

Environmental Products

Innovative Solutions, Comprehensive Support

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HROMalytic Chromatography
Products
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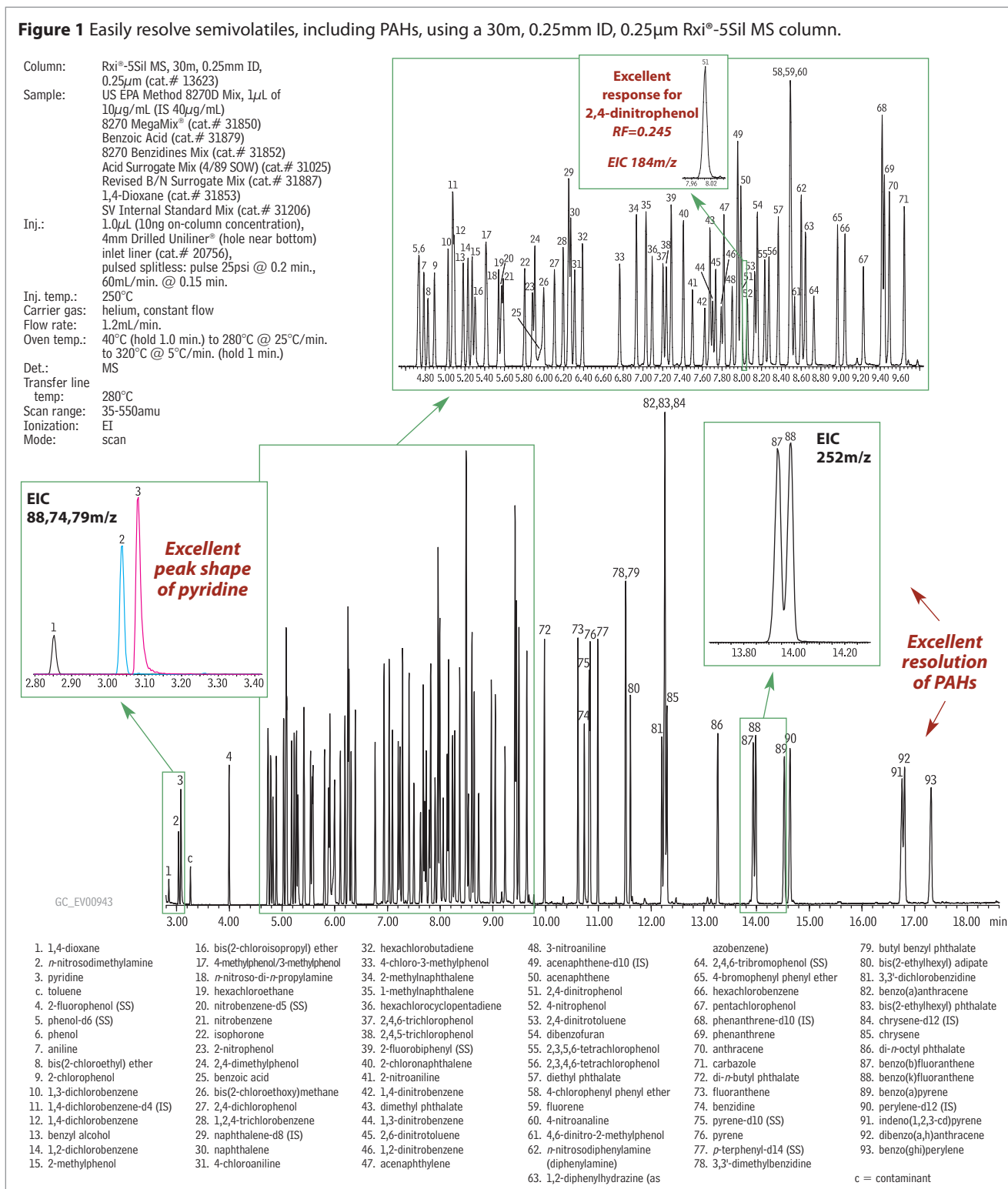
RESTEK

Chromatography Products

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Semivolatiles

EPA SW-846 Method 8270D for semivolatiles is a challenging method covering a wide range of compound classes—neutral, acidic, and basic compounds, including anilines, phenols, PAHs, and more—that differ in both volatility and reactivity. While the chromatography is complicated by a broad list of target analytes, many problems can be avoided by proper attention to the inlet system and an informed column choice. Rxi®-5Sil MS columns are ultra-low bleed and highly inert, resulting in more accurate low level quantification of active compounds (Figure 1).



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Recommended Columns

new!

Rxi®-5Sil MS
GC Column

Rxi®-5Sil MS Columns (fused silica)

(Crossbond®, selectivity close to 5% diphenyl/95% dimethyl polysiloxane)

ID	df (µm)	temp. limits	length	cat. #
0.18mm	0.18	-60 to 330/350°C	20-Meter	43602
0.18mm	0.36	-60 to 330/350°C	20-Meter	43604
0.25mm	0.25	-60 to 330/350°C	15-Meter	13620
0.25mm	0.25	-60 to 330/350°C	30-Meter	13623
0.25mm	0.25	-60 to 330/350°C	60-Meter	13626
0.25mm	0.50	-60 to 330/350°C	30-Meter	13638
0.32mm	0.25	-60 to 330/350°C	30-Meter	13624
0.32mm	0.50	-60 to 330/350°C	30-Meter	13639
0.32mm	1.00	-60 to 325/350°C	30-Meter	13654

For additional dimensions, visit www.restek.com or see our 2009 catalog.

Rxi® Guard/Retention Gap Columns (fused silica)

- Extend column lifetime.
- Excellent inertness—obtain lower detection limits for active compounds.

Nominal ID	Nominal OD	5-Meter
0.25mm	0.37 ± 0.04mm	10029
0.32mm	0.45 ± 0.04mm	10039

Universal Angled Press-Tight® Connectors

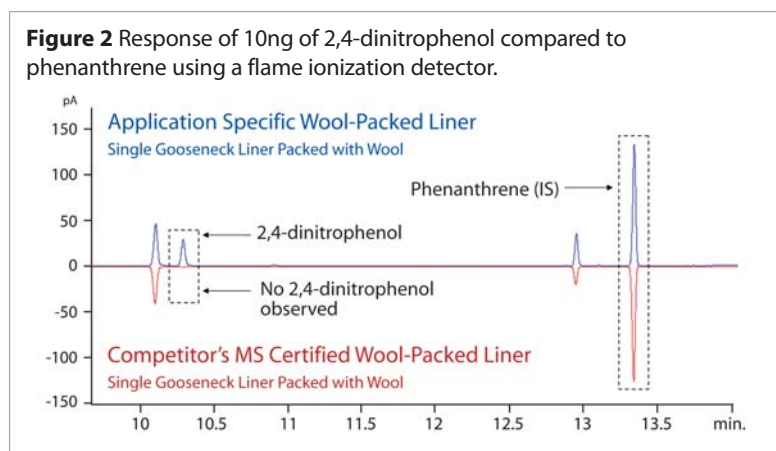
- Angle approximates column curvature, reduces strain on connections.
- Deactivated Press-Tight® connectors assure better recovery of polar and nonpolar compounds.
- Fit column ODs from 0.33–0.74mm (Restek 0.1mm–0.53mm ID).

Description	5-pk.	25-pk.
Deactivated Universal Angled Press-Tight Connectors	20446-261	20447-261

New Deactivated Wool for Semivolatile Analysis!

Application Specific Deactivated Wool

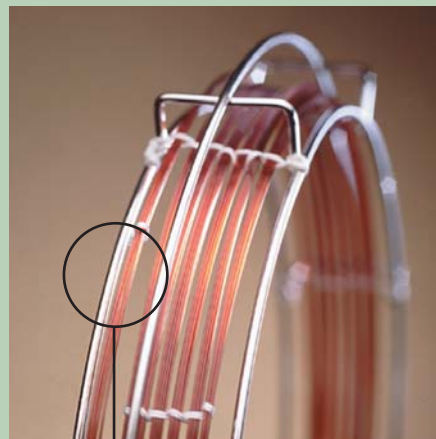
New deactivated wool gives excellent inertness for semivolatile analysis. The acidic compounds are reactive and can be difficult to quantify with wool placed in the inlet liner. With the new deactivation used for wool, the response of 2,4-dinitrophenol is excellent and an improvement over other competitor deactivated wool for semivolatile analysis (Figure 2).



To order the new Application Specific Wool in prepacked liners, add the corresponding suffix number to the liner catalog number.

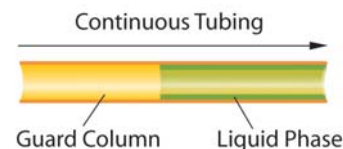
qty.	IP Deactivated Liner with Application Specific Wool		Siltek Liner with Application Specific Wool	
		addl. cost		addl. cost
each	-231.1		-232.1	
5-pk.	-231.5		-232.5	
25-pk.	-231.25		-232.25	

Using a guard column?
Eliminate leaks with a
built-in retention gap.



Integra-Guard™ columns are available for many phases, for columns with 0.25, 0.32 or 0.53mm ID. If you don't see what you need here, contact us.

Integra-Guard™ built-in guard column



Rxi®-5Sil MS with Integra-Guard™

- Extend column lifetime.
- Eliminate leaks with a built-in retention gap.
- Inertness verified by isothermal testing.

Description	qty.	cat.#	price
15m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13620-127	\$410
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13623-124	\$610
30m, 0.25mm ID, 0.25µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13623-127	\$630
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13638-124	\$610
30m, 0.25mm ID, 0.50µm Rxi-5Sil MS w/10m Integra-Guard Column	ea.	13638-127	\$630
30m, 0.32mm ID, 0.50µm Rxi-5Sil MS w/5m Integra-Guard Column	ea.	13639-125	\$655

Semivolatiles (cont.)

Analytical Reference Materials

SV Internal Standard Mix

acenaphthene-d10	naphthalene-d8
chrysene-d12	perylene-d12
1,4-dichlorobenzene-d4	phenanthrene-d10
2,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31206	
4,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31006	

B/N Surrogate Mix (4/89 SOW)

2-fluorobiphenyl	p-terphenyl-d14
nitrobenzene-d5	
1,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31024	
5,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31062	
5,000µg/mL each in methylene chloride, 5mL/ampul	
cat. # 31086	
5,000µg/mL each in methylene chloride, 10mL/ampul	
cat. # 33028	

Acid Surrogate Mix (4/89 SOW)

2-fluorophenol	2,4,6-tribromophenol
phenol-d6	
2,000µg/mL each in methanol, 1mL/ampul	
cat. # 31025	
10,000µg/mL each in methanol, 1mL/ampul	
cat. # 31063	
10,000µg/mL each in methanol, 5mL/ampul	
cat. # 31087	
10,000µg/mL each in methanol, 10mL/ampul	
cat. # 33029	

8270 MegaMix® (76 components)

Please visit us online for compound list.

1,000µg/mL each in methylene chloride, 1mL/ampul*
cat. # 31850

8270 Matrix Spike Mix (76 components)

Please visit us online for compound list.

200µg/mL each in methanol:methylene chloride (80:20), 5mL/ampul**
cat. # 31687

200µg/mL each in methanol:methylene chloride (80:20), 10mL/ampul**
cat. # 33073

605 Benzidines Calibration Mix

benzidine	3,3'-dichlorobenzidine
2,000µg/mL each in methanol, 1mL/ampul	
cat. # 31030	
2,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31834	

GC/MS Tuning Mixture

benzidine	DFTPP
4,4'-DDT	pentachlorophenol
1,000µg/mL each in methylene chloride, 1mL/ampul	
cat. # 31615	

Inlet Liners For Semivolatile Analysis: Inert Sample Path Increases Accuracy

Injection port liners are designed in many configurations, four of which are commonly used for semivolatiles analysis: the single gooseneck, double gooseneck, cyclo double gooseneck, and the Drilled Uniliner® inlet liner. While all four liner types are used for 8270 analysis, we recommend the Drilled Uniliner® inlet liner when using constant flow, and the cyclo double gooseneck inlet liner with pressure pulse conditions.

Liners shown are for Agilent instruments; liners for other instrument brands also are available. For a complete list of liners and seals, refer to our catalog or website.

Gooseneck Splitless (4mm)†



4.0mm x 6.5mm x 78.5mm, 5-pk., 20799, \$85

Cyclo Double Gooseneck (4mm)



4.0mm x 6.5mm x 78.5mm, 5-pk., 20896, \$298

Double Gooseneck Splitless (4mm)



4.0mm x 6.5mm x 78.5mm, 5-pk., 20785, \$103

Drilled Uniliner (hole near bottom)



4.0mm x 6.3mm x 78.5mm, 5-pk., 20771, \$284

The Drilled Uniliner® inlet liner is the most inert liner because the metal injection port outside the glass liner does not contact the sample path—the sample is virtually “funneled” into the column. Also, when using the Drilled Uniliner® inlet liner, inlet seals do not need to be replaced as often, saving maintenance cost and time. The cyclo double gooseneck liner is recommended with pressure pulse conditions. Its corkscrew type sample path enhances sample vaporization and helps prevent sample contact with metal surfaces below the liner. When using a gooseneck type liner, however, routinely replacing the inlet seal below the liner is critical. Gold plated and Siltek® treated liners and seals both ensure an inert sample path.

restek innovation!



Dual Vespe Ring Inlet Seal

0.8mm ID Dual Vespe Ring Inlet Seal

Stainless Steel	2-pk.	21238	\$45.50
Gold Plated	2-pk.	21240	\$58.50
Siltek Treated	2-pk.	21242	\$58.50

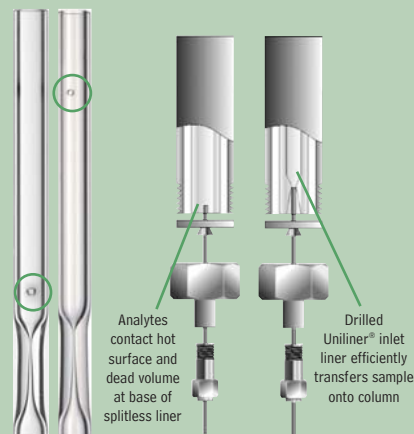
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Drilled Uniliner® Inlet Liners

Drilled Uniliner® inlet liners connect directly to the column, eliminating contact between the active compounds and active metal surfaces in the injector and ensuring an inert sample pathway for analyte transfer from the injection port to the column.

Use hole near **top** configuration for chlorinated pesticide analysis, when analytes elute away from the solvent peak, or when the sample solvent is water.

Use hole near **bottom** configuration for semivolatile analysis or when analytes elute near the solvent peak



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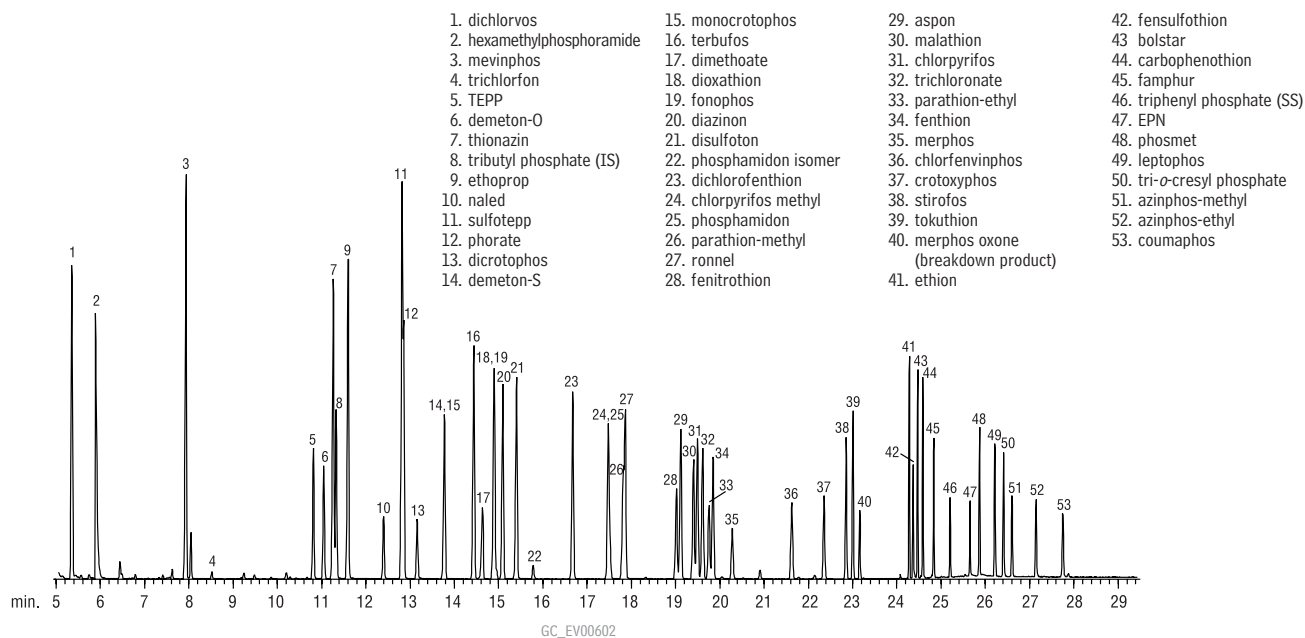


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Organophosphorus Pesticides

We recommend the Rtx®-OPPesticides2 column for separating the organophosphorus pesticides (OPP) listed in EPA Method 8141A. Separation is improved and analysis time is significantly reduced when compared to other columns. The extended upper temperature limit of this phase (330°C) allows analysts to bake out high molecular weight contamination typically associated with pesticide samples. The low bleed column is a perfect match for sensitive detection systems (Figure 1).

Figure 1 Organophosphorus pesticides on an Rtx®-OPPesticides2 column.



Column: Rtx®-OPPesticides2, 30m, 0.25mm ID, 0.25µm (cat.# 11243)
 Sample: US EPA Method 8141A Custom Standard Mix 1µL 100ppm (100ng on column)
 Triphenylphosphate Standard (cat.# 32281)
 Tributylphosphate Standard (cat.# 32280)
 8140/8141 OP Pesticides Calibration Mix A (cat.# 32277)
 8141 OP Pesticides Calibration Mix B (cat.# 32278)
 Custom Mixes: Call Restek for Information
 Inj.: 1.0µL splitless (hold 0.4 min.), 4mm double gooseneck inlet liner (cat.# 20785)

Inj. temp.: 250°C
 Carrier gas: helium, constant flow
 Flow rate: 1.0mL/min.
 Oven temp.: 80°C (hold 0.5 min.) to 140°C @ 20°C/min. to 210°C @ 4°C/min. (hold 1 min.) to 280°C @ 30°C/min. (hold 5 min.)
 Det: MS
 Transfer line temp.: 280°C
 Scan range: 35-400amu
 Ionization: EI

- | | | | |
|----------------------------|-------------------------|---------------------------------------|-------------------------------------|
| 1. dichlorvos | 15. monocrotophos | 29. aspon | 42. fensulfotion |
| 2. hexamethylphosphoramide | 16. terbufos | 30. malathion | 43. bolstar |
| 3. mevinphos | 17. dimethoate | 31. chlorpyrifos | 44. carbofenothion |
| 4. trichlorfon | 18. dioxathion | 32. trichloronate | 45. famphur |
| 5. TEPP | 19. fonophos | 33. parathion-ethyl | 46. triphenyl phosphate (SS) |
| 6. demeton-O | 20. diazinon | 34. fenthion | 47. EPN |
| 7. thionazin | 21. disulfoton | 35. merphos | 48. phosmet |
| 8. tributyl phosphate (IS) | 22. phosphamidon isomer | 36. chlorfenvinphos | 49. leptophos |
| 9. ethoprop | 23. dichlorofenthion | 37. crotoxyphos | 50. tri- <i>o</i> -cresyl phosphate |
| 10. naled | 24. chlorpyrifos methyl | 38. stirofos | 51. azinphos-methyl |
| 11. sulfotepp | 25. phosphamidon | 39. tokuthion | 52. azinphos-ethyl |
| 12. phorate | 26. parathion-methyl | 40. merphos oxone (breakdown product) | 53. coumaphos |
| 13. dicrotophos | 27. ronnel | 41. ethion | |
| 14. demeton-S | 28. fenitrothion | | |

Recommended Column

Rtx®-OPPesticides2 Columns (fused silica)

ID	df (µm)	temp. limits	length	cat. #
0.18mm	0.20	-20 to 310/330°C	20-Meter	11244
0.25mm	0.25	-20 to 310/330°C	30-Meter	11243
0.32mm	0.32	-20 to 310/330°C	30-Meter	11241
0.53mm	0.50	-20 to 310/330°C	30-Meter	11242

Sample Preparation

CarboPrep™ SPE Cartridges

SPE Cartridge	Tube Volume,		qty.	cat#
	Bed Weight			
CarboPrep 90	3mL, 250mg		50-pk.	26091
CarboPrep 90	6mL, 500mg		30-pk.	26092

Use SPE cartridges to clean-up OPP extracts with ONE elution solvent!

free literature

Easily clean up your extracts!

CarboPrep™ SPE Cleanup of Method 8141A Organophosphorus
lit. cat.# 59142



did you know?

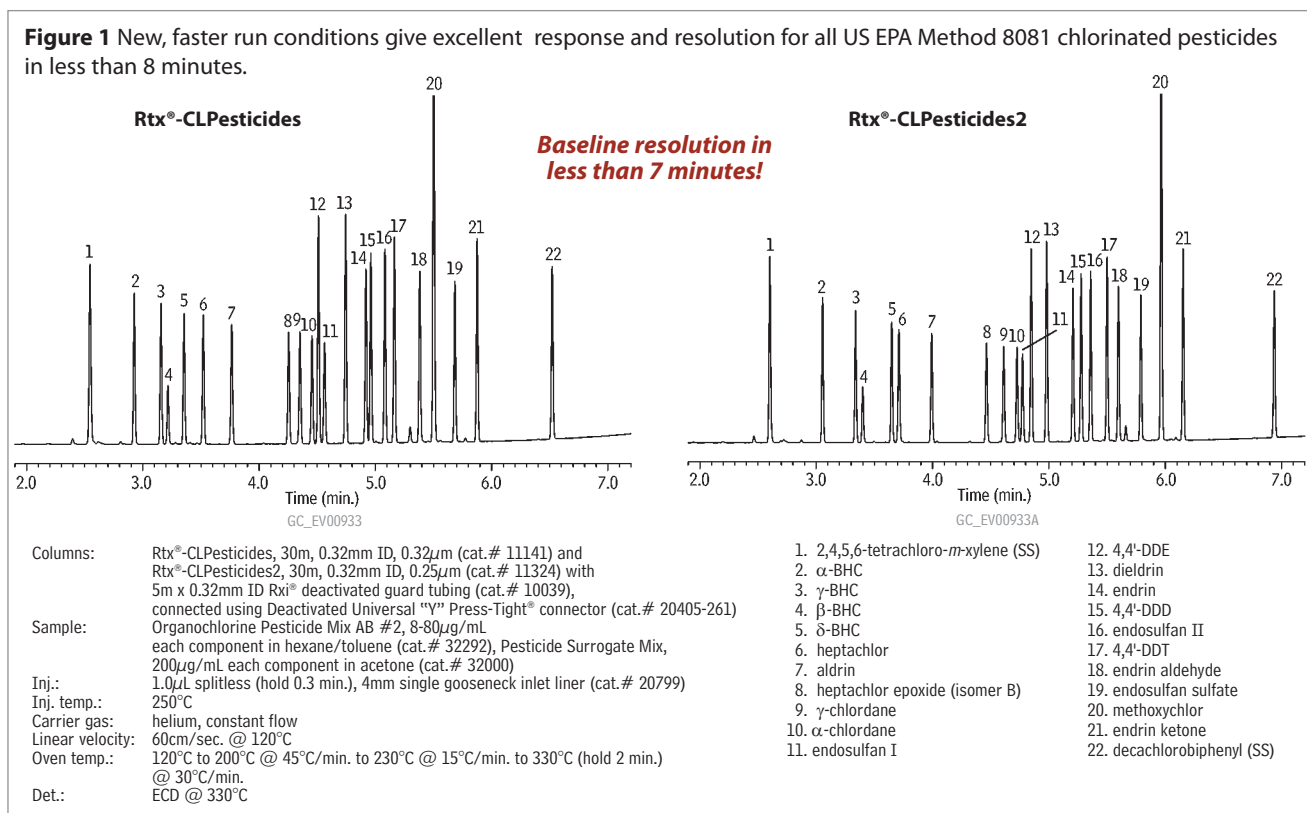
We can supply all your EPA Method 8141A standards. See our catalog or website for details.

Organochlorine Pesticides and PCBs

new!
Faster Run
Conditions

In organochlorine pesticide analysis by EPA SW-846 Method 8081, careful consideration of the instrument set-up and column choice can greatly improve sample throughput—reducing costs and saving time. The most critical aspects of the inlet system are inertness and efficiency of target analyte transfer to the analytical column. For pesticide and PCB analysis we recommend the Drilled Uniliner® inlet liner for its unsurpassed inertness (see page 4).

In the analysis shown, 30m x 0.32mm ID Rtx®-CLPesticides and Rtx®-CLPesticides2 primary and confirmation columns were used. We connected a 5m x 0.32mm guard column to the dual analytical columns, using a deactivated Universal “Y” Press-Tight® connector. These columns have been specifically designed to resolve the chlorinated pesticides when used in parallel under the same temperature program and inlet backpressure. As shown in Figure 1, all the organochlorine pesticide compounds are resolved in less than 7 minutes using the 0.32mm ID columns.



Recommended Columns

Rtx®-CLPesticides Columns (fused silica)

ID	df (µm)	temp. limits	length	cat. #
0.18mm	0.18	-60 to 310/330°C	20-Meter	42102
0.25mm	0.25	-60 to 320/340°C	30-Meter	11123
0.32mm	0.32	-60 to 320/340°C	30-Meter	11141
0.53mm	0.50	-60 to 300/320°C	30-Meter	11140

Rtx®-CLPesticides2 Columns (fused silica)

ID	df (µm)	temp. limits	length	cat. #
0.18mm	0.14	-60 to 310/330°C	20-Meter	42302
0.25mm	0.20	-60 to 320/340°C	30-Meter	11323
0.32mm	0.25	-60 to 320/340°C	30-Meter	11324
0.53mm	0.42	-60 to 300/320°C	30-Meter	11340

Siltek Guard Columns

ID	length	cat. #
0.25mm	5-Meter	10026
0.32mm	5-Meter	10027
0.53mm	5-Meter	10045

also available

Florisil® SPE Cartridges. See page 16 for details.

free literature

Analyze Chlorinated Pesticides, PCBs, and Chlorinated Herbicides Using Rtx®-CLPesticides and Rtx®-CLPesticides2 Fused Silica Columns

lit. cat.# EVFL1013

CarboPrep™ SPE Cleanup of Method 8081A Chlorinated Pesticides

lit. cat.# 59110

Florisil® SPE Cleanup for Organochlorine Pesticides and PCBs

lit. cat.# 59562A

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Organochlorine Pesticide Mix AB #1

(20 components)

aldrin	dieldrin
α-BHC	endosulfan I
β-BHC	endosulfan II
δ-BHC	endosulfan sulfate
γ-BHC (lindane)	endrin
α-chlordane	endrin aldehyde
γ-chlordane	endrin ketone
4,4'-DDD	heptachlor
4,4'-DDE	heptachlor epoxide (isomer B)
4,4'-DDT	methoxychlor

200µg/mL each in hexane:toluene (1:1), 1mL/ampul
cat. # 32291

Organochlorine Pesticide Mix AB #3

(20 components)

Same listing as Organochlorine Pesticide Mix AB #1, shown above.

2,000µg/mL each in hexane:toluene (1:1), 1mL/ampul
cat. # 32415

Pesticide Surrogate Mix

decachlorobiphenyl 2,4,5,6-tetrachloro-*m*-xylene
200µg/mL each in acetone, 1mL/ampul
cat. # 32000

Pesticide Surrogate Mix

decachlorobiphenyl 200µg/mL
2,4,5,6-tetrachloro-*m*-xylene 100
In acetone, 1mL/ampul
cat. # 32453

Organochlorine Pesticide System Evaluation Mix

4,4'-DDT 200µg/mL endrin 100µg/mL
In methyl *tert*-butyl ether, 1mL/ampul
cat. # 32417

508.1 GC Degradation Check Mix

4,4'-DDT endrin
100µg/mL each in ethyl acetate, 1mL/ampul
cat. # 32093

Technical Chlordane, Toxaphene Solutions

Volume is 1mL/ampul. Concentration is µg/mL.

Compound	Solvent	µg/mL*	cat.#
chlordane (technical)	H	1,000	32021
chlordane (technical)	M	2,000	32016
chlordane (technical)	I	5,000	32072
toxaphene	H	1,000	32005
toxaphene	M	2,000	32015
toxaphene	I	5,000	32071

H = hexane
I = isoctane
M = methanol

also available

Aroclor Solutions!

Visit our website, check our catalog, call us at 800-356-1688 or 814-353-1300, or contact your Restek representative for details.



Increase Sample Throughput Using Dual Analytical Columns and a "Y" Connector Union

Most laboratories need to confirm the compound identification obtained on one column with a second column of different selectivity. This is best achieved by making a single injection onto a guard column, which is connected to two analytical columns using a "Y" splitter. This allows data to be collected from both columns simultaneously, allowing samples to be processed without waiting for the confirmation result.

Rtx®-CLPesticides Column Kits

Save money with kits!

0.25mm ID Rtx®-CLPesticides Kit: cat.# 11199 (kit) \$1050, save \$99

Includes	cat. #	price
30-Meter, 0.25mm ID, 0.25µm	11123	\$510
30-Meter, 0.25mm ID, 0.20µm	11323	\$510
Universal Angled "Y" Press-Tight Connector	20403	\$77
5-Meter, 0.25mm ID Siltek Guard Column	10026	\$52
Total if purchased separately \$1149		

0.32mm ID Rtx®-CLPesticides Kit: cat.# 11196 (kit) \$1080, save \$134

Includes	cat. #	price
30-Meter, 0.32mm ID, 0.32µm	11141	\$540
30-Meter, 0.32mm ID, 0.25µm	11324	\$540
Universal Angled "Y" Press-Tight Connector	20403	\$77
5-Meter, 0.32mm ID Siltek Guard Column	10027	\$57
Total if purchased separately \$1214		

0.53mm ID Rtx®-CLPesticides Kit: cat.# 11197 (kit) \$1155, save \$179

Includes	cat. #	price
30-Meter, 0.53mm ID, 0.50µm	11140	\$595
30-Meter, 0.53mm ID, 0.42µm	11340	\$595
Universal Angled "Y" Press-Tight Connector	20403	\$77
5-Meter, 0.53mm ID Siltek Guard Column	10045	\$67
Total if purchased separately \$1334		

"Y" connectors

"Y" connectors are available in both metal and glass. Glass connectors offer the best chromatography, but are prone to leaks. To eliminate leaks, we developed the SeCure™ "Y" connector, which takes advantage of our Press-Tight® connector and adds mechanical strength to hold the columns in place. A second connector, the MXT™ "Y"-Union, is available for fused silica columns.



Universal "Y" Press-Tight® Connectors

Description	ea./price	3-pk./price
Universal "Y" Press-Tight Connector	20405 \$78	20406 \$207
Deactivated Universal "Y" Press-Tight Connector	20405-261 \$79	20406-261 \$210
Siltek Treated Universal "Y" Press-Tight Connector	20485 \$80.50	20486 \$212

SeCure™ "Y" - The most secure connector available!

Kits include: SeCure™ "Y" connector body, 3 knurled nuts, "Y" Universal Press-Tight® union, 3 ferrules.



Ferrules Fit Column ID	qty.	cat.#	price
0.18/0.25/0.28mm	kit	20276	\$242
0.32mm	kit	20277	\$242
0.45/0.53mm	kit	20278	\$242

MXT™ "Y"-Union Connector Kits

Each kit contains the MXT™ union, three 1/32-inch nuts and three one-piece fused silica adaptors.



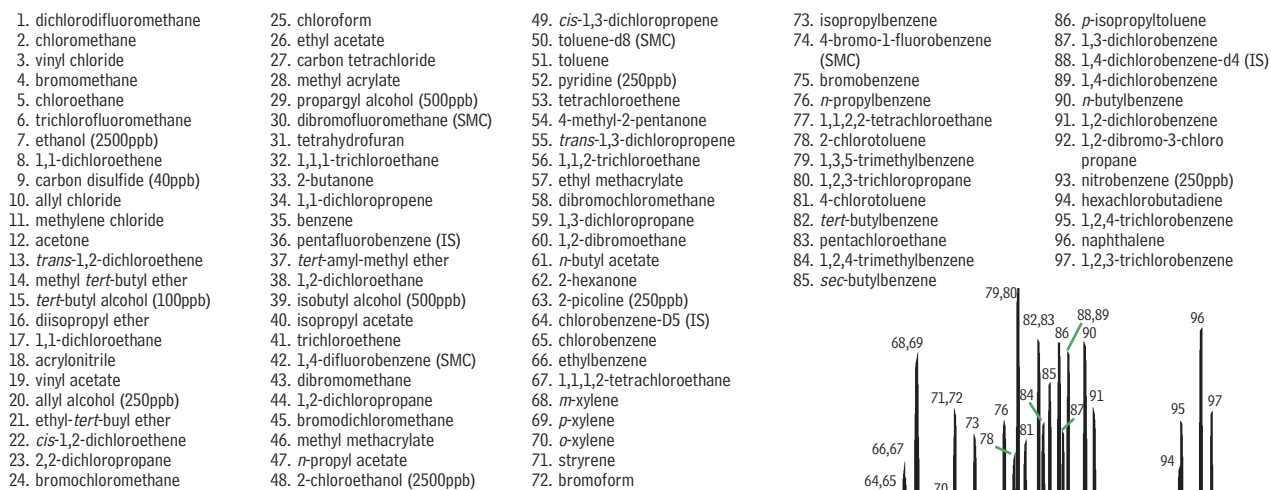
Description	qty.	cat.#	price
For 0.25mm ID Fused Silica Columns	kit	21389	\$138
For 0.32mm ID Fused Silica Columns	kit	21388	\$138
For 0.53mm ID Fused Silica Columns	kit	21387	\$138

Volatiles

Volatile organic compounds (VOCs), such as those tested for in US EPA Method 8260B, are usually analyzed using a purge and trap system connected to a GC. The column used must have a selective stationary phase to resolve the volatile pollutants, have a sufficient film thickness to retain and resolve the low boiling volatile compounds (e.g., dichlorodifluoromethane), and must be thermally stable to elute the high boiling volatiles compounds (e.g., hexachlorobutadiene & naphthalene).

The first fused silica columns used for analyzing volatiles were based on diphenyl/dimethyl polysiloxane stationary phases. However, resolution of gases has always been problematic with these phases. Restek designed the Rtx®-VMS column specifically to optimize separation of volatiles in the most commonly used EPA volatiles methods. A faster oven ramp rate is possible because these compounds elute farther apart on the Rtx®-VMS phase, eliminating partial coelutions that interfere with quantification. As shown in Figure 1, analysis time can be less than 10 minutes with a narrow bore column, allowing you to connect two purge and trap units to one GC/MS instrument—significantly increasing sample throughput.

Figure 1 Excellent resolution of bromomethane and chloroethane, as well as challenging isomer pairs like 2-/4-chlorotoluene on the Rtx®-VMS column.



Resolves all analytes in less than 10 min.!

Column: Rtx®-VMS, 20m, 0.18mm ID, 1.00µm (cat.# 49914)
 Conc.: 10ppb in 5mL of RO water unless otherwise noted; ketones at 2.5X
 Concentrator: Tekmar LSC-3100 Purge and Trap
 Trap: Vocabr 3000 (type K)
 Purge: 11 min. @ 40mL/min. (ambient temperature)
 Dry purge: 1 min. @ 40mL/min.
 Desorb preheat: 245°C
 Desorb: 250°C for 2 min., flow 40mL/min.
 Bake: 260°C for 8 min.

Interface: 0.53mm ID Silcosteel® tubing transfer line 1:40 split at injection port. 1mm ID liner.
 Oven temp.: 50°C (hold 4 min.) to 100°C @ 18°C/min. (hold 0 min.) to 230°C @ 40°C/min. (hold 3 min.)
 Carrier gas: helium @ ~1.0mL/min. constant flow
 Adjust dichlorodifluoromethane to a retention time of 1.03 min. @ 50°C.
 Detector: Agilent 5973 MSD
 Scan range: 35-300amu

¹A.L. Hilling and G. Smith, Environmental Testing & Analysis, 10(3), 15-19, 2001.

Recommended Columns

Rtx®-VMS Columns (fused silica)

ID	df (µm)	temp. limits	length	cat. #
0.18mm	1.00	-40 to 240/260°C	20-Meter	49914
0.25mm	1.40	-40 to 240/260°C	30-Meter	19915

free literature

Optimizing the Analysis of Volatile Organic Compounds
 lit. cat.# 59887A

Rtx®-VMS Capillary Columns
 lit. cat.# 59209A

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8260A Internal Standard Mix

chlorobenzene-d5 fluorobenzene
1,4-dichlorobenzene-d4
2,500µg/mL each in P&T methanol, 1mL/ampul
cat. # 30241

8260 Internal Standard Mix

chlorobenzene-d5 1,4-difluorobenzene
1,4-dichlorobenzene-d4 pentafluorobenzene
2,500µg/mL each in P&T methanol, 1mL/ampul
cat. # 30074

8260A Surrogate Mix

4-bromofluorobenzene 1,2-dichloroethane-d4
dibromofluoromethane toluene-d8
2,500µg/mL each in P&T methanol, 1mL/ampul
cat. # 30240

8260 Surrogate Mix

4-bromofluorobenzene toluene-d8
dibromofluoromethane
2,500µg/mL each in P&T methanol, 1mL/ampul
cat. # 30073

8260B MegaMix® Calibration Mix (76 components)

Please visit us online for compound list.
2,000µg/mL each in P&T methanol, 1mL/ampul
cat. # 30633

8260B MegaMix® Calibration Mix Kit

30633: 8260B MegaMix
30265: 2-chlorethyl vinyl ether
Contains 1mL each of these mixtures.
cat. # 30475

502.2 Calibration Mix #1 (gases)

bromomethane trichlorofluoromethane
chloroethane (CFC-11)
chloromethane vinyl chloride
dichlorodifluoromethane (CFC-12)
200µg/mL each in P&T methanol, 1mL/ampul
cat. # 30439
2,000µg/mL each in P&T methanol, 1mL/ampul
cat. # 30042

VOA Calibration Mix #1 (ketones)

acetone 2-hexanone
2-butanone (MEK) 4-methyl-2-pentanone (MIBK)
5,000µg/mL each in P&T methanol:water (90:10), 1mL/ampul
cat. # 30006

California Oxygenates Mix

diisopropyl ether (DIPE) 2,000µg/mL
ethyl-tert-butyl ether (ETBE) 2,000
tert-amyl methyl ether (TAME) 2,000
tert-butyl alcohol 10,000
methyl tert-butyl ether (MTBE) 2,000
In P&T methanol, 1mL/ampul
cat. # 30465

Reduce Dead Volume, Contamination, & Cold Spots

The injection port can be a source of dead volume, which is especially problematic when dealing with a sample in the gas phase. The severity of the problem is determined by a combination of the inside diameter of the injection port liner and the total desorb flow through the port. To reduce dead volume in the injection port, use a 1mm ID inert split liner. Always be sure to use insulation where the transfer line attaches to the inlet line, since this is a cold spot that will condense high molecular weight analytes.

Transfer lines often are the first place contamination occurs. When the response factor for bromoform fails the method criteria, changing the transfer line is the first step to getting the system working again. Replace your transfer line with our Siltek® deactivated tubing, for optimum performance.

1mm Split Liners for Agilent GCs

	ID* x OD & Length (mm)	ea. cat.#/price	5-pk. cat.#/price
1mm Split**	1.0mm x 6.3mm x 78.5mm	20972/\$26	20973/\$75

*Nominal ID at syringe needle expulsion point.

**Use this liner for increased sensitivity.

P&T Transfer Line Siltek®/Sulfinert® Treated Coiled 304 Grade Stainless Steel Tubing

Recommended for:

- chromatography applications.
- gas delivery systems.
- replacing nickel transfer lines.

*Ideal for
transfer lines*



OD	ID	cat.#	Price-per-foot	
			5-24 ft.	25-199 ft.
1/16" (1.59mm)	0.040" (1.02mm)	22505	\$10.40/ft.	\$6.50/ft.

Purge-and-Trap Spargers for Tekmar 2000, 3000, or 3100

- Available with uniform frits, to ensure maximum purging efficiency.
- Use nonfritted spargers for wastewater samples.
- Manufactured to tight tolerances to ensure a leak-tight seal.



Description	qty.	cat.#	price
Fritted Spargers			
5mL Fritted Sparger, 1/2-inch mount	ea.	21150	\$72
10mL Fritted Sparger, 1/2-inch mount	ea.	26138	\$85.50
25mL Fritted Sparger, 1/2-inch mount	ea.	21151	\$76
Nonfritted Spargers			
5mL Non-Fritted Sparger, 1/2-inch mount	ea.	26139	\$82.50
10mL Non-Fritted Sparger, 1/2-inch mount	ea.	26140	\$82.50
25mL Non-Fritted Sparger, 1/2-inch mount	ea.	26141	\$82.50

Precleaned Volatile Organic Analyte (VOA) Sampling Vials

- Container, liner and closure cleaned and assembled.
- Clear or amber.
- Open top caps.
- Teflon® faced 0.125" silicone septa.
- Each case lot numbered.



Description	Screw-Thread Size	qty.	cat.#	price
20mL Amber Pre-Cleaned VOA Vials	24mm-400	72-pk.	21799	\$91
40mL Clear Pre-Cleaned VOA Vials	24mm-400	72-pk.	21796	\$81
40mL Amber Pre-Cleaned VOA Vials	24mm-400	72-pk.	21797	\$83

Carbamates by HPLC

Carbamates are widely used insecticides that pose a health risk as endocrine disruptors. Our Ultra Carbamate column, in a 50mm length, separates the common carbamates listed in US EPA Method 531 in less than 10 minutes (Figure 1), significantly less than the time required by traditional C18 columns. In addition to the best column choice for the analysis, we offer reference mixes for Method 531 carbamates, a performance check mix, and the specified internal standard, 4-bromo-3,5-dimethylphenyl-N-methylcarbamate (BDMC).

Recommended Column

Ultra Carbamate Columns

Physical Characteristics:

particle size: 3µm or 5µm, spherical
pH range: 2.5 to 7.5
pore size: 100Å temperature limit: 80°C

3µm Column	cat. #
50mm (2.1mm ID)*	9177352
50mm (4.6mm ID)*	9177355
5µm Column	cat. #
250mm (4.6mm ID)	9177575

*For post-column derivatization/fluorescence detection applications for a 4.6mm ID column the total system dead volume, including the post-column reactor, must be less than 650µL. For standard post-column reactor systems, we recommend a 250mm x 4.6mm, 5µm column. Contact Restek technical service or your Restek representative for more information.

Trident HPLC Guard Cartridges

Ultra Carbamate	qty.	cat. #
10 x 2.1mm	3-pk.	917750212
10 x 4.0mm	3-pk.	917750210
20 x 2.1mm	2-pk.	917750222
20 x 4.0mm	2-pk.	917750220

Trident Direct Guard Cartridge System

Description	qty.	cat. #
10mm guard cartridge holder without filter	ea.	25083
20mm guard cartridge holder with filter	ea.	25086

Analytical Reference Materials

531.1 Carbamate Pesticide Calibration Mixture

(10 components)
aldicarb 3-hydroxycarbofuran
aldicarb sulfone methiocarb
aldicarb sulfoxide methomyl
carbaryl (Sevin) oxamyl
carbofuran propoxur (Baygon)
100µg/mL each in methanol, 1mL/ampul
cat. # 32273

531.2 Carbamate Pesticide Calibration Mixture

(11 components)
aldicarb methiocarb
aldicarb sulfone methomyl
aldicarb sulfoxide 1-naphthol
carbaryl (Sevin) oxamyl
carbofuran propoxur (Baygon)
3-hydroxycarbofuran
100µg/mL in acetonitrile, 1mL/ampul
cat. # 32435

Internal Standard

4-bromo-3,5-dimethylphenyl-N-methylcarbamate (BDMC)
100µg/mL in methanol, 1mL/ampul
cat. # 32274

531.1 Performance Check Mix

aldicarb sulfoxide	100µg/mL	3-hydroxycarbofuran	2
BDMC	10	methiocarb	20

In methanol, 1mL/ampul
cat. # 32275

Figure 1 Carbamate pesticides on an Ultra Carbamate column.

Peak List:

- aldicarb sulfone
- aldicarb sulfoxide
- oxamyl
- methomyl
- 3-hydroxycarbofuran
- aldicarb
- propoxur
- carbofuran
- carbaryl
- methiocarb
- 4-bromo-3,5-dimethylcarbamate

Sample:

Inj.: 5µL cat. # 32274 and cat. # 32273 mixed 50:50
Conc.: 50µg/mL each
Solvent: methanol

Column:

Ultra Carbamate
Cat. #: 9177355
Dimensions: 50 x 4.6mm
Particle size: 3µm
Pore size: 100Å

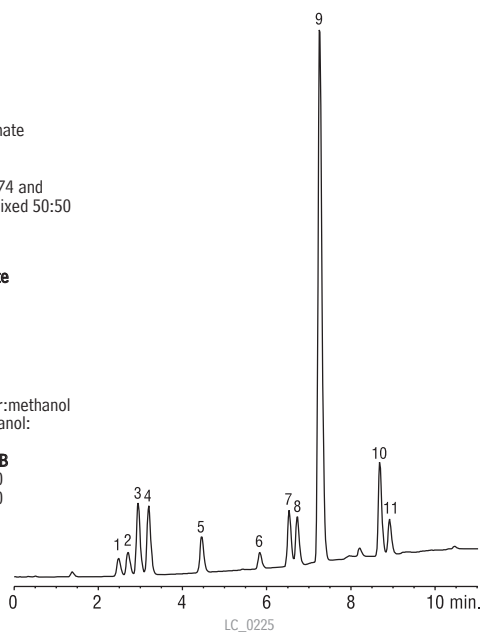
Conditions:

Mobile phase: A: 90:10 water:methanol
B: 90:10 methanol:
acetonitrile

Time (min.)	%B
0	10
10	90

Flow: 1.5mL/min.
Temp.: 27°C
Det.: UV @ 220nm

Faster analysis than a C18!



Looking for a chromatogram?

Search our extensive online library at

www.restek.com



Polycyclic Aromatic Hydrocarbons (PAHs) by HPLC

Most HPLC PAH methods recommend using a C18 column with fluorescence and/or UV/VIS detection. Our Pinnacle® II PAH columns have a highly reproducible modified alkyl phase on Restek manufactured silica, specifically developed for this application. Figure 1 shows the analysis of 16 target PAHs in less than 18 minutes. Figure 2 shows a separation of 19 target PAHs and related compounds, in less than 19 minutes, using a 150mm column.

Recommended Columns

Pinnacle® II PAH Columns

Physical Characteristics:

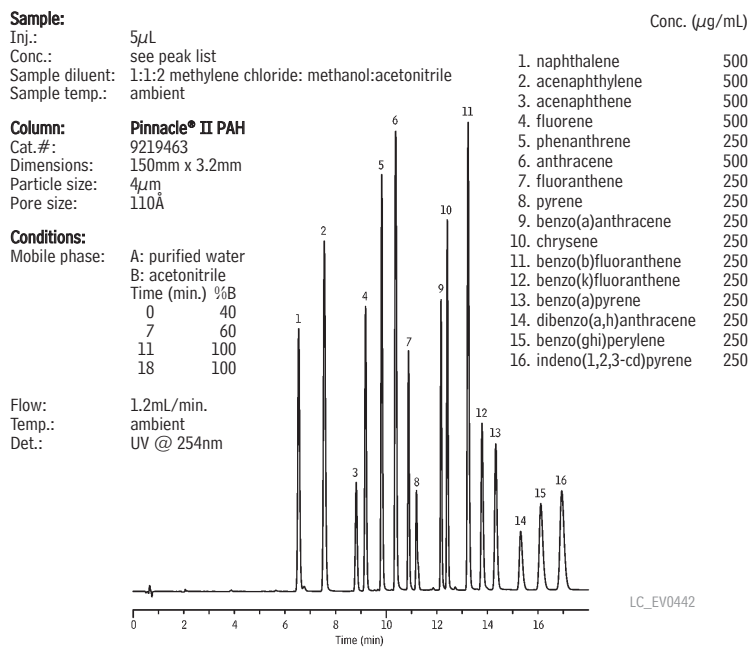
particle size: 4µm, spherical pH range: 2.5 to 10
pore size: 110Å temperature limit: 80°C
endcap: fully endcapped

4µm Column, 3.2mm ID	cat. #
150mm	9219463
4µm Column, 4.6mm ID	cat. #
250mm	9219475

Pinnacle® II Guard Cartridges

Pinnacle II PAH	qty.	cat. #
10 x 2.1mm	3-pk.	921950212
10 x 4.0mm	3-pk.	921950210
20 x 2.1mm	2-pk.	921950222
20 x 4.0mm	2-pk.	921950220

Figure 1 Baseline resolution of 16 PAHs in less than 18 minutes.



Analytical Reference Materials

EPA Method 8310 PAH Mixture (18 components)

acenaphthene	dibenzo(a,h)anthracene
acenaphthylene	fluoranthene
anthracene	fluorene
benzo(a)anthracene	indeno(1,2,3-cd)pyrene
benzo(a)pyrene	1-methylnaphthalene
benzo(b)fluoranthene	2-methylnaphthalene
benzo(ghi)perylene	naphthalene
benzo(k)fluoranthene	phenanthrene
chrysene	pyrene

500µg/mL each in acetonitrile, 1mL/ampul
cat. # 31841

EPA Method 8310 Quality Control Check

(18 components)

acenaphthene	100µg/mL	dibenzo(a,h)anthracene	10
acenaphthylene	100	fluoranthene	10
anthracene	100	fluorene	100
benzo(a)anthracene	10	indeno(1,2,3-cd)pyrene	10
benzo(a)pyrene	10	1-methylnaphthalene	100
benzo(b)fluoranthene	10	2-methylnaphthalene	100
benzo(ghi)perylene	10	naphthalene	100
benzo(k)fluoranthene	5	phenanthrene	100
chrysene	10	pyrene 10	

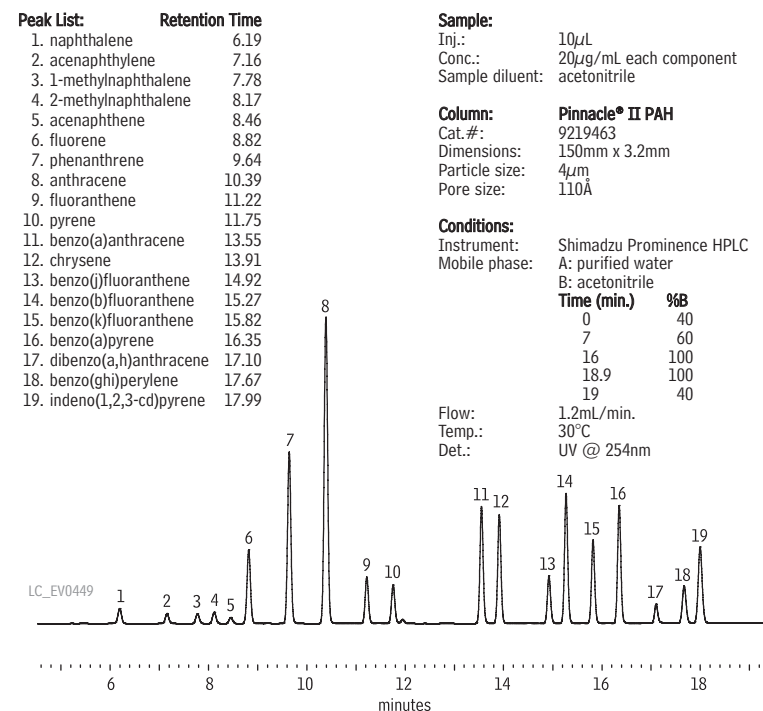
In acetonitrile, 1mL/ampul

cat. # 31843

EPA Method 8310 Surrogate Standard

decafluorobiphenyl
1,000µg/mL in acetonitrile, 1mL/ampul
cat. # 31842

Figure 2 Baseline resolution of benzo(j)fluoranthene!



free literature

Environmental HPLC Applications, Columns, Reference Materials
lit. cat. # 59741A

Explosives by HPLC

US EPA Method 8330B expands the target compound list from the original Method, which was developed for quantifying commonly monitored explosives. It calls for reversed phase HPLC with UV detection, using a primary column and a confirmation column. While cyano phases typically have been used for the confirmation column, resolution of the target explosive compounds is poor. The Pinnacle® II Biphenyl column provides excellent resolution of Method 8330B explosives, as shown in Figure 1. Selectivity is markedly different from C18 phases, making the Pinnacle® II Biphenyl column an ideal confirmation column. If a cyano phase must be used for confirmation, we recommend a Pinnacle® II Cyano column.

Recommended Columns

Ultra C18 Columns (USP L1)

Excellent for a wide range of analyses

Physical Characteristics:

particle size: 3µm or 5µm,	endcap: fully endcapped
spherical	pH range: 2.5 to 7.5
pore size: 100Å	temperature limit: 80°C
carbon load: 20%	

5µm Column, 4.6mm ID	cat. #
150mm	9174565
250mm	9174575

Pinnacle® II Biphenyl Columns (USP L11)

Physical Characteristics:

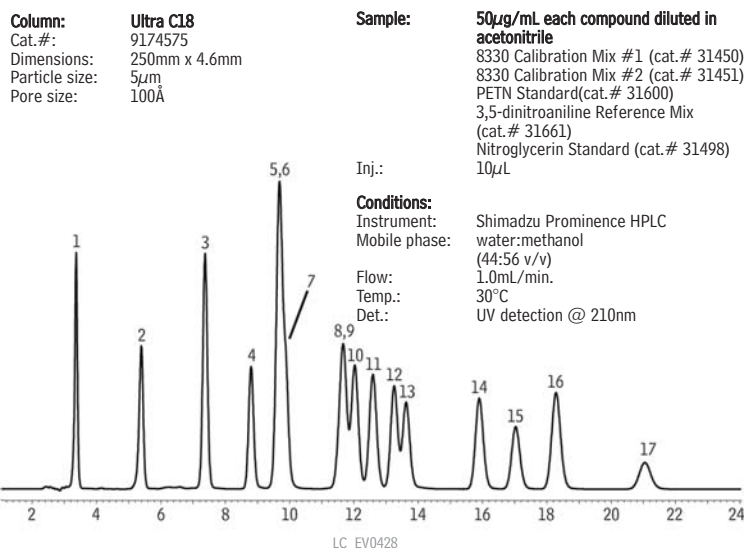
particle size: 5µm, spherical	endcap: yes
pore size: 110Å	pH range: 2.5 to 7.5
	temperature limit: 80°C

5µm Column, 4.6mm ID	cat. #
150mm	9209565
250mm	9209575

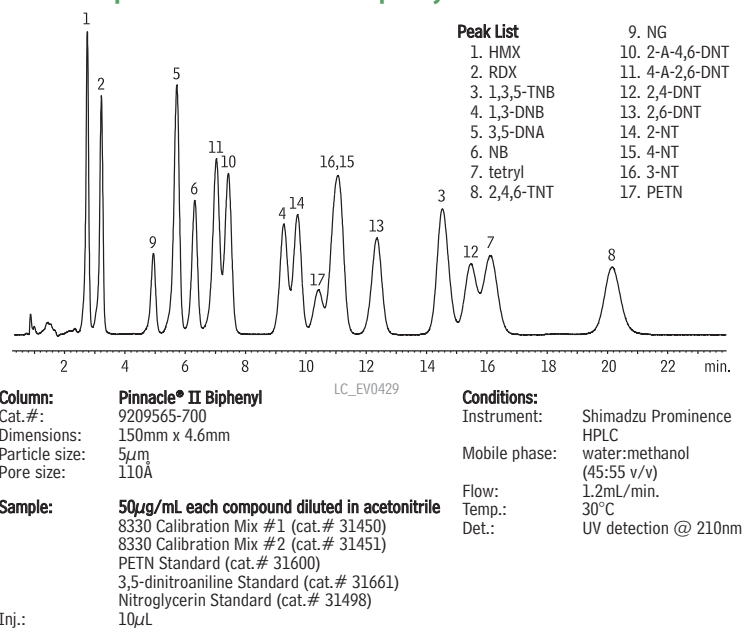
ordering note: For guard cartridges for these columns, visit our website at www.restek.com.

Figure 1 An outstanding column pair for US EPA Method 8330B explosives analysis.

For superior performance, use an Ultra C18 primary column...



...coupled with a Pinnacle® II Biphenyl confirmation column.



Analytical Reference Materials

Nitroaromatics and Nitramine Explosives by HPLC,

EPA 8330B* (17 components)

2-amino-4,6-dinitrotoluene	2-nitrotoluene
4-amino-2,6-dinitrotoluene	3-nitrotoluene
3,5-dinitroaniline	4-nitrotoluene
1,3-dinitrobenzene	PETN
2,4-dinitrotoluene	RDX
2,6-dinitrotoluene	tetryl
HMX	1,3,5-trinitrobenzene
nitrobenzene	2,4,6-trinitrotoluene
nitroglycerin	

1,000µg/mL each in acetonitrile, 1mL/ampul
 cat. # 33204

Nitroaromatics and Nitramine Explosives by HPLC*

(14 components)

1,3-dinitrobenzene	2-nitrotoluene
2-amino-4,6-dinitrotoluene	3-nitrotoluene
4-amino-2,6-dinitrotoluene	4-nitrotoluene
2,4-dinitrotoluene	RDX
2,6-dinitrotoluene	tetryl
HMX	1,3,5-trinitrobenzene
nitrobenzene	2,4,6-trinitrotoluene

1,000µg/mL each in acetonitrile, 1mL/ampul
 cat. # 33905

8330 Internal Standards*

3,4-dinitrotoluene
 1,000µg/mL in methanol, 1mL/ampul
 cat. # 31452

1,4-dinitrobenzene
 2,000µg/mL in acetonitrile, 1mL/ampul
 cat. # 33205

8330 Surrogate*

1,2-dinitrobenzene
 1,000µg/mL in methanol, 1mL/ampul
 cat. # 31453

To Order:

www.restek.com

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* Available in US only.



Hydrogen Generators

Parker Balston® PEM Hydrogen Generators

- No need for liquid electrolytes—reliably generates 99.9995% pure hydrogen from DI water alone.
- Eliminates high-pressure cylinders—greater convenience and improved lab safety.
- Compact unit, requiring only one square foot of bench space.
- Quick and easy to service and maintain; unique display lighting changes color for easy status checks and water level indication.
- Comes with a set of universal power adapters for US, European, and Asian plug types.



Parker
Filtration

Fuel-grade high purity hydrogen generators are safer alternatives to high-pressure gas cylinders. The new Proton Exchange Membrane (PEM) cell eliminates the use of liquid electrolytes with hydrogen generators. Deionized water is all that is required to generate hydrogen for weeks of continuous operation. With an output capacity of up to 510cc/minute, one generator can supply 99.9995% pure hydrogen for up to several FIDs. Based on cylinder gas savings alone, a hydrogen generator pays for itself in one or two years.

Description	Capacity	qty.	cat.#
Hydrogen Generator H2PEM-100	100cc/min.	ea.	23065
Hydrogen Generator H2PEM-165	165cc/min.	ea.	23066
Hydrogen Generator H2PEM-260	260cc/min.	ea.	23067
Hydrogen Generator H2PEM-510	510cc/min.	ea.	23068

Replacement and Maintenance Components for Hydrogen Generators (for all models listed above)

Replacement Desiccant Cartridge for H2PEM Generators		ea.	23069
6-Month Maintenance Kit for H2PEM Generators (Includes: 1 deionizer cartridge, 1 water filter, 3 environmental filters)		kit	23070
24-Month Maintenance Kit for H2PEM Generators (Includes: 1 deionizer cartridge, 1 water filter, 3 environmental filters, 1 water level sensor, 1 water pump, and 1 desiccant cartridge)		kit	23071

GAS SHORTAGE?

Switch to Hydrogen:
Safe, Renewable, and
Dependable



Visit us at
Restek.com/outofgas
for details

**Make the switch to
hydrogen!**

Specifications

Purity: 99.9995% pure hydrogen
Delivery Pressure: 10-100psig
± 1psig (69-689kPa ± 7kPa)
Outlet Port: 1/8" compression
Electrical Requirements:
100-230VAC/50-60Hz
Physical Dimensions:
17.12" h x 13.46" w x 17.95" d
(43.48 x 34.19 x 45.6cm)
Weight: 40 lbs. (18kg) dry

Parker Balston® Model FID-1000 and FID-2500 Gas Stations

- Single unit produces UHP zero air from house compressed air and 99.9995% pure hydrogen from DI water.
- Ideal for supplying up to 5-6 FIDs.
- Eliminates inconvenient and dangerous gas cylinders.
- Silent operation, minimal operator attention required.

Parker Balston® Gas Stations provide both UHP grade hydrogen gas and zero grade air for flame ionization detectors. The system is specifically designed to supply gas to FIDs and to support flame thermionic and flame photometric detectors. The units produce zero air by purifying compressed air to a total hydrocarbon concentration of 0.1ppm or less (measured as methane).

The hydrogen generators produce hydrogen gas from deionized water, using the principle of electrolytic dissociation of water and hydrogen proton conduction through a proton exchange membrane cell.

Specifications

Hydrogen Purity:	99.9995%
Zero Air Purity:	FID-1000: < 0.1ppm total hydrocarbons as methane FID-2500: < 0.05ppm total hydrocarbons as methane
Max. Hydrogen Flow Rate:	FID-1000: 90cc/min. FID-2500: 250cc/min.
Max. Zero Air Flow Rate:	FID-1000: 1000cc/min. FID-2500: 2500cc/min.
Power:	120VAC/amp, 60Hz, 400 watts
Hydrogen Outlet Pressure:	60 psig (414kPa)
Zero Air Outlet Pressure:	40-125 psig* (276-862kPa)
Inlet Connection:	1/4" NPT (female)
Outlet:	1/8" compression
Dimensions:	16.5" h x 10.5" w x 17" d (42cm x 27cm x 43cm)
Weight:	53 lbs. (24kg)

*Zero air inlet requires minimum of 40psig (276kPa) compressed air pressure.



**Built to International
Standards**

Produced and supported by an ISO 9001 registered organization, Parker Balston® hydrogen generators are built to meet the toughest laboratory standards—CSA, UL, CE, and IEC 1010.

Description	qty.	cat.#
Model FID-1000 Gas Station (ideal for 1-2 FIDs)	ea.	20177
Model FID-2500 Gas Station (ideal for 5-6 FIDs)	ea.	24913
Replacement Components for FID Gas Stations		
Resin Bed Cartridge for Hydrogen Generators in FID-1000 and FID-2500 Gas Stations	ea.	24914
Replacement Desiccant Cartridge	ea.	21671
FID Gas Station Maintenance Kit (Includes 1 desiccant cartridge, 1 resin bed cartridge, 1 filter cartridge)	ea.	24915

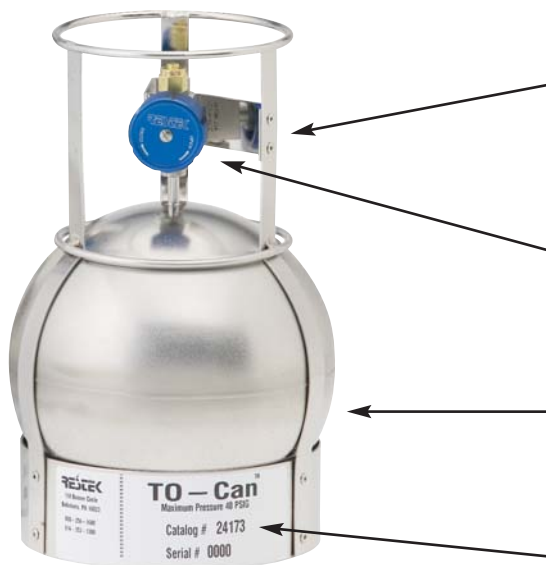
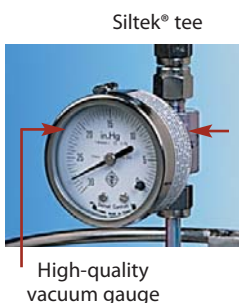
Volatile Organic Compounds in Air

One of the most widely used VOC methods for ambient air monitoring, EPA TO-15, specifies sample collection with a specially prepared stainless steel canister, followed by GC/MS analysis. Restek can support all facets of your air monitoring program—from state-of-the-art sampling equipment to high quality analytical reference standards.

An inert canister surface is critical to obtaining accurate sample results. Restek offers a complete line of TO-Can® canisters (Summa canister equivalents) which are electropolished and extensively cleaned prior to shipping to ensure a high-quality passivated surface for improved analyte stability. No weld marks on the spheres further reduce the occurrence of active sites. For reactive compounds, such as sulfur-containing components, a SilcoCan® is your best canister choice. SilcoCan® canisters are deactivated with Siltek® surface treatment resulting in exceptional inertness and maximum sample stability, even for low level sulfur compounds.

Optional gauge

- Quickly confirm vacuum or pressure inside canister.
- Monitor pressure changes.
- Fully protected by canister frame.
- Can be heated to 90°C during cleaning.



Enhanced valve and canister bracket

Canister holder and valve bracket protect canister, tube stub, and valve.

High quality 2 or 3 port valves are available

Metal-to-metal seal, 2/3 turn with stainless steel diaphragm.

We consider your TO-Cans® and SilcoCans® to be an investment and offer check-ups and reconditioning when needed.

Serial-controlled label
For quick, sure identification.

TO-Can® Air Monitoring Canisters

Optimized for US EPA Methods TO-14A and TO-15, and ASTM D5466

Description	qty.	1L Volume		3L Volume*		6L Volume		15L Volume	
		cat.#	cat.#	cat.#	cat.#	cat.#	cat.#	cat.#	cat.#
TO-Can Canister, 1/4" Valve	ea.	24172	24173	24173	24174	24175			
TO-Can Canister with Gauge, 1/4" Valve	ea.	24176	24177	24177	24178	24179			
TO-Can Canister without Valve	ea.	22094	22095	22095	22096	22097			

free literature

A Guide to Passive Air Sampling Equipment and Practical Techniques for Collecting Air Samples
lit. cat.# 59977B

SilcoCan® Air Monitoring Canisters

Ideal for low-level reactive sulfur (1-20ppb), TO-14A, or TO-15 compounds

Description	qty.	1L Volume		3L Volume*		6L Volume		15L Volume	
		cat.#	cat.#	cat.#	cat.#	cat.#	cat.#	cat.#	cat.#
SilcoCan Canister, 1/4" Valve	ea.	24180	24181	24181	24182	24183			
SilcoCan Canister, Siltek Treated 1/4" Valve	ea.	24180-650	24181-650	24181-650	24182-650	24183-650			
SilcoCan Canister with Gauge, 1/4" Valve	ea.	24140	24141	24141	24142	24143			
SilcoCan Canister with Gauge, Siltek Treated 1/4" Valve	ea.	24140-650	24141-650	24141-650	24142-650	24143-650			
SilcoCan Canister without Valve	ea.	22090	22091	22091	22092	22093			

Restek canisters are originally equipped with high-quality Parker Hannifin diaphragm valves. Each valve is helium leak-tested to 4 x 10⁻⁶ cc/sec. The all-stainless steel construction eliminates contamination and withstands temperatures from -100°C to 250°C. Other features include a compression outlet fitting and a 1/4" inlet and outlet.

*If attaching any of Restek's passive sampling kits to a 3L canister, use a Siltek treated (cat.# 563646) or stainless steel (cat.# 563647) connector between the two components.



To Order:

www.restek.com

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www.chromtech.net.au E-mail : info@chromtech.net.au Tel : +61 3 9762 2034 Fax : +61 3 9761 1169

Recommended Column

Rxi®-1ms Columns (fused silica)

(Crossbond® 100% dimethyl polysiloxane)

ID	df (µm)	temp. limits	length	cat. #
0.32mm	1.00	-60 to 330/350°C	60-Meter	13357

Analytical Reference Materials

TO-15 64 Component Mix (64 components)

acetone	trichlorofluoromethane (Freon 11)
acrolein	dichlorodifluoromethane (Freon 12)
benzene	1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)
benzyl chloride*	1,2-dichlorotetrafluoroethane (Freon 114)
bromodichloromethane	heptane
bromoform	hexachloro-1,3-butadiene
bromomethane	hexane
1,3-butadiene	2-hexanone (MBK)
2-butanone (MEK)	4-methyl-2-pentanone (MIBK)
carbon disulfide*	methylene chloride
carbon tetrachloride	methyl <i>tert</i> -butyl ether (MTBE)
chlorobenzene	methyl methacrylate
chloroethane	2-propanol
chloroform	propylene
chloromethane	styrene
cyclohexane	1,1,2,2-tetrachloroethane
dibromochloromethane	tetrachloroethene
1,2-dichlorobenzene	tetrahydrofuran
1,3-dichlorobenzene	toluene
1,4-dichlorobenzene	1,2,4-trichlorobenzene
1,1-dichloroethane	1,1,1-trichloroethane
1,2-dichloroethane	1,1,2-trichloroethane
1,1-dichloroethene	trichloroethene
<i>cis</i> -1,2-dichloroethene	1,2,4-trimethylbenzene
<i>trans</i> -1,2-dichloroethene	1,3,5-trimethylbenzene
1,2-dichloropropane	vinyl acetate
<i>cis</i> -1,3-dichloropropene	vinyl chloride
<i>trans</i> -1,3-dichloropropene	<i>m</i> -xylene
1,4-dioxane	<i>o</i> -xylene
ethanol*	<i>p</i> -xylene
ethyl acetate	
ethyl benzene	
ethylene dibromide (1,2-dibromoethane)	
4-ethyltoluene	

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34436 (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34437 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34436-PI (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34437-PI (ea.)

*Stability of this compound cannot be guaranteed.

No data pack available.

Quantity discounts not available.

TO-14A Internal Standard/Tuning Mix

bromochloromethane	chlorobenzene-d5
1-bromo-4-fluorobenzene (4-bromofluorobenzene)	1,4-difluorobenzene

1ppm in nitrogen, 104 liters @ 1,800psi
cat. # 34408 (ea.)

100ppb in nitrogen, 104 liters @ 1,800psi
cat. # 34425 (ea.)

1ppm in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34408-PI (ea.)

100ppb in nitrogen, 110 liters @ 1,800psi (Pi-marked Cylinder)
cat. # 34425-PI (ea.)

No data pack available.

Quantity discounts not available.

Another Sampling Valve Option

TO-Can® Canisters with Swagelok® SS4H Bellows-Sealed Valve

- All metal flow path prevents sample adsorption, giving more accurate results.
- Withstands temperatures of up to 300°C.
- Rugged performance in the field.



qty.	1L Volume	3L Volume*	6L Volume	15L Volume
	cat.	cat.	cat.	cat.
ea.	22105	22106	22107	22108

*If attaching any of Restek's passive sampling kits to a 3L canister, use a Siltek treated (cat.# 563646) or stainless steel (cat.# 563647) connector between the two components.

Passive Air Sampling Kits

Our passive kits include all hardware required for field sampling (except the canister) and assemble easily. Our kit was designed to reduce the number of potential leak sites and is available in seven flow ranges, and in stainless steel or with Siltek® surface treatment.

Individual parts are also available.

1. Veriflo® SC423XL flow controller

This flow controller is the heart of the sampling train. It is a high-quality device designed to maintain a constant mass flow as the pressure changes from -30" Hg to 7" Hg (we recommend you stop sampling at or before 7" Hg of vacuum). All wetted parts of the flow controller can be Siltek® treated.

2. Stainless steel vacuum gauge

Fitted to the flow controller, the gauge monitors canister vacuum change during sampling.

3. 1/4-inch Siltek® sample inlet

The 0.3m x 1/4-inch tubing includes a stainless steel nut on the inlet end, to prevent water droplets from accumulating at the edge of the tubing, where they could be pulled into the sampling train.

4. 2-micron frit filter and washer

Located prior to the critical orifice to prevent airborne particles from clogging the critical orifice. Replaceable. Available in stainless steel, or Siltek® treated for optimum inertness.

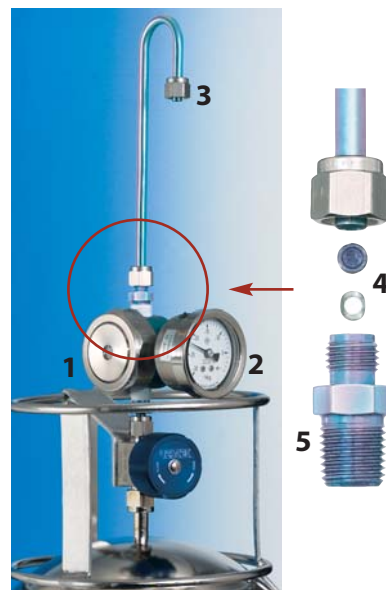
5. Interchangeable critical orifice

An interchangeable ruby critical orifice allows you to control the flow with very high precision. To select the correct critical orifice for your sample, see table below. Available in stainless steel, or Siltek® treated for optimum inertness.

	Flow (sccm)	Orifice size	Siltek Treated Sampling Kits	Stainless Steel Sampling Kits
125 hour	0.5-2	0.0008"	24217	24216
24 hour	2-4	0.0012"	24160	24165
12 hour	4-8	0.0016"	24161	24166
8 hour	8-15	0.0020"	24162	24167
3 hour	15-30	0.0030"	24163	24168
1.5 hour	30-80	0.0060"	24164	24169
0.5 hour	80-340	0.0090"	22101	22100

*Air sampling canisters sold separately. Available in 400cc, 1L, 3L, 6L, and 15L volumes.

Note: If attaching any of Restek's passive sampling kits to a 3L canister, use a Siltek treated (cat.# 563646) or stainless steel (cat.# 563647) connector between the two components.



Sample Preparation



All cartridges are manufactured using high density polypropylene and have polyethylene frits unless otherwise noted.

Resprep™ SPE Cartridges: Normal Phase

Hydrophilic (polar) adsorbents used to extract hydrophilic analytes from nonpolar matrices, such as organic solvents (e.g., polar contaminants from sample extracts).

	3mL/500mg (50-pk.)	6mL/500mg (30-pk.)	6mL/1000mg (30-pk.)	6mL/1000mg (100-pk.)	15mL/2g (100-pk.)
Florisil (EPA SW 846 methods and CLP protocols)	24031 24032*	— 26086**	24034 26085**	26205 —	26228 —
Silica (EPA SW 846 methods)	24035 24036*	— —	24038 —	— —	— —

*Teflon frits

**Glass tubes with Teflon frits

Method Specific SPE Cartridges

These cartridges have been specifically designed to provide consistent and reproducible results for the method or application stated.

Description	Applications	Tube Volume, Bed Weight	qty.	cat.#
Massachusetts EPH	Extraction of hexane-extractable petroleum hydrocarbons from soil and waste samples. Specially treated to reduce contaminants and increase capacity. Silica packing.	20mL, 5g	20-pk.	26065
EPA Method 521	For use in EPA Method 521: Nitrosamines in Drinking Water. This method calls for large volume injection and CI/MS/MS. Activated charcoal packing for NDMA.	6mL, 2g	30-pk.	26032
EPA Method 548.1	Extraction of endothal from aqueous samples. Weak anion exchange resin (BioRex 5) packing.	6mL	30-pk.	26063
Ultra Quat SPE	For use in HPLC analysis of paraquat/diquat, as an alternative to EPA 549.2. For an HPLC column developed specifically for this application, see our Ultra HPLC columns at www.restek.com .	6mL, 500mg	30-pk.	25499
EPA Method 552.1	Extraction of haloacetic acids from aqueous samples. Strong anion exchange resin (Ag 1x8) packing.	1mL	100-pk.	26064
EPA Method 8321 (AH SPE)	For use in HPLC analysis of phenoxy acid herbicides.	6mL, 500mg	30-pk.	26029
Organo Tin	High-capacity clean-up of butyl and phenyl tin compounds from soil, water, and biota. Mixed bed.	60mL	16-pk.	24049
RDX	Extraction of explosive compounds (similar to EPA Method 8095 and 8330 list) from water samples.	6mL, 500mg	30-pk.	26093

Syringe Filters with Luer Lock Inlet

- Variety of filter types, porosities, and diameters.
- Color coded for easy identification.
- Polypropylene housing.
- Reusable storage container.
- Quantity break pricing, for greater savings.



Cut costs, not corners!

Top quality filters at low prices!

Size	Porosity	Color	qty.	cat.#	1-4 packs	5-9 packs	10 or more packs
Cellulose Acetate							
13mm	0.22µm	green	100-pk.	26156			
13mm	0.45µm	blue	100-pk.	26155			
25mm	0.22µm	green	100-pk.	26158			
25mm	0.45µm	blue	100-pk.	26157			
Nylon							
13mm	0.22µm	yellow	100-pk.	26146			
13mm	0.45µm	pink	100-pk.	26147			
25mm	0.22µm	yellow	100-pk.	26148			
25mm	0.45µm	pink	100-pk.	26149			
PTFE (polytetrafluoroethylene)							
13mm	0.22µm	purple	100-pk.	26142			
13mm	0.45µm	orange	100-pk.	26143			
25mm	0.22µm	purple	100-pk.	26144			
25mm	0.45µm	orange	100-pk.	26145			
PVDF (polyvinylidene difluoride)							
13mm	0.22µm	brown	100-pk.	26150			
13mm	0.45µm	red	100-pk.	26151			
25mm	0.22µm	brown	100-pk.	26152			
25mm	0.45µm	red	100-pk.	26153			

Cellulose Acetate, Nylon, PVDF - hydrophilic applications
PTFE - hydrophobic applications, resistant to acids and bases, used mostly with non-aqueous samples

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Sample Preparation

Closed End SPE Cartridge: Activated Sodium Sulfate

- High quality anhydrous sodium sulfate.
- Prepackaged in a convenient capped cartridge with both male and female luer ends for easy connection to a variety of devices.
- The adsorbent is fully activated and ready to use for removal of excess water from small volumes of organic solvent solutions.
- Long storage life.

SPE Cartridge	Bed Weight	qty.	cat.#
Activated Sodium Sulfate	1000mg	50-pk.	26207



CarboPrep™ SPE Cartridges

- Improved recovery of sulfonylurea herbicides, phenols, carbamates, and triazine herbicides, compared to C18 and C8 cartridges.
- Rapid sampling flow rates; higher capacity than silica-based packings for a variety of compounds.
- Suitable for both sample extraction and extract cleanup.
- Controlled manufacturing ensures cleanliness and improves recoveries and reproducibility.

SPE Cartridge	Tube Volume, Bed Weight	qty.	cat.#
CarboPrep 90	3mL, 250mg	50-pk.	26091
CarboPrep 90	6mL, 500mg	30-pk.	26092
CarboPrep 200	3mL, 250mg	50-pk.	26088
CarboPrep 200	6mL, 500mg	30-pk.	26087



restek
innovation!

Extraction Cell Parts for ASE® 200 Systems, Manufacturer's Design

- Choose original equipment-equivalent stainless steel, or Siltek® deactivation for improved inertness.
- Inner surfaces polished, for easier cleaning.
- Caps include frit, washer, PTFE O-ring, and threaded insert.

Description	Similar to Dionex part #	Stainless Steel		Siltek® Treated	
		qty.	cat.#	qty.	cat.#
Extraction Cell Body for ASE 200, 1mL	054973	ea.	26110	ea.	26111
Extraction Cell Body for ASE 200, 5mL	054974	ea.	26112	ea.	26113
Extraction Cell Body for ASE 200, 11mL	048820	ea.	26114	ea.	26115
Extraction Cell Body for ASE 200, 22mL	048821	ea.	26098	ea.	26099
Extraction Cell Body for ASE 200, 33mL	048822	ea.	26116	ea.	26117
Replacement Extraction Cell End Caps for ASE 200	049450	2-pk.	26096	2-pk.	26097
Cap Inserts for ASE 200		2-pk.	26166		
Replacement Frits for ASE 200	049453	10-pk.	26100	10-pk.	26101

Description	Similar to Dionex part #		
		qty.	cat.#
Snap Rings for Caps for ASE 200	049456	10-pk.	26184
Funnel for ASE 200	056958	ea.	26180
PTFE O-Rings for ASE 200 & ASE 300 Caps	049457	100-pk.	26187
Viton O-Rings for ASE 200 & ASE 300 Caps	056325	50-pk.	26188



did you know?

Restek offers tools that simplify routine chores. Please request flyer lit. cat.# 59921B or visit us online.



PEEK™ Washers for ASE® 200 Systems

Description	Similar to Dionex part #	qty.	cat.#
PEEK Washers for ASE 200	049454	12-pk.	25256
		48-pk.	25257
		250-pk.	26120
		1,000-pk.	26229

Buy in bulk and save! →



20mm Filters for ASE® 200 Extraction Cells

Description	Similar to Dionex part #	qty.	cat.#
Cellulose Filters for ASE 200	049458	100-pk.	26118
Cellulose Filters for ASE 200	049458	1,000-pk.	26190
Glass Fiber Filters for ASE 200	047017	100-pk.	26119



Environmental Essentials

Description	ID*/OD & Length (mm)	cat.# ea.	5-pk.
DI Liners for Agilent GCs (For 0.25/0.32/0.53mm ID Columns)			
Drilled Uniliner (hole near top)	4.0mm 6.3mm x 78.5mm	21054	21055
Sitek Drilled Uniliner (hole near top)	4.0mm 6.3mm x 78.5mm	21054-214.1	21055-214.5
Drilled Uniliner (hole near bottom)	4.0mm 6.3mm x 78.5mm	20756	20771
Double Gooseneck Drilled Uniliner (hole near top)	4.0mm 6.3mm x 78.5mm	20508	20509
Double Gooseneck Drilled Uniliner (hole near bottom)	4.0mm 6.3mm x 78.5mm	20954	20989
Sitek 1mm Drilled Uniliner (hole near top)	1.0mm 6.3mm x 78.5mm	21390-214.1	21391-214.5
DI Liners for Varian 1177 GCs (For 0.25/0.32/0.53mm ID Columns)			
Drilled Uniliner (hole near top)	4.0mm 6.3mm x 78.5mm	21470	21471
Drilled Uniliner (hole near bottom)	4.0mm 6.3mm x 78.5mm	21468	21469
DI Liners for Varian 1078/1079 GCs (For 0.25/0.32/0.53mm ID Columns)			
Drilled Uniliner (hole near top)	3.5mm 5.0mm x 54mm	24974	24975
Drilled Uniliner (hole near bottom)	3.5mm 5.0mm x 54mm	22280	22281
DI Liners for Shimadzu 17A, 2010, & 2014 GCs (For 0.32/0.53mm ID Columns)			
Open-top Drilled Uniliner (hole near top)	3.5mm 5.0mm x 95mm	21285	21286
Open-top Drilled Uniliner (hole near bottom)	3.5mm 5.0mm x 95mm	21287	21288
Gooseneck Drilled Uniliner (hole near top)	3.5mm 5.0mm x 95mm	21289	21290
Gooseneck Drilled Uniliner (hole near bottom)	3.5mm 5.0mm x 95mm	21291	21292
DI Liners for PerkinElmer GCs (For 0.32/0.53mm ID Columns)			
Auto SYS Drilled Uniliner (hole near top)	4.0mm 6.2mm x 92.1mm	20819	20822
Auto SYS Drilled Uniliner (hole near bottom)	4.0mm 6.2mm x 92.1mm	21293	21294
Auto SYS Gooseneck Drilled Uniliner (hole near top)	4.0mm 6.2mm x 92.1mm	21295	21296
Auto SYS Gooseneck Drilled Uniliner (hole near bottom)	4.0mm 6.2mm x 92.1mm	21297	21298
DI Liners for Thermo Scientific TRACE & Focus SSL GCs (For 0.32/0.53mm ID Columns)			
Drilled Uniliner (hole near top)	5.0mm 8.0mm x 105mm	22411	22412
Drilled Uniliner (hole near bottom)	5.0mm 8.0mm x 105mm	22413	22414

← *What's a Drilled Uniliner®? See page 4.*

O-Rings & Seals



	Max. temp.	qty.	cat.#
A) Viton O-Rings for Agilent GCs	250°C	25-pk.	20377
B) 6.35mm ID Graphite O-rings for split liners	450°C	10-pk.	20296
B) 6.5mm ID Graphite O-rings for splitless liners	450°C	10-pk.	20298
C) 5mm Graphite Liner Seals for Varian 1078/1079 GCs	450°C	10-pk.	22683
D) Viton O-Rings for Shimadzu 17A, 2010, and 2014 GCs	250°C	10-pk.	24899
E) Graphite O-Rings for Split Liners	450°C	5-pk.	20243
E) Graphite O-Rings for Splitless Liners	450°C	5-pk.	20244
F) Silicone O-Rings for PerkinElmer Auto SYS XL or Clarus with CAP Injector	250°C	10-pk.	20262
G) Viton O-Rings for PerkinElmer PSS Injector	250°C	10-pk.	20366
H) Inlet Liner Seals for Thermo Scientific TRACE PTV	450°C	2-pk.	21392
I) Graphite Sealing Ring for Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL	450°C	ea.	21898
J) Graphite Sealing Rings for Thermo Scientific TRACE, 8000, 8000 TOP & Focus SSL	450°C	2-pk.	21899

*Nominal ID at syringe needle expulsion point.

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Restek Septa

- Preconditioned and ready to use.
- Usable to 340°C inlet temperature.
- Precision molding assures consistent, accurate fit.
- Excellent puncturability.
- Preconditioned and ready to use.

Septum Diameter	25-pk.	50-pk.	100-pk.
Thermolite® Septa			
5mm (3/16")	27120	27121	27122
6mm (1/4")	27123	27124	27125
7mm	27126	27127	27128
8mm	27129	27130	27131
9mm	27132	27133	27134
9.5mm (3/8")	27135	27136	27137
10mm	27138	27139	27140
11mm (7/16")	27141	27142	27143
11.5mm	27144	27145	27146
12.5mm (1/2")	27147	27148	27149
17mm	27150	27151	27152
Shimadzu Plug	27153	27154	27155
IceBlue® Septa			
9mm		27156	27157
9.5mm (3/8")		27158	27159
10mm		27160	27161
11mm (7/16")		27162	27163
11.5mm		27164	27165
12.5mm (1/2")		27166	27167
17mm		27168	27169
Shimadzu Plug		27170	27171
BTO® Septa			
5mm CenterGuide		27100	27101
6mm (1/4")		27102	27103
9mm CenterGuide		27104	27105
9.5mm (3/8")		27106	27107
10mm		27108	27109
11mm (7/16") CenterGuide		27110	27111
11.5mm CenterGuide		27112	27113
12.5mm (1/2") CenterGuide		27114	27115
17mm CenterGuide		27116	27117
Shimadzu Plug		27118	27119

Dual Vespel® Ring Inlet Seals—Eliminate the need for a washer!

Washerless, leak-tight seals for Agilent GCs

0.8mm ID Dual Vespel Ring Inlet Seal	2-pk.	10-pk.
Gold-Plated	21240	21241
Siltek Treated	21242	21243
Stainless Steel	21238	21239
1.2mm ID Dual Vespel Ring Inlet Seal	2-pk.	10-pk.
Gold-Plated	21246	21247
Siltek Treated	21248	21249
Stainless Steel	21244	21245

Replacement Inlet Seals with Washers

Single-Column Installation		
(0.8mm Opening) Replacement Inlet Seal	2-pk.	10-pk.
Gold-Plated*	21317	21318
Siltek Treated	21319	21320
Stainless Steel*	21315	21316
0.25/0.32mm ID Dual-Column Installation		
(1.2mm Opening) Replacement Inlet Seal	2-pk.	10-pk.
Gold-Plated	21305	21306
Siltek Treated	21307	21308
Stainless Steel	20390	20391
0.53mm ID Dual-Column Installation		
(1/8-inch Opening) Replacement Inlet Seal	2-pk.	10-pk.
Stainless Steel	20392	20393



Thermolite® Septa

- Usable to 340°C inlet temperature.
- Excellent puncturability.



IceBlue® Septa

- Usable to 250°C inlet temperature.
- General-purpose septa.
- Excellent puncturability.
- Ideal for SPME.



BTO® Septa

- Usable to 400°C inlet temperature.
- CenterGuide™ design—requires less force for initial penetration
- Each batch GC-FID tested.
- Bleed and temperature optimized; ideal for demanding GC and GC/MS applications.

HANDY septum size chart

Instrument	Septum Diameter (mm)
Agilent (HP)	
5880A, 5890, 6890, 7890	
6850, PTV	11
5700, 5880	9.5/10
On-Column Injection	5
Thermo Scientific	
TRACE GC	17
GCQ w/TRACE, PTV	17
8000 series	17
Finnigan (TMQ)	
GC 9001	9.5
GCQ	9.5
QCQ	9.5
TRACE 2000	9.5
PerkinElmer	
Sigma series	11
900,990	11
8000 series	11
Auto SYS	11
Auto SYS XL	11
Shimadzu	
All models	Plug
SRI	
All models	Plug
Tracor	
540	11.5
550,560	9.5
220,222	12.5
Varian	
Injector type:	
Packed column	9.5/10
1078/1079	10/11
1177	9
1075/1077	11

RESTEK ELECTRONIC LEAK DETECTOR

Protect your data and analytical column!

For more information, visit www.restek.com/leakdetector



*0.8mm ID stainless steel inlet seal is similar to Agilent part #18740-20880, 0.8mm ID gold-plated inlet seal is similar to Agilent part #18740-20885.





Lit. Cat.# EVFL1125-INT

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