G3170-60050	G3170-60050	05971-60140
Filament assembly (CI)	G1099-80053		G1099-80053		
Micro ion vacuum gauge	G3170-80001				
Triode gauge tube for measuring vacuum			0960-0897		
Ion gauge controller		G3880-80010			
Ion gauge tube		G3880-80011			

Tips & Tools

It is very useful to switch from one filament to the other every three months so that when a 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 V. 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 V

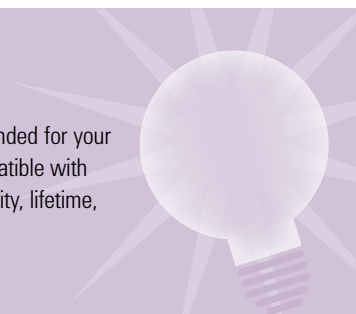
MSD Electron Multipliers and Replacement Horn

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 triple axis detector systems

Tips & Tools

The Agilent multipliers and horns listed are recommended for your MSD. Other manufacturers' products may be incompatible with Agilent instruments and can result in reduced sensitivity, lifetime, and noise problems.





Foreline Pump

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 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

The oil in the foreline or rough pump should be replaced on average once every six months, but can vary depending upon applications. If a foreline trap is present, the molecular sieves should also be replaced after an oil change.

Avoid contact with the pump oil. The residue from some samples may be toxic. Dispense of used oil properly.

Pump Oils

Description	Part No.
Foreline pump oil, Inland 45, 1 L	6040-0834
High vacuum grease, 25 g	6040-0289
Diffusion pump fluid, 18.5 mL	6040-0809*
IDP Series tip seal kit for 5975T	IDP3TS

*2 required for 5975 and 5973 Series



7000A Triple Quadrupole GC/MS Parts and Supplies

Engineered from the ground up for ease-of-use and routine high performance operation, the 7000A Triple Quadrupole GC/MS delivers advanced high-speed GC/MS/MS quantitation for ultra-trace analysis of even the most complex samples. Combined with the Agilent 7890 GC, the result is an optimally robust GC/MS/MS system.

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

Foreline Pump Supplies

Description	Part No.
Diffusion pump fluid, 18.5 mL	6040-0809
Foreline pump oil, P3, 0.5 L	6040-0621
Rough pump inlet flange	0905-1463
Oil return kit	3162-1057
Pump oil drip pan	G1946-00034
Oil mist exhaust filter	G1099-80039
Oil mist filter for RV5 pump	G6600-80043



Low noise EM horn, G3170-80103



Filament assembly (EI), G3170-60050

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
High vacuum grease, 25 g	6040-0289
Electron multiplier replacement horn	05971-80103
Low noise EM horn	G3170-80103
Filament assembly, high temperature (EI)	G3170-60050
Filament assembly (CI)	G1099-80053
Micro ion vacuum gauge	G3170-80001
Replacement glass bulb for PFTBA and PFDTD test sample	G3170-80002



240-MS Ion Trap Parts and Supplies

The Agilent 240-MS Ion Trap delivers unparalleled capabilities for both research and routine applications. Advanced ionization, including positive and negative chemical ionization, improves selectivity and limits of detection. Enhanced scanning techniques ensure compound confirmation. The MS/MS and MSⁿ reduce matrix influences and provide more detailed structural information. The software comes with a full complement of productivity, reporting, and regulatory compliance tools.

- Accurate identification and quantification of trace analytes
- Unsurpassed sensitivity (200 femtogram OFN full scan)
- Choice of internal or external ionization configurations
- Powerful MS/MS and CI options
- Low maintenance and high reliability
- Intuitive software for increased productivity

240-MS Ion Trap Parts and Supplies

Description	Part No.
Manifold O-ring	393010924
Transfer line inner O-ring	393010920
Transfer line outer O-ring	393010918
Internal filaments (2 filaments on one disk)	392017401
Internal transfer line tip	393171201
External filament (single filament)	393161001
Electrode, end cap, Silchrom	393164493
Electrode set kit, Silchrom, DFC (inert) tested Includes 2 end cap electrodes, 1 RF electrode, cleaning instructions	9300003590
Electrode, RF, Silchrom	393167593
Spacer, RF, Silco-quartz	393053502
Electron multiplier	393175101
Transfer line assembly upgrade field kit Contains a complete transfer line and side-mounted block for vacuum manifold	393101291
EPA volatile kit for EPA methods 524.2 & 8260B	393082491
ChromatoProbe microvials, 100/pk	392567111

240-MS Ion Trap Parts and Supplies

Description	Part No.
GC/MS Standards	
Evaluation standard (Internal EI & CI) 2 pg/μL OFN, 5 pg/μL	393112601
Test standard for external EI (5 pg/μL OFN)	393112702
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Test standard for external NCI (1 pg /μL DFB)	393113001
Tuning calibration compound PFTBA (FC-43)	392035300
GC/MS column test mix	392027300
Vacuum Supplies	
Oil mist exhaust filter, DS42	393847701
Oil mist eliminator	2735000500
Replacement cartridge for oil exhaust filter, 2/pk	2710100200
Foreline (roughing) pump oil, 1 L	8829951700
Premium foreline (roughing) pump oil, 1 L	8829953800
IDP-3 dry scroll pump tip seal maintenance kit	2710100400
IDP-3 dry scroll replacement module	2710100500





220-MS Parts and Supplies

The 220-MS is a high sensitivity, flexible gas chromatograph/mass spectrometer that delivers outstanding qualitative and quantitative data in a range of applications. This simple and robust system is easy to operate and maintain.

- Accurately identify and quantify trace analytes
- Take advantage of powerful CI and MS/MS upgrades for advanced applications
- Spend less time on maintenance and more time on analysis

220-MS Parts and Supplies

Description	Part No.
Electron multiplier assembly	393031501
Exit end cap electrode, chrome	393050292
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, chrome	393050392
Filament end cap electrode, SilChrom	393050393
RF ring electrode, chrome	393050492
RF ring electrode, SilChrom	393050493
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Filament disk assembly with wire connectors	393060191
Filament disk assembly	392043700
User must solder on 3 wire connectors	
Thermocouple vacuum gauge	2722990700
Mass spectrometer expendable supplies kit for 2x0MS	393011391
Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	
GC/MS Standards	
Hexachlorobenzene EI sensitivity standard 100 pg/mL	392027500
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Tuning calibration compound PFTBA (FC-43)	392035300
Hexachlorobenzene EI sensitivity standard 2 pg/mL	392047100
GC/MS column test mix	392027300



MS standards

GC/MS Standards

GC/MS Analyzer Kit Standards

Description	Part No.
GC/MS semivolatiles analyzer checkout mixture	5190-0473
GC/MS pesticide analyzer internal standard	5190-0472
Pesticide analyzer checkout solution	5190-0468
Pesticide checkout standard, 100 µg/L, 3 x 1 mL	5190-0494
GC/MS toxicology checkout mixture	5190-0471
Residual solvent revised method 467, class C	5190-0493
Residual solvent revised method 467, class 1	5190-0490
Butanetriol internal standard #1 for biodiesel	5982-0024
Tricaprin internal standard #2 for biodiesel	5982-0025

MS Test and Performance Samples

	Description	Part No.	5975 Series	5973 Series	5972 Series	5971 Series	GCD	7000 Series
Tuning Samples								
EI Tune	PFTBA sample, certified, 10 g, 5.32 mL	8500-0656	◆	◆	◆	◆	◆	◆
CI Tune	PFTBA MS Sample Kit, 0.942 g, 0.5 mL	05971-60571	◆	◆			◆	◆
	PFDTD calibrant	8500-8510	◆	◆				◆
Performance Verification Samples								
EI	OFN, 1 pg/μL	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	◆	◆	◆	◆		◆
Checkout Samples								
HighMass	PHFT, 100 pg/μL	5188-5357	◆					
Semi-Volatile	GC/MS tuning standard, DFTPP	8500-5995	◆	◆	◆	◆	◆	
Volatile	p-Bromofluorobenzene (BFB), 25 μg/mL	8500-5851	◆	◆	◆	◆	◆	
Evaluation sample	Solution of dodecane, biphenyl, p-chlorodiphenyl, 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	◆	◆	◆	◆		

Tips & Tools

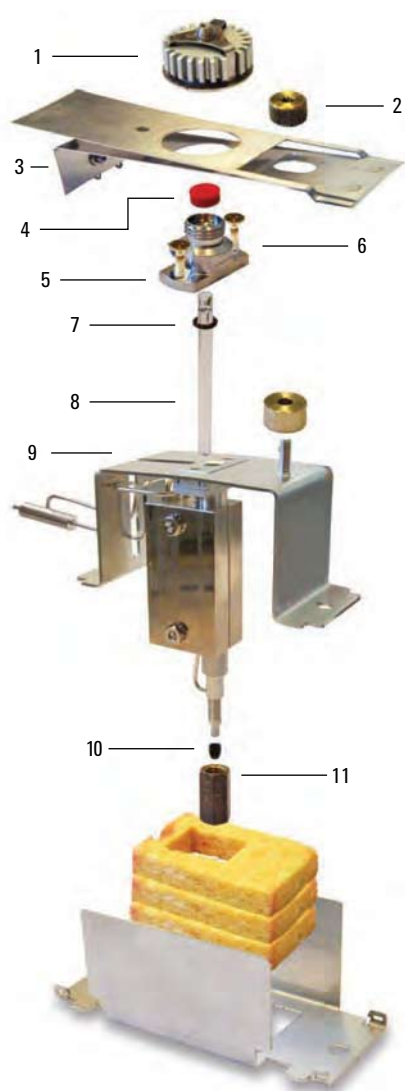
Each GC/MS has a specific test and performance sample. Refer to the chart above for the exact sample. All volumes are approximately 0.5-1 mL unless otherwise specified.



GC Parts and Supplies for Varian Instruments

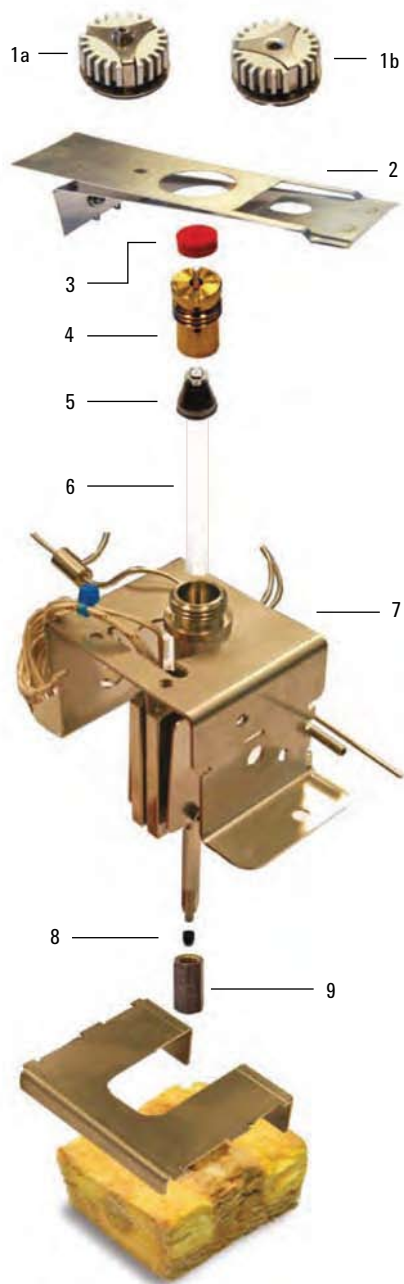
Agilent now provides replacement parts and supplies for GC instruments formerly manufactured by Varian. The following section includes ordering information for GC injectors, detectors and GC/MS systems.

Injector Replacement Parts and Supplies



1177 Split/Splitless Injector

Item	Description	Part No.
1	Injector nut	392597501
	Injector nut wrench	390842300
2	Knob	392597101
3	Automatic start switch	390820601
4	Septum, 9 mm	
	BTO	8010-0217
	Long Life	8010-0233
	Advanced Green	8010-0201
	Septum pick	7200008400
5	Septum purge head	
	EFC21 (stainless steel)	392597301
	EFC21 (UltiMetal)	392597303
	EFC25 or Manual Pneumatics	392597302
6	Purge head screw	391866308
7	Graphite liner O-ring, splitless, 6.5 mm	8004-0202
	Viton liner O-ring, 6.3 mm	8004-0201
8	Glass liner	8004-0165
9	Injector body	
	Stainless steel	392599401
	UltiMetal	392599411
	Manual	392599501
10	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
11	Bottom nut	8004-0311

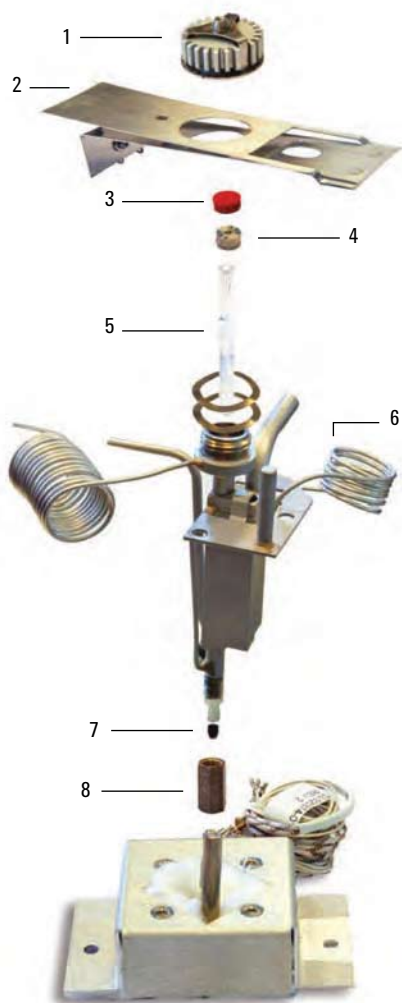


1079 Large Volume Injector (LVI)

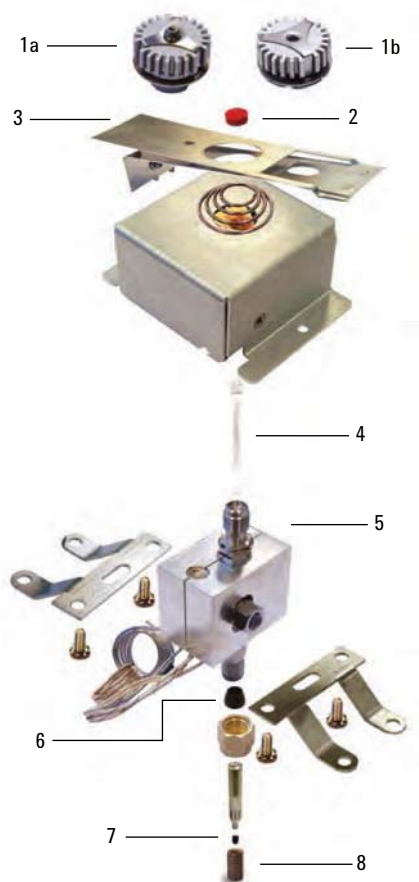
Item	Description	Part No.
1a	Injector nut	394966601
1b	Injector nut	394966601
	Injector nut wrench	390842300
2	Automatic start switch	390820601
3	Septum, 11.5 mm	
	BTO	8010-0225
	Long Life	8010-0241
	Advanced Green	8010-0209
	Septum pick	7200008400
4	Septum support	391867600
5	Insert ferrule	8004-0204
6	Glass liner	8004-0164
7	Injector body, EFC type	
	Stainless steel	392544001
	UltiMetal	392544011
8	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
9	Bottom nut	8004-0311

To learn more about Agilent CrossLab and to request your copy of the Agilent CrossLab product catalog, visit www.agilent.com/chem/CrossLab



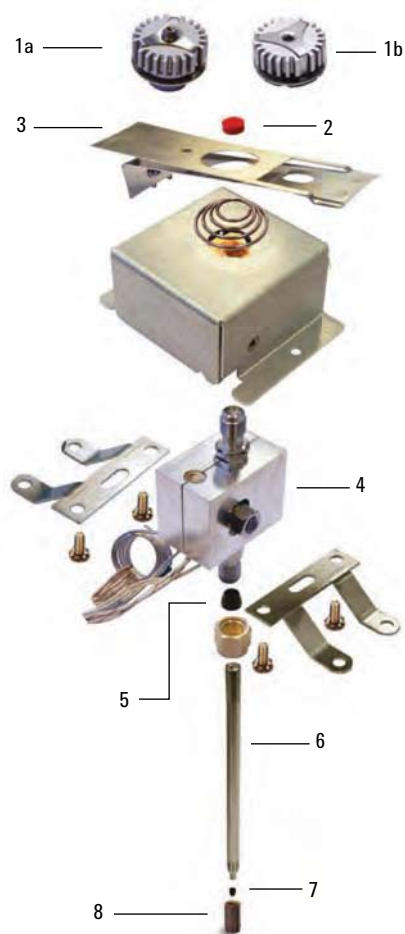
**1093 Cool On-Column (COC) Injector**

Item	Description	Part No.
1	Injector nut	394966601
	Injector nut wrench	390842300
2	Automatic start switch	390820601
3	Septum, 11.5 mm	
	BTO	8010-0225
	Long Life	8010-0241
	Advanced Green	8010-0209
	Septum pick	7200008400
4	Septum support	391821100
5	Glass liner	
	Default	8004-0162
	High performance	8004-0167
	On-column	8004-0166
6	Screw	391866306
7	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
8	Bottom nut	
	Brass	8004-0311
	Stainless steel	8004-0312



1061 Packed/530 µm Capillary Column Injector

Item	Description	Part No.
1a	Injector nut	390812700
1b	Injector nut	392595501
	Injector nut wrench	390842300
2	Septum, 9.5 mm	
	BTO	8010-0219
	Long Life	8010-0235
	Advanced Green	8010-0203
	Septum pick	7200008400
3	Automatic start switch	390820601
4	Glass liner	8004-0168
5	Injector body, EFC23	392548301
6	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
7	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
8	Bottom nut	8004-0311

**1041 Packed/Wide Bore On-Column (PWOC) Injector**

Item	Description	Part No.
1a	Injector nut	390812700
1b	Injector nut	392595501
	Injector nut wrench	390842300
2	Septum, 9.5 mm	
	BTO	8010-0219
	Long Life	8010-0235
	Advanced Green	8010-0203
	Septum pick	7200008400
3	Automatic start switch	390820601
4	Injector body, EFC type	392548201
5	Graphite/Vespel ferrule	8004-0217
	Graphite ferrule	8010-0305
6	Injector insert, stainless steel	392543101
7	For replacement ferrules, see Agilent's new line of CrossLab Supplies	
8	Bottom nut	8004-0311

Detector Replacement Parts and Supplies

Thermal Conductivity Detector (TCD)

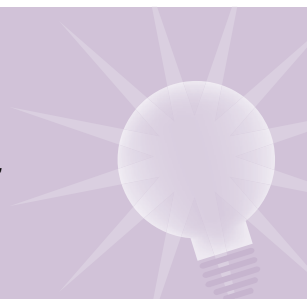
Description	Part No.
Adapter TCD/DEFC capillary make-up	392585291
Adapter TCD/DEFC reference gas kit	392585292
Adapter TCD capillary make-up, MPC, 3800	392560591
TCD DEFC 14 (Non-H ₂), 2 channels	392561290

Flame Ionization Detector (FID)

Description	Part No.
Tube collector	394958700
Lower FID insulator 17311	2100003200
FID flame tip jet, 0.010 in.	200187500
FID flame tip jet with nut, 0.020 in.	200193800
Crunch washer, 25/pk	1500334701

Tips & Tools

To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services



Pulsed Flame Photometric Detector (PFPD)

Description	Part No.
Photomultiplier tube (PFPD) #R647-08	392517100
O-Ring, silicone, 0.53 in. ID, PFPD	2740292400
PFPD light pipe	392515500
Sapphire window assembly	392514500
Sapphire window washer	392514300
Wrench, PFPD combustor support	392519200
Seal, combustor support	392513800
Combustor holder (2 mm)	392517800
Combustor Sulfur (2 mm), cleaned	392517600
Holder, combustor, 3 mm, cleaned	392517901
Combustor Phosphorus, 3 mm, cleaned	392517700

PFPD Filter Assemblies

Description	Part No.
Arsenic (As)	392515105
Manganese (Mn)	392544391
Nitrogen (N)	392511901
Sulfur and Phosphorus (S and P)	392515104
Phosphorus (P)	392515102
Sulfur (S)	392515101
Tin (Sn)	392515103

PFPD Nitrogen Mode Maintenance

Description	Part No.
Photomultiplier tube, Nitrogen R-5070A	392512800
O-Ring, 0.987 in. ID	2740236100
PFPD filter assembly, Nitrogen	392511901
PFPD light pipe	392515500
Sapphire window assembly	392514500
Sapphire window washer	392514300

Thermionic Specific Detector (TSD)

Description	Part No.
TSD bead probe, unconditioned and untested	390607400
TSD bead probe, conditioned and tested	390607401
Upper TSD insulator #17310 TSD	2100003100
O-Ring, 30/pk	2740928202
TSD collector assembly	390607900
Lower FID insulator #17311	2100003200
Crunch washer, 25/pk	1500334701
FID flame tip jet with nut, 0.020 in.	200193800
Flow tube assembly	200187600

GC/MS System Replacement Parts and Supplies

210/220/225 GC/MS Systems

Description	Part No.
Electron multiplier assembly	393031501
Exit end cap electrode, chrome	393050292
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, chrome	393050392
Filament end cap electrode, SilChrom	393050393
RF ring electrode, chrome	393050492
RF ring electrode, SilChrom	393050493
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Filament disk assembly with wire connectors	393060191
Filament disk assembly	392043700
User must solder on 3 wire connectors	
Thermocouple vacuum gauge	2722990700
Mass spectrometer expendable supplies kit for 2x0MS	393011391
Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	
GC/MS Standards	
Hexachlorobenzene EI sensitivity standard 100 pg/mL	392027500
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Tuning calibration compound PFTBA (FC-43)	392035300
Hexachlorobenzene EI sensitivity standard 2 pg/mL	392047100
GC/MS column test mix	392027300

240 GC/MS and 4000 GC/MS Systems

Description	Part No.
Manifold O-ring	393010924
Transfer line inner O-ring	393010920
Transfer line outer O-ring	393010918
Internal filaments (2 filaments on one disk)	392017401
Internal transfer line tip	393171201
External filament (single filament)	393161001
Electrode, end cap, SilChrom	393164493
Electrode set kit, SilChrom, DFC (inert) tested Includes 2 end cap electrodes, 1 RF electrode, cleaning instructions	9300003590
Electrode, RF, SilChrom	393167593
Spacer, RF, Silco-quartz	393053502
Electron multiplier	393175101
Transfer line assembly upgrade field kit Contains a complete transfer line and side-mounted block for vacuum manifold	393101291
EPA volatile kit for EPA methods 524.2 & 8260B	393082491
ChromatoProbe microvials, 100/pk	392567111
GC/MS Standards	
Evaluation standard (Internal EI & CI) 2 pg/ μ L OFN, 5 pg/ μ L	393112601
Test standard for external EI (5 pg/ μ L OFN)	393112702
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Test standard for external NCI (1 pg/ μ L DFB)	393113001
Tuning calibration compound PFTBA (FC-43)	392035300
GC/MS column test mix	392027300
Vacuum Supplies	
Oil mist exhaust filter, DS42	393847701
Oil mist eliminator	2735000500
Replacement cartridge for oil exhaust filter, 2/pk	2710100200
Foreline (roughing) pump oil, 1 L	8829951700
Premium foreline (roughing) pump oil, 1 L	8829953800
IDP-3 dry scroll pump tip seal maintenance kit	2710100400
IDP-3 dry scroll replacement module	2710100500

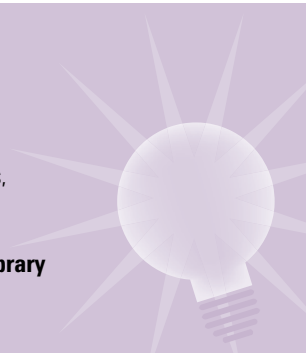
Saturn 2000 Series MS Systems

Description	Part No.
Mass spectrometer expendable supplies kit for 2x0MS Includes PFTBA calibration compound, cal-gas glass chamber, capillary injector nut, O-rings, cotton tipped applicators, end cap insulator, vacuum pump oil	393011391
Electron multiplier assembly	393031501
Filament disk assembly with wire connectors	393060191
Filament disk assembly User must solder on 3 wire connectors	392043700
Exit end cap electrode, SilChrom	393050293
Filament end cap electrode, SilChrom	393050393
RF ring electrode, SilChrom	393050493
Exit end cap electrode, chrome	393050292
Filament end cap electrode, chrome	393050392
RF ring electrode, chrome	393050492
Spacer, RF, quartz	393053501
Spacer, RF, Silco-quartz	393053502
Complete set of SilChrom electrodes and Silco-quartz spacers	393001991
GC/MS Standards	
Tuning calibration compound PFTBA (FC-43)	392035300
Benzophenone CI sensitivity standard 50 pg/mL	392030500
Hexachlorobenzene EI sensitivity standard 2 pg/mL	392047100
Hexachlorobenzene EI sensitivity standard 100 pg/mL	392027500
GC/MS column test mix	392027300

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



■ AGILENT J&W GC AND GC/MS COLUMNS



A legacy of confidence: The continuing story of Agilent J&W GC Columns

In 2000, Agilent Technologies, the inventor of low-bleed HP-5ms columns, merged with J&W Scientific, the creator of DB-5ms – the first GC stationary phase to use arylene technology for lower column bleed.

Thanks to this partnership, you can find both the renowned HP and DB column families under the Agilent J&W name. And they're all brought to you by Agilent Technologies – a company with over 40 years of gas chromatography experience.

In 2010, a new chapter began with the addition of Varian, Inc.

This key acquisition enabled Agilent to expand its GC column portfolio to include three highly respected column families:

- FactorFour GC columns employ advanced proprietary manufacturing techniques to ensure low background and high signal-to-noise values for your routine or trace analysis.
- Select GC columns offer guaranteed performance for specific methods and applications.
- PoraBOND GC columns are highly retentive Porous Layer Open Tubular (PLOT) columns. Because they do not shed any particles, they can improve the quality of your data for volatile compounds.



The Agilent J&W column difference

Low bleed and high inertness for sensitivity and performance

Column bleed can decrease data integrity, reduce uptime, and shorten column life, while column activity contributes to severe peak tailing, compound loss, and degradation of active compounds, all of which raise detection limits and reduce method linearity.

Agilent J&W columns have the widest range of GC/MS and Ultra Inert stationary phases proven to deliver consistent column inertness, exceptionally low column bleed, and high upper temperature limits to ensure accurate peak identification and quantification, improved sensitivity, and extended linearity.

Better precision for better results and greater productivity

Every Agilent J&W GC column adheres to tight retention factor (k) specifications, promoting consistent retention and separation. They also feature narrow retention indexes and a high number of theoretical plates per meter, both of which provide narrow peaks, improve the resolution of closely eluting peaks, and simplify data interpretation.

The industry's tightest quality control specifications

Agilent's stringent testing ensures reliable qualitative and quantitative results – even for your most challenging compounds. For example, we measure peak height ratios for acids and bases to achieve top performance for the widest range of analytes.

In 2008, Agilent also ushered in a new era of column inertness QC testing with the industry's most rigorous test probe mixture.

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"	• Accurate quantification
	• Improved sample throughput	• Potentially shorter run times
Lowest Bleed	• Increased analytical sensitivity for all detectors	• Improved detection limits
	• Fast baseline stabilization	• Reliable compound identification
	• Faster column exchange	• Minimized conditioning time
	• Excellent thermal stability	• Increased sample throughput
Highest Degree of Inertness	• Increased column lifetime, reduced downtime	• Increased sample throughput
	• Better peak shape for active compounds	• Improved detection limit, more accurate quantification, and more instrument uptime
	• Minimum compound adsorption	• More accurate quantification for trace samples and unknown sample screening



Agilent J&W Ultra Inert GC Capillary Columns

The only GC columns that deliver on the promises of consistent column inertness and exceptionally low column bleed

Agilent J&W Ultra Inert GC columns give you outstanding sensitivity and peak shape, allowing you to confidently perform trace-level analysis of acids, bases, and other active compounds.

Like all Agilent columns, Ultra Inert GC columns undergo tight QC testing procedures. However, Ultra Inert columns must also pass through a more difficult set of test parameters, including:

- A demanding test probe mixture that contains compounds with low molecular weights, low boiling points, and no steric shielding of active functional groups, which prevents masking effects and reveals true column quality.
- Testing at lower isothermal temperatures (65°C vs. 120°C for GC/MS columns). Lower-temperature testing decreases the kinetic energy of probes in the mobile phase, preventing molecules from sweeping past active sites on the column. This allows a true evaluation of column surface activity and ensures consistent column inertness.

Together, these conditions enhance the opportunity for solute/column interactions, and expose column deficiencies that traditional GC/MS testing might not detect.

Agilent J&W High Efficiency GC Capillary Columns

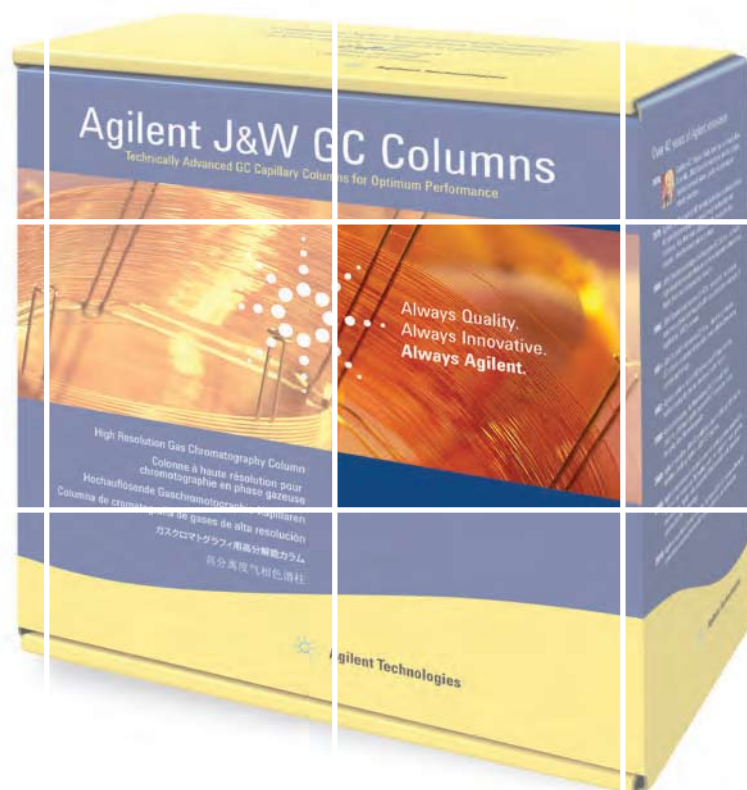
High efficiency, high throughput, and high resolution without the high costs

This leading-edge column technology is ideal for applications that require faster run times, such as high-throughput screening, fast process monitoring, and fast method development. In fact, Agilent High Efficiency columns can reduce your sample run time by 50% or more without compromising resolution.

Unlike other manufacturers' 0.1 mm ID columns, Agilent High Efficiency Capillary GC columns are compatible with all standard-pressure capillary GC and GC/MS instruments – without expensive high-pressure modifications. They also give you:

- The flexibility to choose between helium and hydrogen carrier gases. You can stay with a helium carrier if you wish to simplify method development, or switch to a hydrogen carrier to further reduce your analysis time.
- The ability to separate samples using less carrier gas, which can lead to longer intervals between cylinder changes, increased uptime, and a lower cost per sample.

In addition, these flexible columns easily adapt to a wide variety of environmental, petrochemical, flavor/fragrance, clinical toxicology, and pharmaceutical sample matrices.



Agilent J&W FactorFour GC Columns

Low-bleed performance for all areas of GC and GC/MS analysis

With Agilent J&W FactorFour columns, you get the throughput you need to analyze more compounds in less time – and the analytical accuracy you need to get the right results every time. They are manufactured from detailed specifications and high-quality materials to ensure the reproducibility, low bleed, and high inertness that today's applications demand.

FactorFour columns are available in a variety of general and application-specific phases – including VF-WAXms, the only GC/MS-compatible Wax column – to meet your lab's every requirement.

Double your sample throughput and reduce your cost per analysis with FactorFour 0.15 mm ID columns

In addition to standard dimensions, FactorFour columns are available in an extended range of 0.15 mm ID choices specifically designed to reduce run times and increase throughput.



Agilent J&W LTM Column Modules

Shorten analytical cycle times and boost your high speed gas chromatography capabilities

Agilent J&W LTM column modules combine a high quality fused silica capillary column with heating and temperature sensing components for a low thermal mass column assembly. The LTM column module contains a patented design which 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.

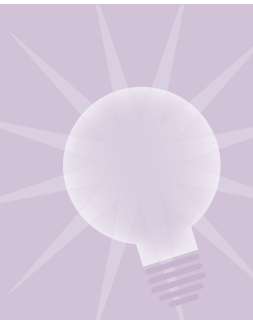
Agilent offers LTM technology for our popular 7890 and 6890 Series GC systems, as well as the new 5875T GC/MS.

All LTM column modules are packaged with:

- Two 1 m guard columns (one each for the inlet and detector) made from deactivated fused silica tubing of the same ID as the analytical column
- Five non-reusable ferrules that fit the dimensions of the analytical and guard columns

Tips & Tools

Agilent LTM column module technology is compatible with metal capillary columns. However, LTM modules are generally not recommended for fast GC applications because of their poor cooling performance compared to fused silica capillaries.



Agilent J&W LTM Column Modules for 7890 and 6890 GC Systems

This groundbreaking column technology is designed specifically for Agilent 7890A and 6890 series gas chromatographs, and delivers:

- The capacity to run up to four column modules simultaneously – with four different temperature programs – to maximize your productivity
- Rapid temperature programming rates of up to 1800°C/min for higher analysis speeds
- Faster cooling times – as low as one minute or less – to decrease idling and downtime
- Shorter analytical cycle times than conventional air-bath GC oven techniques
- Excellent retention time repeatability and performance – comparable to conventional GC
- Strong synergy with Agilent Capillary Flow Technology, which can enhance your ability to perform multi-dimensional and comprehensive GC
- The ability to use the same 6890/7890 GC injectors and detectors with little change to your existing methods

Most Agilent J&W Capillary GC columns – including Wall Coated Open Tubular (WCOT) and Porous Layer Open Tubular (PLOT) columns – can be used for LTM column modules.

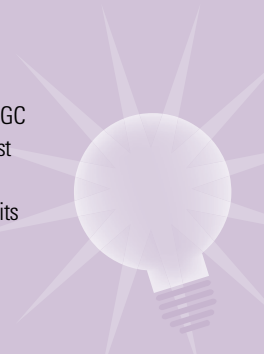
Module assemblies are available in two sizes that deliver equal chromatographic quality:

- 5 inch diameter (standard): features faster cooling speeds, and is recommended for most applications. The 5 inch format allows two column modules to be installed per Agilent LTM system, and can be used with any capillary GC column up to 30 m long.
- 3 inch diameter (small): enables multidimensional GC applications by allowing up to four column modules to be installed per Agilent LTM system. The 3 inch format is limited to capillary GC columns with a 0.32 mm or smaller ID, and is not recommended for fragile capillary columns or PLOT columns.

Module sizes can also be mixed; for example, you can use one 5 inch module with either one or two 3 inch modules.

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.



NEW!

Agilent J&W LTM Column Modules for 5975T Transportable GC/MS Systems

This groundbreaking column technology is designed specifically for Agilent 5975T GC/MS systems. These modules include integrated 3 inch LTM capillary column toroid assembly with heated transfer lines, cooling fan assembly and sheet metal enclosure. Replacement column toroid assemblies are also available. Benefits of the LTM column modules include:

- Rapid temperature programming rates of up to 1200°C/min
- Faster heating and cooling times – as low as one minute or less – for more rapid analytical cycle times than standard air-bath GC oven techniques
- Excellent retention time repeatability and performance comparable to conventional GC
- Less power consumption for longer in-field operation
- Integrated module design to facilitate easy column module change in the field

The entire assembly is leak tested and ready for installation into your Agilent 5975T instrument. LTM column modules for the 5975T include:

- 2 heated transfer lines
- Transferline base assembly
- 3 inch LTM column toroid assembly
- 2 ultimate unions
- Cooling fan assembly
- Sheet metal enclosure

For more information, visit www.agilent.com/chem/LTMcol



Agilent J&W LTM Column Modules for 5975T Transportable GC/MS Systems

Phase	ID (mm)	Length (m)	Film (μm)	Toroid Assembly	Column Module
DB-5ms Ultra Inert	0.18	20	0.18	221-5522UILTM	G3900-63014
	0.25	15	0.25	222-5512UILTM	G3900-63031
		30	0.25	222-5532UILTM	G3900-63005
HP-5ms Ultra Inert	0.18	20	0.18	29091S-577UILTM	G3900-63039
	0.25	15	0.25	29091S-431UILTM	G3900-63038
		30	0.25	29091S-433UILTM	G3900-63001
DB-1	0.25	30	0.25	222-1032LTM	G3900-63002
DB-1ms	0.18	20	0.18	221-0122LTM	G3900-63009
	0.25	15	0.25	222-0112LTM	G3900-63016
		30	0.25	222-0132LTM	G3900-63017
DB-1ht	0.25	15	0.10	222-1111LTM	G3900-63018
		30	0.10	222-1131LTM	G3900-63019
HP-1ms	0.18	20	0.18	29091S-677LTM	G3900-63040
	0.25	30	0.10	29091S-833LTM	G3900-63041
		15	0.25	29091S-931LTM	G3900-63042
DB-5ms	0.18	20	0.18	221-5522LTM	G3900-63013
	0.25	15	0.25	222-5512LTM	G3900-63030
		30	0.25	222-5532LTM	G3900-63004
DB-5ht	0.25	15	0.10	222-5731LTM	G3900-63033
		30	0.10	222-5711LTM	G3900-63032
HP-5ms	0.25	30	0.25	29091S-433LTM	G3900-63007
DB-35ms	0.18	20	0.18	221-3822LTM	G3900-63011
	0.25	15	0.25	222-3812LTM	G3900-63026
		30	0.25	222-3832LTM	G3900-63027
DB-17ms	0.18	20	0.18	221-4722LTM	G3900-63012
	0.25	15	0.25	222-4712LTM	G3900-63028
		30	0.25	222-4732LTM	G3900-63029
DB-225ms	0.25	15	0.25	222-2912LTM	G3900-63022
		30	0.25	222-2932LTM	G3900-63023
DB-1701	0.25	30	0.25	222-0732LTM	G3900-63003
DB-WAX	0.25	15	0.50	222-7013LTM	G3900-63034
		30	0.50	222-7033LTM	G3900-63035
HP-INNOWax	0.18	20	0.18	29091N-577LTM	G3900-63036
	0.25	30	0.25	29091N-133LTM	G3900-63008
DB-FFAP	0.25	15	0.25	222-3212LTM	G3900-63024
		30	0.25	222-3232LTM	G3900-63025
DB-608	0.18	20	0.18	221-6822LTM	G3900-63015
DB-VRX	0.18	20	1.00	221-1524LTM	G3900-63006
	0.25	30	1.40	222-1534LTM	G3900-63021
DB-624	0.18	20	1.00	221-1324LTM	G3900-63010
	0.25	30	1.40	222-1334LTM	G3900-63020
HP-VOC	0.20	30	1.12	29091R-303LTM	G3900-63037



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 compiled 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, selecting 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.

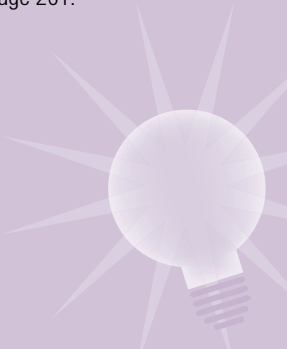
Our Technical Support Chemists have more than 100 years of combined experience running samples and developing methods. We are the gas chromatography column experts and we are at your disposal.

Send in questions via the Technical Support 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

Agilent Ultra Inert Liners are the perfect companion to Agilent J&W Ultra Inert GC Columns, providing reproducible inertness liner after liner, maintained through a sequence of samples, and for a range of analytes.

Turn to page 261.



Agilent J&W Ultra Inert Capillary GC Columns

- Individually tested with a unique, demanding 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 Chromatograms

Environmental

Trace Level Polycyclic Aromatic Hydrocarbon (PAH) Analyses	Page 589
US EPA Method 8270 Short Mix	Page 589
US EPA Method 551.1	Page 590

Life Sciences

Benzodiazepines I	Page 671
-------------------	----------

Food, Flavors and Fragrances

Lavender Oil Characterization	Page 622
-------------------------------	----------

DB-1ms Ultra Inert

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.18	20	0.18	-60 to 325/350	121-0122UI	
0.25	15	0.25	-60 to 325/350	122-0112UI	122-0112UIE
	30	0.25	-60 to 325/350	122-0132UI	122-0132UIE
	60	0.25	-60 to 325/350	122-0162UI	
0.32	15	0.25	-60 to 325/350	123-0112UI	
	30	0.25	-60 to 325/350	123-0132UI	

HP-1ms Ultra Inert

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.18	20	0.18	-60 to 325/350	19091S-677UI	19091S-677UIE
0.25	15	0.25	-60 to 325/350	19091S-931UI	19091S-931UIE
		0.25	-60 to 325/350	19091S-933UI	19091S-933UIE
	30	0.50	-60 to 325/350	19091S-633UI	
		1.00	-60 to 325/350	19091S-733UI	19091S-733UIE
0.32	15	0.25	-60 to 325/350	19091S-911UI	
		0.52	-60 to 325/350	19091S-612UI	
	30	0.25	-60 to 325/350	19091S-913UI	19091S-913UIE
		1.00	-60 to 325/350	19091S-713UI	

DB-35ms Ultra Inert

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.18	20	0.18	50 to 340/360	121-3822UI
0.25	15	0.25	50 to 340/360	122-3812UI
	30	0.25	50 to 340/360	122-3832UI
0.32	15	0.25	50 to 340/360	123-3812UI
	30	0.25	50 to 340/360	123-3832UI

DB-5ms Ultra Inert

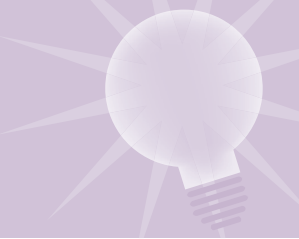
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	121-5522UI		121-5522UILTM	221-5522UILTM
		0.36	-60 to 325/350	121-5523UI		121-5523UILTM	
	40	0.18	-60 to 325/350	121-5542UI			
0.25	15	0.25	-60 to 325/350	122-5512UI		122-5512UILTM	222-5512UILTM
		1.00	-60 to 325/350	122-5513UI		122-5513UILTM	
	25	0.25	-60 to 325/350	122-5522UI		122-5522UILTM	
	30	0.25	-60 to 325/350	122-5532UI	122-5532UIE	122-5532UILTM	222-5532UILTM
		0.50	-60 to 325/350	122-5536UI		122-5536UILTM	
		1.00	-60 to 325/350	122-5533UI	122-5533UIE	122-5533UILTM	
	50	0.25	-60 to 325/350	122-5552UI			
60	0.25	-60 to 325/350	122-5562UI				
1.00		-60 to 325/350	122-5563UI				
0.32	30	0.25	-60 to 325/350	123-5532UI	123-5532UIE	123-5532UILTM	
		0.50	-60 to 325/350	123-5536UI		123-5536UILTM	
		1.00	-60 to 325/350	123-5533UI		123-5533UILTM	
	60	1.00	-60 to 325/350	123-5563UI			

HP-5ms Ultra Inert

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
HP-5ms Ultra Inert							
0.18	20	0.18	-60 to 325/350	19091S-577UI		19091S-577UILTM	29091S-577UILTM
0.25	15	0.25	-60 to 325/350	19091S-431UI		19091S-431UILTM	29091S-431UILTM
		0.25	-60 to 325/350	19091S-433UI	19091S-433UIE	19091S-433UILTM	29091S-433UILTM
	30	0.50	-60 to 325/350	19091S-133UI		19091S-133UILTM	
		1.00	-60 to 325/350	19091S-233UI	19091S-233UIE	19091S-233UILTM	
60	0.25	-60 to 325/350	19091S-436UI				
0.32	30	0.25	-60 to 325/350	19091S-413UI		19091S-413UILTM	
		1.00	-60 to 325/350	19091S-213UI		19091S-213UILTM	

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.



Guard Columns

- 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)

Guard columns (or retention gaps) are often added to the front of the analytical column to protect against contamination, or to act as a band-focusing device for liquid samples introduced by on-column and splitless injection techniques.

When resolution or response in a chromatogram diminishes, remove a coil from the guard column so that peak shapes will improve. By removing a coil, the column length is shortened and peaks will elute somewhat faster. For best results, check the integration time windows of your data system.

DuraGuard

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 using part number 100-2000. Specify the phase, ID, length, and film thickness of analytical column, and desired length of DuraGuard.

DuraGuard

Phase	ID (mm)	Length (m)	Film (µm)	Guard 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
			0.50	10	122-5536G
			1.00	10	122-5533G
		60	0.25	10	122-5562G
		0.32	30	1.00	10
	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

EZ-Guard

EZ-Guard columns combine a FactorFour column with a built-in guard column. The first five or ten meter section of the EZ-Guard column (guard length depends on the column you select) is not coated with stationary phase, but has been deactivated. The lack of a column connection between the guard and analytical section results in a 100% leak-free column.

Every EZ-Guard column features a unique uncoated and deactivated outlet section, approximately 100 cm long, which acts as an integrated transfer line. This provides a shorter stabilization time with all types of detectors. The absence of a stationary phase in the last part of the column significantly reduces background noise. The impact of water, oxygen or other polar or aggressive components that move through the end of the column at high temperature will also be greatly reduced.

EZ-Guard

Phase	ID (mm)	Length (m)	Film (μm)	Guard Length (m)	Part No.
VF-1ms	0.20	12	0.33	5	CP9023
			0.25	5	CP9010
			0.25	10	CP9011
VF-5ms	0.25	15	0.25	5	CP9021
			0.25	5	CP9012
			0.25	10	CP9013
			0.50	5	CP9014
			0.50	10	CP9015
			0.25	5	CP9016
			0.25	10	CP9020
VF-Xms	0.25	30	0.10	10	CP9022
			0.25	5	CP9018
			0.25	10	CP9019
VF-17ms	0.25	30	0.25	5	CP9024
			0.25	10	CP9025
VF-1701ms	0.25	30	0.25	5	CP9176
			0.25	10	CP9177
VF-35ms	0.25	30	0.25	5	CP9026
			0.25	10	CP9027

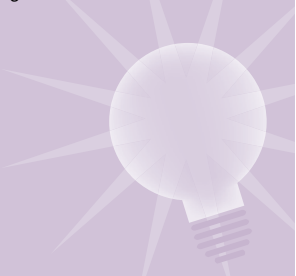
Low-bleed GC/MS Columns



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 262.



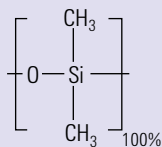
There is a rapidly increasing population of benchtop GC/MS instruments in analytical laboratories that analyze a widening range of trace level, higher temperature samples. These samples require increasingly inert, lower bleed, higher temperature columns. In response to this growing need, Agilent Technologies designed several "ms" columns to chromatograph a broader range of low level samples and generate lower bleed even at higher temperatures.

What makes an Agilent J&W low bleed column unique?

What makes an Agilent J&W low bleed column exceptional? 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 DB-1ms

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

DB-1ms Chromatograms

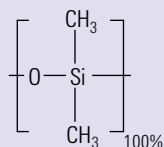
Life Sciences

Drug Screen

Page 673

DB-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.10	10	0.10	-60 to 340/360	127-0112		127-0112LTM	
		0.40	-60 to 340/360	127-0113		127-0113LTM	
	20	0.10	-60 to 340/360	127-0122		127-0122LTM	
		0.40	-60 to 340/360	127-0123		127-0123LTM	
0.18	20	0.18	-60 to 340/360	121-0122	121-0122E	121-0122LTM	221-0122LTM
0.20	12	0.33	-60 to 340/350	128-0112		128-0112LTM	
	25	0.33	-60 to 340/350	128-0122	128-0122E	128-0122LTM	
0.25	15	0.25	-60 to 340/360	122-0112	122-0112E	122-0112LTM	222-0112LTM
		0.10	-60 to 340/360	122-0131		122-0131LTM	
	30	0.25	-60 to 340/360	122-0132	122-0132E	122-0132LTM	222-0132LTM
		0.25	-60 to 340/360	122-0162			
0.32	15	0.25	-60 to 340/360	123-0112		123-0112LTM	
		0.10	-60 to 340/360	123-0131		123-0131LTM	
	30	0.25	-60 to 340/360	123-0132		123-0132LTM	
		0.25	-60 to 340/360	123-0162			



Structure of HP-1ms

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

HP-1ms Chromatograms

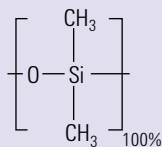
Environmental

Nitrogen Containing Herbicides (EPA Method 507)

Page 586

HP-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	19091S-677	19091S-677E	19091S-677LTM	29091S-677LTM
0.20	25	0.33	-60 to 325/350	19091S-602	19091S-602E	19091S-602LTM	
0.25	15	0.25	-60 to 325/350	19091S-931	19091S-931E	19091S-931LTM	29091S-931LTM
		0.10	-60 to 325/350	19091S-833		19091S-833LTM	29091S-833LTM
	0.25	-60 to 325/350	19091S-933	19091S-933E	19091S-933LTM	29091S-433LTM	
	0.50	-60 to 325/350	19091S-633		19091S-633LTM		
	1.00	-60 to 325/350	19091S-733	19091S-733E	19091S-733LTM		
0.32	60	0.25	-60 to 325/350	19091S-936	19091S-936E		
	15	0.25	-60 to 325/350	19091S-911		19091S-911LTM	
		0.52	-60 to 325/350	19091S-612		19091S-612LTM	
	30	0.25	-60 to 325/350	19091S-913	19091S-913E	19091S-913LTM	
		1.00	-60 to 325/350	19091S-713		19091S-713LTM	
60	0.25	-60 to 325/350	19091S-916				



Structure of VF-1ms



Column shown with EZ-GRIP

VF-1ms

- Lowest guaranteed bleed specification for trace analysis with MS
- Wide range of applications ensures near universal applicability
- Highly inert for accurate analysis, even at trace levels

VF-1ms is a highly inert, non-polar, low bleed GC column providing increased sensitivity over a broad array of applications. The 100% dimethylpolysiloxane phase delivers a guaranteed bleed specification of 1 pA @ 325°C (30 m, 0.25 mm, 0.25 µm).

The VF-1ms comes with an EZ-GRIP to simplify installation, coupling and operation of capillary columns. For guaranteed performance, the retention index, efficiency, selectivity and bleed is measured and specified on the test report supplied with every column.

VF-1ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-1ms Chromatograms

Food, Flavors and Fragrances

Triglycerides C28-C54	Page 639
Separation of TMS-derivatized sugars	Page 630

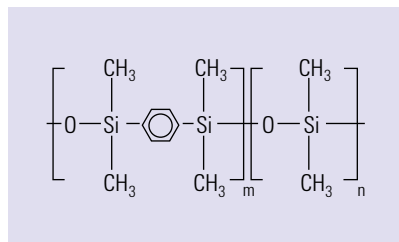
VF-1ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	-60 to 325/350	CP8900	
		0.40	-60 to 325/350	CP8901	
	20	0.10	-60 to 325/350	CP8902	
		0.40	-60 to 325/350	CP8903	
0.15	10	0.15	-60 to 325/350	CP9030	
	15	0.15	-60 to 325/350	CP5881	
		0.15	-60 to 325/350	CP9031	
	20	0.60	-60 to 325/350	CP9032	CP903215

(Continued)

VF-1ms

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	
0.20	12	0.33	-60 to 325/350	CP8904		
	25	0.33	-60 to 325/350	CP8905		
0.25	15	0.10	-60 to 325/350	CP8906	CP8906I5	
		0.25	-60 to 325/350	CP8907	CP8907I5	
		1.00	-60 to 325/350	CP8908	CP8908I5	
	25	0.25	-60 to 325/350	CP8909		
		0.40	-60 to 325/350	CP8910		
	30	0.10	-60 to 325/350	CP8911	CP8911I5	
		0.25	-60 to 325/350	CP8912	CP8912I5	
		1.00	-60 to 325/350	CP8913	CP8913I5	
	50	0.25	-60 to 325/350	CP8914		
		0.40	-60 to 325/350	CP8915		
	60	0.25	-60 to 325/350	CP8916	CP8916I5	
		1.00	-60 to 325/350	CP8917	CP8917I5	
0.32	15	0.10	-60 to 325/350	CP8918	CP8918I5	
		0.25	-60 to 325/350	CP8919		
		1.00	-60 to 325/350	CP8920	CP8920I5	
	25	0.25	-60 to 325/350	CP8921		
		0.40	-60 to 325/350	CP8922		
	30	0.10	-60 to 325/350	CP8923		
		0.25	-60 to 325/350	CP8924		
		0.50	-60 to 325/350	CP8925		
		1.00	-60 to 325/350	CP8926		
	50	0.25	-60 to 325/350	CP8927		
		0.40	-60 to 325/350	CP8928		
	60	0.25	-60 to 325/350	CP8929		
		1.00	-60 to 325/350	CP8930		
	0.53	15	0.50	-60 to 325/350	CP8965	
			1.50	-60 to 325/350	CP8967	
30		0.50	-60 to 325/350	CP8968		
		1.00	-60 to 325/350	CP8969		
		1.50	-60 to 310/335	CP8970		



Structure of DB-5ms

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

DB-5ms Chromatograms

Environmental

Diesel Fuel	Page 570
EPA Air Analysis Method TO-15 (1 ppbV Standard)	Page 612
EPA Method 525.2	Page 598
EPA Method 8061 (Phthalate Esters)	Page 599
Formaldehyde, 50ppb	Page 613
Organochlorine Pesticides II EPA Method 8081A	Page 575
Organophosphorous Pesticides I, EPA Method 8141A	Page 583
Phenols	Page 601
Sulfur in Air	Page 613

Industrial Chemicals

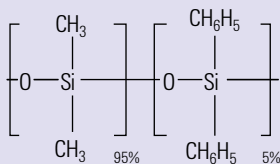
Amines and Nitriles	Page 646
Phenols II	Page 666
Polyethyleneamines	Page 646
Substituted Anilines	Page 665

Life Sciences

Narcotics	Page 679
-----------	----------

DB-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid	
0.18	20	0.18	-60 to 325/350	121-5522	121-5522E	121-5522LTM	221-5522LTM	
		0.36	-60 to 325/350	121-5523		121-5523LTM		
	40	0.18	-60 to 325/350	121-5542				
0.20	12	0.33	-60 to 325/350	128-5512		128-5512LTM		
	25	0.33	-60 to 325/350	128-5522		128-5522LTM		
	50	0.33	-60 to 325/350	128-5552				
0.25	15	0.10	-60 to 325/350	122-5511		122-5511LTM		
		0.25	-60 to 325/350	122-5512		122-5512LTM	222-5512LTM	
		0.50	-60 to 325/350	122-5516		122-5516LTM		
		1.00	-60 to 325/350	122-5513		122-5513LTM		
	25	0.25	-60 to 325/350	122-5522		122-5522LTM		
		0.40	-60 to 325/350	122-552a		122-552aLTM		
	30	0.10		-60 to 325/350	122-552A		122-552ALTM	
			0.25	-60 to 325/350	122-5532	122-5532E	122-5532LTM	222-5532LTM
		0.50	-60 to 325/350	122-5536	122-5536E	122-5536LTM		
		1.00	-60 to 325/350	122-5533	122-5533E	122-5533LTM		
		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	122-5562E			
1.00		-60 to 325/350	122-5563					
0.32	15	0.10	-60 to 325/350	123-5511		123-5511LTM		
		0.25	-60 to 325/350	123-5512		123-5512LTM		
		1.00	-60 to 325/350	123-5513	123-5513E	123-5513LTM		
	25	0.52	-60 to 325/350	123-5526		123-5526LTM		
	30	0.10		-60 to 325/350	123-5531		123-5531LTM	
			0.25	-60 to 325/350	123-5532	123-5532E	123-5532LTM	
		0.50	-60 to 325/350	123-5536		123-5536LTM		
		1.00	-60 to 325/350	123-5533		123-5533LTM		
	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		125-5512LTM		
	30	0.50	-60 to 300/320	125-5537		125-5537LTM		
		1.00	-60 to 300/320	125-553J		125-553JLTM		
		1.50	-60 to 300/320	125-5532		125-5532LTM		



Structure of HP-5ms

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

HP-5ms Chromatograms

Environmental

Chlorinated Pesticides, EPA Method 508	Page 578
Nitrogen/Phosphorus Containing Pesticides, EPA Method 507	Page 582
Organohalide Pesticides in Water, EPA Method 505	Page 578
Semivolatile Compounds, EPA Method 8270	Page 597

Food, Flavors and Fragrances

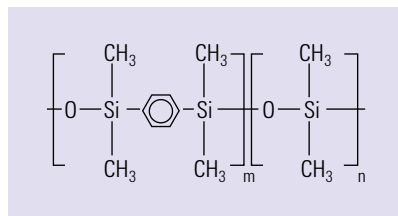
Fragrance Allergens	Page 618
---------------------	----------

Industrial Chemicals

Trace Active Amines, 10 ng on-column	Page 645
Phenols I	Page 666

HP-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	-60 to 325/350	19091S-577		19091S-577LTM	
0.20	12	0.33	-60 to 325/350	19091S-101		19091S-101LTM	
	25	0.33	-60 to 325/350	19091S-102	19091S-102E	19091S-102LTM	
	50	0.33	-60 to 325/350	19091S-105			
0.25	15	0.10	-60 to 325/350	19091S-331		19091S-331LTM	
		0.25	-60 to 325/350	19091S-431		19091S-431LTM	
		1.00	-60 to 325/350	19091S-231		19091S-231LTM	
	30	0.10	-60 to 325/350	19091S-333		19091S-333LTM	
		0.25	-60 to 325/350	19091S-433	19091S-433E	19091S-433LTM	29091S-433LTM
		0.50	-60 to 325/350	19091S-133		19091S-133LTM	
		1.00	-60 to 325/350	19091S-233	19091S-233E	19091S-233LTM	
	60	0.10	-60 to 325/350	19091S-336			
0.25		-60 to 325/350	19091S-436	19091S-436E			
0.32	25	0.52	-60 to 325/350	19091S-112	19091S-112E	19091S-112LTM	
	30	0.10	-60 to 325/350	19091S-313		19091S-313LTM	
		0.25	-60 to 325/350	19091S-413	19091S-413E	19091S-413LTM	
		0.50	-60 to 325/350	19091S-113		19091S-113LTM	
		1.00	-60 to 325/350	19091S-213		19091S-213LTM	
	60	0.25	-60 to 325/350	19091S-416			



Structure of VF-5ms

VF-5ms

- Excellent selectivity for aromatic compounds
- Minimal column bleed improves sensitivity
- Individual test certificates guarantee performance

VF-5ms is a highly inert 5% phenyl-methyl column for increased sensitivity, accuracy and instrument uptime. The columns have the lowest guaranteed bleed specification of 1 pA @ 325°C (30 m, 0.25 mm, 0.25 µm). VF-5ms has a slightly higher polarity than VF-1ms, resulting in a better selectivity for aromatic compounds. This selectivity, combined with superior inertness, also makes these columns applicable for a wide range of semi-polar and even polar components, such as phenols.

VF-5ms is also available with 0.15 mm ID for fast GC and GC/MS that can at least double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-5ms Chromatograms

Environmental

High resolution phenol analysis by GC/MS

Page 602

Food, Flavors and Fragrances

Pesticides in sunflower oil

Page 640

VF-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.40	-60 to 325/350	CP8934	
	20	0.40	-60 to 325/350	CP8933	
0.15	10	0.15	-60 to 325/350	CP9034	CP9034I5
	15	0.15	-60 to 325/350	CP9035	
	20	0.15	-60 to 325/350	CP9036	CP9036I5
			-60 to 325/350	CP9037	
			-60 to 325/350	CP9038	
	40	0.15	-60 to 325/350	CP9039	CP9039I5
-60 to 325/350			CP9040		
0.20	12	0.33	-60 to 325/350	CP8935	CP8935I5
	25	0.33	-60 to 325/350	CP8936	CP8936I5
	50	0.33	-60 to 325/350	CP8937	

(Continued)

VF-5ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	15	0.10	-60 to 325/350	CP8938	
		0.25	-60 to 325/350	CP8939	
		0.50	-60 to 325/350	CP8963	
		1.00	-60 to 325/350	CP8940	
	25	0.25	-60 to 325/350	CP8941	CP8941I5
		0.40	-60 to 325/350	CP8942	
	30	0.10	-60 to 325/350	CP8943	CP8943I5
		0.25	-60 to 325/350	CP8944	CP8944I5
		0.50	-60 to 325/350	CP8945	
		1.00	-60 to 325/350	CP8946	
	50	0.25	-60 to 325/350	CP8947	
	60	0.10	-60 to 325/350	CP8948	CP8948I5
0.25		-60 to 325/350	CP8960	CP8960I5	
1.00		-60 to 325/350	CP8949		
0.32	15	0.10	-60 to 325/350	CP8950	
		0.25	-60 to 325/350	CP8951	
		1.00	-60 to 325/350	CP8952	
	25	0.52	-60 to 325/350	CP8953	
	30	0.10	-60 to 325/350	CP8954	CP8954I5
		0.25	-60 to 325/350	CP8955	CP8955I5
		0.50	-60 to 325/350	CP8956	
		1.00	-60 to 325/350	CP8957	CP8957I5
	50	0.25	-60 to 325/350	CP8958	
		0.40	-60 to 325/350	CP8959	
	60	0.25	-60 to 325/350	CP8961	CP8961I5
		1.00	-60 to 325/350	CP8962	
0.53	15	0.50	-60 to 325/350	CP8971	
		1.00	-60 to 325/350	CP8972	
		1.50	-60 to 325/350	CP8973	
	30	0.50	-60 to 325/350	CP8974	
		1.00	-60 to 325/350	CP8975	
		1.50	-60 to 310/335	CP8976	

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)

DB-XLB Chromatograms

Environmental

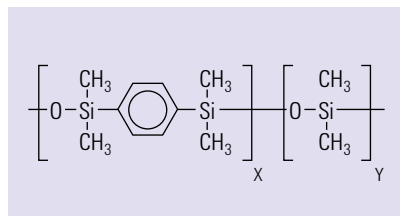
Aroclors 1016-1268 (without 1221)	Page 592
CLP Pesticides	Page 574
CLP Pesticide Analysis	Page 573
Congeners in DIN Method PCBs	Page 593
EPA Method 552.2	Page 603
Herbicides I	Page 585
PBDEs	Page 592
PCBs by EPA Method 8082	Page 594
Pesticides, EPA 508.1	Page 577
Phenols	Page 601
Phenoxy Acid Herbicides – Methyl Derivatives, EPA 8151A	Page 584

Food, Flavors and Fragrances

Ylang Ylang Oil	Page 626
-----------------	----------

DB-XLB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.18	20	0.18	30 to 340/360	121-1222	121-1222E	121-1222LTM
	30	0.18	30 to 340/360	121-1232		121-1232LTM
0.20	12	0.33	30 to 340/360	128-1212	128-1212E	128-1212LTM
	25	0.33	30 to 340/360	128-1222		128-1222LTM
0.25	15	0.10	30 to 340/360	122-1211		122-1211LTM
		0.25	30 to 340/360	122-1212		122-1212LTM
	30	0.10	30 to 340/360	122-1231		122-1231LTM
		0.25	30 to 340/360	122-1232		122-1232LTM
		0.50	30 to 340/360	122-1236		122-1236LTM
		1.00	30 to 340/360	122-1233		122-1233LTM
60	0.25	30 to 340/360	122-1262	122-1262E		
0.32	30	0.25	30 to 340/360	123-1232		123-1232LTM
		0.50	30 to 340/360	123-1236		123-1236LTM
	60	0.25	30 to 340/360	123-1262		
0.53	15	1.50	30 to 320/340	125-1212		125-1212LTM
	30	1.50	30 to 320/340	125-1232		125-1232LTM



Structure of VF-Xms



Column shown with EZ-GRIP

VF-Xms

- High arylene modified phase for accurate results
- Isothermal applications up to 340°C for a broad application range
- Ideal for confirmational analysis for ultimate confidence

The VF-Xms has the lowest bleed of all FactorFour columns. VF-Xms delivers the ultimate in sensitivity and signal-to-noise ratio, and is the low bleed, more polar alternative to the VF-5ms. Compared to non-polar "ms" type phases, VF-Xms provides exceptionally high selectivity for pesticides and delivers high resolution in the shortest analysis time.

The VF-Xms comes with an EZ-GRIP, simplifying installation, coupling and operation of capillary columns. For guaranteed performance, the retention index, efficiency, selectivity and bleed is measured and specified on the test report supplied with each column.

VF-Xms Chromatograms

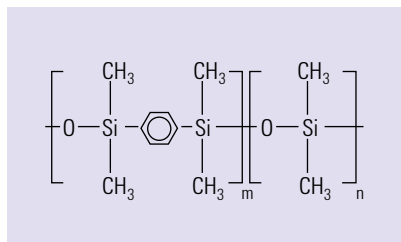
Environmental

Analysis of Polycyclic Aromatic Hydrocarbons

Page 570

VF-Xms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	20	0.15	30 to 340/360	CP9041	
0.20	12	0.33	30 to 340/360	CP8800	
	25	0.33	30 to 340/360	CP8801	
0.25	15	0.10	30 to 340/360	CP8802	
		0.25	30 to 340/360	CP8803	
	30	0.10	30 to 340/360	CP8805	
		0.25	30 to 340/360	CP8806	CP880615
		0.50	30 to 340/360	CP8807	
	60	1.00	30 to 340/360	CP8808	
0.32	15	0.25	30 to 340/360	CP8810	
		1.00	30 to 340/360	CP8811	
	30	0.10	30 to 340/360	CP8812	
		0.25	30 to 340/360	CP8813	
		0.50	30 to 340/360	CP8814	
		1.00	30 to 340/360	CP8815	
60	0.25	30 to 340/360	CP8816		
0.53	15	1.50	30 to 325/340	CP8817	
	30	1.50	30 to 325/340	CP8818	



Structure of DB-35ms

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

DB-35ms Chromatograms

Environmental

CLP Pesticides	Page 574
EPA Method 552.2	Page 603
Organochlorine Pesticides I EPA Method 8081A	Page 575
Organophosphorous Pesticides I, EPA Method 8141A	Page 583
PCBs by EPA Method 8082	Page 594
Pesticides, EPA 508.1	Page 577
Phenoxy Acid Herbicides – Methyl Derivatives, EPA 8151A	Page 584

Industrial Chemicals

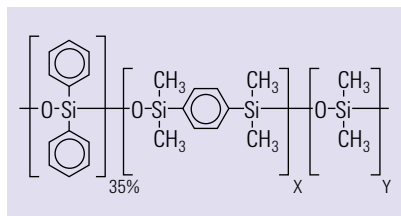
Anilines	Page 665
----------	----------

Life Sciences

Barbiturates	Page 677
Benzodiazepines II	Page 677

DB-35ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	50 to 340/360	121-3822	121-3822E	121-3822LTM	221-3822LTM
0.20	15	0.33	50 to 340/360	128-3812		128-3812LTM	
	25	0.33	50 to 340/360	128-3822		128-3822LTM	
0.25	15	0.25	50 to 340/360	122-3812		122-3812LTM 222-3812LTM	
	30	0.15	50 to 340/360	122-3831		122-3831LTM	
		0.25	50 to 340/360	122-3832	122-3832E	122-3832LTM	222-3832LTM
	60	0.25	50 to 340/360	122-3862			
0.32	15	0.25	50 to 340/360	123-3812		123-3812LTM	
	30	0.25	50 to 340/360	123-3832	123-3832E	123-3832LTM	
0.53	30	0.50	50 to 320/340	125-3837		125-3837LTM	
		1.00	50 to 320/340	125-3832		125-3832LTM	



Structure of VF-35ms

VF-35ms

- Ideal for dual column confirmational analysis for ultimate confidence
- High maximum temperature for broad applicability
- Stabilized arylene-modified equivalent of a 35% phenylmethyl phase for longevity

The VF-35ms is a medium polarity column, which is the ideal choice for trace environmental and chemical analyses, and as a confirmation column. The VF-35ms uses FactorFour technology to produce a low bleed, highly stable column with a programmable maximum temperature of 360°C.

VF-35ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-35ms Chromatograms

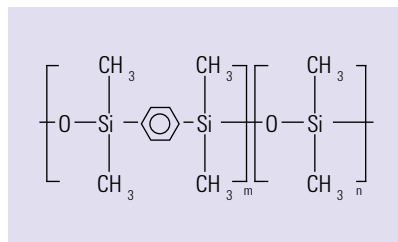
Environmental

Organochlorine pesticides to EPA 625 via GC/MS

Page 588

VF-35ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	10	0.15	40 to 340/360	CP5887	
	15	0.15	40 to 340/360	CP5888	
	20	0.15	40 to 340/360	CP5889	
0.20	15	0.33	40 to 340/360	CP8872	
	25	0.33	40 to 340/360	CP8873	
0.25	15	0.25	40 to 340/360	CP8874	
		0.10	40 to 340/360	CP8875	
	30	0.15	40 to 340/360	CP8876	
		0.25	40 to 340/360	CP8877	CP8877I5
		0.50	40 to 340/360	CP8878	CP8878I5
		1.00	40 to 340/360	CP8879	
60	0.25	40 to 340/360	CP8880		
0.32	15	0.25	40 to 340/360	CP8881	
		0.25	40 to 340/360	CP8882	
	30	0.50	40 to 340/360	CP8883	CP8883I5
		1.00	40 to 340/360	CP8884	
		60	0.25	40 to 340/360	CP8885
0.53	15	1.00	40 to 325/350	CP8886	
		0.50	40 to 325/350	CP8887	
	30	1.00	40 to 325/350	CP8888	



Structure of DB-17ms

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

DB-17ms Chromatograms

Environmental

PAHs	Page 600
------	----------

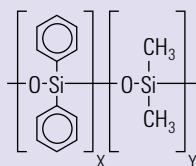
Life Sciences

Hallucinogens	Page 678
---------------	----------

Tocopherols	Page 678
-------------	----------

DB-17ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 320/340	121-4722	121-4722E	121-4722LTM	221-4722LTM
0.25	15	0.15	40 to 320/340	122-4711		122-4711LTM	
		0.25	40 to 320/340	122-4712		122-4712LTM	222-4712LTM
	30	0.15	40 to 320/340	122-4731		122-4731LTM	
		0.25	40 to 320/340	122-4732	122-4732E	122-4732LTM	222-4732LTM
	60	0.25	40 to 320/340	122-4762			
0.32	15	0.25	40 to 320/340	123-4712		123-4712LTM	
	30	0.25	40 to 320/340	123-4732		123-4732LTM	



Structure of VF-17ms

VF-17ms

- Deactivation technology improves data quality
- Ideal EPA confirmation column for ultimate confidence
- Bonded and cross-linked to allow solvent rinsing, reducing replacement costs

VF-17ms is a 50% phenyl, 50% dimethylpolysiloxane, medium polarity, low bleed column for increased sensitivity, accuracy and instrument uptime. VF-17ms is often referenced in environmental and clinical methods. The use of new deactivation technology improves column stability, resulting in improved repeatability and column lifetimes. VF-17ms has a very low bleed specification at 2 pA @ 325°C (0.25 mm x 30 m x 0.25 µm).

VF-17ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-17ms Chromatograms

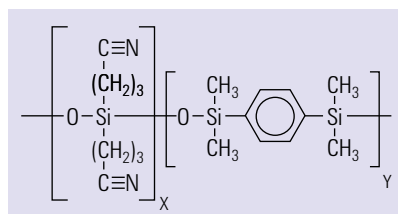
Environmental

Organochlorine pesticides

Page 582

VF-17ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.20	40 to 330/360	CP8977	
0.15	10	0.15	40 to 330/360	CP5882	
	15	0.15	40 to 330/360	CP5883	
	20	0.15	40 to 330/360	CP5884	
0.25	15	0.25	40 to 330/360	CP8979	
	15	0.50	40 to 330/360	CP8980	
	30	0.15	40 to 330/360	CP8981	
		0.25	40 to 330/360	CP8982	CP8982I5
		0.50	40 to 330/360	CP8983	
	60	0.25	40 to 330/360	CP8984	
0.32	15	0.15	40 to 330/360	CP8986	
		0.25	40 to 330/360	CP8987	
	30	0.25	40 to 330/360	CP8990	CP8990I5
		0.50	40 to 330/360	CP8991	
0.53	15	0.25	40 to 330/360	CP8994	
		1.00	40 to 330/360	CP8996	
		1.50	40 to 310/340	CP8998	
	30	0.50	40 to 330/360	CP9000	
		1.00	40 to 310/340	CP9001	
		1.50	40 to 310/340	CP9002	



Structure of VF-23ms

VF-23ms

- 100% bonded phase permits column rinsing to enhance column lifetime
- Fast run times improve productivity
- Operating temperature up to 260°C expands the application range

The VF-23ms column has a high polarity and highly substituted cyanopropyl low bleed phase. VF-23ms features a unique combination of high polarity and low bleed to enable more accurate analysis of very polar analytes. The enhanced stabilization of the VF-23ms permits splitless injection, column rinsing and temperatures up to 260°C to be used. Compared to other 23ms type phases, this expands the range of possible applications by enabling the analysis of higher molecular weight compounds.

VF-23ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-23ms Chromatograms

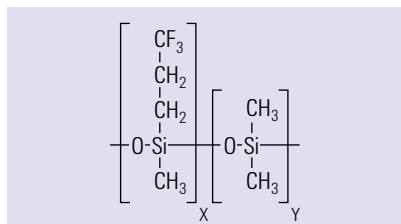
Food, Flavors and Fragrances

Fast screening of FAME isomers in butter

Page 639

VF-23ms

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	40 to 260/260	CP8819	
0.15	15	0.15	40 to 260/260	CP5886	
	20	0.15	40 to 260/260	CP9042	
	40	0.15	40 to 260/260	CP5885	
0.25	15	0.25	40 to 260/260	CP8820	CP882015
	30	0.15	40 to 260/260	CP8821	CP882115
		0.25	40 to 260/260	CP8822	CP882215
	60	0.15	40 to 260/260	CP8823	
		0.25	40 to 260/260	CP8824	CP882415
0.32	15	0.25	40 to 260/260	CP8825	
	30	0.15	40 to 260/260	CP8826	
		0.25	40 to 260/260	CP8827	
	60	0.15	40 to 260/260	CP8828	
		0.25	40 to 260/260	CP8829	
0.53	15	0.50	40 to 245/245	CP8830	
	30	0.50	40 to 245/245	CP8831	



Structure of VF-200ms

VF-200ms

- Superior deactivation delivers symmetrical peaks to improve data accuracy
- Ultra-low background noise for trace analysis maximizes sensitivity
- Ideal for sensitive and selective detector systems for enhanced productivity

The VF-200ms is designed with a unique selectivity for compounds rich in dipole-dipole interactions, resulting from the electrophilic nature of the trifluoropropyl stationary phase. VF-200ms is especially suited for electron rich, high dipole moment compounds like ketones, aldehydes, nitro- or chloro-containing compounds, PAHs, unsaturated compounds, silanes and CFCs. VF-200ms, as with all FactorFour columns, offers superior surface deactivation and thereby symmetrical peak shapes. The high inertness of the VF-200ms leads to more accurate peak identification and reliable analysis. The VF-200ms trifluoropropyl phase has very high temperature stability and can be used routinely up to 350°C.

VF-200ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-200ms Chromatograms

Industrial Chemicals

Fast separation of silanes

Page 670

VF-200ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	10	0.15	0 to 325/350	CP5893	
	20	0.15	0 to 325/350	CP5891	
		0.60	0 to 325/350	CP5892	
0.25	15	0.25	0 to 325/350	CP8855	CP8855I5
		0.50	0 to 325/350	CP8856	
	30	0.10	0 to 325/350	CP8857	
		0.25	0 to 325/350	CP8858	
		0.50	0 to 325/350	CP8859	CP8859I5
	1.00	0 to 325/350	CP8860	CP8860I5	
60	0.25	0 to 325/350	CP8861		
0.32	15	0.25	0 to 325/350	CP8862	
	30	0.25	0 to 325/350	CP8863	
		0.50	0 to 325/350	CP8864	
		1.00	0 to 325/350	CP8865	CP8865I5
0.53	15	1.00	0 to 300/325	CP8866	
		0.50	0 to 300/325	CP8867	
	30	1.00	0 to 300/325	CP8868	CP8868I5

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

DB-225ms Chromatograms

Environmental

Tetrachlorodibenzo-p-furans

Page 591

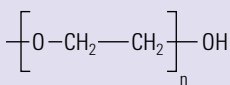
Food, Flavors and Fragrances

FAMES II

Page 633

DB-225ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890	5975T
						LTM Module	LTM Toroid
0.25	15	0.25	40 to 240	122-2912		122-2912LTM	222-2912LTM
	30	0.25	40 to 240	122-2932	122-2932E	122-2932LTM	222-2932LTM
	60	0.25	40 to 240	122-2962			
0.32	30	0.25	40 to 240	123-2932		123-2932LTM	



Structure of VF-WAXms

VF-WAXms

- Specially designed for MS for more accurate results with polar compounds
- Operating temperature range of 20°C to 250°C for maximum flexibility
- Better signal-to-noise ratio for trace analyses improves productivity

The VF-WAXms is a high performance column for applications in the food, flavors and fragrances markets, and especially where trace analyses are required. These applications often require higher temperatures to analyze polar compounds, and therefore need an ultra-stable wax as a stationary phase. The very low bleed of VF-WAXms provides increased sensitivity, extended column lifetime and greater accuracy, even at higher temperatures.

Advanced coating technology means that VF-WAXms columns are highly inert. Such inertness gives better chromatograms, enhancing critical pair separation. With the introduction of the VF-WAXms column, wax applications such as food, flavors and fragrances can now benefit from the use of GC/MS detectors. Impurities can easily be identified using an MS detector when a wax column is required for separation. Significantly improved performance is achieved with VF-WAXms columns, yet the typical selectivity of PEG is unchanged.

VF-WAXms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-WAXms Chromatograms

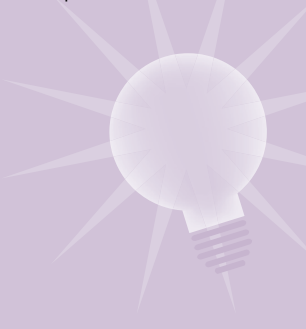
Food, Flavors and Fragrances

Acids

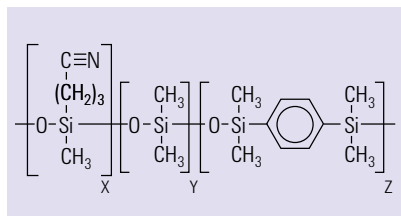
Page 631

Tips & Tools

As a special MS-type phase, the VF-WAXms column generates less bleed, and therefore less noise and higher signal-to-noise ratios for critical components.

**VF-WAXms**

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.10	10	0.10	20 to 250/260	CP9219	
		0.20	20 to 250/260	CP9218	
	20	0.10	20 to 250/260	CP9229	CP922915
0.15	10	0.15	20 to 250/260	CP9200	
	15	0.15	20 to 250/260	CP9201	
	20	0.15	20 to 250/260	CP9220	
	30	0.15	20 to 250/260	CP9202	
0.25	15	0.25	20 to 250/260	CP9203	
		0.50	20 to 250/260	CP9221	
	25	0.20	20 to 250/260	CP9204	
	30	0.25	20 to 250/260	CP9205	CP920515
		0.50	20 to 250/260	CP9222	
		1.00	20 to 240	CP9206	
	60	0.25	20 to 250/260	CP9207	
0.50		20 to 240	CP9223		
0.32	15	0.25	20 to 250/260	CP9209	
		0.50	20 to 250/260	CP9224	
		1.00	20 to 250/260	CP9208	
	30	0.25	20 to 250/260	CP9212	CP921215
		0.50	20 to 250/260	CP9210	
		1.00	20 to 240	CP9211	
	60	0.25	20 to 250/260	CP9214	
		0.50	20 to 240	CP9225	CP922515
		1.00	20 to 230	CP9213	
0.53	15	1.00	20 to 250/260	CP9226	CP922615
		2.00	20 to 240	CP9227	
	30	1.00	20 to 240	CP9215	
		2.00	20 to 230	CP9216	
	60	1.00	20 to 230	CP9228	
		2.00	20 to 220	CP9217	



Structure of VF-624ms and VF-1301ms

VF-624ms and VF-1301ms

- Improved signal-to-noise ratio for more accurate trace analysis
- Eliminate ghost peaks and unstable baselines for best data accuracy
- Enhanced selectivity eliminating co-eluters such as benzene and 1,2-dichloroethane for improved productivity

The VF-624ms and VF-1301ms are the world's first ultra-low bleed 6% cyanopropyl/phenyl, 94% PDMS GC columns. VF-624ms columns set a new standard for the analysis of volatile organic compounds. Improved phase technology reduces bleed, thereby increasing signal-to-noise ratios. These columns are especially suited for analyzing solvents according to EPA Methods 524, 624 and 8260, as well as USP 467.

The ultra low bleed, thin filmed, VF-1301ms column has a similar selectivity and is suitable for semi-volatile organic solvents, as well as PCBs and pesticides.

VF-624ms and VF-1301ms are also available with 0.15 mm ID for fast GC and GC/MS that can boost sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-624ms and VF-1301ms Chromatograms

Environmental

FactorFour cyano columns eliminate unstable baselines

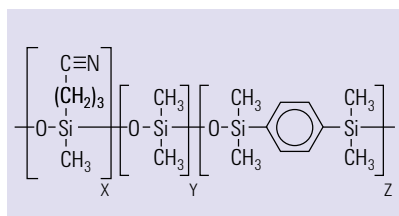
Page 610

VF-624ms

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	15	0.84	-40 to 280/300	CP9101	CP9101I5
	20	0.84	-40 to 280/300	CP9100	
	30	0.84	-40 to 280/300	CP9109	
	40	0.84	-40 to 280/300	CP9110	
0.25	30	1.40	-40 to 280/300	CP9102	CP9102I5
	60	1.40	-40 to 280/300	CP9103	CP9103I5
0.32	30	1.80	-40 to 280/300	CP9104	CP9104I5
	60	1.80	-40 to 280/300	CP9105	CP9105I5
0.53	30	3.00	-40 to 280/300	CP9106	CP9106I5
	60	3.00	-40 to 265/280	CP9107	
	75	3.00	-40 to 265/280	CP9108	

VF-1301ms

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	1.00	-40 to 280/300	CP9066	
0.15	15	0.15	-40 to 280/300	CP9050	
	20	0.15	-40 to 280/300	CP9051	
0.25	15	1.00	-40 to 280/300	CP9052	
		0.25	-40 to 280/300	CP9053	
		1.00	-40 to 280/300	CP9054	
	60	0.25	-40 to 280/300	CP9055	
		1.00	-40 to 280/300	CP9056	
0.32	15	0.25	-40 to 280/300	CP9057	
		1.00	-40 to 280/300	CP9058	
	30	0.25	-40 to 280/300	CP9059	
		1.00	-40 to 280/300	CP9060	CP9060I5
		1.00	-40 to 280/300	CP9061	
0.53	15	1.00	-40 to 280/300	CP9062	
	30	1.00	-40 to 280/300	CP9063	
		1.50	-40 to 280/300	CP9064	



Structure of VF-1701ms

VF-1701ms

- Highly inert for difficult analytes such as p,p'-DDT to improve productivity
- Column deactivation for more accurate trace analysis
- Eliminate ghost peaks and unstable baselines for more reliable data

The VF-1701ms is the world's first ultra-low bleed 14% cyanopropyl/phenyl, 86% PDMS GC column for pesticides, PCBs and semi-volatile organic compounds. Improved phase technology delivers increased inertness and reduced bleed, resulting in more accurate trace analysis. The bleed specification is 2 pA @ 280°C for a 0.25 mm x 60 m x 0.25 µm ID column.

VF-1701ms is also available with 0.15 mm ID for fast GC and GC/MS that can double sample throughput when compared to 0.25 and 0.32 mm ID columns.

VF-1701ms Chromatograms

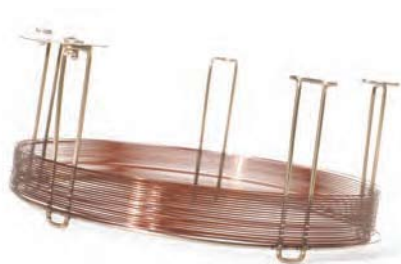
Environmental

Analysis of pesticides using EPA 8081 with ECD

Page 576

VF-1701ms

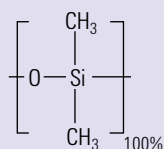
ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	
0.10	10	0.20	-20 to 280/300	CP9140		
		0.40	-20 to 280/300	CP9141		
	20	0.10	-20 to 280/300	CP9142		
0.15	15	0.10	-20 to 280/300	CP9175		
		0.15	-20 to 280/300	CP9143		
		0.60	-20 to 280/300	CP9144		
	20	0.15	-20 to 280/300	CP9145		
		0.60	-20 to 280/300	CP9146		
0.25	15	0.15	-20 to 280/300	CP9147		
		0.25	-20 to 280/300	CP9148		
		1.00	-20 to 280/300	CP9149	CP9149I5	
	30	0.15	-20 to 280/300	CP9150		
		0.25	-20 to 280/300	CP9151	CP9151I5	
		1.00	-20 to 280/300	CP9152	CP9152I5	
	60	0.15	-20 to 280/300	CP9153		
		0.25	-20 to 280/300	CP9154	CP9154I5	
		0.50	-20 to 280/300	CP9155	CP9155I5	
		1.00	-20 to 280/300	CP9156		
0.32	15	0.15	-20 to 280/300	CP9157		
		0.25	-20 to 280/300	CP9158		
		1.00	-20 to 280/300	CP9159		
	30	0.10	-20 to 280/300	CP9160		
		0.15	-20 to 280/300	CP9161		
		0.25	-20 to 280/300	CP9162		
		1.00	-20 to 280/300	CP9163		
	60	0.15	-20 to 280/300	CP9164		
		0.25	-20 to 280/300	CP9165		
		1.00	-20 to 280/300	CP9166	CP9166I5	
	0.53	15	1.00	-20 to 280/300	CP9167	
		30	0.10	-20 to 280/300	CP9168	
0.25			-20 to 280/300	CP9169		
0.50			-20 to 280/300	CP9170		
1.00			-20 to 280/300	CP9171		
1.50			-20 to 280/300	CP9172		
60		1.00	-20 to 280/300	CP9173		
		1.50	-20 to 265/280	CP9174		



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 DB and HP versions for our customers who have methods already developed on these columns.



Structure of DB-1

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

DB-1 Chromatograms**Environmental**

EPA Air Analysis Compendium Method TO-14 Standard	Page 611
EPA Method 551	Page 609
Pyrethrins	Page 595

Food, Flavors and Fragrances

Fragrance Reference Standard I	Page 620
Spearmint Oil	Page 617

Industrial Chemicals

Aldehydes and Ketones	Page 648
Aromatics in Finished Gasoline – ASTM Method 5769	Page 702
Esters I	Page 653
PFBHA Derivative	Page 649
Glycols III	Page 656
Halogenated Hydrocarbons II	Page 658
Nitrogen Based Solvents I	Page 662
Triethylene Glycol and Impurities	Page 656
Volatile Amines	Page 645

Life Sciences

Anabolic Steroids	Page 681
Anticonvulsants	Page 675

Petroleum

Aromatics in Finished Gasoline – ASTM Method 5769	Page 702
DNPH Derivative	Page 649
Polyethylene	Page 706
Regular Unleaded Gasoline (California Phase 1) – "Normal" GC Run II	Page 704
Volatile Sulfur Compounds	Page 694

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.05	10	0.05	-60 to 325/350	126-1012		126-1012LTM
		0.05	-60 to 325/350	126-10SP		
		0.20	-60 to 325/350	126-1013		126-1013LTM
0.10	5	0.12	-60 to 325/350	127-100a		127-100aLTM
	10	0.10	-60 to 325/350	127-100A	127-1012E	127-100aLTM
		0.40	-60 to 325/350	127-1013	127-1013E	127-1013LTM
	20	0.10	-60 to 325/350	127-101A	127-1022E	127-1022LTM
		0.40	-60 to 325/350	127-1023	127-1023E	127-1023LTM
	40	0.20	-60 to 325/350	127-1046	127-1046E	
		0.40	-60 to 325/350	127-1043		
0.15	10	1.20	-60 to 325/350	12A-1015		12a-1015LTM
0.18	10	0.18	-60 to 325/350	121-1012	121-1012E	12A-1015LTM
		0.20	-60 to 325/350	121-101A		121-101aLTM
		0.40	-60 to 325/350	121-1013	121-1013E	121-1013LTM
	20	0.18	-60 to 325/350	121-1022	121-1022E	121-101aLTM
		0.40	-60 to 325/350	121-1023		121-1023LTM
	40	0.40	-60 to 325/350	121-1043	121-1043E	
0.20	12	0.33	-60 to 325/350	128-1012		128-1012LTM
	25	0.33	-60 to 325/350	128-1022		128-1022LTM
	30	0.8	-60 to 325/350	128-1034		128-1034LTM
	50	0.33	-60 to 325/350	128-1052		
0.25	15	0.10	-60 to 325/350	122-1011		122-1011LTM
		0.25	-60 to 325/350	122-1012		122-1012LTM
		1.00	-60 to 325/350	122-1013		122-1013LTM
	25	0.25	-60 to 325/350	122-1022		122-1022LTM
	30	0.10	-60 to 325/350	122-1031		122-1031LTM
		0.25	-60 to 325/350	122-1032	122-1032E	122-1032LTM*
		0.50	-60 to 325/350	122-103E		122-103ELTM
		1.00	-60 to 325/350	122-1033	122-1033E	122-1033LTM
		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		

*Also available as LTM column toroid assembly for Agilent 5975T, 0.25 mm x 30 m, 0.25 µm, P/N 222-1032LTM

(Continued)

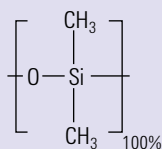
DB-1

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	10	0.5	-60 to 325/350	123-100E		123-100ELTM
	15	0.10	-60 to 325/350	123-1011		123-1011LTM
0.25		-60 to 325/350	123-1012		123-1012LTM	
1.00		-60 to 325/350	123-1013		123-1013LTM	
3.00		-60 to 280/300	123-1014		123-1014LTM	
5.00		-60 to 280/300	123-1015		123-1015LTM	
25		0.12	-60 to 325/350	123-1027		123-1027LTM
	0.25	-60 to 325/350	123-1022		123-1022LTM	
	0.52	-60 to 325/350	123-1026		123-1026LTM	
	1.05	-60 to 325/350	123-102F		123-102FLTM	
30	0.10	-60 to 325/350	123-1031		123-1031LTM	
	0.25	-60 to 325/350	123-1032		123-1032LTM	
	0.50	-60 to 325/350	123-103E		123-103ELTM	
	1.00	-60 to 325/350	123-1033	123-1033E	123-1033LTM	
	1.50	-60 to 300/320	123-103B		123-103BLTM	
	3.00	-60 to 280/300	123-1034		123-1034LTM	
50	5.00	-60 to 280/300	123-1035		123-1035LTM	
	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	123-1062E		
	0.50	-60 to 325/350	123-106E			
	1.00	-60 to 325/350	123-1063	123-1063E		
	1.50	-60 to 300/320	123-106B	123-106BE		
	2.00	-60 to 280/300	123-106G			
	3.00	-60 to 280/300	123-1064	123-1064E		
	5.00	-60 to 280/300	123-1065	123-1065E		

(Continued)

DB-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.45	30	1.27	-60 to 325/350	124-1032		124-1032LTM
		2.55	-60 to 260/280	124-1034		124-1034LTM
0.53	5	0.88	-60 to 325/350	125-100a		125-100aLTM
		2.65	-60 to 325/350	125-100A		125-100ALTM
		5.00	-60 to 325/350	125-1005		125-1005LTM
	7.5	1.50	-60 to 325/350	125-1002		125-1002LTM
	10	2.65	-60 to 260/280	125-10HB	125-10HBE	125-10HBLTM
		5.00	-60 to 260/280	125-10H5		125-10H5LTM
	15	0.15	-60 to 340/360	125-1011	125-1011E	125-1011LTM
			-60 to 320/340	125-101K		125-101KLTM
		0.50	-60 to 300/320	125-1017		125-1017LTM
			-60 to 300/320	125-101J		125-101JLTM
		1.50	-60 to 300/320	125-1012	125-1012E	125-1012LTM
			-60 to 260/280	125-1014		125-1014LTM
	5.00	-60 to 260/280	125-1015		125-1015LTM	
		1.00	-60 to 300/320	125-102J		125-102JLTM
	25	5.00	-60 to 260/280	125-1025		125-1025LTM
		30	0.10	-60 to 340/360	125-1039	
	0.25		-60 to 320/340	125-103K	125-103KE	125-103KLTM
	0.50		-60 to 300/320	125-1037		125-1037LTM
	1.00		-60 to 300/320	125-103J		125-103JLTM
	1.50		-60 to 300/320	125-1032		125-1032LTM
2.65	-60 to 260/280		125-103B		125-103BLTM	
3.00	-60 to 260/280		125-1034	125-1034E	125-1034LTM	
5.00	-60 to 260/280	125-1035	125-1035E	125-1035LTM		
50	5.00	-60 to 260/280	125-1055			
60	1.00	-60 to 300/320	125-106J	125-106JE		
		-60 to 300/320	125-1062	125-1062E		
	3.00	-60 to 260/280	125-1064			
	5.00	-60 to 260/280	125-1065	125-1065E		
105	5.00	-60 to 260/280	125-10B5			



Structure of HP-1

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

HP-1 Chromatograms

Environmental

Organotin Compounds I Page 595

Industrial Chemicals

Common Industrial Solvents Page 661

Inorganic Hydride Gases Page 669

Solvents IV Page 660

Petroleum

Denatured Fuel Ethanol – ASTM D5501 Page 701

Glycols/Diols Page 657

Oxygenates in Gasoline ASTM D5599 (GC-OFID) Page 701

Sulfur Compounds in Natural Gas – Synthetic Mixture Page 698

HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.18	-60 to 325/350	19091Z-577	19091Z-577E	19091Z-577LTM
0.20	12	0.33	-60 to 325/350	19091-60312		
		0.11	-60 to 325/350	19091Z-008		19091Z-008LTM
	25	0.11	-60 to 325/350	19091Z-002		19091Z-002LTM
		0.33	-60 to 325/350	19091Z-102	19091Z-102E	19091Z-102LTM
		0.50	-60 to 325/350	19091Z-202		19091Z-202LTM
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			

(Continued)

HP-1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.25	15	0.10	-60 to 325/350	19091Z-331		19091Z-331LTM	
		0.25	-60 to 325/350	19091Z-431		19091Z-431LTM	
		1.00	-60 to 325/350	19091Z-231		19091Z-231LTM	
	30	0.10	-60 to 325/350	19091Z-333		19091Z-333LTM	
		0.25	-60 to 325/350	19091Z-433	19091Z-433E	19091Z-433LTM	
		1.00	-60 to 325/350	19091Z-233	19091Z-233E	19091Z-233LTM	
	60	0.25	-60 to 325/350	19091Z-436			
		1.00	-60 to 325/350	19091Z-236	19091Z-236E		
	100	0.50	-60 to 325/350	19091Z-530	19091Z-530E		
0.32	15	0.25	-60 to 325/350	19091Z-411	19091Z-411E	19091Z-411LTM	
		1.00	-60 to 325/350	19091Z-211		19091Z-211LTM	
	25	0.17	-60 to 325/350	19091Z-012	19091Z-012E	19091Z-012LTM	
		0.52	-60 to 325/350	19091Z-112	19091Z-112E	19091Z-112LTM	
		1.05	-60 to 325/350	19091Z-212		19091Z-212LTM	
	30	0.10	-60 to 325/350	19091Z-313	19091Z-313E	19091Z-313LTM	
		0.25	-60 to 325/350	19091Z-413	19091Z-413E	19091Z-413LTM	
		1.00	-60 to 325/350	19091Z-213	19091Z-213E	19091Z-213LTM	
		3.00	-60 to 260/280	19091Z-513	19091Z-513E	19091Z-513LTM	
		4.00	-60 to 260/280	19091Z-613		19091Z-613LTM	
	50	5.00	-60 to 260/280	19091Z-713	19091Z-713E	19091Z-713LTM	
		0.17	-60 to 325/350	19091Z-015			
		0.52	-60 to 325/350	19091Z-115	19091Z-115E		
	60	1.05	-60 to 325/350	19091Z-215			
		0.25	-60 to 325/350	19091Z-416			
		1.00	-60 to 325/350	19091Z-216	19091Z-216E		
	0.53	5	5.00	-60 to 260/280	19091Z-716		
			0.15	-60 to 320/400	19095Z-220		
			0.88	-60 to 320/400	19095Z-020		19095Z-020LTM
		7.5	2.65	-60 to 325/350	125-100a		
			2.65	-60 to 260/280	19095S-100	19095S-100E	19095S-100LTM
5.00			-60 to 260/280	19095Z-627	19095Z-627E	19095Z-627LTM	
10		0.88	-60 to 300/320	19095Z-021	19095Z-021E	19095Z-021LTM	
		2.65	-60 to 260/280	19095Z-121	19095Z-121E	19095Z-121LTM	
15		0.15	-60 to 320/400	19095Z-221	19095Z-221E		
		1.50	-60 to 300/320	19095Z-321		19095Z-321LTM	
		3.00	-60 to 260/280	19095Z-421	19095Z-421LTM	19095Z-421LTM	
		5.00	-60 to 260/280	19095Z-621		19095Z-621LTM	
30		0.88	-60 to 300/320	19095Z-023	19095Z-023E	19095Z-023LTM	
		1.50	-60 to 300/320	19095Z-323	19095Z-323E	19095Z-323LTM	
		2.65	-60 to 260/280	19095Z-123	19095Z-123E	19095Z-123LTM	
	3.00	-60 to 260/280	19095Z-423	19095Z-423E	19095Z-423LTM		
	5.00	-60 to 260/280	19095Z-623	19095Z-623E	19095Z-623LTM		
60	5.00	-60 to 260/280	19095Z-626				

CP-Sil 5 CB

- Extended column lifetime reduces replacement costs
- Wide application range improves productivity
- Available in Fused Silica or UltiMetal to maximize choice

The CP-Sil 5 CB high efficiency column contains a 100% dimethylpolysiloxane phase. Separation is almost entirely based on boiling points, making this column suitable for a wide range of applications with a broad temperature range. Due to intensive cross-linking, CP-Sil 5 CB is highly inert and withstands large solvent injections, guaranteeing reproducibility and ensuring maximum column lifetime. For the highest operating temperatures, use our UltiMetal columns.

CP-Sil 5 CB Chromatograms

Industrial Chemicals

Analysis of amino alcohols in water

Page 643

CP-Sil 5 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	5	0.12	-60 to 330/350	CP7300	
	10	0.10	-60 to 330/350	CP7311	
		0.12	-60 to 330/350	CP7310	CP7310I5
		0.40	-60 to 325/350	CP7312	
	20	0.10	-60 to 330/350	CP7313	
0.15	10	0.12	-60 to 330/350	CP7684	CP7684I5
		2.00	-60 to 325/350	CP7682	CP7682I5
	25	0.12	-60 to 330/350	CP7694	
		1.20	-60 to 325/350	CP7693	
		2.00	-60 to 325/350	CP7692	CP7692I5
0.20	12	0.33	-60 to 325/350	CP7602	
	15	0.20	-60 to 330/350	CP7604	
	25	0.33	-60 to 325/350	CP7622	
	30	0.80	-60 to 325/350	CP7633	
	50	0.11	-60 to 330/350	CP7642	
		0.33	-60 to 325/350	CP7643	CP7643I5
		0.50	-60 to 325/350	CP7644	CP7644I5

(Continued)

CP-Sil 5 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	
0.25	10	0.12	-60 to 330/350	CP7700		
		15	-60 to 330/350	CP8510		
	25	0.12	-60 to 330/350	CP7710	CP7710I5	
		0.25	-60 to 330/350	CP7441		
		0.40	-60 to 325/350	CP7709		
		1.20	-60 to 325/350	CP7670	CP7670I5	
	30	0.10	-60 to 330/350	CP8710		
		0.25	-60 to 330/350	CP8741	CP8741I5	
		1.00	-60 to 325/350	CP8770		
	50	0.12	-60 to 330/350	CP7720		
		0.25	-60 to 330/350	CP7443	CP7443I5	
		0.40	-60 to 325/350	CP7719	CP7719I5	
60	0.25	-60 to 330/350	CP8743	CP8743I5		
	1.00	-60 to 325/350	CP8780	CP8780I5		
0.32	10	0.12	-60 to 330/350	CP7730		
		1.20	-60 to 325/350	CP7758	CP7758I5	
	15	0.10	-60 to 330/350	CP8529		
		0.25	-60 to 325/350	CP8530		
		3.00	-60 to 325/350	CP8550	CP8550I5	
		1.00	-60 to 325/350	CP8540		
	25	5.00	-60 to 300/325	CP8560	CP8560I5	
		0.12	-60 to 330/350	CP7740		
		0.25	-60 to 325/350	CP7442		
		0.40	-60 to 325/350	CP7739		
		0.52	-60 to 325/350	CP8430	CP8430I5	
		1.20	-60 to 325/350	CP7760	CP7760I5	
	30	5.00	-60 to 300/325	CP7680	CP7680I5	
		0.25	-60 to 325/350	CP8742	CP8742I5	
		1.00	-60 to 325/350	CP8760	CP8760I5	
		3.00	-60 to 310/335	CP8687	CP8687I5	
	50	5.00	-60 to 300/325	CP8688	CP8688I5	
		0.12	-60 to 330/335	CP7750	CP7750I5	
		0.25	-60 to 325/350	CP7444	CP7444I5	
		0.40	-60 to 325/350	CP7749	CP7749I5	
		1.20	-60 to 325/350	CP7770	CP7770I5	
	60	5.00	-60 to 300/325	CP7690	CP7690I5	
		0.25	-60 to 325/350	CP8744	CP8744I5	
		1.00	-60 to 325/350	CP8870		
		3.00	-60 to 310/335	CP8689		
			5.00	-60 to 300/325	CP8690	CP8690I5

(Continued)

CP-Sil 5 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	1.00	-60 to 315/340	CP7625	
		2.00	-60 to 305/330	CP7620	CP762015
		5.00	-60 to 290/325	CP7645	
15	15	0.15	-60 to 330/350	CP8673	CP867315
		1.50	-60 to 305/330	CP8674	CP867415
		3.00	-60 to 300/325	CP8675	
		5.00	-60 to 290/325	CP8676	
20	5.00	-60 to 290/325	CP8774		
25	25	1.00	-60 to 315/340	CP7635	CP763515
		2.00	-60 to 305/330	CP7630	
		5.00	-60 to 290/325	CP7675	CP767515
30	30	1.50	-60 to 305/330	CP8735	CP873515
		2.00	-60 to 305/330	CP8730	CP873015
		3.00	-60 to 300/325	CP8677	CP867715
		5.00	-60 to 290/325	CP8775	CP877515
50	50	1.00	-60 to 315/340	CP7695	
		2.00	-60 to 305/330	CP7640	
		5.00	-60 to 290/325	CP7685	CP768515
60	60	1.50	-60 to 305/330	CP8799	
		5.00	-60 to 290/325	CP8685	
100	100	0.50	-60 to 325/350	CP7608	
		2.00	-60 to 305/330	CP7650	
		5.00	-60 to 290/325	CP7688	

CP-Sil 5 CB UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	1.00	-60 to 325/350	CP7120	
		2.00	-60 to 325/350	CP7150	
		5.00	-60 to 325/350	CP6666	CP666615
25	25	0.50	-60 to 325/350	CP7135	CP713515
		2.00	-60 to 325/350	CP7160	
		5.00	-60 to 325/350	CP6670	
50	50	0.50	-60 to 325/350	CP7195	
		1.00	-60 to 325/350	CP7140	
		2.00	-60 to 325/350	CP7170	
		5.00	-60 to 325/350	CP6671	

Ultra 1

- 100% Dimethylpolysiloxane
- Non-polar
- Equivalent to HP-1 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Ultra 1 Chromatograms

Industrial Chemicals

Ethylene Glycol Mixture	Page 657
Pyrolysates of Polystyrene	Page 652

Ultra 1

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	12	0.33	-60 to 325/350	19091A-002		19091A-008LTM
		0.11	-60 to 325/350	19091A-112LTM		19091A-002LTM
	25	0.33	-60 to 325/350	19091a-108		19091A-008
		0.11	-60 to 325/350	19091A-108		19091A-115
		0.33	-60 to 325/350	19091A-005	19091A-012	19091A-101LTM
	50	0.11	-60 to 325/350	19091A-101		
0.33		-60 to 325/350	19091A-015			
0.32	25	0.17	-60 to 325/350	19091A-102		19091A-102LTM
		0.52	-60 to 325/350	19091A-105		19091A-012LTM
	50	0.17	-60 to 325/350	19091A-102E		
		0.52	-60 to 325/350	19091A-112		

Ultra 2

- (5%-Phenyl)-methylpolysiloxane
- Non-polar
- Equivalent to HP-5 with tighter specifications for retention index and capacity factors
- Bonded and cross-linked
- Solvent rinsable

Ultra 2 Chromatograms

Food, Flavors and Fragrances

Flavor Mixture Page 623

Life Sciences

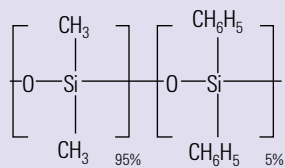
Antiepileptic Drugs Page 676

Tricyclic Antipsychotics Page 676

Urine Drug Screen Page 673

Ultra 2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	12	0.33	-60 to 325/350	19091B-101		19091B-101LTM
	25	0.11	-60 to 325/350	19091B-002		19091B-002LTM
		0.33	-60 to 325/350	19091B-102	19091B-102E	19091B-102LTM
	50	0.11	-60 to 325/350	19091B-005		
		0.33	-60 to 325/350	19091B-105	19091A-108LTM	
0.32	25	0.17	-60 to 325/350	19091B-012	19091B-012E	19091B-012LTM
		0.52	-60 to 325/350	19091B-112		19091B-112LTM
	50	0.17	-60 to 325/350	19091B-015		
		0.52	-60 to 325/350	19091B-115	19091B-115E	



Structure of DB-5

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

DB-5 Chromatograms

Environmental

Organochlorine Pesticides, DB5/1701P	Page 581
--------------------------------------	----------

Food, Flavors and Fragrances

Bacterial Fatty Acid Methyl Esters	Page 632
------------------------------------	----------

Cold-Pressed Orange Oil	Page 625
-------------------------	----------

Lemon Oil	Page 624
-----------	----------

Life Sciences

Amphetamines and Precursors – TMS Derivatives	Page 674
---	----------

Antihistamines	Page 676
----------------	----------

Common Drug Screen	Page 672
--------------------	----------

Marijuana (Δ^9 -THC) and Major Metabolites – TMS Derivatives	Page 681
--	----------

Narcotics and Adulterants	Page 680
---------------------------	----------

Over-the-Counter Pain Killers – TMS Derivatives	Page 680
---	----------

DB-5

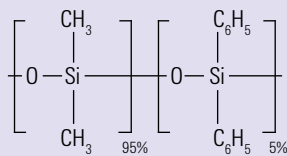
ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.10	10	0.10	-60 to 325/350	127-500A	127-5012E	127-5012LTM
		0.17	-60 to 325/350	127-501E	127-501EE	127-501ELTM
		0.33	-60 to 325/350	127-501N		127-501NLTM
		0.40	-60 to 325/350	127-5013		127-5013LTM
	20	0.10	-60 to 325/350	127-5022	127-5022E	127-5022LTM
		0.40	-60 to 325/350	127-5023		127-5023LTM
0.15	10	1.20	-60 to 300/320	12a-5015		12a-5015LTM
0.18	10	0.18	-60 to 325/350	121-5012	121-5012E	12A-5015LTM
		0.40	-60 to 325/350	121-5013		121-5013LTM
	20	0.18	-60 to 325/350	121-5022	121-5022E	121-5022LTM
		0.40	-60 to 325/350	121-5023	121-5023E	121-5023LTM
	40	0.18	-60 to 325/350	121-5042		
0.20	12	0.33	-60 to 325/350	128-5012		128-5012LTM
	15	0.20	-60 to 325/350	128-50H7		128-50H7LTM
	25	0.33	-60 to 325/350	128-5022		128-5022LTM
	50	0.33	-60 to 325/350	128-5052		
0.25	15	0.10	-60 to 325/350	122-5011		122-5011LTM
		0.25	-60 to 325/350	122-5012		122-5012LTM
		0.50	-60 to 325/350	122-501E		122-501ELTM
		1.00	-60 to 325/350	122-5013		122-5013LTM
	25	0.25	-60 to 325/350	122-5022		122-5022LTM
	30	0.10	-60 to 325/350	122-5031		122-5031LTM
		0.25	-60 to 325/350	122-5032	122-5032E	122-5032LTM
		0.50	-60 to 325/350	122-503E		122-503ELTM
		1.00	-60 to 325/350	122-5033	122-5033E	122-5033LTM
	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		

(Continued)



DB-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.32	10	0.5	-60 to 325/350	123-500E		123-500ELTM	
		15	0.10	-60 to 325/350	123-5011		123-5011LTM
	25		0.25	-60 to 325/350	123-5012	123-5012E	123-5012LTM
			1.00	-60 to 325/350	123-5013	123-5013E	123-5013LTM
			0.17	-60 to 325/350	123-502D		123-502DLTM
			0.25	-60 to 325/350	123-5022		123-5022LTM
	30		0.52	-60 to 325/350	123-5026		123-5026LTM
			1.05	-60 to 325/350	123-502F		123-502FLTM
			0.10	-60 to 325/350	123-5031		123-5031LTM
			0.25	-60 to 325/350	123-5032	123-5032E	123-5032LTM
	50		0.50	-60 to 325/350	123-503E		123-503ELTM
			1.00	-60 to 325/350	123-5033	123-5033E	123-5033LTM
			1.50	-60 to 325/350	123-503B		123-503BLTM
			0.25	-60 to 325/350	123-5052		
	60		0.52	-60 to 325/350	123-5056		
			1.00	-60 to 325/350	123-5053		
		0.25	-60 to 325/350	123-5062			
0.45		1.00	-60 to 325/350	123-5063	123-5063E		
	15	1.27	-60 to 300/320	124-5012		124-5012LTM	
	30	0.42	-60 to 300/320	124-5037		124-5037LTM	
0.53	10	1.27	-60 to 300/320	124-5032		124-5032LTM	
		2.65	-60 to 260/280	125-50HB		125-50HBLTM	
	15		0.25	-60 to 300/320	125-501K		125-501KLTM
			0.50	-60 to 300/320	125-5017		125-5017LTM
			1.00	-60 to 300/320	125-501J		125-501JLTM
			1.50	-60 to 300/320	125-5012	125-5012E	125-5012LTM
	25	5.00	-60 to 260/280	125-5025		125-5025LTM	
	30		0.25	-60 to 300/320	125-503K		125-503KLTM
			0.50	-60 to 300/320	125-5037		125-5037LTM
			0.88	-60 to 300/320	125-503D		125-503DLTM
			1.00	-60 to 300/320	125-503J		125-503JLTM
			1.50	-60 to 300/320	125-5032	125-5032E	125-5032LTM
			2.65	-60 to 260/280	125-503B		125-503BLTM
			3.00	-60 to 260/280	125-5034	125-5034E	125-5034LTM
			5.00	-60 to 260/280	125-5035	125-5035E	125-5035LTM
	60	1.50	-60 to 300/320	125-5062	125-5062E		
		5.00	-60 to 260/280	125-5065	125-5065E		



Structure of HP-5

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

HP-5 Chromatograms

Environmental

Organotin Compounds II

Page 596

HP-5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.18	20	0.18	-60 to 325/350	19091J-577	19091J-577E	19091J-577LTM	
0.20	12	0.33	-60 to 325/350	19091J-101		19091J-101LTM	
		17	0.33	-60 to 325/350	19091J-108		
	25	0.11	-60 to 325/350	19091J-002		19091J-002LTM	
		0.33	-60 to 325/350	19091J-102	19091J-102E	19091J-102LTM	
		0.50	-60 to 325/350	19091J-202		19091J-202LTM	
50	0.11	-60 to 325/350	19091J-005				
	0.33	-60 to 325/350	19091J-105	19091J-105E			
	0.50	-60 to 325/350	19091J-205				
0.25	5	0.10	-60 to 325/350	19091J-330		19091J-330LTM	
		15	0.25	-60 to 325/350	19091J-431	19091J-431E	19091J-431LTM
		1.00	-60 to 325/350	19091J-231		19091J-231LTM	
	30	0.10	-60 to 325/350	19091J-333		19091J-333LTM	
		0.25	-60 to 325/350	19091J-433	19091J-433E	19091J-433LTM	
		1.00	-60 to 325/350	19091J-233		19091J-233LTM	
60	0.25	-60 to 325/350	19091J-436	19091J-436E			
	1.00	-60 to 325/350	19091J-236	19091J-236E			

(Continued)

HP-5

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.25	-60 to 325/350	19091J-411		19091J-411LTM
	25	0.17	-60 to 325/350	19091J-012	19091J-012E	19091J-012LTM
		0.52	-60 to 325/350	19091J-112	19091J-112E	19091J-112LTM
		1.05	-60 to 325/350	19091J-212		19091J-212LTM
30	0.10	-60 to 325/350	19091J-313		19091J-313LTM	
	0.25	-60 to 325/350	19091J-413	19091J-413E	19091J-413LTM	
	0.50	-60 to 325/350	19091J-113	19091J-113E	19091J-113LTM	
	1.00	-60 to 325/350	19091J-213	19091J-213E	19091J-213LTM	
50	0.17	-60 to 325/350	19091J-015	19091J-015E		
	0.52	-60 to 325/350	12A-5015	19091J-115E		
	1.05	-60 to 325/350	19091J-215	19091J-215E		
60	0.25	-60 to 325/350	19091J-416			
	1.00	-60 to 325/350	19091J-216	19091J-216E		
0.53	10	2.65	-60 to 260/280	19095J-121	19095J-121E	19095J-121LTM
	15	1.50	-60 to 300/320	19095J-321		19095J-321LTM
30		5.00	-60 to 260/280	19095J-621		19095J-621LTM
	0.88	-60 to 300/320	19095J-023	19095J-023E	19095J-023LTM	
	1.50	-60 to 300/320	19095J-323	19095J-323E	19095J-323LTM	
	2.65	-60 to 260/280	19095J-123	19095J-123E	19095J-123LTM	
	5.00	-60 to 260/280	19095J-623	19095J-623E	19095J-623LTM	

CP-Sil 8 CB

- High efficiency increases data accuracy
- Wide choice of dimensions for maximum utility
- Ultimate reproducibility, selectivity and retention times enhance productivity

By incorporating 5% phenyl groups in the dimethylpolysiloxane polymer, the CP-Sil 8 CB column has a slightly higher polarity than CP-Sil 5 CB columns. This results in better selectivity for aromatic compounds and is generally the best choice when developing a method. CP-Sil 8 CB shows excellent column-to-column reproducibility and very high column efficiencies. We recommend the UltiMetal column for the highest operating temperatures, and when working in rugged environments with process or portable instruments.

CP-Sil 8 CB Chromatograms

Environmental

Phenols according to EPA Method 8040

Page 602

CP-Sil 8 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	20	0.10	-60 to 330/350	CP7319	CP731915
0.15	10	0.12	-60 to 330/350	CP7884	
		1.20	-60 to 325/350	CP7885	
		0.12	-60 to 330/350	CP7894	
0.20	12	0.33	-60 to 325/350	CP7900	
		0.33	-60 to 325/350	CP7921	
		0.33	-60 to 325/350	CP7941	
		0.20	-60 to 330/350	CP7950	
0.25	15	0.25	-60 to 330/350	CP8511	
		1.00	-60 to 325/350	CP8521	
	25	0.12	-60 to 330/350	CP7711	
			-60 to 330/350	CP7451	CP745115
			-60 to 325/350	CP7759	
			-60 to 325/350	CP7671	
	30	0.25	-60 to 330/350	CP8751	CP875115
			-60 to 325/350	CP8771	CP877115
	50	0.12	-60 to 330/350	CP7721	
			-60 to 330/350	CP7453	CP745315
-60 to 325/350			CP7769		
60	0.10	-60 to 325/350	CP8750		
		-60 to 330/350	CP8753		
		-60 to 325/350	CP8781		

(Continued)

CP-Sil 8 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	10	0.12	-60 to 330/350	CP7731	
		5.00	-60 to 300/325	CP8014	CP8014I5
	15	0.25	-60 to 325/350	CP8531	
		1.00	-60 to 325/350	CP8541	
	25	0.12	-60 to 330/350	CP7741	CP7741I5
		0.25	-60 to 325/350	CP7452	
		0.40	-60 to 325/350	CP7779	
		0.52	-60 to 325/350	CP8431	
		1.20	-60 to 325/350	CP7761	
		5.00	-60 to 300/325	CP7681	CP7681I5
	30	0.10	-60 to 330/350	CP8791	
		0.25	-60 to 325/350	CP8752	CP8752I5
		1.00	-60 to 325/350	CP8761	CP8761I5
	50	0.12	-60 to 330/350	CP7751	CP7751I5
		0.25	-60 to 325/350	CP7454	
		0.40	-60 to 325/350	CP7789	
		1.20	-60 to 325/350	CP7771	
		5.00	-60 to 300/325	CP7691	CP7691I5
	60	0.25	-60 to 325/350	CP8754	
		1.00	-60 to 325/350	CP8871	CP8871I5
0.53	10	2.00	-60 to 305/330	CP7621	
		5.00	-60 to 290/325	CP7646	
	15	1.50	-60 to 305/330	CP8678	
	25	0.15	-60 to 325/350	CP7634	
		2.00	-60 to 305/330	CP7631	
		1.00	-60 to 315/340	CP7636	
		5.00	-60 to 290/325	CP7656	
	30	0.50	-60 to 325/350	CP8716	
		1.50	-60 to 305/330	CP8736	CP8736I5
		5.00	-60 to 290/325	CP8756	CP8756I5
	50	1.00	-60 to 315/340	CP7696	
		2.00	-60 to 305/330	CP7641	
		5.00	-60 to 290/325	CP7666	
	60	1.50	-60 to 305/330	CP8796	
	100	5.00	-60 to 290/325	CP7676	

CP-Sil 8 CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	25	5.00	-60 to 325/350	CP6680
	50	5.00	-60 to 325/350	CP7196

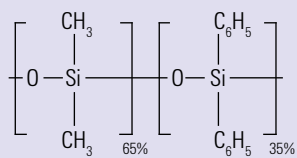
CP-Sil 13 CB

- Bonded and cross-linked for solvent rinsing that extends column lifetime
- Ideal confirmation column for complete confidence
- Non-cyano phase for the best sensitivity with ECD

The CP-Sil 13 CB was specially developed for the analysis of medium polarity compounds where halocarbon-sensitive detectors are used (e.g. ECD). It is a non-cyano containing, medium polarity column with a 14% phenyl, 86% dimethylpolysiloxane phase, preventing raised baselines due to the column bleed on an ECD.

CP-Sil 13 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.15	25	0.40	-25 to 300/330	CP7813	
0.25	25	0.20	-25 to 300/330	CP7906	
		0.40	-25 to 300/330	CP7916	
		1.20	-25 to 300/330	CP7977	CP797715
	50	0.20	-25 to 300/330	CP7907	
		0.40	-25 to 300/330	CP7917	
0.32	25	0.20	-25 to 300/330	CP7926	CP792615
		0.40	-25 to 300/330	CP7936	
		1.20	-25 to 300/330	CP7946	
	50	0.20	-25 to 300/330	CP7927	
		0.40	-25 to 300/330	CP7937	
		1.20	-25 to 300/330	CP7947	
0.53	10	1.00	-25 to 300/330	CP7609	
		2.00	-25 to 300/330	CP7649	
	25	1.00	-25 to 300/330	CP7619	
		2.00	-25 to 300/330	CP7649	
	50	1.00	-25 to 300/330	CP7629	
		2.00	-25 to 300/330	CP7659	
100	2.00	-25 to 300/330	CP7669		



Structure of DB-35

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

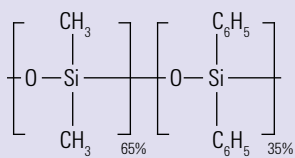
DB-35 Chromatograms

Environmental

Organochlorine Pesticides IV	Page 580
Nitrogen/Phosphorus Containing Pesticides, EPA Method 507	Page 586

DB-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	0.25	40 to 300/320	122-1932		122-1932LTM
	60	0.25	40 to 300/320	122-1962		
0.32	30	0.25	40 to 300/320	123-1932		123-1932LTM
		0.50	40 to 300/320	123-1933	123-1933E	123-1933LTM
0.53	15	1.00	40 to 280/300	125-1912		125-1912LTM
	30	0.50	40 to 280/300	125-1937		125-1937LTM
		1.00	40 to 280/300	125-1932		125-1932LTM



Structure of HP-35

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

HP-35 Chromatograms

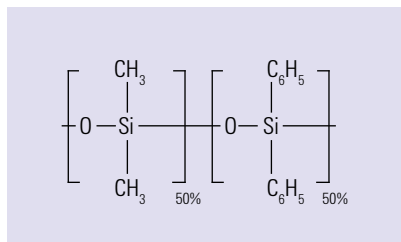
Industrial Chemicals

Polymer Additives

Page 669

HP-35

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890
						LTM Module
0.25	15	0.25	40 to 300/320	19091G-131	19091G-131E	19091G-131LTM
		30				19091G-133
0.32	30	0.25	40 to 300/320	19091G-113		19091G-113LTM
		0.50				19091G-213



Structure of DB-17

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

DB-17 Chromatograms

Life Sciences

Common Drug Screen	Page 672
Free Steroids	Page 681

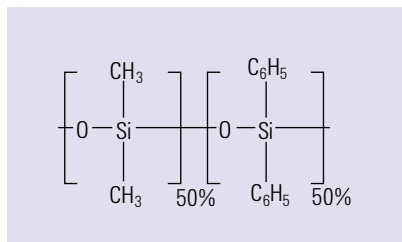
DB-17

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.05	10	0.10	40 to 280/300	126-1713		126-1713LTM
0.10	10	0.10	40 to 280/300	127-1712		127-1712LTM
		0.20	40 to 280/300	127-1713		127-1713LTM
		0.10	40 to 280/300	127-1722		127-1722LTM
0.18	20	0.18	40 to 280/300	121-1722		121-1722LTM
		0.30	40 to 280/300	121-1723		121-1723LTM
0.25	15	0.15	40 to 280/300	122-1711		122-1711LTM
		0.25	40 to 280/300	122-1712		122-1712LTM
		0.50	40 to 280/300	122-1713	122-1713E	122-1713LTM
30	30	0.15	40 to 280/300	122-1731	122-1731E	122-1731LTM
		0.25	40 to 280/300	122-1732	122-1732E	122-1732LTM
		0.50	40 to 280/300	122-1733		122-1733LTM
60	60	0.25	40 to 280/300	122-1762		

(Continued)

DB-17

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.15	40 to 280/300	123-1711		123-1711LTM
		0.25	40 to 280/300	123-1712		123-1712LTM
		0.50	40 to 280/300	123-1713		123-1713LTM
	30	0.15	40 to 280/300	123-1731		123-1731LTM
		0.25	40 to 280/300	123-1732	123-1732E	123-1732LTM
		0.50	40 to 280/300	123-1733	123-1733E	123-1733LTM
60	0.25	40 to 280/300	123-1762			
0.53	5	2.00	40 to 280/300	125-1704		125-1704LTM
	15	0.25	40 to 260/280	125-1711		125-1711LTM
		0.50	40 to 260/280	125-1717		125-1717LTM
		1.00	40 to 260/280	125-1712		125-1712LTM
		1.50	40 to 260/280	125-1713		125-1713LTM
	30	0.25	40 to 260/280	125-1731		125-1731LTM
		0.5	40 to 260/280	125-1737		125-1737LTM
		1.00	40 to 260/280	125-1732	125-1732E	125-1732LTM
		1.50	40 to 260/280	125-1733		125-1733LTM
	60	1.00	40 to 260/280	125-1762		



Structure of HP-50+

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

HP-50+

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	
0.18	20	0.18	40 to 280/300	19091L-577		19091L-577LTM	
0.20	12	0.31	40 to 280/300	19091L-101		19091L-101LTM	
0.25	5	0.15	40 to 280/300	19091L-330		19091L-330LTM	
		15	40 to 280/300	19091L-431		19091L-431LTM	
		30	0.15	40 to 280/300	19091L-333		19091L-333LTM
		0.25	40 to 280/300	19091L-433		19091L-433LTM	
0.32	15	0.50	40 to 280/300	19091L-133		19091L-133LTM	
		15	40 to 280/300	19091L-111		19091L-111LTM	
		30	0.25	40 to 280/300	19091L-413	19091L-413E	19091L-413LTM
		0.50	40 to 280/300	19091L-113	19091L-113E	19091L-113LTM	
0.53	60	0.25	40 to 280/300	19091L-416			
		15	1.00	40 to 260/280	19095L-021		19095L-021LTM
		30	0.50	40 to 260/280	19095L-523	19095L-523E	19095L-523LTM
		1.00	40 to 260/280	19095L-023	19095L-023E	19095L-023LTM	

CP-Sil 24 CB

- Bonded and cross linked for extended longevity
- Lowest detection limits using ECD
- Good inertness for highly accurate results

CP-Sil 24 CB is a medium polarity, 50% phenyl/50% dimethylpolysiloxane phase with no cyano groups, making it ideal for use with ECD. The CP-Sil 24 CB column produces perfect peak shapes for amines as shown by the Grob test mixture. It is especially suitable for the analysis of drugs and pesticides and is an excellent confirmation column in combination with CP-Sil 5 CB or CP-Sil 8 CB.

CP-Sil 24 CB Chromatograms

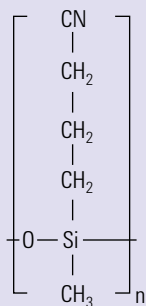
Environmental

Phenols according to EPA Method 8040

Page 602

CP-Sil 24 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	15	0.25	40 to 280/300	CP7820	
	30	0.25	40 to 280/300	CP7821	
		0.50	40 to 280/300	CP7824	
	60	0.25	40 to 280/300	CP7822	CP782215
		0.50	40 to 280/300		CP782515
0.32	15	0.25	40 to 280/300	CP7830	CP783015
	30	0.25	40 to 280/300	CP7831	CP783115
	60	0.25	40 to 280/300	CP7832	
0.53	15	1.00	40 to 265/290	CP7870	
	30	0.50	40 to 280/300	CP7834	CP783415
		1.00	40 to 265/290	CP7871	CP787115
	60	1.00	40 to 265/290	CP7872	



Structure of DB-23

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

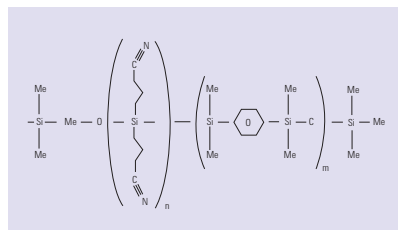
DB-23 Chromatograms

Food, Flavors and Fragrances

Canola Oil Margarine Partially Hydrogenated FAMES AOCS Method 1c-89	Page 637
FAMES I	Page 633

DB-23

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	20	0.20	40 to 250/260	121-2323		121-2323LTM
0.25	15	0.25	40 to 250/260	122-2312		122-2312LTM
		30	0.15	40 to 250/260	122-2331	
	60	0.25	40 to 250/260	122-2332	122-2332E	122-2332LTM
		0.25	40 to 250/260	122-2362	122-2362E	
0.32	30	0.25	40 to 250/260	123-2332	123-2332E	123-2332LTM
	60	0.25	40 to 250/260	123-2362		
0.53	15	0.50	40 to 230/240	125-2312		125-2312LTM
	30	0.50	40 to 230/240	125-2332		125-2332LTM



Structure of HP-88

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

HP-88 Chromatograms

Food, Flavors and Fragrances

69 Component FAME Mix

Page 634

HP-88

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	100	0.25	0 to 250/260	112-88A7	112-88A7E	
	60	0.2	0 to 250/260	112-8867	112-8867E	
	30	0.2	0 to 250/260	112-8837	112-8837E	112-8837LTM

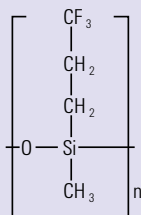
CP-Sil 88

- High selectivity towards positional and geometric isomers for ease-of-use
- Highly substituted cyanopropyl phase
- Highest polarity, non-chemically bonded and stabilized

The CP-Sil 88 column contains a highly substituted cyanopropyl phase that has been stabilized. It has the highest polarity and is non-chemically bonded. The extremely high polarity of this column offers maximum resolution in separations where the boiling point and polarity of the analytes are nearly equal (for example, in the separation of positional and geometric isomers).

CP-Sil 88

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.20	50 to 225/240	CP6172	CP6172I5
	50	0.20	50 to 225/240	CP6173	CP6173I5
0.32	25	0.20	50 to 225/240	CP6174	CP6174I5
	50	0.20	50 to 225/240	CP6175	



Structure of DB-200

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

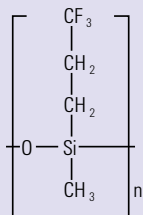
DB-200 Chromatograms

Industrial Chemicals

Acrylate Impurities I	Page 663
Aromatic Solvents	Page 661
Solvents I	Page 659

DB-200

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	30 to 300/320	122-2032	122-2032LTM
		0.50	30 to 300/320	122-2033	122-2033LTM
0.32	30	0.25	30 to 300/320	123-2032	123-2032LTM
		0.50	30 to 300/320	123-2033	123-2033LTM
0.53	30	1.00	30 to 280/300	125-2032	125-2032LTM



Structure of DB-210

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

DB-210 Chromatograms

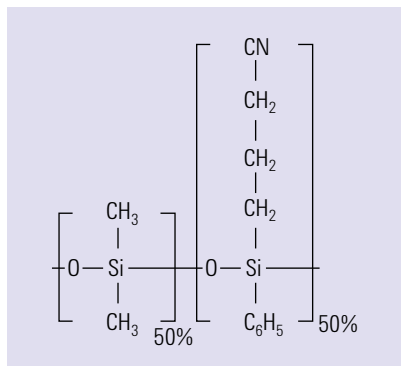
Environmental

Herbicides II

Page 586

DB-210

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	15	0.25	45 to 240/260	122-0212		122-0212LTM
		0.25	45 to 240/260	122-0232	122-0232E	122-0232LTM
		0.50	45 to 240/260	122-0233		122-0233LTM
0.32	15	0.50	45 to 240/260	123-0213		123-0213LTM
		0.25	45 to 240/260	123-0232		123-0232LTM
		0.50	45 to 240/260	123-0233		123-0233LTM
0.53	15	1	45 to 220/240	125-0212		125-0212LTM
		1.00	45 to 220/240	125-0232		125-0232LTM



Structure of DB-225

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

DB-225 Chromatograms

Environmental

Tetrachlorodibenzo-p-furans Page 591

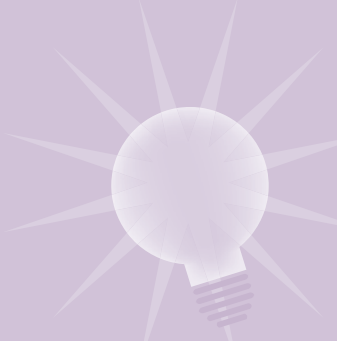
Food, Flavors and Fragrances

Alditol Acetates Page 629

FAME Standard II Page 636

Tips & Tools

Need assistance selecting a column for your method? Contact our chromatography technical specialists at www.agilent.com/chem/TechRep



DB-225

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.10	20	0.10	40 to 220/240	127-2222		127-2222LTM
0.18	20	0.20	40 to 220/240	121-2223		121-2223LTM
0.25	15	0.25	40 to 220/240	122-2212		122-2212LTM
		0.15	40 to 220/240	122-2231		122-2231LTM
		0.25	40 to 220/240	122-2232		122-2232LTM
0.32	30	0.25	40 to 220/240	123-2232	123-2232E	123-2232LTM
0.53	15	1.00	40 to 200/220	125-2212		125-2212LTM
		0.50	40 to 200/220	125-2237		125-2237LTM
		1.00	40 to 200/220	125-2232		125-2232LTM

CP-Sil 43 CB

- Moderate polarity for specific selectivity
- Separates aromatic from aliphatic compounds
- Bonded and cross-linked for extended longevity

CP-Sil 43 CB is a chemically bonded, moderately polar column with a 25% cyanopropyl/25% phenyl/50% dimethylpolysiloxane phase for specific selectivity. It separates aromatic from aliphatic hydrocarbons and is equivalent to a OV-255 column.

CP-Sil 43 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	0.20	45 to 200/225	CP7715	CP7715I5
	50	0.20	45 to 200/225	CP7725	CP7725I5
0.32	10	0.20	45 to 200/225	CP7735	
	25	0.20	45 to 200/225	CP7745	

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

DB-1301

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.18	10	0.40	-20 to 280/300	121-1313		121-1313LTM
0.25	30	0.25	-20 to 280/300	122-1332	122-1332E	122-1332LTM
		1.00	-20 to 280/300	122-1333		122-1333LTM
	60	0.25	-20 to 280/300	122-1362		
		1.00	-20 to 280/300	122-1363	122-1363E	
0.32	30	0.25	-20 to 280/300	123-1332		123-1332LTM
		1.00	-20 to 280/300	123-1333		123-1332LTM
	60	1.00	-20 to 280/300	123-1363	123-1363E	
0.53	15	1.00	-20 to 260/280	125-1312		125-1312LTM
	30	1.00	-20 to 260/280	125-1332		125-1332LTM
		1.50	-20 to 260/280	125-1333		125-1333LTM

CP-1301

- Thin film, medium polarity GC column for fast analysis
- Good reproducibility improves workflow
- Good inertness for better quality of data

The CP-1301 is a non-bonded, 6% cyanopropyl-phenyl phase that delivers lower bleed and improved column-to-column reproducibility. This medium polarity column is ideal for the analysis of herbicides, pesticides and many pharmaceutical products.

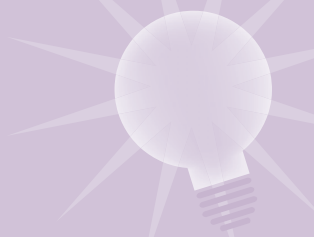
CP-1301

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	1.00	-25 to 265/280	CP8604
	60	0.25	-25 to 280/280	CP8602
		1.00	-25 to 265/280	CP8605
0.32	30	0.25	-25 to 280/280	CP8607
		1.00	-25 to 265/280	CP8610
	60	0.25	-25 to 280/280	CP8608
		1.00	-25 to 265/280	CP8611
		1.00	-25 to 265/280	CP8613

Tips & Tools

Agilent also offers DB-624 columns for the analysis of volatile priority pollutants and residual solvents.

Turn to pages 511–512.



DB-1701

- (14%-Cyanopropyl-phenyl)-methylpolysiloxane
- Low/mid-polarity
- Bonded and cross-linked
- Exact replacement of HP-1301 and HP-1701
- Solvent rinsable

DB-1701 Chromatograms

Environmental

Organochlorine Pesticides III	Page 580
Phenoxy Acid Herbicides	Page 585

Industrial Chemicals

Acrylate Impurities II	Page 664
------------------------	----------

Life Sciences

Fentanyl	Page 678
----------	----------

DB-1701

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.10	20	0.10	-20 to 280/300	127-0722		127-0722LTM
		0.40	-20 to 280/300	127-0723		127-0723LTM
0.18	10	0.40	-20 to 280/300	121-0713		121-0713LTM
	20	0.18	-20 to 280/300	121-0722		121-0722LTM
0.25	15	0.25	-20 to 280/300	122-0712		122-0712LTM
		1.00	-20 to 280/300	122-0713		122-0713LTM
	30	0.15	-20 to 280/300	122-0731		122-0731LTM
		0.25	-20 to 280/300	122-0732	122-0732E	122-0732LTM*
		1.00	-20 to 280/300	122-0733	122-0733E	122-0733LTM
	60	0.15	-20 to 280/300	122-0761		
0.25		-20 to 280/300	122-0762			
1.00		-20 to 280/300	122-0763	122-0763E		

*Also available as LTM column toroid assembly for Agilent 5975T, 0.25 mm x 30 m, 0.25 µm, P/N 222-0732LTM

(Continued)

DB-1701

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	0.25	-20 to 280/300	123-0712		123-0712LTM
		1.00	-20 to 280/300	123-0713		123-0713LTM
	30	0.15	-20 to 280/300	123-0731		123-0731LTM
		0.25	-20 to 280/300	123-0732	123-0732E	123-0732LTM
		1.00	-20 to 280/300	123-0733	123-0733E	123-0733LTM
	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	123-0763E	
0.53	15	1.00	-20 to 260/280	125-0712	125-0712E	125-0712LTM
	30	0.25	-20 to 260/280	125-0731		125-0731LTM
		0.50	-20 to 260/280	125-0737		125-0737LTM
		1.00	-20 to 260/280	125-0732	125-0732E	125-0732LTM
		1.50	-20 to 260/280	125-0733		125-0733LTM
	60	1.00	-20 to 260/280	125-0762	125-0762E	

CP-Sil 19 CB

- Confirmation column for highly reliable results
- Bonded and cross-linked phase for longevity
- Broad range of dimensions for ultimate utility

The medium polarity, 14% cyanopropyl-phenyl/86% dimethylpolysiloxane stationary phase of the CP-Sil 19 CB column shows a different selectivity than phenyl/dimethylsiloxane based phases because of the cyano functional groups. Its long history yields many practical applications for environmental, food and beverage and pharmaceutical laboratories.

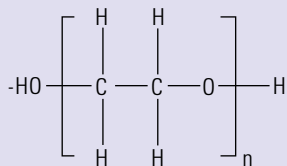
CP-Sil 19 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	0.20	-25 to 275/300	CP7331	
0.15	25	0.50	-25 to 275/300	CP7340	
0.20	25	0.20	-25 to 275/300	CP7360	
0.25	10	0.20	-25 to 275/300	CP7702	
		15	0.15	-25 to 275/300	CP8502
	25	0.25	-25 to 275/300	CP8512	CP8512I5
		0.20	-25 to 275/300	CP7712	
		0.40	-25 to 275/300	CP7809	
30	1.20	0.20	-25 to 275/300	CP7672	
		0.25	-25 to 275/300	CP8712	CP8712I5
		1.00	-25 to 275/300	CP8562	CP8562I5
50	0.20	0.20	-25 to 275/300	CP7722	
		0.40	-25 to 275/300	CP7819	CP7819I5
60	0.15	0.15	-25 to 275/300	CP8592	CP8592I5
		0.25	-25 to 275/300	CP8722	

(Continued)

CP-Sil 19 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	10	0.20	-25 to 275/300	CP7732	
	15	0.25	-25 to 275/300	CP8542	CP8542I5
	25	0.20	-25 to 275/300	CP7742	
		0.40	-25 to 275/300	CP7829	
		1.20	-25 to 275/300	CP7762	
	30	0.25	-25 to 275/300	CP8842	
		1.00	-25 to 275/300	CP8762	
	50	0.20	-25 to 275/300	CP7752	
		0.40	-25 to 275/300	CP7839	
		1.20	-25 to 275/300	CP7772	
	60	0.15	-25 to 275/300	CP8662	
		0.25	-25 to 275/300	CP8852	
		1.00	-25 to 275/300	CP8772	CP8772I5
	0.53	10	2.00	-25 to 275/300	CP7647
15		0.50	-25 to 275/300	CP8663	
25		1.00	-25 to 275/300	CP7637	
		2.00	-25 to 275/300	CP7657	
30		1.00	-25 to 275/300	CP8737	
50		2.00	-25 to 275/300	CP7667	
		1.00	-25 to 275/300	CP7697	



Structure of Polyethylene Glycol (PEG)

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 your varying analysis needs.

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



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 page 255.



DB-WAX and DB-WaxFF Chromatograms

Food, Flavors and Fragrances

FAME Standard I	Page 635
Fragrance Reference Standard II	Page 621
Lavender Oil Spiked with Camphor	Page 622
Peppermint Oil	Page 625
Spearmint Oil (Western)	Page 626
Ylang Ylang Oil II	Page 627

Industrial Chemicals

Aldehydes and Ketones	Page 648
Aromatics II	Page 651
Ethylene Oxide	Page 667
Formaldehyde Underivatized	Page 649
Glycols I	Page 655
Impurities in Styrene	Page 652
Phenols III	Page 667

DB-WAX and DB-WaxFF

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
DB-WAX							
0.05	10	0.05	20 to 250/260	126-7012		126-7012LTM	
		0.10	20 to 240/250	126-7013		126-7013LTM	222-7013LTM
0.10	10	0.10	20 to 250/260	127-7012	127-7012E	127-7012LTM	
		0.20	20 to 240/250	127-7013		127-7013LTM	
	20	0.10	20 to 250/260	127-7022		127-7022LTM	
		0.20	20 to 240/250	127-7023	127-7023E	127-7023LTM	
0.18	10	0.18	20 to 250/260	121-7012		121-7012LTM	
	20	0.18	20 to 250/260	121-7022	121-7022E	121-7022LTM	
		0.30	20 to 240/250	121-7023	121-7023E	121-7023LTM	
	40	0.18	20 to 250/260	121-7042	121-7042E		
0.30		20 to 240/250	121-7043				
0.20	25	0.20	20 to 250/260	128-7022		128-7022LTM	
	30	0.20	20 to 250/260	128-7032		128-7032LTM	
	50	0.20	20 to 250/260	128-7052			
0.25	15	0.25	20 to 250/260	122-7012	122-7012E	122-7012LTM	
		0.50	20 to 240/250	122-7013		122-7013LTM	
	30	0.15	20 to 250/260	122-7031		122-7031LTM	
		0.25	20 to 250/260	122-7032	122-7032E	122-7032LTM	
		0.50	20 to 240/250	122-7033	122-7033E	122-7033LTM	222-7033LTM
	60	0.15	20 to 250/260	122-7061			
		0.25	20 to 250/260	122-7062	122-7062E		
0.50	20 to 240/250	122-7063	122-7063E				
0.32	15	0.25	20 to 250/260	123-7012		123-7012LTM	
		0.50	20 to 240/250	123-7013		123-7013LTM	
	30	0.15	20 to 250/260	123-7031		123-7031LTM	
		0.25	20 to 250/260	123-7032	123-7032E	123-7032LTM	
		0.50	20 to 240/250	123-7033	123-7033E	123-7033LTM	
	60	0.25	20 to 250/260	123-7062			
0.50		20 to 240/250	123-7063	123-7063E			
0.45	30	0.85	20 to 230/240	124-7032		124-7032LTM	
0.53	15	0.50	20 to 230/240	125-7017		125-7017LTM	
		1.00	20 to 230/240	125-7012	125-7012E	125-7012LTM	
	30	0.25	20 to 230/240	125-7031		125-7031LTM	
		0.50	20 to 230/240	125-7037		125-7037LTM	
		1.00	20 to 230/240	125-7032	125-7032E	125-7032LTM	
	60	1.00	20 to 230/240	125-7062	125-7062E		
DB-WaxFF							
0.10	20	0.20	20 to 240/250	127-7023FF			

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

DB-WAXetr Chromatograms

Industrial Chemicals

Alcohols II	Page 642
Impurities in Mixed Xylenes	Page 668
Impurities in Styrene	Page 652
Organic Acids	Page 644
Solvents I	Page 659
Solvents II	Page 659

DB-WAXetr

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	25	0.40	30 to 250/260	128-7323		128-7323LTM
0.25	30	0.25	30 to 260/280	122-7332	122-7332E	122-7332LTM
		0.50	30 to 250/260	122-7333		122-7333LTM
	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		123-7312LTM
		1.00	30 to 250/260	123-7314		123-7314LTM
	30	0.25	30 to 260/280	123-7332		123-7332LTM
		0.50	30 to 250/260	123-7333		123-7333LTM
		1.00	30 to 250/260	123-7334		123-7334LTM
	50	1.00	30 to 250/260	123-7354	123-7354E	
	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		125-7312LTM
		2.00	50 to 230/250	125-7314		125-7314LTM
	30	1.00	30 to 240/260	125-7332	125-7332E	125-7332LTM
		1.50	30 to 230/240	125-7333		125-7333LTM
		2.00	50 to 230/250	125-7334	125-7334E	125-7334LTM
		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

HP-INNOWax Chromatograms

Food, Flavors and Fragrances

Bourbon	Page 629
Free Fatty Acids	Page 630
Perfume	Page 623
Strawberry Syrup	Page 629

Industrial Chemicals

Alcohols III	Page 642
Aldehydes and Acids	Page 647
Free Organic Acids/C4-C5 Isomers	Page 644
Chlorinated Isooctane	Page 659
Esters III	Page 654
Impurities in Ethylbenzene	Page 652

Petroleum

Aromatics Analysis – Ethylbenzene Impurities	Page 699
Aromatics Analysis – ASTM D16 Analytes	Page 699
Fast Analysis of Aromatic Solvent	Page 708
Impurities in p-Xylene – ASTM D3798	Page 700

HP-INNOWax

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 260/270	19091N-577	19091N-577E	19091N-577LTM	29091N-577LTM
0.20	25	0.20	40 to 260/270	19091N-102		19091N-102LTM	
		0.40	40 to 260/270	19091N-202		19091N-202LTM	
	50	0.20	40 to 260/270	19091N-105	19091N-105E		
		0.40	40 to 260/270	19091N-205	19091N-205E		
0.25	4	0.25	40 to 260/270	19091N-130		19091N-130LTM	
	5	0.1	40 to 260/270	19091N-330			
		0.15	40 to 260/270	19091N-030		19091N-030LTM	
	15	0.1	40 to 260/270	19091N-331			
		0.25	40 to 260/270	19091N-131	19091N-131E	19091N-131LTM	
		0.50	40 to 260/270	19091N-231		19091N-231LTM	
	30	0.15	40 to 260/270	19091N-033		19091N-033LTM	
		0.25	40 to 260/270	19091N-133	19091N-133E	19091N-133LTM	29091N-133LTM
		0.50	40 to 260/270	19091N-233	19091N-233E	19091N-233LTM	
	60	0.15	40 to 260/270	19091N-036			
0.25		40 to 260/270	19091N-136	19091N-136E			
0.50		40 to 260/270	19091N-236				
0.32	15	0.25	40 to 260/270	19091N-111		19091N-111LTM	
	30	0.15	40 to 260/270	19091N-013		19091N-013LTM	
		0.25	40 to 260/270	19091N-113	19091N-113E	19091N-113LTM	
		0.50	40 to 260/270	19091N-213	19091N-213E	19091N-213LTM	
	60	0.25	40 to 260/270	19091N-116			
0.50		40 to 260/270	19091N-216	19091N-216E			
0.53	15	1.00	40 to 240/250	19095N-121	19095N-121E	19095N-121LTM	
	30	1.00	40 to 240/250	19095N-123	19095N-123E	19095N-123LTM	
	60	1.00	40 to 240/250	19095N-126			

CP-Wax 52 CB

- For enhanced column lifetime and better detection limits
- High polarity provides wide application area
- Broad temperature range for enhanced productivity

The CP-Wax 52 CB column has a lower minimum temperature and a higher maximum temperature than non-bonded polyethylene glycols due to extensive cross-linking, delivering higher resolution of low boiling point analytes. With guaranteed reproducibility and excellent temperature stability, CP-Wax 52 CB is ideal for EPA and ASTM methods.

We recommend the UltiMetal column when working in rugged environments with process or portable instruments.

CP-Wax 52 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.10	10	0.10	20 to 250/265	CP7334	CP7334I5
		0.20	20 to 250/265	CP7335	
0.15	15	0.15	20 to 250/265	CP7791	CP7791I5
	25	0.25	20 to 250/265	CP7792	CP7792I5
0.20	25	0.20	20 to 250/265	CP7765	
	30	0.20	20 to 250/265	CP7775	
	50	0.20	20 to 250/265	CP7785	
0.25	10	0.20	20 to 250/265	CP7703	
	15	0.25	20 to 250/265	CP8513	
	25	0.20	20 to 250/265	CP7713	CP7713I5
			20 to 250/265	CP7673	CP7673I5
	30	0.15	20 to 250/265	CP8745	
			20 to 250/265	CP8713	CP8713I5
			20 to 250/265	CP8746	CP8746I5
	50	0.20	20 to 250/265	CP7723	CP7723I5
60	0.25	20 to 250/265	CP8723	CP8723I5	
		20 to 250/265	CP8748		

(Continued)

CP-Wax 52 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	10	0.20	20 to 250/265	CP7733	CP7733I5
		1.00	20 to 250/265	CP7628	
	15	0.15	20 to 250/265	CP8533	
		0.25	20 to 250/265	CP8543	
		0.50	20 to 250/265	CP8553	
	25	0.20	20 to 250/265	CP7743	
		0.40	20 to 250/265	CP7879	
		1.20	20 to 250/265	CP7763	CP7763I5
	30	0.25	20 to 250/265	CP8843	CP8843I5
		0.50	20 to 250/265	CP8763	CP8763I5
	50	0.20	20 to 250/265	CP7753	CP7753I5
		0.40	20 to 250/265	CP7889	
1.20		20 to 250/265	CP7773	CP7773I5	
60	0.25	20 to 250/265	CP8853		
	0.50	20 to 250/265	CP8773		
	1.20	20 to 250/265	CP8073	CP8073I5	
0.53	10	2.00	20 to 250/265	CP7648	
	15	1.00	20 to 250/265	CP8718	
	25	1.00	20 to 250/265	CP7638	
		2.00	20 to 250/265	CP7658	CP7658I5
	30	1.00	20 to 250/265	CP8738	CP8738I5
	50	1.00	20 to 250/265	CP7698	CP7698I5
		2.00	20 to 250/265	CP7668	
	60	1.00	20 to 250/265	CP8798	
100	2.00	20 to 250/265	CP7678		

CP-Wax 52 CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Part No.
0.53	10	0.50	20 to 250/275	CP7128
		1.00	20 to 250/275	CP7148
		2.00	20 to 250/275	CP7177
	25	0.50	20 to 250/275	CP7138
		1.00	20 to 250/275	CP7158
		2.00	20 to 250/275	CP7178
	50	0.50	20 to 250/275	CP7198
		1.00	20 to 250/275	CP7168
		2.00	20 to 250/275	CP7179

DB-FFAP

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 40°C 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.

DB-FFAP Chromatograms

Food, Flavors and Fragrances

Organic Acids Page 631

Life Sciences

Aspirin and Ibuprofen in Methanol Page 680

DB-FFAP

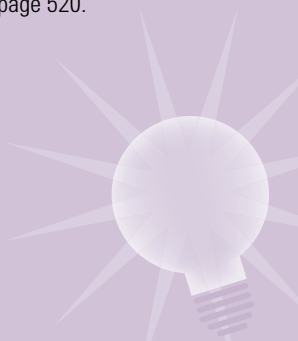
ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.10	10	0.10	40 to 250	127-3212		127-3212LTM	
	15	0.10	40 to 250	127-32H2		127-32H2LTM	
0.25	15	0.25	40 to 250	122-3212		122-3212LTM	222-3212LTM
		0.25	40 to 250	122-3232	122-3232E	122-3232LTM	222-3232LTM
	30	0.50	40 to 250	122-3233		122-3233LTM	
		60	0.25	40 to 250	122-3262	122-3262E	
	0.50		40 to 250	122-3263			

DB-FFAP

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.32	15	0.25	40 to 250	123-3212		123-3212LTM	
	25	0.50	40 to 250	123-3223		123-3223LTM	
	30	0.25	40 to 250	123-3232	123-3232E	123-3232LTM	
		0.50	40 to 250	123-3233		123-3233LTM	
		1.00	40 to 250	123-3234		123-3234LTM	
	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		124-3232LTM	
0.53	10	1.00	40 to 250	125-32H2		125-32H2LTM	
	15	0.50	40 to 250	125-3217		125-3217LTM	
		1.00	40 to 250	125-3212		125-3212LTM	
	30	0.25	40 to 250	125-3231		125-3231LTM	
		0.50	40 to 250	125-3237		125-3237LTM	
		1.00	40 to 250	125-3232	125-3232E	125-3232LTM	
		1.50	40 to 250	125-3233		125-3233LTM	
	60	1.00	40 to 250	125-3262			

Tips & Tools

Agilent also offers CAM columns for amine analysis. Turn to page 520.

**HP-FFAP**

- Nitroterephthalic acid modified polyethylene glycol
- High polarity
- Temperature range from 60°C 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.

HP-FFAP Chromatograms**Food, Flavors and Fragrances**

Alcohol Beverage Standard	Page 628
---------------------------	----------

Industrial Chemicals

Acrylates	Page 664
Ethoxyethanol	Page 644

HP-FFAP

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	25	0.30	60 to 240/250	19091F-102	19091F-102E	19091F-102LTM
	50	0.30	60 to 240/250	19091F-105	19091F-105E	
0.25	30	0.25	60 to 240/250	19091F-433	19091F-433E	19091F-433LTM
0.32	25	0.50	60 to 240/250	19091F-112	19091F-112E	19091F-112LTM
	30	0.25	60 to 240/250	19091F-413		19091F-413LTM
	50	0.50	60 to 240/250	19091F-115	19091F-115E	
0.53	10	1.00	60 to 240	19095F-121		19095F-121LTM
	15	1.00	60 to 240	19095F-120	19095F-120E	19095F-120LTM
	30	1.00	60 to 240	19095F-123	19095F-123E	19095F-123LTM

CP-Wax 58 FFAP CB

- Highest polarity bonded wax column for more productivity when analyzing polar compounds
- Chemically-bonded for enhanced longevity
- High inertness provides excellent peak shapes for highest accuracy

The phase of the CP-Wax 58 FFAP CB column is a nitroterephthalic acid-modified, chemically bonded polyethylene glycol. It is designed for the analysis of acidic compounds, such as phenols, underivatized and derivatized free fatty acids.

CP-Wax 58 FFAP CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.20	25	0.30	20 to 250/275	CP7787	CP778715
	50	0.30	20 to 250/275	CP7797	
0.25	25	0.20	20 to 250/275	CP7717	CP771715
	50	0.20	20 to 250/275	CP7727	
0.32	25	0.20	20 to 250/275	CP7747	CP774715
		1.20	20 to 250/275	CP7767	
	50	0.20	20 to 250/275	CP7757	
		0.50	20 to 250/275	CP7778	
		1.20	20 to 250/275	CP7777	
0.53	15	0.50	20 to 250/275	CP7665	
		2.00	20 to 250/275	CP7654	
	25	1.00	20 to 250/275	CP7614	CP761415
		2.00	20 to 250/275	CP7654	
		1.00	20 to 250/275	CP7624	
50	2.00	20 to 250/275	CP7664		

CP-Wax 57 CB

- Unique high polarity wax column enhances productivity
- 100% chemically-bonded polyethylene glycol for excellent longevity
- Excellent peak shape for alcohols and glycols for accurate results

The CP-Wax 57 CB column has a unique selectivity, especially for the analysis of alcohols in the brewing and wines/spirits industry. The high inertness of this column offers excellent peak shapes for these very polar compounds, ensuring high precision. The 0.15 mm ID version offers a significant gain in analysis speed.

CP-Wax 57 CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.15	15	0.12	20 to 200/225	CP97711	CP9771115
	30	0.12	20 to 200/225	CP97721	
0.25	25	0.20	20 to 200/225	CP97713	
	50	0.20	20 to 200/225	CP97723	CP9772315
	60	0.40	20 to 200/225	CP8120	
0.32	25	0.20	20 to 200/225	CP97743	
		1.20	20 to 200/225	CP97763	CP9776315
	50	0.20	20 to 200/225	CP97753	CP9775315
		1.20	20 to 200/225	CP97773	CP9777315
0.53	25	1.00	20 to 200/225	CP97638	CP9763815
	25	2.00	20 to 200/225	CP97658	CP9765815



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.

CP-PoraBOND Q

- Bonded PLOT column for more reliable results
- Extended analysis of hydrocarbons for broader application range
- Increased maximum temperature for greater productivity

CP-PoraBOND Q is the long-term solution for analyzing volatile solvents and hydrocarbons. It is the most stable column of its kind and withstands repeated later injections. Due to our manufacturing techniques, the porous polymer is very pure and has virtually no catalytic activity, allowing temperatures up to 320°C without decomposition.

The use of bonding technology in the CP-PoraBOND Q also reduces the presence of loose particles that cause detector spiking, so there is no need for particle traps.

CP-PoraBOND Q Chromatograms

Industrial Chemicals

Analysis of solvents

Page 662

CP-PoraBOND Q

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	10	3.00	-100 to 300/300	CP7347	CP7347I5
	25	3.00	-100 to 300/320	CP7348	CP7348I5
0.32	10	5.00	-100 to 300/320	CP7350	CP7350I5
	25	5.00	-100 to 300/320	CP7351	CP7351I5
	50	5.00	-100 to 300/320	CP7352	CP7352I5
0.53	10	10.00	-100 to 300/320	CP7353	CP7353I5
	25	10.00	-100 to 300/320	CP7354	CP7354I5
	50	10.00	-100 to 300/320	CP7355	

CP-PoraBOND U

- Increased maximum temperature widens application range
- Reduced bleed delivers lower detection limits and more accurate results
- Bonded PLOT phase for longevity

CP-PoraBOND U is a highly stable polar-bonded porous polymer with the maximum temperature extended from 190°C to 300°C. The reduction of bleed provides lower detection limits and faster stabilization times. Because the porous polymer is bonded to the column, the CP-PoraBOND U is ideal for use with pressure programs, GC/MS applications and valve switching.

CP-PoraBOND U

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.25	10	3.00	-100 to 300/300	CP7347

CP-PoraPLOT Q and CP-PoraPLOT Q-HT

- Analysis of polar and non-polar volatile compounds delivers broad applicability
- Water elutes as a sharp peak and can therefore be quantified, improving productivity
- Repeatable retention times for long-term stability that enhances efficiency

CP-PoraPLOT Q

CP-PoraPLOT Q is recommended for column switching systems that analyze polar and apolar volatile compounds. Water elutes as a sharp and quantifiable peak. In addition, retention times are repeatable, as retention is not influenced by water in the sample.

CP-PoraPLOT Q Chromatograms

Petroleum

Analysis of gases C1 to C4

Page 709

CP-PoraPLOT Q

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	10	8.00	-100 to 250/250	CP7548	
	25	8.00	-100 to 250/250	CP7549	CP754915
0.32	10	10.00	-100 to 250/250	CP7550	CP755015
	25	10.00	-100 to 250/250	CP7551	CP755115
	50	10.00	-100 to 250/250	CP7552	
0.53	10	20.00	-100 to 250/250	CP7553	CP755315
	25	20.00	-100 to 250/250	CP7554	CP755415
	50	20.00	-100 to 250/250	CP7555	

CP-PoraPLOT Q UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	10	20.00	-100 to 250/250	CP6953	CP695315
	25	20.00	-100 to 250/250	CP6954	CP695415
	50	20.00	-100 to 250/250	CP6955	

CP-PoraPLOT Q-HT

CP-PoraPLOT Q-HT is the high temperature version of CP-PoraPLOT Q, offering the same benefits but operating up to 290 $^{\circ}\text{C}$.

CP-PoraPLOT Q-HT

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	10	10.00	-100 to 290/290	CP7556	
	25	10.00	-100 to 290/290	CP7557	CP755715
0.53	10	20.00	-100 to 290/290	CP7558	CP755815
	25	20.00	-100 to 290/290	CP7559	CP755915

HP-PLOT Q

- Bonded polystyrene-divinylbenzene based column
- Polarity between Porapak-Q and Porapak-N
- Excellent column for C₁ to C₃ isomers and alkanes to C₁₂, CO₂, methane, air/CO, oxygenated compounds, sulfur compounds and solvents
- Replaces 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

HP-PLOT Q Chromatograms

Environmental

N2O I	Page 615
-------	----------

Petroleum

Baseline Resolution of Air/CO, CO ₂ , and Methane in a Natural Gas Sample	Page 687
Ethylene Oxide Synthetic Standard	Page 700
Oxygenates	Page 700

HP-PLOT Q

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage		5 in. Cage		7890/6890 LTM Module
				7 in. Cage	5 in. Cage	5 in. Cage	7 in. Cage	
0.32	15	20.00	-60 to 270/290	19091P-Q03				19091P-Q03LTM
	30	20.00	-60 to 270/290	19091P-Q04	19091P-Q04E			19091P-Q04LTM
0.53	15	40.00	-60 to 270/290	19095P-Q03	19095P-Q03E			19095P-Q03LTM
	30	40.00	-60 to 270/290	19095P-Q04	19095P-Q04E			19095P-Q04LTM

GS-Q

- Porous divinylbenzene homopolymer
- 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

GS-Q Chromatograms

Petroleum

Sulfur Gas Analysis in Light Hydrocarbon Streams II

Page 696

GS-Q

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	10	-60 to 250	113-3432	113-3432E	113-3432LTM
0.53	10	-60 to 250	115-34H2		115-34H2LTM
	15	-60 to 250	115-3412		115-3412LTM
	25	-60 to 250	115-3422		115-3422LTM
	30	-60 to 250	115-3432	115-3432E	115-3432LTM

CP-PoraPLOT U and CP-PoraPLOT S

- Symmetrical peaks from polar and non-polar volatiles for ultimate accuracy
- Minimal particle loss reduces detector spiking for reliable results
- Repeatable retention times for better long-term stability

CP-PoraPLOT U

CP-PoraPLOT U provides symmetrical peaks with polar volatiles. Water has no effect on retention times and elutes as a sharp and quantifiable peak. CP-PoraPLOT U is the most polar porous polymer PLOT column and is designed for halogenated compounds, hydrocarbons C1-C6, ketones and solvents.

CP-PoraPLOT U Chromatograms

Industrial Chemicals

Sulfur gases

Page 670

CP-PoraPLOT U

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	8.00	-100 to 190/190	CP7579	
0.32	10	10.00	-100 to 190/190	CP7580	
	25	10.00	-100 to 190/190	CP7581	
0.53	10	20.00	-100 to 190/190	CP7583	CP7583I5
	25	20.00	-100 to 190/190	CP7584	CP7584I5

CP-PoraPLOT S

CP-PoraPLOT S is a divinylbenzene/vinylpyridine polymer for hydrocarbons and ketones. This phase is ideal for the analysis of medium polarity volatiles, including hydrocarbons and ketones, at higher temperatures than CP-PoraPLOT U.

CP-PoraPLOT S

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	25	20.00	-100 to 250/250	CP7574	CP7574I5

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

HP-PLOT U

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	30	10	-60 to 190	19091P-U04	19091P-U04E	19091P-U04LTM
0.53	15	20	-60 to 190	19095P-U03		19095P-U03LTM
	30	20	-60 to 190	19095P-U04	19095P-U04E	19095P-U04LTM

HP-PLOT Al₂O₃ KCl

- Least "polar" Alumina phase
- Aluminum oxide deactivated with KCl
- Standard column choice for light hydrocarbon analysis – C₁ to C₈ 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

HP-PLOT Al₂O₃ KCl

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	5.00	-60 to 200	19091P-K33	19091P-K33E	19091P-K33LTM
0.32	50	8.00	-60 to 200	19091P-K15	19091P-K15E	
0.53	30	15	-60 to 200	19095P-K23		19095P-K23LTM
	50	15	-60 to 200	19095P-K25	19095P-K25E	

GS-Alumina KCl

- 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

GS-Alumina KCl Chromatograms

Petroleum

Impurities in Ethylene	Page 688
Impurities in Propylene	Page 689

GS-Alumina KCl

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.53	30	-60 to 200	115-3332		115-3332LTM
	50	-60 to 200	115-3352	115-3352E	



CP-Al₂O₃/KCl and CP-Al₂O₃/Na₂SO₄

- High analytical capacity improves efficiency
- No need for sub-ambient cooling simplifies operation
- Choice of two polarities for a broad range of applications

Aluminum oxide PLOT columns offer high selectivity for separating ppm levels of C₁ to C₅ hydrocarbons in a main stream of C₁ to C₅ hydrocarbons. These columns analyze more compounds in a single run than packed columns, while still delivering higher resolution and faster analysis times. When compared to liquid stationary phases, the CP-Al₂O₃ PLOT column offers increased selectivity and allows all C₁ to C₅ hydrocarbon isomers to be separated. CP-Al₂O₃ operates without the need for sub-ambient cooling and is available in two unique selectivities.

Selectivity Through KCl or Na₂SO₄ Deactivation

Aluminum oxide PLOT columns are deactivated using very small salt crystals, providing a reproducible and stable deactivation up to 200°C. Depending on the type of deactivation salt, the CP-Al₂O₃ PLOT column will show a particular selectivity. The KCl salt results in a relatively apolar Al₂O₃ surface, while Na₂SO₄ deactivation provides a polar surface. Unsaturated compounds such as ethylene and acetylene (ethyne) are retained longer.

CP-Al₂O₃/Na₂SO₄

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	4.00	-100 to 200/200	CP7586	
	50	4.00	-100 to 200/200	CP7587	
0.32	10	5.00	-100 to 200/200	CP7561	
	50	5.00	-100 to 200/200	CP7565	CP756515
0.53	25	10.00	-100 to 200/200	CP7567	
	50	10.00	-100 to 200/200	CP7568	

CP-Al₂O₃/Na₂SO₄ UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	50	10.00	-100 to 200/200	CP6968

CP-Al₂O₃/KCl

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	4.00	-100 to 200/200	CP7576	
	50	4.00	-100 to 200/200	CP7577	CP7577I5
0.32	10	5.00	-100 to 200/200	CP7511	CP7511I5
	25	5.00	-100 to 200/200	CP7515	CP7515I5
	50	5.00	-100 to 200/200	CP7519	CP7519I5
0.53	10	10.00	-100 to 200/200	CP7516	
	25	10.00	-100 to 200/200	CP7517	
	50	10.00	-100 to 200/200	CP7518	

CP-Al₂O₃/KCl UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	50	10.00	-100 to 200/200	CP6918

HP-PLOT Al₂O₃ S

- Middle range of "polarity" for Alumina phases
- Aluminum oxide deactivated with sodium sulfate
- Excellent general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Best for resolving acetylene from butane and propylene from isobutane

HP-PLOT Al₂O₃ S Chromatograms

Petroleum

Ethylene	Page 688
Natural Gas	Page 687

HP-PLOT Al₂O₃ S

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	5.00	-60 to 200	19091P-S33		19091P-S33LTM
0.32	25	8.00	-60 to 200	19091P-S12		19091P-S12LTM
	50	8.00	-60 to 200	19091P-S15	19091P-S15E	
0.53	15	15.00	-60 to 200	19095P-S21		19095P-S21LTM
	30	15.00	-60 to 200	19095P-S23		19095P-S23LTM
	50	15.00	-60 to 200	19095P-S25	19095P-S25E	





GS-Alumina

- Most "polar" Alumina phase
- Aluminum oxide with proprietary deactivation
- Excellent general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Separates C₁ to C₄ 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

Note: Alumina columns have a tendency to adsorb water and CO₂ 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 Chromatograms

Petroleum

1,3-Butadiene Purity	Page 691
Extended Hydrocarbon Analysis I	Page 692
Propylene	Page 689

GS-Alumina

ID (mm)	Length (m)	Temp Limits (°C)	7890/6890		
			7 in. Cage	5 in. Cage	LTM Module
0.53	30	-60 to 200	115-3532	115-3532E	115-3532LTM
	50	-60 to 200	115-3552		

HP-PLOT Al₂O₃ M

- Most "polar" Alumina phase (similar to GS-Alumina)
- Aluminum oxide deactivated with proprietary deactivation
- Good general use column for light hydrocarbon analysis – C₁ to C₈ hydrocarbon isomers
- Good for resolving acetylene from butane and propylene from isobutane

HP-PLOT Al₂O₃ M

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	50	8.00	-60 to 200	19091P-M15	19091P-M15E	
0.53	30	15.00	-60 to 200	19095P-M23		19095P-M23LTM
	50	15.00	-60 to 200	19095P-M25		

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 CO₂ on a single column
- Ideal PLOT column for GC/MS – no particles

GS-GasPro Chromatograms

Environmental

C1 and C2 Halocarbons (Freons)	Page 614
--------------------------------	----------

Industrial Chemicals

Halocarbons	Page 667
Halothane	Page 668
Inorganic Gases	Page 669

Petroleum

Extended Hydrocarbon Analysis II	Page 693
Mercaptans	Page 697
Sulfur Compounds in Propylene (1 ppm)	Page 697
Sulfur Gas Analysis in Light Hydrocarbon Streams I	Page 695

GS-GasPro

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage
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

CP-SilicaPLOT

- No influence of water on retention times for robust methodology
- Elution of CO₂ and sulfur gases at ppm levels for improved productivity
- Separates cyclopropane from propylene for accurate results

CP-SilicaPLOT brings the benefits of capillary PLOT columns (higher efficiency and faster analysis time) to many applications that previously could only be done by packed columns. It is ideal for COS in ethylene, freons/CFCs, hydrocarbons, propylene and sulfur gases. The column offers high selectivity of C₁ to C₄ isomers in the presence of water, with water having no influence on retention times. CP-SilicaPLOT elutes CO₂ and sulfur gases at ppm levels and separates cyclopropane from propylene. Decomposition of pentadienes or CFCs is absent.

CP-SilicaPLOT Chromatograms

Environmental

Halogenated hydrocarbons C1 to C2

Page 610

CP-SilicaPLOT

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	30	3.00	-80 to 225/225	CP8564	
	60	3.00	-80 to 225/225	CP8565	
0.32	10	4.00	-80 to 225/225	CP8574	
	15	4.00	-80 to 225/225	CP8566	CP856615
	30	4.00	-80 to 225/225	CP8567	CP856715
	60	4.00	-80 to 225/225	CP8568	CP856815
0.53	30	6.00	-80 to 225/225	CP8570	CP857015
	60	6.00	-80 to 225/225	CP8571	

CP-CarboBOND and CP-CarboPLOT P7

- Single column solution for ASTM D 2505 for higher productivity
- Stable and robust for high repeatability of results
- Available in bonded and PLOT versions for improved versatility and enhanced productivity

These carbon-based PLOT columns offer a simplified solution for ASTM D 2505, which describes the measurement of ppm CO and CO₂ in ethylene and propylene streams. Compared to a multi-packed column system, the analysis is performed on a single column, providing higher sample throughputs and reduced system maintenance.

CP-CarboBOND

For hydrocarbons in ethylene and trace gases in ethylene and propylene, He, Xe, CO, Ne, CH₄, CO₂, O₂/Ar, N₂, Kr, and hydrocarbons C₂ and C₃ (ASTM D 2505). The bonded CP-CarboBOND offers significant improvement in column stability with a maximum temperature of 300°C, reducing cycle times by speeding up the elution of high boiling contaminants. Retention times are repeatable because water has no influence on retention. High stability makes this bonded PLOT column equally suited for both laboratory and online applications.

CP-CarboBOND

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	25	5.00	-100 to 200/300	CP7371
		10.00	-100 to 200/300	CP7374
	50	5.00	-100 to 200/300	CP7372
		10.00	-100 to 200/300	CP7375

CP-CarboPLOT P7

For the separation of N₂, O₂, CO, CO₂, He, Xe, Ne, CH₄, O₂/Ar, Kr and C₁ to C₂ hydrocarbons, such as C₂H₆, C₂H₄, C₂H₂. CP-CarboPLOT is recommended in cases where air or oxygen are present. The high separation efficiency of the column is revealed in the separation of CO from nitrogen peak, allowing CO to be determined at ppm levels. Because the CP-CarboPLOT P7 column exhibits a specific retention for CO and CO₂, it is possible to analyze both compounds in one run in the presence of air.

CP-CarboPLOT P7

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	10	25.00	-200 to 115/115	CP7513
	25	25.00	-200 to 115/115	CP7514

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

GS-CarbonPLOT Chromatograms

Environmental

N2O III

Page 615

GS-CarbonPLOT

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.32	15	1.50	0 to 360	113-3112	113-3112LTM
	30	1.50	0 to 360	113-3132	113-3132LTM
		3.00	0 to 360	113-3133	113-3133LTM
	60	1.50	0 to 360	113-3162	
0.53	15	3.00	0 to 360	115-3113	115-3113LTM
	30	3.00	0 to 360	115-3133	115-3133LTM

HP-PLOT Molesieve

- A PLOT column for the analysis of permanent gases
- O₂, N₂, CO and CH₄ 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/O₂ 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 Chromatograms

Environmental

N20 II Page 615

Petroleum

Noble Gases Page 686

Permanent Gases Page 687

HP-PLOT Molesieve

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	15	25.00	-60 to 300	19091P-MS7		19091P-MS7LTM
		30	-60 to 300	19091P-MS4	19091P-MS4E	19091P-MS4LTM
		25.00	-60 to 300	19091P-MS8		19091P-MS8LTM
0.53	15	25.00	-60 to 300	19095P-MS5		19095P-MS5LTM
		50.00	-60 to 300	19095P-MS9		19095P-MS9LTM
	30	25.00	-60 to 300	19095P-MS6	19095P-MS6E	19095P-MS6LTM
		50.00	-60 to 300	19095P-MS0	19095P-MS0E	19095P-MS0LTM

CP-Molsieve 5Å

- Separate argon and oxygen at ambient temperature to reduce costs
- High efficiency for increased productivity
- Symmetrical peaks for accurate results

This molecular-sieve coated capillary column is especially valuable when separating permanent gases. Analysis times are reduced by up to 75% compared to packed columns. On the CP-Molsieve 5Å, baseline separation of Ar/O₂ is achieved at ambient temperatures. The column's thin layer dimensions produce fast elution of CO with symmetrical peaks. High resolution analysis of permanent gases is assured.

CP-Molsieve 5Å Chromatograms

Environmental

Permanent gases on a thick film Molsieve column

Page 616

CP-Molsieve 5Å

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	30.00	-200 to 350/350	CP7533	
0.32	10	30.00	-200 to 350/350	CP7535	CP753515
	25	30.00	-200 to 350/350	CP7536	CP753615
	30	10.00	-200 to 350/350	CP7534	CP753415
	50	30.00	-200 to 350/350	CP7540	CP754015
0.53	10	50.00	-200 to 350/350	CP7537	
	15	15.00	-200 to 350/350	CP7543	
	25	50.00	-200 to 350/350	CP7538	CP753815
	30	15.00	-200 to 350/350	CP7544	CP754415
	50	50.00	-200 to 350/350	CP7539	

CP-Molsieve 5Å UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	50.00	-200 to 350/350	CP6937	CP693715
	25	50.00	-200 to 350/350	CP6938	CP693815

CP-PoraPLOT Amines

- Guaranteed performance for volatile amines providing ease-of-use
- Very high efficiency at temperatures above ambient for lower cost per analysis
- High sensitivity for amines and ammonia for accurate results

CP-PoraPLOT Amines is a unique column specially designed for the high retention analysis of very volatile amines.

CP-PoraPLOT Amines

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	25	10.00	-100 to 220/220	CP7591	CP759115
0.53	25	20.00	-100 to 220/220	CP7594	

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

Particle Traps for PoraPLOT Columns

ID (mm)	Length (m)	Material	Part No.
0.32	2.5	Fused Silica	CP4016
0.53	2.5	Fused Silica	CP4017
0.53	2.5	UltiMetal	CP4018*

*Includes CP-UltiMetal connector

Particle Trap Connectors for PoraPLOT Columns

ID (mm)	Material	Unit	Part No.
0.25/0.32	Fused Silica	10/pk	CP4788
0.53	Fused Silica	10/pk	CP4789
0.25	UltiMetal	5/pk	CP4795
0.53	UltiMetal	5/pk	CP4796

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.



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 P/N 160-BD65-5 (5 m 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)	7 in. Cage
Biodiesel ASTM D6584 Free/Total Glycerin	0.32	15	0.10	-60 to 400	123-BD11
Biodiesel EN14105 Free/Total Glycerin	0.32	10	0.10	-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	1.80	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 method D6584	5190-1407
Biodiesel D6584 kit 2 internal standard solutions, 1 mL, 5/µg 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

Select Biodiesel

- Complete set of biodiesel columns for full compliance and ease-of-use
- UltiMetal technology provides high accuracy and longevity
- Designed and pre-tested for complete confidence in results

Select Biodiesel columns address the key challenge of good column lifetime when operating at very high temperatures up to 400°C. Although traditional fused silica can be used, high temperatures often mean shortened column lifetimes. By using an UltiMetal column with an ultra-stable stationary phase, results are more consistent and column breakage is a thing of the past.

Select Biodiesel columns are offered with a pre-coupled retention gap that is leak tested prior to shipment, making life much easier for the operator. This short piece of tubing not only enhances the analytical separation but also dramatically simplifies automation when using the column with a column inlet as specified in the standard methods.

Technical Specifications

Method	Analytes	Column	Injector Type	Analysis Time (min)
ASTM D 6584	Free and total glycerine	Select Biodiesel for Glycerides	On-column	32
EN14103	Ester and linoleic acid methyl esters	Select Biodiesel for FAME	Split/splitless	30
EN14105	Free and total glycerine; mono, di- and tri-glycerides	Select Biodiesel for Glycerides	On-column	35
EN14106	Free glycerol	Select Biodiesel for Glycerides	Split/splitless	10
EN14110	Methanol	Select Biodiesel for Methanol	Headspace with split/splitless	10

Select Biodiesel

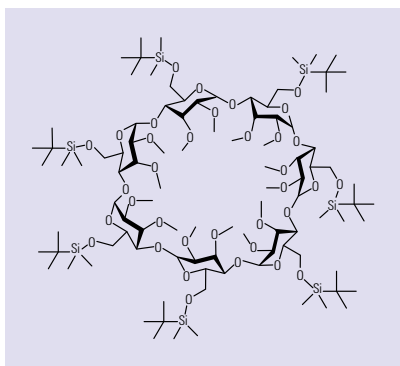
Description	ID (mm)	Length (m)	Film (µm)	7 in. Cage
For glycerides, UltiMetal, with retention gap	0.32	15	0.10	CP9078
For glycerides, UltiMetal	0.32	15	0.10	CP9079
For glycerides, UltiMetal, with retention gap	0.32	10	0.10	CP9076
For glycerides, UltiMetal	0.32	10	0.10	CP9077
For FAME, fused silica	0.32	30	0.25	CP9080
For Methanol, fused silica	0.32	30	3.00	CP9083
UltiMetal retention gap, methyl deactivated	0.53	2		CP6530

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



Structure of CycloSil-B

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.

CycloSil-B Chromatograms

Food, Flavors and Fragrances

Citrus Flavored Carbonated Beverage (Soda)	Page 628
Rosemary Oil	Page 627

CycloSil-B

ID (mm)	Length (m)	Film (μ m)	Temp Limits ($^{\circ}$ C)	7 in. Cage	7890/6890 LTM Module
0.25	30	0.25	35 to 260/280	112-6632	112-6632LTM
0.32	30	0.25	35 to 260/280	113-6632	113-6632LTM

Cyclodex-B

- 10.5% β -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.

Cyclodex-B Chromatograms

Food, Flavors and Fragrances

Menthol

Page 624

Cyclodex-B

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	30	0.25	50 to 230/250	112-2532	112-2532E	112-2532LTM
	60	0.25	50 to 230/250	112-2562		
0.32	30	0.25	50 to 230/250	113-2532	113-2532E	113-2532LTM

HP-Chiral β

- β -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 β -cyclodextrin: 10% and 20%
- 20% β -cyclodextrin best choice for initial screening

HP-Chiral β Chromatograms

Food, Flavors and Fragrances

Chiral Compounds in Essential Oils and Fragrances

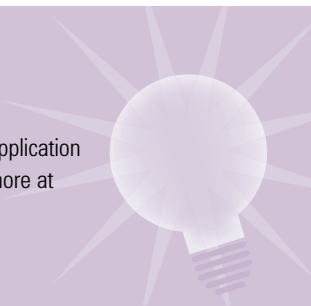
Page 623

HP-Chiral β

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
HP-Chiral 10β					
0.25	30	0.25	30 to 240/250	19091G-B133	
0.32	30	0.25	30 to 240/250	19091G-B113	
HP-Chiral 20β					
0.25	30	0.25	30 to 240/250	19091G-B233	19091G-B233E
0.32	30	0.25	30 to 240/250	19091G-B213	19091G-B213E

Tips & Tools

View up-to-date educational resources such as posters, Application Notes, training tools, seminars, product information and more at www.agilent.com/chem/mygccolumns



CP-Chirasil-Dex CB

- High resolution across a broad application range
- Chemically-bonded phase for excellent longevity
- No need for derivatization improves productivity

The CP-Chirasil-Dex CB phase consists of cyclodextrin directly bonded to dimethylpolysiloxane. This bond prevents the cyclodextrin from migrating to different locations in the surface film, delivering homogeneous enantioselectivity throughout the phase. This provides the highest resolution factor between isomers.

It also guarantees stability of enantioselectivity. As a result, the lifetime of β -cyclodextrin capillary columns is significantly improved. CP-Chirasil-Dex CB permits low elution temperatures of polar compounds and is suitable for all injection techniques.

CP-Chirasil-Dex CB Chromatograms

Industrial Chemicals

High resolution separation of xylene isomers

Page 668

CP-Chirasil-Dex CB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	25	0.25	200/200	CP7502	CP7502I5
0.32	25	0.25	200/200	CP7503	CP7503I5

CP-Chirasil Val

- Both antipode phases available (D and L) for maximum versatility
- Stabilized phase, over 50% cross-linked for great longevity
- Specially designed and tested for amino acid enantiomers for the ultimate in reliable data

The CP-Chirasil Val columns are designed for the separation of optically active compounds, especially amino acids. They have lower bleed levels than other phases with a T_{max} of 200°C, isothermally and programmed. Both antipodes of the phase are available. On Chirasil-L-Val, D-amino acids elute before the L-amino acids, while on Chirasil-D-Val this elution order is reversed. This is especially valuable when determining the optical purity of compounds. Selecting the column from which the minor component elutes before the major enantiomer results in the lowest detection levels.

CP-Chirasil Val

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.08	200/200	CP7494	CP7494I5
0.25	25	0.12	200/200	CP7495	CP7495I5

CP-Cyclodextrin-β-2,3,6-M-19

- Unique selectivity for isomer separation with ease-of-use
- High inertness delivers accurate results
- High efficiency for a broad application area

The CP-Cyclodextrin-β-2,3,6-M-19 column separates many optical isomers that could not be analyzed previously. Due to its selectivity, o-, m- and p-xylenes can now be separated. The column is also useful for non-chiral compounds. CP-Cyclodextrin-β-2,3,6-M-19 has a very high inertness, enabling separation of underivatized polar compounds.

CP-Cyclodextrin-β-2,3,6-M-19

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.25	225/250	CP7500	CP7500I5
0.32	50	0.25	225/250	CP7501	



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

Select FAME

- Long lifetime due to high polarity 100% bonded phase
- Low bleed provides more sensitivity for better detection limits
- Better separation due to high efficiency and loadability for more accurate results

The Select FAME column is tuned for optimal cis-trans separations of FAMEs, especially C18 isomers. The bonded column has an isothermal maximum operation temperature of 275°C and a programmed temperature of 290°C – a dramatic improvement of 50°C compared to non-bonded columns. Select FAME has better detection limits because the column has a very low bleed level. Even though this is a very polar column, the column efficiency is extremely high. Columns up to 200 m are available for detailed analysis of the C18:1 isomer cluster. The Select FAME column also offers three times greater loadability, further improving the shape and separation for FAME isomers – especially if one component is present at a higher concentration.

Select FAME Chromatograms

Food, Flavors and Fragrances

Separation of cis-trans FAME isomers

Page 634

Select FAME

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	275/290	CP7419	CP7419I5
	100	275/290	CP7420	CP7420I5
	200	275/290	CP7421	

CP-Sil 88 for FAME

- Guaranteed analysis of FAME cis-trans isomers for complete confidence
- High polarity stationary phase providing more efficiency and higher productivity
- Use for FAME in the C₆ to C₂₆ range

CP-Sil 88 for FAME

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	50	0.20	225/240	CP7488
	60	0.20	225/240	CP7487
	100	0.20	225/240	CP7489

CP-Carbowax 400 for Volatiles in Alcohol

- Highest resolution for amyl alcohols for accurate quality inspection
- High plate number, even at 0°C, for reliable analysis of the most volatile compounds
- Specially designed and tested for this application, ensuring ease-of-use

This column is guaranteed for the analysis of volatiles in alcoholic beverages and offers the highest resolution for amyl alcohols, to verify possible falsification.

CP-Carbowax 400 for Volatiles in Alcohol

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	50	0.20	60/80	CP7527	CP752715

CP-TAP CB for Triglycerides

- Guaranteed detailed analysis of triglycerides for complete confidence
- Complete triglyceride pattern in about 15 min improves productivity
- Stabilized phase and special fused silica for enhanced longevity at higher temperatures

The resolution of this column depends not only on carbon number – a more refined separation is produced according to the degree of unsaturation. The chemically-bonded phase exhibits low bleed and provides longer column lifetimes. CP-TAP CB is available in special Fused Silica for maximum column strength at temperatures up to 370°C, or UltiMetal capillary for the ultimate robustness.

CP-TAP CB for Triglycerides

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.10	350/360	CP7483

CP-TAP CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.10	355/370	CP7463

CP-FFAP CB

- Separates C₂ to C₂₄ acids in one run without derivatization, saving time
- Water and solvent resistant for long lifetimes
- Chemically-bonded for excellent longevity

CP-FFAP CB is ideal for flavors, aromas and free fatty acids C₁ to C₂₆.

CP-FFAP CB

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	0.25	250/275	CP7686	CP7686I5
0.32	25	0.30	250/275	CP7485	CP7485I5
0.53	25	1.00	250/275	CP7486	CP7486I5

CP-Wax 57 CB for Glycols and Alcohols

- Guaranteed analysis for complete confidence
- Symmetrical peaks providing the most accurate results
- Extensive cross-linking delivers robustness and enhanced column lifetime

CP-Wax 57 CB for Glycols and Alcohols is guaranteed for the analysis of glycols, diols and alcohols. It has a unique, high polarity wax phase that produces symmetrical peaks.

CP-Wax 57 CB for Glycols and Alcohols

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	0.25	200/200	CP7615	CP7615I5
0.53	25	0.50	225/250	CP7617	CP7617I5



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

DB-1ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890	5975T
						LTM Module	LTM Toroid
0.25	15	0.10	-60 to 400	122-1111	122-1111E	122-1111LTM	222-1111LTM
	30	0.10	-60 to 400	122-1131		122-1131LTM	222-1131LTM
0.32	15	0.10	-60 to 400	123-1111		123-1111LTM	
	30	0.10	-60 to 400	123-1131	123-1131E	123-1131LTM	
0.53	30	0.17	-60 to 400	125-1131			

DB-5ht

- (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

DB-5ht Chromatograms

Food, Flavors and Fragrances

Butter Triglycerides I

Page 638

DB-5ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.25	15	0.10	-60 to 400	122-5711	122-5711E	122-5711LTM	222-5711LTM
	30	0.10	-60 to 400	122-5731		122-5731LTM	222-5731LTM
0.32	10	0.10	-60 to 400	123-5701		123-5701LTM	
	15	0.10	-60 to 400	123-5711	123-5711E	123-5711LTM	
	30	0.10	-60 to 400	123-5731	123-5731E	123-5731LTM	



VF-5ht and VF-5ht UltiMetal

- High molecular weight selectivity extends the range of applications
- Enhanced stability improves column longevity and reduces downtime
- Superior detector performance gives you better detection limits and greater accuracy

The VF-5ht improves the analysis of high boiling compounds by exhibiting low bleed, even at high temperatures. Based on ultra-low bleed FactorFour technology, VF-5ht provides unmatched selectivity, sensitivity, and accuracy for the analysis of high-molecular weight compounds.

VF-5ht is a stabilized equivalent of 5% phenyl methyl dimethylpolysiloxane, offering the same polarity as a VF-5ms. The difference is that it can be operated above 350°C yet still offers a low bleed level (bleed specification of a 30 m x 0.25 mm column is <5 pA at 400°C). This enables better separation of high-boiling mixtures. VF-5ht is well suited to the separation of non-polar to mid-polar compounds.

UltiMetal technology renders the stainless steel inert and enhances the bonding of the stationary phase. The result is long column lifetime with excellent peak shape and low column bleed for the best detection limits at high temperatures, and the lowest cost per analysis.

VF-5ht Chromatograms

Petroleum

Diesel analysis

Page 706

VF-5ht

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	15	0.10	-60 to 400/400	CP9045
	30	0.10	-60 to 400/400	CP9046
0.32	10	0.10	-60 to 400/400	CP9044
	15	0.10	-60 to 400/400	CP9047
	30	0.10	-60 to 400/400	CP9048

VF-5ht UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	15	0.10	-60 to 430/450	CP9090	
		0.10	-60 to 430/450	CP9091*	
	30	0.10	-60 to 430/450	CP9092	CP909215
		0.10	-60 to 430/450	CP9093*	
0.32	15	0.10	-60 to 430/450	CP9094	CP909415
		0.10	-60 to 430/450	CP9095*	
	30	0.10	-60 to 430/450	CP9096	
		0.10	-60 to 430/450	CP9097*	

*Retention gap 2 x 0.53 mm ID

DB-17ht

- (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

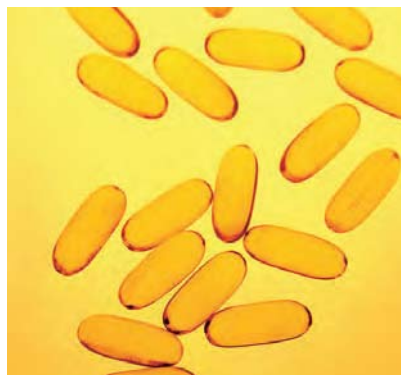
DB-17ht Chromatograms**Food, Flavors and Fragrances**

Butter Triglycerides II

Page 638

DB-17ht

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	5	0.15	40 to 340/365	122-1801		122-1801LTM
	15	0.15	40 to 340/365	122-1811		122-1811LTM
	30	0.15	40 to 340/365	122-1831		122-1831LTM
0.32	15	0.15	40 to 340/365	123-1811		123-1811LTM
	30	0.15	40 to 340/365	123-1831	123-1831E	123-1831LTM
	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

- 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

DB-ALC1 and DB-ALC2 Chromatograms

Life Sciences

Blood Alcohols I (Static Headspace/Split)	Page 682
Blood Alcohols II (Static Headspace/Split)	Page 682
Blood Pollutants I	Page 683
Blood Pollutants II	Page 683

DB-ALC1 and DB-ALC2

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
DB-ALC1						
0.32	30	1.80	20 to 260/280	123-9134		123-9134LTM
0.53	30	3.00	20 to 260/280	125-9134	125-9134E	125-9134LTM
DB-ALC2						
0.32	30	1.20	20 to 260/280	123-9234	123-9234E	123-9234LTM
0.53	30	2.00	20 to 260/280	125-9234		125-9234LTM

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 ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.32	7.5	2.00	-60 to 270/290	19091S-510	19091S-510E	19091S-510LTM

DB-5ms EVDX

- Specially configured and tested for drugs of abuse confirmation
- Drug test mix included: caffeine, glutethimide, lidocaine, phenobarbital, EDDP, methaqualone, methadone, cocaine, desipramine, 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-5ms EVDX Chromatograms

Life Sciences

Anesthetics	Page 675
Sedative Hypnotics	Page 679

DB-5ms EVDX

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
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

HP-Fast Residual Solvent

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.53	30	1.00	-20 to 260	19095V-420	19095V-420E	19095V-420LTM

VF-DA

- Cross-linked and bonded to extend column lifetime
- Minimal bleed to improve detection limits and productivity
- High recovery of trace components to deliver accurate results

VF-DA is a unique, guaranteed low bleed FactorFour GC column for drugs of abuse confirmation testing. The VF-DA column has high recovery for trace components and excellent resistance to direct methanol injections. Drugs of abuse are measured in a variety of matrices. In urine, most general screenings are performed using full-scan GC/MS (EI). Since column bleeding can negatively influence detection limits in full scan mode, the exceptionally low bleed of VF-DA columns is critically important. As column bleed is minimized, all the benefits of low bleed are provided; reduced detection limits, improved accuracy and a cleaner detector.

VF-DA Chromatograms

Life Sciences

Analysis of drugs of abuse in urine via GC/MS

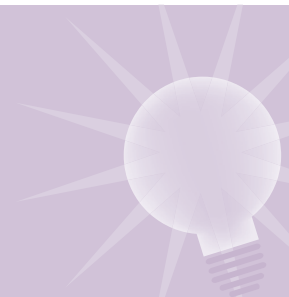
Page 674

VF-DA

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.20	12	Optimized	-60 to 325/350	CP8964

Tech Support

Need assistance selecting a column for your method?
 Contact our chromatography technical specialists at
www.agilent.com/chem/TechRep





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 ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

HP-PAS5

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890	
					LTM Module	
0.32	25	0.52	-60 to 325/350	19091S-010	19091S-010LTM	

DB-1701P

- Low/mid-polarity
- Exact replacement of HP-PAS1701
- Specifically designed and processed for the analysis of organochlorine pesticides
- ECD tested to ensure minimal pesticide breakdown and low ECD bleed
- Bonded and cross-linked
- Solvent rinsable

DB-1701P

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890	
						LTM Module	
0.25	30	0.25	-20 to 280/300	122-7732	122-7732LTM		
0.32	25	0.25	-20 to 280/300	123-7722	123-7722LTM		
	30	0.25	-20 to 280/300	123-7732	123-7732E	123-7732LTM	
0.53	30	1.00	-20 to 260/280	125-7732	125-7732LTM		

DB-608

- 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

DB-608 Chromatograms

Environmental

Organochlorine Pesticides II

Page 579

DB-608

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	0.18	40 to 280/300	121-6822	121-6822LTM	221-6822LTM
0.25	30	0.25	40 to 280/300	122-6832	122-6832LTM	
0.32	30	0.50	40 to 280/300	123-1730	123-1730LTM	
0.45	30	0.70	40 to 260/280	124-1730	124-1730LTM	
0.53	15	0.83	40 to 260/280	125-1710	125-1710LTM	
	30	0.50	40 to 260/280	125-6837	125-6837LTM	
		0.83	40 to 260/280	125-1730	125-1730LTM	



VF-5 Pesticides and VF-1701 Pesticides

- Tested with key pesticides for improved efficiency
- Highly inert for enhanced detection
- Proven performance with ECD and MS detection for maximum productivity

These columns are specially designed for the determination of trace levels of pesticide residue. Every column is individually tested before shipment with key pesticides, including endrin and aldrin, ensuring optimal performance and consistency of results. The columns are highly inert for trace pesticide determination, and therefore provide better detection limits. Analyses at extremely low concentrations are easy, regardless of whether your method specifies ECD or MS detection. VF-Pesticides columns benefit from ultra low bleed FactorFour technology to improve sensitivity. VF-1701 Pesticides deliver up to 8 times lower bleed than other columns used for pesticide analysis.

VF-1701 Pesticides Chromatograms

Environmental

EPA 625 halogenated pesticides

Page 587

VF-5 Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	0.25	-60 to 325/350	CP9074
	50	0.25	-60 to 325/350	CP9073
0.32	30	0.25	-60 to 325/350	CP9075

VF-1701 Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	30	0.25	-20 to 280/300	CP9070
	50	0.25	-20 to 280/300	CP9072
0.32	30	0.25	-20 to 280/300	CP9071

Rapid-MS

- Fast analysis improves productivity
- High loadability for better detection limits
- Easy installation enhances efficiency

Rapid-MS columns reduce analysis duration by 3 to 5 times for temperature programmed, and up to 10 times for isothermal runs. The film thickness from 0.1 μm to 1 μm ensures high loadability and the higher sensitivity typically increases the signal-to-noise ratio by a factor of three or greater.

Rapid-MS columns utilize the high optimal carrier gas velocity obtained when a separation is performed under reduced pressure to reduce analysis times. The low bleed VF-5ms stationary phase is equivalent to a 5% phenyl, 95% dimethylpolysiloxane phase. Rapid-MS requires no changes to your injector procedures or MS methods. Installation is easy, standard fittings and ferrules can be used, and no special skills are required.

Rapid-MS Chromatograms

Food, Flavors and Fragrances

Fast analysis of lemon oil using Rapid-MS

Page 624

Rapid-MS

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.53	10	0.12	-60 to 325/325	CP8131
		0.25	-60 to 325/325	CP8132
		0.50	-60 to 325/325	CP8133
		1.0	-60 to 325/325	CP8134

Restriction for Rapid-MS

Description	Part No.
Restriction for Rapid-MS, fused silica, 0.1 mm ID, 0.6 m, 5/pk	CP8121

CP-Sil 8 CB for Pesticides

- Linear column response down to femtogram levels improves productivity
- Maximum inertness – tested with DDTs to provide very reliable data
- Can be used with on-column injection techniques for best detection limits

CP-Sil 8 CB delivers a linear column response down to femtogram levels. The column is supplied with a retention gap to avoid problems with solvent condensation, thus allowing repeated splitless injections without phase deterioration. In addition, because of the integrated retention gap, there is no leakage from coupling devices, thereby considerably extending column life.

CP-Sil 8 CB for Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.12	300/325	CP7481
0.53	50	0.25	300/325	CP7504

CP-Sil 19 CB for Pesticides

- Ideal as a confirmation column for reliable results
- Specified for EPA and CLP analytes for ultimate compliance
- Supplied with a coupled retention gap for on-column injection for best detection limits

CP-Sil 19 CB for Pesticides

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	30	0.25	275/300	CP7406	
	50	0.20	275/300	CP7407	CP740715
0.32	30	0.25	275/300	CP7408	
0.53	30	1.00	260/275	CP7409	

Polycyclic Aromatic Hydrocarbons (PAH) Columns

DB-EUPAH

Polycyclic aromatic hydrocarbons (PAHs) are chemical compounds consisting of fused aromatic rings formed during the incomplete combustion of organic materials. The European Commission (EU) recommends the monitoring of 16 PAHs possessing both genotoxic and carcinogenic properties. Agilent J&W DB-EUPAH capillary GC columns are purposely designed, application optimized and tested to provide the most optimal performance for all EU regulated PAHs.

- Specially designed for analysis of EU regulated PAHs
- Individually tested with application-specific QC test probe mixture
- Great resolution of critical isomers, e.g. benzo(b,j,k)fluoranthenes
- Superb thermal stability for accurate analysis of high boiling PAHs, e.g. dibenzopyrenes
- Excellent signal-to-noise ratio
- Optimized column dimensions for proven performance

DB-EUPAH Chromatograms

Environmental

15+1 EU Priority PAHs

Page 568

DB-EUPAH

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.18	20	0.14	40 to 320/340	121-9627
0.25	60	0.25	40 to 320/340	122-96L2
0.32	15	0.25	40 to 320/340	123-9612

Select PAH

- No time wasted on false positives
- Fast results with no need for further analysis
- Low bleed reduces maintenance time and enhances sensitivity

Select PAH is the first capillary column that provides a single solution for PAH analysis by separating all the isomers, thereby avoiding false positives and inaccurate results. It provides easy, fast, and accurate quantification of PAHs in environmental and food samples by resolving PAH isomers. Select PAH provides full separations of EPA PAHs in less than 7 minutes and EU PAHs in less than 30 minutes, including separation of chrysene, triphenylene, and benzofluoranthene (type b, j and k), with no need for additional analysis.

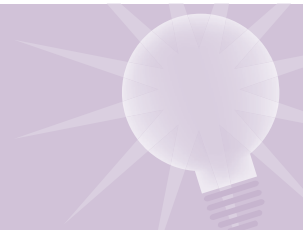
Its one-shot technology saves money on capital investment and cost per analysis, and increases productivity. In addition, the low column bleed of Select PAH reduces the requirement for MS maintenance and enhances sensitivity.

Select PAH

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.15	15	0.10	40 to 325/350	CP7461
0.25	30	0.15	40 to 325/350	CP7462

Tips & Tools

Find all the tools you need for column installation in Agilent's Column Installation Kit, P/N 430-2000.



CP-Sil PAH CB UltiMetal

- High temperature, low bleed phase for extended lifetime
- Virtually unbreakable, inert UltiMetal capillary column, reducing replacement costs
- Maximum temperature of 400/425°C for enhanced productivity

The UltiMetal CP-Sil PAH CB column combines the advantages of a highly thermo-stable stationary phase with UltiMetal as the column material. This unique column can separate all 16 PAHs according to EPA Method 610. It may also be used for fingerprint analysis and pattern recognition of complex hydrocarbon mixtures.

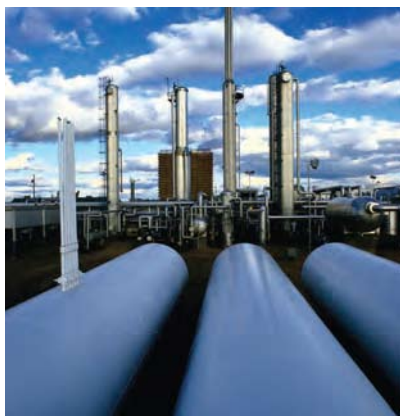
CP-Sil PAH CB UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	25	0.12	400/425	CP7440

VF-17ms for PAH

VF-17ms for PAH

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.15	15	0.05	-40 to 290/320	CP9009



Petroleum Columns

Petroleum applications vary greatly in character. From 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.

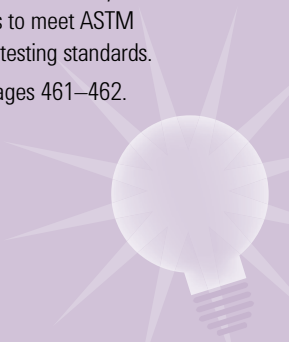
Recommended Columns for Petroleum

- DB-HT SimDis for Simulated Distillation
- HP-PONA, DB-5 or HP-1 for PONA and PIANO analysis

Tips & Tools

Agilent offers a complete line of columns designed and application optimized for the analysis of biodiesels to meet ASTM and CEN testing standards.

Turn to pages 461–462.



DB-2887

- 100% Dimethylpolysiloxane
- Specifically designed for simulated distillation using ASTM Method D 2887
- Rapid conditioning, fast run time and low bleed when compared to packed columns
- Bonded and cross-linked
- Solvent rinsable

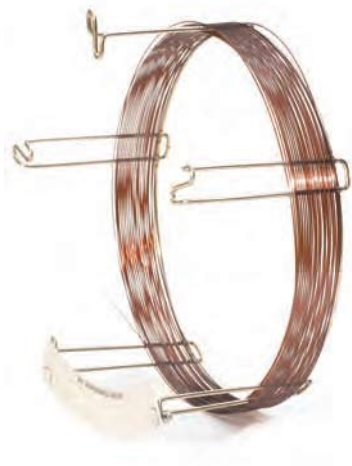
DB-2887 Chromatograms

Petroleum

Reference Gas Oil	Page 703
Simulated Distillation	Page 703

DB-2887

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.53	10	3.00	-60 to 350	125-2814	125-2814E	125-2814LTM



DB-HT SimDis

- 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

DB-HT SimDis Chromatograms

Petroleum

n-Paraffin Standard

Page 705

DB-HT SimDis

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.53	5	0.10	-60 to 400/430	145-1009
		0.15	-60 to 400/430	145-1001

CP-SimDist

- Conforms to ASTM Method D 2887 to provide full compliancy
- High temperature stationary phase for extended column lifetime
- Low bleed makes quantitation easier

CP-SimDist Fused Silica columns are guaranteed for simulated distillation up to C₁₀₀. These columns are low bleed, typically only 4-5 pA at 400°C. The high temperature stationary phase and polyimide coating extend column lifetime.

CP-SimDist

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	10	0.10	375/400	CP7521	
0.53	5	0.17	375/400	CP7522	CP752215
	10	0.10	375/400	CP7541	

CP-SimDist UltiMetal

- Conforms to ASTM D 2887 and the extended D 2887 method for compliance
- Lower bleed rate than Fused Silica, best column lifetime and accurate results
- Extended analysis to C120, with maximum temperature of 450°C
- UltiMetal tubing for extreme durability

The internal diameter of UltiMetal tubing is the same as for Fused Silica 0.53 mm ID (wide bore) columns, providing trouble-free automation of on-column injection. Retention time repeatability is better than that of any other high temperature column, due to the special deactivation applied to the UltiMetal surface.

CP-SimDist UltiMetal

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.53	5	0.09	450/450	CP7569	CP7569I5
		0.17	450/450	CP7532	CP7532I5
		0.88	450/450	CP7570	
		2.65	400/400	CP7571	
	10	0.17	450/450	CP7542	CP7542I5
			0.06	450/450	CP6540
		0.53	450/450	CP7592	
			0.88	450/450	CP7512
		1.20	450/450	CP7562	
			2.65	400/400	CP7582
		5.00	400/400	CP7572	
		20	0.11	450/450	CP7593
	25	0.06	450/450	CP6550	
	50	0.06	450/450	CP6560	

HP-PONA

- 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

Note: 100 psi regulator required to reach optimum carrier gas velocity

HP-PONA Chromatograms

Petroleum

Sulfur Compounds in Naphtha

Page 698

HP-PONA

Description	ID (mm)	Length		Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
		(m)					
HP-PONA	0.20	50		0.50	-60 to 325/350	19091S-001	19091S-001E
HP-1	0.20	50		0.50	-60 to 325/350	19091Z-205	19091Z-205E
HP-1	0.25	100		0.50	-60 to 325/350	19091Z-530	19091Z-530E

CP-Sil PONA CB

- Guaranteed hydrocarbon analysis for ultimate reliability
- Inert to polar compounds for highly accurate data
- Excellent reproducibility increases productivity

CP-Sil PONA CB delivers accurate analysis of paraffins, olefins, naphthalenes and aromatics in complex hydrocarbon mixtures. The column delivers guaranteed hydrocarbon analysis according to ASTM (DHA method).

CP-Sil PONA CB Chromatograms

Petroleum

Gasoline unleaded ASTM D 5769

Page 705

CP-Sil PONA CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.21	50	0.50	250/275	CP7531	CP753115
0.25	100	0.50	250/275	CP7530	CP753015

CP-Sil PONA for ASTM D 5134

- Guaranteed PONA analysis to ASTM D 5134 for ultimate reliability
- Exact dimensions as specified in the ASTM method for complete compliance
- Inert to polar additives for excellent data quality

CP-Sil PONA for ASTM D 5134 Chromatograms

Petroleum

Petroleum naphthas through n-nonane

Page 709

CP-Sil PONA for ASTM D 5134

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.21	50	0.50	250/275	CP7531

DB-Petro

- 100% Dimethylpolysiloxane
- Configured for the analysis of petroleum process products
- PONA, PIANO
- High resolution
- Bonded and cross-linked
- Solvent rinsable

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Petro Chromatograms

Petroleum

Regular Unleaded Gasoline (California Phase 1) – "Normal" GC Run I	Page 704
Unleaded Gasoline	Page 701
PONA Mix	Page 702

DB-Petro

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.20	50	0.50	-60 to 325/350	122-10A6E	
0.25	100	0.50	-60 to 325/350	122-10A6	122-10A6



HP-1 Aluminum Clad

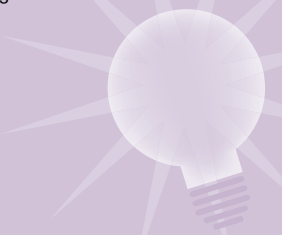


- 100% Dimethylpolysiloxane
- Aluminum clad fused silica tubing
- For high temperature simulated distillation
- Bonded and cross-linked
- Solvent rinsable

Tips & Tools

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

Turn to pages 268–270.



HP-1 Aluminum Clad

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.53	5	0.09	0 to 350/450	19095S-205
	10	0.09	0 to 350/450	19095S-200

Select Al₂O₃ MAPD

- Two-fold improvement of sensitivity for MAPD decreases detection limits
- Faster run times improve operating efficiency
- Improved responses from polar hydrocarbons for better data accuracy

The Select Al₂O₃ MAPD is an aluminum oxide PLOT column for the analysis of reactive hydrocarbons and is especially targeted towards the response for methyl acetylene and propadiene (MAPD). The column is stable up to 200°C for hydrocarbons up to C₁₀. With Select Al₂O₃ MAPD, the adsorption and non-stable response for reactive (polar) hydrocarbons is greatly improved. Select Al₂O₃ MAPD delivers up to a two-fold higher response for MAPD, especially important when running an impurity analysis.

Select Al₂O₃ MAPD Chromatograms

Industrial Chemicals

Analysis of acetylenes mixture

Page 670

Select Al₂O₃ MAPD

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage
0.32	50	-100 to 200/200	CP7431
0.53	25	-100 to 200/200	CP7433
	50	-100 to 200/200	CP7432

CP-TCEP for Alcohols in Gasoline

- Guaranteed analysis of alcohols in gasoline
- Perfect peak shape for accurate separations of alcohols
- High temperature stability to 135°C for high productivity and enhanced longevity

To avoid confusing aliphatic and aromatic fractions, the CP-TCEP column is able to separate benzene after n-dodecane. In addition, the excellent separation power provides the necessary resolution for complex mixtures such as gasoline.

CP-TCEP

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	50	0.40	135/140	CP7525	CP7525I5

CP-Sil 5 CB for Sulfur

- Trace analysis of volatile sulfur compounds to C₇ mercaptan for higher productivity
- Non-polar phase providing accurate results based on volatility
- High inertness, elutes SO₂ for high quality data and low detection limits

CP-Sil 5 CB for Sulfur

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	30	4.00	-60 to 300/325	CP7529	CP7529I5

Select Silanes

- High capacity and retention provide optimized productivity for silane analysis
- Low bleed analysis to ppm levels for best detection limits and most accurate results
- Reduced surface activity provides better peak shape for more reliable data

The Select Silanes column is a stabilized trifluoropropyl-methyl polysiloxane phase optimized for silanes determination. The Select Silanes column has a very thick film, resulting in high capacity and retention for highly volatile silanes. In addition, the low bleed allows the column to perform compositional as well as impurity analyses down to ppm levels, while reducing surface activity so that you get better peak shapes. Typical applications include alkylated chlorosilanes at % levels or impurity analysis. Valve, direct, and split/splitless injections are possible.

Select Silanes

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.32	30	1.80	0 to 270/300	CP7434
	60	1.80	0 to 270/300	CP7435
0.53	60	3.00	0 to 270/300	CP7437

Select Permanent Gases

- Isothermal separation at temperatures >40°C reduces operating costs
- Temperature stability up to 300°C allows short regeneration times and improves efficiency
- One injector, one detector simplifies operation

Select Permanent Gases/CO₂ is a set of two parallel columns that combine CP-Molsieve 5Å for permanent gas analysis and CP-PoraBOND Q for CO₂ analysis. The selection of column dimensions accords with your need for fast separation, lowest level analysis, and quantification of argon/oxygen. The Select Permanent Gases column separates permanent gases and CO₂ in a single run, and columns are coupled, tested, and securely mounted on the EZ-GRIP column mounting system.

The CP7429 Select Permanent Gases/CO₂ column is designed for fast analysis of permanent gases and CO₂. For resolution of the difficult-to-separate argon/oxygen and helium/neon pairs, use CP7430 Select Permanent Gases/HR (High Resolution) column.

Select Permanent Gases Chromatograms

Environmental

Fast analysis of permanent gases and CO₂

Page 616

Select Permanent Gases

ID (mm)	Temp Limits (°C)	7 in. Cage
Select Permanent Gases/CO ₂	300/325	CP7429
Select Permanent Gases/HR	300/325	CP7430

CP-Volamine

- Excellent stability for samples containing water expands the application range
- Maximum temperature of 265°C for enhanced productivity
- Highly inert providing sharp amine peaks for accurate results

CP-Volamine is optimized for the separation of volatile amines. The column is coated with a non-polar stationary phase and produces symmetrical peaks due to MPD (Multi-Purpose Deactivation) technology. CP-Volamine is the most stable column for analyzing volatile amines even when the sample contains high percentages of water.

The CP-Volamine column is the best choice for analyzing volatile amines like MMA, DMA and TMA (monomethyl, dimethyl and trimethyl amine). On this column other components of interest such as alcohols, water, and ammonia also elute as sharp peaks. CP-Volamine is highly inert, elutes a wide range of compounds, and delivers excellent performance and unique stability for water. Both 15 m and 30 m columns are available to ensure the shortest run times for amine samples that do not require the resolution of the 60 m column.

CP-Volamine Chromatograms

Industrial Chemicals

Amines and alcohols

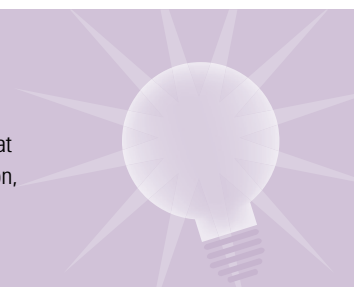
Page 643

CP-Volamine

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	15	265/300	CP7446	
	30	265/300	CP7447	CP7447I5
	60	265/275	CP7448	CP7448I5

Tips & Tools

For fast and easy GC pressure and flow calculations at your fingertips with Agilent's GC Calculator Application, visit www.agilent.com/chem/GCapp



CP-Sil 8 CB for Amines

- Good inertness towards basic compounds for best accuracy
- Guaranteed for the analysis of a broad range of amines for reliable results
- Available in non-polar and polar phases for broad application range

CP-Sil 8 CB for Amines is a base-deactivated 5% phenyl polydimethylsiloxane column that can be used for a wide range of amines. Due to a thermal stability up to 350°C, it analyzes a broad range of amines up to C₂₀, as well as alkanolamines.

CP-Sil 8 CB for Amines Chromatograms

Industrial Chemicals

Analysis of ethanolamines

Page 643

CP-Sil 8 CB for Amines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	2.00	325/350	CP7599	
0.25	30	0.25	325/350	CP7598	CP759815
	30	0.50	325/350	CP7595	CP759515
0.32	30	1.00	325/350	CP7596	CP759615
0.53	30	1.00	325/350	CP7597	CP759715

CP-Wax for Volatile Amines and Diamines

CP-Wax for Volatile Amines and Diamines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.32	25	1.20	220/220	CP7422	CP742215
0.53	25	2.00	220/220	CP7424	

CP-Wax 51 for Amines

CP-Wax 51 for Amines

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.25	25	0.20	60 to 260/275	CP7405	CP740515

CP-Lowox

- Unique selectivity for a wide range of oxygenates maximizes flexibility
- No particle loss preserves detector performance
- Suitable for process applications

CP-Lowox offers a unique solution to the chemical and petrochemical industries. It is now possible to analyze trace level oxygenate impurities in gas and liquid hydrocarbon streams. This high polarity makes the column ideal for the measurement of oxygenated compounds. CP-Lowox can be used for the prevention of catalyst contamination by oxygenates, process/on-line applications or portable GC applications (ASTM D 7059).

CP-Lowox Chromatograms

Petroleum

Analysis of oxygenates in a C1 to C5 hydrocarbon mix	Page 707
--	----------

CP-Lowox

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	10.00	0 to 350/350	CP8587	CP8587I5

GS-OxyPLOT

- Accurate analysis of ppm/ppb level oxygenates in C₁ to C₁₀ 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 eliminates particle generation and detector spiking
- Excellent for low concentration, quantitative GC analysis
- Ideal for selective heart-cutting applications

GS-OxyPLOT Chromatograms

Petroleum

Selected Oxygenates	Page 686
Trace Oxygenates in Light Hydrocarbon Matrices	Page 686

GS-OxyPLOT

ID (mm)	Length (m)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.53	10	350	115-4912	115-4912E

CP-Sil 5 CB for Formaldehyde

CP-Sil 5 CB for Formaldehyde

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.32	60	8.00	-60 to 300/325	CP7475	CP747515

CP-Squalane

CP-Squalane

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	100	0.20	-15 to 90/95	CP7520	CP752015

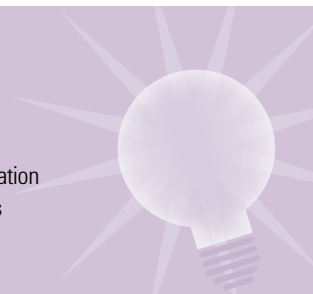
CP-Propox

CP-Propox

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.32	60	8.00	-60 to 300/325	CP7475

Tips & Tools

View up-to-date educational resources such as posters, Application Notes, training tools, seminars, product information and more at www.agilent.com/chem/mygccolumns



Semivolatiles Columns

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

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.

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

Note: 100 psi regulator required to reach optimum carrier gas velocity

DB-Dioxin

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage
0.25	60	0.15	40 to 250/270	122-2461	122-2461E
		0.25	40 to 250/270	122-2462	
0.32	60	0.15	40 to 250/270	123-2461	
		0.25	40 to 250/270	123-2462	

CP-Sil 88 for Dioxins

- Integrated retention gap eliminates leaks and extends column lifetime
- 2,3,7,8-TCDD can be determined at low concentrations for ease-of-use
- Guaranteed analysis of dioxin isomers for complete confidence in results

The CP-Sil 88 column has a very high polarity and a specific selectivity for dioxins and dibenzofuran separations. The column is supplied with an integrated retention gap to avoid problems with solvent condensation, thus allowing repeated splitless injections without phase deterioration, extending column life. In addition, because of the integrated retention gap, data quality is considerably improved. For the shortest analysis times, a series of thin-film coated columns is available that allow applications up to 270°C in temperature programmed mode.

CP-Sil 88 for Dioxins Chromatograms

Environmental

Dioxins and dibenzofurans

Page 571

CP-Sil 88 for Dioxins

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage
0.25	30	0.10	50 to 250/270	CP7497
	50	0.20	50 to 225/240	CP7588
	60	0.10	50 to 250/270	CP7498
0.32	60	0.13	50 to 250/270	CP7499

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.

DB-5.625 Chromatograms

Environmental

Analysis of Semivolatiles	Page 591
European Red List Volatiles	Page 609

DB-5.625

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.18	20	0.18	-60 to 325/350	121-5621	121-5621LTM
		0.36	-60 to 325/350	121-5622	121-5622LTM
0.25	30	0.25	-60 to 325/350	122-5631	122-5631LTM
		0.50	-60 to 325/350	122-5632	122-5632LTM
		1.00	-60 to 325/350	122-5633	122-5633LTM
		60	0.25	-60 to 325/350	122-5661
0.32	30	0.25	-60 to 325/350	123-5631	123-5631LTM
		0.50	-60 to 325/350	123-5632	123-5632LTM



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 ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	0.50	-60 to 325/350	19091S-139	19091S-139LTM

CP-Sil 5/C18 CB for PCB

- Guaranteed for very high resolution PCB analysis for ultimate confidence
- 100 m column separates critical isomer pairs for accurate results
- Use with high sensitivity ECD detection for enhanced productivity

CP-Sil 5/C18 CB for PCB has a lower polarity than 100% polydimethylsiloxane due to its C18 substitutions. Due to the absence of cyano groups it provides high signal-to-noise ratios for ECD detectors. The 100 m column separates critical isomer pairs: 28/31, 56/60, 149/118, 105/153/132 and 170/190.

CP-Sil 5/C18 CB for PCB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.10	275/300	CP7477
	100	0.10	275/300	CP7476
0.32	100	0.10	275/300	CP7478

CP-Sil 8 CB for PCB

- Guaranteed for the analysis of PCBs according to DIN Method 51527 for confidence in results
- Suitable for high sensitivity ECD detection for low detection limits
- High temperature stability provides extended lifetime and enhanced productivity

CP-Sil 8 CB has high temperature stability and is resistant to continuous splitless injections. Due to the absence of cyano groups the column provides high signal-to-noise ratios on ECD.

CP-Sil 8 CB for PCB

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.25	300/325	CP7482

Select 28/31

Select 28/31

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
0.25	50	0.25	300/325	CP7482

Volatiles Columns

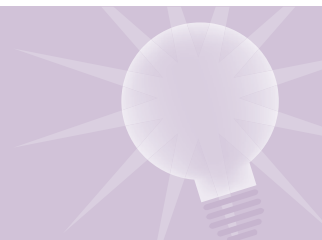
Recommended Columns for Volatiles

- 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

Agilent offers a selection of advanced polymer chemistries for increasingly demanding volatiles applications. Whether for a primary analytical column or as a complementary confirmation column, Agilent J&W capillaries are chromatographers' first choice.

Tips & Tools

Find all the tools you need for column installation in Agilent's Column Installation Kit, P/N 430-2000.



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.

DB-VRX Chromatograms

Environmental

EPA Volatiles by GC/MS (Split Injector)	Page 604
High Speed VOC, EPA Method 8260	Page 606
Unleaded Gasoline	Page 569
Extended Analyte List for EPA Method 8021	Page 607

DB-VRX

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	1.00	-10 to 260	121-1524		121-1524LTM	221-1524LTM
	40	1.00	-10 to 260	121-1544	121-1544E	121-1544LTM	
0.25	30	1.40	-10 to 260	122-1534		122-1534LTM	222-1534LTM
	60	1.40	-10 to 260	122-1564	122-1564E		
0.32	30	1.80	-10 to 260	123-1534		123-1534LTM	
	60	1.80	-10 to 260	123-1564	123-1564E		
0.45	30	2.55	-10 to 260	124-1534		124-1534LTM	
	75	2.55	-10 to 260	124-1574			

DB-624

- Specifically designed for the analysis of volatile priority pollutants and residual solvents
- 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, and USP 467
- Excellent inertness for active compounds
- Bonded and cross-linked
- Solvent rinsable
- Exact replacement of HP-624
- Equivalent to USP Phase G43

DB-624 Chromatograms**Environmental**

EPA Volatiles by GC/MS II (Split Injector)	Page 605
European Red List Volatiles	Page 609
Extended Analyte List for EPA Method 8021	Page 607
Fast VOC Analysis	Page 608

Food, Flavors and Fragrances

Fusel Oil Standard & Brandy Sample	Page 619
------------------------------------	----------

Industrial Chemicals

Alcohols I	Page 641
Esters II	Page 653
Ethers	Page 654
Glycols II	Page 655
Halogenated Hydrocarbons I	Page 658
Nitrogen Based Solvents II	Page 663

Life Sciences

Residual Solvents, DMI Diluent	Page 684
Residual Solvents, USP 467	Page 684

Petroleum

1,3-Butadiene	Page 690
---------------	----------

DB-624

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.18	20	1.00	-20 to 280	121-1324	121-1324E	121-1324LTM	221-1324LTM
0.20	25	1.12	-20 to 260	128-1324	128-1324E	128-1324LTM	
0.25	30	1.40	-20 to 260	122-1334	122-1334E	122-1334LTM	222-1334LTM
	60	1.40	-20 to 260	122-1364	122-1364E		
0.32	30	1.80	-20 to 260	123-1334	123-1334E	123-1334LTM	
	60	1.80	-20 to 260	123-1364	123-1364E		
0.45	30	2.55	-20 to 260	124-1334		124-1334LTM	
	75	2.55	-20 to 260	124-1374			
0.53	15	3.00	-20 to 260	125-1314			
	30	3.00	-20 to 260	125-1334	125-1334E	125-1334LTM	
	60	3.00	-20 to 260	125-1364	125-1364E		
	75	3.00	-20 to 260	125-1374	125-1374E		

CP-Select 624 CB

- Guaranteed for EPA volatiles with methods 524.2, 624 and 8015 for maximum confidence
- Excellent peak shape for polar and basic compounds for accurate results
- Specified by Pharmacopoeia Method V.3.3.9 for residual solvent analysis, providing compliancy

The CP-Select 624 CB is a highly reproducible version of the popular 624 phase and has 2-3 times lower bleed (bleed specification for a 30 m, 0.53 mm, df = 3.00 µm is <9 pA) than conventional columns. The Select 624 CB, a 6% cyanopropylphenyl, 94% dimethylsiloxane phase is synthesized and fully characterized to ensure maximum column-to-column reproducibility. For an even lower bleed performance we recommend the VF-624ms.

CP-Select 624 CB

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage
0.15	25	0.84	265/280	CP7411	CP7411I5
0.25	30	1.40	265/280	CP7412	
	60	1.40	265/280	CP7413	CP7413I5
0.32	30	1.80	265/280	CP7414	CP7414I5
	60	1.80	265/280	CP7415	CP7415I5
0.53	30	3.00	265/280	CP7416	CP7416I5
	75	3.00	265/280	CP7417	
	105	3.00	265/280	CP7418	

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

HP-VOC

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	7890/6890 LTM Module	5975T LTM Toroid
0.20	30	1.10	-60 to 280/290	19091R-303	19091R-303LTM	29091R-303LTM
	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 m for volatiles analyses
- Excellent peak shape
- Bonded and cross-linked
- Solvent rinsable

DB-502.2

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	60	1.40	0 to 260/280	122-1464
0.32	60	1.80	0 to 260/280	123-1464
0.45	75	2.55	0 to 260/280	124-1474
	105	2.55	0 to 260/280	124-14a4
0.53	105	3.00	0 to 260/280	124-14A4

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 Chromatograms

Environmental

Methyl Tert-Butyl Ether (MTBE) FID, Extended 8020 Analysis

Page 569

DB-MTBE

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.45	30	2.55	35 to 260/280	125-14A4		124-0034LTM
0.53	30	3.00	35 to 260/280	125-0034	125-0034E	125-0034LTM

CP-Select CB for MTBE

- Guaranteed analysis of MTBE in reformulated gasolines for reproducible results
- Unique selectivity for ease-of-use with MTBE
- Broad dynamic range for quantification of MTBE for the highest productivity

CP-Select CB for MTBE

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.25	50	0.25	200/200	CP7528

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

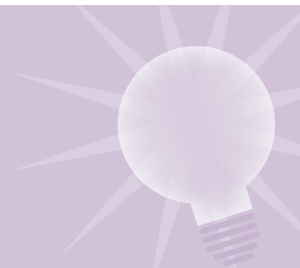
DB-TPH

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.32	30	0.25	-10 to 320	123-1632	123-1632LTM
0.45	30	1.00	-10 to 290	124-1632	



Tips & Tools

For a precision cut on your capillary column, use Agilent's GC column cutting tool (P/N 5183-4620).



Select Mineral Oil

- Optimized selectivity for more reliable results
- Low bleed for better accuracy
- Available in UltiMetal for ultimate longevity

Total petroleum hydrocarbon (TPH) analysis is a routine technique used in environmental laboratories screening many samples. A simple and reliable method that provides the shortest analysis time is required. Select Mineral Oil is designed to meet this need, with a stabilized, non-polar bonded phase specifically for fast mineral oil analysis. The column is temperature stable up to 375/400°C and provides speedy analyses according to DIN H53 and DIN-EN-ISO 9377-2 methods. Thanks to the temperature stability of Select Mineral Oil, your C₄ to C₄₀ hydrocarbons can be analyzed in less than ten minutes. The high temperature stability of the column permits faster bakeout. For optimal injection performance be sure to use the special 4 m retention gap. Select Mineral Oils are available in economical three- and six-packs.

Select Mineral Oil

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	Unit	7 in. Cage	5 in. Cage
0.32	15	0.10	-60 to 390/400	1/pk	CP7491	CP749115
	15	0.10	-60 to 390/400	3/pk	CP749103	
	15	0.10	-60 to 390/400	6/pk	CP749106	
Retention gap						
0.53	4		-60 to 325/350	3/pk	CP8015	

Select Mineral Oil UltiMetal

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage
0.32	15	0.10	-60 to 390/400	CP7493

Metal Columns

Recommended Metal Columns

- CP-Sil 13 CB UltiMetal
- CP-Sil 5 CB UltiMetal
- CP-SIL 8 CB UltiMetal
- CP-WAX 52 CB UltiMetal
- FactorFour VF-5HT UltiMetal
- CP-AL₂O₃/KCL UltiMetal
- CP-AL₂O₃/NA₂SO₄ UltiMetal
- CP-PoraPLOT Q UltiMetal
- PLOT Molesieve 5Å UltiMetal



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 that 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.

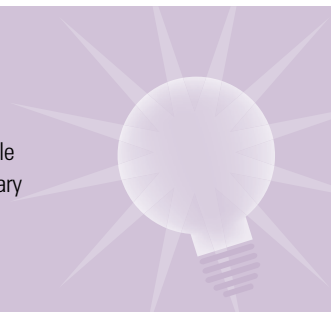
DB-ProSteel GC columns have the same outer diameter as standard Megabore (0.53 mm ID), so no special ferrules are required.

DB-ProSteel

Phase	ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage
DB-PS1	0.53	15	0.15	-60 to 340/360	145-1011
			0.50	-60 to 300/320	145-1017
			1.50	-60 to 300/320	145-1012
		30	0.15	-60 to 340/360	145-1031
			0.50	-60 to 300/320	145-1037
			3.00	-60 to 260/280	145-1034
		5.00	-60 to 260/280	145-1035	
DB-PS624	0.53	30	3.00	-20 to 260	145-1334
DB-PSWAX	0.53	30	1.00	20 to 230/240	145-7032
DB-PS2887	0.53	10	3.00	-60 to 350	145-2814

Tips & Tools

For a comprehensive listing of chromatograms searchable by compound name, visit our online Chromatogram Library at www.agilent.com/chem/library



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 non-bonded phases and therefore maintains these columns to support established methods.

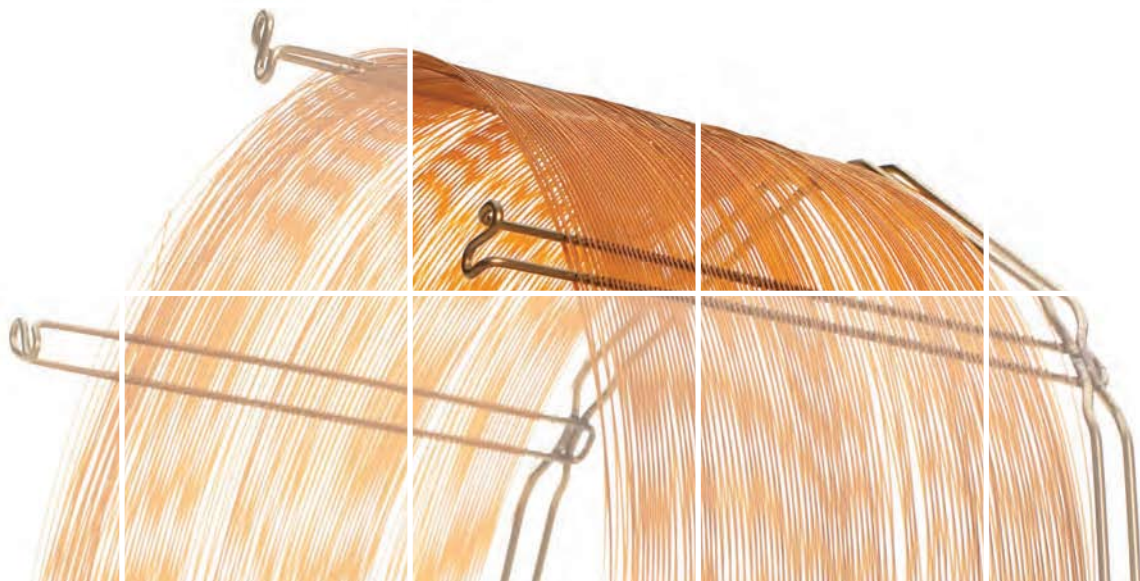
HP-101

- 100% Dimethylpolysiloxane

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 ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	10	0.20	-60 to 280	19091Y-101		
	25	0.20	-60 to 280	19091Y-102		19091Y-102LTM
	50	0.20	-60 to 280	19091Y-105		
	12	0.25	-60 to 280	19091-60010	19091-60010E	
0.32	25	0.30	-60 to 280	19091Y-012	19091Y-012E	19091Y-012LTM
	50	0.30	-60 to 280	19091Y-015		



HP-17

- 50% Phenyl and 50% Methyl siloxane

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)	7 in. Cage	7890/6890 LTM Module
0.53	10	2.00	25 to 260/280	19095L-121	19095L-121LTM

CAM

- Base deactivated polyethylene glycol
- Specifically designed for amine analysis
- Excellent peak shape for primary amines
- Replaces HP-Basicwax

Because the CAM is not bonded or cross-linked, we do not recommend solvent rinsing.

CAM Chromatograms

Industrial Chemicals

Amines in Water	Page 647
Primary Amines	Page 645

CAM

ID (mm)	Length (m)	Film (µm)	Temp Limits (°C)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.25	15	0.25	60 to 220/240	112-2112		112-2112LTM
	30	0.25	60 to 220/240	112-2132		112-2132LTM
		0.50	60 to 220/240	112-2133		112-2133LTM
	60	0.25	60 to 220/240	112-2162		
0.32	30	0.25	60 to 220/240	113-2132	113-2132E	113-2132LTM
		0.50	60 to 220/240	113-2133	113-2133E	113-2133LTM
0.53	30	1.00	60 to 200/220	115-2132		115-2132LTM

Carbowax 20M and HP-20M

- Polyethylene glycol, MW 20,000
- Equivalent to USP Phase G16

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 ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	0.25	60 to 220/240	112-2032	112-2032LTM
0.32	30	0.25	60 to 220/240	113-2032	113-2032LTM
	60	0.25	60 to 220/240	113-2062	

HP-20M

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	5 in. Cage	7890/6890 LTM Module
0.20	25	0.10	60 to 220	19091W-102		19091W-102LTM
	50	0.10	60 to 220	19091W-105		
0.32	25	0.30	60 to 220	19091W-012	19091W-012E	19091W-012LTM
	50	0.30	60 to 220	19091W-015	19091W-015E	
0.53	10	1.33	60 to 220	19095W-121		19095W-121LTM
	30	1.33	60 to 220	19095W-123		19095W-123LTM

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 ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	1.00	50 to 250/270	122-6133	
0.32	30	1.00	50 to 250/270	123-6133	123-6133LTM

DX-4

ID (mm)	Length (m)	Film (μm)	Temp Limits ($^{\circ}\text{C}$)	7 in. Cage	7890/6890 LTM Module
0.25	30	0.25	50 to 250/270	122-6432	122-6432LTM
	60	0.25	50 to 250/270	122-6462	
0.32	15	0.25	50 to 250/270	123-6412	123-6412LTM
	30	0.25	50 to 250/270	123-6432	123-6432LTM
	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)	7 in. Cage	7890/6890
					LTM Module
0.32	30	0.25	0 to 325/350	113-3032	113-3032LTM

SE-54

ID (mm)	Length (m)	Film (μm)	Temp Limits (°C)	7 in. Cage	7890/6890
					LTM Module
0.25	30	0.25	0 to 325/350	112-5432	112-5432LTM
	60	0.25	0 to 325/350	112-5462	
0.32	30	0.25	0 to 325/350	113-5432	113-5432LTM

Packed GC Columns

Stationary phases are available for the production of packed columns and coated packings.

Stationary Phases for Packed GC Columns

A	C
Antarox CO 630	CP-Sil 34
Antarox CO 880	CP-Sil 5
Antarox CO 990	CP-Sil 58
Apiezon H	CP-Sil 76
Apiezon J	CP-Sil 8
Apiezon K	CP-Sil 84
Apiezon L	CP-Sil 88
Apiezon M	CP-Wax 4000 M
Apiezon N	CP-Wax 600 M
Armeen SD	Cyano B
B	Cyanoethyl sucrose
Bentone 34	Cyanoethyl sucrose, CES
Benzylcyanide-silver nitrate	Cyclo N
Bis(2-butoxyethylphthalate)	Cyclohexane dimethanol succinate, CDS
Benzylpyridine	D
Bis(2-ethoxyethyladipate)	Decaglycerol
Bis(2-cyanoethyl)formamide N,N-	Decane n-
Bis(2-ethoxyethylsebacate)	Dexsil 300 GC polymethylcarborane
Bis(2-methoxyethyl)adipate	Dexsil 400 GC polymethylcarborane
Butanediol succinate	Dexsil 410 GC polymethylcarborane
Bis(p-butoxybenziline)- α,α -bi-p-toluidine N,N-	Di isodecyl-phthalate, DIDP
Bis(p-methoxybenzylidene)- α,α -bi-p-toluidine N,N-	Di isooctyl-adipate
C	Di isooctyl-phthalate
Carbowax 1000	Di isooctyl-sebacate, DEHS
Carbowax 10000	Di-n-decyl phthalate, DDP
Carbowax 1500	Di-n-octyl adipate
Carbowax 1540	Di-n-propyl phthalate
Carbowax 200	Di-n-propyl tetrachlorophthalate
Carbowax 20M	Dioctoil
Carbowax 20M TPA	Dioctyl phthalate
Carbowax 300	Dioctyl sebacate (Octoil s)
Carbowax 400	Dibenzyl ether
Carbowax 4000	Dibutyl maleate
Carbowax 4000 TPA	Dibutyl phthalate, DBP
Carbowax 550	Dibutyl tetrachlorophthalate, DBTP
Carbowax 600	Diethylene glycol
Carbowax 6000	Diethylene glycol adipate, DEGA, cross linked
Carbowax 750	Diethylene glycol adipate, DEGA
Castorwax	Diethylene glycol sebacate, DEGS _e
Celanese ester	Diethylene glycol succinate, DEGS

Stationary Phases for Packed GC Columns

D	H
Diglycerol	Hexadecene
Dimer acid	Hexadecanol
Dimethylformamide, DMF	Hexakis(2-cyanoethoxy)cyclohexane 1,2,3,4,5,6-
Dimethyl sulfolane, DMS 2,4-	Hexamethyl phosphoramidate, HMPA
Dimethanol cyclohexane succinate, CDS	HI-EFF 1 AP
Dimethyl sulfoxide, DMSO	HI-EFF 1 BP
Dinonyl phthalate	HI-EFF 3 AP
Dinonyl sebacate	HI-EFF 3 B
DOW corning 705	HI-EFF 8 BP
Dow fax 9 N 40	Hyprose SP-80, (octakis-(2-hydroxypropyl)sucrose)
Dowfax 9N9	I
E	Isoquinoline
EGSS-X	K
Emulphor ON-870	Kel F grease
Epon 1001, epoxy resin	Kel F oil no. 10
Ethofat 60/25	Kel F oil no. 3
Ethylbenzene	Kel F wax
Ethylene glycol adipate, EGA	KOH (potassium hydroxide)
Ethylene glycol isophthalate	L
Ethylene glycol isophthalate EGIP	LAC 1 R 296
Ethylene glycol phthalate	LAC 10 R 744
Ethylene glycol sebacate	LAC 12 R 796
Ethylene glycol succinate	LAC 17-R-770
Ethylene glycol tetrachlorophthalate	LAC 22 R 863
F	Lexan (polycarbonate resin)
FFAP	M
Fluorad FC 431	Mannitol
Fluorene	Montan wax
Fluorolube GR-362	N
Fyrquel 220	Neopentyl glycol adipate
G	Neopentyl glycol sebacate
Glycerol	Neopentyl glycol succinate
H	Nitrobenzene
H ₃ PO ₄ (Phosphoric acid)	Nujol (paraffin oil)
Hallcomid M-18, dimethylstearamide	O
Hallcomid M-18-OL, dimethyloleamide	Octadecane n-
Halocarbon K-352	Octadecene n-
Halocarbon oil 10.25	Octoil
Halocarbon wax	Olive oil
Hexadecane	Oronite NIW

Stationary Phases for Packed GC Columns

O	S
Oronite polybutene 128	Silicone DC 200
Oronite polybutene 32	Silicone DC 410
OS-124 (PMPE 5 ring)	Silicone DC 550
OS-138 (PMPE 6 ring)	Silicone DC 560
P	Silicone DC 702
Palladium	Silicone DC-704
Paraffin oil	Silicone DC 710
Paraffin wax	Silicone fluid MS 550
Pentanedioisuccinate; 1,5-	Silicone OV-1
Phenyl diethanolamine	Silicone OV-101
Phenyl diethanolamine succinate	Silicone OV-105
Pluronic P84	Silicone OV-11
Poly-A 101A (polyamide)	Silicone OV-17
Poly-A 103 (polyamide)	Silicone OV-1701
Poly-A 135 (polyamide)	Silicone OV-202
Poly-L 110 (polyamide)	Silicone OV-210
Poly-m-phenyl ether 5 ring	Silicone OV-215
Poly-m-phenoxyene, PPE-21	Silicone OV-22
Poly-m-phenyl ether 6 ring	Silicone OV-225
Poly-S 179	Silicone OV-25
Polyethylene glycol 2000	Silicone OV-275
Polyethylene glycol 600, Jefferson	Silicone OV-3
Polyethylene imine	Silicone OV-330
Polypropylene glycol 2000	Silicone OV-351
Polypropylene glycol 3500	Silicone OV-61
Polypropylene glycol 4000	Silicone OV-7
Polypropylene imine	Silicone OV-73
Polyvinylpyrrolidone	Silicone QF-1
Q	Silicone SE-30
Quadrol	Silicone SE-30 GC Grade
R	Silicone SE-52
Reoplex 4000	Silicone SE-54
S	Silicone SF-96
Sebaconitrile	Silicone UC W-98
Silar 10 C	Silicone UC W-982
Silar 5 CP highly polar	Silver nitrate
Silar 7 C	Sorbitol
Silar 9 C	SP-1000
Silicone AN-600 (50% cyanoethyl)	SP-1200
Silicone DC 111 grease	SP-2100

Stationary Phases for Packed GC Columns

S	U
SP-2250	UC-L-45
SP-2300	UCON 50 HB 2000
SP-2310	UCON 50 HB 280X
SP-2330	UCON 50 HB 5100
SP-2340	UCON 75 H 90000
SP-2401	UCON LB 1200X
SP-300	UCON LB 1715
Span-80	UCON LB 1800X
Squalane	UCON LB 550X
Squalene	UCW-98
Sucrose acetate isobutyrate	UC W-982
Sucrose-octa acetate	V
Supelco SP-216 PS	Versamid 900 (polyamide resin)
Surfonic N-300	
T	
Terephthalic acid	
Tergitol NP-35	
Tergitol NPX	
Tetra ethylene glycol	
Tetracyanoethyl pentaerythritol	
Tetraethylene glycol dimethyl ether	
Tetraethylene pentamine	
Tetrahydroxyethylenediamine	
Thiodipropionitrile β,β -	
Tri(tetra hydrofuryl)phosphate	
Triacetin	
Tributylphosphate	
Triethanolamine	
Trimer acid	
Trimethylol pelargonate	
Triton X-100	
Tris(2-cyanoethoxy)propane 1,2,3-	
Tritolyl phosphate	
Triton X-305	
Tween-80	

Supports for Packed GC Columns

Supports are available for the production of packed columns and coated packings.

Supports for Packed GC Columns

Description	Mesh Size	Description	Mesh Size
Activated charcoal	40-60	Chromosorb G AW DMCS	80-100
Activated charcoal	60-80	Chromosorb G AW DMCS	100-120
Activated charcoal	80-100	Chromosorb G HP	45-60
Alumina GC	40-60	Chromosorb G HP	60-80
Alumina GC	60-80	Chromosorb G HP	80-100
Alumina GC	80-100	Chromosorb G HP	100-120
Carbopack B	60-80	Chromosorb G NAW	45-60
Carbopack B	80-100	Chromosorb G NAW	60-80
Carbopack C	60-80	Chromosorb G NAW	80-100
Carbopack C	80-100	Chromosorb G NAW	100-120
Carbosieve G	60-80	Chromosorb P	20-40
Carbosieve G	80-100	Chromosorb P	40-60
Carbosieve S II	60-80	Chromosorb P	60-80
Carbosieve S II	80-100	Chromosorb P	80-100
Carbosieve S III	60-80	Chromosorb P	100-120
Carbosieve S III	80-100	Chromosorb P AW	45-60
Carbosphere	60-80	Chromosorb P AW	60-80
Carbosphere	80-100	Chromosorb P AW	80-100
Chromosorb 101	60-80	Chromosorb P AW	100-120
Chromosorb 101	80-100	Chromosorb P AW DMCS	45-60
Chromosorb 101	100-120	Chromosorb P AW DMCS	60-80
Chromosorb 102	20-40	Chromosorb P AW DMCS	80-100
Chromosorb 102	60-80	Chromosorb P AW DMCS	100-120
Chromosorb 102	80-100	Chromosorb P NAW	45-60
Chromosorb 102	100-120	Chromosorb P NAW	60-80
Chromosorb 103	80-100	Chromosorb P NAW	80-100
Chromosorb 103	100-120	Chromosorb P NAW	100-120
Chromosorb 105	80-100	Chromosorb T	30-60
Chromosorb 105	100-120	Chromosorb T	40-60
Chromosorb 106	60-80	Chromosorb W AW	40-60
Chromosorb 106	80-100	Chromosorb W AW	60-80
Chromosorb 106	100-120	Chromosorb W AW	80-100
Chromosorb 107	80-100	Chromosorb W AW	100-120
Chromosorb 107	100-120	Chromosorb W AW DMCS	45-60
Chromosorb 108	80-100	Chromosorb W AW DMCS	60-80
Chromosorb 108	100-120	Chromosorb W AW DMCS	80-100
Chromosorb 750	80-100	Chromosorb W AW DMCS	100-120
Chromosorb G AW	60-80	Chromosorb W HMDS	45-60
Chromosorb G AW	80-100	Chromosorb W HMDS	60-80
Chromosorb G AW	100-120	Chromosorb W HMDS	80-100
Chromosorb G AW DMCS	60-80	Chromosorb W HMDS	100-120

Supports for Packed GC Columns

Description	Mesh Size	Description	Mesh Size
Chromosorb W HP	60-80	Porapak N	50-80
Chromosorb W HP	80-100	Porapak N	80-100
Chromosorb W HP	100-120	Porapak N	100-120
Chromosorb W NAW	60-80	Porapak P	50-80
Chromosorb W NAW	80-100	Porapak P	80-100
Chromosorb W NAW	100-120	Porapak P	100-120
Glass beads regular	45-60	Porapak PS	50-80
Glass beads regular	60-80	Porapak PS	80-100
Glass beads regular	80-100	Porapak Q	50-80
Glass beads regular	100-120	Porapak Q	80-100
Hayesep A	60-80	Porapak Q	100-120
Hayesep A	80-100	Porapak QS	50-80
Hayesep A	100-120	Porapak QS	80-100
Hayesep B	60-80	Porapak QS	100-120
Hayesep B	80-100	Porapak R	50-80
Hayesep B	100-120	Porapak R	80-100
Hayesep C	60-80	Porapak R	100-120
Hayesep C	80-100	Porapak S	50-80
Hayesep C	100-120	Porapak S	80-100
Hayesep N	60-80	Porapak S	100-120
Hayesep N	80-100	Porapak T	50-80
Hayesep N	100-120	Porapak T	80-100
Hayesep P	60-80	Porapak T	100-120
Hayesep P	80-100	Porasil B	80-100
Hayesep P	100-120	Porasil C	80-100
Hayesep Q	60-80	Silica gel GC grade	30-40
Hayesep Q	80-100	Silica gel GC grade	45-60
Hayesep Q	100-120	Silica gel GC grade	60-80
Hayesep R	60-80	Silocel	45-60
Hayesep R	80-100	Silocel	60-80
Hayesep R	100-120	Silocel	80-100
Hayesep S	60-80	Silocel	100-120
Hayesep S	80-100	Spherosil XOB 75	100-120
Hayesep S	100-120	Tenax GR	35-60
Hayesep T	50-80	Tenax GR	60-80
Hayesep T	80-100	Tenax GR	80-100
Hayesep T	100-120	Tenax TA	20-35
Molecular sieve 5Å	45-60	Tenax TA	35-60
Molecular sieve 5Å	60-80	Tenax TA	60-80
Molecular sieve 5Å	80-100	Tenax TA	80-100
Molecular sieve 5Å	100-120	W KOH washed	45-60
Molecular sieve 13X	60-80	W KOH washed	60-80
Molecular sieve 13X	80-100	W KOH washed	80-100
Molecular sieve 13X	100-120	W KOH washed	100-120



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.

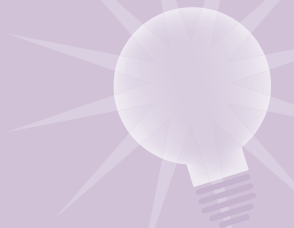
Custom columns are ordered using P/N 100-2000. Be sure to provide the details of your desired custom service or column including phase, length, ID, and film thickness.

Contact your local Agilent office or 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

Tech Support

Need assistance selecting a column for your method? Contact our chromatography technical specialists at www.agilent.com/chem/TechRep



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/ μ L 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

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

GC Column Application and Method Guides

Application	Specific Application	Agilent Phase
Biodiesel	EN14105 Free/Total Glycerin	Biodiesel, Select Biodiesel
	ASTM D6584 Free/Total Glycerin	Biodiesel, Select Biodiesel
	EN14103 FAME Analysis	Biodiesel, Select Biodiesel
	EN14110 Residual Methanol	Biodiesel, Select Biodiesel
	EN14106 Free Glycerol	Select Biodiesel
Chiral	Chiral γ -lactones and terpenes	CycloSil-B
	Optical isomers of acids, alcohols, amino acids, aromatic hydrocarbons, diols, flavors, aromas, ketones, organic acids and phenols	Cyclodex-B
	Chiral compounds using a nitrogen selective detector	HP-Chiral β
	Optical isomers of acids, alcohols, amino acids, aromatic, diols, flavor, aromas, ketones, organic acids and phenols	CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19
	Amino acids, optical isomers	CP-Chirasil-Dex CB, CP-Cyclodextrin- β -2,3,6-M-19
Foods, Flavors and Fragrances	FAME up to C26, cis, trans, fast resolution FAME	Select FAME
	Best separation for cis, trans FAME up to 260°C	CP-Sil 88 for FAME
	Volatiles	CP-Carbowax 400 for Volatiles in Alcohol
	Unsaturated triglycerides	CP-TAP CB for Triglycerides
	Flavors, aromas, free fatty acids C1-C26	CP-FFAP CB
	Glycols, diols, alcohols	CP-Wax 57 CB for Glycols and Alcohols
Life Sciences	Blood alcohol analysis	DB-ALC1 and DB-ALC2
	Blood alcohol analysis	HP-Blood Alcohol
	Drugs of abuse confirmation	DB-5ms EVDX
	USP solvents, common solvents	HP-Fast Residual Solvent
	Drugs of abuse confirmation	VF-DA
Pesticides	Organochlorine pesticides	HP-PAS5
	Organochlorine pesticides	DB-1701P
	Chlorinated pesticides and PCBs	DB-608
	Trace levels of pesticides in food and environmental samples	VF-5 Pesticides and VF-1701 Pesticides
	Chlorinated, nitrogen, phosphorus pesticides and PCBs	Rapid-MS
	Chlorinated, nitrogen, phosphorus pesticides	CP-Sil 8 CB for Pesticides
	Chlorinated, nitrogen, phosphorus pesticides, trace level DDT and Endrin	CP-Sil 19 CB for Pesticides

Application	Specific Application	Agilent Phase
Polycyclic Aromatic Hydrocarbons	EU regulated PAHs	DB-EUPAH
	PAHs in environmental and food samples	Select PAH
	C5-C80, PAH and polar compounds	CP-Sil PAH CB UltiMetal
	EU and EPA regulated PAHs	VF-17ms for PAH
Petroleum	Simulated distillation using ASTM Method D2887	DB-2887
	C6-C110+	DB-HT SimDis
	C5-C100 simulated distillation	CP-SimDist
	C5-C120 simulated distillation	CP-SimDist UltiMetal
	PONA and PIANO analysis	HP-PONA
	Paraffins, aromatics, naphthenes and olefins C4-C20	CP-Sil PONA CB
	ASTM D 5134	CP-Sil PONA for ASTM D 5134
	PONA and PIANO analysis	DB-Petro
	High temperature simulated distillation	HP-1 Aluminum Clad
	C1-C10 hydrocarbons	Select Al2O3 MAPD
	C1-C6 alcohols, aromatic C6-C10	CP-TCEP for Alcohols in Gasoline
	Hydrogen, sulfide, carbonyl sulfide, methanethiol, ethanethiol and thiophenes in LPG	CP-Sil 5 CB for Sulfur
	Polar and non-polar volatile compounds, especially chlorosilanes with different substituents such as alkyl groups, or groups with ether, hydroxy and nitrile bonds	Select Silanes
	C1-C6 amines, alcohols, NH ₃ , water, solvents, ethanol amines	CP-Volamine
	C3-C20 amines, alkanol amines	CP-Sil 8 CB for Amines
	C3-C8 amines and diamines	CP-Wax for Volatile Amines and Diamines
	C4-C10 amines, diamines and aromatic amines	CP-Wax 51 for Amines
	Oxygenates in C1-C10 hydrocarbons	CP-Lowox
	C1-C10 hydrocarbons	GS-OxyPLOT
	Methanol, formaldehyde and formic acid in water	CP-Sil 5 CB for Formaldehyde
	C1-C12 hydrocarbons	CP-Squalane
	Volatile oxygenates and halogenated hydrocarbons	CP-Propox
Semivolatiles	Polychlorinated dibenzodioxins (PCDDs) and dibenzofurans (PCDFs)	DB-Dioxin
	Dioxins and dibenzo furan	CP-Sil 88 for Dioxins
	EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols	DB-5.625
	EPA Semivolatiles Methods 625, 1625, 8270 and CLP protocols	HP-5ms Semivolatile
	PCB, detailed analysis	CP-Sil 5/C18 CB for PCB
	PCB	CP-Sil 8 CB for PCB

Application	Specific Application	Agilent Phase
Volatiles	EPA Methods 502.2, 524.2 and 8260	DB-VRX
	Volatile priority pollutants and residual solvents	DB-624
	Halogenated hydrocarbons and solvents	CP-Select 624 CB
	EPA Methods 502.2, 524.2 and 8260	HP-VOC
	EPA Method 502.2	DB-502.2
	MTBE in soil and water	DB-MTBE
	Oxygenates and solvents	CP-Select CB for MTBE
	Total petroleum hydrocarbons (TPHs), soil analysis, and LUFT	DB-TPH
	C5-C40 hydrocarbons	Select Mineral Oil
Metal	High temperature analysis and process applications	DB-ProSteel
Non-Bonded	Amino acid derivatives, essential oils	HP-101
	Drugs, glycols, pesticides, steroids	HP-17
	Amines, basic compounds	CAM
	Alcohols, free acids, essential oils, ethers, glycols, solvents	Carbowax 20M and HP-20M
	Generic	SE-30 and SE-54

Agilent Phase	Composition	Application
Ultra Inert Columns		
DB-1ms Ultra Inert	100% Dimethylpolysiloxane	Semivolatiles, halogenated compounds, pesticides, herbicides, drugs of abuse, amines, unknown sample screening
HP-1ms Ultra Inert	100% Dimethylpolysiloxane	
DB-5ms Ultra Inert	5% Phenyl 95% dimethyl arylene siloxane	
HP-5ms Ultra Inert	5% Phenyl 95% dimethylpolysiloxane	
DB-35ms Ultra Inert	5% Phenyl 65% dimethylpolysiloxane	
General Application Columns		
DB-1ms	100% Dimethylpolysiloxane	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances
HP-1ms		
VF-1ms		
DB-5ms	5% Phenyl 95% dimethyl arylene siloxane	Semivolatiles, alkaloids, drugs, FAMES, halogenated compounds, pesticides, herbicides
HP-5ms		
VF-5ms		
DB-XLB		Pesticides, herbicides, PCBs and PAHs
VF-Xms	High arylene modified	Pesticides, herbicides, PCBs and PAHs
DB-35ms	5% Phenyl 65% dimethylpolysiloxane	Aromatic compounds, pesticides and herbicides, sterols and other substituted aromatic compounds
VF-35ms		

(Continued)

Agilent Phase	Composition	Application
General Application Columns		
DB-17ms VF-17ms	50% Phenyl 50% dimethylpolysiloxane	Antidepressants, herbicides and pesticides
VF-23ms	High cyanopropyl modified	FAMES, solvents, sugars
VF-200ms	Trifluoropropyl methyl	Ketones, aldehydes, nitro- or chloro-containing compounds, PAHs, unsaturated compounds, silanes and CFCs
DB-225ms	50% Cyanopropylphenyl 50% dimethylpolysiloxane	FAMES, alditol acetates, neutral sterols
VF-624ms	6% Cyanopropyl-phenyl 94% dimethylpolysiloxane	Purgeable organic volatiles and semi-volatiles, aromatics, halocarbons, solvents
VF-1301ms	6% Cyanopropyl-phenyl 94% dimethylpolysiloxane	Thin-film version of the VF-624ms suitable for volatile solvents, pesticides, PCBs and other organic compounds requiring thin films
VF-WAXms	Polyethylene glycol	Trace analysis of polar substances
VF-1701ms	14% Cyanopropyl-phenyl 86% dimethylpolysiloxane	Organic compounds in drinking water, base/neutrals and acids, PCBs and chlorinated pesticides, organophosphorus pesticides and herbicides
DB-1 HP-1 CP-Sil 5 CB	100% Dimethylpolysiloxane	Amines, hydrocarbons, pesticides, PCBs, phenols, sulfur compounds, flavors and fragrances
Ultra 1	100% Dimethylpolysiloxane	
Ultra 2	100% Dimethylpolysiloxane	
DB-5 HP-5 CP-Sil 8 CB	5% Phenyl 95% dimethylpolysiloxane	Semivolatiles, alkaloids, drugs, FAMES, halogenated compounds, pesticides, herbicides
CP-Sil 13 CB	14% Phenyl 86% dimethylpolysiloxane	Analysis of medium-polarity compounds where halocarbon-sensitive detectors are used (e.g. ECD) Amines, aromatic hydrocarbons, EPA methods, fungicides, halogenated compounds, herbicides, pesticides, PCBs, phenols, phthalate esters, steroids, sugars and tranquilizers
DB-35 HP-35	35% Phenyl 65% dimethylpolysiloxane	CLP-pesticides, aroclors, pharmaceuticals, drugs of abuse
DB-17 HP-50+ CP-Sil 24 CB	50% Phenyl 50% dimethylpolysiloxane	Drugs, glycols, pesticides, steroids Antidepressants, herbicides and pesticides
DB-23	50% Cyanopropyl 50% methylpolysiloxane	FAMES
HP-88	88% Cyanopropyl 12% aryl-polysiloxane	FAMES
CP-Sil 88	Highly substituted, stabilized cyanopropyl	Dioxins, FAME, PCBs, PCDFs, pyridines and sugars

(Continued)

Agilent Phase	Composition	Application
General Application Columns		
DB-200	35% Trifluoropropyl 65% dimethylpolysiloxane	Residual solvents, pesticides, herbicides
DB-210	50% Trifluoropropyl 50% dimethylpolysiloxane	EPA Methods 8140 and 609
DB-225	50% Cyanopropylphenyl 50% dimethylpolysiloxane	FAMEs, alditol acetates, neutral sterols
CP-Sil 43 CB	25% Cyanopropyl 25% phenyl 50% dimethylpolysiloxane	FAME, halogenated compounds, phenols and pyridines
DB-1301	6% Cyanopropylphenyl 94% dimethylpolysiloxane	Aroclors, alcohols, pesticides, VOCs
CP-1301		Herbicides, pesticides and many pharmaceutical products
DB-1701	14% Cyanopropylphenyl 86% dimethylpolysiloxane	Pesticides, herbicides, TMS sugars, aroclors
CP-Sil 19 CB		Trace levels of pesticide residues in food and environmental samples
Polyethylene Glycol (PEG) Columns		
DB-WAX	Polyethylene glycol	Solvents, glycols, alcohols
HP-INNOWax		Alcohols, free organic acids, solvents, essential oils, flavors and fragrances
CP-Wax 52 CB		Alcohols, aldehydes, anesthetics, antidepressants, aromatic hydrocarbons, EPA methods, esters, FAME, flavors and aromas, glycols, halogenated components, ketones, nitro compounds, PAHs, phenols, solvents and sulfur compounds
DB-FFAP	Polyethylene glycol-acid modified	Organic acids, alcohols, aldehydes, ketones, acrylates
HP-FFAP		
CP-Wax 58 FFAP CB		FAME, flavors and aromas, free fatty acids, organic acids and phenols
CP-Wax 57 CB	Polyethylene glycol	Alcohols, aromatic hydrocarbons, esters, FAME, flavors and aromas, free fatty acids, glycols, halogenated compounds, ketones, organic acids and solvents
PLOT Columns		
CP-PoraBOND Q	Styrene-divinylbenzene copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraBOND U	Styrene-glycol methacrylate copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraPLOT Q	Styrene-divinylbenzene copolymer	Alcohols, free fatty acids, gases, glycols, halogenated compounds, hydrocarbons, C1-C9, ketones, solvents, sulfur compounds
CP-PoraPLOT Q-HT	Styrene-divinylbenzene copolymer	Halogenated compounds, hydrocarbons C1-C9, ketones, oxygenated hydrocarbons, permanent gases, solvents

(Continued)

Agilent Phase	Composition	Application
PLOT Columns		
HP-PLOT Q	Polystyrene-divinylbenzene	Hydrocarbons including isomers, CO ₂ , methane, air/CO, water, polar solvents, sulfur compounds
GS-Q	Porous divinylbenzene homopolymer	Hydrocarbons, halogenated hydrocarbons, sulfides except for SO ₂
CP-PoraPLOT U	Ethylene glycol dimethacrylate-divinylbenzene copolymer	Halogenated compounds, hydrocarbons C1-C6, ketones, oxygenated hydrocarbons, permanent gases and solvents
CP-PoraPLOT S	Vinylpyridine-divinylbenzene copolymer	Hydrocarbons, ketones
HP-PLOT U	Divinylbenzene/ethylene glycol dimethacrylate	C1-C7 hydrocarbons, CO ₂ , methane, air/CO, water, oxygenates, amines, solvents, alcohols, ketones, aldehydes
HP-PLOT Al ₂ O ₃ KCl	Aluminum oxide KCl deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-Alumina KCl	Aluminum oxide KCl deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
CP-Al ₂ O ₃ /KCl	Aluminium oxide	Hydrocarbons C1-C10 and impurities in hydrocarbon mainstreams, benzene and toluene
CP-Al ₂ O ₃ /Na ₂ SO ₄	Aluminium oxide	Hydrocarbons C1-C10 and impurities in hydrocarbon mainstreams, benzene and toluene
HP-PLOT Al ₂ O ₃ S	Aluminum oxide "Sodium Sulfate" deactivated	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-Alumina	Aluminum oxide with proprietary deactivation	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
HP-PLOT Al ₂ O ₃ M	Aluminium oxide	C1-C6 hydrocarbons in natural gas, refinery gas, fuel gas, synthetic gas, dienes
GS-GasPro	Proprietary, bonded silica-based	C1-C12 hydrocarbons, CO ₂ , trace-level sulfurs, hydride gases, inorganic gases, halocarbons, SF ₆ , oxygen/nitrogen separation at -80°C
CP-SilicaPLOT	Proprietary, bonded silica-based	COS in ethylene, freons/CFCs, hydrocarbons, propylene and sulfur gases
CP-CarboBOND	Active carbon	Hydrocarbons in ethylene and traces CO and CO ₂ in ethylene and propylene
CP-CarboPLOT P7	Active carbon	He, Xe, CO, Ne, CH ₄ , CO ₂ , O ₂ /Ar, C ₂ H ₆ , N ₂ , C ₂ H ₄ , Kr, and C ₂ H ₂
GS-CarbonPLOT	Bonded monolithic carbon layer	C1-C5 hydrocarbons, CO ₂ , air/CO, trace acetylene in ethylene, methane
HP-PLOT Molesieve	5Å molecular sieve zeolite	Permanent and noble gases. Argon and oxygen separation at 35°C
CP-Molsieve 5Å	Molecular sieve	He, H ₂ , O ₂ , CO, Ne, HD, N ₂ , NO, Ar, D ₂ , CH ₄ , KrHT, Xe, DT, CD ₄ , Rn, T ₂
CP-PoraPLOT Amines	Styrene-divinylbenzene copolymer base deactivated	Amines C1-C6

EPA Method

Drinking Water			
EPA Method	Application	Recommended Column	Part No.
501, 501.3	Measurement of trihalomethanes in drinking water GC/MS and selected ion monitoring	VF-624ms, 30 m x 0.53 mm, 3.00 µm	CP9106
		VF-624ms, 30 m x 0.25 mm, 1.40 µm	CP9102
		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
502.2	Volatile organic compounds in water by purge and trap capillary column GC with photoionization and electrolytic conductivity detectors in series	VF-624ms, 75 m x 0.53 mm, 3.00 µm	CP9108
		VF-624ms, 30 m x 0.53 mm, 3.00 µm	CP9106
		VF-624ms, 30 m x 0.25 mm, 1.40 µm	CP9102
		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
503.1	Volatile aromatic and unsaturated organic compounds in water by purge and trap gas chromatography	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
504.1	1,2-Dibromoethane (EDB) and 1,2-dibromo-3-chloropropane (DB CP), GC, microextraction	VF-1ms, 30 m x 0.32 mm, 1.00 µm	CP8926
		VF-1701ms, 30 m x 0.32 mm, 1.00 µm	CP9163
		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
505	Analysis of organohalide pesticides and commercial polychlorinated biphenyl (PCB) products in water by microextraction and GC	VF-1ms, 30 m x 0.32 mm, 1.00 µm	CP8926
		VF-17ms, 30 m x 0.32 mm, 0.50 µm	CP8991
506	Determination of phthalate and adipate esters in drinking water by liquid-liquid extraction or liquid-solid extraction and GC with photoionization detection	VF-5ms, 30 m x 0.32 mm, 0.25 µm	CP8955
		VF-1ms, 30 m x 0.32 mm, 0.25 µm	CP8924
		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
507	Determination of nitrogen and phosphorus-containing pesticides in water by GC with a nitrogen-phosphorus detector	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		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
508	Determination of chlorinated pesticides in water GC with an electron capture detector	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
508.1	Determination of chlorinated pesticides, herbicides, and organohalides by liquid-solid extraction and electron capture GC	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		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

(Continued)

Drinking Water

EPA Method	Application	Recommended Column	Part No.
515	Determination of chlorinated herbicides in drinking water	DB-35ms, 30 m x 0.32 mm, 0.25 μ m	123-3832
515.3	Determination of chlorinated acids in drinking water by liquid-liquid extraction, derivatization and GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 μ m	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
515.4	Determination of chlorinated acids in drinking water by liquid-liquid microextraction, derivatization, and fast GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 μ m	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
521	Determination of nitrosamines in drinking water by solid phase extraction and capillary column gas chromatography with large volume injection and chemical ionization tandem mass spectrometry (MS/MS)	VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
524.2	Measurement of purgeable organic compounds in water by capillary GC/MS	VF-624ms, 30 m x 0.53 mm, 3.00 μ m	CP9106
		VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-5ms, 30 m x 0.32 mm, 1.00 μ m	CP8957
		DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
		DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
525, 525.2	Determination of organic compounds in drinking water by liquid-solid extraction and capillary column GC/MS	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
526	Determination of selected semivolatile organic compounds in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
527	Determination of selected pesticides and flame retardants in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
528	Determination of phenols in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
529	Determination of explosives and related compounds in drinking water by solid phase extraction and capillary column GC/MS	VF-5ms, 15 m x 0.25 mm, 0.25 μ m	CP8939

(Continued)

Drinking Water

EPA Method	Application	Recommended Column	Part No.
551	Determination of Chlorination Disinfection Byproducts and Chlorinated Solvents in Drinking Water by Liquid-Liquid Extraction and Gas Chromatography with Electron Capture Detection	VF-1301ms, 30 m x 0.25 mm, 1.00 µm	CP9054
		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
551.1	Determination of chlorination disinfection byproducts, chlorinated solvents, and halogenated pesticides/herbicides in drinking water by liquid-liquid extraction and GC with electron-capture detection	VF-1ms, 30 m x 0.25 mm, 1.00 µm	CP8913
		VF-1301ms, 30 m x 0.25 mm, 1.00 µm	CP9054
		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
552	Determination of Haloacetic Acids in Drinking Water by Liquid-Liquid Extraction, Derivatization, and Gas Chromatography with Electron Capture Detection	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		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
552.1	Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion Exchange Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector	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
552.2	Determination of haloacetic acids and dalapon in drinking water by liquid-liquid extraction, derivatization GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		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
552.3	Determination of haloacetic acids and dalapon in drinking water by liquid-liquid microextraction, derivatization, and GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
556	Determination of carbonyl compounds in drinking water by pentafluorobenzylhydroxylamine derivatization and capillary GC with electron capture detection	VF-1701ms, 30 m x 0.25 mm, 0.25 µm	CP9151
		VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944

Waste Water

EPA Method	Application	Column	Part No.
601	Purgeable Halocarbons	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374
602	Purgeable aromatics	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 30 m x 0.45 mm, 2.55 μ m	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 μ m	124-1334
603	Acrolein and Acrylonitrile	VF-WAXms, 30 m x 0.25 mm, 1.00 μ m	CP9206
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 30 m x 0.45 mm, 2.55 μ m	124-1534
		DB-624, 30 m x 0.45 mm, 2.55 μ m	124-1334
604	Phenols	VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
605	Benzidines	DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 μ m	125-6837
606	Phthalate esters	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 μ m	125-6837
607	Nitrosamines	CP-Sil 8 CB for Amines, 30 m x 0.32 mm, 1.00 μ m	CP7596
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
608	Organochlorine pesticides and PCBs	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9070
		VF-17ms, 30 m x 0.25 mm, 0.25 μ m	CP8982
		DB-35ms, 30 m x 0.32 mm, 0.25 μ m	123-3832
		DB-XLB, 30 m x 0.32 mm, 0.50 μ m	123-1236

(Continued)

Waste Water			
EPA Method	Application	Column	Part No.
609	Nitroaromatics and Isophorone	VF-5ms, 30 m x 0.53 mm, 1.50 μ m	CP8976
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
		HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
		DB-5ms, 30 m x 0.53 mm, 1.50 μ m	125-5532
		DB-608, 30 m x 0.53 mm, 0.50 μ m	125-6837
610	Polynuclear Aromatic Hydrocarbons	VF-17ms, 30 m x 0.25 mm, 0.25 μ m	CP8982
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
		DB-5ms, 30 m x 0.32 mm, 0.25 μ m	123-5532
		DB-1ms, 30 m x 0.25 mm, 0.25 μ m	122-0132
611	Haloethers	VF-5ms, 30 m x 0.53 mm, 1.50 μ m	CP8976
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
612	Chlorinated Hydrocarbons	VF-5ms, 30 m x 0.25 mm, 0.10 μ m	CP8943
		VF-35ms, 30 m x 0.25 mm, 0.25 μ m	CP8877
		VF-200ms, 30 m x 0.25 mm, 1.00 μ m	CP8860
		DB-5ms, 30 m x 0.32 mm, 0.50 μ m	123-5536
		HP-5ms, 30 m x 0.32 mm, 0.50 μ m	19091S-113
		DB-1, 30 m x 0.32 mm, 0.50 μ m	123-103E
613	2,3,7,8-Tetrachlorodibenzo-p-dioxin	CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m	CP7588
		VF-5ms, 60 m x 0.25 mm, 0.10 μ m	CP8948
614	The Determination of Organophosphorus Pesticides in Municipal and Industrial Wastewater	DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
615	Chlorinated herbicides	VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9070
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		DB-35ms, 30 m x 0.32 mm, 0.25 μ m	123-3832
619	Triazine pesticides	VF-17ms, 30 m x 0.25 mm, 0.50 μ m	CP8983
		VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532
622	The Determination of Organophosphorus Pesticides in Municipal and Industrial Wastewater	DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832
		DB-5ms, 30 m x 0.25 mm, 0.25 μ m	122-5532

(Continued)

Waste Water

EPA Method	Application	Column	Part No.
624	Purgeables	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
		VF-624ms, 30 m x 0.25 mm, 1.40 μ m	CP9102
		DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
625	Base/neutrals and acids	DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
		VF-5 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9074
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 μ m	CP9070
		VF-200ms, 30 m x 0.25 mm, 0.25 μ m	CP8858
1613	Tetra- through octa-chlorinated dioxins and furans by isotope dilution HRGC/HRMS	HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
		VF-5ms, 60 m x 0.25 mm, 0.25 μ m	CP8960
		CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m	CP7588
1624	Volatile organic compounds by isotope dilution GC/MS	VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
1625	Semivolatile organic compounds by isotope dilution GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
8010	Volatile Halogenated Organic Compounds List by EPA Method 8021	DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374
8021	Volatile Halogenated & Aromatic Organic Compounds	DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
		DB-624, 75 m x 0.45 mm, 2.55 μ m	124-1374

Solid Waste			
EPA Method	Application	Column	Part No.
8010	Volatile Halogenated Organic Compounds List by EPA Method 8021	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
8011	1,2-Dibromoethane and 1,2-dibromo-3-chloropropane by microextraction and GC	VF-1ms, 30 m x 0.32 mm, 0.25 µm	CP8924
		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
8015	Nonhalogenated organics by GC	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
8015c	Nonhalogenated organics by GC	VF-WAXms, 30 m x 0.53 mm, 1.00 µm	CP9215
		CP-Sil 8 CB, 30 m x 0.53 mm, 1.50 µm	CP8736
8020	Volatile Aromatic Organic Compounds List by EPA Method 8021	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
8021, CLP Volamines	Volatile Halogenated & Aromatic Organic Compounds	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
8021b	Aromatic and halogenated volatiles by GC	VF-624ms, 60 m x 0.53 mm, 3.00 µm	CP9107
		VF-624ms, 60 m x 0.25 mm, 1.40 µm	CP9103
8031	Acrylonitrile by GC	CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
		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
8032	Acrylamide by GC	CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 2.00 µm	CP7654
8033	Acetonitrile by GC with nitrogen-phosphorus detection	VF-WAXms, 15 m x 0.53 mm, 1.00 µm	CP9226
8040, 8041	Phenols by Gas Chromatography	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
8041a	Phenols by GC	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-17ms, 30 m x 0.53 mm, 1.00 µm	CP9001
8060	Phthalate esters	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

(Continued)

Solid Waste

EPA Method	Application	Column	Part No.
8061	Phthalate esters by GC with electron capture detection (GC/ECD)	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		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
8070	Nitrosamines by Gas Chromatography	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
8070a	Nitrosamines by GC	CP-Sil 8 CB for Amines, 30 m x 0.53 mm, 1.00 µm	CP7597
		VF-17ms, 30 m x 0.53 mm, 1.50 µm	CP9002
8081	Organochlorine pesticides by GC	VF-5ms, 30 m x 0.25 mm, 1.00 µm	CP8946
		VF-35ms, 30 m x 0.25 mm, 1.00 µm	CP8879
		VF-35ms, 30 m x 0.53 mm, 0.50 µm	CP8887
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
8081a	Organochlorine Pesticides by Gas Chromatography	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
8082, CLP Pesticides	Polychlorinated Biphenyls (PCBs) by Gas Chromatography	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
8082a	Polychlorinated biphenyls (PCBs) by GC	VF-5ms, 30 m x 0.25 mm, 1.00 µm	CP8946
		VF-35ms, 30 m x 0.25 mm, 1.00 µm	CP8879
		VF-35ms, 30 m x 0.53 mm, 0.50 µm	CP8887
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
8090	Nitroaromatics and Isophorone	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
8091	Nitroaromatics and cyclic ketones by GC	VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8095	Explosives by GC	VF-5ms, 15 m x 0.53 mm, 1.50 µm	CP8973
		VF-1ms, 15 m x 0.53 mm, 1.50 µm	CP8967
		VF-200ms, 15 m x 0.53 mm, 1.00 µm	CP8866
8100	Polynuclear aromatic hydrocarbons	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		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

(Continued)

Solid Waste			
EPA Method	Application	Column	Part No.
8111	Haloethers by GC	VF-5ms, 15 m x 0.53 mm, 1.50 µm	CP8973
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8120	Chlorinated hydrocarbons by Gas Chromatography	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
8121	Chlorinated hydrocarbons by GC: capillary column technique	VF-200ms, 30 m x 0.53 mm, 1.00 µm	CP8868
		VF-WAXms, 30 m x 0.53 mm, 1.00 µm	CP9215
		VF-5ms, 30 m x 0.53 mm, 1.50 µm	CP8976
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
		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
8131	Aniline and selected derivatives by GC	VF-5ms, 30 m x 0.25 mm, 0.25 µm	CP8944
		CP-Sil 8 CB for Amines, 30 m x 0.25 mm, 0.25 µm	CP7598
8140	Organophosphorus Pesticides by GC-NPD	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
8141a	Organophosphorus compounds by gas chromatography: capillary column technique	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
8141b	Organophosphorus compounds by GC	VF-200ms, 30 m x 0.53 mm, 1.00 µm	CP8868
		VF-35ms, 30 m x 0.53 mm, 1.00 µm	CP8888
		VF-5ms, 30 m x 0.53 mm, 1.00 µm	CP8975
		VF-1ms, 30 m x 0.53 mm, 1.00 µm	CP8969
8150	Chlorinated herbicides	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
8151	Chlorinated herbicides by GC using methylation or pentafluorobenzoylation derivatization: capillary column technique	DB-35ms, 30 m x 0.32 mm, 0.25 µm	123-3832
8151b	Chlorinated herbicides by GC using methylation or pentafluorobenzoylation derivatization	VF-5 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9074
		VF-5ms, 30 m x 0.32 mm, 1.00 µm	CP8957
		VF-35ms, 30 m x 0.25 mm, 0.25 µm	CP8877
		VF-1701 Pesticides, 30 m x 0.25 mm, 0.25 µm	CP9070
		VF-35ms, 30 m x 0.53 mm, 1.00 µm	CP8888
		VF-1701ms, 30 m x 0.53 mm, 1.00 µm	CP9171
8240	Volatile Chlorinated and Aromatic Hydrocarbons	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
		DB-VRX, 60 m x 0.25 mm, 1.40 µm	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 µm	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 µm	19091R-306

(Continued)

Solid Waste

EPA Method	Application	Column	Part No.
8260/CLP-VOCs	Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy (GC/MS): Capillary Column Technique Method	DB-VRX, 60 m x 0.25 mm, 1.40 μ m	122-1564
		DB-624, 60 m x 0.25 mm, 1.4 μ m	122-1364
		HP-VOC, 60 m x 0.20 mm, 1.10 μ m	19091R-306
		DB-VRX, 20 m x 0.18 mm, 1.00 μ m	121-1524
		DB-624, 20 m x 0.18 mm, 1.00 μ m	121-1324
8260b	Volatile organic compounds by GC/MS	VF-624ms, 75 m x 0.53 mm, 3.00 μ m	CP9108
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
		VF-624ms, 60 m x 0.32 mm, 1.80 μ m	CP9105
8261	Volatile organic compounds by vacuum distillation in combination with GC/MS spectrometry (VD/GC/MS)	VF-624ms, 60 m x 0.53 mm, 3.00 μ m	CP9107
		VF-624ms, 60 m x 0.25 mm, 1.40 μ m	CP9103
8270	Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	HP-5ms, 30 m x 0.25 mm, 0.50 μ m	19091S-133
8270d	Semivolatile organic compounds by GC/MS	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
8275a	Semivolatile organic compounds (PAHs and PCBs) in soils/sludges and solid wastes using thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS)	VF-5ms, 30 m x 0.25 mm, 0.25 μ m	CP8944
		VF-5ms, 30 m x 0.25 mm, 0.50 μ m	CP8945
		VF-5ms, 30 m x 0.25 mm, 1.00 μ m	CP8946
8280b	Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/low resolution mass spectrometry (HRGC/LRMS)	CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 μ m	CP8751
8290b	Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS)	CP-Sil 8 CB, 30 m x 0.25 mm, 0.25 μ m	CP8751
		CP-Sil 88 for Dioxins, 50 m x 0.25 mm, 0.20 μ m	CP7588
8410	Gas chromatography/Fourier transform infrared (GC/FT-IR) spectrometry for semivolatile organics: capillary column	VF-5ms, 30 m x 0.32 mm, 0.25 μ m	CP8955
8430	Analysis of bis(2-chloroethyl) ether and hydrolysis products by direct aqueous injection (GC/FT-IR)	VF-WAXms, 30 m x 0.53 mm, 1.00 μ m	CP9215

United States Pharmacopoeia (USP) GC Phases

USP Phase Composition	Agilent Phase Recommendation
G1 Dimethylpolysiloxane oil	HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS
G2 Dimethylpolysiloxane gum	HP-1*, DB-1*, HP-1ms*, DB-1ms*, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS, CP-SimDist
G3 50% Phenyl 50% methylpolysiloxane	DB-17*, HP-50+*, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS
G5 3-cyanopropyl polysiloxane	DB-23, VF-23ms, Select for FAME, CP-Sil 88
G6 Trifluoropropylmethylpolysilicone	DB-200, DB-210, VF-200ms
G7 50% 3-cyanopropyl 50% phenylmethylsilicone	DB-225, DB-225ms, CP-Sil 43 CB
G8 80% Bis(3-cyanopropyl) 20% 3-cyanopropylphenylpolysiloxane or 90% 3-cyanopropyl 10% phenylmethylsiloxane	HP-88, VF-23ms
G14 Polyethylene glycol (average molecular weight of 950-1,050)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G15 Polyethylene glycol (average molecular weight of 3,000-3,700)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G16 Polyethylene glycol (average molecular weight of 15,000)	DB-WAX*, VF-WAXms, CP-Wax 52 CB
G17 75% Phenyl 25% methylpolysiloxane	DB-17, HP-50+, VF-17ms, CP-Sil 24 CB, CP-Sil 24 CB Low Bleed/MS
G19 25% Phenyl 25% cyanopropylmethylsilicone	DB-225*, DB-225ms, CP-Sil 43 CB
G20 Polyethylene glycol (average molecular weight of 380-420)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G25 Polyethylene glycol TPA (Carbowax 20M terephthalic acid)	DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB
G27 5% Phenyl 95% methylpolysiloxane	DB-5*, HP-5*, HP-5ms*, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G28 25% Phenyl 75% methylpolysiloxane	DB-35, HP-35, DB-35ms, VF-35ms
G32 20% Phenylmethyl 80% dimethylpolysiloxane	DB-35, HP-35, DB-35ms, VF-35ms
G35 Polyethylene glycol & diepoxide esterified with nitroterephthalic acid	DB-FFAP*, HP-FFAP*, CP-Wax 58 (FFAP) CB, CP-FFAP CB
G36 1% Vinyl 5% phenylmethylpolysiloxane	DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G38 Phase G1 plus a tailing inhibitor	DB-1, HP-1, HP-1ms, DB-1ms, VF-1ms, CP-Sil 5 CB, CP-Sil 5 CB Low Bleed/MS
G39 Polyethylene glycol (average molecular weight of 1,500)	DB-WAX, VF-WAXms, CP-Wax 52 CB
G41 Phenylmethyldimethylsilicone (10% phenyl substituted)	DB-5, HP-5, HP-5ms, DB-5ms, VF-5ms, VF-5ht, CP-Sil 8 CB, CP-Sil 8 CB Low Bleed/MS
G42 35% Phenyl 65% dimethylvinylsiloxane	DB-35*, HP-35*, DB-35ms, VF-35ms
G43 6% Cyanopropylphenyl 94% dimethylpolysiloxane	DB-624*, DB-1301, VF-624ms, VF-1301ms, CP-1301, CP-Select 624 CB
G45 Divinylbenzene-ethylene glycol-dimethacrylate	HP-PLOT U*, CP-PoraBOND U, CP-PoraPLOT U
G46 14% Cyanopropylphenyl 86% methylpolysiloxane	DB-1701*, VF-1701ms, CP-Sil 19 CB, CP-Sil 19 CB Low Bleed/MS

*Indicates an exact equivalent

Tips & Tools

Gain extra confidence to meet high standards with Agilent's solution for the revised USP <467>. Visit www.agilent.com/chem/usp467an



ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 1945	Standard Test Method for the Analysis of Natural Gas by GC	HP PLOT, 15 m x 0.53 mm, 50 µm	19095P-MS9
		HP PLOT Q, 15 m x 0.53 mm, 40 µm	19095P-Q03
		CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm	CP7537
		CP-PoraPLOT Q-HT, 10 m x 0.53 mm, 20.00 µm	CP7558
D 1946	Standard Test Method for the Analysis of Reformed Gas by GC	HP PLOT, 15 m x 0.53 mm, 50 µm	19095P-MS9
		HP PLOT Q, 15 m x 0.53 mm, 40 µm	19095P-Q03
		CP-Molsieve 5Å, 10 m x 0.53 mm, 50.00 µm	CP7537
		CP-Molsieve 5Å, 25 m x 0.25 mm, 30.00 µm	CP7533
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 AI203 "KCl", 30 m x 0.53 mm, 15 µm	19095P-K23
		HP PLOT AI203 "S", 30 m x 0.53 mm, 15 µm	19095P-S23
D 2195	Standard Test Methods for Pentaerythritol	CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
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 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
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
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
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
		CP-AI203/KCl, 50 m x 0.53 mm, 10.00 µm	CP7518
D 2245	Standard Test Method for Identification of Oils and Oil Acids in Solvent-Reducible Paints	CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm	CP7488
D 2504	Standard Test Method for Noncondensable Gases in C2 and Lighter Hydrocarbon Products by GC	HP PLOT, 30 m x 0.53 mm, 50 µm	19095P-MS0
		CP-CarboBOND, 25 m x 0.53 mm, 10.00 µm	CP7374
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 2580	Standard Test Method for Phenols in Water by Gas-Liquid Chromatography	CP-Sil 8 CB, 25 m x 0.32 mm, 0.40 µm	CP5850
		CP-FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7486

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 2593	Standard Test Method for Butadiene Purity and Hydrocarbon Impurities by GC	GS-Alumina, 30 m x 0.53 mm	115-3532
		CP-AI203/KCl, 25 m x 0.32 mm, 5.00 µm	CP7515
		CP-AI203/KCl, 50 m x 0.53 mm, 10.00 µm	CP7518
D 2712	Standard Test Method for Hydrocarbon Traces in Propylene Concentrates by GC	GS-Alumina, 50 m x 0.53 mm	115-3552
D 2743	Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography	CP-Sil 88 for FAME, 50 m x 0.25 mm, 0.20 µm	CP7488
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 µm	125-0212
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 µm	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
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
		CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.88 µm	CP7570
		CP-SimDist UltiMetal, 10 m x 0.53 mm, 2.65 µm	CP7582
		CP-SimDist UltiMetal, 5 m x 0.53 mm, 0.17 µm	CP7532
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
D 2908	Standard Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection GC	CP-Select 624 CB, 30 m x 0.32 mm, 1.80 µm	CP7414
		CP-Select 624 CB, 75 m x 0.53 mm, 3.00 µm	CP7417
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 µm	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
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 3168	Standard Practice for Qualitative Identification of Polymers in Emulsion Paints	CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 µm	CP8760
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 µm	CP8735
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 3271	Standard Practice for Direct Injection of Solvent-Reducible Paints into a Gas Chromatograph for Solvent Analysis	CP-PoraPLOT Q, 25 m x 0.53 mm, 20.00 µm	CP7554
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 µm	CP8738
D 3328	Standard Test Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm	CP8687
		CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm	CP8677
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
		CP-WAX 52 CB, 60 m x 0.53 mm, 1.00 µm	CP8798
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

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 3447	Standard Test Method for Purity of Halogenated Organic Solvents	DB-624, 30 m x 0.53 mm, 3.00 μ m	125-1334
D 3452	Standard Practice for Rubber – Identification by Pyrolysis-Gas Chromatography	CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 μ m	CP8735
D 3465	Standard Test Method for Purity of Monomeric Plasticizers by Gas Chromatography	CP-Sil 5 CB, 25 m x 0.32 mm, 0.52 μ m	CP8430
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 μ m	CP8735
D 3524	Standard Test Method for Diesel Fuel Diluent in Used Diesel Engine Oils by Gas Chromatography	CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 μ m	CP7592
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 μ m	125-1334
D 3606	Standard Test Method for Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography	VF-1ms, 15 m x 0.25 mm, 0.10 μ m	CP8906
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 μ m	CP7525
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 μ m	125-7032
		DB-WAX, 30 m x 0.45 mm, 0.85 μ m	124-7032
		CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 μ m	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 μ m	CP8738
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 μ m	125-7032
		CP-SimDist UltiMetal, 10 m x 0.53 mm, 0.53 μ m	CP7592
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 μ m	125-2814
D 3749	Standard Test Method for Residual Vinyl Chloride Monomer in Poly(Vinyl Chloride) Resins by Gas Chromatographic Headspace Technique	CP-PoraBOND Q, 10 m x 0.32 mm, 5.00 μ m	CP7350
		CP-PoraBOND Q, 10 m x 0.53 mm, 10.00 μ m	CP7353
D 3760	Standard Test Method for Analysis of Isopropylbenzene (Cumene) by GC	DB-WAX, 60 m x 0.32 mm, 0.25 μ m	123-7062
		HP-1, 50 m x 0.32 mm, 0.52 μ m	19091Z-115
		CP-Xylenes, 50 m x 0.53 mm,	CP7428
D 3792	Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph	CP-PoraBOND Q, 25 m x 0.32 mm, 5.00 μ m	CP7351
		CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 μ m	CP7354
D 3797	Standard Test Method for Analysis of o-Xylene by GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 μ m	19091N-216
		CP-Xylenes, 50 m x 0.53 mm	CP7428
D 3798	Standard Test Method for Analysis of p-Xylene by GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 μ m	19091N-216
		CP-Xylenes, 50 m x 0.53 mm	CP7428
D 3871	Standard Test Method for Purgeable Organic Compounds in Water Using Headspace Sampling	DB-VRX, 75 m x 0.45 mm, 2.55 μ m	124-1574
D 3876	Standard Test Method for Methoxyl and Hydroxypropyl Substitution in Cellulose Ether Products by Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 1.00 μ m	CP8760
		CP-Sil 5 CB, 30 m x 0.53 mm, 1.50 μ m	CP8735

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
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 4059	Standard Test Method for Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography	CP-Sil 8 CB for PCB, 50 m x 0.25 mm, 0.25 µm	CP7482
D 4275	Standard Test Method for Determination of Butylated Hydroxy Toluene (BHT) in Polymers of Ethylene and Ethylene – Vinyl Acetate (EVA) Copolymers By Gas Chromatography	CP-Sil 5 CB, 30 m x 0.32 mm, 3.00 µm	CP8687
		CP-Sil 5 CB, 30 m x 0.53 mm, 3.00 µm	CP8677
D 4322	Standard Test Method for Residual Acrylonitrile Monomer Styrene-Acrylonitrile Copolymers and Nitrile Rubber by Headspace Gas Chromatography	CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
D 4367	Standard Test Method for Benzene in Hydrocarbon Solvents by Gas Chromatography	VF-1ms, 15 m x 0.25 mm, 0.10 µm	CP8906
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
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 Al ₂ O ₃ S, 50 m x 0.53 mm, 15 µm	19095P-S25
		CP-Al203/Na2SO4, 25 m x 0.53 mm, 10.00 µm	CP7567
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 4492	Standard Test Method for Analysis of Benzene by Gas Chromatography	CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
D 4509	Standard Test Methods for Determining the 24-Hour Gas (AIR) Space Acetaldehyde Content of Freshly Blown PET Bottles	CP-PoraBOND Q, 25 m x 0.32 mm, 5.00 µm	CP7351
		CP-PoraBOND Q, 25 m x 0.53 mm, 10.00 µm	CP7354
D 4534	Test Method for Benzene Content of Cyclic Products by Gas Chromatography	CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 µm	CP7525
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
		CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7614
D 4768	Standard Test Method for Analysis of 2,6-Ditertiary-Butyl Para-Cresol and 2,6-Ditertiary- Butyl Phenol in Insulating Liquids by Gas Chromatography	CP-Wax 58 FFAP CB, 25 m x 0.53 mm, 1.00 µm	CP7614
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

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 4947	Standard Test Method for Chlordane and Heptachlor Residues in Indoor Air	DB-5, 30 m x 0.53 mm, 1.50 μ m	125-5032
		DB-608, 30 m x 0.53 mm, 0.83 μ m	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 μ m	124-3232
		HP PLOT Q, 15 m x 0.53 mm, 40 μ m	19095P-Q03
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 μ m	19091S-213
		CAM, 30 m x 0.53 mm, 1 μ m	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 μ m	19095Z-621
		HP-INNOWax, 30 m x 0.32 mm, 0.25 μ m	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 μ m	19091N-216
		CP-WAX 52 CB, 60 m x 0.32 mm, 0.50 μ m	CP8773
D 5075	Standard Test Method for Nicotine in Indoor Air	DB-5, 30 m x 0.53 mm, 1.50 μ m	125-5032
		DB-5, 30 m x 0.32 mm, 1.00 μ m	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 μ m	19091S-001
		CP-Sil PONA for ASTM D 5134, 50 m x 0.21 mm, 0.50 μ m	CP7531
D 5135	Standard Test Method for Analysis of Styrene by Capillary GC	HP-INNOWax, 60 m x 0.32 mm, 0.50 μ m	19091N-216
		CP-WAX 52 CB, 60 m x 0.32 mm, 0.50 μ m	CP8773
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 μ m	123-1033
		DB-608, 30 m x 0.32 mm, 0.5 μ m	123-1730
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
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 μ m	19095P-Q04
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 μ m	19095Z-627
D 5310	Standard Test Method for Tar Acid Composition by Capillary GC	HP-5ms, 30 m x 0.25 mm, 0.25 μ m	19091S-433
		DB-225ms, 30 m x 0.25 mm, 0.25 μ m	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 μ m	19091S-713
		DB-624, 30 m x 0.45 mm, 2.55 μ m	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 μ m	19091S-433
		DB-1701P, 30 m x 0.25 mm, 0.25 μ m	122-7732
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
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 μ m	125-1034
		DB-VRX, 30 m x 0.32 mm, 1.80 μ m	123-1534
D 5399	Standard Test Method for Boiling Point Distribution of Hydrocarbon Solvents by GC	DB-2887, 10 m x 0.53 mm, 3.00 μ m	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 μ m	19091S-001
		DB-Petro, 100 m x 0.25 mm, 0.50 μ m	122-10A6
D 5442	Standard Test Method for Analysis of Petroleum Waxes by GC	DB-1, 25 m x 0.32 mm, 0.25 μ m	123-1022
		DB-5, 15 m x 0.25 mm, 0.25 μ m	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 μ m	19091S-433
		DB-1701P, 30 m x 0.25 mm, 0.25 μ m	122-7732
		DB-XLB, 30 m x 0.25 mm, 0.25 μ m	122-1232
		DB-35ms, 30 m x 0.25 mm, 0.25 μ m	122-3832
D 5480	Standard Test Method for Engine Oil Volatility by GC	DB-PS1, 15 m x 0.53 mm, 0.15 μ m	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 μ m	19091Z-530
D 5504	Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence	CP-Sil 5 CB for Sulfur, 30 m x 0.32 mm, 4.00 μ m	CP7529
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 μ m	19095P-Q03
		HP PLOT U, 30 m x 0.53 mm, 20 μ m	19095P-U04
D 5508	Standard Test Method for Determination of Residual Acrylonitrile Monomer in Styrene-Acrylonitrile Co-polymer Resins and Nitrile-Butadiene Rubber by Headspace Capillary GC	HP PLOT Q, 30 m x 0.53 mm, 40 μ m	19095P-Q04
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 μ m	125-1035
		CP-TCEP for Alcohols in Gasoline, 50 m x 0.25 mm, 0.40 μ m	CP7525
		CP-Sil 5 CB, 30 m x 0.53 mm, 5.00 μ m	CP8775
		VF-1ms, 15 m x 0.25 mm, 0.10 μ m	CP8906
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 μ m	122-5032

(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
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, 0.5 µm	122-10A6E
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 DB-TPH, 30 m x 0.32 mm, 0.25 µm	122-5032 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 DB-VRX, 20 m x 0.18 mm, 1.00 µm DB-624, 60 m x 0.25 mm, 1.4 µm DB-624, 20 m x 0.18 mm, 1.00 µm	122-1564 121-1524 122-1364 121-1324
D 5812	Standard Test Method for Determination of Organochlorine Pesticides in Water by Capillary Column GC	HP-5MS, 30 m x 0.25 mm, 0.25 µm DB-1701P, 30 m x 0.25 mm, 0.25 µm DB-XLB, 30 m x 0.25 mm, 0.25 µm DB-35ms, 30 m x 0.25 mm, 0.25 µm	19091S-433 122-7732 122-1232 122-3832
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 µm GS-Alumina, 50 m x 0.53 mm DB-1, 30 m x 0.53 mm, 5.00 µm	19095P-K25 115-3552 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 DB-XLB, 30 m x 0.25 mm, 0.25 µm	19091S-413 122-1232
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

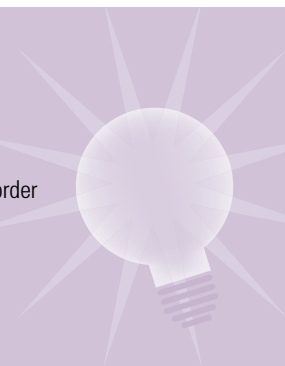
(Continued)

ASTM Methods

Method	Title	Recommended Agilent Column	Part No.
D 6387	Standard Test Methods for Composition of Turpentine and Related Terpene Products by Capillary Gas Chromatography	CP-WAX 52 CB, 30 m x 0.32 mm, 0.50 μ m	CP8763
		CP-WAX 52 CB, 30 m x 0.53 mm, 1.00 μ m	CP8738
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 μ m	145-1001
D 6584	Standard Test Method for Determination of Total Monoglyceride, Total Diglyceride, Total Triglyceride, and Free and Total Glycerin in B-100 Biodiesel Methyl Esters by Gas Chromatography	Select Biodiesel, 15 m x 0.32 mm, 0.10 μ m	CP9078
D 6806	Standard Practice for Analysis of Halogenated Organic Solvents and Their Admixtures by Gas Chromatography	CP-Sil 5 CB, 50 m x 0.53 mm, 5.00 μ m	CP7685
E 1616	Standard Test Method for Analysis of Acetic Anhydride Using GC	HP-1, 50 m x 0.32 mm, 0.52 μ m	19091Z-115
E 1863	Standard Test Method for Analysis of Acrylonitrile by GC	DB-WAXetr, 60 m x 0.32 mm, 1.00 μ m	123-7364
E 0202	Standard Test Method for Analysis of Ethylene Glycols and Propylene Glycols	DB-624, 30 m x 0.53 mm, 3.00 μ m	125-1334
		CP-Wax 57 CB for Glycols and Alcohols, 50 m x 0.25 mm, 0.25 μ m	CP7615
E 0475	Standard Test Method for Assay of Di-tert-Butyl Peroxide Using GC	HP-5, 30 m x 0.53 mm, 5.00 μ m	19095J-623

Tips & Tools

GC Method Translation Software allows you to port a current GC method to another while ensuring that relative retention order is maintained so peaks elute in the same order. Download at www.agilent.com/chem/gcmethodtranslation





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 m 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 m 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 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 in split ratio or sample dilution.
Leak in the injector	Leak check the injector	A change in peak size usually occurs
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 past the plunger or around the needle; leaks are not often readily visible
Column contamination	Trim the column	Remove 0.5-1 m 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 m 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

Tips & Tools

Watch Agilent's in-depth video series cover common chromatographic problems, causes, and corresponding solutions presented by two of Agilent's seasoned GC experts at www.agilent.com/chem/gctroubleshooting



LC AND LC/MS



In this Chapter

Parts and Supplies

- 712** Bio-inert Supplies
- 716** General Supplies
- 739** Pump Supplies
- 752** Autosampler Supplies
- 758** Fraction Collector Supplies
- 762** Valve Supplies
- 772** TCC Supplies
- 775** Detector Supplies
- 787** LC/MS Supplies

LC and LC/MS Columns

- 796** HPLC Column Selection
- 806** Cartridge Column Systems
- 818** Columns for Analytical HPLC
- 891** Columns for Special Applications
- 916** Preparative HPLC Columns and Flash Chromatography
- 945** GPC/SEC Columns and Calibrants
- 996** Biosolutions and Columns for Biologic Characterization

LC and LC/MS Troubleshooting

- 1052** HPLC Troubleshooting
- 1056** LC/MS Troubleshooting

LC and LC/MS Applications

- 1059** BioPharmaceutical Applications
- 1076** Chemical/Industrial Applications
- 1079** Environmental Applications
- 1088** Food and Consumer Product Applications
- 1102** Pharmaceutical Applications



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.

LC/MS Maintenance Schedule

Procedure	When to Perform
Flush the nebulizer	Daily or at the end of each shift to flush traces of samples and buffers out of the tubing, valves, and nebulizer.
Clean the electrospray spray chamber	Daily or anytime you suspect carryover contamination from one sample or analysis to another.
Replace the electrospray nebulizer needle	When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure, off-axis spraying, or dripping from the nebulizer.
Clean the APCI spray chamber	Daily or anytime you suspect carryover contamination from one sample or analysis to another.
Replace the APCI nebulizer needle	When the needle is plugged. Common symptoms of a plugged needle are increased LC back pressure or off-axis spray from the nebulizer.
Clean the multimode source	Daily or anytime you suspect carryover contamination from one sample or analysis to another, or when you must access the end cap and capillary cap for cleaning and inspection.
Check calibrant levels	Monthly or weekly if you tune the LC/MS frequently.





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, for E1M18/E2M28	6040-0834
Oil mist filter element for E1M18/E2M28	1535-4970
Filter element, 5 µm, 5/pk	0100-2051
Spring, canted coil, 4/pk	1460-2571
Big hydrocarbon trap, 1/4 in. fittings	BHT-4
Rotor seal, Vespel, pH 0 to 10	0100-1855

Tips & Tools

Save ordering time and money with the LC/MS PM Kit!
It contains the common supplies specified in Agilent service engineer preventive maintenance procedure for LC/MS platforms.



LC/MS Supplies

Description	6100 Series Single Quadropole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadropole LC/MS	6500 Series Accurate- Mass Q-TOF LC/MS	Part No.
ES nebulizer assembly, original	◆	◆	◆	◆	◆	G1946-60098
ES nebulizer needle (original) replacement kit	◆	◆	◆	◆	◆	G2427A
ES nebulizer assembly, new	◆	◆	◆	◆	◆	G1958-60098
ES nebulizer needle (new) replacement kit	◆	◆	◆	◆	◆	G1958-60136
APCI nebulizer assembly	◆	◆	◆	◆	◆	G1946-60037
APCI nebulizer needle replacement kit	◆	◆	◆	◆	◆	G2428A
Needle assembly APCI/Multimode	◆	◆	◆		◆	G1947-60103
Corona needle APCI/Multimode	◆	◆	◆	◆	◆	G1947-20029
Capillary cap, high temperature, 3.0 mm	◆	◆	◆	◆	◆	G1946-20301
Capillary, 0.5 mm ID, dielectric*	◆		◆			G1946-80009
Capillary, 0.6 mm ID, dielectric*	◆	◆	◆	◆	◆	59987-20040
Capillary, 0.6 mm ID, resistive, fast polarity switching*				◆		G1960-80060
Spring, canted coil, 0.25 in. ID, 0.53 mm	◆	◆	◆	◆	◆	1460-2571
1/6 in. tee, low dead volume, stainless steel		◆			◆	0100-0969

*Dielectric capillary supports standard polarity switching only. Resistive capillary supports fast polarity switching

(Continued)

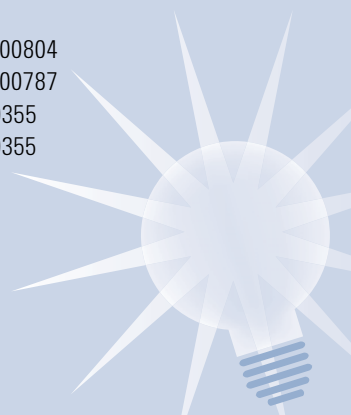


Corona needle APCI, G1947-20029

Tips & Tools

ES nebulizer (original) is compatible with the following ion sources:

- ESI G1948A with Serial Number < US91801994
- ESI G1948B with Serial Number < US91201787
- Multimode G1978A with Serial Number < US90800804
- Multimode G1978B with Serial Number < US90700787
- Dual ESI G3251A with Serial Number < US91200355
- Dual ESI G3251B with Serial Number < US91200355



LC/MS Supplies

Description	6100 Series Single Quadropole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadropole LC/MS	6500 Series Accurate- Mass Q-TOF LC/MS	Part No.
Syringe adapter			◆			9301-1291
Syringe pump			◆			3162-0178
1/16 in. finger-tight PEEK fitting		◆	◆		◆	0100-1516
Female luer to female 10/32 adapter		◆	◆		◆	0100-2304
PEEK tubing		◆	◆		◆	0890-1915
Gas-tight syringe, PTFE luer lock		◆	◆		◆	5182-9710
High-throughput skimmer, 2 mm		◆		◆	◆	G1969-20302
Skimmer 1 (G1956A/B)	◆					G1956-20302
HED assembly	◆					G1946-80019
HED assembly (G6140A, G6460A, G6530A)				◆		G2571-80103
HED assembly		◆				G1956-80000
Electron multiplier replacement horn	◆	◆		◆		05971-80103
Replacement horn and dynode	◆		◆	◆		G2441-80010

*Dielectric capillary supports standard polarity switching only. Resistive capillary supports fast polarity switching



05971-80103



LC/MS Foreline Pump Supplies

Description	Part No.
Oil mist filter kit for E1M18/E2M28	3162-1056
Oil mist cartridge filter for MS40+	G1960-80039
Oil return kit	3162-1057
Foreline pump oil, Inland 45, 1 L, for E1M18/E2M28	6040-0834
Rotary pump oil, 4 L, for E1M18/E2M28	6040-0798
Foreline exhaust adapter	59980-20134
Hose clamp	1400-0563
Oil mist filter element for E1M18/E2M28	1535-4970
KF25 clamp, stainless steel	0100-0549
KF25 coseal (inside clamp)	0100-1597
Exhaust tubing	0890-1727
Pump oil drip pan	G1946-00034

LC/MS Chemicals

Description	6100 Series		6300 Series Ion Trap LC/MS	6400 Series		6500 Series		Part No.
	Single Quadrupole LC/MS	6200 Series TOF LC/MS		Triple Quadrupole LC/MS	Accurate- Mass Q-TOF LC/MS			
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	◆	◆		◆	◆			G2423A
Electrospray LC demo sample (Sulfamix)	◆			◆*				59987-20033
ESI+APCI LC demo sample	◆							G1978-85000
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
ES/APCI positive ion performance standard, 5 x 1 mL ampoules	◆							G2423A
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
Ammonium formate	◆	◆	◆	◆	◆			G1946-85021
Formic acid, 5 mL	◆	◆	◆	◆	◆			G2453-85060
Acetonitrile, 1 L	◆	◆	◆	◆	◆			G2453-85050

*Recommended item for familiarization

LC/MS Common Supplies*

Description	Part No.
Common Parts	
Filter element, 5 µm, 5/pk	0100-2051
Rotor seal, Tefzel, pH 0 to 14	0100-1854
Rotor seal, Vespel, pH 0 to 10	0100-1855
Inlet filter assembly	G1946-60180
SSV long drain tubing assembly	G1969-60086
Spring, canted coil	1460-2571
Cleaning Supplies	
Abrasive mesh, 4000 grit	8660-0827
Capillary cleaning wire for dip tube	G1946-80054
Cleaning powder, dielectric capillary, Alconox	5190-1401
Cloths, lint-free	05980-60051
Cotton swabs, 100/pk	5080-5400
Gas Purifiers	
Big hydrocarbon trap, 1/4 in. fittings	BHT-4
Big moisture trap, 1/4 in. fittings	BMT-4
Big universal trap, 1/4 in. fittings	RMSN-4
Big universal trap, 1/8 in. fittings, Nitrogen	RMSN-2
Tools	
LC/MS tool kit	G1946-60157
Nebulizer adjustment fixture	G1946-20215
Nebulizer 25X magnifier	G1946-80049
Plastic tubing cutter	8710-1930
Screwdriver, Torx T15	8710-1622
Screwdriver, Torx T20	8710-1615
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
3 mm wrench for nebulizer needle adjustment	8710-2699

*These parts are common to all LC/MS systems

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





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°C 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 that use Edwards pumps:

- 6300 Traps: G2440DA, G2451AA, G4533AA, G2474SS
- 6410 QQQ: G6410AA
- 6210 TOF: G3250AA, G3252A
- 6510AA Q-TOF: G6510AA
- Any analytical system using BOC Edwards pumps (lbs/kg): E2M28, E2M18, E1M18

Please confirm rough pump used in your Agilent LC/MS system to ensure compatibility.

Quiet Cover II for Agilent LC/MS Systems

Description	Part No.
Quiet Cover II for Agilent LC/MS Systems 12.5 W x 17.3 H x 33.5 L	G3199B

LC/MS Standards Kits

LC/MS Standards Kits

Description	Part No.
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 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
Sulfa drug standards kit for LC/MS OQ/PV 5 x 2 mL ampoules with 4 sulfa drugs in water/methanol 70:30	5188-6523

LC/MS Analyzer Kit Standards

Description	Part No.
LC/MS toxicology calibration mixture, 3 x 1 mL ampoules	5190-0470
Method EN12916/IP391 LC standard calibration kit, 4 x 1 mL ampoules	5190-0484
Method EN12916/IP391 system calibration standard kit, 2 x 1 mL ampoules	5190-0485
LC TOF/QTOF/QQQ pesticide test mixture, 2 solutions, 3 x 1 mL ampoules of each	5190-0469

LC/MS Calibrant Mixes

Description	Part No.
ESI tuning mix, 100 mL	G2421A
APCI/APPI calibrant solution, 100 mL	G2432A
ESI tuning mix for ion trap, 100 mL	G2431A
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

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



LC/MS Calibrant Mix and Source Compatibility Matrix

Source	6100 Series Single Quadropole LC/MS*	6140A/6150B Single Quadropole LC/MS	6200 Series TOF LC/MS	6300 Series Ion Trap LC/MS	6400 Series Triple Quadropole LC/MS	6500 Series Accurate-Mass Q-TOF LC/MS
ESI	G2421A	G1969-85000	G1969-85000	G2431A	G1969-85000	G1969-85000
APCI	G2432A	G1969-85010	G1969-85010	G2432A	G1969-85010 ²	G1969-85010 ²
APPI	G2432A	G2432A	G1969-85010	G2432A	G2432A ²	G1969-85010 ²
MMI	G2432A	G1969-85000	G1969-85020	G2432A	G1969-85020	G1969-85020
NanoESI			G1969-85000 ⁴	G2431A		G1969-85000 ⁴
HPLC chip cube		G1969-85000 ²	G1969-85000 ⁴	G2431A ¹	G1969-85000 ³	G1969-85000 ⁴

*G6110A, G6120A/B, G6130A/B

¹5X dilution suggested

²No autotune

³ESI positive tune only

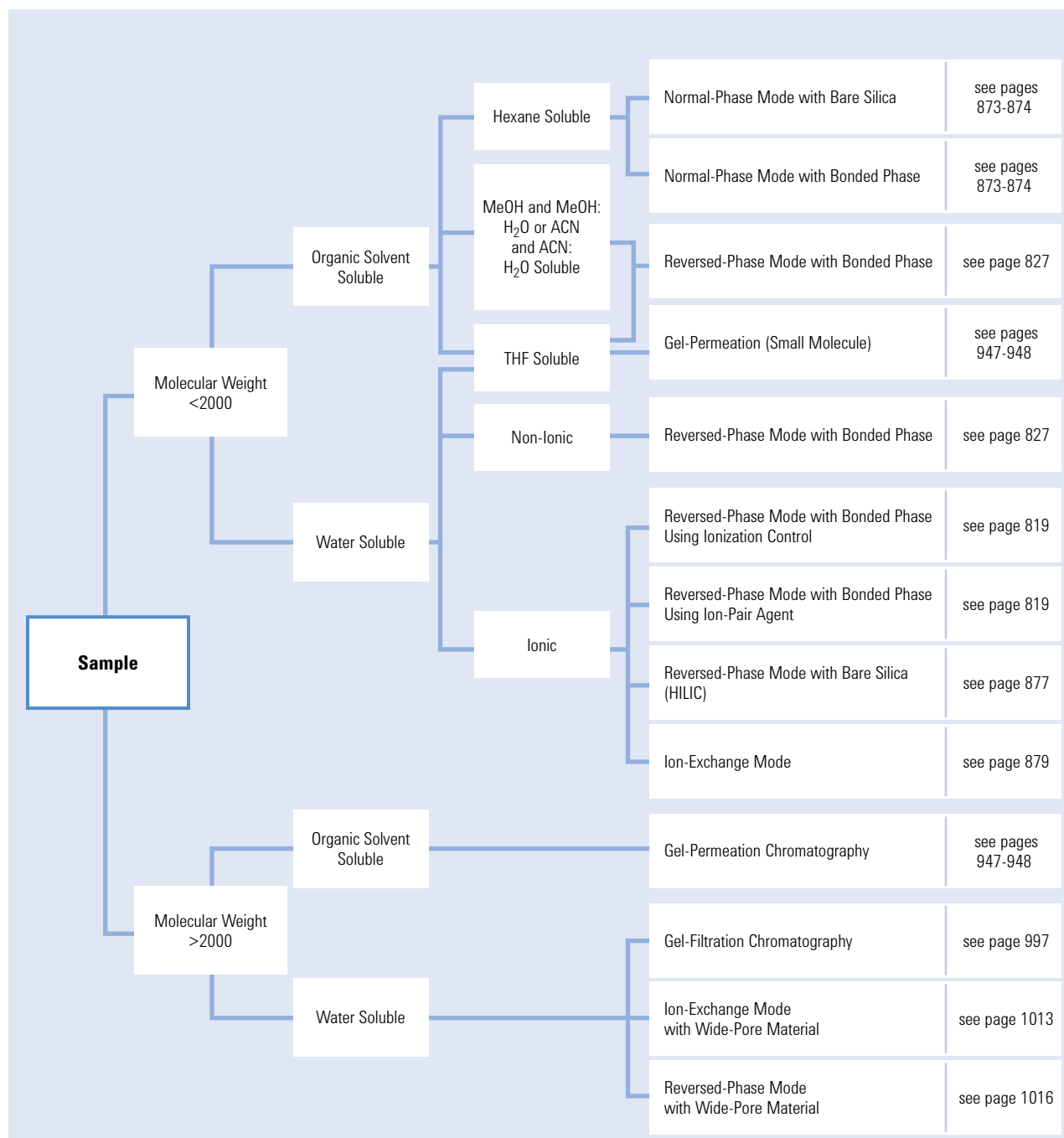
⁴Calibration only



LC and LC/MS Columns

HPLC 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 HT, Solvent Saver, Capillary 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 typical particle size for HPLC columns is 5 µm with 3.5 µm and smaller now common in method development. If high-speed analyses or higher resolution analyses are required, packing with 1.8 µm and 2-3 µm particles can be used. Shorter columns with these particles can produce faster high-resolution separations, with the 1.8 µm particle size providing the highest efficiency and 2.7 µm superficially porous providing similar results. With 1.8, 2.7, 3.5 and 5 µm particle sizes to choose from, start with the smallest particle size for your HPLC or UHPLC – 400 bar, 600 bar, or 1200 bar – to achieve the best results.

Column Configuration

Choosing the best column size for method development has changed dramatically in the past few years. Smaller 3.0 mm ID or 2.1 mm ID columns are now used more than 4.6 mm ID to lower solvent use and achieve compatibility with MS detectors. And shorter 50, 75 and 100 mm long columns can be a great starting choice, with longer columns used only when more resolution is needed or when 3.5 and 5 µm particle sizes are used.

Silica Type and Bonded Phase

Base Material

The base material for an LC column is most often high purity silica material with totally porous particles such as that used in most Agilent ZORBAX columns. However, more choices are available, including polymer material with high pH stability used in PLRP-S columns and superficially porous silica particles such as those used in Poroshell 120 columns. The high purity Type B silicas, including the ZORBAX Rx-Sil used in ZORBAX Eclipse Plus, and superficially porous Poroshell 120, are an excellent first choice for most methods. Type A silicas, such as ZORBAX SIL, used in Original ZORBAX columns, are still manufactured and used in many methods.

Bonded Phase

A good first choice for bonded phase is C18 or C8, and the recommended starting column choices are Eclipse Plus C18 or Poroshell 120 EC-C18. These two choices provide excellent peak shape and can be used over the pH range 2-9, accommodating most typical LC and LC/MS mobile phases. If the sample solutes of interest are not adequately separated on these columns, CN and Phenyl columns – including Phenyl, Phenyl-Hexyl and Diphenyl – may offer significant differences in selectivity from straight-chain alkyl phases to effect the separation.

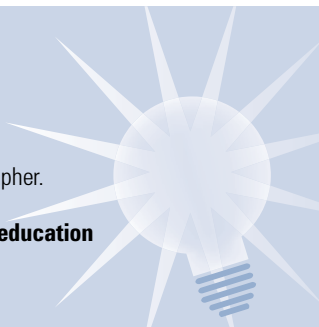
pH and Mobile Phase

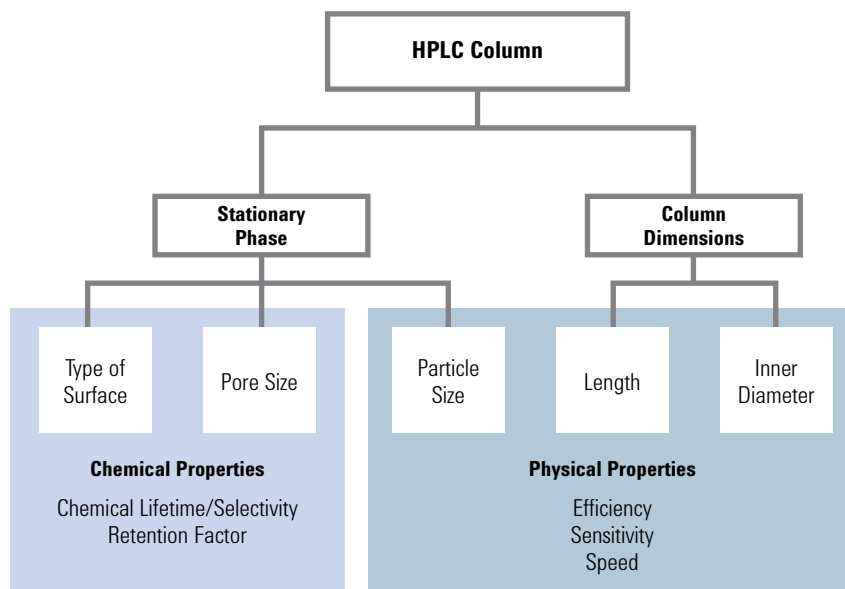
The choice of mobile phase for a reversed-phase system starts with selecting the organic modifier. Acetonitrile is the most commonly used organic modifier. However, selectivity differences and sample retention will vary significantly among mobile phases containing acetonitrile, methanol, and tetrahydrofuran (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).

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



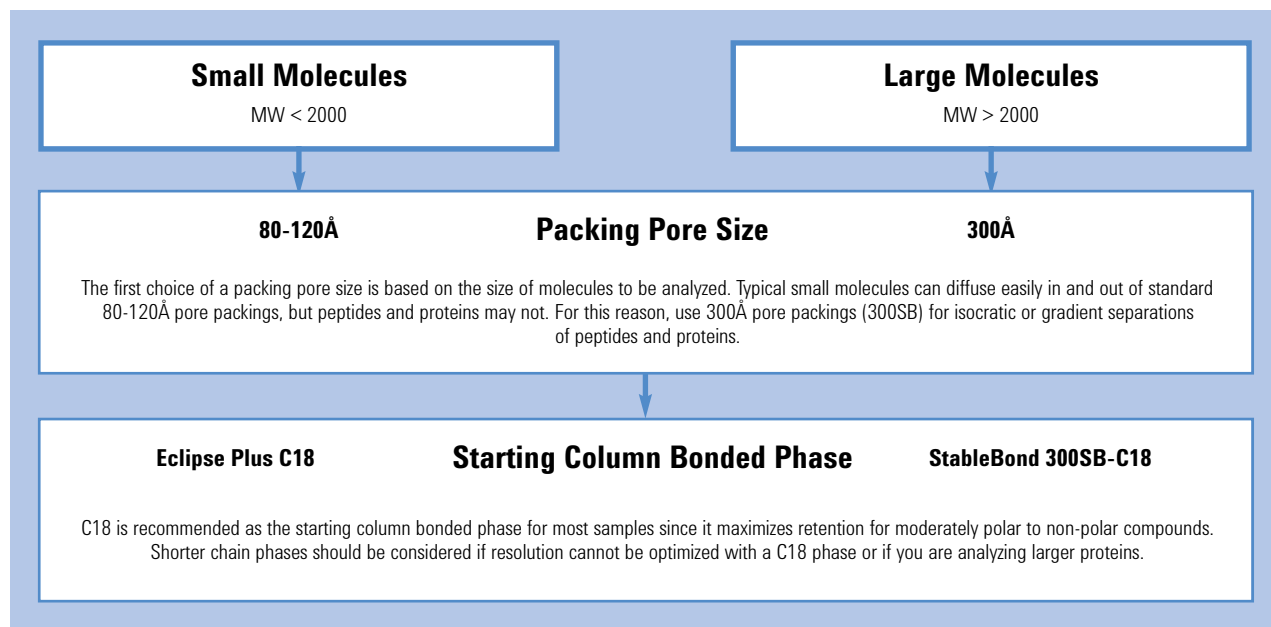


Column Choice Relative to Application Objective

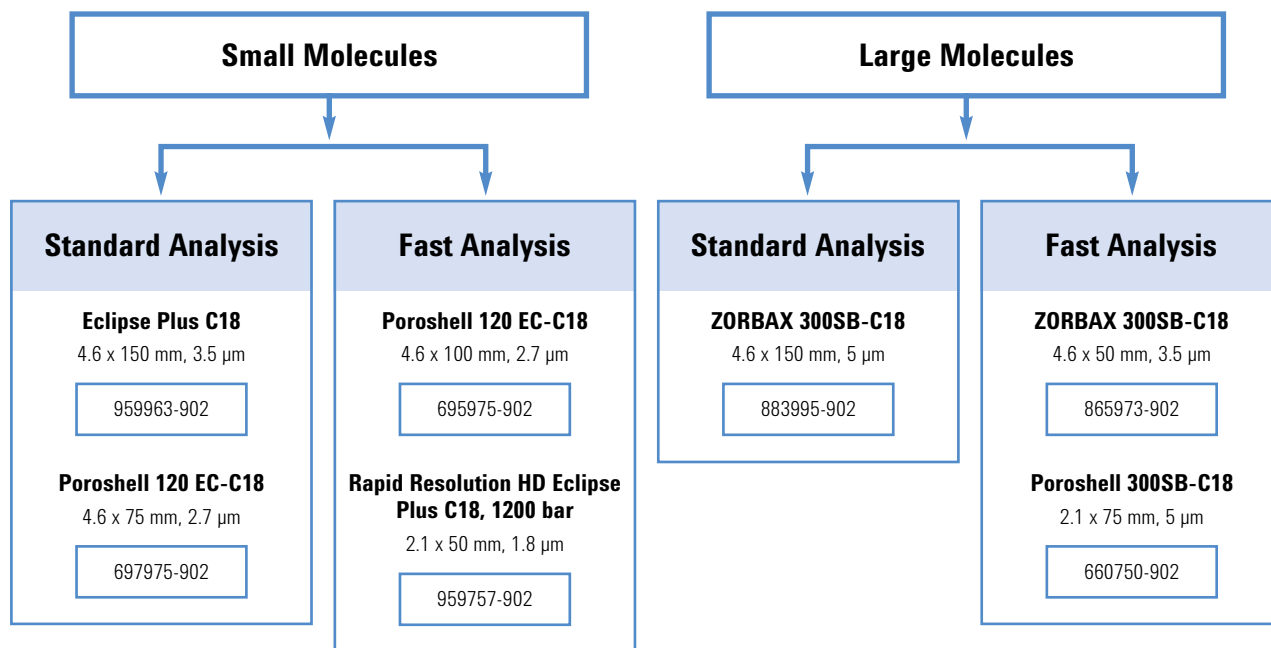
Application	Objective Column Diameter (mm)
Very high sensitivity, LC/MS, peptides and proteins	0.1, 0.075
Very high sensitivity, limited sample, LC/MS, peptides and proteins	0.3, 0.5
High sensitivity, limited sample, LC/MS	1.0
Save solvent; special low-volume instrumentation is available	2.1
Special 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

Recommended Column Choices for Method Development



Starting Column Choices



USP Designations

The US Pharmacopeia (USP) is a standard source for many pharmaceutical methods that 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 Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L1	Octadecyl silane chemically bonded to porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter	Poroshell 120 EC-C18	2.7	822
		Poroshell 120 SB-C18	2.7	822
		ZORBAX Eclipse Plus C18	1.8, 3.5, 5	827
		ZORBAX Eclipse XDB-C18	1.8, 3.5, 5, 7	831
		ZORBAX SB-C18	1.8, 3.5, 5, 7	838
		ZORBAX Rx-C18	3.5, 5	854
		ZORBAX Extend-C18	1.8, 3.5, 5, 7	850
		ZORBAX ODS	3.5, 5, 7	870
		ZORBAX ODS classic	5	870
		Pursuit XRs C18	3, 5, 10	862
		Pursuit C18	3, 5, 10	860
		Polaris C18-A	3, 5, 10	867
		Polaris C18-Ether	3, 5	867
		SepTech ST60 C18	10	928
SepTech ST150 C18	10	928		
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	873
		ZORBAX Rx-Sil	3.5, 5	873
		Pursuit XRs Si	3, 5, 10	862
		Polaris Si-A	5, 10	867
		MicroSpher Si	5	
		Microsorb 100 Si	5	
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter			
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		

(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L7	Octyl silane chemically bonded to totally porous microsilica particles, 1.5 to 10 µm in diameter	Poroshell 120 EC-C8	2.7	822
		ZORBAX Eclipse Plus C8	1.8, 3.5, 5	827
		ZORBAX Eclipse XDB-C8	1.8, 3.5, 5, 7	831
		ZORBAX SB-C8	1.8, 3.5, 5, 7	838
		ZORBAX Rx-C8	1.8, 3.5, 5, 7	854
		ZORBAX C8	5	870
		Pursuit XRs C8	3, 5, 10	856
		Pursuit C8	3, 5, 10	856
		Polaris C8-A	3, 5	865
		Polaris C8-Ether	3, 5	865
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 10 µm in diameter	ZORBAX NH2	5	873
		Polaris NH2	5	865
		Microsorb 100 Amino	5	
L9	10 µm irregular, totally porous silica gel having a chemically bonded, strongly acidic cation exchange coating	ZORBAX SCX	5 spherical	879
L10	Nitrile groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX CN	5	873
		ZORBAX SB-CN	3.5, 5	838
		ZORBAX Eclipse XDB-CN	3.5, 5	831
		Microsorb 100 Cyano	5	
L13	Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter	ZORBAX TMS	5	
L14	Silica gel 10 µm in diameter with a chemically bonded, strongly basic quaternary ammonium anion exchange coating	ZORBAX SAX IonoSpher A	5	879
L15	Hexyl silane chemically bonded to totally porous silica particles, 3 to 10 µm in diameter	MetaSil C6		
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	Hi-Plex H	8	881
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	Hi-Plex Ca	8	881
		Hi-Plex Ca (Duo)	8	881
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 3 to 10 µm in diameter	LiChrospher Diol	5	

(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L21	A rigid, spherical styrene-divinylbenzene copolymer, 5 to 10 µm in diameter	PLgel	3, 5, 10, 20	947
		PLRP-S 100Å	3, 5, 8	1027
		PLRP-S 300Å	3, 5, 8	1027
		PLRP-S 1000Å	5, 8	1027
L22	A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm in size	Hi-Plex H	8	881
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 1,000 to 5,000 da (as determined by the polyethylene oxide), applied to neutral, ionic and cationic water-soluble polymers	PL aquagel-OH	5, 8	974
L26	Butyl silane chemically bonded to totally porous silica particles, 5 to 10 µm in diameter	MicroSorb C4	5	
L27	Porous silica particles, 30 to 50 µm in diameter	Bondesil Silica		204
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	1001
		Bio SEC-3	3	997
		Bio SEC-5	5	999

(Continued)







USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 9 µm in diameter	Hi-Plex Pb	8	881
L35	A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase	ZORBAX GF-250	4	1001
		ZORBAX GF-450	6	1001
L36	L-Phenylglycine-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 to 4,000 da MW	N/A		
L38	Methacrylate-based size exclusion packing for water solubles	N/A		
L39	Hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin	N/A		
L40	Cellulose tris-3,5-dimethylphenylcarbamate 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	Pursuit PFP	3, 5	856
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	915
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		

(Continued)

USP Method	USP Packing Materials	Column	Particle Size (µm)	Page No.
L50	A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µm in diameter	ZORBAX 300SCX	5	879
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		
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	Bio SAX	3, 5, 10	1006
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	838
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	913
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter	Hi-Plex Na	10	881
		Hi-Plex Na (Octo)	8	881
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, 5	846
		Polaris Amide-C18	3, 5	865














CARTRIDGE COLUMN SYSTEMS

Cartridge Selection Guide

Icon*	Type of Cartridge	Features	Benefits
	Agilent HPLC Cartridge	Can reverse collets in the end fitting to add guard cartridges Cartridges have a unique filter and sieve at each end	Inexpensive Extends column lifetime Permits rapid column changes Can use 2, 3, 4 and 4.6 mm cartridges Helps prevent blockage
	ZORBAX Guard Cartridge: Standalone system	High efficiency, standalone, low dead volume cartridge Polymeric cartridge designed for leak-tight seals against metal surfaces Reusable fittings	Seals up to 400 bar No gaskets required More solvent-resistant than PEEK Adapt for connections to 1/16 in. LC fittings
	ZORBAX Rapid Resolution and Rapid Resolution HT Cartridge Columns: 3.5 µm and 1.8 µm packings, standalone 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 Sold individually or as three-packs	For all analyte types Low bleed
	ZORBAX Semi-Preparative Guard HPLC Hardware Kit: Standalone system	Easy, low-dead-volume assembly Tubing (polyphenylene sulfone) designed for leak-tight seals against metal surfaces Reusable fittings	Seals up to 2000 psi (135 bar, 13.5 MPa) No gaskets required Adapt for connections to 1/16 in. LC fittings
	ZORBAX and Agilent Prep Preparative Cartridge Column and Guard HPLC System: Standalone and integral hardware options	Easy, low-dead-volume assembly Reusable fittings Hardware options for integral and external guards	Extends column lifetime Permits rapid column changes Can use with 21.2 and 30 mm ID columns
	ChromSep Column Hardware: Complete systems and replacement cartridges	Easy, no-dead-volume assembly	Economical format No tools required Modular flexibility

*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
	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
				
	Standard fitting	Column guard cartridge (standalone) cartridge holder 820999-901	2.1 3.0 4.6	ZORBAX
				
	Rapid Resolution cartridge holder 820555-901	No guard cartridge holder	4.6	ZORBAX
				
	Semi-preparative column	Semi-prep guard cartridge (standalone) cartridge holder 840140-901	9.4	ZORBAX
				
	PrepHT	Guard cartridge 820444-901	21.2	ZORBAX Agilent Prep
				

*Standalone guard cartridges fit all cartridge 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.

Agilent Cartridge System

Agilent's flexible cartridge system has been thoroughly tested to ensure that the design and hardware meet Agilent's quality standards. Finger-tight connections allow rapid column changes without removing capillaries from 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.



Guard cartridge installed



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

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





This icon identifies standalone 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 in. OD tubing adapts the cartridge guard column for direct connection to standard 1/16 in. LC fittings and provides a standalone guard column system for 2.1 to 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 surfaces 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	820999-901
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 fitting, 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 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 in convenient three-packs.

One cartridge holder kit includes all components for use with 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 (1 ea), 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, two required 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 standalone 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*	840140-901
Includes inlet fitting, outlet end fitting, column connector	

*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



Prep external guard hardware kit, assembled, 420420-901

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 to 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 standalone or with an integral guard column. The integral guard column holder is a stainless steel body and is used with a PTFE sealing gasket to ensure a tight, leak-free and extremely low-dead-volume seal against the 21.2 mm ID cartridge body. The external guard system seals finger-tight 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 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 end fittings 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



This icon identifies ChromSep column hardware

ChromSep HPLC Column Hardware

The ChromSep system combines simplicity with extraordinary flexibility and considerable savings on column and operating costs. The ChromSep 316 stainless steel column-housing hardware is a durable one-time investment. Once you have purchased the complete basic system of a holder, analytical cartridge and guard column, you will only need to replace the cartridges or replacement guard columns, both of which are available in economical packages: 3-pack analytical column replacements and 5-pack guard column replacements for added value.

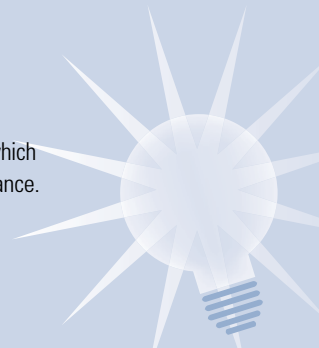
Unlike other modular column systems, ChromSep is extremely flexible. Column housings are available in lengths of 10, 30, 50, 100, 150 and 250 mm, and cartridges are available in various IDs ranging from 2 to 4.6 mm. You can use any combination of cartridge columns to match the column length with the separation you need and minimize your analysis time.

Tips & Tools

Guard columns and filters help protect your column and instrument from particulates that can cause blockages, which increase system pressure and negatively impact performance.

Learn more about this common problem at

www.agilent.com/chem/lctroubleshooting



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 your 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 non-Zorbax columns. See the respective column listings for 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 recommended. 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 precolumn filters, 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, 3.0, 4.6, 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 compares the processes 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.

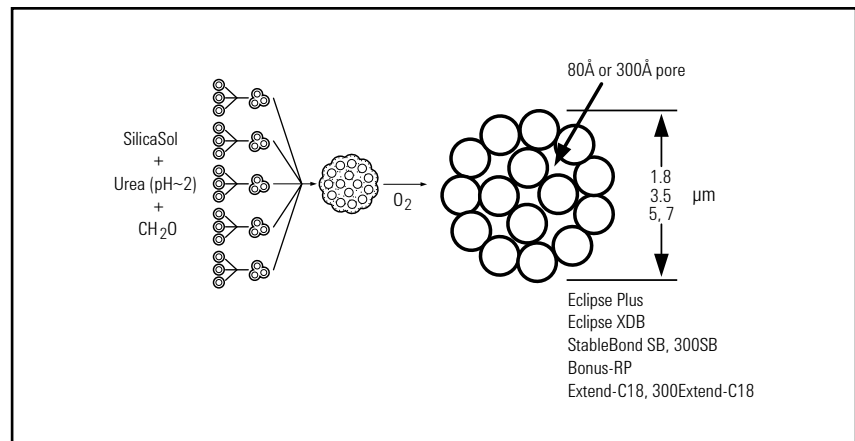
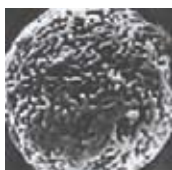


Figure 1. Formation of ZORBAX porous silica particles



ZORBAX Rx-SIL uniform sub particles



Xerogel "sponge-like" polymeric network

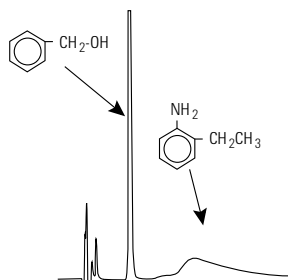
Characteristics of ZORBAX Rx-SIL and a Contrasting Type of Silica

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/180 m ² /g	100Å/300 m 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, ultra pure (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.

Original ZORBAX SIL (1973)



Highly Purified ZORBAX Rx-SIL

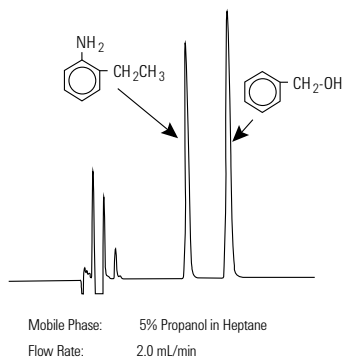
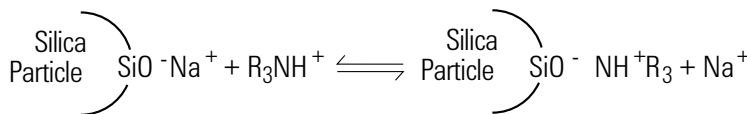
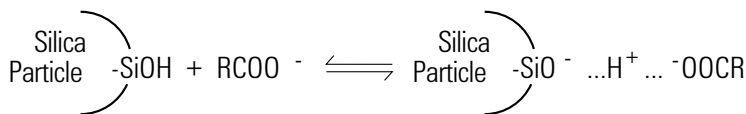


Figure 3. Chromatographic improvement using highly purified ZORBAX Rx-SIL



1. Ionized silanols (SiO⁻) will ion-exchange with protonated bases (R₃NH⁺) 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

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 18,000 psi (1200 bar). This packed bed stability increases column lifetime using ZORBAX 1.8, 3.5, 5 or 7 μm particles. When ZORBAX Rapid Resolution HD or 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 HD and 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.

AGILENT COLUMNS FOR ANALYTICAL HPLC

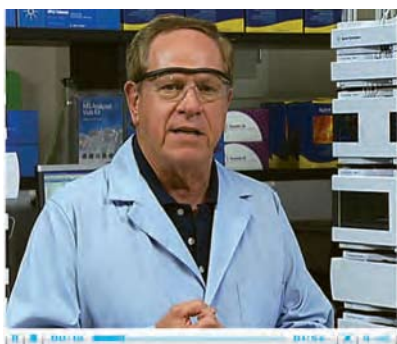
Achieve excellent peak shape and resolution — and eliminate "false starts"

Good news for analysts who do not have time to "make columns work" for a particular application: Agilent columns let you choose the right column based on your sample and mobile phase — eliminating any guesswork.

Additionally, Agilent's ZORBAX silica is manufactured by Agilent — not purchased from outside suppliers. And that means we control every step of the manufacturing process, ensuring lot-to-lot consistency, superior performance, and long-term, reliable results.

In this section, you will find a diverse range of columns designed for optimum resolution over a wide pH range, including:

- Poroshell 120 HPLC Columns
- ZORBAX Reversed-Phase HPLC Columns
- Pursuit HPLC Columns
- Polaris HPLC Columns
- ZORBAX Normal-Phase HPLC Columns
- ZORBAX and Hi-Plex Ion Exchange HPLC Columns
- ZORBAX Method Development and Validation Kits



Tips & Tools

All ZORBAX and Poroshell conventional columns (non-cartridge) come with a QC chromatogram. Run a standard sample of QC components or key analytes from your lab on each new column before use, and keep this chromatogram in your log book. Periodically re-run this test to see how your column has aged. Learn how this can help with troubleshooting issues by watching the videos at www.agilent.com/chem/lctroubleshooting



Agilent 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.

Agilent RP-HPLC Column Chemistry

Modern Columns*	Silica Type	Particle Type	Endcapping	Side Group Structure on Silane	Polar Group	Page No.
Poroshell 120 EC	B	Superficially porous	Double	Dimethyl	None	822
Poroshell 120 SB	B	Superficially porous	None	Diisobutyl	None	822
Eclipse Plus	B	Totally porous	Double	Dimethyl	None	827
Eclipse XDB	B	Totally porous	Double	Dimethyl	None	831
StableBond	B	Totally porous	None	Diisopropyl (C8, C3, CN, phenyl), diisobutyl (C18)	None	838
Bonus-RP	B	Totally porous	Triple	Diisopropyl	Amide	846
Extend-C18	B	Totally porous	Double	Unique bidentate structure	None	850
Rx-C18	B	Totally porous	None	Dimethyl	None	854
Pursuit	B	Totally porous	Single	Dimethyl	None	856
Pursuit XRs	B	Totally porous	Single	Dimethyl	None	862
Polaris A	B	Totally porous	Single	Dimethyl	Yes	865
Polaris Ether	B	Totally porous	Single	Dimethyl	Ether	865
Polaris Amide	B	Totally porous	Single	Dimethyl	Amide	925
Original ZORBAX Columns**						
ZORBAX	A	Totally porous	Single	Dimethyl	None	870
ZORBAX ODS Classic	A	Totally porous	None	Dimethyl	None	870

*Type B silica: low acidity, low metal content; these bonded phases use ZORBAX Rx-SIL

**Type A silica: more acidic, higher metal content

Quick Guide to Agilent Reversed-Phase Bonded Phases

Modern RP-HPLC Columns	Recommended Uses and Applications	Page No.
Poroshell 120	<ul style="list-style-type: none"> • Superficially porous particles for high efficiency at low pressure • Sub-2 µm efficiency with a 2.7 µm particle • Endcapped and non-endcapped C18 and C8 phases for selectivity optimization • Compatible with 400 bar and 600 bar LC's 	822
Eclipse Plus	<ul style="list-style-type: none"> • 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 	827
Eclipse XDB	<ul style="list-style-type: none"> • Four selectivity choices for flexible method development • High performance over a wide pH range (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 	831
StableBond (SB)	<ul style="list-style-type: none"> • Basic, acidic, neutral compounds • Exceptional stability at low pH (1-2) • 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 	838
Bonus-RP	<ul style="list-style-type: none"> • 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 	846

(Continued)

Quick Guide to Agilent Reversed-Phase Bonded Phases

Modern RP-HPLC

Columns	Recommended Uses and Applications	Page No.
Extend-C18	<ul style="list-style-type: none"> 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 	850
ZORBAX Rx	<ul style="list-style-type: none"> 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 	854
Pursuit	<ul style="list-style-type: none"> Good separations of a wide range of analytes Diphenyl and Pentafluorophenyl bonded phases for unique selectivity 200Å pore size for separations of larger molecules 	856
Pursuit XRs	<ul style="list-style-type: none"> High carbon load for excellent retention and resolution Basic, acidic, and neutral compounds Unique diphenyl bonded phase for separations based on pi-pi selectivity 	862
Polaris A	<ul style="list-style-type: none"> Good for polar acids, polar bases and non-polar compounds High aqueous compatibility 	865
Polaris Ether	<ul style="list-style-type: none"> Additional selectivity for H-bond donors High aqueous compatibility No "phase collapse" 	865

Original ZORBAX

Columns	Recommended Uses and Applications	Page No.
ZORBAX	<ul style="list-style-type: none"> 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 	870
ZORBAX ODS Classic (non-encapped)	<ul style="list-style-type: none"> General separation of basic, acidic, neutral compounds at mid-range to low pH with different selectivity than SB or XDB columns 	870



Poroshell 120

- Up to 90% of the efficiency of sub-2 μm
- 2X the efficiency of 3.5 μm
- Up to 50% less pressure than sub-2 μm columns
- Ideal for use up to 600 bar for HPLC and UHPLC
- Three 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 μm 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 Poroshell 300 columns, ideal for fast, high resolution separations of biomolecules.

Column Specifications

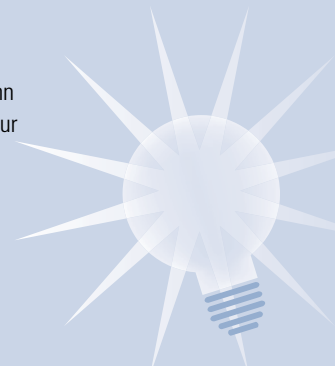
Bonded Phase	Pore Size	Temp. Limits	pH Range	Endcapped	Carbon Load
SB-C18	120Å	90°C	1.0-8.0	No	8%
EC-C18	120Å	60°C	2.0-8.0	Double	10%
EC-C8	120Å	60°C	2.0-8.0	Double	5%

Specifications represent typical values only.



Tips & Tools

Method transfer from a conventional 3.5 or 5 μm column is easy, and often requires only minor adjustments to your method and no revalidation. Learn more at www.agilent.com/chem/poroshell120video



Poroshell 120

Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	EC-C18 USP L1	EC-C8 USP L7
Analytical	4.6 x 150	2.7	683975-902	693975-902	693975-906
Analytical	4.6 x 100	2.7	685975-902	695975-902	695975-906
Analytical	4.6 x 75	2.7	687975-902	697975-902	697975-906
Analytical	4.6 x 50	2.7	689975-902	699975-902	699975-906
Analytical	4.6 x 30	2.7	681975-902	691975-902	691975-906
Solvent Saver	3.0 x 150	2.7	683975-302	693975-302	693975-306
Solvent Saver	3.0 x 100	2.7	685975-302	695975-302	695975-306
Solvent Saver	3.0 x 75	2.7	687975-302	697975-302	697975-306
Solvent Saver	3.0 x 50	2.7	689975-302	699975-302	699975-306
Solvent Saver	3.0 x 30	2.7	681975-302	691975-302	691975-306
Narrow Bore	2.1 x 150	2.7	683775-902	693775-902	693775-906
Narrow Bore	2.1 x 100	2.7	685775-902	695775-902	695775-906
Narrow Bore	2.1 x 75	2.7	687775-902	697775-902	697775-906
Narrow Bore	2.1 x 50	2.7	689775-902	699775-902	699775-906
Narrow Bore	2.1 x 30	2.7	681775-902	691775-902	691775-906

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education

Superficially porous particles provide similar performance to sub-2 μm particles

This Van Deemter curve shows that Poroshell 120 – a superficially porous, 2.7 μm particle column – can deliver reduced plate heights similar to a 1.8 μm column for similar efficiency.

✕ **Agilent Poroshell 120 EC-C18**

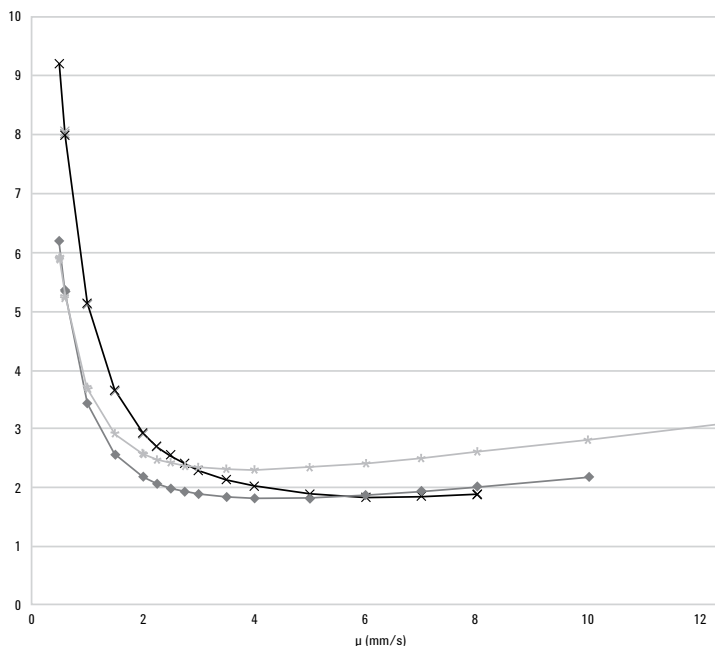
3.0 x 100 mm, 2.7 μm
(USCFX01009)
P/N 695975-302

◆ **Agilent ZORBAX Eclipse Plus C18**

3.0 x 100 mm, 1.8 μm
(USUYB01455)
P/N 959964-302

* **Agilent ZORBAX Eclipse Plus C18**

3.0 x 100 mm, 3.5 μm
(USUXV01435)
P/N 959961-302



UHPLC efficiency at HPLC pressures

Column A: Poroshell 120 EC-C18
695975-302
3 x 100 mm, 2.7 μm

Column B: Eclipse Plus C18
959964-302
3.0 x 100 mm, 1.8 μm

Mobile Phase: 60% Acetonitrile:40% Water

Flow Rate: 0.58 mL/min

Temperature: 60°C

Injection Volume: 4 μL

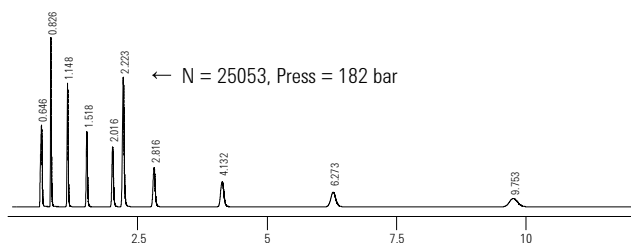
Detector: DAD Sig = 254.4 nm

Ref = 360,100 nm

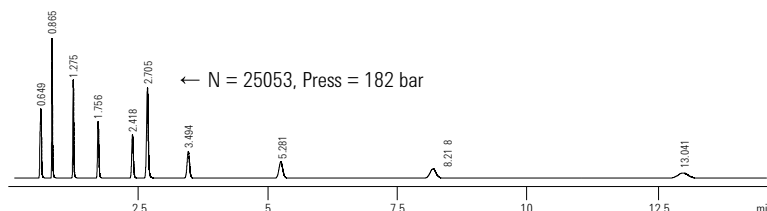
Sample: (PN 5188-6529) spiked w/50 μL
2 mg/mL Thiourea in
water/acetonitrile (65:35)

For this sample of neutral alkylphenones, the Poroshell 120 column delivered >90% of the efficiency attained by the 1.8 μm column. Also note that the pressure on the Poroshell 120 column is about 50% of the pressure on the 1.8 μm column.

A Agilent Poroshell 120 EC-C18, 3.0 x 100 mm, 2.7 μm
PN 695975-302



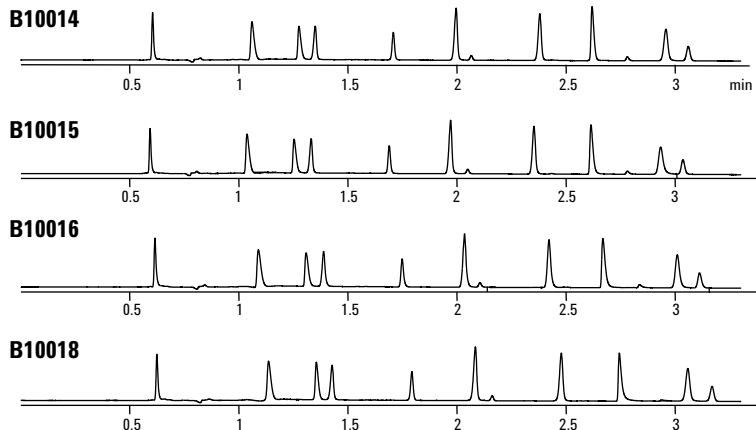
B Agilent Eclipse Plus C18, 3.0 x 100 mm, 1.8 μm
PN 959964-302



The simpler the manufacturing process, the more consistent the column

A single-step shell process creates a highly reproducible column, as you can see in this lot-to-lot comparison.

Agilent Poroshell 120 EC-C18
4.6 x 100 mm, 2.7 μ m
P/N 695975-902 – from 4 Different Lots

**Poroshell 120 EC-C8 is less retentive for faster analysis of non-polar compounds**

Column A: Poroshell 120 EC-C18
699975-302

3 x 50 mm, 2.7 μ m

Column B: Poroshell 120 EC-C8
699975-306

3.0 x 50 mm, 2.7 μ m

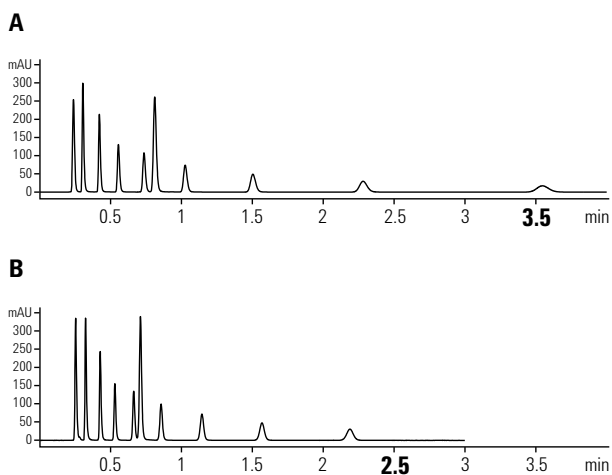
Mobile Phase: 60% CH₃CN:40% H₂O

Flow Rate: 0.85 mL/min

Temperature: 26°C

Detector: 254 nm

Sample: 2 μ L of RRLC Checkout Sample
(PN 5188-6529), alkylphenones

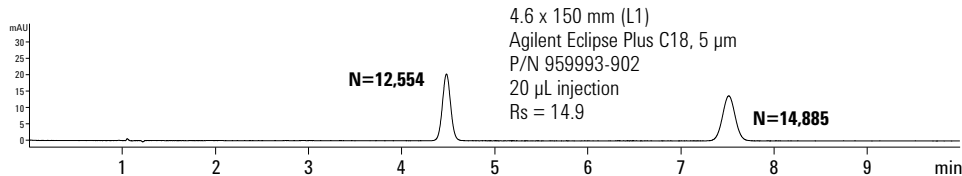


USP method for Naproxen tablets – 4.5X faster analysis on Agilent Poroshell 120 at HPLC pressures

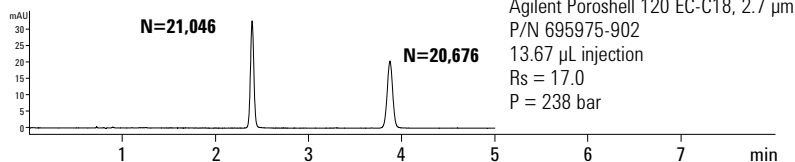
Mobile Phase: 50:49:1 MeCN:H₂O
Acetic Acid
Flow Rate: 1.2 mL/min

This Naproxen separation demonstrates how easy it can be to convert a method to Poroshell 120 columns without changing the flow rate or mobile phase.

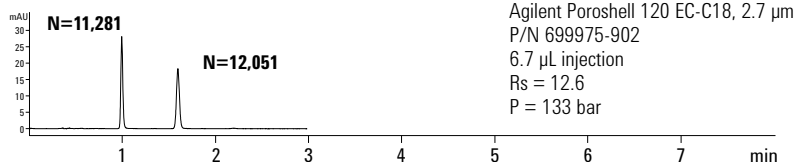
1. Naproxen
2. Butyrophenone



2X Faster



4.5X Faster

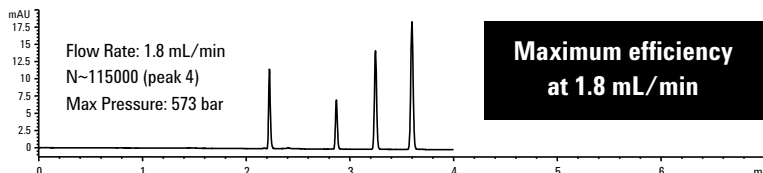
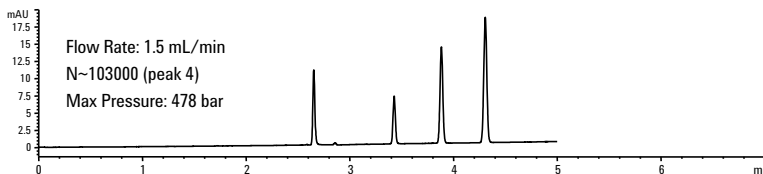
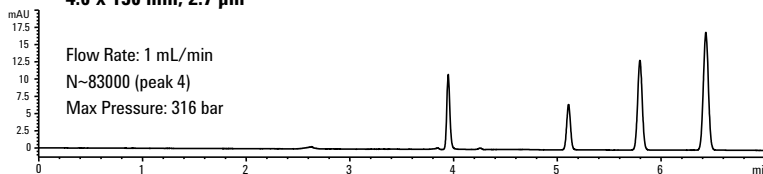


Agilent Poroshell 120 columns in series deliver the highest efficiency at HPLC and UHPLC pressures

Because low backpressure is one of the advantages of Poroshell 120 columns, you can couple several columns in series to achieve the highest separation power per unit time. This enables better separation of complex samples.

Peak #	Compound	Plates	k'
2	Acetophenone	114120	0.29
3	Benzene	109931	0.46
4	Touene	114800	0.65

3 Agilent Poroshell 120 EC-C18 columns in series 693975-902 4.6 x 150 mm, 2.7 μm



**Maximum efficiency
at 1.8 mL/min**

LC2011_120



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

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	No	14%
ZORBAX Eclipse Plus Phenyl-Hexyl	95Å	160 m ² /g	60°C	2.0-8.0	Double	9%

Specifications represent typical values only.

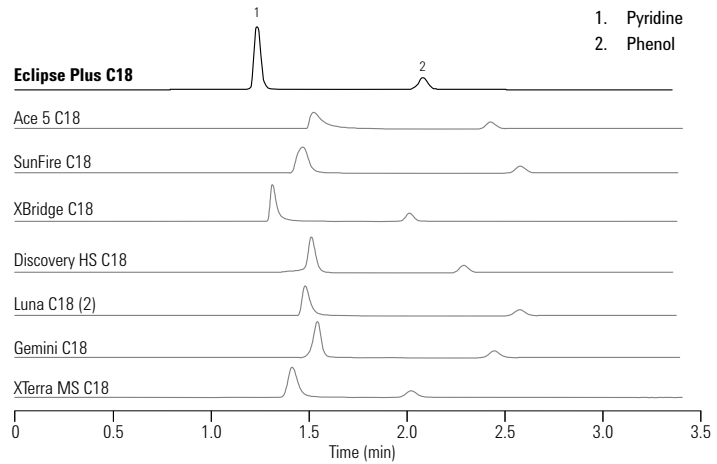
*Column lifetime will be reduced significantly at pH >7 and temperature >40°C. At pH 6-9, highest column stability for all silica based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in range of 0.01-0.02 M, especially with phosphate and carbonate buffers.

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



LCECD01

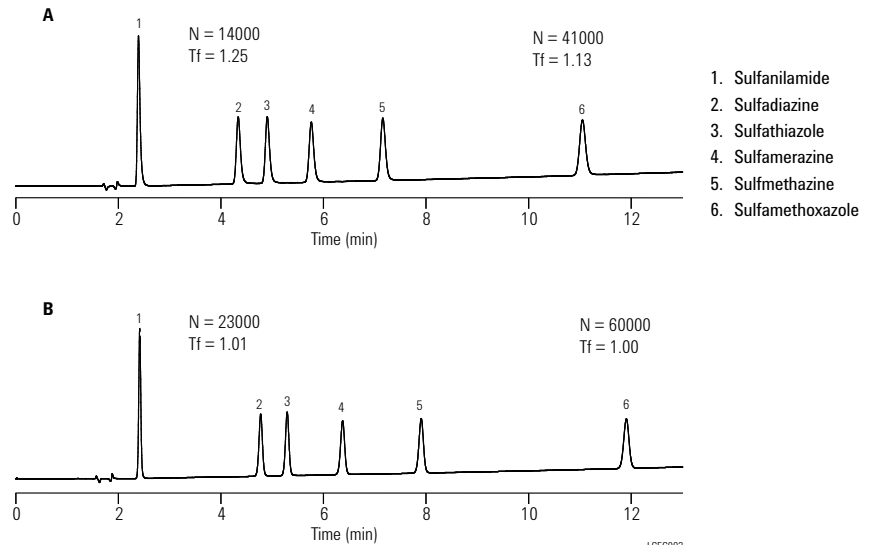
Peak Shape and Efficiency are Better with ZORBAX Eclipse Plus

Column A: XBridge C18, 4.6 x 150 mm, 5 µm
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

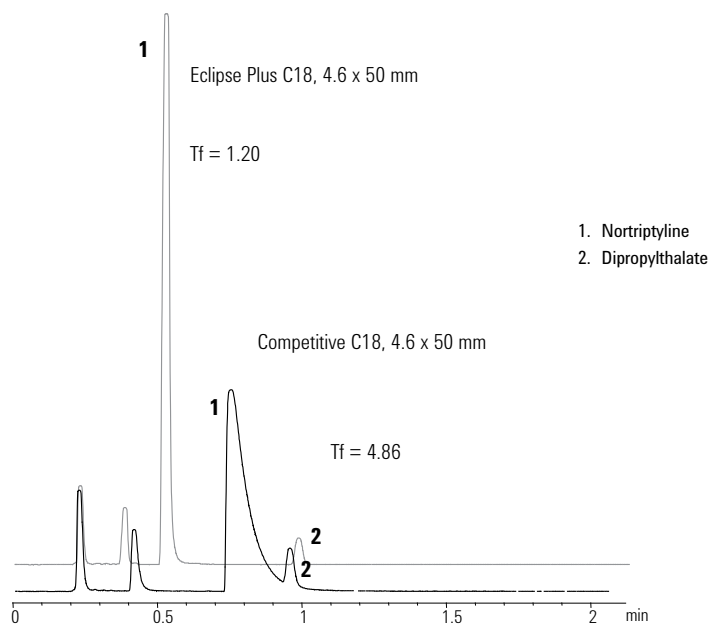


LCECD03




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

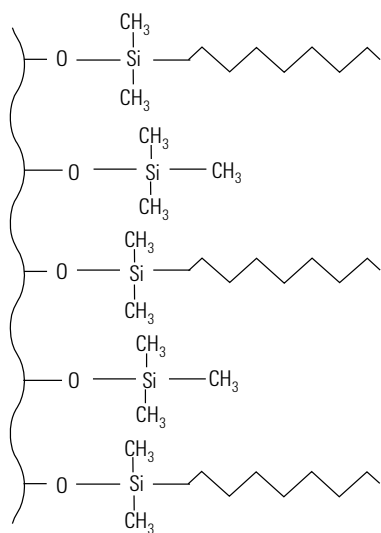
Mobile Phase: 65% ACN:35% 25 mM phosphate buffer (pH 7.4)

Superior peak shape and better selectivity with Eclipse Plus means more resolution, easier quantitation and better results in your separations.

**Tips & Tools**To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services

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 RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306		
	Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306		
	Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306		
	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 RRHD, 1200 bar	2.1 x 150	1.8	959759-902	959759-906		
	Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	959758-902	959758-906		
	Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	959757-902	959757-906		
	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	
	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-936	820950-937	820950-938	820950-939
	Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-936	821125-937	821125-938	821125-939
	Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901



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.

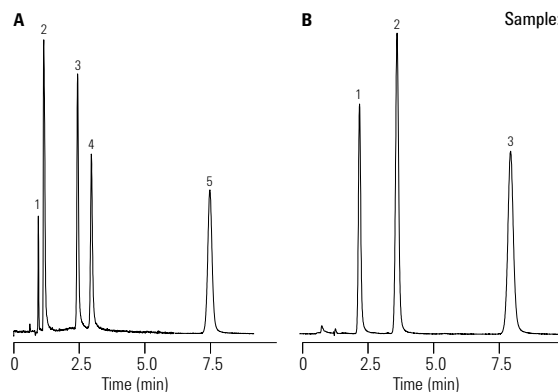
*Eclipse XDB columns are designed for operation over a wide pH range. At pH 6-9, highest columns stability for all silica based columns is achieved by operating at temperatures <40°C and using low buffer concentrations in the range of 0.01-0.02 M.

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
25% ACN
B: pH 7.0 90% 20 mM phosphate
10% ACN

Flow Rate: 1.5 mL/min
Temperature: 40°C



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.

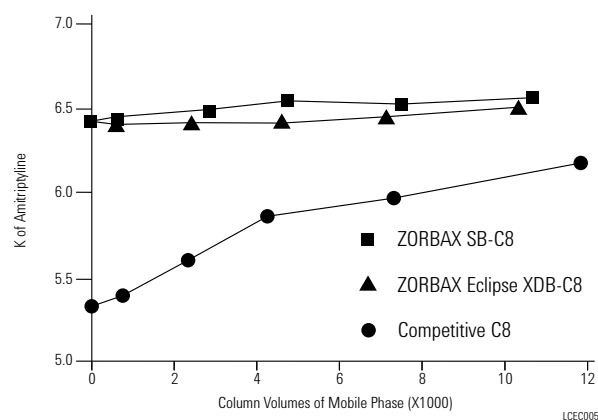
Column Stability Testing at pH 3 and 60°C

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 an Eclipse endcapped 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

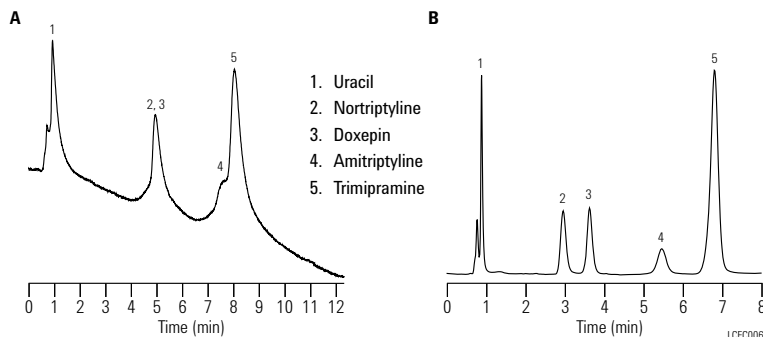
Column B: Eclipse XDB-C8
993967-906
4.6 x 150 mm, 5 µm
Sol-type
After 1843 Column Volumes

Mobile Phase: 60% ACN
40% 250 mM Phosphate Buffer, pH 7.0

Flow Rate: 1.5 mL/min

Temperature: 60°C

Sample: Tricyclic Antidepressants



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

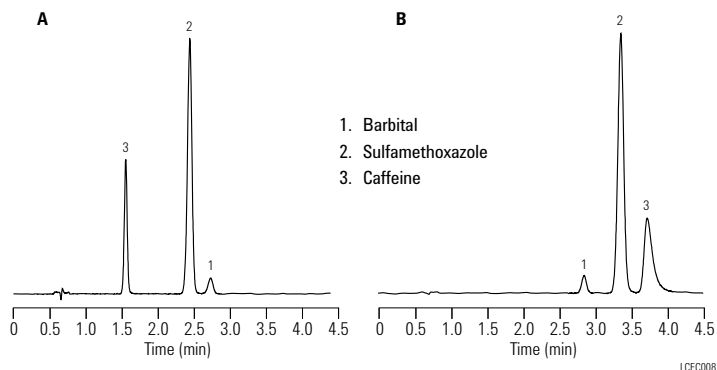
Column A: Eclipse XDB-C8
966967-906
4.6 x 75 mm, 3.5 µm

Column B: ZORBAX Rx/SB-C8
866953-906
4.6 x 75 mm, 3.5 µm

Mobile Phase: 70% 25 mM NaH₂PO₄, 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

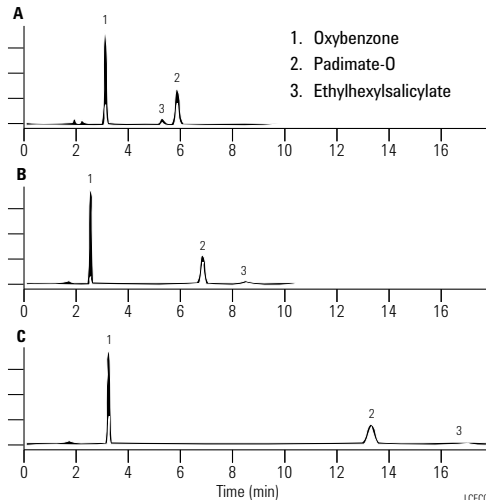
Column A: Eclipse XDB-Phenyl
963967-912
4.6 x 150 mm, 3.5 µm

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% H₂O: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.



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

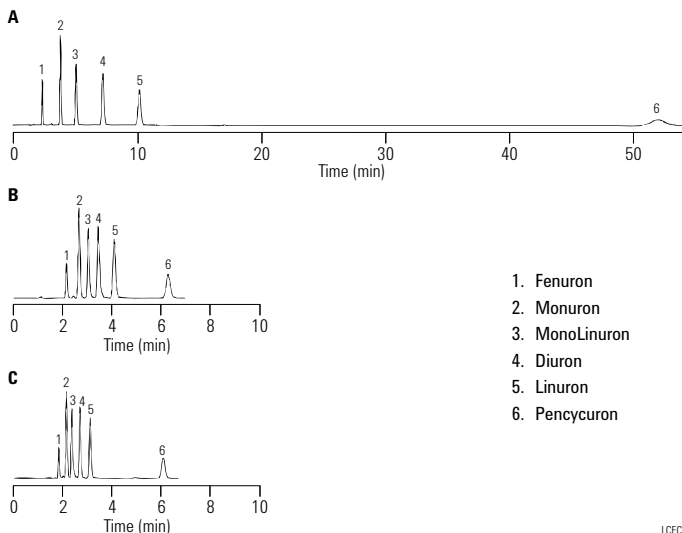
Column C: Eclipse XDB-C18
993967-902
4.6 x 150 mm, 5 µm

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














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 RRHD, 1200 bar	3.0 x 150	1.8	981759-302			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	981758-302			
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	981757-302			
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 RRHD, 1200 bar	2.1 x 150	1.8	981759-902			
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	981758-902			
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	981757-902			





(Continued)

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)						
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		
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-925	820950-926	820950-927	820950-935
 Guard Cartridges, 4/pk	2.1 x 12.5	5	821125-926	821125-926	821125-926	821125-935
 Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)						
 PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106		
 PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106		
 PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906		
 PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906		
 PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906		
 PrepHT Guard Cartridge	17 x 7.5	5	820212-925	820212-926		
 Guard Cartridge Hardware			820444-901	820444-901		
 PrepHT endfittings, 2/pk			820400-901	820400-901		

Unless indicated, column pressure limit is 400 bar.

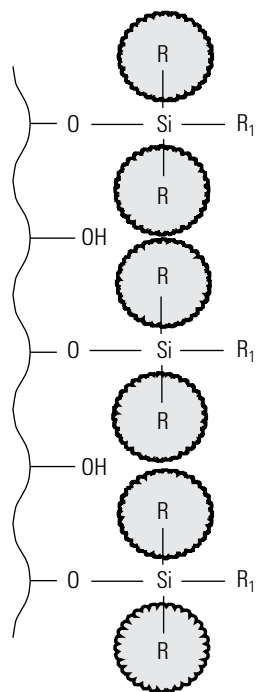
ZORBAX Eclipse XDB

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)				
 Analytical	4.6 x 250	5	7995118-585	7995108-585
 Analytical	4.6 x 150	5	7995118-595	7995108-595
 Rapid Resolution	4.6 x 75	3.5	7995118-344	7995108-344
 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	5021-1845

(Continued)

ZORBAX Eclipse XDB

Hardware	Description	Size (mm)	Particle Size (µm)	Eclipse XDB-C18 USP L1	Eclipse XDB-C8 USP L7
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
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, and 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 making StableBond columns 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 0.01-0.02 M. At mid-range pH, Eclipse Plus, 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

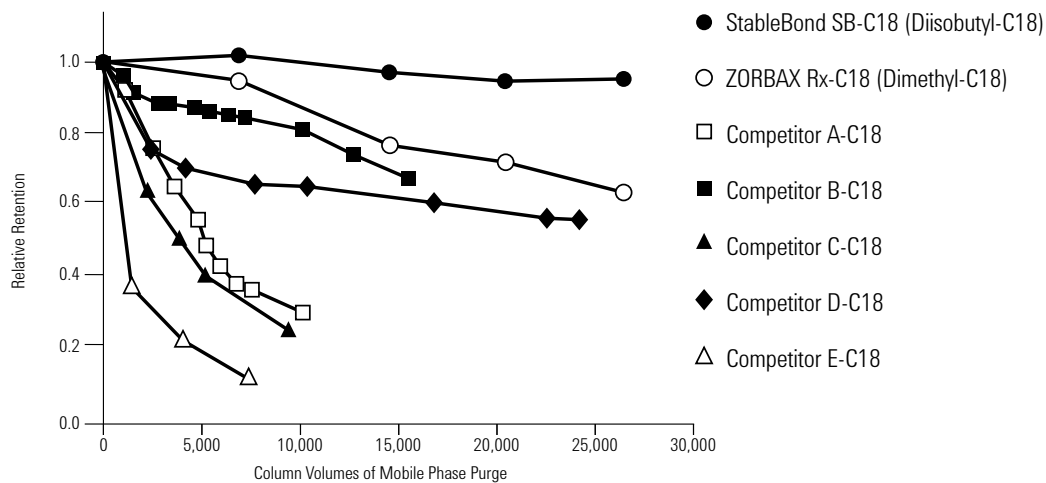
Column: ZORBAX Rx-C18
883967-902
4.6 x 150 mm, 5 µm

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

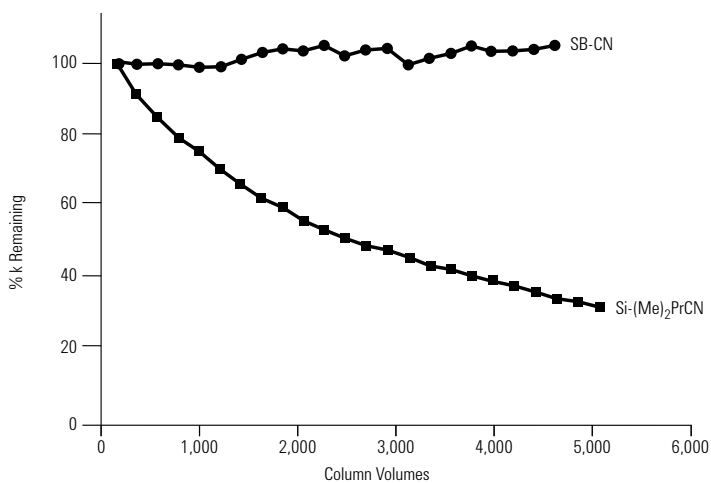
Flow Rate: 1 mL/min

Gradient: 0-100% ACN

Temperature: 50°C

Sample: 1-phenylheptane @ 50% AC/50% Water
with 0.1% TFA

ZORBAX StableBond SB-CN and other short chain StableBond bonded phases are also exceptionally stable at low pH. Conventional dimethyl CN and similar bonded phases lack this stability.



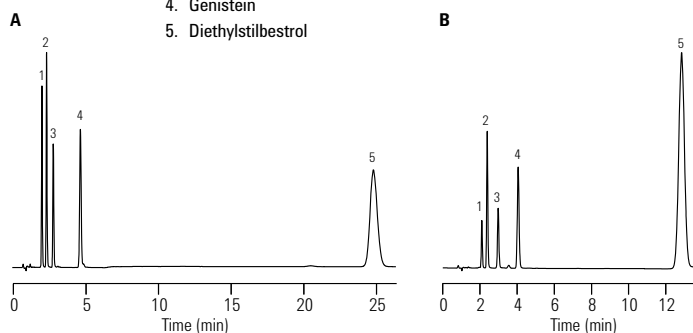
SB-CN Optimizes Retention and Resolution

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 NaH₂PO₄, 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

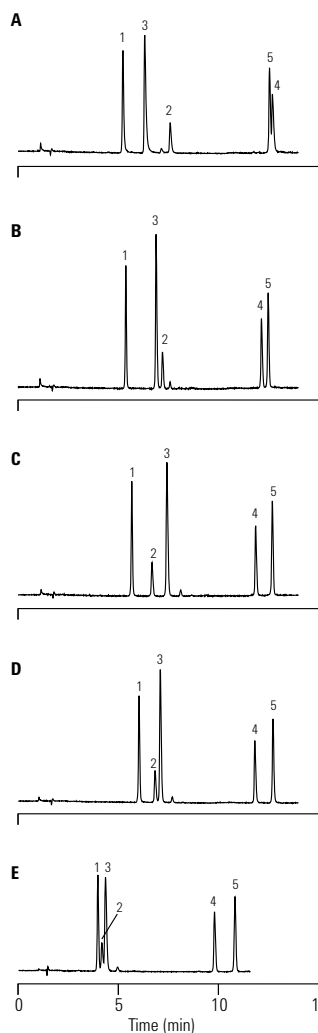
Mobile Phase: 0-100% B in 18.8 min
A: 50 mM NaH₂PO₄,
pH 2.5 in 95% H₂O / 5% ACN
B: 50 mM NaH₂PO₄,
pH 2.5 in 47% H₂O / 53% ACN

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	SB-C8	SB-CN	SB-C3	SB-Phenyl	SB-Aq
			USP L1	USP L7	USP L10	USP L56	USP L11	
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	827975-901	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					

Unless indicated, column pressure limit is 400 bar.

(Continued)












ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	Particle					
			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)								
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	859700-302	859700-306				
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	858700-302	858700-306	858700-305		858700-312	
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	857700-302	857700-306	857700-305		857700-312	
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 RRHD, 1200 bar	2.1 x 150	1.8	859700-902	859700-906	859700-905		859700-912	
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	858700-902	858700-906	858700-905		858700-912	
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	857700-902	857700-906	857700-905		857700-912	

Unless indicated, column pressure limit is 400 bar.

(Continued)

ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18	SB-C8	SB-CN	SB-C3	SB-Phenyl	SB-Aq
			USP L1	USP L7	USP L10	USP L56	USP L11	
Standard Columns (no special hardware required)								
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				
 Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-124	820675-124	820675-115	
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-920	820950-915	820950-916	820950-922	820950-917	820950-933
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-915	821125-915	821125-924	821125-924	821125-915	821125-933
 Guard Hardware Kit	9.4 x 15	0	840140-901	840140-901	840140-901	840140-901	840140-901	
 Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)								
 PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-105		877250-112	877250-114
 PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106				877150-114
 PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906				870150-914
 PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906				870100-914
 PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906				870050-914
 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.

ZORBAX 80Å StableBond

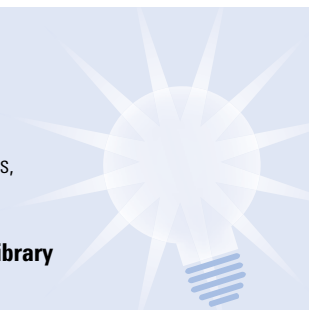
Hardware	Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11
Agilent Cartridge Columns (require hardware kit 5021-1845)						
AC	Analytical	4.6 x 250	5	7995218-585	7995208-585	
AC	Analytical	4.6 x 150	5	7995218-595	7995208-595	
AC	Rapid Resolution	4.6 x 75	3.5	7995218-344	7995208-344	
AC	Guard Cartridges, 10/pk	4.0 x 4	5	7995118-504	7995118-504	
AC	Cartridge Holder, 5021-1845			5021-1845	5021-1845	
Standard Columns (no special hardware required)						
AC	Rapid Resolution HT	4.6 x 50	1.8	822975-902	822975-906	
AC	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	822975-932		
AC	Narrow Bore RRHT	2.1 x 50	1.8	822700-902		
AC	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	

(Continued)

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

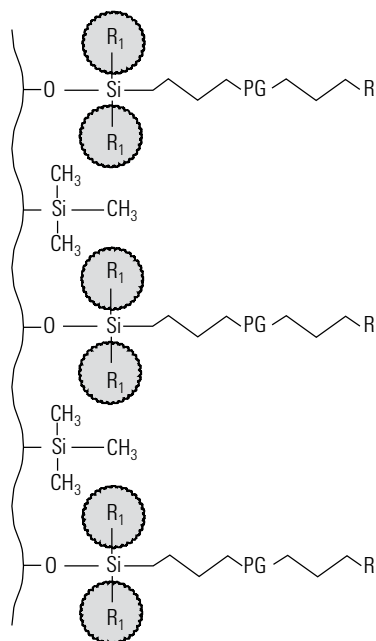


ZORBAX 80Å StableBond

Hardware Description	Size (mm)	Particle Size (µm)	SB-C18 USP L1	SB-C8 USP L7	SB-Phenyl USP L11
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



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.

Unique, Polar Alkyl Bonus-RP Bonded Phase

Improved Peak Shape of Basic Compounds Using Bonus-RP

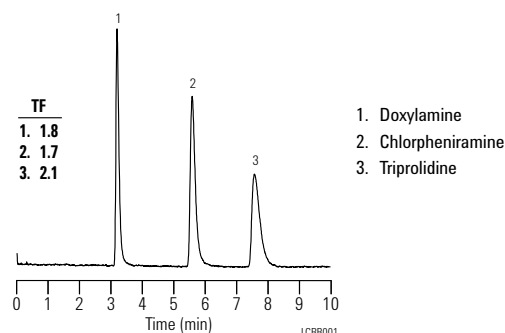
Column: Alkyl-C8
4.6 x 150 mm, 5 µm

Mobile Phase: 75% 25 mM NH₄OAc, pH 5.5
25% ACN

Flow Rate: 1.5 mL/min

Temperature: 40°C

Detector: 254 nm



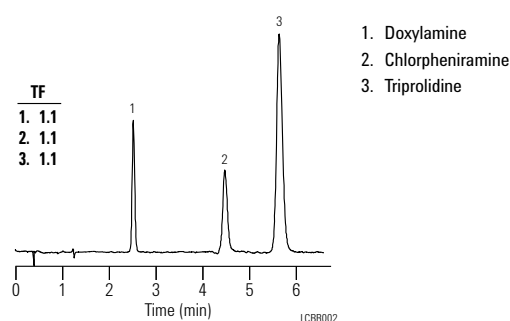
Column: ZORBAX Bonus-RP
883668-901
4.6 x 150 mm, 5 µm

Mobile Phase: 80% 25 mM NH₄OAc, pH 5.5
20% ACN

Flow Rate: 1.5 mL/min

Temperature: 40°C

Detector: 254 nm



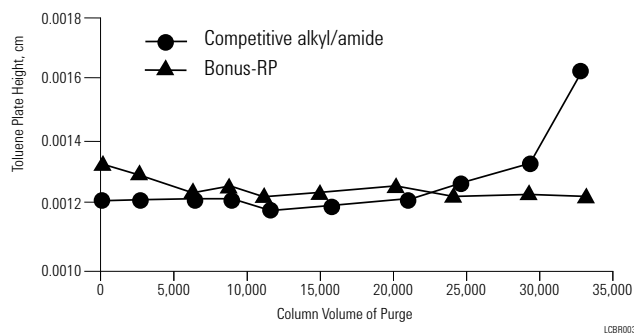
Bonus-RP eliminates peak tailing of these basic compounds in comparison to a typical alkyl C8 bonded phase. In the mid-pH region, residual silanols can interact more strongly with basic compounds to cause peak tailing. The polar group in the Bonus-RP bonded phase eliminates peak tailing of these basic 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 volume is equivalent to approximately one working month.

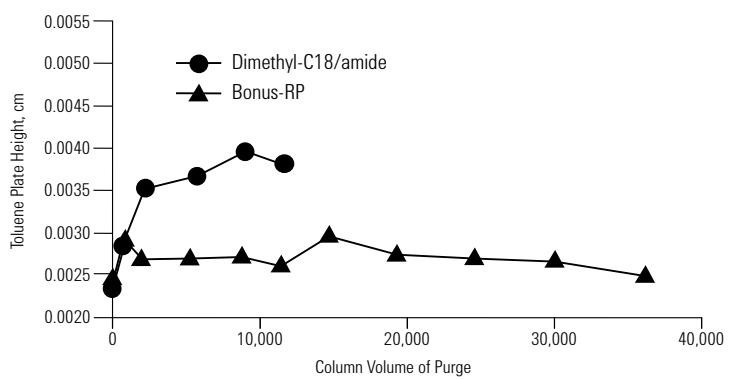
Dimethyl-C18/amide, Bonus-RP

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

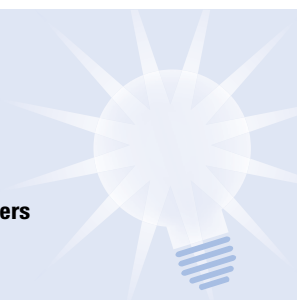


Sterically protecting side groups provide good low pH stability and longer column lifetime than similar polar alkyl bonded phases.

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



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

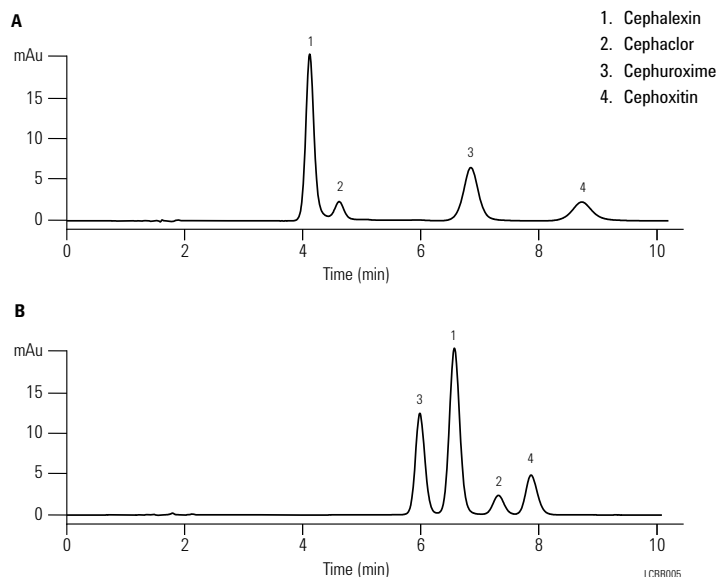
Flow Rate: 1.0 mL/min

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 changes.














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

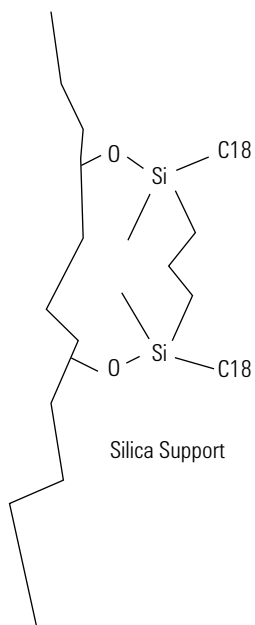
Unless indicated, column pressure limit is 400 bar.

(Continued)

ZORBAX Bonus-RP

Hardware Description	Size (mm)	Particle Size (µm)	Bonus-RP USP L60
Standard Columns (no special hardware required)			
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
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-928
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-928
 Guard Hardware Kit			820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)			
 PrepHT Cartridge	21.2 x 250	7	878250-101
 PrepHT Cartridge	21.2 x 150	7	878150-101
 PrepHT Cartridge	21.2 x 150	5	868150-901
 PrepHT Cartridge	21.2 x 100	5	868100-901
 PrepHT Cartridge	21.2 x 50	5	868050-901
 PrepHT endfittings, 2/pk			820400-901
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-928
 Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.



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 columns is obtained by reducing the operating temperature to 40°C or below and using lower buffer concentrations (0.01-0.02 M) 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 Na₂HPO₄ 70% MeOH
pH 11:
30% 20 mM TEA 70% MeOH

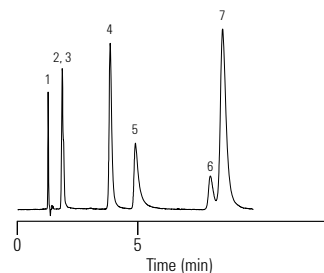
Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: 254 nm

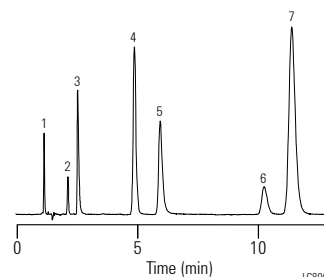
Sample: Antihistamines

pH 7



1. Maleate
2. Scopolamine
3. Pseudoephedrine
4. Doxylamine
5. Chlorpheniramine
6. Triprolidine
7. Diphenhydramine

pH 11



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.

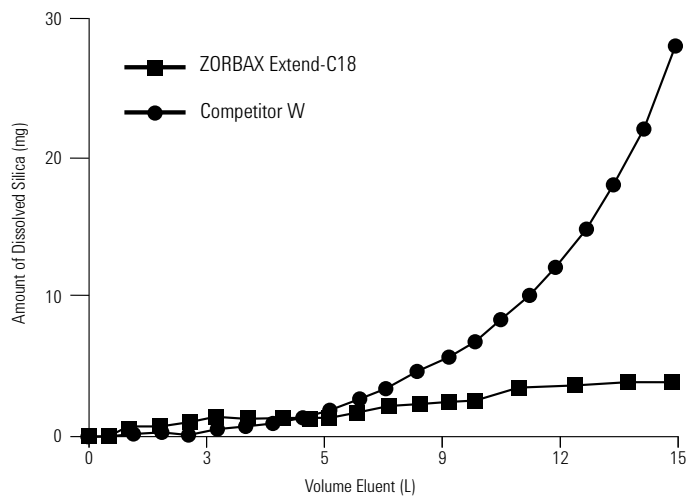
Long Life at High pH with Extend-C18

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

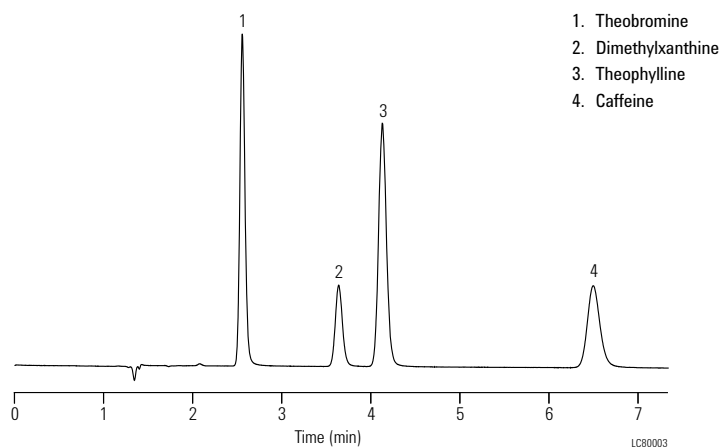
Temperature: Ambient



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 NaH₂PO₄, pH 3.0
 20% Methanol
Flow Rate: 1.0 mL/min
Temperature: 35°C
Detector: 254 nm
Sample: Basic Compounds



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

Unless indicated, column pressure limit is 400 bar.

(Continued)

ZORBAX 80Å Extend-C18

Hardware Description	Size (mm)	Particle Size (µm)	Extend-C18 USP L1
Standard Columns (no special hardware required)			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	758700-302
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	757700-302
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
Narrow Bore RR	2.1 x 100	3.5	761753-902
Narrow Bore RR	2.1 x 50	3.5	735700-902
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	759700-902
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	758700-902
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	757700-902
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
 Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-930
 Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-930
 Guard Hardware Kit			820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)			
 PrepHT Cartridge	21.2 x 150	5	770150-902
 PrepHT	21.2 x 100	5	770100-902
 PrepHT	21.2 x 50	5	770050-902
 PrepHT endfittings, 2/pk			820400-901
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-930
 Guard Cartridge Hardware			820444-901

Unless indicated, column pressure limit is 400 bar.

ZORBAX Rx

- Recommended for alternate selectivity at low pH relative to Eclipse XDB-C18 and StableBond SB-C18; for higher temperature applications, StableBond is recommended
- Higher carbon load than SB-C18 columns (12% vs. 10%).
- High stability and good peak shape for low pH applications (up to pH 8)
- Manufactured using dimethyloctadecylsilane and non-encapped
- Same product as SB-C8

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Encapped	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.

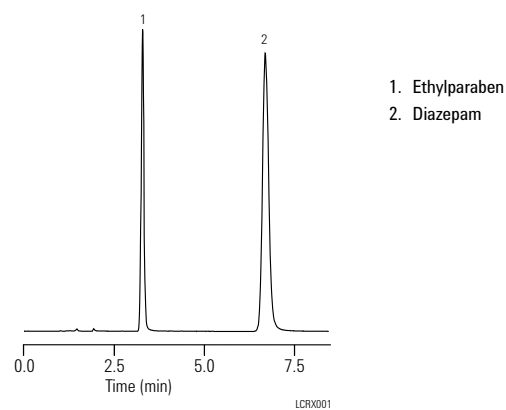
*At pH 6-9 highest column stability for all silica based columns is obtained by operating at temperatures <40°C and using lower buffer concentrations in the range of 0.01-0.02 M.

Analysis of Diazepam on Rx-C18

Column: ZORBAX Rx-C18
880967-302
3.0 x 250 mm, 5 µm

Mobile Phase: 35% H₂O: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 ID Rx-C18 column reduces solvent usage by 60% over what would be used if the analysis was 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	
Rapid Resolution	4.6 x 100	3.5	861967-902	
Rapid Resolution	4.6 x 75	3.5	866967-902	
Solvent Saver	3.0 x 250	5	880967-302	
Solvent Saver	3.0 x 150	5	883967-302	
Solvent Saver Plus	3.0 x 150	3.5	863967-302	
Solvent Saver Plus	3.0 x 100	3.5	861967-302	
Narrow Bore	2.1 x 150	5	883700-902	
Narrow Bore RR	2.1 x 100	3.5	861767-902	
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			820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)				
PI PrepHT Cartridge	21.2 x 250	7	877967-102	877250-106
PI PrepHT Cartridge	21.2 x 150	7		877150-106
PI PrepHT Cartridge	21.2 x 150	5		870150-906
PI PrepHT Cartridge	21.2 x 100	5		870100-906
PI PrepHT Cartridge	21.2 x 50	5		870050-906
PI PrepHT Guard Cartridge, 2/pk		5	820212-914	820212-915
PI Guard Cartridge Hardware			820444-901	820444-901
PI PrepHT endfittings, 2/pk			820400-901	820400-901

*Rx-C8 is the same product as SB-C8. For other sizes and configurations, see the ZORBAX StableBond section. Turn to pages 841–848.

Pursuit HPLC Columns

Beginning in drug discovery and drug metabolism, Pursuit columns are ideal for analyzing lead compounds and biological samples. The column's performance is due to the unique combination of advanced bonding chemistry and ultra-high purity silica. These factors combine to provide rapid separations with excellent first time resolution and symmetrical peaks for polar compounds, whether at pH 1.5 or 10. Additionally, the need for ion pairing agents such as TFA is often eliminated, thus maximizing the performance of single and parallel multi-channel LC/MS systems.

Culminating in QC, Pursuit is ideal for implementing dependable trouble-free analysis of raw materials and approved drugs. Rigorous control and validation of each step in the manufacturing process ensures column reproducibility. With Pursuit your laboratory can spend its energy on producing results.

Special selectivities such as Pursuit PFP (for very polar compounds) and Pursuit PAH (environmental) give you the extra selectivities you need for your most challenging applications.

Pursuit

For LC/MS and high throughput applications. Built on the larger 200Å pore size silica, high ligand density delivers up to 40% faster separations without sacrificing resolution. This is accomplished by optimizing mass transfer with the larger pore size.

Pursuit XRs

For performance in analytical R&D, QC and preparative applications. Combining high ligand density with a 100Å pore size, high surface area silica, Pursuit XRs columns are designed to increase productivity, as they offer maximum loadability, excellent stability and easy scalability while maintaining superior resolution.

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



Pursuit XR^sUltra 2.8

For the ultimate in speed and good resolution on any instrument, we designed the Pursuit XR^sUltra 2.8 around an optimized 2.8 μm particle and an advanced packing procedure. Now you can decrease your run time while maintaining resolution. Lower backpressure allows high flow rates to be used, and the 2.8 μm particles of ultra-pure silica delivers 10-15% higher efficiency than 3 μm columns.

Pursuit UPS^{2.4}

For maximum efficiency, particularly in high viscosity solvent separations. With an optimized 2.4 μm particle, Pursuit UPS columns offer approximately 50% lower backpressure compared to sub-2 μm columns, delivering higher speed and resolution without the need for ultra-high pressure equipment.

Pursuit UPS^{1.9}

Pursuit UPS^{1.9} columns deliver sub-2 μm efficiencies when sensitivity, resolution, and throughput are critical. These columns excel under the high pressures and fast gradients demanded by today's pharmaceutical industry, up to a pressure limit of 1000 bar.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped	Carbon		
					Load	Pore Volume	Ligand Coverage
Pursuit C18	200Å	200 m ² /g	1.5-10	Yes	12.9%	1.1 mL/g	3.5 $\mu\text{mol}/\text{m}^2$
Pursuit C8	200Å	200 m ² /g	1.5-10	Yes	7.4%	1.1 mL/g	3.8 $\mu\text{mol}/\text{m}^2$
Pursuit Diphenyl	200Å	200 m ² /g	1.5-8.0	Yes	7.3%	1.1 mL/g	2.8 $\mu\text{mol}/\text{m}^2$
Pursuit PFP	200Å	200 m ² /g	1.5-10	Yes	6.3%	1.1 mL/g	3.4 $\mu\text{mol}/\text{m}^2$
Pursuit PAH	200Å	200 m ² /g	1.5-10	Yes		1.1 mL/g	
Pursuit XR ^s C18	100Å	440 m ² /g	1.5-10	Yes	22%	1.1 mL/g	2.9 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s C8	100Å	440 m ² /g	1.5-10	Yes	15%	1.1 mL/g	3.7 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Diphenyl	100Å	440 m ² /g	1.5-8.0	Yes	14.6%	1.1 mL/g	2.6 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Si	100Å	440 m ² /g	1.5-10	Yes		1.1 mL/g	
Pursuit XR ^s Ultra 2.8 C18	100Å	440 m ² /g	1.5-10	Yes	23.2%	1.1 mL/g	3.2 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Ultra 2.8 C8	100Å	440 m ² /g	1.5-10	Yes	15%	1.1 mL/g	3.7 $\mu\text{mol}/\text{m}^2$
Pursuit XR ^s Ultra 2.8 Diphenyl	100Å	440 m ² /g	1.5-8.0	Yes	14.6%	1.1 mL/g	2.6 $\mu\text{mol}/\text{m}^2$
Pursuit UPS ^{2.4} C18	100Å	350 m ² /g	1.5-10	Yes	21%	0.9 mL/g	2.5 $\mu\text{mol}/\text{m}^2$
Pursuit UPS ^{1.9} C18	100Å	350 m ² /g	1.5-10	Yes	21%	0.9 mL/g	3.0 $\mu\text{mol}/\text{m}^2$

Specifications represent typical values only.

Tricyclic antidepressants and benzodiazepines

Column: Pursuit XRs C18
A6000150X046
4.6 x 150 mm, 5 µm

Mobile Phase: A: Water+0.1% HCOOH
 B: MeCN+0.1% HCOOH

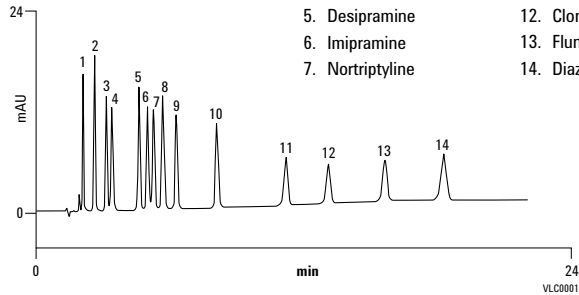
Gradient: 30-40% B in 15 min, hold at 40% B for 15 min

Flow Rate: 1.0 mL/min

Temperature: Ambient

Detector: UV, 254 nm

- | | |
|-------------------------|-------------------|
| 1. 7-Aminoclonazepam | 8. Amitriptyline |
| 2. 7-Aminoflunitrazepam | 9. Trimipramine |
| 3. Nordoxepin | 10. Clomipramine |
| 4. Doxepin | 11. Nordiazepam |
| 5. Desipramine | 12. Clonazepam |
| 6. Imipramine | 13. Flunitrazepam |
| 7. Nortriptyline | 14. Diazepam |



Mechanical stability of Pursuit XRs

Column: Pursuit XRs C18
A6000050X020
2.0 x 50 mm, 5 µm

Sample: DMSO mix

Mobile Phase: A: MeOH:water, 10:90 + 0.1% HCOOH
 B: MeOH:water, 90:10 + 0.1% HCOOH

Gradient: 0-100% B in 3 min, back to 0% B
 in 0.5 min, hold at 0% B for 3.5 min

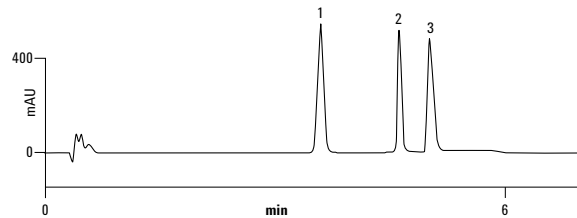
Flow Rate: 0.4 mL/min

Temperature: Ambient

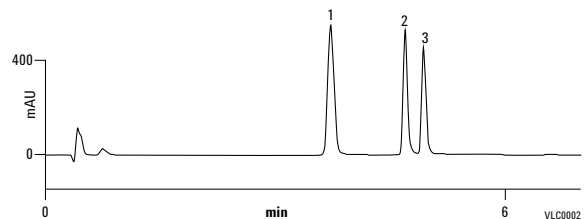
Detector: UV, 254 nm

1. 4-Methoxybenzenesulfonamide
2. Methyl 3-aminothiophene-2-carboxylate
3. Trimipramine

Injection 1



Injection 5000



Antifungals

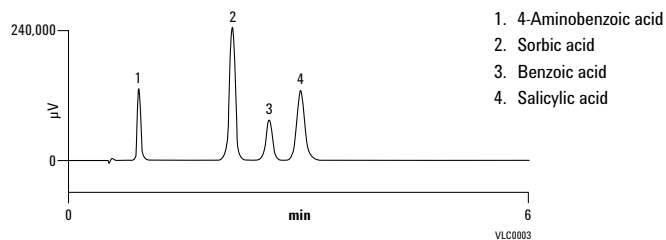
Column: Pursuit XR^{Ultra} 2.8 Diphenyl
A7521050X020
2 x 50 mm, 2.8 µm

Mobile Phase: Water+0.1% HCOOH:MeCN+0.1%
HCOOH, 80:20

Flow Rate: 0.4 mL/min

Temperature: Ambient

Detector: UV, 254 nm

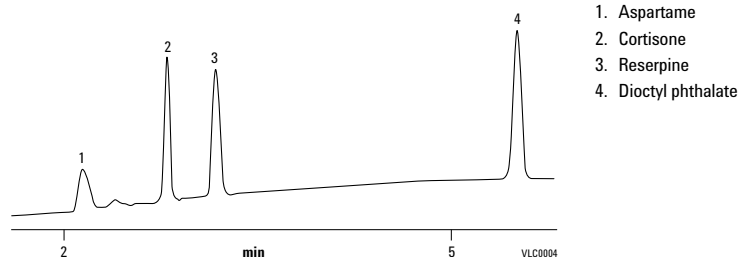
**Liquid chromatography phase test mixture (LPTM) on Pursuit C8**

Column: Pursuit C8
A3031050X020
2.0 x 50 mm, 3 µm

Mobile Phase: A: 0.05% HCOOH in water
B: 0.05% HCOOH in MeCN

Flow Rate: 0.6 mL/min

Detector: UV, 220 nm

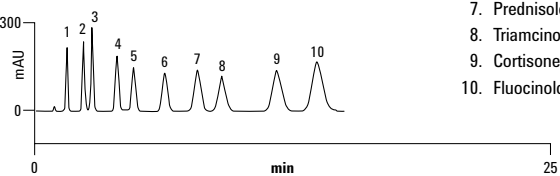
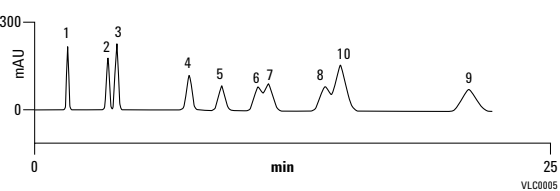
**Adrenocorticosteroids on Pursuit PFP and C18**

Mobile Phase: MeCN:water, 22.5:77.5

Flow Rate: 1.5 mL/min

Temperature: Ambient

Detector: UV, 240 nm

Pursuit PFP**Pursuit C18**

Pursuit HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit Diphenyl	Pursuit PFP	Pursuit PAH USP L1
50 x 250	10	A3002250X500	A3032250X500			
21.2 x 250	10	A3002250X212	A3032250X212			
21.2 x 150	10	A3002150X212				
21.2 x 250	5	A3000250X212			A3050250X212	
21.2 x 150	5	A3000150X212			A3050150X212	
21.2 x 100	5			A3040100X212		
10 x 250	10	A3002250X100	A3032250X100			
10 x 150	5	A3000150X100			A3050150X100	
10 x 250	5	A3000250X100	A3030250X100		A3050250X100	
4.6 x 250	10	A3002250X046	A3032250X046			
4.6 x 150	10	A3002150X046	A3032150X046			
4.6 x 100	10					
4.6 x 250	5	A3000250X046	A3030250X046	A3040250X046	A3050250X046	A7000250X046
4.6 x 150	5	A3000150X046	A3030150X046	A3040150X046	A3050150X046	A7000150X046
4.6 x 100	5	A3000100X046	A3030100X046	A3040100X046	A3050100X046	
4.6 x 50	5	A3000050X046	A3030150X046	A3040050X046	A3050050X046	
4.6 x 250	3	A3001250X046	A3031250X046	A3041250X046	A3051250X046	
4.6 x 150	3	A3001150X046	A3031150X046	A3041150X046	A3051150X046	
4.6 x 100	3	A3001100X046	A3031100X046	A3041100X046	A3051100X046	A7001100X046
4.6 x 50	3	A3001050X046		A3041050X046	A3051050X046	
4.6 x 30	3	A3001030X046				
4.0 x 250	5	A3000250X040				
4.0 x 125	5	A3000125X040				
3.9 x 300	10	A3002300X039				
3.9 x 300	5	A3000300X039				
3.9 x 150	5	A3000150X039				
3.0 x 250	5	A3000250X030		A3040250X030		
3.0 x 150	5	A3000150X030		A3040150X030	A3050150X030	
3.0 x 100	5	A3000100X030			A3050100X030	
3.0 x 250	3	A3001250X030				
3.0 x 150	3	A3001150X030		A3041150X030	A3051150X030	
3.0 x 100	3	A3001100X030		A3041100X030	A3051100X030	A7001100X030
3.0 x 50	3	A3001050X030		A3041050X030	A3051050X030	
2.0 x 250	5	A3000250X020				
2.0 x 150	5	A3000150X020	A3030150X020	A3040150X020		

(Continued)

Pursuit HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit Diphenyl	Pursuit PFP	Pursuit PAH USP L1
2.0 x 100	5	A3000100X020	A3030100X020	A3040100X020	A3050100X020	
2.0 x 50	5	A3000050X020	A3030050X020	A3040050X020	A3050050X020	
2.0 x 30	5	A3000030X020		A3040030X020	A3050030X020	
2.0 x 20	5	A3000020X020			A3050020X020	
2.0 x 250	3	A3001250X020		A3041250X020		
2.0 x 200	3			A3041200X020		
2.0 x 150	3	A3001150X020	A3031150X020	A3041150X020	A3051150X020	
2.0 x 100	3	A3001100X020	A3031100X020	A3041100X020	A3051100X020	A7001100X020
2.0 x 50	3	A3001050X020	A3031050X020	A3041050X020	A3051050X020	
2.0 x 30	3	A3001030X020	A3031030X020	A3041030X020	A3051030X020	
2.0 x 20	3	A3001020X020		A3041020X020	A3051020X020	

Pursuit ChromSep Complete Cartridge Systems

Hardware	Size (mm)	Particle Size (µm)	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit PAH USP L1
CS	4.6 x 250	5	A3000250C046	A3030250C046	A7000250C046
CS	4.6 x 250	3		A3031250C046	
CS	4.6 x 150	5	A3000150C046	A3030150C046	A7000150C046
CS	4.6 x 100	5	A3000100C046	A3030100C046	
CS	4.6 x 150	3	A3001150C046	A3031150C046	A7001150C046
CS	4.6 x 100	3	A3001100C046	A3031100C046	A7001100C046
CS	4.6 x 50	3	A3001050C046		
CS	3.0 x 250	5	A3000250C030		
CS	3.0 x 150	5	A3000150C030		
CS	3.0 x 100	5	A3000100C030		A7000100C030
CS	3.0 x 150	3	A3001150C030		
CS	3.0 x 100	3	A3001100C030		
CS	2.0 x 250	5	A3000250C020		
CS	2.0 x 150	5	A3000150C020	A3030150C020	
CS	2.0 x 100	5	A3000100C020		
CS	2.0 x 150	3	A3001150C020		
CS	2.0 x 100	3	A3001100C020		
CS	2.0 x 50	3	A3001050C020		

Pursuit ChromSep Replacement Cartridges

Hardware	Size (mm)	Particle Size (µm)	Unit	Pursuit C18 USP L1	Pursuit C8 USP L7	Pursuit PAH USP L1
CS	4.6 x 250	5				A7000250R046
			3/pk			A7000250T046
CS	4.6 x 150	5		A3000150R046	A3030150R046	A7000150R046
			3/pk	A3000150T046	A3030150T046	A7000150T046
CS	4.6 x 150	3			A3031150R046	A7001150R046
			3/pk		A3031150T046	A7001150T046
CS	4.6 x 100	3				A7001100R046
			3/pk			A7001100T046
CS	4.6 x 50	3		A3001050R046		
			3/pk	A3001050T046		
CS	3.0 x 150	5		A3000150R030		
			3/pk	A3000150T030		
CS	3.0 x 100	5		A3000100R030		A7000100R030
			3/pk	A3000100T030		A7000100T030
CS	3.0 x 150	3		A3001150R030		
			3/pk	A3001150T030		
CS	3.0 x 100	3		A3001100R030		A7001100R030
			3/pk	A3001100T030		A7001100T030
CS	2.0 x 50	3			A3031050R020	
			3/pk		A3031050T020	

Pursuit XRs HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XRs C18 USP L1	Pursuit XRs C8 USP L7	Pursuit XRs Diphenyl	Pursuit XRs Si USP L3
50.0 x 250	10	A6002250X500		A6002250X500	A6004250X500
30.0 x 250	5	A6000250X300			A6004250X300
30.0 x 150	5	A6000150X300		A6020150X300	
30.0 x 100	5	A6000100X300			
30.0 x 50	5	A6000050X300			
21.2 x 250	10	A6002250X212	A6012250X212		A6004250X212
21.2 x 250	5	A6000250X212		A6020250X212	
21.2 x 150	5	A6000150X212			
21.2 x 100	5	A6000100X212		A6020100X212	
21.2 x 50	5	A6000050X212			
21.2 x 30	5	A6000030X212			

(Continued)

Pursuit XRs HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XRs C18 USP L1	Pursuit XRs C8 USP L7	Pursuit XRs Diphenyl	Pursuit XRs Si USP L3
10.0 x 250	10	A6002250X100			A6004250X100
10.0 x 250	5	A6000250X100		A6020250X100	
10.0 x 150	5	A6000150X100			
10.0 x 50	5	A6000050X100			
10.0 x 150	3			A6021150X100	
4.6 x 250	10	A6002250X046			A6004250X046
4.6 x 50	10	A6002050X046S			
4.6 x 250	5	A6000250X046	A6010250X046	A6020250X046	
4.6 x 150	5	A6000150X046	A6010150X046	A6020150X046	
4.6 x 100	5	A6000100X046	A6010100X046	A6020100X046	A6006100X046
4.6 x 50	5	A6000050X046		A6020050X046	A6006050X046
4.6 x 250	3	A6001250X046		A6021250X046	
4.6 x 150	3	A6001150X046	A6010150X046	A6021150X046	
4.6 x 100	3	A6001100X046	A6011100X046	A6021100X046	A6005100X046
4.6 x 50	3	A6001050X046	A6011050X046	A6021050X046	A6005050X046
4.6 x 30	3	A6001030X046		A6021030X046	
4.0 x 250	5	A6000250X040	A6010250X040		
4.0 x 150	5	A6000150X040	A6010150X040		
3.0 x 250	5	A6000250X030			
3.0 x 150	5	A6000150X030			
3.0 x 100	5	A6000100X030			
3.0 x 150	3	A6001150X030		A6021150X030	
3.0 x 100	3	A6001100X030		A6021100X030	
3.0 x 50	3	A6001050X030		A6021050X030	
3.0 x 30	3	A6001030X030			
2.1 x 100	5				A6006100X021
2.0 x 250	5	A6000250X020		A6020250X020	
2.0 x 150	5	A6000150X020	A6010150X020	A6020150X020	
2.0 x 100	5	A6000100X020	A6010100X020		
2.0 x 50	5	A6000050X020	A6010050X020	A6020050X020	
2.0 x 30	5	A6000030X020			
2.0 x 250	3	A6001250X020		A6021250X020	
2.0 x 150	3	A6001150X020	A6011150X020	A6021150X020	
2.0 x 100	3	A6001100X020	A6011100X020	A6021100X020	
2.0 x 50	3	A6001050X020	A6011050X020	A6021050X020	A6005050X020
2.0 x 30	3			A6021030X020	
2.0 x 20	3	A6001020X020			
1.0 x 150	3	A6001150X010			
1.0 x 100	3	A6001100X010		A6021100X010	

Pursuit XR^sUltra 2.8 HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit XR ^s Ultra 2.8 C18	Pursuit XR ^s Ultra 2.8 C8	Pursuit XR ^s Ultra 2.8 Diphenyl
3.0 x 150	2.8	A7501150X030	A7511150X030	
3.0 x 100	2.8	A7501100X030		
2.0 x 150	2.8	A7501150X020		
2.0 x 100	2.8	A7501100X020	A7511100X020	A7521100X020
2.0 x 50	2.8	A7501050X020	A7511050X020	A7521050X020
2.0 x 30	2.8	A7501030X020	A7511030X020	A7521030X020

Pursuit UPS^{2.4} HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit UPS ^{2.4}
3.0 x 100	2.4	A8100100X030H
3.0 x 50	2.4	A8100050X030H
2.0 x 100	2.4	A8100100X020H
2.0 x 50	2.4	A8100050X020H
2.0 x 30	2.4	A8100030X020H

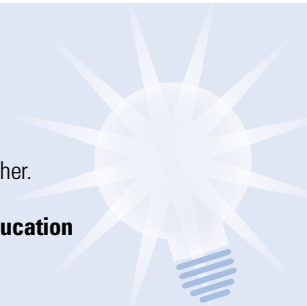
Pursuit UPS^{1.9} HPLC Columns

Size (mm)	Particle Size (µm)	Pursuit UPS ^{1.9} C18	Pursuit UPS ^{1.9} Diphenyl
3.0 x 100	1.9	A8000100X030H	A8020100X030H
3.0 x 50	1.9	A8000050X030H	A8020050X030H
2.0 x 100	1.9	A8000100X020H	A8020100X020H
2.0 x 50	1.9	A8000050X020H	A8020050X020H
2.0 x 30	1.9	A8000030X020H	A8020030X020H

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Polaris HPLC Columns

In areas like drug discovery where target compounds are increasingly polar, it is critical to have a reverse phase column that performs well under aqueous conditions. Retention is critical, but cannot come with troublesome secondary interactions. Likewise, phase collapse and shifting retention times need to be avoided. The answer is our Polaris line of polar-modified columns.

From the collapse-resistant pore structure of our base silica, to the "wettability" engineered into the bonded phases, Polaris columns have been designed for high aqueous conditions. The combination of high phase density bonding, ultra pure silica, and silanol shielding leads to excellent peak shape among polar-modified columns.

As a family, Polaris offers a variety of polar modifications in both C18 and C8 chemistries.

Polaris C18-A

Polaris C18-A is the best starting place for separations where the benefits of polar-modified columns are desired. The polar modifications of C18-A help it avoid poor peak shape and retention issues in low organic conditions.

Polaris C8-A

Polaris C8-A offers an alternative selectivity to standard C8 phases and has a lower hydrophobicity than Polaris C18-A, making it ideal for polar samples, or faster overall analysis times.

Polaris C18-Ether

Polaris C18-Ether offers an alternative selectivity to Polaris C18-A and standard C18 phases, and typically delivers increased retention of polar compounds away from the void volume.

Polaris C8-Ether

Polaris C8-Ether offers an alternative selectivity to Polaris C8-A with particular utility for hydrogen bonding compounds.

Column Specifications

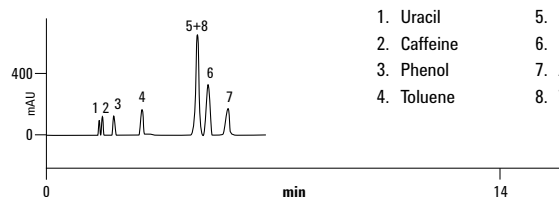
Bonded Phase	Pore Size	Surface Area	Carbon Load	Endcapped	Pore Volume	Ligand Coverage
Polaris C18-A	180Å	200 m ² /g	13.8%	Yes	1.1 cm ³ /g	3.9 μmol/m ²
Polaris C8-A	180Å	200 m ² /g	7.4%	Yes	1.1 cm ³ /g	4.8 μmol/m ²
Polaris C18-Ether	180Å	200 m ² /g	12.1%	Yes	1.1 cm ³ /g	3.3 μmol/m ²
Polaris C8-Ether	180Å	200 m ² /g	7.1%	Yes	1.1 cm ³ /g	4.5 μmol/m ²

Specifications represent typical values only.

Selectivity text mix for Polaris columns

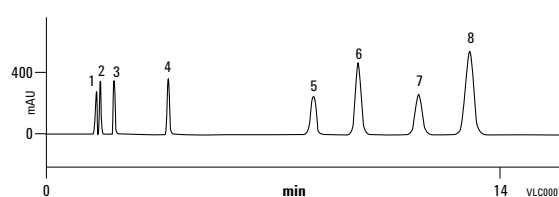
Mobile Phase: MeCN:water 70:30
 Flow Rate: 1.0 mL/min
 Temperature: Ambient
 Detector: UV, 254 nm

Polaris C8-A



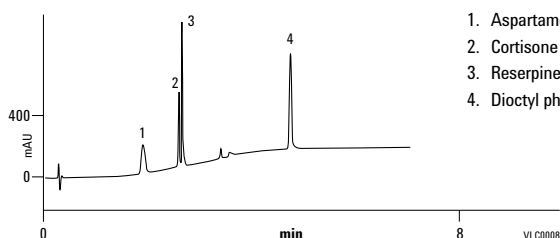
1. Uracil
2. Caffeine
3. Phenol
4. Toluene
5. Butylbenzene
6. o-Terphenyl
7. Amylbenzene
8. Triphenylene

Polaris C18-A



LC/MS performance test mix for Polaris C8-A

Column: Polaris C8-A
 A2011030X030
 3.0 x 30 mm, 3 μm
Mobile Phase: A: Water+0.05% HCOOH
 B: MeCN+0.05% HCOOH
Gradient: 5-90% B in 3 min and hold for 4 min
Flow Rate: 0.6 mL/min
Temperature: Ambient
Detector: UV, 220 nm



1. Aspartame
2. Cortisone
3. Reserpine
4. Diocetyl phthalate

Polaris HPLC Columns

Size (mm)	Particle Size (µm)	Polaris C18-A	Polaris C8-A	Polaris C18-Ether	Polaris C8-Ether	Polaris NH2	Polaris Si-A
50 x 250	10	A2002250X500					A2004250X500
30 x 100	5	A2000100X300					
21.2 x 250	10	A2002250X212					A2004250X212
21.2 x 250	5	A2000250X212	A2010250X212	A2020250X212	A2030250X212	A2013250X212	A2003250X212
21.2 x 150	5	A2000150X212					A2003150X046
21.2 x 100	5	A2000100X212					
21.2 x 50	5						A2003050X212
10 x 250	5	A2000250X100		A2020250X100	A2030250X100	A2013250X100	
10 x 50	3			A2021050X100			
4.6 x 250	10	A2002250X046					A2003250X046
4.6 x 250	5	A2000250X046	A2010250X046	A2020250X046	A2030250X046	A2013250X046	
4.6 x 200	5	A2000200X046					
4.6 x 150	5	A2000150X046	A2010150X046	A2020150X046	A2030150X046	A2013150X046	A2003150X046
4.6 x 100	5	A2000100X046	A2010100X046			A2013100X046	A2003100X046
4.6 x 50	5	A2000050X046		A2020050X046		A2013050X046	A2003050X046
4.6 x 30	5	A2000030X046					
4.6 x 250	3	A2001250X046		A2021250X046	A2031250X046	A2014250X046	A2005250X046
4.6 x 150	3	A2001150X046	A2011150X046			A2014150X046	A2005150X046
4.6 x 100	3	A2001100X046	A2011100X046			A2014100X046	A2005100X046
4.6 x 75	3	A2001075X046	A2011075X046				
4.6 x 50	3	A2001050X046		A2021050X046	A2031050X046	A2014050X046	A2005050X046
4.6 x 30	3	A2001030X046					
4.0 x 250	5	A2000250X040				A2013250X040	A2003250X040
4.0 x 150	5	A2000150X040				A2013150X040	A2003150X040
4.0 x 125	5					A2013125X040	A2003125X040
3.0 x 250	5	A2000250X030				A2013250X030	A2005250X046
3.0 x 150	5	A2000150X030		A2020150X030		A2013150X030	A2003150X030
3.0 x 100	5	A2000100X030				A2013100X030	A2003100X030
3.0 x 50	5	A2000050X030					A2003050X030
3.0 x 250	3	A2001250X030				A2014250X030	A2003250X030
3.0 x 200	3	A2001200X030					
3.0 x 150	3	A2001150X030		A2021150X030		A2014150X030	A2005150X030
3.0 x 100	3	A2001100X030				A2014100X030	A2005100X030
3.0 x 50	3	A2001050X030		A2021050X030	A2031050X030	A2014050X030	A2005050X030
3.0 x 30	3	A2001030X030	A2011030X030				

(Continued)

Polaris HPLC Columns

Size (mm)	Particle Size (µm)	Polaris C18-A	Polaris C8-A	Polaris C18-Ether	Polaris C8-Ether	Polaris NH2	Polaris Si-A
2.0 x 250	5	A2000250X020		A2020250X020	A2030250X020	A2013250X020	A2003250X020
2.0 x 150	5	A2000150X020	A2010150X020	A2020150X020	A2030150X020	A2013150X020	A2003150X020
2.0 x 100	5	A2000100X020				A2013100X020	A2003100X020
2.0 x 50	5	A2000050X020	A2010050X020	A2020050X020	A2030050X020	A2013050X020	A2003050X020
2.0 x 30	5	A2000030X020				A2013030X020	A2003030X020
2.0 x 20	5	A2000020X020				A2013020X020	A2003020X020
2.0 x 250	3	A2001250X020	A2011250X020	A2021250X020	A2031250X020	A2014250X020	A2005250X020
2.0 x 150	3	A2001150X020	A2011150X020	A2021150X020	A2031150X020	A2014150X020	A2005150X020
2.0 x 100	3	A2001100X020		A2021100X020	A2031100X020	A2014100X020	A2005100X020
2.0 x 75	3			A2021075X020			
2.0 x 50	3	A2001050X020	A2011050X020	A2021050X020	A2031050X020	A2014050X020	A2005050X020
2.0 x 30	3	A2001030X020		A2021050X020		A2014030X020	A2005030X020
2.0 x 20	3	A2001020X020				A2014020X020	A2005020X020

Tips & Tools

To learn more about Agilent's complete portfolio of services, please visit www.agilent.com/chem/services



Polaris ChromSep Complete Cartridge Systems

Hardware	Size (mm)	Particle Size (µm)	Polaris C18-A
CS	4.6 x 250	5	A2000250C046
CS	4.6 x 150	5	A2000150C046
CS	4.6 x 100	5	A2000100C046
CS	4.6 x 250	3	A2001250C046
CS	4.6 x 150	3	A2001150C046
CS	3.0 x 250	5	A2000250C030
CS	3.0 x 100	5	A2000100C030
CS	2.0 x 100	5	A2000100C020
CS	2.0 x 150	3	A2001150C020
CS	2.0 x 100	3	A2001100C020
CS	2.0 x 50	3	A2001050C020







Polaris ChromSep Replacement Cartridges

Hardware	Size (mm)	Particle Size (µm)	Unit	Polaris C18-A
CS	4.6 x 250	5		A2000250R046
			3/pk	A2000250T046
CS	4.6 x 150	5		A2000150R046
			3/pk	A2000150T046
CS	4.6 x 100	5		A2000100R046
			3/pk	A2000100T046
CS	4.6 x 150	3		A2001150R046
			3/pk	A2001150T046
CS	4.6 x 100	3		A2001100R046
			3/pk	A2001100T046
CS	3.0 x 150	5		A2000150R030
			3/pk	A2000150T030
CS	3.0 x 100	5		A2000100R030
			3/pk	A2000100T030
CS	3.0 x 100	3		A2001100R030
			3/pk	A2001100T030
CS	2.0 x 150	3		A2001150R020
			3/pk	A2001150T020
CS	2.0 x 50	3		A2001050R020
			3/pk	A2001050T020

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.

ZORBAX Original Reversed Phase Columns

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)								
	Guard Cartridge, 2/pk	9.4 x 15	7	820675-115	820675-115	820675-115	820675-124	
	Guard Cartridge, 4/pk	4.6 x 12.5	5	820950-902	820950-906	820950-912	820950-905	820950-924
	Guard Hardware Kit			840140-901	840140-901	840140-901	840140-901	840140-901
	Guard Hardware Kit			820999-901	820999-901	820999-901	820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)								
	PrepHT Cartridge	21.2 x 250	7	877952-102	877952-106		877952-105	
	PrepHT endfittings, 2/pk			820400-901	820400-901		820400-901	

Agilent TC-C18(2) and HC-C18(2)

TC-C18(2)

Agilent TC-C18(2) is the ideal choice for complex natural product extract samples, traditional medicines and environmental samples or any sample where you need to analyze mixtures of polar and non-polar compounds, including strong basic compounds.

- Lower carbon load – 12%
- Ideal for polar compounds and gradient separations that start at low % organic or cover a wide organic range
- Good choice for samples dissolved in water, or mostly water
- Use with most common mobile phases, including formic acid, acetic acid, trifluoroacetic acid (TFA) and phosphate buffers with acetonitrile and methanol as the organic modifiers
- Excellent performance from pH 2-8

HC-C18(2)

Agilent HC-C18(2) is a more retentive C18 with a higher carbon load. An excellent value alternative to other high carbon load columns, it also provides superior peak shape for basic compounds.

- Higher carbon load – 17% – provides greater retention for moderately polar and non-polar compounds
- Ideal for non-polar compounds and separations that start at mid-level % organic (at least greater than 10% organic)
- Good choice for industrial samples or samples dissolved in organic/mostly organic solvents
- Stable over a very wide pH range (2-9) for maximum flexibility

Column Specifications

Bonded Phase	Pore Size	Surface Area	Temp. Limits	pH Range*	Endcapped	Carbon Load
TC-C18 (2)	170Å	290 m ² /g	60°C	2.0-8.0	Yes	12%
HC-C18 (2)	170Å	290 m ² /g	60°C	2.0-9.0	Yes	17%

Specifications represent typical values only.

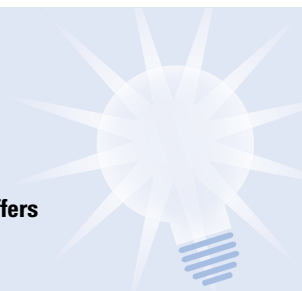
Agilent HC-C18(2) and TC-C18(2)

Description	Size (mm)	Particle Size (µm)	Part No.
Agilent HC-C18(2)	4.6 x 250	5	588905-902
Agilent HC-C18(2)	4.6 x 150	5	588915-902
Agilent TC-C18(2)	4.6 x 250	5	588925-902
Agilent TC-C18(2)	4.6 x 150	5	588935-902
Agilent HC-C18(2) guards, 2/pk	4.6 x 12.5	5	520518-904
Agilent TC-C18(2) guards, 2/pk	4.6 x 12.5	5	520518-905
Guard Hardware Kit			820999-901

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



Normal-Phase Columns

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

Pursuit XRs Silica is another choice for normal-phase chromatography. For more information, see page 862–863.



ZORBAX CN

- Cyanopropyltrimethylsilane 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 NH2

- 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)

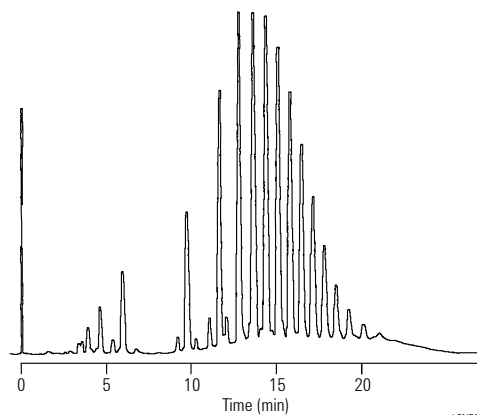
Flow Rate: 2 mL/min

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)













LCNP001

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	827975-901	
	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)					
	Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	
	Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-919	820950-935
	Guard Cartridge, 4/pk	2.1 x 12.5	5	821125-919	821125-935
	Guard Hardware Kit	9.4 x 15	0	840140-901	
	Guard Hardware Kit			820999-901	820999-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)					
	PrepHT Cartridge	21.2 x 250	7	877250-101	
	PrepHT Cartridge	21.2 x 250	7		
	PrepHT endfittings, 2/pk			820400-901	
	PrepHT Guard Cartridge, 2/pk	17 x 7.5	5	820212-919	
	Guard Cartridge Hardware			820444-901	

*These columns ship containing reversed-phase solvents. Flush with isopropanol before using normal-phase solvents. These columns can also be used in HILIC mode.

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)						
 Guard Cartridge, 2/pk	9.4 x 15	5	820675-119	820675-111	820675-111	
 Guard Cartridges, 4/pk	4.6 x 12.5	5	820950-901	820950-905	820950-908	820950-908
 Guard Cartridge, 4/pk	2.1 x 12.5	5				
 Guard Hardware Kit	9.4 x 15		840140-901	840140-901	840140-901	
 Guard Hardware Kit			820999-901	820999-901	820999-901	820888-901
PrepHT Cartridge Columns (require endfittings kit 820400-901)						
 PrepHT Cartridge	21.2 x 250	7	877952-101			
 PrepHT Cartridge	21.2 x 250	7		877952-105	877952-108	
 PrepHT endfittings, 2/pk			820400-901	820400-901	820400-901	
 PrepHT Guard Cartridge, 2/pk	17 x 7.5	5				
 Guard Cartridge Hardware						



ZORBAX HILIC Plus

- HILIC column for good retention of small, polar analytes
- Based on Eclipse Plus silica for excellent peak shape
- High sensitivity for LC/MS applications
- Recommended for EPA Method 1694

Agilent ZORBAX HILIC Plus columns are for use in hydrophilic interaction chromatography (HILIC) applications, which are typically used for the retention and resolution of small polar compounds. HILIC Plus columns are non-bonded silica columns based on the high performance silica used in ZORBAX Eclipse Plus columns. This silica provides excellent peak shape, critical for many polar, basic analytes. These columns ship prepared for use in HILIC mode – containing acetonitrile:water – in order to reduce the extensive equilibration typically required for HILIC separations. HILIC Plus columns are available in a 3.5 μm particle size for high resolution and in 2.1 and 4.6 mm ID for compatibility with mass spectrometers or with standard UV detectors.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range
Non-bonded silica	95Å	160 m ² /g	0-8.0

Specifications represent typical values only.

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.

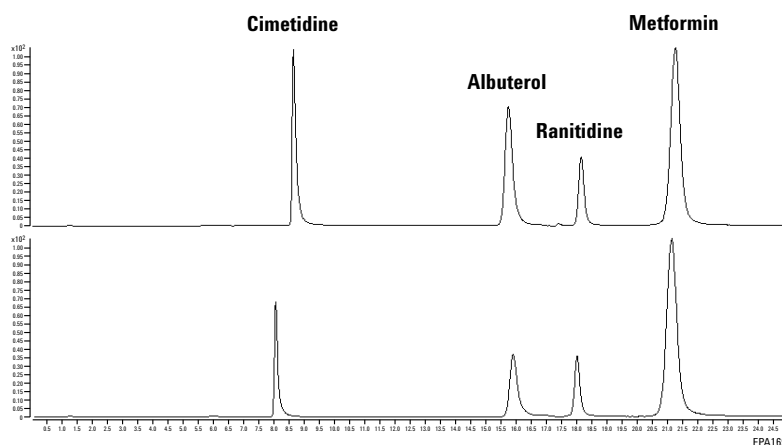
To learn more, visit www.agilent.com/chem/OnlineLibrary



Separation of Group 4 Analytes in EPA 1694 on ZORBAX HILIC Plus Column

Column: ZORBAX HILIC Plus
959793-901
2.1 x 100 mm, 3.5 µm
Mobile Phase: 90% Acetonitrile:10% Water
Flow Rate: 0.25 mL/min
Gradient: Linear gradient to 55% acetonitrile
 in 7 min
 Held at 55%
Temperature: 25°C

Duplicate runs for column USCJP0004;
 10 min equilibration between two runs



ZORBAX HILIC Plus

Description	Size (mm)	Particle Size (µm)	Part No.
Analytical	4.6 x 100	3.5	959961-901
Analytical	4.6 x 50	3.5	959943-901
Narrow Bore	2.1 x 100	3.5	959793-901
Narrow Bore	2.1 x 50	3.5	959743-901

Ion Exchange Columns

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 300 \AA 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.

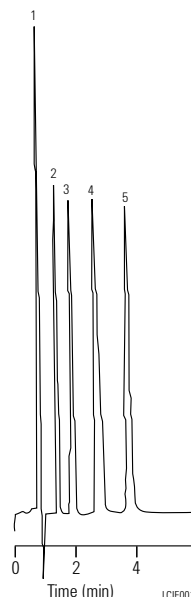
Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Functionality	Max Pressure
ZORBAX SAX	70 \AA	300 m ² /g	2.0-7.0	Quaternary amine	350 bar
ZORBAX 300SCX	300 \AA	50 m ² /g	2.0-7.0	Sulfonic acid	350 bar

Specifications represent typical values only.

Cough/Cold Remedies on ZORBAX 300SCX

Column: ZORBAX 300SCX
880952-704
4.6 x 250 mm, 5 µm
Mobile Phase: 100 mM NaH₂PO₄ (pH 6.5)
Flow Rate: 3 mL/min
Temperature: 20°C
Detector: 210 nm
Sample: Cold remedies



1. Pyrilamine
2. Theophylline
3. Glyceryl Guaiacolate
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
Guard Cartridge, 4/pk	4.6 x 12.5	6	820950-903	820950-904
Guard Hardware Kit			820888-901	820888-901

Hi-Plex HPLC Columns

- Preferred separation mechanism for the analysis of carbohydrates and oligosaccharides
- Matched to the USP definitions of media types L17, L19, L34 and L58
- Ideal for isocratic separations using water or dilute acid as the eluent

Hi-Plex columns are ion exchange or ligand exchange columns used predominantly for the separation of carbohydrates and organic acids. These columns are the preferred separation mechanism for the analysis of simple sugars, alcohols, oligosaccharides and organic acids in foodstuffs, but they can be used for the separation of other compounds as well.

The range comprises a 4% cross-linked resin for the analysis of oligosaccharides and an 8% cross-linked resin, with lower exclusion limit, for mono-, di- and tri-saccharide analysis. For carbohydrate and alcohol investigations, Hi-Plex columns use isocratic conditions with water as the eluent and temperature as the main variable for control of resolution. The exception is the Hi-Plex Na (Octo), which is used with sodium hydroxide eluents when pulsed amperometric detection (PAD) is employed.

Column Specifications

Bonded Phase	Temperature Range	Flow Rate (mL/min)	Eluent
Hi-Plex Ca	80-90°C	0.6	Water
Hi-Plex Ca USP L19	80-90°C	0.3	Water
Hi-Plex Pb	70-90°C	0.6	Water
Hi-Plex H for carbohydrates	60-70°C	0.6	Water
Hi-Plex H for organic acids	40-60°C	0.6	Dilute Acid
Hi-Plex Ca (Duo)	80-90°C	0.6	Water
Hi-Plex K	80-90°C	0.6	Water
Hi-Plex Na (Octo)	80-90°C	0.6	Water, Sodium Hydroxide
Hi-Plex Na	80-90°C	0.3	Water

Hi-Plex Column Selection

USP methods specify the type of HPLC media and column dimensions which should be used for the analysis. The Hi-Plex product range has four materials that comply with USP definitions.

Media Type L17

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 to 11 μm in diameter – Hi-Plex H.

Media Type L19

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the calcium form, 9 μm in diameter – Hi-Plex Ca and Hi-Plex Ca (Duo).

Media Type L34

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the lead form, about 9 μm in diameter – Hi-Plex Pb.

Media Type L58

Strong cation exchange resin consisting of sulfonated, cross-linked styrene-divinylbenzene copolymer in the sodium form, 6 to 30 μm diameter – Hi-Plex Na and Hi-Plex Na (Octo).

In addition to the standard column sizes, the media is also packed in specific column dimensions for different USP methods, including sugar alcohol analysis.

For some application areas there are several column options, and the choice of the most appropriate Hi-Plex media will depend on sample matrix and exact carbohydrate composition.

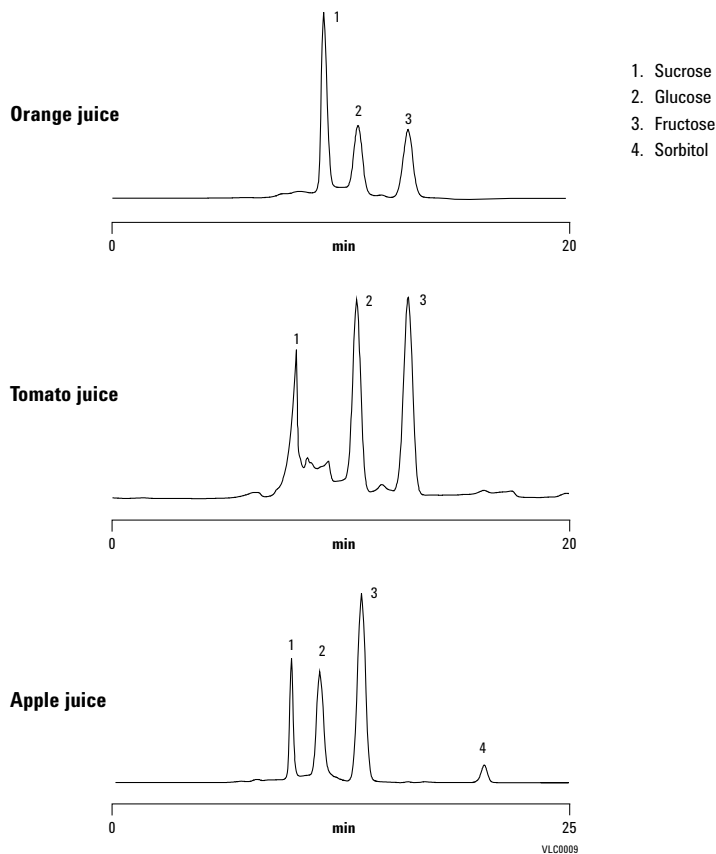
Hi-Plex Column Selection

Application Area	Recommended Column
USP Methods Specifying L17 Media	Hi-Plex H
USP Methods Specifying L19 Media	Hi-Plex Ca and Hi-Plex Ca (Duo)
USP Methods Specifying L34 Media	Hi-Plex Pb
USP Methods Specifying L58 Media	Hi-Plex Na and Hi-Plex Na (Octo)
Mono- and Disaccharides	Hi-Plex Ca
	Hi-Plex Pb
	Hi-Plex H
	Hi-Plex Na (Octo)
Anomer Separations	Hi-Plex Ca
Organic Acids	Hi-Plex H
Alcohols	Hi-Plex Ca
	Hi-Plex K
	Hi-Plex H
	Hi-Plex Pb
Adulteration of Food and Beverages	Hi-Plex Ca and Hi-Plex Pb
Food Additives	Hi-Plex Ca and Hi-Plex Pb
Dairy Products	Hi-Plex Ca and Hi-Plex H
Sweetened Dairy Products	Hi-Plex Pb
Confectionery	Hi-Plex Ca and Hi-Plex Pb
Fruit Juice	Hi-Plex Ca
Wine	Hi-Plex H
Wood Pulp Hydrolysates (cellulose/hemi-cellulose)	Hi-Plex Pb
Fermentation Monitoring	Hi-Plex H
Oligosaccharides	Hi-Plex Na
Samples with High Salt Content (molasses)	Hi-Plex Na (Octo)
Oligosaccharides <Dp5 with Monosaccharides	Hi-Plex Ca (Duo)
Corn Syrups	Hi-Plex Na

Analysis of fruit juice

Column: Hi-Plex Ca
PL1170-6810
7.7 x 300 mm, 8 µm

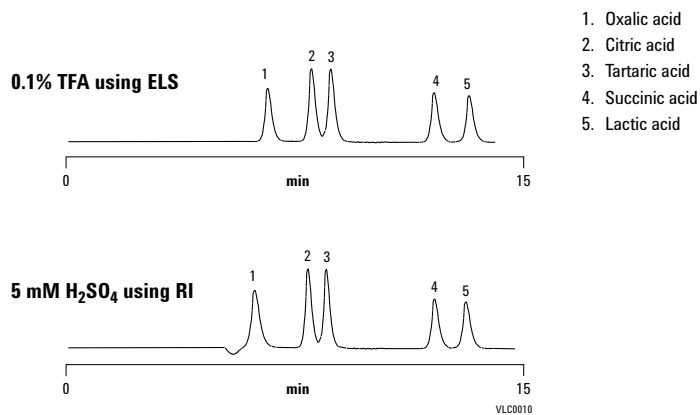
Mobile Phase: Water
Flow Rate: 0.6 mL/min
Temperature: 85°C
Detector: RI



Organic acid analysis

Column: Hi-Plex H
PL1170-6830
7.7 x 300 mm, 8 µm

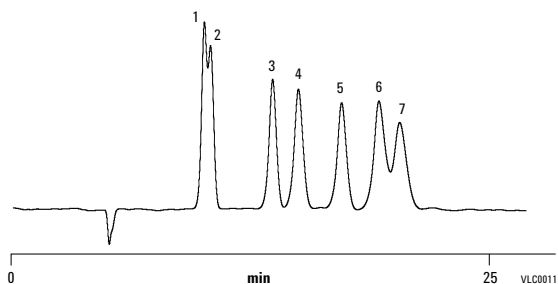
Mobile Phase: Water with acid as specified
Flow Rate: 0.6 mL/min
Temperature: 60°C
Detector: ELS (neb=80°C, evap=90°C, gas=0.7 SLM), RI



USP methods for sugar alcohols

Column: Hi-Plex Ca USP L19
 PL1570-5810
 4.0 x 250 mm, 8 µm

Mobile Phase: Water
 Flow Rate: 0.3 mL/min
 Temperature: 60°C
 Detector: RI

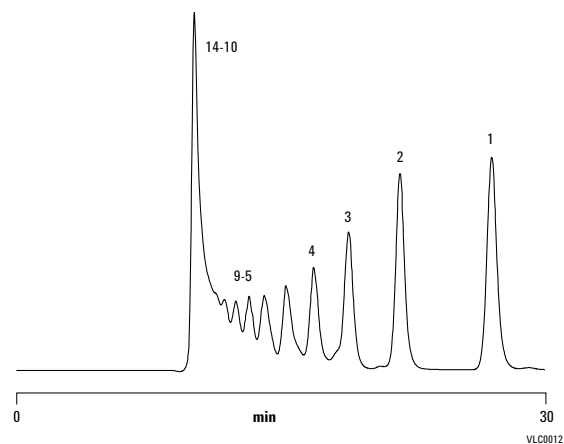


1. Iso-erythritol
2. Adonitol
3. Arabitol
4. Mannitol
5. Xylitol
6. Dulcitol
7. Sorbitol

Corn syrup, Hi-Plex

Column: Hi-Plex Na
 PL1171-6140
 7.7 x 300 mm, 10 µm

Mobile Phase: Water
 Pressure: 11 bar
 Flow Rate: 0.3 mL/min
 Temperature: 80°C
 Detector: RI



1. Dp1
2. Dp2
3. Dp3
4. Dp4
5. Dp5
6. Dp6
7. Dp7
8. Dp8
9. Dp9
10. Dp10
11. Dp11
12. Dp12
13. Dp13
14. Dp14

Hi-Plex HPLC Columns

Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca USP L19	4.0 x 250	8	8	Ca ²⁺	PL1570-5810
Hi-Plex Ca (Duo)	6.5 x 300	8	8	Ca ²⁺	PL1F70-6850
Hi-Plex Ca	7.7 x 300	8	8	Ca ²⁺	PL1170-6810
Hi-Plex Pb USP L34	7.7 x 100	8	8	Pb ²⁺	PL1170-2820
Hi-Plex Pb	7.7 x 300	8	8	Pb ²⁺	PL1170-6820
Hi-Plex K	7.7 x 300	8	8	K ⁺	PL1170-6860
Hi-Plex H	6.5 x 300	8	8	H ⁺	PL1F70-6830
Hi-Plex H	7.7 x 300	8	8	H ⁺	PL1170-6830
Hi-Plex H USP L17	7.7 x 100	8	8	H ⁺	PL1170-2823
Hi-Plex Na	7.7 x 300	10	4	Na ⁺	PL1171-6140
Hi-Plex Na (Octo)	7.7 x 300	8	8	Na ⁺	PL1170-6840

Hi-Plex Guard Columns

Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca	7.7 x 50	8	8	Ca ²⁺	PL1170-1810
Hi-Plex Ca (Duo)	7.7 x 50	8	8	Ca ²⁺	PL1170-1850
Hi-Plex Pb	7.7 x 50	8	8	Pb ²⁺	PL1170-1820
Hi-Plex K	7.7 x 50	8	8	K ⁺	PL1170-1860
Hi-Plex H	7.7 x 50	8	8	H ⁺	PL1170-1830
Hi-Plex Na	7.7 x 50	10	4	Na ⁺	PL1171-1140
Hi-Plex Na (Octo)	7.5 x 50	8	8	Na ⁺	PL1170-1840

Hi-Plex Guard Cartridges, 2/pkg

Description	Size (mm)	Particle Size (µm)	Crosslink Content (%)	Counter Ion	Part No.
Hi-Plex Ca	7.7 x 50	8	8	Ca ²⁺	PL1170-1810
Hi-Plex Ca	3.0 x 0.5	8	8	Ca ²⁺	PL1670-0810
Hi-Plex Ca (Duo)	3.0 x 0.5	8	8	Ca ²⁺	PL1670-0850
Hi-Plex Pb	3.0 x 0.5	8	8	Pb ²⁺	PL1670-0820
Hi-Plex K	3.0 x 0.5	8	8	K ⁺	PL1670-0860
Hi-Plex H	3.0 x 0.5	8	8	H ⁺	PL1670-0830
Hi-Plex Na	3.0 x 0.5	10	4	Na ⁺	PL1671-0140
Hi-Plex Na (Octo)	3.0 x 0.5	8	8	Na ⁺	PL1670-0840
Guard cartridge holder for 5 x 3 mm cartridges					PL1310-0016



Kits for Analytical HPLC

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 **cag_sales-na@agilent.com**. You will receive a quote from your Customer Service Representative 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.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



Custom HPLC Column Ordering

Columns not listed can be easily ordered using 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 **cag_sales-na@agilent.com**. You will receive a quote from your Customer Service Representative 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 COLUMNS FOR SPECIAL HPLC APPLICATIONS

Reproducible results for UHPLC and high-throughput LC

No matter how many samples you have, or how complex they may be, you need to feel confident that you can achieve reproducible results without wasting valuable time testing different columns and configurations.

The following column families deliver industry-leading performance for specific measurement and purification challenges:

- ZORBAX Rapid Resolution High Definition (RRHD) Columns
- ZORBAX Rapid Resolution High Throughput (RRHT) Columns
- ZORBAX Solvent Saver Columns
- Chiral HPLC Columns
- Other Specialty HPLC Columns

Tips & Tools

Poroshell 120 columns are ideal for up to 600 bar for UHPLC and use up to 50% less pressure than sub 2 μm columns.

Turn to page 822.



UHPLC Columns

Agilent has UHPLC columns for systems with pressure limits up to 600 and 1200 bar to match all Agilent LC systems and for use on other UHPLCs. These columns provide the resolution and fast results expected for ultra high performance liquid chromatography.

- **ZORBAX Rapid Resolution High Throughput** – 1.8 μm columns for up to 600 bar
- **ZORBAX Rapid Resolution High Definition** – 1.8 μm columns for up to 1200 bar and the Agilent 1290 Infinity LC
- **Agilent Poroshell 120** – 2.7 μm superficially porous columns for up to 600 bar
Turn to page 822.
- **Pursuit UPS** – 1.9 and 2.4 μm columns for up to 1000 bar UHPLCs
Turn to page 864.

ZORBAX Rapid Resolution High Definition 1.8 μm

- High pressure (1200 bar) columns for optimum results with the 1290 Infinity LC or other UHPLC instruments
- 1.8 μm particles deliver maximum resolution for the most defined separations
- Available in ZORBAX Eclipse Plus C18 for superior peak shape and ZORBAX StableBond C18 for alternate selectivity and low pH stability
- Achieve the same selectivity on 3.5 and 5 μm ZORBAX columns with the same bonded phase for compatibility with any LC

ZORBAX Rapid Resolution High Definition (RRHD) columns are an expansion of the ZORBAX 1.8 μm particle column line. The new RRHD columns use improved packing processes to achieve stability up to 1200 bar for use with the Agilent 1290 Infinity LC or other UHPLC instruments. RRHD 1.8 μm columns are available in 50, 100 and 150 mm lengths for fast or high resolution – truly high definition – separations of your most complex samples.

Column Specifications

Bonded Phase	Pore Size	Surface Area	pH Range	Endcapped
ZORBAX Eclipse Plus C18	95Å	160 m ² /g	2.0-9.0	Yes
ZORBAX SB-C18	80Å	180 m ² /g	1.0-8.0*	No
ZORBAX SB-C8	80Å	180 m ² /g	1.8-8.0*	No

*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 – 10-20 mM. For pH 6-8 select the Eclipse Plus C18 column.

Separation of Licorice Root on RRHD Columns

Column A: ZORBAX RRHD SB-C18
857700-902

2.1 x 50 mm, 1.8 μ m

Column B: 858700-902

2.1 x 100 mm, 1.8 μ m

Column C: 859700-902

2.1 x 150 mm, 1.8 μ m

Mobile Phase: 10-100% B/30 min

A: 0.1% formic acid (fa)

B: acetonitrile with 0.1% fa

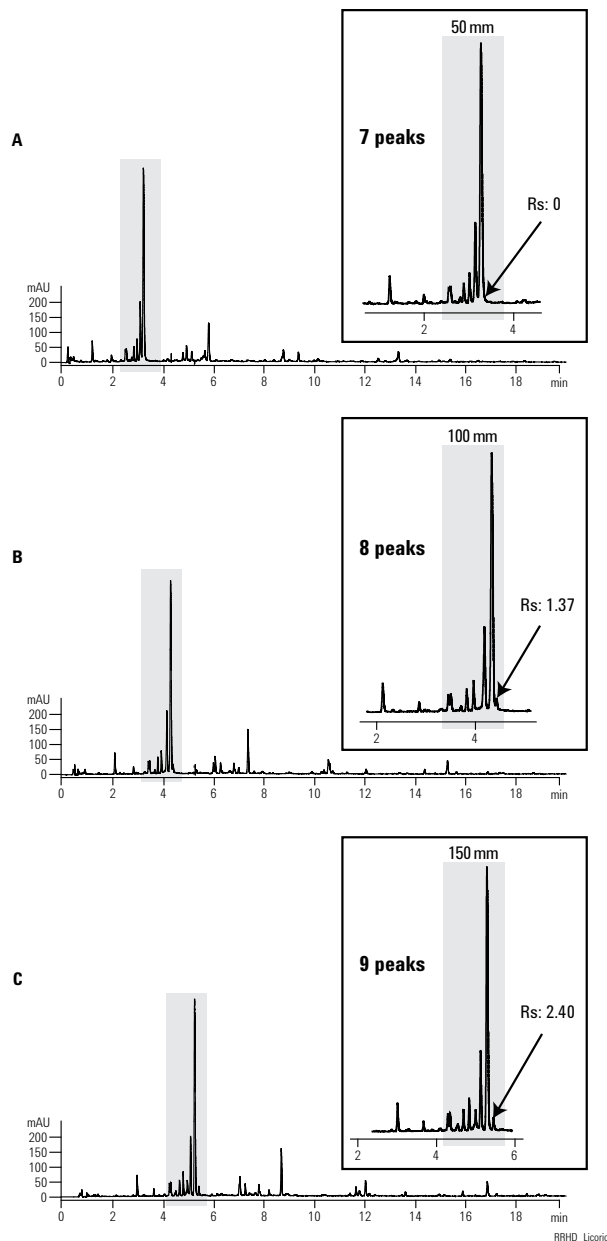
Flow Rate: F = 0.4 mL/min

Gradient: 30 minute gradient on each length

Temperature: Ambient

Detector: 280 nm UV

Instrument: 1290 Infinity LC

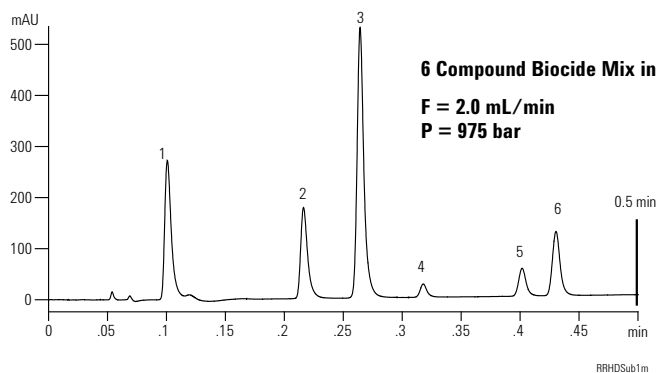


Sub-1 Minute Separations with RRHD Columns

Column: ZORBAX RRHD SB-C18
857700-902
2.1 x 50 mm, 1.8 µm

Gradient: H₂O (0.05% trifluoroacetic acid)/10-40% ACN/1min
Temperature: 60°C
Injection Volume: 0.5 µL x 100 ppm each
Detector Wavelength: 275 nm
Data Rate: 160 Hz

1. 2-methyl-4-isothiazolin-3-one
2. 5-chloro-2-methyl-4-isothiazolin-3-one
3. Carbendazim
4. Benisothiazol-3(2H)-one
5. 2-phenoxyethanol
6. Methylparaben



Rapid Resolution HD Columns for High Pressure Use (Maximum Pressure: 1200 bar)

Description	Size (mm)	Particle Size (µm)	Eclipse Plus C18 USP L1	Eclipse Plus C8 USP L7	SB-C18 USP L1	SB-C8 USP L7	SB-CN USP L10	SB-Phenyl USP L11	Extend-C18 USP L1	Eclipse XDB-C18 USP L1
Solvent Saver RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306	859700-302	859700-306			759700-302	981759-302
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306	858700-302	858700-306	858700-305	858700-905	758700-302	981758-302
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306	857700-302	857700-306	857700-305	857700-312	757700-302	981757-302
Narrow Bore RRHD, 1200 bar	2.1 x 150	1.8	959759-902	959759-906	859700-902	859700-906	859700-905	859700-912	759700-902	981759-902
Narrow Bore RRHD, 1200 bar	2.1 x 100	1.8	959758-902	959758-906	858700-902	858700-906	858700-905	858700-912	758700-902	981758-902
Narrow Bore RRHD, 1200 bar	2.1 x 50	1.8	959757-902	959757-906	857700-902	857700-906	857700-905	857700-912	757700-902	981757-902



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 µm 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 columns 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.

1100 Series Conversion Kits for Fast LC

Kit Selection	Description	Part No.
For Variable Wavelength Detectors (VWD)	Columns: 4.6 x 50 mm, 1.8 μ m (3) Flow Cell for VWD, 5 μ L 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 μ m (2) Flow Cell for DAD, 5 μ L capillaries, μ -LC inline filter	5188-5324
For Diode Array Detector and Mass Spec	Columns: 2.1 x 50 mm, 1.8 μ m (2) Flow Cell for DAD, 1.7 μ L 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 μ m

Column B: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 μ m

Column C: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 μ m

Mobile Phase: A: H₂O
B: ACN

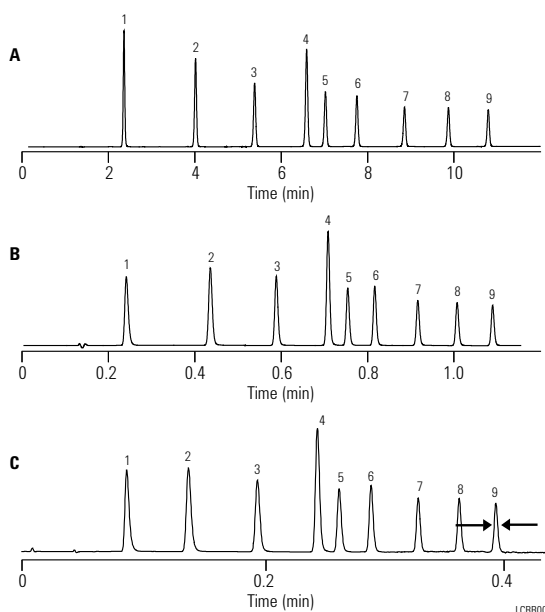
Gradient: 0.0 min 50% B
A: 11 min 100% B
B: 1.2 min 100% B
C: 0.4 min 100% B

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



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 μ m

Column B: ZORBAX SB-C18
827975-901
4.6 x 50 mm, 1.8 μ m

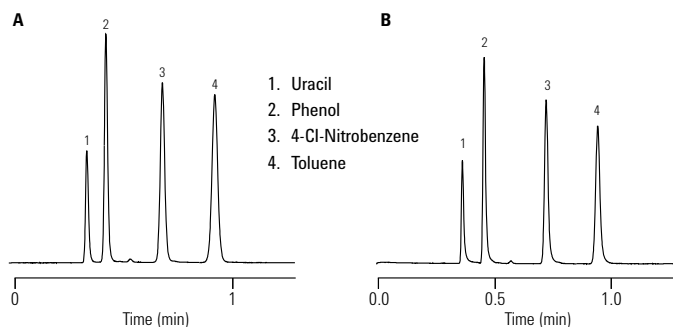
Mobile Phase: 25% Water, 75% MeOH
Flow Rate: 1.5 mL/min
Temperature: Ambient
Detector: 254 nm

Plates (N)

1. 3476
2. 4585
3. 5673
4. 6180

Plates (N)

1. 6560
2. 8958
3. 11508
4. 12266



This figure shows that Rapid Resolution HT columns can provide double the efficiency of a 3.5 μ m column in the same column length. This high efficiency can be used for very high-resolution, high throughput analyses.

LCRR002

Reduce Analysis Time Dramatically with Rapid Resolution HT Columns

Column A: Eclipse XDB-C18
990967-902
4.6 x 250 mm, 5 μ m

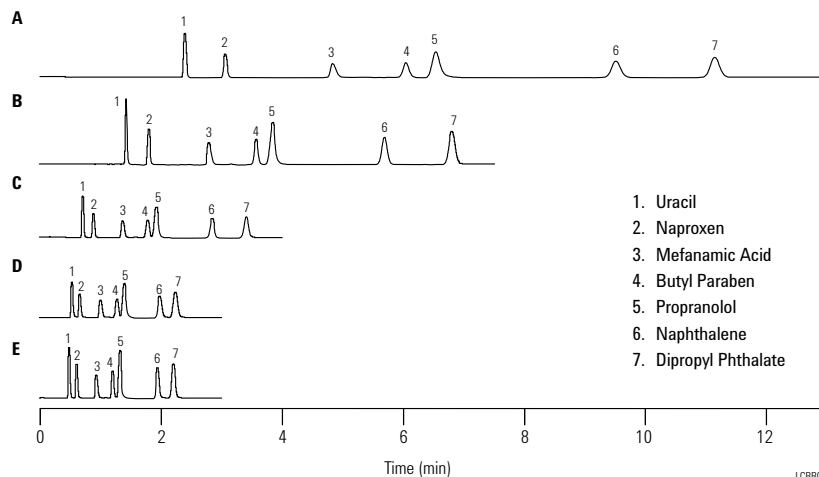
Column B: Eclipse XDB-C18
963967-902
4.6 x 150 mm, 3.5 μ m

Column C: Eclipse XDB-C18
966967-902
4.6 x 75 mm, 3.5 μ m

Column D: ZORBAX Eclipse XDB-C18
935967-902
4.6 x 50 mm, 3.5 μ m

Column E: Eclipse XDB-C18
925975-902
4.6 x 50 mm, 1.8 μ m

Mobile Phase: 73% MeOH:27% 20 mM Phosphate Buffer, pH 7.0
Flow Rate: 1 mL/min
Temperature: Ambient
Detector: 254 nm



This figure shows the dramatic reduction in analysis time made possible by using Rapid Resolution HT columns. Chromatogram A shows a separation that takes 11.5 minutes on a 25 cm, 5 μ m column. Rapid Resolution (3.5 μ m) 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.

LCRR003

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: H₂O

B: ACN

Peak capacity: A: 461

B: 343

Flow Rate: 0.5 mL/min

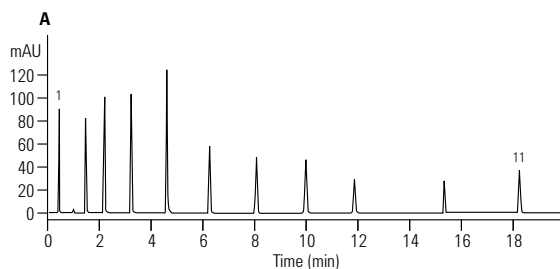
Gradient: 0.0 min 50% B

20.0 min 100% B

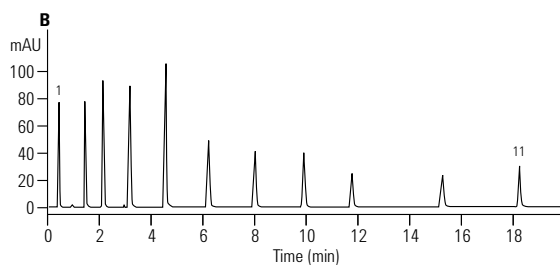
Temperature: 40°C

Detector: UV 254 nm

Sample: Alkylphenones



1. Uracil
2. C₃-Alkylphenone
3. C₄-Alkylphenone
4. C₅-Alkylphenone
5. C₆-Alkylphenone
6. C₇-Alkylphenone
7. C₈-Alkylphenone
8. C₉-Alkylphenone
9. C₁₀-Alkylphenone
10. C₁₂-Alkylphenone
11. C₁₄-Alkylphenone



LCRR004

Long Lifetime of RRHT Columns at Elevated Temperatures

Column: ZORBAX SB-C18
827700-902
2.1 x 50 mm, 1.8 µm

Mobile Phase: A: 60% H₂O

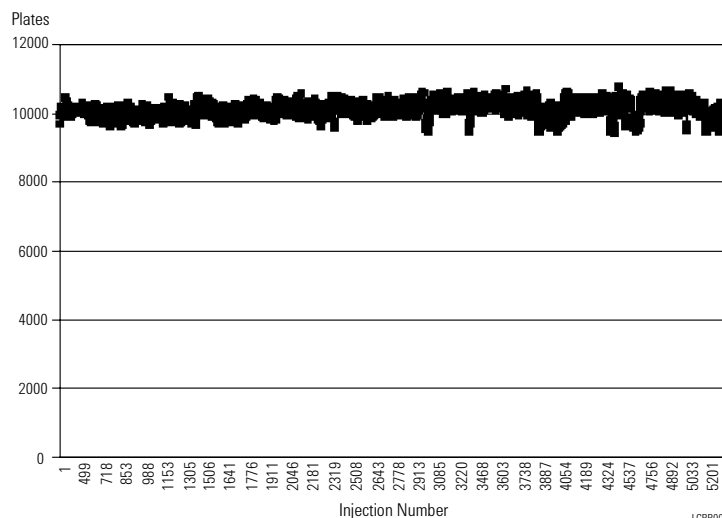
B: 40% ACN

Flow Rate: 1 mL/min

Temperature: 80°C

Detector: UV 254 nm

Sample: QC Test Mix



LCRR005














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 75	1.8	959951-902						
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 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	SB-C8	SB-Phenyl	SB-CN	SB-Aq	Rx-SIL	Bonus-RP
			USP L1	USP L7	USP L11	USP L10		USP L3	USP L60
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	827975-901	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	922975-902	822975-906	722975-902
	Rapid Resolution HT, 3/pk	4.6 x 50	1.8	922975-932		922975-932		
	Narrow Bore RRHT	2.1 x 50	1.8	922700-902		922700-902		
	Narrow Bore RRHT, 3/pk	2.1 x 50	1.8	922700-932		922700-932		
Rapid Resolution HT Cartridges (require hardware kit 820555-901)								
	Rapid Resolution HT Cartridge	4.6 x 50	1.8	925975-902		825975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 50	1.8	925975-932		825975-932		
	Rapid Resolution HT Cartridge	2.1 x 50	1.8	925700-902		825700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 50	1.8	925700-932		825700-932		
	Rapid Resolution HT Cartridge	4.6 x 30	1.8	923975-902		823975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 30	1.8	923975-932		823975-932		
	Rapid Resolution HT Cartridge	2.1 x 30	1.8	923700-902		823700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 30	1.8	923700-932		823700-932		
	Rapid Resolution HT Cartridge	4.6 x 15	1.8	921975-902		821975-902		
	Rapid Resolution HT Cartridge, 3/pk	4.6 x 15	1.8	921975-932		821975-932		
	Rapid Resolution HT Cartridge	2.1 x 15	1.8	921700-902		821700-902		
	Rapid Resolution HT Cartridge, 3/pk	2.1 x 15	1.8	921700-932		821700-932		
	Hardware Kit for RR and RRHT Cartridges			820555-901		820555-901		

Other Specialty Columns

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 detectors (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 Cartridges, 4/pk	4.6 x 12.5	5	820950-908
Guard Hardware Kit			820999-901

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% H₂O

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)

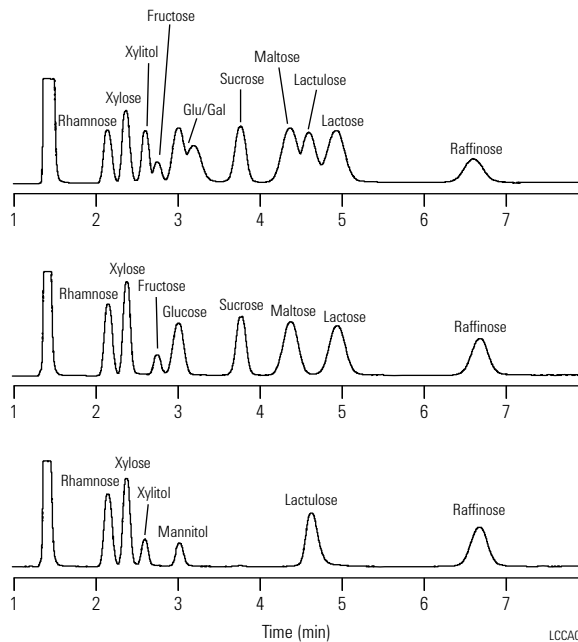
Maltose, Lactose (6 µg each), Inj. = 6.3 µL

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



Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers

ZORBAX Eclipse Amino Acid Analysis (AAA) Columns

- High resolution and rapid analysis of 24 amino acids
- 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 Cartridges, 4/pk	4.6 x 12.5	5	820950-931
ZGC	Guard Hardware Kit			820999-901

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 Na₂HPO₄, pH 7.8
B: ACN:MeOH:Water,
45:45:10 v/v

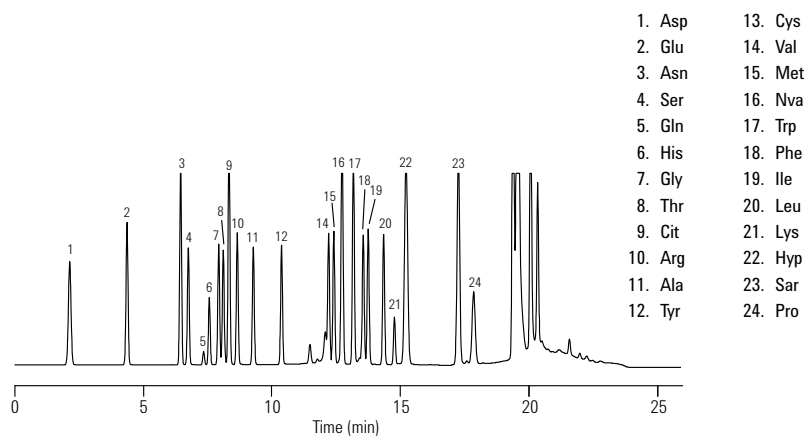
Flow Rate: 2 mL/min

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.



LCPAH01

Amino Acid Standards

Each amino acid standard 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 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, P/N 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 (Dithiodipropionic) reagent, for analysis of cysteine, 5 g	5062-2479



ZORBAX Eclipse PAH

- High resolution separation of 16 PAHs in EPA Method 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 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. Eclipse PAH columns separate all 16 PAHs in EPA method 610 quickly and 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.

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



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			820999-901

High Resolution and Fast Analysis on RRHT Eclipse PAH Column

Column: Eclipse PAH
959941-918
4.6 x 50 mm, 1.8 μm

Mobile Phase: A: Water; B: Acetonitrile

Gradient:

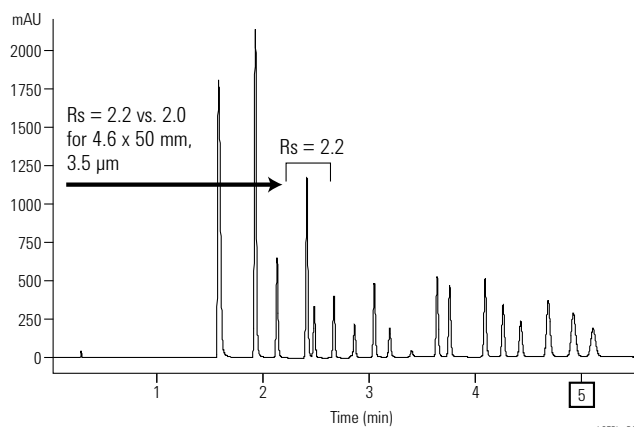
Time (Min)	% B
0.00	40
3.5	100
5.2	100
5.5	40
6.5	40

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



Pursuit PAH

- Fast analysis times for higher throughput
- Complete resolution of PAHs for easy integration
- Reproducible columns for rugged method development

Agilent Pursuit PAH columns are based on a specially tailored, polymerically bonded C18 phase designed for the complete resolution of polycyclic aromatic hydrocarbons (PAHs). Using the 100 x 4.6 mm Pursuit 3 μ m PAH column, all 16 components of the PAH mixture defined by EPA Method 610 can be fully resolved in less than ten minutes. Separation of critical pairs is maintained, while run times are reduced by as much as a factor of two.

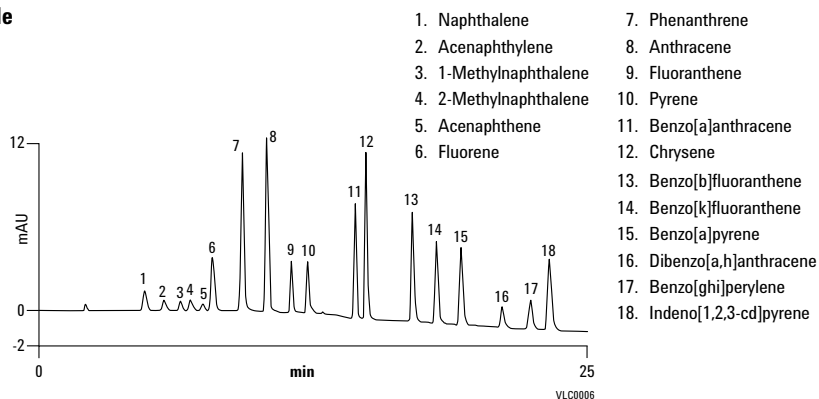
Pursuit PAH

Hardware	Dimensions	Particle Size (μ m)	Part No.
	4.6 x 250	5	A7000250X046
	4.6 x 150	5	A7000150X046
	4.6 x 100	3	A7001100X046
	3.0 x 100	3	A7001100X030
	2.0 x 100	3	A7001100X020
Pursuit PAH ChromSep Complete Cartridge Systems			
CS	4.6 x 250	5	A7000250C046
CS	4.6 x 150	5	A7000150C046
CS	4.6 x 150	3	A7001150C046
CS	4.6 x 100	3	A7001100C046
CS	3.0 x 100	5	A7000100C030

**Polycyclic aromatic hydrocarbons
according to Florida Administrative Code
(Pre 9/97) 62.770**

Column: Pursuit PAH
A7001100X046
4.6 x 100 mm, 3 μ m

Sample: PAH test mix
Temperature: 25°C
Detector: UV, 254 nm





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 ID, which is ideal for reducing solvent usage by 50% compared to 4.6 mm ID columns. Also ideal for LC/MS, with a typical flow rate of 0.5 mL/min, these columns are compatible with almost all LC interfaces. Solvent Saver columns improve sensitivity 2 to 3 times over 4.6 mm ID columns and can be used with conventional HPLC instruments.

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

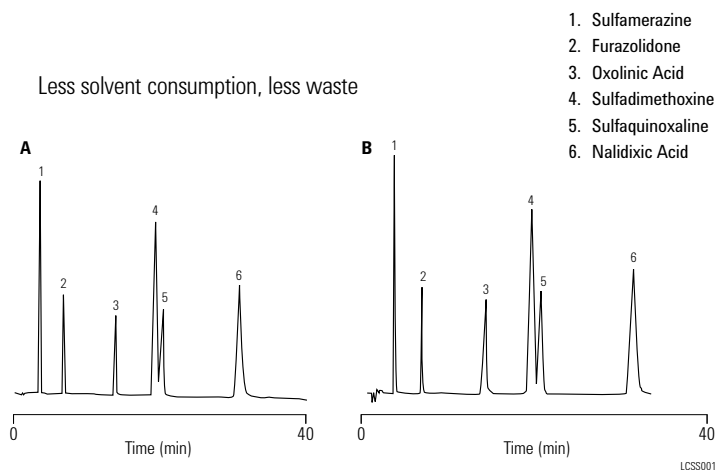
Column B: ZORBAX SB-C18
883975-302
3.0 x 150 mm, 5 μm

Mobile Phase: 20% ACN:80% 0.2 M Na_2HPO_4
+ 0.1 M Citric Acid, pH 2.6

Temperature: Ambient

Sample: Antibacterials

This separation of antibacterials on 4.6 and 3.0 mm ID columns shows that solvent use is reduced by 50% simply by changing to a Solvent Saver column with no change in the chromatography, dramatically reducing the cost of analyses.



Solvent Saver Columns Increase Sensitivity

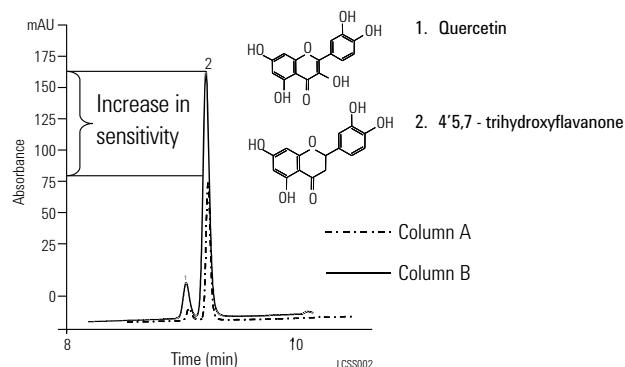
Column A: ZORBAX SB-C18
863953-902
4.6 x 150 mm, 3.5 µm

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

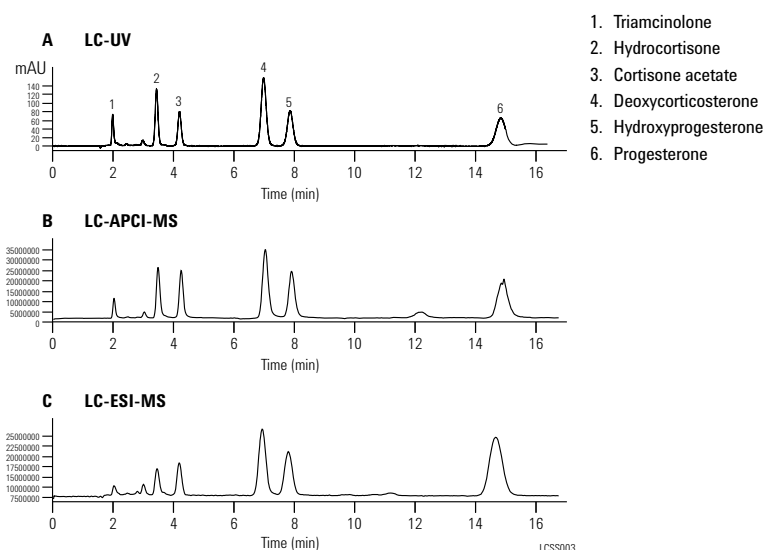
Mobile Phase: A: 70% Methanol+0.4% Formic Acid
B: 30% Water+0.4% Formic Acid

Flow Rate: 0.425 mL/min

Detector: A: UV 254 nm
B: Positive Ion APCI
C: Positive Ion Electrospray

Sample: Steroids

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 RRHD, 1200 bar	3.0 x 150	1.8	959759-302	959759-306		
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	959758-302	959758-306		
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	959757-302	959757-306		
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 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	963954-305	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 RRHD, 1200 bar	3.0 x 150	1.8	981759-302			
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	981758-302			
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	981757-302			
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		

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
Solvent Saver Plus	3.0 x 75	3.5	866953-302					

(Continued)

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 RRHD, 1200 bar	3.0 x 150	1.8	859700-302	859700-306				
Solvent Saver RRHD, 1200 bar	3.0 x 100	1.8	858700-302	858700-306	858700-305		858700-312	
Solvent Saver RRHD, 1200 bar	3.0 x 50	1.8	857700-302	857700-306	857700-305		857700-312	
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				

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 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	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



Chiral HPLC Columns

Ultron ES Chiral Columns

- Direct racemic separations without derivatization
- Use Ultron ES-OVM as the USP L57 choice and 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 ES 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)

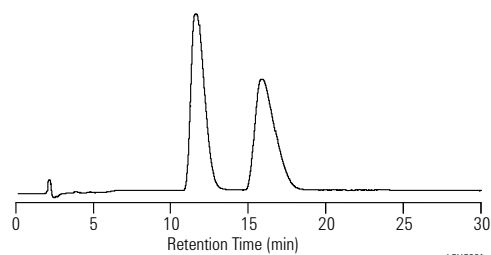
Column: Ultron ES-OVM Chiral
702111651
4.6 x 150 mm, 5 µm

Mobile Phase: 25:75 (v/v) EtOH/20 mM KH₂PO₄, pH 5.5
(adjusted with NaOH)

Temperature: Ambient

Detector: UV (225 nm)

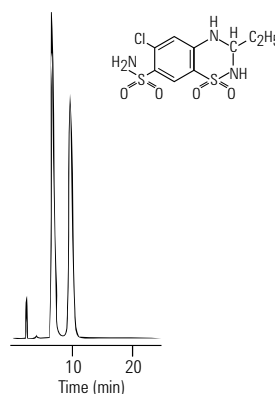
Sample: Mixture Fluoxetine (Prozac) enantiomers



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 KH₂PO₄ (pH 4.6)
Flow Rate: 1 mL/min
Temperature: 25°C
Detector: 220 nm



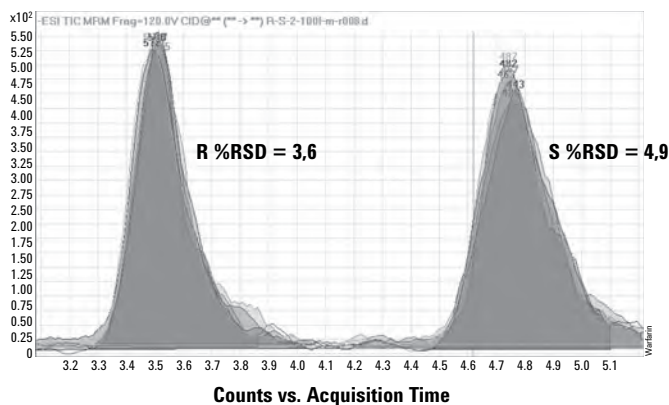
Chiral Separation of Warfarin Enantiomers R and S Limit of Quantitation %RSD at 100 fg/mL

Column: Ultron ES-OVM Chiral 702111610
2.0 x 150 mm, 5 µm
Temperature: 30°C
Injection Volume: 5 µL
Autosampler Temperature: 10°C
Needle Wash: Flush port (50:25:25 H₂O, IPA:MeOH:H₂O, 5 seconds)
Mobile Phase: 83% A = H₂O + 5mM Ammonium Formate
 17% B = ACN
Flow Rate: 0.5 mL/min
 Stop time: 7.0 min
MS Conditions: Agilent 6410A Triple Quadrupole LC/MS/MS with MultiMode Source
Ion Mode: ESI, Negative

Source Conditions
Capillary Voltage: 2000 V
Drying Gas (nitrogen): 5 L/min
Drying Gas Temperature: 300°C
Nebulizer Gas (nitrogen): 40 psi
Vaporizer: 200°C

Product Ion Scan
Mass Range: 50-500 m/z
Scan Speed: 500 msec

MRM acquisition (Q1 peak width = 1.2 and Q2 peak width = 0.70 amu)
Delta EMV: 1000V





Ultron ES Chiral Columns

Description	Size (mm)	Particle Size (µm)	ES-OVM	
			USP L57	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

ChiraDex Chiral Columns

Hardware	Description	Size (mm)	Particle Size (μm)	Part No.
	Cartridge Column	4.0 x 250	5	79925CB-584
	Cartridge Holder, 5021-1845			5021-1845

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education



■ PREPARATIVE HPLC COLUMNS AND FLASH CHROMATOGRAPHY

Agilent provides a range of preparative columns for direct scale-up of analytical separations or preparative scale purification of organic compounds. Preparative LC columns are used when resolution is critical and high-efficiency columns are key. Column choices range from semi-prep to several inches in internal diameter for use on analytical and preparative HPLC systems.

Flash chromatography can be used to purify reaction products and isolate target compounds. This is a popular purification technique for fast results and high throughput with many samples. Flash columns have larger particle sizes and lower pressure than traditional HPLC columns. They are often disposable and very cost-effective. Corresponding flash systems are available for convenient use of flash cartridges.

Some choices shown in this section include the following:

- **ZORBAX PrepHT** – ideal for analytical to preparative separations on ZORBAX phases where resolution is critical
- **Agilent Prep** – cost-effective preparative separation choice and are available in 21.2, 30 and 50 mm ID sizes with matching scalar columns in either 5 or 10 μm particle sizes
- **Dynamax Preparative** – use a modular design with dynamic axial compression to eliminate column voids and are available with cost-effective, high-capacity packing materials
- **High Efficiency Purification** – range of Pursuit and Polaris HPLC materials for small molecule separations
- **Load & Lock Preparative HPLC** – enable you to quickly and easily pack your own preparative high efficiency columns
- **SuperFlash Purification** – maximum recovery of high purity compounds every time
- **Flash F75/F150 Cartridges** – designed for routine, quick purification of several grams or more of your target compounds



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.

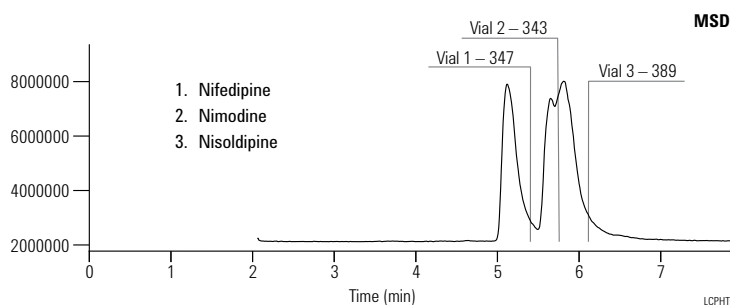
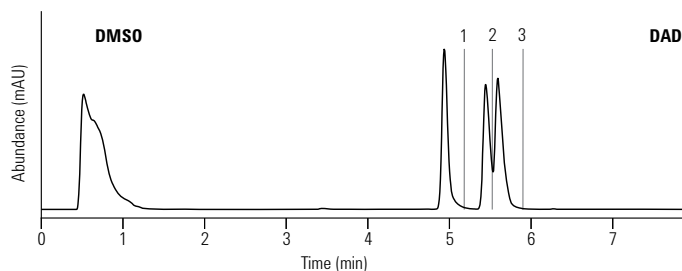
ZORBAX PrepHT columns are packed with 5 and 7 μm particle sizes for very high resolution. The high resolution allows high loadability, high yield, and high purity of compounds. The larger diameter columns and mechanically stronger ZORBAX particles allow for flow rates up to 100 mL/min, thus increasing 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		

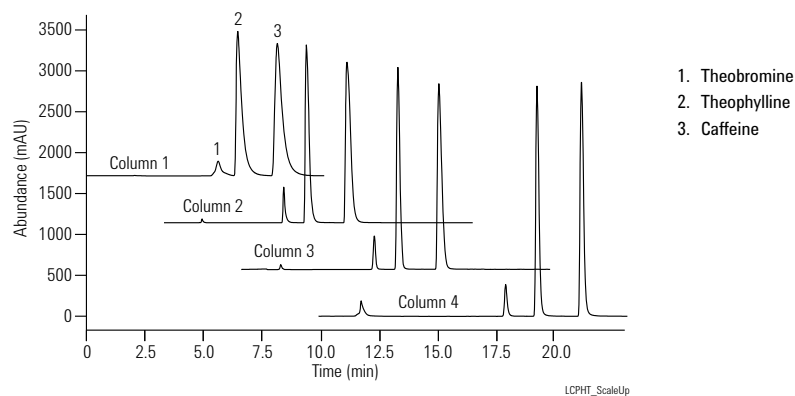
ZORBAX PrepHT columns are designed for rapid scale-up from analytical to preparative scale without losing resolution. For complex separations for larger columns (21.2 mm ID and higher, 150 mm length and higher), Agilent has carefully chosen the 7 μm particle size to achieve a balance between high efficiency 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 increases 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
 PrepHT Cartridge	21.2 x 250	7	877250-102	877250-106	877250-114	877250-105	877250-112
 PrepHT Cartridge	21.2 x 150	7	877150-102	877150-106	877150-114		
 PrepHT Cartridge	21.2 x 150	5	870150-902	870150-906	870150-914		
 PrepHT Cartridge	21.2 x 100	5	870100-902	870100-906	870100-914		
 PrepHT Cartridge	21.2 x 50	5	870050-902	870050-906	870050-914		
 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
 PrepHT Cartridge	21.2 x 250	7	897250-102	897250-106	897250-109	897250-105
 PrepHT Cartridge	21.2 x 150	7	897150-102	897150-106	897150-109	
 PrepHT Cartridge	21.2 x 150	5	895150-902	895150-906	895150-909	
 PrepHT Cartridge	21.2 x 100	5	895100-902	895100-906	895100-909	
 PrepHT Cartridge	21.2 x 50	5	895050-902	895050-906	895050-909	
 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
 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
 PrepHT Cartridge	21.2 x 250	7	977250-102	977250-106
 PrepHT Cartridge	21.2 x 150	7	977150-102	977150-106
 PrepHT Cartridge	21.2 x 150	5	970150-902	970150-906
 PrepHT Cartridge	21.2 x 100	5	970100-902	970100-906
 PrepHT Cartridge	21.2 x 50	5	970050-902	970050-906
 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
 PrepHT Cartridge	21.2 x 250	7	878250-101	
 PrepHT Cartridge	21.2 x 150	7	878150-101	
 PrepHT Cartridge	21.2 x 150	5	868150-901	770150-902
 PrepHT Cartridge	21.2 x 100	5	868100-901	770100-902
 PrepHT Cartridge	21.2 x 50	5	868050-901	770050-902
 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
 PrepHT Cartridge	21.2 x 250	7	877250-101	
 PrepHT Cartridge	21.2 x 250	7		877967-102
 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.
 Guard Cartridge Hardware	820444-901
 PrepHT endfittings, 2/pk	820400-901
 Replacement Seals	820385-901

Agilent Prep LC Columns

- High loadability for maximum sample purification
- Easy scalability from 4.6 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 size 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.

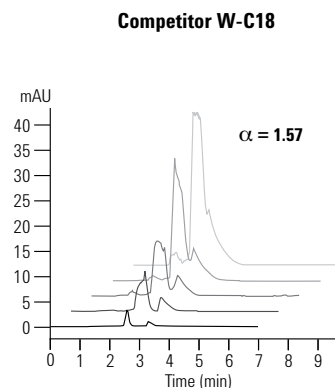
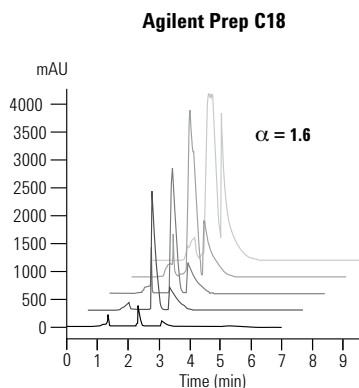
Superior Loadability on Agilent Prep C18 with Basic Compounds

Column: Agilent Prep C18
443905-902
4.6 x 150 mm, 5 μ m

Mobile Phase: 50% 0.1%TFA:50% ACN

Flow Rate: 1 mL/min

Sample: 10 μ L
Doxepin/Amitriptyline
0.5-50 mg/mL



Agilent Prep columns show better resolution and loadability than competitor columns.

LCPLC01

Steroids: Easy Scalability Using Agilent Prep Columns

Column A: Agilent Prep C18
443905-902
4.6 x 150 mm, 5 μ m

Column B: 443905-102
21.2 x 150 mm, 5 μ m

Column C: 413910-302
30.0 x 150 mm, 10 μ m

Column D: 413910-502
50.0 x 150 mm, 10 μ m

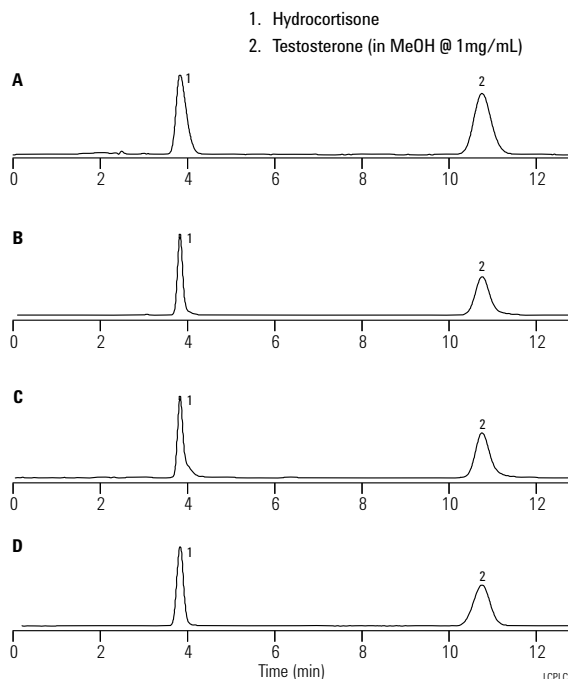
Mobile Phase: 55% Water:45% ACN

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 μ L
42.4 μ L
170 μ L
488 μ L



Agilent Prep C18 shows excellent scalability, making method transfer simple and predictable.

LCPLC02

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)*					
	PrepHT	21.2 x 250	10	410910-102	410910-101
	PrepHT	21.2 x 150	10	413910-102	413910-101
	PrepHT	21.2 x 50	10	446910-102	
	PrepHT	21.2 x 150	5	443905-102	443905-101
	PrepHT	21.2 x 100	5	449905-102	449905-101
	PrepHT	21.2 x 50	5	446905-102	446905-101
	PrepHT endfittings, 2/pk			820400-901	820400-901
Standard Columns (no special hardware required)					
	Prep 30	30.0 x 250	10	410910-302	410910-301
	Prep 30	30.0 x 150	10	413910-302	413910-301
	Prep 30	30.0 x 100	10	419910-302	419910-301
	Prep 30	30.0 x 100	5	449905-302	449905-301
	Prep 30	30.0 x 50	5	446905-302	446905-301
	Prep 50	50.0 x 250	10	410910-502	410910-501
	Prep 50	50.0 x 150	10	413910-502	413910-501
	Prep 50	50.0 x 100	10	419910-502	419910-501
	Prep 50	50.0 x 100	5	449905-502	449905-501
Guard Columns (hardware required)					
	PrepHT Guard Cartridges, 2/pk	21.2 x 10	10	420212-902	420212-901
	Guard Cartridge Hardware			820444-901	820444-901
	PrepHT External Guard Hardware Kit			420420-901	420420-901
	Bulk Packing (1kg)		10	420910-902	420910-901

*All PrepHT cartridge columns require hardware kit P/N 820400-901. If a guard column is desired for the 21.2 mm ID columns, the PrepHT Guard Hardware Kit, P/N 820444-901, is also required. If the guard column is used on a 30 mm ID column then the external guard column hardware kit, P/N 420420-901, is required.

High Efficiency Purification for Small Molecule Separations

- Small column sizes for high-speed media selection, method development and purification
- Comprehensive range of selectivities
- Packed columns and bulk media

Agilent offers a range of high efficiency, small particle silica and polymeric HPLC materials. These are pre-packed preparative columns and bulk media for reverse phase, normal phase and ion exchange purification. A range of pore sizes is available, providing maximum capacity for all applications, from small molecules to biological macromolecules.

Small Molecule Separations

Separation	Media Characterization	Column
Hydrophobic	Highest Mass Loading	Pursuit XRs 100Å C18 Pursuit XRs 100Å C8
	Hydrophobic Work Horse	Pursuit 200Å C18 Pursuit 200Å C8
	Aromatic/Double Bonds	Pursuit 200Å Diphenyl
Hydrophilic	Polar Selectivity	Polaris 200Å C18-A Polaris 200Å C8-A
	H-bond Accepting	Polaris 200Å C18-Ether Polaris 200Å C8-Ether
	Reverse or Normal-Phase	Polaris 200Å NH2
	H-bonding	Polaris 200Å Amide-C8
	Normal-Phase Organic Soluble	Pursuit XRs Si Pursuit XRs Diol
Extreme Conditions	pH Extremes/High Temperatures	PLRP-S 100Å, 8 µm

Pursuit High Efficiency XRs Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)	XRs C18	XRs C8	XRs Diphenyl	XRs Diol	XRs Si
21.2 x 250	10	A6002250X212				A6004250X100
21.2 x 250	5	A6000250X212		A6020250X212	A3040250X212	
21.2 x 100	5		A6010100X212			
10.0 x 250	10	A6002250X100				
10.0 x 250	5	A6000250X100		A6020250X100		
High Efficiency Bulk Media						
100 g	10	A6002100G	A6012100G			A6004100G

Pursuit High Efficiency Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)	C18	C8	Diphenyl	PFP
21.2 x 250	10	A6002250X212	A3032250X212	A3042250X212	
21.2 x 250	5	A3000250X212	A3030250X212	A3040250X212	A3050250X212
10.0 x 250	10	A6002250X100	A3032250X100	A3042250X100	
10.0 x 250	5	A3000250X100	A3030250X100	A3040250X100	A3050250X100

Polaris High Efficiency Columns for Small Molecule Separations

Size (mm)	Particle Size (µm)							
		C18-A	C18-Ether	Amide C18	C8-A	C8-Ether	NH2	Si-A
21.2 x 250	10	A2002250X212		A2008250X212				A2004250X212
21.2 x 250	5	A2000250X212	A2030250X212	A2006250X212	A2010250X212	A2030250X212	A2013250X212	A2003250X212
10.0 x 250	10			A2008250X100				
10.0 x 250	5	A2000250X100	A2020250X100	A2006250X100	A2010250X100	A2030250X100	A2013250X100	

Dynamax Preparative HPLC Columns

- Modular design with reusable end fittings reduces hardware costs
- Three internal diameters – 10, 21.4 and 41.4 mm – for easy scale-up
- Integral guard column option for longer column lifetimes with complex samples

The Dynamax preparative column hardware utilizes a patented dynamic axial compression (DAC) design and is the ideal format for the development and optimization of a high throughput or high yield purification. The DAC principle of operation maintains packed bed integrity and improves column performance over an extended period of time with a reduction in operating costs.

Agilent offers Dynamax columns as compression modules (cartridges) onto which separate axial compression end fittings are fitted. This provides a means of eliminating voids that may form at the column inlet during use and also enables the end fittings to be reused. When changing the column it is only necessary to replace the compression module with one of a similar internal diameter.

There are three options when configuring a Dynamax column. To simplify choice, end fittings kits are available for each of the configurations. Kit #1 contains the end fittings for using the Dynamax column without a guard module. Kit #2 contains all the parts needed to operate with a protective guard module. There is also a guard coupling assembly parts kit to upgrade Kit #1 to Kit #2. When the guard column is used as a short preparative column only the standalone guard holder is needed.

SepTech ST60 10-C18 and SepTech ST150 10-C18 media designed for high performance separations at high capacity are available in the Dynamax format for rapid method development and small-scale separations.

Dynamax Column Hardware Kits

Description	ID (mm)	Part No.
End fittings kit #1	10	R000083810
	21.4	R000083820
	41.4	R000083840
End fittings kit #2	10	R000083812
	21.4	R000083822
	41.4	R000083842
Guard coupling assembly	10	R000083811
Upgrades kit #1 to kit #2	21.4	R000083821
	41.4	R000083841
Standalone guard holder	10	R000083814
	21.4	R000083824
	41.4	R000083844

SepTech C18 Reverse Phase Media

- Symmetrical peaks improve yield of high purity product
- High capacity delivers maximum throughput
- Narrow particle size distribution improves packed bed stability

SepTech media has been developed specifically for prep to process HPLC, from the definition of the base silica particle, pore sizes, pore volume, specific surface area, mechanical strength and particle size distribution through to the bonding chemistry, ligand density and end capping. The result is two products: SepTech ST60 10-C18 – optimized for small molecule purifications, and SepTech ST150 10-C18 – the preferred option for larger, natural molecules and biomolecules.

The high level of batch-to-batch reproducibility and particle integrity give consistent performance and ease of column packing, which are essential for minimizing production downtime. SepTech media helps you meet the demands of a robust and economical process by purifying the maximum amount of product at the required purity in the shortest period of time.

Column Specifications

Characteristics	SepTech ST60 10-C18	SepTech ST150 10-C18
Nominal Particle Size	10 µm	10 µm
Nominal Pore Size	60Å	150Å
Nominal Distribution	<2 d90/d10	<2 d90/d10
Shape	Spherical	Spherical
Silica Purity	99.999%	99.999%
Chemistry	Octadecyl	Octadecyl
End Capping	Yes	Yes
Carbon Load	25%	15%
Ligand Coverage	3.5 µmol/m ²	3.8 µmol/m ²
Working pH Range	1.5-10	1.5-10

SepTech ST60 10-C18

Description	Size (mm)	Part No.
Method Development Column	4.6 x 250	A8060250X046
Dynamax Packed Cartridge Module	10 x 50	A8060050DG100
	10 x 250	A8060250DM100
	21.2 x 50	A8060050DG214
	21.2 x 250	A8060250DM214
	41.4 x 50	A8060050DG414
	41.4 x 250	A8060250DM414
Bulk media	100 g	A80600100G
	1 kg	A8060001KG

SepTech ST150 10-C18

Description	Size (mm)	Part No.
Method Development Column	4.6 x 250	A8150250X046
Dynamax Packed Cartridge Module	10 x 50	A8150050DG100
	10 x 250	A8150250DM100
	21.2 x 50	A8150050DG214
	21.2 x 250	A8150250DM214
	41.4 x 50	A8150050DG414
	41.4 x 250	A8150250DM414
Bulk media	100 g	A81500100G
	1 kg	A8150001KG

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers



FlowTrap

- Reduced dry-down times improve productivity
- Desalting in situ preserves compound integrity
- Retentive sorbent handles a wide range of sample pH and pKa

FlowTrap columns contain ultra-retentive, high capacity, and hydrophobic polymeric material that captures and concentrates small molecules. Once trapped, the desired analyte can be back eluted using a small volume of volatile organic solvent, affording simple compound isolation. FlowTrap columns give you excellent retention and easy elution. The efficiency of the packed bed delivers superior reproducibility and can be used for up to 500 flow-trapping cycles when run under optimized conditions.

With FlowTrap you can solvent switch from a high volume of water-based HPLC eluent to a low volume of volatile solvent, dramatically reducing the evaporation times needed for compound isolation. Ion pairing reagents such as TFA can be removed from the compound during trapping, allowing the isolation of free-base compounds and reducing the risk of potential compound hydrolysis.

FlowTrap is available in standard HPLC column hardware covering a range of column sizes that handle seamless scale-up as compound batch sizes increase. Using FlowTrap columns will help you dramatically reduce dry-down times, increasing throughput for compound recovery.

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



FlowTrap

Size (mm)	Capacity Range (mg)*	Part No.
4.6 x 150	50	PL1560-3M07
7.5 x 150	50-150	PL1160-3M07
10.0 x 150	150-200	PL1060-3M07
21.2 x 150	200-400	PL1E60-3M07

*Recommendation only, based on representative loading studies. Capacity will vary according to compound type and eluent constitution.

Metronidazole TFA removal

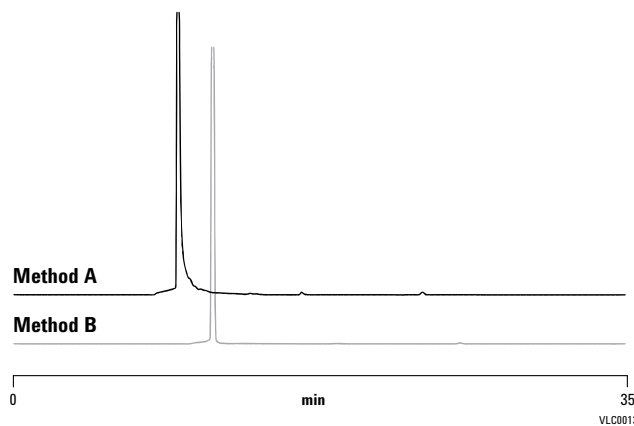
Column: FlowTrap
PL1560-3M07
4.6 x 150 mm, μ m

Mobile Phase: Metronidazole (12 mL) @ 2 mg/mL
in water + 0.1% TFA
Caffeine @ 2 mg/mL in water + 0.1% TFA

Detector: UV, 280 nm

Wash Conditions: Method A: R.O. water flow rate: 4 mL/min for 4 min
Method B: 2 M NH₃, flow rate: (4 mL/min) for 2 min then
R.O. water, flow rate: (4 mL/min) for 4 min

Elution: 100% CH₃CN over 5 min flow rate:
(4 mL/min)



Load & Lock Preparative HPLC Systems

Agilent offers a complete range of Load & Lock column systems for laboratory and process preparative LC. They are designed to enable you to easily and quickly pack your own preparative high efficiency columns. This is the right solution for applications ranging in scale from discovery (milligrams) to production (multi-kilos) of pharmaceutical compounds, peptides, and natural products. Our Load & Lock columns have a unique fluid/sample distribution system to maximize productivity. It is the only system that provides dynamic axial compression (DAC) and static "locked" axial compression (SAC) and is designed for easy operation to deliver greater convenience.

Laboratory Load & Lock Columns

- Mobile packing station supports three different column sizes
- Runs on compressed air with no need for a power supply
- Quick and easy packing and unpacking within minutes

Agilent's laboratory scale Load & Lock columns combine excellent packed-bed stability with enhanced flow distribution to deliver the highest quality purification possible with maximum speed, flexibility and ease of operation. Three different column sizes are supported: 1 in., 2 in. and 3 in. ID. Because the station is powered by compressed air, it is the perfect solution for hazardous environments. The quick-release single bolt clamp offers speedy and easy packing and unpacking within minutes.

Load & Lock Preparative HPLC Systems

Description	Water Jacket	Size (mm)	Part No.
Load & Lock 4001 Column	No	25 x 500	PCG93LL500X25
	Yes	25 x 500	PCG93LL500X25WJ
	Spare parts kit		PCG931AAKIT
Load & Lock 4002 Column	No	50 x 500	PCG93LL500X50
	Yes	50 x 500	PCG93LL500X50WJ
	Spare parts kit		PCG932AAKIT
Load & Lock 4003 Column	No	75 x 500	PCG93LL500X75
	Yes	75 x 500	PCG93LL500X75WJ
	Spare parts kit		PCG933AAKIT
Mobile packing station (air driven hydraulic)			PCG93LLSTAND123

Flash Chromatography

- Isolate compounds from synthesis mixtures quickly and easily
- Maximize compound purity and recovery with superior purification columns
- Enhance gradient accuracy with solid loading system

Flash chromatography purifies reaction products to isolate the target compound. Flash columns are designed for purification. Every element has been thought out, custom designed and carefully manufactured for excellent purification performance, time after time.

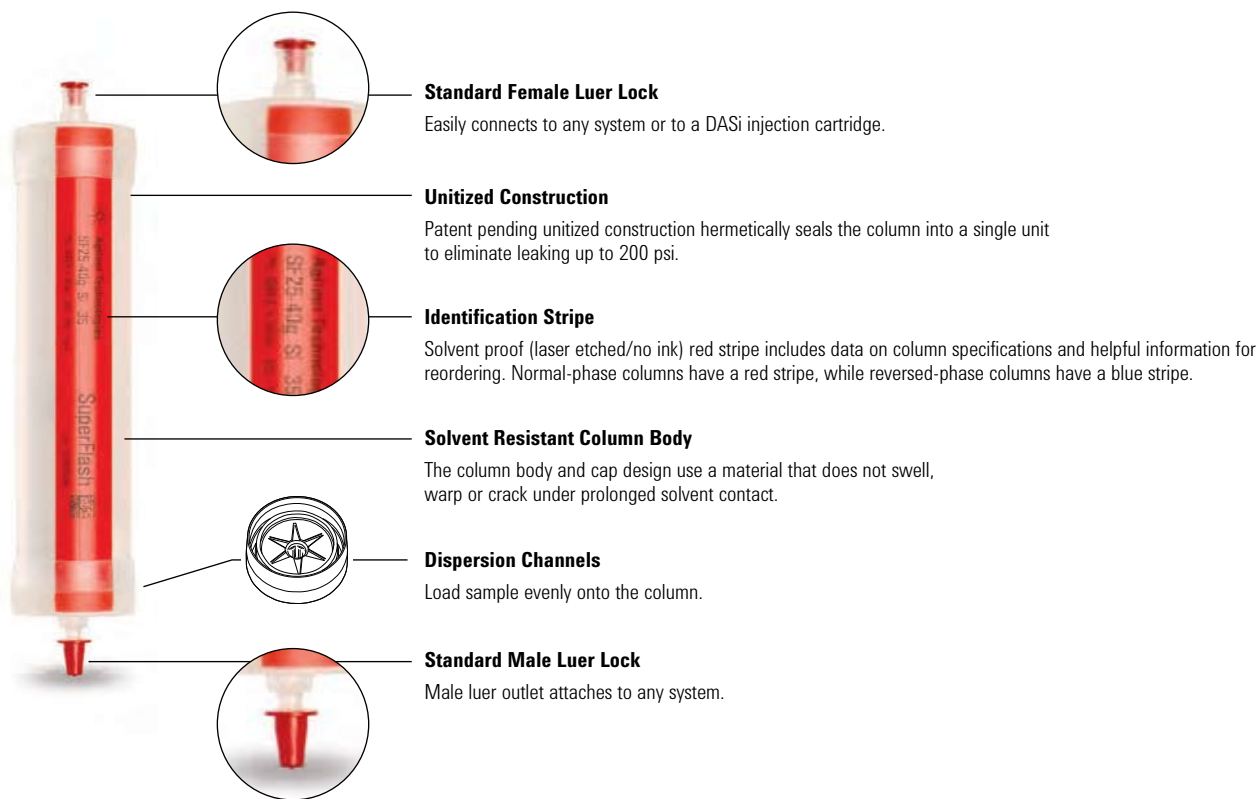
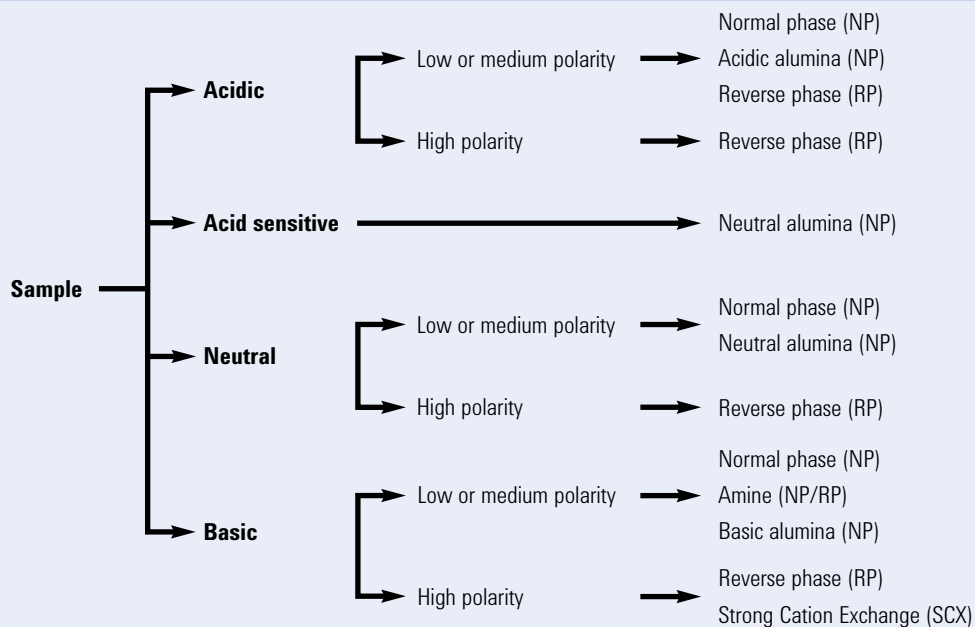


SuperFlash Purification Columns

- Sixteen standard sizes plus customized sizes for a wide application range
- Short, wide columns for speed and long, thin columns for resolution
- Flat packaging for stock room organization and supply visibility to maintain inventory

Each element of the SuperFlash compound purification column, with our patented and patent-pending technologies, delivers optimal performance, offering maximum recovery of high purity compounds time after time. Our columns, available in Si 50, Si 35, C18, PLRP-S and SCX for normal and reverse phase separations, and a variety of other sorbents, eliminate the common problems of leaking, size limitations, complicated connections and poor compound separation. Instead, you receive a cost-effective, high performance disposable column specifically designed for delivering convenient, efficient separations.

Media selection



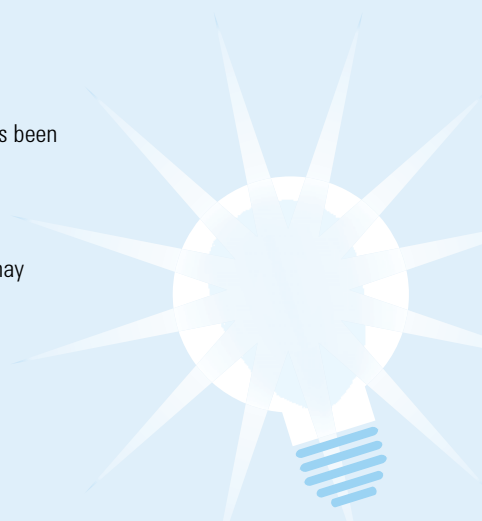
Solvent Polarity		
Polarity Index at 20°C		Solvent
Non-polar ↓ Polar	0.0	Heptane
	0.0	Hexane
	0.0	Pentane
	0.2	Cyclohexane
	1.0	Trichloroethylene
	1.6	Carbon tetrachloride
	2.8	di-Ethyl ether
	3.1	Dichloromethane
	3.9	Propan-2-ol
	4.0	Propan-1-ol
	4.0	Tetrahydrofuran
	4.1	Chloroform
	5.1	Acetone
	5.1	Methanol
5.2	Ethanol	
5.8	Acetonitrile	
9.0	Water	



SuperFlash Notes

This information applies to the following SuperFlash ordering tables.

- Maximum pressure for all columns is 14 bar (200 psi).
- Obey pressure maximum limits marked on every column. Confirm the instrument has been set to the appropriate maximum pressure before attaching column.
- Dimensions are for sorbent bed diameter x overall column length.
- Flow rates up to 40% higher than the recommended normal operating flow rates may be used to reduce equilibration times.
- Sample loading values are suggested. Results may vary with specific samples.



Normal Phase (NP)

SuperFlash Si 50

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 4 g	14.2 x 95	50	18	40 - 400 mg	8/pk	AX1368-8
SF10 - 8 g	14.2 x 136	50	18	80 - 800 mg	8/pk	AX1403-8
SF15 - 12 g	20.8 x 112	50	30	120 mg - 1.2 g	7/pk	AX1369-7
SF15 - 24 g	20.8 x 175	50	30	240 mg - 2.4 g	7/pk	AX1404-7
SF25 - 40 g	28.2 x 164	50	40	400 mg - 4 g	6/pk	AX1281-6
SF25 - 60 g	28.2 x 214	50	40	600 mg - 6 g	6/pk	AX1212-6
SF25 - 80 g	28.2 x 280	50	40	800 mg - 8 g	6/pk	AX1213-6
SF25 - 120 g	28.2 x 388	50	40	1.2 - 12 g	6/pk	AX1214-6
SF25 - 160 g	28.2 x 507	50	40	1.6 - 16 g	6/pk	AX1215-6
SF40 - 80 g	40.6 x 158	50	85	800 mg - 8 g	4/pk	AX1356-4
SF40 - 120 g	40.6 x 202	50	85	1.2 - 11.5 g	4/pk	AX1216-4
SF40 - 150 g	40.6 x 257	50	85	1.5 - 15 g	4/pk	AX1217-4
SF40 - 240 g	40.6 x 371	50	85	2.4 - 24 g	4/pk	AX1218-4
SF65 - 200 g	66 x 156	50	100	2 - 20 g	3/pk	AX1357-3
SF65 - 400 g	66 x 256	50	100	4 - 40 g	3/pk	AX1219-3
SF65 - 600 g	66 x 365	50	100	6 - 60 g	3/pk	AX1220-3

SuperFlash Si 35

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 4 g	14.2 x 95	35	18	40 - 400 mg	8/pk	AX1370-8
SF10 - 8 g	14.2 x 136	35	18	80 - 800 mg	8/pk	AX1407-8
SF15 - 12 g	20.8 x 112	35	30	120 mg - 1.2 g	7/pk	AX1371-7
SF15 - 24 g	20.8 x 175	35	30	240 mg - 2.4 g	7/pk	AX1408-7
SF25 - 40 g	28.2 x 164	35	40	400 mg - 4 g	6/pk	AX1393-6
SF25 - 60 g	28.2 x 215	35	40	600 mg - 6 g	6/pk	AX1292-6
SF25 - 80 g	28.2 x 280	35	40	800 mg - 8 g	6/pk	AX1293-6
SF25 - 120 g	28.2 x 388	35	40	1.2 - 12 g	6/pk	AX1294-6
SF25 - 160 g	40.6 x 507	35	40	1.6 - 16 g	6/pk	AX1295-6
SF40 - 80 g	40.6 x 158	35	85	800 mg - 8 g	4/pk	AX1405-4
SF40 - 115 g	40.6 x 202	35	85	1.2 - 11.5 g	4/pk	AX1296-4
SF40 - 150 g	40.6 x 257	35	85	1.5 - 15 g	4/pk	AX1297-4
SF40 - 240 g	40.6 x 371	35	85	2.4 - 24 g	4/pk	AX1298-4
SF65 - 200 g	66 x 156	35	100	2 - 20 g	3/pk	AX1406-3
SF65 - 400 g	66 x 256	35	100	4 - 40 g	3/pk	AX1299-3
SF65 - 600 g	66 x 365	35	100	6 - 60 g	3/pk	AX1300-3

SuperFlash Aminopropyl – NH₂

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Unit	Part No.
SF10 - 5 g	14.2 x 96	40	18	1/pk	AX1374-1
SF10 - 10 g	14.2 x 136	40	18	1/pk	AX1511-1
SF15 - 15 g	20.8 x 113	40	30	1/pk	AX1375-1
SF15 - 30 g	20.8 x 174	40	30	1/pk	AX1512-1
SF25 - 50 g	28.2 x 163	40	40	1/pk	AX1311-1
SF25 - 75 g	28.2 x 220	40	40	1/pk	AX1376-1
SF25 - 100 g	28.2 x 277	40	40	1/pk	AX1377-1
SF25 - 150 g	28.2 x 391	40	40	1/pk	AX1378-1
SF25 - 200 g	28.2 x 506	40	40	1/pk	AX1379-1
SF40 - 100 g	40.6 x 159	40	85	1/pk	AX1380-1
SF40 - 150 g	40.6 x 207	40	85	1/pk	AX1316-1
SF40 - 200 g	40.6 x 255	40	85	1/pk	AX1317-1
SF40 - 300 g	40.6 x 379	40	85	1/pk	AX1381-1
SF65 - 250 g	66 x 157	40	100	1/pk	AX1382-1
SF65 - 500 g	66 x 262	40	100	1/pk	AX1319-1
SF65 - 750 g	66 x 365	40	100	1/pk	AX1383-1

Strong Cation Exchange (SCX)**SuperFlash SCX**

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Unit	Part No.
SF10 - 5 g	14.2 x 49	50	18	8/pk	AX2130-8
SF10 - 8 g	14.2 x 81	50	18	8/pk	AX2135-8
SF15 - 14 g	20.8 x 63	50	30	7/pk	AX2140-7
SF15 - 25 g	20.8 x 114	50	30	7/pk	AX2145-7
SF25 - 45 g	28.2 x 114	50	40	6/pk	AX2150-6
SF25 - 70 g	28.2 x 186	50	40	6/pk	AX2155-6
SF25 - 80 g	28.2 x 206	50	40	6/pk	AX2160-6
SF25 - 120 g	28.2 x 308	50	40	6/pk	AX2165-6
SF25 - 160 g	28.2 x 414	50	40	6/pk	AX2170-6
SF40 - 80 g	40.6 x 99	50	85	4/pk	AX2175-4
SF40 - 125 g	40.6 x 153	50	85	4/pk	AX2180-4
SF40 - 160 g	40.6 x 208	50	85	4/pk	AX2185-4
SF40 - 245 g	40.6 x 299	50	85	4/pk	AX2190-4
SF65 - 250 g	66 x 118	50	100	3/pk	AX2195-3
SF65 - 440 g	66 x 204	50	100	3/pk	AX2200-3
SF65 - 650 g	66 x 302	50	100	3/pk	AX2205-3



Reversed Phase (RP)

SuperFlash PLRP-S

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 2.5 g	14.2 x 95	50	12	15 - 60 mg	1/pk	AX2250-1
SF10 - 4 g	14.2 x 127	50	12	25 - 100 mg	1/pk	AX2255-1
SF15 - 7 g	20.8 x 112	50	20	41 - 167 mg	1/pk	AX2260-1
SF15 - 13 g	20.8 x 163	50	20	75 - 300 mg	1/pk	AX2265-1
SF25 - 24 g	28.2 x 163	50	30	138 - 500 mg	1/pk	AX2270-1
SF25 - 38 g	28.2 x 235	50	30	188 - 750 mg	1/pk	AX2275-1
SF25 - 42 g	28.2 x 255	50	30	250 mg - 1 g	1/pk	AX2280-1
SF25 - 63 g	28.2 x 357	50	30	375 mg - 1.5 g	1/pk	AX2285-1
SF25 - 85 g	28.2 x 463	50	30	500 mg - 2 g	1/pk	AX2290-1
SF40 - 42 g	40.6 x 148	50	50	250 mg - 1 g	1/pk	AX2295-1
SF40 - 65 g	40.6 x 202	50	50	375 mg - 1.5 g	1/pk	AX2300-1
SF40 - 90 g	40.6 x 257	50	50	500 mg - 2 g	1/pk	AX2305-1
SF40 - 130 g	40.6 x 348	50	50	750 mg - 3 g	1/pk	AX2310-1
SF65 - 133 g	66 x 170	50	65	750 mg - 3 g	1/pk	AX2315-1
SF65 - 230 g	66 x 256	50	65	1.4 - 5.4 g	1/pk	AX2320-1
SF65 - 340 g	66 x 354	50	65	2 - 8 g	1/pk	AX2325-1

SuperFlash C18

Model	Diameter x Length (mm)	Particle Size (µm)	Flow Rate (mL/min)	Sample Load	Unit	Part No.
SF10 - 5 g	14.2 x 95	50	12	15 - 60 mg	1/pk	AX1372-1
SF10 - 10 g	14.2 x 127	50	12	25 - 100 mg	1/pk	AX1409-1
SF15 - 16 g	20.8 x 112	50	20	41 - 167 mg	1/pk	AX1373-1
SF15 - 30 g	20.8 x 163	50	20	75 - 300 mg	1/pk	AX1410-1
SF25 - 55 g	28.2 x 163	50	30	138 - 500 mg	1/pk	AX1394-1
SF25 - 75 g	28.2 x 235	50	30	188 - 750 mg	1/pk	AX1302-1
SF25 - 100 g	28.2 x 255	50	30	250 mg - 1 g	1/pk	AX1303-1
SF25 - 150 g	28.2 x 357	50	30	375 mg - 1.5 g	1/pk	AX1304-1
SF25 - 200 g	28.2 x 463	50	30	500 mg - 2 g	1/pk	AX1305-1
SF40 - 100 g	40.6 x 148	50	50	250 mg - 1 g	1/pk	AX1411-1
SF40 - 150 g	40.6 x 202	50	50	375 mg - 1.5 g	1/pk	AX1306-1
SF40 - 205 g	40.6 x 257	50	50	500 mg - 2 g	1/pk	AX1307-1
SF40 - 300 g	40.6 x 348	50	50	750 mg - 3 g	1/pk	AX1308-1
SF65 - 300 g	66 x 172	50	65	750 mg - 3 g	1/pk	AX1412-1
SF65 - 540 g	66 x 256	50	65	1.4 - 5.4 g	1/pk	AX1309-1
SF65 - 800 g	66 x 354	50	65	2 - 8 g	1/pk	AX1310-1

Normal Phase (NP) Alumina

SuperFlash Alumina

Model	Diameter x Length (mm)	Particle Size (µm)	Sample Load	Unit	Alumina Neutral	Alumina Acidic	Alumina Basic
SF10 - 8 g	14.2 x 95	125	80 - 400 mg	8/pk	AX1448-8	AX1474-8	AX1450-8
SF10 - 16 g	14.2 x 136	125	150 - 750 mg	8/pk	AX1477-8	AX1494-8	AX1476-8
SF15 - 24 g	20.8 x 112	125	230 mg - 1.2 g	7/pk	AX1466-7	AX1495-7	AX1467-7
SF15 - 48 g	20.8 x 175	125	450 mg - 2.2 g	7/pk	AX1468-7	AX1496-7	AX1469-7
SF25 - 80 g	28.2 x 163	125	750 mg - 2.2 g	6/pk	AX1449-6	AX1497-6	AX1478-6
SF25 - 120 g	28.2 x 215	125	1.1 - 5.5 g	6/pk	AX1481-6	AX1498-6	AX1480-6
SF25 - 160 g	28.2 x 280	125	1.5 - 7.5 g	6/pk	AX1483-6	AX1499-6	AX1482-6
SF25 - 240 g	28.2 x 388	125	2.2 - 11 g	6/pk	AX1462-6	AX1500-6	AX1464-6
SF25 - 320 g	28.2 x 507	125	3 - 15 g	6/pk	AX1485-6	AX1501-6	AX1484-6
SF40 - 160 g	40.6 x 158	125	1.5 - 7.5 g	4/pk	AX1487-4	AX1502-4	AX1486-4
SF40 - 230 g	40.6 x 214	125	2.2 - 11 g	4/pk	AX1489-4	AX1503-4	AX1488-4
SF40 - 300 g	40.6 x 256	125	2.8 - 10 g	4/pk	AX1438-4	AX1504-4	AX1437-4
SF40 - 480 g	40.6 x 388	125	4.5 - 22.5 g	4/pk	AX1473-4	AX1505-4	AX1479-4
SF65 - 400 g	66 x 157	125	3.7 - 18.5 g	3/pk	AX1463-3	AX1506-3	AX1465-3
SF65 - 800 g	66 x 262	125	7.5 - 37.5 g	3/pk	AX1491-3	AX1507-3	AX1490-3
SF65 - 1200 g	66 x 365	125	11.2 - 56 g	3/pk	AX1493-3	AX1508-3	AX1492-3


Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

For more information, visit www.agilent.com/chem/education

Flash F75/F150 Cartridges

- Available in a variety of sizes for development systems
- Convenient sorbents to meet your needs
- Consistent packing for less channelling and fraction dilution

If you regularly purify more than a few grams of compound, Flash F75/F150 cartridges deliver the convenience and compatibility you need. The cartridges are packed with silica for normal phase separations and silica C18 for reverse phase purifications. For development scale they are available in different bed diameters and bed masses to provide solutions for a range of sample sizes.

Flash F75 Cartridges

Model	Sorbent	Unit	Part No.
F75S - 200 g	Si 50	2/pk	AX0346-2
F75S - 200 g	Si 50	10/pk	AX0346-10
F75S - 200 g	Si 35	2/pk	AX1363-2
F75S - 200 g	Si 35	10/pk	AX1363-10
F75S - 300 g	C18	1/pk	AX0349-1
F75M - 400 g	Si 50	2/pk	AX0347-2
F75M - 400 g	Si 35	10/pk	AX0347-10
F75M - 400 g	Si 35	2/pk	AX1364-2
F75M - 400 g	Si 35	10/pk	AX1364-10
F75M - 600 g	C18	1/pk	AX0350-1
F75L - 800 g	Si 50	2/pk	AX0348-2
F75L - 800 g	Si 50	10/pk	AX0348-10
F75L - 800 g	Si 35	2/pk	AX1352-2
F75L - 800 g	Si 35	10/pk	AX1352-10
F75L - 1.2 kg	C18	1/pk	AX0351-1
F75XL - 1.6 kg	Si 50	2/pk	AX1178-2

Flash F150 Cartridges

Model	Sorbent	Unit	Part No.
F150M - 2.5 kg	Si 50	2/pk	AX0355-2
F150M - 2.5 kg	Si 50	10/pk	AX0355-10
F150M - 2.5 kg	Si 35	2/pk	AX1360-2
F150M - 2.5 kg	Si 35	10/pk	AX1360-10
F150M - 3.9 kg	C18	1/pk	AX0357-1
F150L - 5 kg	Si 50	2/pk	AX0356-2
F150L - 5 kg	Si 50	10/pk	AX0356-10
F150L - 5 kg	Si 35	2/pk	AX1361-2
F150L - 5 kg	Si 35	10/pk	AX1361-10
F150L - 9 kg	C18	1/pk	AX0414-1

DASi Sample Loading Module

- For even loading of low solubility and high viscosity compounds
- Modules are available in three sizes to match your sample needs
- Adjustable plunger eliminates dead volume and maintains gradient accuracy
- Provides security as a guard column for high-cost, specialty-sorbent columns

DASi Module Kits

Description	Part No.
DASi 12 module kit Includes five empty cartridges and two Si 50, 5 g packed cartridges	AX1238-1
DASi 35 module kit Includes five empty cartridges, two Si 50, 5 g packed cartridges and two Si 50, 10 g packed cartridges	AX1237-1
DASi 65 module kit Includes five empty cartridges, two Si 50, 5 g packed cartridges, two Si 50, 15 g packed cartridges and two Si 50, 25 g packed cartridges	AX1236-1
DASi 12, 35 and 65 module kit	AX1239-1

Each module kit contains plunger assembly and appropriate DASi Si Cartridge Sampler Kit

DASi Si Cartridge Sampler Pack

Description	Part No.
DASi 12 cartridge sampler pack	AX1266-1
DASi 35 cartridge sampler pack	AX1263-1
DASi 65 cartridge sampler pack	AX1252-1



DASi Module (showing one pre-packed cartridge)

Standard Female Luer Lock

Easily connect the DASi to any system with a female Luer lock top fitting.

Patent Pending Locking Mechanism

Easily push piston down. Assembly will remain in position until released.

Adjustable Plunger Head

Eliminates dead volume to maintain the superior gradient accuracy of the 971-FP instrument (especially important for DCM/methanol solvent combination).

Sample Cartridge

Solvent compatible cartridge body does not swell, warp, or crack under prolonged solvent contact.

Dispersion Channels

Distribute solvent evenly on the sample bed for tight, thin separation bands.

Standard Male Luer Lock

Male Luer outlet attaches to any system or to the top of a SuperFlash column.



Flash Purification

- Excellent purification performance of UV-active compounds at different wavelengths
- Eliminates uncontrolled sample loss to ensure sample security and retention
- Method-guiding functionality optimizes solvent, column and gradient options to increase efficiency and flexibility
- Ready-to-Run technology reduces downtime

The 971-FP system enhances productivity through its ready-to-run technology that eliminates warmup time, performs self diagnostics to ensure proper operation, supplies helpful navigation run start software and introduces walk-away start features like system auto-prime and sample auto-inject. The instrument incorporates the latest compound separation innovations, and contains new sample security and retention technology.

Solutions

Description	Part No.
971-FP multiple wavelength UV flash chromatography workstation Includes advanced features pack (AFP)	AX1600-1
971-FP single wavelength UV flash chromatography workstation	AX1605-1

Instrument Supplies

Agilent offers several accessories to support the 971-FP, including a Multi-column Controller to connect additional stations for uninterrupted column operation. The Advanced Feature Package (AFP) offers uninterrupted solvent supply, waste level monitoring and feedback, Guide Me functionality and dynamic run queues for multi-column control capacity. A high-speed processor and advanced operating software are integral to the AFP. The integral fume enclosure traps solvent fumes for use in areas without hoods (requires a 4 in. or greater exhaust ventilation connection), and the solvent bottle safety tray provides additional support of storing 4 L solvent bottles.

Instrument Supplies

Description	Part No.
MCC2 – Multi-column controller	AX1426-1
Advanced feature package (AFP)	AX1440-1
Integral fume enclosure	AX1429-1
Solvent bottle safety tray	AX1441-1

Accessory Racks

A variety of accessory racks for the 971-FP, all with radio frequency identification (RFID), is available.

Accessory Racks

Description	Part No.
13 x 100 mm rack, holds 90 tubes	AX1442-1
16 x 100 mm rack, holds 60 tubes	AX1443-1
16 x 150 mm rack, holds 60 tubes	AX1444-1
18 x 150 mm rack, holds 40 tubes	AX1446-1
25 x 150 mm rack, holds 24 tubes	AX1447-1

GPC/SEC COLUMNS AND CALIBRANTS

Agilent delivers leading solutions for characterizing and separating polymers by GPC/SEC. We manufacture all components for accurate polymer analysis, including columns and standards.

With the addition of Varian in 2010, Agilent greatly expanded its GPC/SEC portfolio to include the highly respected PLgel, PolarGel, PlusPore, and PL aquagel-OH column families, as well as an extensive line of polymer standards for GPC/SEC.

If you're currently using one of these part numbers for GPC/SEC columns or standards, reorder using the new part number listed below:

Cross Reference Guide for GPC/SEC Columns & Standards

If you're using...		Reorder this...	
Part No.	Description	Size (mm)	New Part No.
Organic GPC			
79911GP-110	PLgel 10 μ m guard	7.5 x 50	PL1110-1120
79911GP-510	PLgel 5 μ m guard	7.5 x 50	PL1110-1520
79911GP-MXB	PLgel 10 μ m MIXED-B	7.5 x 300	PL1110-6100
79911GP-100	PLgel 10 μ m 50 \AA	7.5 x 300	PL1110-6115
79911GP-101	PLgel 10 μ m 100 \AA	7.5 x 300	PL1110-6120
79911GP-102	PLgel 10 μ m 500 \AA	7.5 x 300	PL1110-6125
79911GP-103	PLgel 10 μ m 10 ³ \AA	7.5 x 300	PL1110-6130
79911GP-104	PLgel 10 μ m 10 ⁴ \AA	7.5 x 300	PL1110-6140
79911GP-105	PLgel 10 μ m 10 ⁵ \AA	7.5 x 300	PL1110-6150
79911GP-106	PLgel 10 μ m 10 ⁶ \AA	7.5 x 300	PL1110-6160
79911GP-MXA	PLgel 20 μ m MIXED-A	7.5 x 300	PL1110-6200
79911GP-MXE	PLgel 3 μ m MIXED-E	7.5 x 300	PL1110-6300
79911GP-MXC	PLgel 5 μ m MIXED-C	7.5 x 300	PL1110-6500
79911GP-MXD	PLgel 5 μ m MIXED-D	7.5 x 300	PL1110-6504
79911GP-500	PLgel 5 μ m 50 \AA	7.5 x 300	PL1110-6515
79911GP-501	PLgel 5 μ m 100 \AA	7.5 x 300	PL1110-6520
79911GP-502	PLgel 5 μ m 500 \AA	7.5 x 300	PL1110-6525
79911GP-503	PLgel 5 μ m 10 ³ \AA	7.5 x 300	PL1110-6530
79911GP-504	PLgel 5 μ m 10 ⁴ \AA	7.5 x 300	PL1110-6540
79911GP-505	PLgel 5 μ m 10 ⁵ \AA	7.5 x 300	PL1110-6550

(Continued)

Cross Reference Guide for GPC/SEC Columns & Standards

If you're using...			Reorder this...
Part No.	Description	Size (mm)	New Part No.
Aqueous SEC of Polymers			
79911GF-083	PL aquagel-OH 30 8 µm	7.5 x 300	PL1120-6830
79911GF-080	PL aquagel-OH 8 µm guard	7.5 x 50	PL1149-1840
79911GF-MXA	PL aquagel-OH MIXED-H 8 µm	7.5 x 300	PL1149-6800
79911GF-084	PL aquagel-OH 40 8 µm	7.5 x 300	PL1149-6840
79911GF-085	PL aquagel-OH 50 8 µm	7.5 x 300	PL1149-6850
79911GF-086	PL aquagel-OH 60 8 µm	7.5 x 300	PL1149-6860
Polymer Standards for GPC/SEC			
79911-60500	S-L-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0101
79911-60501	S-M-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0100
79911-60502	S-H-10 polystyrene calibration kit, 10 x 0.5 g		PL2010-0103
5064-8281	EasiVial PS-H, pre-weighted calibration kit		PL2010-0201
1535-4545	Polyethylene glycol/oxide calibration kits, PEG-10, 10 x 0.5 g		PL2070-0100
5064-8280	EasiVial PEG/PEO, pre-weighted calibration kit		PL2080-0201
1535-4546	Polyacrylic acid - Na salt calibration kit, PAA-10, 10 x 0.2 g		PL2140-0100

Organic GPC

PLgel GPC Columns

- Robust performance under the most exacting conditions
- Temperature stability up to 220°C
- Solvent compatibility allows easy and rapid transfer between solvents of varying polarity

PLgel materials have high pore volume and high efficiency to maximize resolution. Their unequalled solvent compatibility makes for easy transfer between polar and non-polar eluents, and outstanding physical rigidity provides extended lifetimes that minimize downtime.

The key to successful GPC separations is the correct choice of columns. The comprehensive range of PLgel products has been designed to cover virtually all organic solvent-based polymer analysis application areas, and to make selection of the correct column, solvent and calibration standard fast and reliable.

PLgel is a highly cross-linked, porous polystyrene/divinylbenzene matrix, which is recognized as a market leader in GPC column technology. PLgel is manufactured to ISO 9001:2000 and benefits from comprehensive QC/QA for total reproducibility, batch-to-batch and column-to-column.

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



Solvent Compatibility

Solvent Polarity	Solvent
6.0	Perfluoroalkane
7.3	Hexane
8.2	Cyclohexane
8.9	Toluene
9.1	Ethyl acetate
9.1	Tetrahydrofuran (THF)
9.3	Chloroform
9.3	Methyl ethyl ketone (MEK)
9.7	Dichloromethane
9.8	Dichloroethene
9.9	Acetone
10.0	o-Dichlorobenzene (o-DCB)
10.0	Trichlorobenzene (TCB)
10.2	m-Cresol
10.2	o-Chlorophenol (o-CP)
10.7	Pyridine
10.8	Dimethyl acetamide (DMAc)
11.3	n-Methyl pyrrolidone (NMP)
12.0	Dimethyl sulfoxide (DMSO)
12.1	Dimethyl formamide (DMF)

Tips & Tools

Don't forget, we have special offers throughout the year.

To learn more, visit www.agilent.com/chem/specialoffers

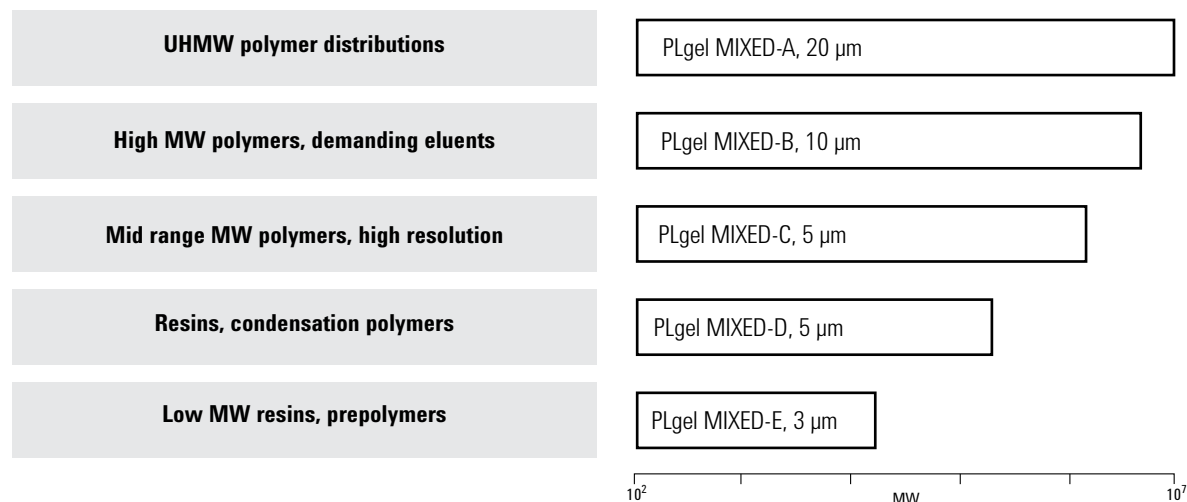


PLgel MIXED Columns

The PLgel MIXED range greatly simplifies column selection for easy decision making. Using these mixed columns you can eliminate mismatched column sets and spurious peaks for more reliable results. Every column contains a mixture of individual pore size materials, accurately blended to cover a specified broad range of molecular weight with a linear calibration to eliminate column mismatch. Simply add extra columns for even greater resolution.

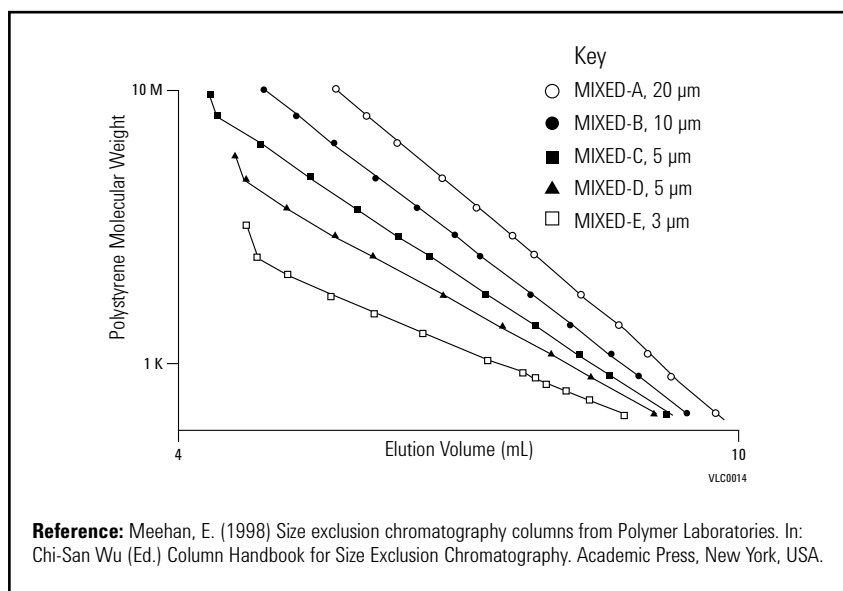
Column Specifications						
Column	Linear MW Operating Range (g/mol)	Guaranteed Column Efficiency	Typical Pressure	Maximum Flow Rate	Maximum Pressure	Maximum Temperature
MIXED-A	2,000-40,000,000	> 17,000 p/m	1 mL/min (7.5 mm ID): ≈ 3 bar (44 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 2.4 bar (35 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	220°C
MIXED-B	500-10,000,000	> 35,000 p/m	1 mL/min (7.5 mm ID): ≈ 10 bar (145 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 8 bar (116 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	220°C
MIXED-C	200-2,000,000	> 50,000 p/m	1 mL/min (7.5 mm ID): ≈ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 24 bar (348 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	150°C
MIXED-D	200-400,000	> 50,000 p/m	1 mL/min (7.5 mm ID): ≈ 30 bar (435 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 24 bar (348 psi) per 250 mm (THF @ 20°C, TCB @ 140°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	150 bar (2175 psi)	150°C
MIXED-E	up to 30,000	7.5 x 300 mm: > 80,000 p/m 4.6 x 250 mm: > 70,000 p/m	1 mL/min (7.5 mm ID): ≈ 50 bar (725 psi) per 300 mm 0.3 mL/min (4.6 mm ID): ≈ 42 bar (609 psi) per 250 mm (THF @ 20°C)	7.5 mm ID: 1.5 mL/min 4.6 mm ID: 0.5 mL/min	180 bar (2611 psi)	110°C

PLgel MIXED Column Selection Guide



PLgel MIXED Gel Calibration Curves

MIXED gel calibration curves are designed to be linear over a specified molecular weight range, ensuring that the same degree of resolution is achieved across the full operating range of the column. The particle size of the packing and porosity of a particular MIXED gel column are carefully matched to the MW range and application, thus optimizing performance and eliminating the effects of shear degradation. Resolution in GPC is controlled by the slope of the calibration curve and the particle size of the packing material. Agilent has scientifically determined the minimum number of MIXED gel columns required to perform accurate MWD determinations based on specific resolution (Rsp). Thus you can have complete confidence in the accuracy and precision of the calculated data.



PLgel MIXED Columns

Description	Size (mm)	Part No.
PLgel 20 μ m MIXED-A	7.5 x 300	PL1110-6200
PLgel 10 μ m MIXED-B	7.5 x 300	PL1110-6100
PLgel 5 μ m MIXED-C	7.5 x 300	PL1110-6500
PLgel 5 μ m MIXED-D	7.5 x 300	PL1110-6504
PLgel 3 μ m MIXED-E	7.5 x 300	PL1110-6300

PLgel MIXED Guards

Size (mm)	Particle Size (μm)	Part No.
7.5 x 50	20	PL1110-1220
7.5 x 50	10	PL1110-1120
7.5 x 50	5	PL1110-1520
7.5 x 50	3	PL1110-1320

PLgel MIXED-LS Columns

- Obtain an instant improvement in data quality
- No need for conditioning, saving time and solvent costs
- Maximize the potential of light scattering detectors

The PLgel MIXED-LS series is a PS/DVB packing using an innovative proprietary suspension polymerization technique to virtually eliminate nano-particle leakage. A startling improvement is achieved immediately in the quality of light scattering data obtained with PLgel MIXED-LS columns in place of conventional GPC columns. The light scattering chromatograms shown here were obtained after flushing the columns for one hour in THF at 1 mL/min. A polystyrene standard (Mp 210,000) was injected at 1 mg/mL in order to illustrate the dramatic improvement in signal-to-noise with the PLgel MIXED-LS column.

The performance of PLgel MIXED-LS columns has been matched to PLgel 20 µm MIXED-A and PLgel 10 µm MIXED-B columns in terms of calibration, column efficiency, wide solvent compatibility and operating temperature. MIXED-LS are also ideal for online viscosity detection, minimizing the risk of capillary blockage, and can be used with regular PLgel guard columns that are packed with rigid low pore size gels with no particle bleed.

PLgel MIXED-LS Columns

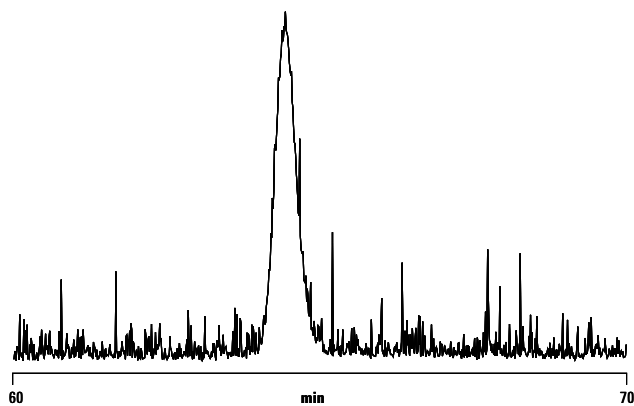
Description	Size (mm)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
PLgel 10 µm MIXED-B LS	7.5 x 300	500-10,000,000	> 35,000	PL1110-6100LS
PLgel 10 µm guard	7.5 x 50			PL1110-1120
PLgel 20 µm MIXED-A LS	7.5 x 300	2,000-40,000,000	> 17,000	PL1110-6200LS
PLgel guard 20 µm	7.5 x 50			PL1110-1220

Conventional GPC column**Column:** Conventional GPC column

Mobile Phase: THF

Flow Rate: 1.0 mL/min

Detector: LS

**PLgel LS column****Column:** PLgel 10 μ m MIXED-B LS

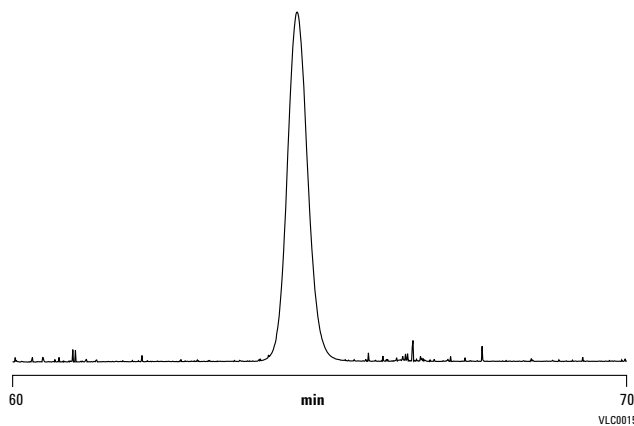
PL1110-6100LS

7.5 x 300 mm, 10 μ m

Mobile Phase: THF

Flow Rate: 1.0 mL/min

Detector: LS



PLgel MiniMIX Columns

- Use about 70% less solvent and save money
- Store less solvent and increase operator safety
- High performance comparable to Agilent's conventional ID columns

For reduced solvent cost and consumption, use industry standard PLgel MiniMIX mixed gel columns in 250 x 4.6 mm narrow bore dimensions. These narrow bore columns offer high performance, excellent solvent compatibility and mechanical stability. PLgel MiniMIX columns can be used with conventional GPC equipment.

To maintain the same linear velocity through the column, the volumetric flow rate must be reduced to 0.3 mL/min in line with the column cross sectional area, resulting in significantly lower solvent consumption. Sample loading should also be scaled down in line with reduced column volume, and system dead volume should be minimized to avoid excessive band broadening.

PLgel MiniMIX Columns

Description	Size (mm)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
PLgel 20 µm MiniMIX-A	4.6 x 250	2,000-40,000,000	> 17,000	PL1510-5200
PLgel 20 µm MiniMIX-A guard	4.6 x 50			PL1510-1200
PLgel 10 µm MiniMIX-B	4.6 x 250	500-10,000,000	> 35,000	PL1510-5100
PLgel 10 µm MiniMIX-B guard	4.6 x 50			PL1510-1100
PLgel 5 µm MiniMIX-C	4.6 x 250	200-2,000,000	> 50,000	PL1510-5500
PLgel 5 µm MiniMIX-C guard	4.6 x 50			PL1510-1500
PLgel 5 µm MiniMIX-D	4.6 x 250	200-400,000	> 50,000	PL1510-5504
PLgel 5 µm MiniMIX-D guard	4.6 x 50			PL1510-1504
PLgel 3 µm MiniMIX-E	4.6 x 250	up to 30,000	> 70,000	PL1510-5300
PLgel 3 µm MiniMIX-E guard	4.6 x 50			PL1510-1300

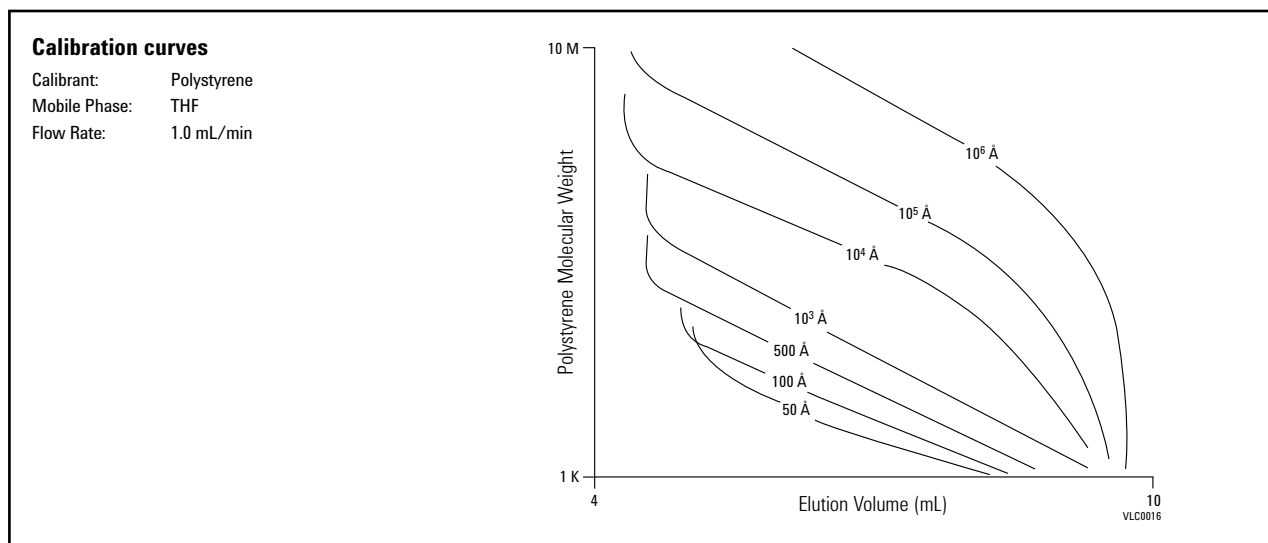
PLgel Individual Pore Size Columns

- Very high efficiency improves productivity
- Choose the optimum column for a perfect match of performance and application
- Fast analysis with fewer columns saves time and money

Individual pore size GPC columns offer high resolution over a specific molecular weight range. The linear portion of the calibration curve, where the slope is at its shallowest, defines the MW region over which optimum resolution will be achieved.

PLgel Individual Pore Size Columns

Size (mm)	Particle Size (µm)	Pore Size (Å)	Linear MW Operating Range (g/mol) (PS)	Guaranteed Efficiency (p/m)	Part No.
7.5 x 300	3	100	up to 4,000	> 100,000	PL1110-6320
7.5 x 300	5	50	up to 2,000	> 60,000	PL1110-6515
7.5 x 300	5	100	up to 4,000	> 60,000	PL1110-6520
7.5 x 300	5	500	500-30,000	> 60,000	PL1110-6525
7.5 x 300	5	10 ³	500-60,000	> 50,000	PL1110-6530
7.5 x 300	5	10 ⁴	10,000-600,000	> 50,000	PL1110-6540
7.5 x 300	5	10 ⁵	60,000-2,000,000	> 50,000	PL1110-6550
7.5 x 300	10	50	up to 2,000	> 35,000	PL1110-6115
7.5 x 300	10	100	500-30,000	> 35,000	PL1110-6120
7.5 x 300	10	500	500-30,000	> 35,000	PL1110-6125
7.5 x 300	10	10 ³	500-60,000	> 35,000	PL1110-6130
7.5 x 300	10	10 ⁴	500-60,000	> 35,000	PL1110-6140
7.5 x 300	10	10 ⁵	10,000-600,000	> 35,000	PL1110-6150
7.5 x 300	10	10 ⁶	60,000-2,000,000	> 35,000	PL1110-6160



PLgel Preparative Columns

- Excellent column efficiency provides optimum resolution
- High loading can isolate mg amounts for further study
- Over 10 times scale up permits efficient quantification

Preparative GPC is generally employed to fractionate polymers, isolate components in a polymer formulation or simplify mixtures of relatively small molecules in complex matrices. Mixtures of materials are easily separated on the basis of size, preferably in a low boiling organic solvent. They are then collected as a series of discrete fractions and isolated by simple evaporation of the solvent.

PLgel preparative columns are packed with the same rigid, high performance media as the analytical columns. The 10 μm particle provides high column efficiency ($> 25,000$ p/m) for optimum resolution and loading characteristics. PLgel 25 mm ID preparative columns offer over 10 times scale-up compared to the 7.5 mm analytical columns. The increased ID and column volume permit even higher loading. With low molecular weight materials, sample concentration can also be significantly increased, enabling production of milligram quantities of very pure material. The actual loading is ultimately controlled by the sample and its molecular weight.

PLgel Preparative Columns

Size (mm)	Particle Size (μm)	Pore Size (\AA)	Linear MW Operating Range (g/mol) (PS)	Part No.
25 x 300	10	50	up to 2,000	PL1210-6115
25 x 300	10	10	up to 4,000	PL1210-6120
25 x 300	10	500	500-30,000	PL1210-6125
25 x 300	10	10^3	500-60,000	PL1210-6130
25 x 300	10	10^4	10,000-600,000	PL1210-6140
25 x 300	10	10^5	60,000-2,000,000	PL1210-6150
25 x 300	10	10^6	600,000-10,000,000	PL1210-6160
MIXED-B 25 x 300	10		500-10,000,000	PL1210-6100
MIXED-D 25 x 300	10		200-400,000	PL1210-6104
Prep guard 25 x 25				PL1210-1120

Columns for Special GPC/SEC Applications

EnviroPrep

- High sample loading ensures effective trace analysis
- Simple clean-up procedure saves sample preparation costs
- Optimized particle size distribution provides high resolution

EnviroPrep columns permit a simple, one stage clean-up as part of a methodology to determine pesticides in many organic matrices. The higher molecular weight fractions such as lipids, polymers, natural resins and dispersed high molecular weight components are easily eliminated in the GPC analysis.

Preparative GPC for soil extract clean-up is described in EPA Method 3640A using 300 x 25 mm and 150 x 25 mm columns to give higher sample loading and fraction yields, which is particularly useful for low levels of pollutants. Low pore size EnviroPrep columns are ideal for this method. The columns have 10 μm particles with 100Å pore sizes for high resolution, with an exclusion limit of 4000 MW. The preparative columns offer good resolution and high loading through optimization of the particle size distribution.

EnviroPrep

Size (mm)	Part No.
21.2 x 150	PL1E10-3120EPA
25 x 150	PL1210-3120EPA
21.2 x 300	PL1E10-6120EPA
25 x 300	PL1210-6120EPA

Columns for sample clean-up

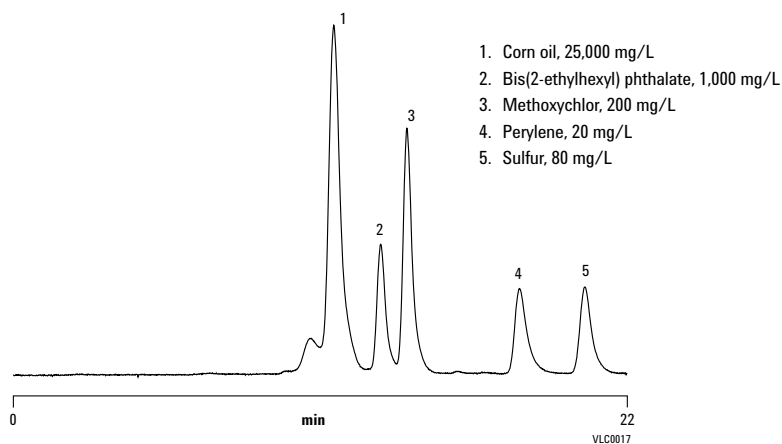
Column: EnviroPrep
PL1210-6120EPA
25 x 300

Column: PL1210-3120EPA
25 x 150

Mobile Phase: DCM

Flow Rate: 10 mL/min

Detector: UV, 254 nm



PLgel Olexis

- Optimized design for polyolefin analysis
- High temperature capability
- High resolution with no damage from sample shear provides clean separations

PLgel Olexis is designed for the analysis of very high molecular weight polymers, specifically polyolefins. The column resolves up to 100,000,000 g/mol (polystyrene in THF), and is packed with 13 μm particles to optimize efficiency and resolution without the risk of sample shear degradation during analysis. The packing of PLgel Olexis has the mechanical stability and robustness expected from a PLgel column, and so it is able to operate up to 220°C for the analysis of highly crystalline materials.

PLgel Olexis

Description	Size (mm)	Part No.
PLgel Olexis	7.5 x 300	PL1110-6400
PLgel Olexis guard	7.5 x 50	PL1110-1400

PLgel Olexis reveals true modalities across the range of polyolefins

Column: 3 x PLgel Olexis, 7.5 x 300 mm
PL1110-6400

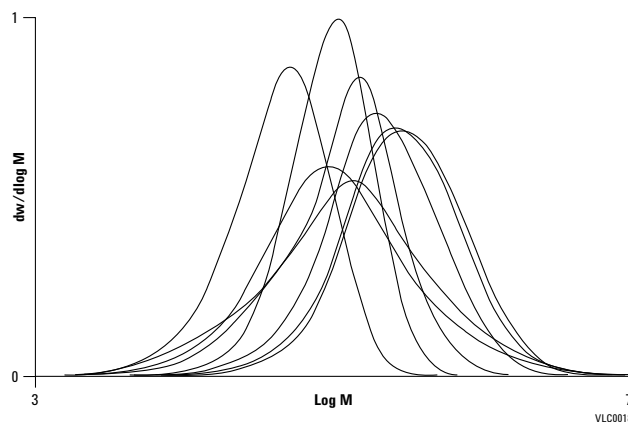
Mobile Phase: Trichlorobenzene + 0.0125% BHT

Flow Rate: 1.0 mL/min

Injection Volume: 200 μL

Temperature: 160°C

Detector: PL-GPC 220 (RI)



PL HFIPgel

- Optimized separation range delivers high performance with no artifacts
- Highly durable packing prolongs column lifetime
- Low operating pressure reduces system wear and unnecessary downtimes

Hexafluoroisopropanol (HFIP) is used as a solvent in GPC for the analysis of important industrial polymers such as polyesters, polyamides and polylactide/glycolide copolymers. For greatly improved performance in extremely polar solvents such as HFIP and trifluoroethanol, we have developed novel "multipore" technology to produce PL HFIPgel, a PS/DVB packing featuring a monodisperse particle size, high pore volume and high resolution.

Using PL HFIPgel avoids issues associated with conventional packing and HFIP, such as excessive curvature of calibration curves, dislocations/shoulders on peaks for polydisperse samples and poor resolution in the low MW region.

Column efficiency is guaranteed > 30,000 p/m and the columns are very durable, with a maximum operating pressure of 145 bar (2030 psi). They are packed and tested in methanol but shipped ready-to-use in HFIP.

PL HFIPgel columns with 7.5 mm ID normally operate at 1 mL/min. However, the 4.6 mm ID columns run at 0.3 mL/min, providing a 70% reduction in solvent consumption with consequent savings in the cost of buying and disposing of solvents.

PL HFIPgel

Description	Size (mm)	Part No.
PL HFIPgel	4.6 x 250	PL1514-5900HFIP
PL HFIPgel	7.5 x 300	PL1114-6900HFIP
PL HFIPgel guard	7.5 x 50	PL1114-1900HFIP
PL HFIPgel guard	4.6 x 50	PL1514-1900HFIP

Polyamides

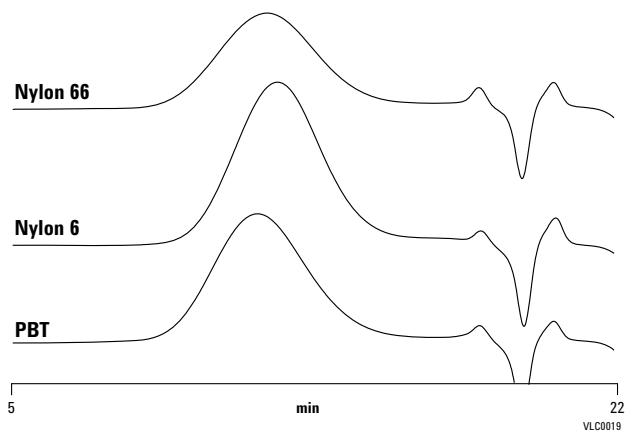
Column: 2 x PL HFIPgel, 7.5 x 300 mm
PL1110-6400

Mobile Phase: HFIP + 20mM NaTFAc

Flow Rate: 1.0 mL/min

Temperature: 40°C

Detector: PL-GPC 50 Plus (RI)



VLC0019

PL Rapide

- Analysis in less than ten minutes saves time
- Significantly increased sample throughput improves efficiency
- Reduced solvent consumption and disposal costs save money
- Available in L, M and H versions for low, medium and high molecular weights; available in F version for flow injection analysis

Rapid GPC is an excellent tool for screening polymer MWD for trend analysis. Short PL Rapide columns reduce analysis times while maintaining the excellent solvent compatibility and mechanical stability of all GPC columns from Agilent.

PL Rapide columns are ideal for high speed applications such as high throughput screening, process monitoring, or tracking changes in MW distributions, where time is the most critical factor in the analysis. Packed with high quality gels, these columns cover the complete spectrum of molecular weights and are available for the analysis of both organic and water soluble polymers. Key features include high pore volume and high resolution packing materials, no special system requirements, choice of molecular weight resolving range, wide solvent compatibility, and excellent mechanical stability.

Tips & Tools

Agilent offers a variety of e-Seminars and on-site training to help you learn how to be a more effective chromatographer.

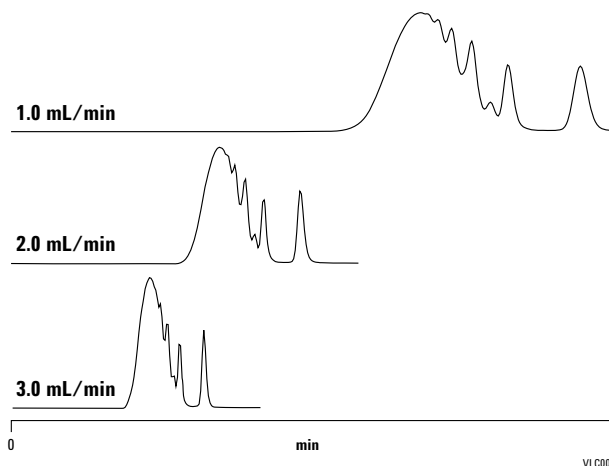
For more information, visit www.agilent.com/chem/education

PL Rapide

Description	Size (mm)	MW Range (g/mol)	Guaranteed Efficiency (p/m)	Part No.
PL Rapide H	7.5 x 150 10 x 100	500-10,000,000	> 35,000	PL1113-3100 PL1013-2100
PL Rapide M	7.5 x 150 10 x 100	200-2,000,000	> 60,000	PL1113-3500 PL1013-2500
PL Rapide L	7.5 x 150 10 x 100	200-400,000	> 80,000	PL1113-3300 PL1013-2300
PL Rapide F	7.5 x 150 10 x 100	up to 4,500 up to 4,000	> 55,000 > 40,000	PL1113-3120 PL1013-2120
PL Rapide Aqua H	7.5 x 150 10 x 100	100-10,000,000	> 35,000	PL1149-3800 PL1049-2800
PL Rapide Aqua L	7.5 x 150 10 x 100	100-30,000	> 35,000	PL1120-3830 PL1020-2830

Resin analysis by rapid GPC

Column: PL Rapide L
 PL1013-2300
 10 x 100 mm
Sample: Epoxy resin
Mobile Phase: THF
Flow Rate: 1.0 , 2.0 and 3.0 mL/min
Detector: UV, 254 nm



PolarGel

- Medium polarity surface and high mechanical stability
- Operate in a wide range of solvents and solvent combinations
- Available in two resolving ranges, PolarGel-L and PolarGel-M

The PolarGel range is ideal for use with polar solvents, such as dimethyl formamide (DMF) and dimethyl sulfoxide (DMSO), and for solvent combinations such as tetrahydrofuran with water. These eluents are very useful in GPC/SEC to separate polar materials, such as polar resins, modified polysaccharides or complex polar polymers that are difficult to analyze in traditional SEC solvents, such as tetrahydrofuran alone. PolarGel-L is used for low molecular weight polar polymers and PolarGel-M for high MW polar polymers.

With polar polymers, highly polar groups can lead to non-specific interactions and secondary separation mechanisms when using polar solvents and traditional non-polar styrene/divinylbenzene columns. Additives and/or column conditioning are normally required to reduce these interactions. PolarGel has no need for these interventions, and also avoids the interactions and secondary effects that produce chromatogram distortions.

These PolarGel "mixed bed" columns have a medium polarity surface and high mechanical stability. They are capable of operating in a wide range of solvents and solvent combinations, greatly enhancing your ability to analyze polar polymers that are not necessarily water soluble. PolarGel is available in two resolving ranges to meet your precise requirements.

PolarGel

Description	Size (mm)	Part No.
PolarGel-L	7.5 x 300	PL1117-6830
PolarGel-L guard	7.5 x 50	PL1117-1830
PolarGel-L repair gel		PL1417-0830
PolarGel-M	7.5 x 300	PL1117-6800
PolarGel-M guard	7.5 x 50	PL1117-1800
PolarGel-M repair gel		PL1417-0800

Two samples of melamine resin analyzed by PolarGel-L

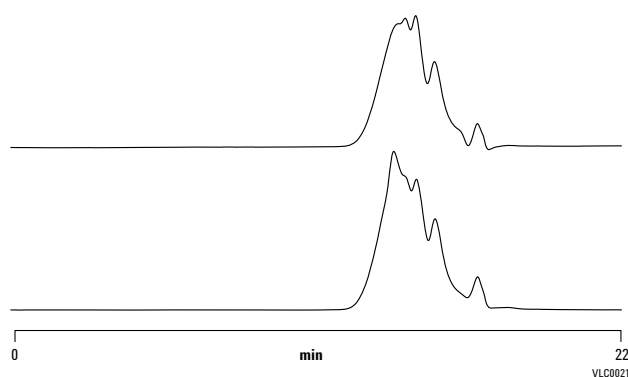
Column: 2 x PolarGel-L, 300 x 7.5 mm
PL1117-6830

Mobile Phase: Dimethylacetamide + 0.1% LiBr

Flow Rate: 1.0 mL/min

Injection Volume: 100 μ L

Detector: Agilent PL-GPC 220 (RI)



Excellent separation of two phenol formaldehyde resins with PolarGel-M

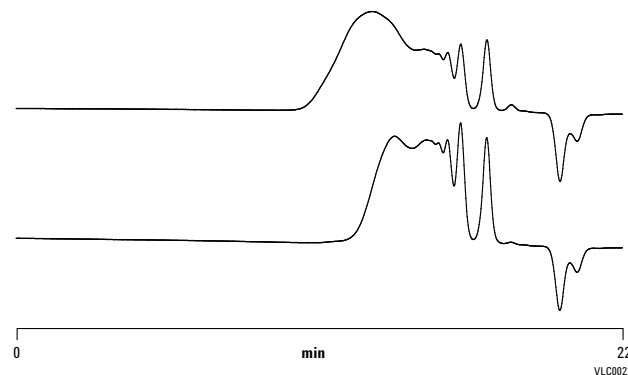
Column: 2 x PolarGel-M, 300 x 7.5 mm
PL1117-6800

Mobile Phase: 0.2% (w/v) DMF & 0.1% LiBr to reduce sample aggregation

Flow Rate: 1.0 mL/min

Injection Volume: 100 μ L

Detector: Agilent PL-GPC 50 (RI)



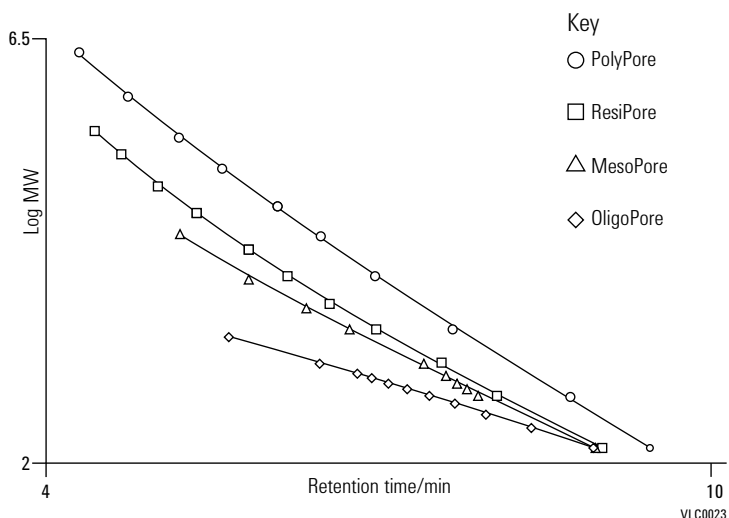
PlusPore

The PlusPore range has an increased pore volume that provides high resolution for specific applications. The high stability media permits the use of a wide range of organic solvents with accuracy and precision so that there is no distortion of the MW distribution shape.

The PlusPore series of columns has been specifically designed for high resolution GPC, and represents the very latest in GPC column technology. These novel packing materials are based on the industry standard, highly cross-linked polystyrene/divinylbenzene (PS/DVB), for the widest applicability and solvent compatibility. Each is made using a novel polymerization process to produce particles that exhibit a specific, controlled pore structure for optimum GPC performance. Typical applications include resins, condensation polymers, prepolymers, and oligomers.

For high resolution polymer analysis, the PolyPore, ResiPore, MesoPore and OligoPore columns of the PlusPore product series exhibit a wide pore size distribution with near linear calibration curves covering an extended molecular weight range. These so-called "multipore" structures have increased pore volume compared to regular PS/DVB packing materials. This results in very high resolution GPC columns designed for specific application areas. The highly cross-linked porous particles provide excellent chemical and physical stability and permit easy transfer across the full range of organic solvents with little change in the shape of the calibration curve or the efficiency of the columns. As this multipore column technology does not require the combination of individual pore size packing materials, the result is high accuracy and precision without any artifacts in the shape of the molecular weight distribution.

PlusPore calibration curves



PlusPore Selection Guide

Column	MW Range (g/mol) (PS)	Nominal Particle Size (µm)	Typical Efficiency (p/m)	Recommended Calibrants	Frit Porosity (µm)
PolyPore	200-2,000,000	5	> 60,000	EasiCal PS-1 or EasiVial PS-H	2
ResiPore	200-400,000	3	> 80,000	EasiCal PS-2 or EasiVial PS-M	2
MesoPore	up to 25,000	3	> 80,000	Polystyrene S-L-10 Kit	2
OligoPore	up to 4,500	6	> 55,000	Polystyrene S-L2-10 Kit	2

PolyPore

- Routine polymer analysis with very high resolution
- Wide operating range simplifies column choice
- Low particle size extracts maximum information from the analyte

PolyPore columns have been specifically developed to give unrivaled resolution for the analysis of polymers with broad molecular weight distributions. With a wide operating range covering many decades of molecular weight, PolyPore columns combine a low 5 μm particle size with extremely high pore volume to give the highest possible resolution, ensuring the most detailed information possible from your analysis.

PolyPore

Description	Size (mm)	Part No.
PolyPore	7.5 x 300	PL1113-6500
PolyPore guard	7.5 x 50	PL1113-1500

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.

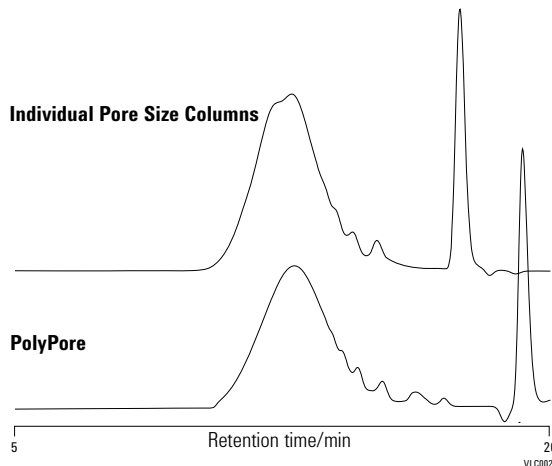
To learn more, visit www.agilent.com/chem/OnlineLibrary



Comparison of PolyPore with conventional individual pore size GPC columns

Column: 2 x PolyPore, 300 x 7.5 mm
PL1113-6500

Sample: High MW Resin
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 100 µL
Detector: Agilent PL-GPC 50 (RI)



Polymethylmethacrylate in DMF

Column: 2 x PolyPore, 7.5 x 300 mm
PL1113-6500

Sample: Commercial PMMA
Mobile Phase: DMF + 0.1% LiBr
Flow Rate: 1.0 mL/min
Temperature: 80°C
Injection Volume: 100 µL
Detector: Agilent PL-GPC 50 (RI)



ResiPore

- Efficient separation of complex molecular weight distributions
- Reveals oligomer content to provide a true representation of the sample
- High pore volume extracts maximum information from the analyte

ResiPore columns are the ideal choice for the analysis of resins and condensation polymers with complex molecular weight distributions that include oligomer content. By combining a low 3 μm particle size and high pore volume, high efficiency ResiPore columns offer maximum resolution of these intermediate molecular weight polymers.

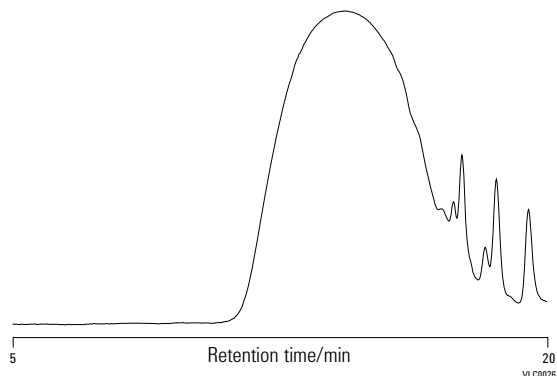
ResiPore

Description	Size (mm)	Part No.
ResiPore	7.5 x 300	PL1113-6300
ResiPore guard	7.5 x 50	PL1113-1300

Alkyd resin

Column: 2 x ResiPore, 7.5 x 300 mm
PL1113-6500

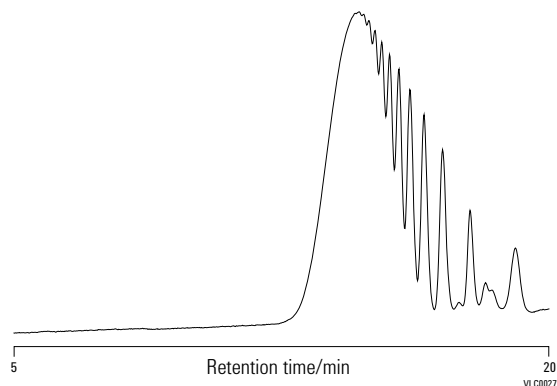
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μ L
Detector: UV, 254 nm



Polyester

Column: 2 x ResiPore, 7.5 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μ L
Detector: UV, 254 nm



MesoPore

- Full solvent compatibility with no detrimental effect on efficiency
- Low particle size extracts maximum information from the analyte
- No MWD dislocations so the distribution is an accurate representation of the sample

MesoPore columns have been specifically designed to provide optimum results in the analysis of prepolymers, i.e. polymeric materials with a large oligomeric component. By combining a 3 μm particle size with high pore volume, MesoPore columns give the highest resolution separations for the analysis of low molecular weight polymers, such as prepolymers, resins, polyols and siloxanes.

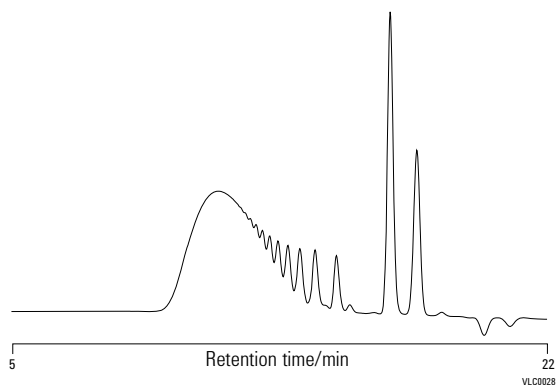
MesoPore

Description	Size (mm)	Part No.
MesoPore	7.5 x 300	PL1113-6325
MesoPore guard	7.5 x 50	PL1113-1325

Polyurethanes

Column: 2 x MesoPore, 7.5 x 300 mm
PL1113-6500

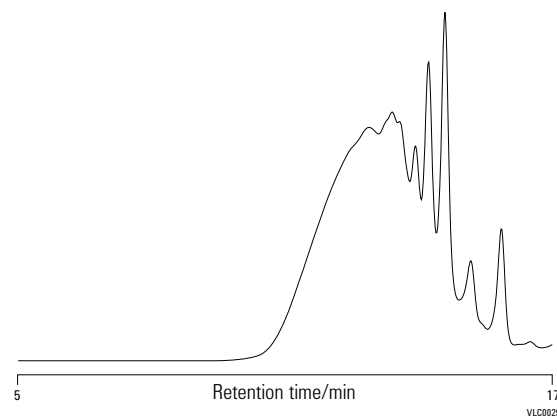
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μL
Detector: Agilent PL-GPC 50 (RI)



Polyesterimide

Column: 2 x MesoPore, 7.5 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Injection Volume: 20 μL
Detector: Agilent PL-GPC 50 (RI)



OligoPore

- Near linear calibration curve for best accuracy and precision
- Very stable media allows for a wide choice of solvents
- Isolation of individual fractions reveals more information from whole samples

OligoPore columns have been developed from an innovative new media that exhibits significantly increased pore volumes compared to conventional low pore size GPC columns. The outcome is higher resolution in the oligomeric region. The 300 x 25 mm preparative column offers high resolution at greatly increased loading for effective isolation of individual components. Oligomer fractions collected from the OligoPore preparative column can then be re-injected on analytical columns to check for the purity of the fractions and for comparison with the whole sample.

OligoPore

Description	Size (mm)	Part No.
OligoPore	25 x 300	PL1213-6520
OligoPore	7.5 x 300	PL1113-6520
OligoPore guard	7.5 x 50	PL1113-1320

Tips & Tools

Don't forget, we have special offers throughout the year.

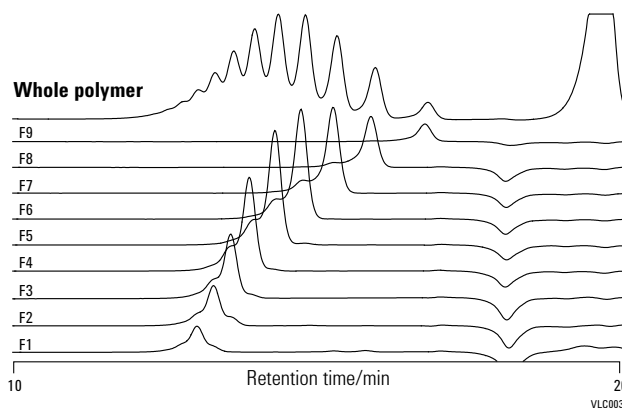
To learn more, visit www.agilent.com/chem/specialoffers



Analysis of low molecular weight polystyrene and oligomer fractions collected from OligoPore preparative columns

Column: 2 x OligoPore, 7.5 x 300 mm
PL1113-6500

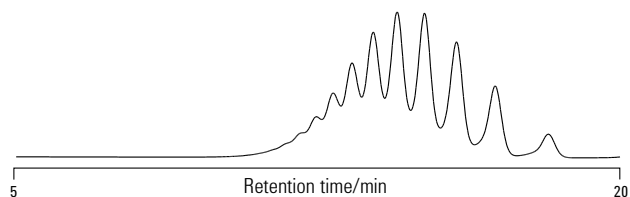
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detector: UV



Analytical separation of low molecular weight polystyrene

Column: 2 x OligoPore, 7.5 x 300 mm
PL1113-6500

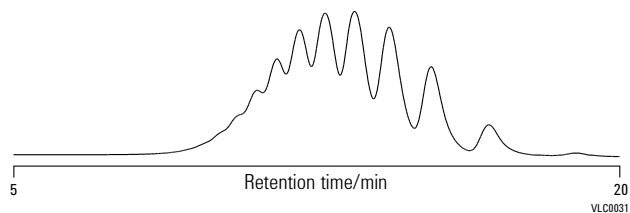
Mobile Phase: THF
Flow Rate: 1.0 mL/min
Loading: 0.2%, 100 mL
Detector: UV



Preparative separation of low molecular weight polystyrene

Column: 2 x OligoPore, 25 x 300 mm
PL1113-6500

Mobile Phase: THF
Flow Rate: 10.0 mL/min
Loading: 2.0%, 2 mL
Detector: UV



Aqueous SEC of Polymers

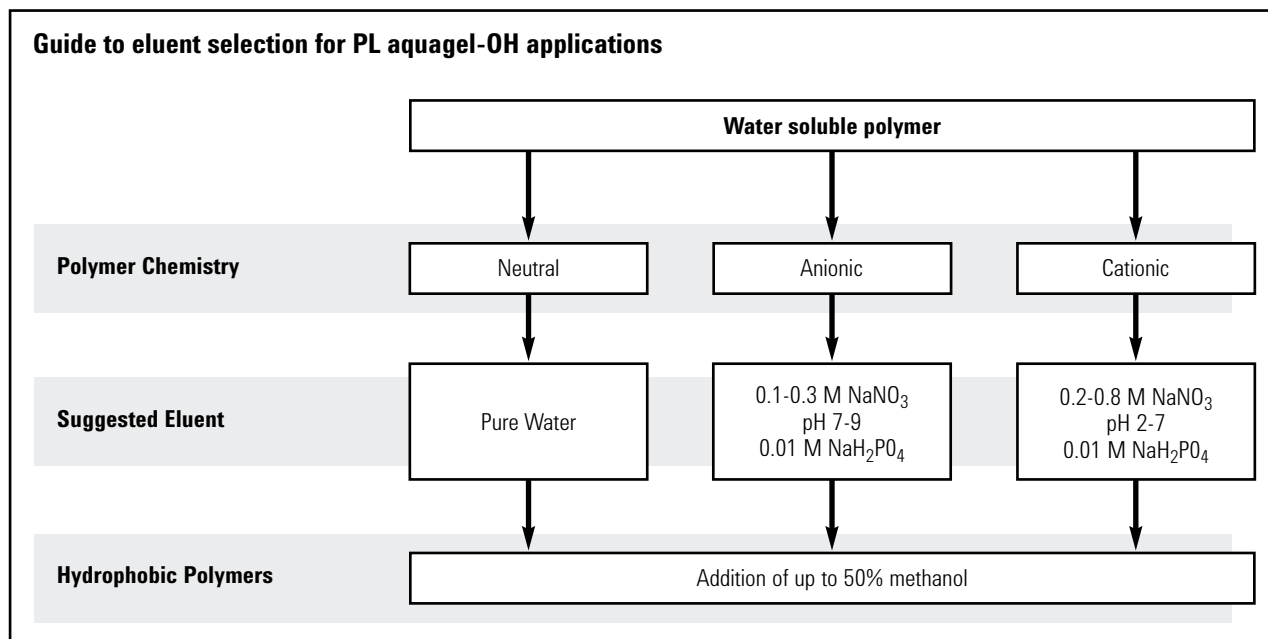
PL aquagel-OH SEC

Aqueous size exclusion chromatography (SEC) is widely used for the determination of molecular weight distributions of a variety of synthetic and naturally occurring water-soluble polymers, and separations of oligomers and small molecules. The requirement to eliminate ionic and hydrophobic effects makes aqueous SEC very demanding.

The PL aquagel-OH series provides a chemically and physically stable matrix for reliable aqueous SEC separations. The columns are packed with macroporous copolymer beads with an extremely hydrophilic polyhydroxyl functionality. The "neutral" surface and the capability to operate across a wide range of eluent conditions provide for high performance analyses of compounds with neutral, ionic and hydrophobic moieties, alone or in combination. PL aquagel-OH is available for analytical and preparative applications.

Optimizing Conditions for Aqueous SEC with PL aquagel-OH Columns

Due to the complex nature of water-soluble polymers, it is often necessary to modify the eluent in order to avoid sample-to-sample and sample-to-column interactions which can result in poor aqueous SEC separations. The excellent stability of the PL aquagel-OH packing material allows the eluent to be tailored to suit the polymer, while retaining the high column efficiency. For ionic interactions, the eluent can be modified by the addition of salt and/or the adjustment of pH. For water soluble polymers with a hydrophobic character, only the addition of a weak organic solvent (methanol) is required to inhibit hydrophobic interactions.

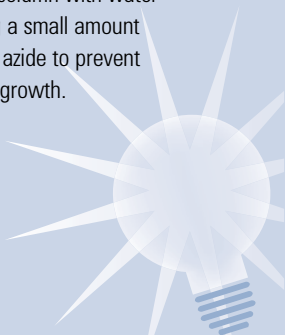


PL aquagel-OH Column Selection Guide

Sample Type	Typical Applications	Recommended Column Sets
Low MW polymers and oligomers	Surfactants, oligosaccharides, PEGs, lignosulfonates, polyacrylates	2 or 3 30, 20 PL aquagel-OH 8 μm, or PL aquagel-OH 20 5 μm, or PL aquagel-OH MIXED-M 8 μm
Polydisperse synthetic or naturally occurring polymers	Polysaccharides, PVA, cellulose derivatives, PEO, polyacrylic acid	2 or 3 PL aquagel-OH MIXED-H 8 μm, or PL aquagel-OH 60/50/40 8 μm
Very high MW polymers	Polyacrylamides, hyaluronic acids, CMC, starches, gums	PL aquagel-OH 60/50/40 15 μm in series

Tips & Tools

Buffers in a stored column may crystallize and cause damage. Flush the column with water containing a small amount of sodium azide to prevent biological growth.

**PL aquagel-OH Analytical**

- Highly stable matrix ensures reliable separations, even with modified eluents
- MIXED columns cover a wide range of molecular weights, simplifying column selection
- Highly versatile for neutral, polar, anionic and cationic samples

The PL aquagel-OH analytical series has a pH range of 2-10, compatibility with organic solvent (up to 50% methanol), mechanical stability up to 140 bar (2030 psi) and low column operating pressures.

PL aquagel-OH Analytical

Description	Size (mm)	MW Range (g/mol) (PEG/PEO)	Guaranteed Efficiency (p/m)	Part No.
PL aquagel-OH 20 5 µm	7.5 x 300	100-20,000	> 55,000	PL1120-6520
PL aquagel-OH 20 8 µm	7.5 x 300	100-20,000	> 35,000	PL1149-6820
PL aquagel-OH 30 8 µm	7.5 x 300	100-30,000	> 35,000	PL1120-6830
PL aquagel-OH 40 8 µm	7.5 x 300	10,000-200,000	> 35,000	PL1149-6840
PL aquagel-OH 40 15 µm	7.5 x 300	10,000-200,000	> 15,000	PL1149-6240
PL aquagel-OH 50 8 µm	7.5 x 300	50,000-1,000,000	> 35,000	PL1149-6850
PL aquagel-OH 50 15 µm	7.5 x 300	50,000-1,000,000	> 15,000	PL1149-6250
PL aquagel-OH 60 8 µm	7.5 x 300	200,000 - > 10,000,000	> 35,000	PL1149-6860
PL aquagel-OH 60 15 µm	7.5 x 300	200,000 - > 10,000,000	> 15,000	PL1149-6260
PL aquagel-OH MIXED-H 8 µm	7.5 x 300	100-10,000,000	> 35,000	PL1149-6800
PL aquagel-OH MIXED-M 8 µm	7.5 x 300	100-10,000,000	> 35,000	PL1149-6801
PL aquagel-OH 10 µm guard	25 x 25			PL1249-1120
PL aquagel-OH 5 µm guard	7.5 x 50			PL1149-1530
PL aquagel-OH 8 µm guard	7.5 x 50			PL1149-1840

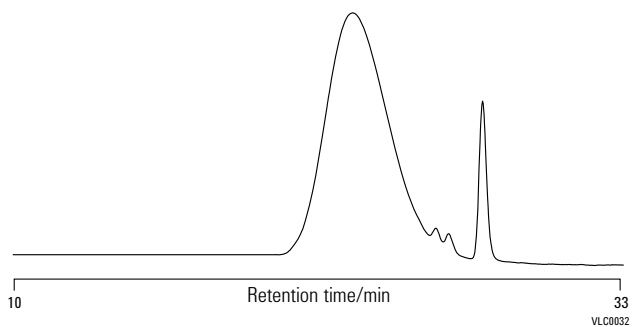
Polyvinyl alcohol

Column: 3 x PL aquagel-OH MIXED
PL1149-6800
7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)

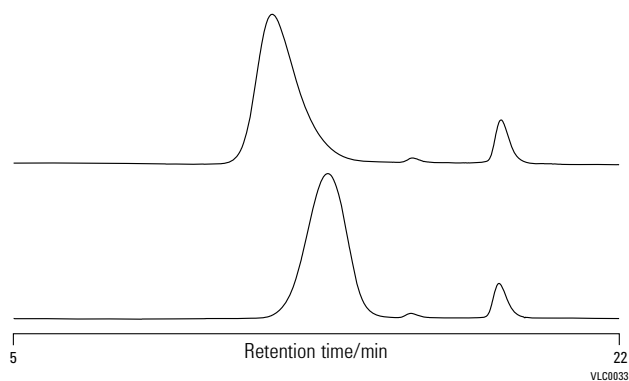
**Heparin**

Column: 2 x PL aquagel-OH 30
PL1120-6830
7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Hyaluronic acid

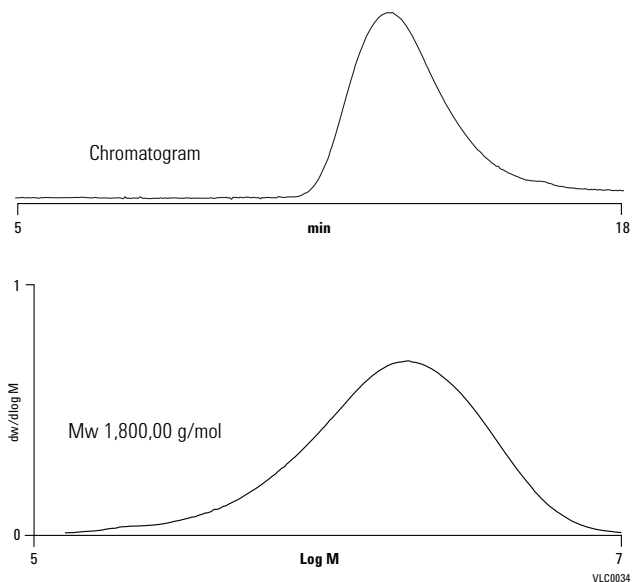
Column: PL aquagel-OH 60 15 μ m
 PL1149-6260
 7.5 x 300 mm, 15 μ m

Column: PL aquagel-OH 40 15 μ m
 PL1149-6240
 7.5 x 300 mm, 15 μ m

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Differences in composition of two alkyl naphthalene sulfonates

Column: 2 x PL aquagel-OH 20
 PL1120-6520
 7.5 x 300 mm, 5 μ m

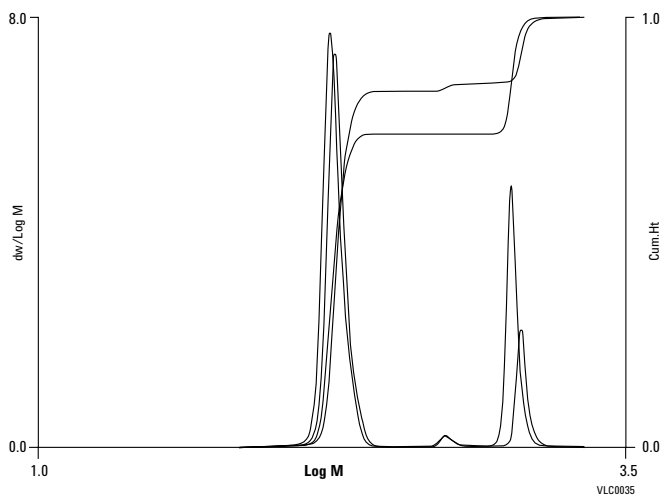
Mobile Phase: 0.25 M ammonium formate in water

Flow Rate: 1.0 mL/min

Injection Volume: 20 μ L

Software: Cirrus GPC module for Galaxie CDS

Detector: ELS (neb=30°C, evap=30°C, gas=1.4 SLM)



PL aquagel-OH Preparative

- Up to 10 times scale-up maximizes yield
- High loading maximizes sample throughput
- Carefully chosen particle size provides optimum resolution

Preparative SEC is used for the fractionation of a wide variety of water-soluble samples based on their size in solution. The technique is applied to the fractionation of disperse polymers or to isolate components in a polymer formulation.

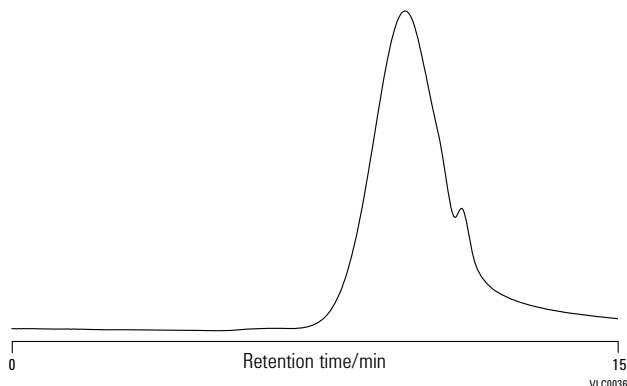
Preparative PL aquagel-OH columns and associated guard columns enable rapid and convenient scale-up from analytical separations. The 25 mm ID prep column offers at least a 10 times scale-up in loading from the 7.5 mm ID analytical columns. Typically, a 10 mL/min flow rate results in a separation time of ten minutes with a 300 mm column. The columns are packed with the same robust macroporous particles as the analytical column range. The 8 μm particle size provides optimum resolution and loading characteristics with column efficiency > 20,000 plates/m.

PL aquagel-OH Preparative

Description	Size (mm)	MW Range (g/mol) (PEG/PEO)	Part No.
PL aquagel-OH 30 8 μm	25 x 300	100-30,000	PL1220-6130
PL aquagel-OH 40 8 μm	25 x 300	10,000-200,000	PL1249-6140
PL aquagel-OH 50 8 μm	25 x 300	50,000-1,000,000	PL1249-6150
PL aquagel-OH MIXED 8 μm	25 x 300	100-10,000,000	PL1249-6100
PL aquagel-OH 10 μm guard	25 x 25		PL1249-1120

Polyvinyl alcohol

Column: PL aquagel-OH 40 8 μm
 PL1249-6140
 25 x 300 mm, 8 μm
Mobile Phase: 0.2 M NaNO_3 , 0.01 M NaH_2PO_4 , pH 7
Flow Rate: 10.0 mL/min
Loading: 10 mg/mL, 2 mL
Detector: Agilent PL-GPC 50 (RI)



GPC Column Accessories

Description	Unit	Part No.
Frit removal tool for threaded columns only	1/pk	PL1310-0001
2 μm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0002
5 μm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0012
10 μm frit kit for threaded columns, 7.5 mm ID	5/pk	PL1310-0036
PLgel column repair gel, 10 μm	1/pk	PL1410-0101
PLgel column repair gel, 5 μm	1/pk	PL1410-0501
Column connecting nuts, 1/16 in. tube	5/pk	PL1310-0007
Tubing ferrules, 1/16 in. tube	5/pk	PL1310-0008
Connecting tubing, 10 cm length, 0.01 in. ID	10/pk	PL1310-0048
LDV intercolumn stainless steel connector	1/pk	PL1310-0005

Polymer Standards for GPC/SEC

Polymer standards from Agilent are the ideal reference materials for generating accurate, reliable GPC/SEC column calibrations, with the assurance of the ISO 9001:2000 quality standard. Additional applications for our highly characterized homopolymers and copolymers exhibiting unique characteristics are as model polymers for research and analytical method development.

Agilent manufactures the highest quality polymer standards with extremely narrow polydispersity and the widest molecular weight range commercially available. These quality polymer standards are supplied with extensive characterization data utilizing a variety of independent techniques (e.g. light scattering and viscometry) and high performance GPC to verify polydispersity and assign that all important peak molecular weight (Mp).

Our comprehensive range of EasiVial, EasiCal and traditional calibration kits has been specifically designed to cover all molecular weight ranges for organic and aqueous GPC/SEC applications. We provide you with the widest choice to maximize your specific characterization needs. In addition, we supply other polymers as individual molecular weights, and broad distribution polymers for system validation or broad standard calibration procedures.

Calibration Kits

Agilent offers a wide range of polymer standards kits for conventional GPC/SEC column calibration or for calibrating light scattering and viscometry detectors. The kits are in boxed sets of ten different polymer standards covering a particular molecular weight range, to be used with organic and aqueous, medium polarity and polar solvents. Every individual polymer has its own Certificate of Analysis of the analytical conditions and values, such as M_p needed for constructing a calibration plot. The polymers are chosen to give equidistant calibration points on a logarithmic MW scale, providing a more uniform calibration curve.

Individual Polymer Molecular Weights

We design our individual standards to have the narrowest molecular weight distribution commercially available. Additionally, they cover the widest molecular weight range, from 162-15 million MW. The current polystyrene nominal molecular weight of 15 million MW has a polydispersity ≤ 1.10 . These standards are generally available in 1, 5 and 10 g quantities, and each comes with its own Certificate of Analysis detailing analysis conditions and relevant data.

GPC/SEC Standards Selection Guide

Polymer Type	Individual Calibration		EasiCal	EasiVial	Type of GPC/SEC
	MW	Kits			
Polystyrene	◆	◆	◆	◆	Organic
Polymethylmethacrylate	◆	◆		◆	Organic
Polyethylene	◆	◆			Organic
Polyethylene glycol (PEG)	◆	◆		◆	Organic/Aqueous
Polyethylene oxide (PEO)	◆	◆		◆	Organic/Aqueous
Pullulan polysaccharide	◆	◆			Organic/Aqueous
Polyacrylic acid Na salt	◆	◆			Aqueous

EasiVial

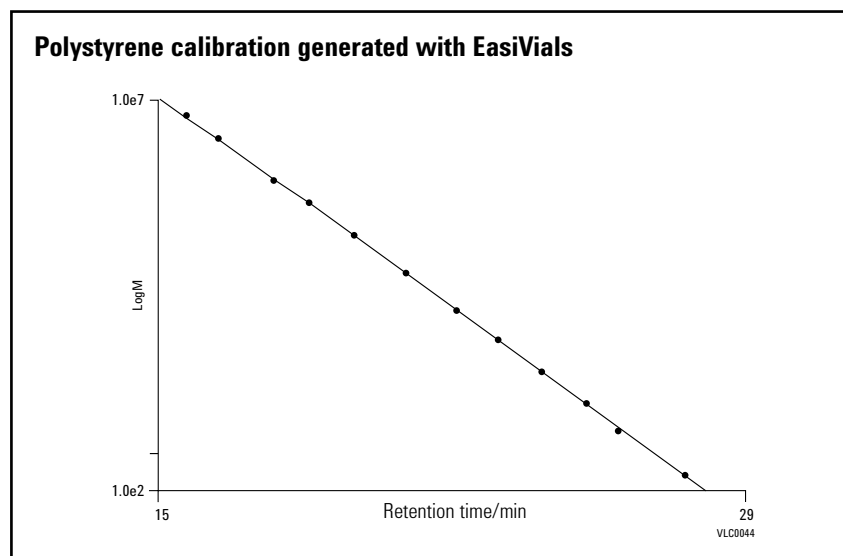
- Eliminates tedious weighing procedures to improve calibration accuracy
- Reduces solvent dispensing to limit risks associated with handling solvents
- For conventional and multi-detector GPC to maximize applicability

For organic and aqueous GPC/SEC column calibration, this premier product is the quickest and most convenient method to deliver an accurate 12-point column calibration.

The key to achieving baseline separation from polymer mixtures, therefore eliminating doubt and errors, is in selecting only the narrowest polydispersity polymers. This is where Agilent polymer standards excel and deliver, as shown in the chromatograms.

The EasiVial standards kit is a pre-prepared, time saving product for rapid and reliable GPC column calibration. EasiVial kits contain three vials, each with a mixture of four accurately pre-weighed polymer standards, providing a 12-point GPC calibration in just three injections. The mass of each polymer in the vial is accurately known, so that upon addition of a fixed volume of eluent, the solution is prepared at a precise concentration. EasiVial is ideal for both conventional and multi-detector GPC calibration. Simply prepare and manually inject, or transfer to autosampler vials, or place directly into a compatible autosampler.

Every EasiVial kit contains 30 vials (ten of each type) that are color-coded for easy identification and are available in 4 or 2 mL vials making them suitable for most autosamplers. The kits are available for polystyrene (PS), polymethylmethacrylate (PMMA), polyethylene glycol/oxide (PEG/PEO) and polyethylene glycol (PEG). For added value, a Tri-Pack (90 vials) is offered, extending reproducibility.



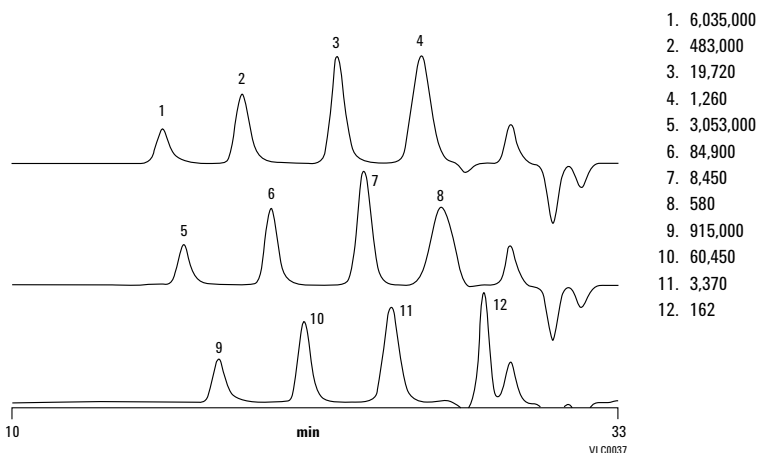
EasiVial Pre-weighed Calibration Kits

Description	Range of Nominal Mp (g/mol)	Vial Volume (mL)	Unit	Part No.
EasiVial PEG/PEO	100-1,200,000	2	30/pk	PL2080-0201
EasiVial PEG/PEO	100-1,200,000	4	30/pk	PL2080-0200
EasiVial PEG	106-35,000	2	30/pk	PL2070-0201
EasiVial PEG	106-35,000	4	30/pk	PL2070-0200
EasiVial PM	600-2,000,000	2	30/pk	PL2020-0201
EasiVial PM	600-2,000,000	4	30/pk	PL2020-0200
EasiVial PS-H	162-6,000,000	2	30/pk	PL2010-0201
EasiVial PS-H	162-6,000,000	4	30/pk	PL2010-0200
EasiVial PS-M	162-400,000	2	30/pk	PL2010-0301
EasiVial PS-M	162-400,000	4	30/pk	PL2010-0300
EasiVial PS-L	162-40,000	2	30/pk	PL2010-0401
EasiVial PS-L	162-40,000	4	30/pk	PL2010-0400
PEG/PEO Tri-Pack		2	90/pk	PL2080-0202
PEG/PEO Tri-Pack		4	90/pk	PL2080-0203
PEG Tri-Pack		2	90/pk	PL2070-0202
PEG Tri-Pack		4	90/pk	PL2070-0203
PMMA Tri-Pack		2	90/pk	PL2020-0202
PMMA Tri-Pack		4	90/pk	PL2020-0203
PS-H Tri-Pack		2	90/pk	PL2010-0202
PS-H Tri-Pack		4	90/pk	PL2010-0203
PS-L Tri-Pack		3	90/pk	PL2010-0402
PS-L Tri-Pack		4	90/pk	PL2010-0403

EasiVial PS-H

Column: 3 x PLgel MIXED-B, 10 µm
 PL1110-6100
 7.5 x 300 mm, 10 µm

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Temperature: 40°C
Detector: PL-GPC 220 (RI)



EasiCal

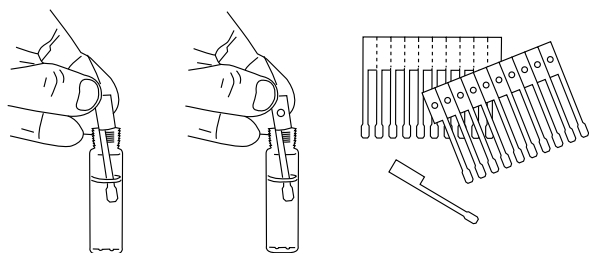
- Easy three-step process with no fuss
- Cost-effective format saves money
- Only two injections for improved productivity

The EasiCal system for organic solvents consists of two different combs, each with ten detachable spatulas, supporting a mixture of five polymer standards. The thin film of polymer (approximately 5 mg) on the tip of the PTFE spatulas rapidly dissolves when immersed in eluent to provide two GPC/SEC calibration solutions. A single pack provides ten spatulas of each type, with MWs selected to provide equidistant calibration points for greater accuracy.

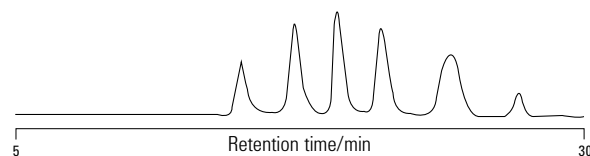
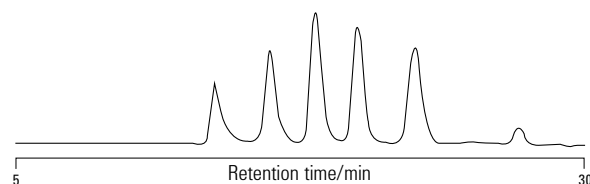
EasiCal Pre-prepared Polystyrene Kits

Description	Range of Nominal Mp (g/mol)	Unit	Part No.
Polystyrene PS-1	580-7,500,000	1/pk	PL2010-0501
		5/pk	PL2010-0505
Polystyrene PS-2	580-400,000	1/pk	PL2010-0601
		5/pk	PL2010-0605

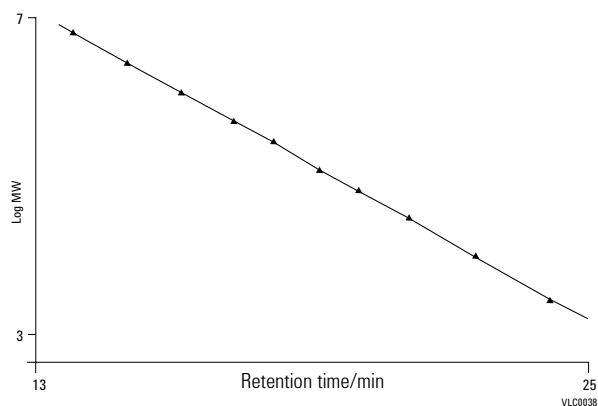
Column calibration for GPC/SEC is as easy as 1, 2, 3...



1. Place one spatula of each type into appropriate volume of solvent.



2. Chromatograph each solution; only two injections required



3. Generate a 10-point calibration

Polystyrene

- Compatible with most organic solvents
- Certificate of Analysis meets international protocols
- Calibration capability for virtually all applications

Polystyrene standards are the first choice for many organic solvents, either for conventional GPC column calibration or for calibrating light scattering and viscosity detectors. Our organic polymers cover a range from 162-15 million MW, with MWs selected to provide equidistant calibration points for greater accuracy. Every kit contains 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
S-H-10, 10 x 0.5 g	300,000-15,000,000	PL2010-0103
S-H2-10, 10 x 0.5 g	1,000-15,000,000	PL2010-0104
S-M-10, 10 x 0.5 g	580-3,000,000	PL2010-0100
S-M2-10, 10 x 0.5 g	580-300,000	PL2010-0102
S-L-10, 10 x 0.5 g	162-20,000	PL2010-0101
S-L2-10, 10 x 0.5 g	162-4,500	PL2010-0105

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



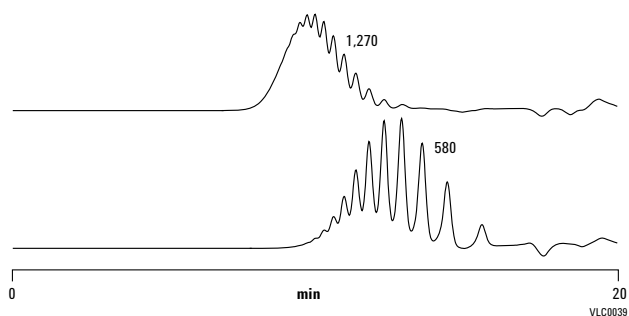
Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
162	1.00	PL2012-1001	PL2012-1005	PL2012-1010
370	1.11	PL2012-0001	PL2012-0005	PL2012-0010
580	1.11	PL2012-2001	PL2012-2005	PL2012-2010
1,000	1.09	PL2012-3001	PL2012-3005	PL2012-3010
1,300	1.07	PL2012-4001	PL2012-4005	PL2012-4010
2,000	1.05	PL2012-5001	PL2012-5005	PL2012-5010
3,000	1.04	PL2012-6001	PL2012-6005	PL2012-6010
5,000	1.03	PL2012-7001	PL2012-7005	PL2012-7010
7,000	1.04	PL2012-8001	PL2012-8005	PL2012-8010
10,000	1.02	PL2012-9001	PL2012-9005	PL2012-9010
20,000	1.02	PL2013-1001	PL2013-1005	PL2013-1010
30,000	1.02	PL2013-2001	PL2013-2005	PL2013-2010
50,000	1.03	PL2013-3001	PL2013-3005	PL2013-3010
70,000	1.03	PL2013-4001	PL2013-4005	PL2013-4010
100,000	1.02	PL2013-5001	PL2013-5005	PL2013-5010
130,000	1.01	PL2013-6001	PL2013-6005	PL2013-6010
200,000	1.05	PL2013-7001	PL2013-7005	PL2013-7010
300,000	1.03	PL2013-8001	PL2013-8005	PL2013-8010
500,000	1.03	PL2013-9001	PL2013-9005	PL2013-9010
700,000	1.03	PL2014-0001	PL2014-0005	PL2014-0010
1,000,000	1.05	PL2014-1001	PL2014-1005	PL2014-1010
1,500,000	1.04	PL2014-2001	PL2014-2005	PL2014-2010
2,000,000	1.04	PL2014-3001	PL2014-3005	PL2014-3010
2,500,000	1.05	PL2014-4001	PL2014-4005	PL2014-4010
4,000,000	1.04	PL2014-6001	PL2014-6005	PL2014-6010
7,000,000	1.04	PL2014-7001	PL2014-7005	PL2014-7010
10,000,000	1.06	PL2014-8001	PL2014-8005	PL2014-8010
15,000,000	1.06	PL2014-9001	PL2014-9005	PL2014-9010

Polystyrene standards

Column: 2 x OligoPore
PL1113-6520
7.5 x 300

Mobile Phase: THF
Flow Rate: 1.0 mL/min
Detector: Agilent PL-GPC 50 (RI)



Polymethylmethacrylate

- Many solvent options increase applicability
- Stringent quality control improves performance
- Proprietary manufacturing methods ensure consistent supply

Polymethylmethacrylate (PMMA) standards are extremely versatile as they can be used for organic GPC with a wide range of medium polarity eluents, such as tetrahydrofuran, toluene, methyl ethyl ketone, and ethyl acetate. They also work well with more polar organic eluents, for example dimethylformamide, dimethylacetamide, and hexafluoroisopropanol. The MWs are selected to provide equidistant calibration points for greater accuracy, covering from 600-1.5 million MW. Every kit contains 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
M-L-10, 10 x 0.5 g	600-50,000	PL2020-0100
M-M-10, 10 x 0.5 g	1,000-1,500,000	PL2020-0101

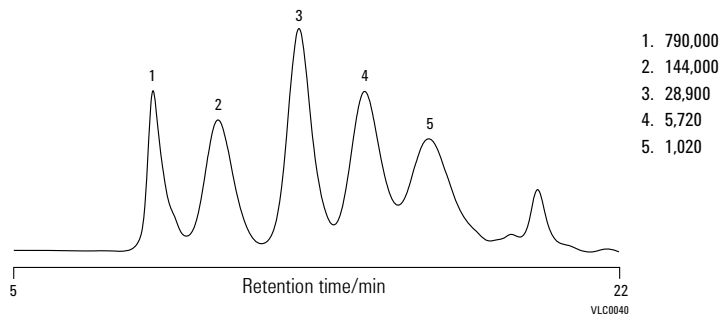
Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
500	1.19	PL2022-2001	PL2022-2005	PL2022-2010
1,000	1.26	PL2022-3001	PL2022-3005	PL2022-3010
2,000	1.08	PL2022-5001	PL2022-5005	PL2022-5010
3,000	1.08	PL2022-6001	PL2022-6005	PL2022-6010
5,000	1.09	PL2022-7001	PL2022-7005	PL2022-7010
7,000	1.08	PL2022-8001	PL2022-8005	PL2022-8010
10,000	1.03	PL2022-9001	PL2022-9005	PL2022-9010
13,000	1.03	PL2023-0001	PL2023-0005	PL2023-0010
20,000	1.03	PL2023-1001	PL2023-1005	PL2023-1010
30,000	1.02	PL2023-2001	PL2023-2005	PL2023-2010
50,000	1.02	PL2023-3001	PL2023-3005	PL2023-3010
70,000	1.02	PL2023-4001	PL2023-4005	PL2023-4010
100,000	1.02	PL2023-5001	PL2023-5005	PL2023-5010
130,000	1.05	PL2023-6001	PL2023-6005	PL2023-6010
200,000	1.02	PL2023-7001	PL2023-7005	PL2023-7010
300,000	1.02	PL2023-8001	PL2023-8005	PL2023-8010
500,000	1.06	PL2023-9001	PL2023-9005	PL2023-9010
700,000	1.03	PL2024-0001	PL2024-0005	PL2024-0010
1,000,000	1.09	PL2024-1001	PL2024-1005	PL2024-1010
15,000,000	1.09	PL2024-2001	PL2024-2005	PL2024-2010

Polymethylmethacrylate standards

Column: 2 x PL HFIPgel
PL1114-6900HFIP
7.5 x 300

Mobile Phase: HFIP + 20 mM NaTFAc
Flow Rate: 1.0 mL/min
Temperature: 40°C
Detector: Agilent PL-GPC 50 (RI)



Polyethylene Glycol/Oxide

- Simple-to-use kit form
- Combines glycols and oxides to extend the MW range and cover more applications
- MWs selected to provide equidistant calibration points for greater accuracy

These hydrophilic polymers are suitable for both aqueous SEC and organic GPC using the majority of polar organic solvents. The oxides are available in high molecular weights, while the glycols cover the lower molecular weight range. The two types are chemically similar so they can be used together across a wider molecular weight range, with aqueous and organic polymers from 106-1 million MW. Every kit contains 0.2 g or 0.5 g of ten different molecular weight standards.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
PEG-10, 10 x 0.5 g	106-20,000	PL2070-0100
PEO-10, 10 x 0.5 g	20,000-1,000,000	PL2080-0101

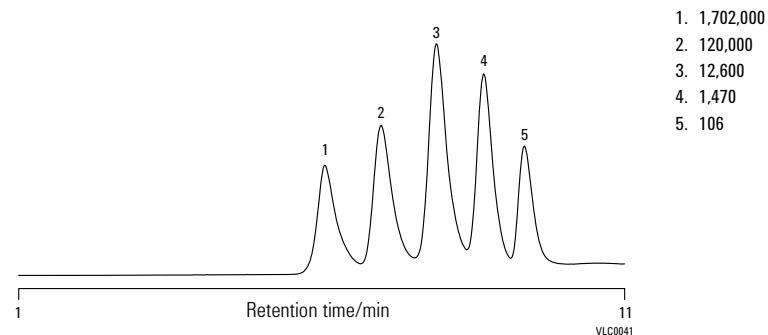
Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	1 g Part No.	5 g Part No.	10 g Part No.
Polyethylene Glycol				
106	1.00	PL2070-1001	PL2070-1005	PL2070-1010
194	1.00	PL2070-2001	PL2070-2005	PL2070-2010
238	1.00	PL2071-2001	PL2071-2005	PL2071-2010
282	1.00	PL2071-3001	PL2071-3005	PL2071-3010
420	1.09	PL2070-3001	PL2070-3005	PL2070-3010
600	1.06	PL2070-4001	PL2070-4005	PL2070-4010
1,000	1.04	PL2070-5001	PL2070-5005	PL2070-5010
1,500	1.04	PL2070-6001	PL2070-6005	PL2070-6010
4,000	1.03	PL2070-7001	PL2070-7005	PL2070-7010
7,000	1.04	PL2070-8001	PL2070-8005	PL2070-8010
10,000	1.05	PL2070-9001	PL2070-9005	PL2070-9010
13,000	1.07	PL2071-0001	PL2071-0005	PL2071-0010
20,000	1.07	PL2071-1001	PL2071-1005	PL2071-1010
Polyethylene Oxide				
20,000	1.05	PL2083-1001	PL2083-1005	PL2083-1010
30,000	1.07	PL2083-2001	PL2083-2005	PL2083-2010
50,000	1.05	PL2083-3001	PL2083-3005	PL2083-3010
70,000	1.05	PL2083-4001	PL2083-4005	PL2083-4010
100,000	1.06	PL2083-5001	PL2083-5005	PL2083-5010
130,000	1.07	PL2083-6001	PL2083-6005	PL2083-6010
200,000	1.07	PL2083-7001	PL2083-7005	PL2083-7010
300,000	1.07	PL2083-8001	PL2083-8005	PL2083-8010
500,000	1.06	PL2083-9001	PL2083-9005	PL2083-9010
700,000	1.07	PL2084-0001	PL2084-0005	PL2084-0010
1,000,000	1.12	PL2084-1001	PL2084-1005	PL2084-1010
1,500,000	1.13	PL2084-2001	PL2084-2005	PL2084-2010

Polyethylene Glycol/Oxide standards

Column: **PL aquagel-OH MIXED-H 8 µm**
PL1149-6800
7.5 x 300 mm, 8 µm

Mobile Phase: Water
 Flow Rate: 1.0 mL/min
 Detector: Agilent PL-GPC 50 (RI)



Polysaccharides

- Comprehensive format provides full MW range in one handy kit
- Also available as individual standards

The pullulan polysaccharides kit consists of several simple sugars with relatively narrow polydispersity linear macromolecules of maltotriose units.

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
SAC-10, 10 x 0.2 g	180-700,000	PL2090-0100

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Unit	Part No.
1,500	0.2 g	PL2091-2000
2,000	0.2 g	PL2091-3000
3,000	0.2 g	PL2091-4000
5,000	0.5 g	PL2090-1000
20,000	0.5 g	PL2090-3000
50,000	0.5 g	PL2090-4000
100,000	0.5 g	PL2090-5000
200,000	0.5 g	PL2090-6000
700,000	0.5 g	PL2090-8000
1,660,000	0.2 g	PL2091-1000

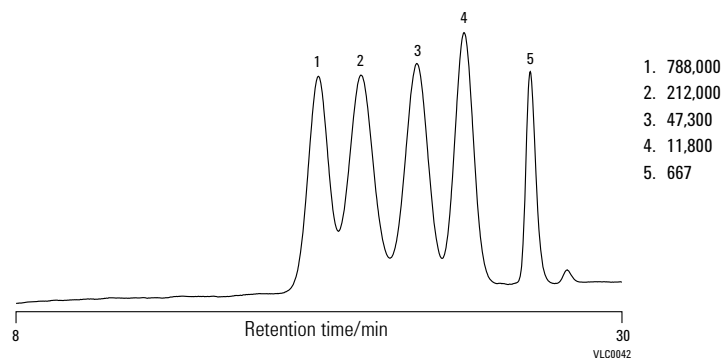
Pullulan polysaccharide standards

Column: 3 x PL aquagel-OH MIXED
PL1149-6800
7.5 x 300 mm, 8 µm

Mobile Phase: 0.2 M NaNO₃, 0.01 M NaH₂PO₄, pH 7

Flow Rate: 1.0 mL/min

Detector: Agilent PL-GPC 50 (RI)



Polyethylene

- Robust particles provide reliable high temperature calibrations
- Two linear molecular weight ranges maximize choice
- Short chain branching kit, for FT-IR calibration and TREF/CRYSTAF reference

Linear polyethylene standards with low polydispersities (1.01 to 1.9) deliver accurate GPC/SEC calibration curves, from 170-1.5 million MW. The E-MW-10 kit is recommended for polyolefins, and is designed for direct column calibration in solvents such as trichlorobenzene and o-dichlorobenzene from 135-180°C. Every kit contains 0.1 or 0.2 g of ten different molecular weight standards.

Short chain branching standards

Determination of short chain branching (SCB) as a function of MWD in polyethylene is now possible using high temperature GPC coupled with FT-IR. This series of well-characterized polyethylene SCB standards is a valuable reference set for temperature rising elution fractionation/crystallization analysis fractionation (TREF/CRYSTAF).

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
E-M-10, 10 x 0.2 g	170-120,000	PL2650-0101
E-MW-10, 10 x 0.1 g	5,000-1,500,000	PL2650-0102
Polyethylene Short Chain Branching Calibration Kit	Range of Polymer Nominal Methyl/1000 Total Carbons (NMR)	Part No.
E-SCB, 10 x 0.1 g	1.27-62.50	PL2650-0103

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	Unit	Part No.
170	1.00	1 g	PL2650-8001
282	1.00	1 g	PL2650-9001
394	1.00	1 g	PL2650-0001
540	1.09	1 g	PL2650-4001
750	1.18	1 g	PL2650-1001
1,100	1.09	1 g	PL2650-2001
2,155	1.14	1 g	PL2650-3001
14,000	1.2	0.2 g	PL2650-5000
32,000	1.11	0.2 g	PL2650-6000
120,000	1.19	0.2 g	PL2650-7000

Polyethylene Broad MWD Individual Molecular Weights

250,000	9.50	1 g	PL2660-7001
---------	------	-----	-------------

Polyethylene Broad MWD/SCB Individual Molecular Weights

35,000	5.0	0.2 g	PL2660-8001
400,000	5.0	0.2 g	PL2660-9001

Polyacrylic Acid

- Compatible with all aqueous columns for wide applicability
- Aqueous polymers 1,000-1 million MW
- Well-characterized Mp values ensure wide utility

Calibration Kits

Description	Range of Nominal Mp (g/mol)	Part No.
PAA-10, 10 x 0.2 g	1,000-1,000,000	PL2140-0100

Individual Polymer Molecular Weights

Polymer Nominal Mp (g/mol)	0.2 g Part No.	1 g Part No.
1,000	PL2142-3000	PL2142-3001
2,000	PL2142-5000	PL2142-5001
3,000	PL2142-6000	PL2142-6001
5,000	PL2142-7000	PL2142-7001
7,000	PL2142-8000	PL2142-8001
13,000	PL2143-0000	PL2143-0101
30,000	PL2143-2000	PL2143-2001
50,000	PL2143-3000	PL2143-3001
70,000	PL2143-4000	PL2143-4001
100,000	PL2143-5000	PL2143-5001
130,000	PL2143-6000	PL2143-6001
200,000	PL2143-7000	PL2143-7001
300,000	PL2143-8000	PL2143-8001
500,000	PL2143-9000	PL2143-9001
700,000	PL2144-0000	PL2144-0101
1,000,000	PL2144-1000	PL2144-1001
1,500,000	PL2144-2000	PL2144-2001
2,000,000	PL2144-3000	PL2144-3001

Methoxy Polyethylene Glycols (MPEGs)

Agilent offers a range of highly characterized, very narrow polydispersity methoxy polyethylene glycols (MPEGs). These very pure polymers are ideal as molecular weight reference materials or for further modification where cross-linking should be avoided.

Methoxy Polyethylene Glycols (MPEGs)

Polymer Nominal Mp (g/mol)	Nominal Mw/Mn	Part No.
5,000	1.03	PL2570-5001
10,000	1.05	PL2571-0001
20000	1.05	PL2572-0001
30,000	1.06	PL2573-0001
40,000	1.06	PL2574-0001
50,000	1.06	PL2575-0001

■ AGILENT BIOSOLUTIONS AND COLUMNS FOR BIOLOGIC CHARACTERIZATION

Is your lab ready for the ever-increasing number and variety of HPLC applications for biocharacterization and analysis of biomolecules?

Basic peptide separations. High-sensitivity, high-resolution amino acid analyses. Fast size exclusion separations of antibodies. The number of bio-HPLC applications continues to grow at an unprecedented rate. Agilent's durable and reproducible line of silica and polymeric bio-HPLC columns can help meet your lab's evolving needs for performance and speed.

On the following pages, you will find key facts and specifications for the following columns for bio-HPLC:

- Size Exclusion Columns
- Ion Exchange Columns
- Reversed-Phase Columns for Proteins
- Capillary, Nano and MicroBore Columns
- Preparative HPLC Columns
- Oligo Solutions