Restek GC

Fox Scientific, Inc.

See Semivolatiles Clearly with Rugged, Reliable

Rxi-SVOCms Columns

- Increase productivity with chromatography you can count on:
  - Outstanding inertness keeps calibrations passing and samples running.
  - Excellent resolution of critical pairs for improved accuracy.
  - Consistent column-to-column performance.
- Long column lifetime—restore performance with a quick trim instead of a time-consuming replacement.

Rxi GCColumns

RESTEK Pure Chromatography www.restek.com

See Semivolatiles Clearly with Rugged, Reliable Rxi-SVOCms Columns

- Outstanding inertness keeps calibrations passing and samples running.
- Excellent resolution of critical pairs for improved accuracy.
- Consistent column-to-column performance.
- Long column lifetime.

Designed specifically for semivolatiles analysis, Restek's new Rxi-SVOCms columns ensure consistent performance that will keep calibrations passing longer, so you can run more samples before needing to recalibrate the instrument or replace the column. Our new polymer and deactivation chemistries produce highly inert columns with tightly controlled selectivity resulting in exceptional performance for a wide range of analytes (acidic, basic, and neutral).

Rxi-SVOCms columns are tuned specifically to improve peak shape for challenging SVOCs, such as pentachlorophenol, pyridine, and benzidine, as well as to ensure optimized resolution of difficult polycyclic aromatic hydrocarbons (PAH). As shown in Figure 1, the most problematic reactive analytes show highly symmetrical peak shapes and good responses. In addition, excellent resolution (≥85% valley) is obtained for benzo[b]fluoranthene and benzo[k]fluoranthene, which are isobaric PAHs that must be separated chromatographically, as well as for indeno[1,2,3-cd]pyrene and dibenz[a,h]anthracene.

For chemists in the environmental industry who are slowed down by variable column performance, frequent calibration failures, and poor column lifetimes, switching to rugged Rxi-SVOCms columns can ensure data requirements are met longer and downtime is minimized.

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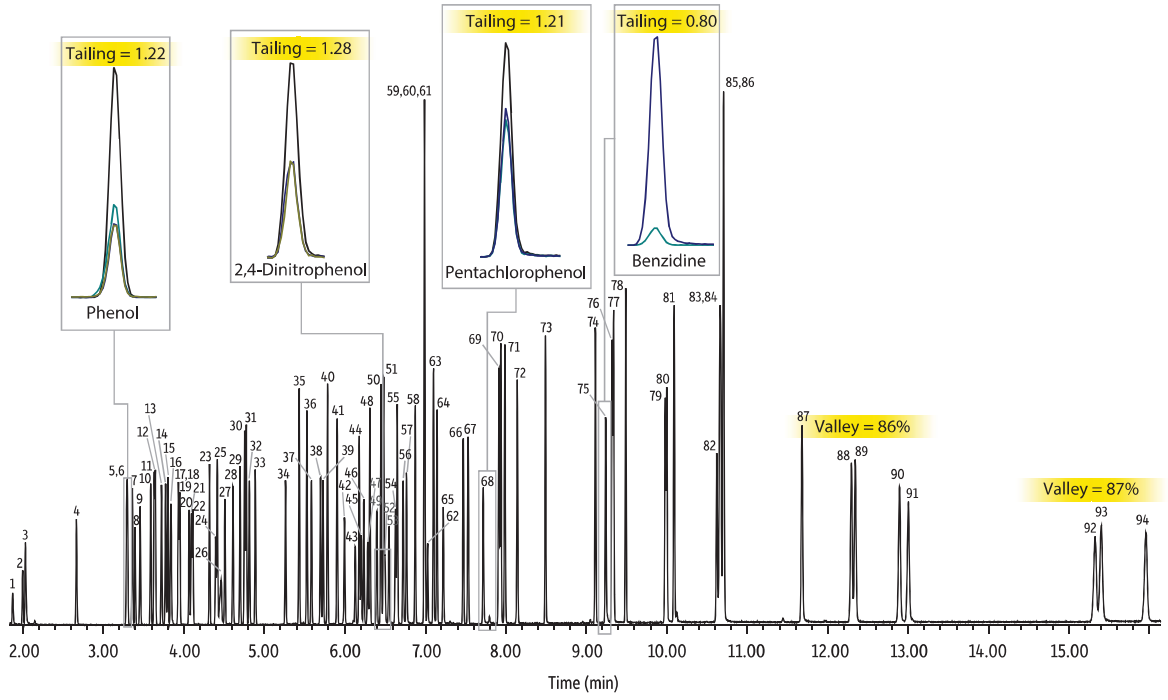
Figure 1: Rxi-SVOCms columns provide outstanding chromatographic performance, reliably producing good peak shape and resolution even for problematic compounds. Split injection is recommended, when possible, because it minimizes the effect of inlet contamination on transfer of sample to the analytical column.



GC_EV1604

Peaks	t_R (min)
1. (IS) 1,4-Dioxane-d8	1.87
2. N-Nitrosodimethylamine	2.00
3. Pyridine	2.03
4. (SS) 2-Fluorophenol	2.67
5. (SS) Phenol-d6	3.29
6. Phenol	3.30
7. Aniline	3.36
8. Bis(2-chloroethyl) ether	3.40
9. 2-Chlorophenol	3.46
10. 1,3-Dichlorobenzene	3.59
11. (IS) 1,4-Dichlorobenzene-D4	3.63
12. 1,4-Dichlorobenzene	3.65
13. Benzyl alcohol	3.72
14. 1,2-Dichlorobenzene	3.78
15. 2-Methylphenol	3.80
16. Bis(2-Chloroisopropyl)ether	3.84
17. 4-Methylphenol	3.93
18. 3-Methylphenol	3.93
19. N-Nitrosodi-N-propylamine	3.95
20. Hexachloroethane	4.07
21. (SS) Nitrobenzene-D5	4.10
22. Nitrobenzene	4.11
23. Isophorone	4.32
24. 2-Nitrophenol	4.40

Peaks	t_R (min)
25. 2,4-Dimethylphenol	4.42
26. Benzoic acid	4.46
27. Bis(2-chloroethoxy)methane	4.51
28. 2,4-Dichlorophenol	4.61
29. 1,2,4-Trichlorobenzene	4.70
30. (IS) Naphthalene-D8	4.76
31. Naphthalene	4.78
32. 4-Chloroaniline	4.82
33. Hexachlorobutadiene	4.89
34. 4-Chloro-3-methylphenol	5.26
35. 2-Methylnaphthalene	5.43
36. 1-Methylnaphthalene	5.53
37. Hexachlorocyclopentadiene	5.59
38. 2,4,6-Trichlorophenol	5.70
39. 2,4,5-Trichlorophenol	5.73
40. (SS) 2-Fluorobiphenyl	5.79
41. 2-Chloronaphthalene	5.91
42. 2-Nitroaniline	6.00
43. 1,4-Dinitrobenzene	6.13
44. Dimethyl phthalate	6.18
45. 1,3-Dinitrobenzene	6.20
46. 2,6-Dinitrotoluene	6.24
47. 1,2-Dinitrobenzene	6.29
48. Acenaphthylene	6.31

Peaks	t_R (min)
49. 3-Nitroaniline	6.40
50. (IS) Acenaphthene-D10	6.45
51. Acenaphthene	6.48
52. 2,4-Dinitrophenol	6.50
53. 4-Nitrophenol	6.55
54. 2,4-Dinitrotoluene	6.63
55. Dibenzofuran	6.65
56. 2,3,5,6-Tetrachlorophenol	6.73
57. 2,3,4,6-Tetrachlorophenol	6.77
58. Diethyl phthalate	6.88
59. 4-Chlorophenyl phenyl ether	6.99
60. Fluorene	6.99
61. 4-Nitroaniline	7.00
62. 4,6-Dinitro-2-methylphenol	7.03
63. N-Nitrosodiphenylamine	7.10
64. N,N-Diphenylhydrazine	7.15
65. (SS) 2,4,6-Tribromophenol	7.23
66. 4-Bromophenyl phenyl ether	7.47
67. Hexachlorobenzene	7.53
68. Pentachlorophenol	7.72
69. (IS) Phenanthrene-D10	7.92
70. Phenanthrene	7.94
71. Anthracene	7.99
72. Carbazole	8.15

Peaks	t_R (min)
73. di-*n*-Butyl phthalate	8.49
74. Fluoranthene	9.12
75. Benzidine	9.24
76. (SS) Pyrene-D10	9.32
77. Pyrene	9.34
78. (SS) *p*-Terphenyl-d14	9.49
79. 3,3'-Dimethylbenzidine	9.98
80. Butyl benzyl phthalate	10.00
81. Bis(2-ethylhexyl) adipate	10.09
82. 3,3'-Dichlorobenzidine	10.62
83. Benz[a]anthracene	10.66
84. (IS) Chrysene-D12	10.67
85. Chrysene	10.71
86. Bis(2-ethylhexyl) phthalate	10.71
87. Di-*n*-octyl phthalate	11.68
88. Benzo[b]fluoranthene	12.30
89. Benzo[k]fluoranthene	12.34
90. Benzo[a]pyrene	12.89
91. (IS) Perylene-D12	13.00
92. Indeno[1,2,3-cd]pyrene	15.32
93. Dibenz[a,h]anthracene	15.40
94. Benzo[ghi]perylene	15.95

All compounds are 2 ng on column.

Column	Rxi-SVOCms, 30 m, 0.25 mm ID, 0.25 µm (cat.# 16623)
Standard/Sample	8270 MegaMix standard (cat.# 31850) 8270 Benzidines mix (cat.# 31852) Benzoic acid (cat.# 31879) Revised SV internal standard mix (cat.# 31886) Revised B/N surrogate mix (cat.# 31888) Acid surrogate mix (cat.# 31063)
Diluent:	Dichloromethane
Conc.:	20 µg/mL
Injection	
Inj. Vol.:	1 µL split (split ratio 10:1)
Liner:	Topaz 4.0 mm ID single taper inlet liner with wool (cat.# 23303)
Inj. Temp.:	250 °C
Split Vent Flow Rate:	12 mL/min
Oven	
Oven Temp.:	60 °C (hold 0.5 min) to 285 °C at 25 °C/min to 305 °C at 3 °C/min to 330 °C at 20 °C/min (hold 5 min)
Carrier Gas	He, constant flow
Flow Rate:	1.2 mL/min
Detector	MS
Mode:	Scan

Scan Program:

Group	Start Time (min)	Scan Range (amu)	Scan Rate (scans/sec)
1	1.55	35-500	5.9

Transfer Line Temp.:	280 °C
Analyzer Type:	Quadrupole
Source Type:	Inert
Drawout Plate:	6 mm ID
Source Temp.:	330 °C
Quad Temp.:	180 °C
Electron Energy:	70 eV
Tune Type:	DFTPP
Ionization Mode:	EI
Instrument	Agilent 7890A GC & 5975C MSD
Sample Preparation	Samples were aliquoted into amber 2 mL, 9 mm short-cap, screw-thread vials (cat.# 21143) containing glass Big Mouth inserts (cat.# 21782) and sealed with 2.0 mL, 9 mm short-cap, screw-vial closures (cat.# 23842).

Stable Calibrations Increase Sample Throughput

Failed calibrations mean lost productivity as sample analysis must be put on hold for time-consuming maintenance and recalibration. The improved inertness of Rxi-SVOCms columns overcomes this, resulting in an average response factor %RSD from the initial calibration of six columns of just 6% over all compounds and columns (Table I). Extremely low and consistent response factor %RSDs ensure that calibrations will last longer, allowing more samples to be run before recalibration is required. As shown in Figure 2, consistent peak shapes and retention times are seen even across different concentrations of pyridine and pentachlorophenol, which are problematic compounds that tend to tail and often fail calibration criteria on columns that are not highly inert.

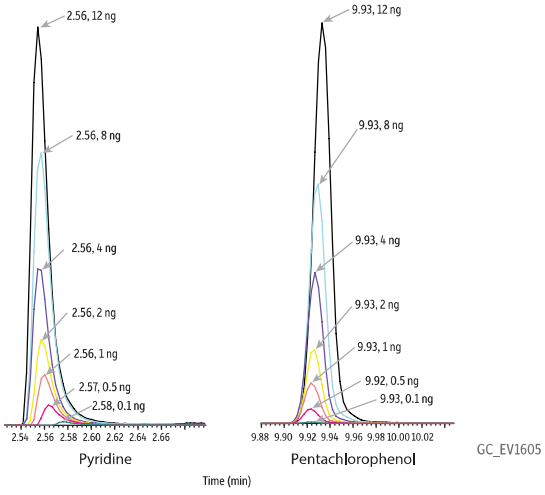
Table I: Stable performance means fewer recalibrations and more time available for running samples, which improves lab productivity. Green indicates passing initial calibrations (n = 6 columns).

Compound	Calibration Range (µg/mL)	Average %RSD of Response Factors
N-Nitrosodimethylamine	1 - 120	4.70%
Pyridine	1 - 120	6.10%
(SS) 2-Fluorophenol	1 - 120	1.70%
(SS) Phenol-d6	1 - 120	2.10%
Phenol	1 - 120	3.20%
Aniline	1 - 120	3.10%
Bis(2-chloroethyl)ether	1 - 120	2.40%
2-chlorophenol	1 - 120	2.80%
1,3-dichlorobenzene	1 - 120	2.60%
1,4-Dichlorobenzene	1 - 120	2.10%
Benzyl alcohol	1 - 120	3.30%
1,2-Dichlorobenzene	1 - 120	2.70%
2-Methylphenol	1 - 120	3.30%
Bis(2-chloroisopropyl)ether	1 - 120	2.40%
4-Methylphenol/3-methylphenol	1 - 120	3.30%
N-nitroso-di-*n*-propylamine	1 - 120	3.80%
Hexachloroethane	1 - 120	3.00%
(SS) Nitrobenzene-D5	1 - 120	1.60%
Nitrobenzene	1 - 120	2.60%
Isophorone	1 - 120	3.40%
2-Nitrophenol	1 - 120	7.00%
2,4-Dimethylphenol	1 - 120	3.70%
Benzoic acid	2.5 - 120	25.00%
Bis(2-chloroethoxy)methane	1 - 120	3.60%
2,4-Dichlorophenol	1 - 120	4.10%
1,2,4-Trichlorobenzene	1 - 120	2.80%
Naphthalene	1 - 120	3.20%
4-Chloroaniline	1 - 120	3.90%
Hexachlorobutadiene	1 - 120	3.70%
4-Chloro-3-methylphenol	1 - 120	4.40%
2-Methylnaphthalene	1 - 120	3.40%
1-Methylnaphthalene	1 - 120	3.60%
Hexachlorocyclopentadiene	1 - 120	6.90%
2,4,6-Trichlorophenol	1 - 120	5.90%
2,4,5-Trichlorophenol	1 - 120	6.20%
(SS) 2-Fluorobiphenyl	1 - 120	1.10%
2-Chloronaphthalene	1 - 120	2.80%
2-Nitroaniline	1 - 120	7.80%
1,4-Dinitrobenzene	1 - 120	11.10%
Dimethyl phthalate	1 - 120	3.40%
1,3-Dinitrobenzene	1 - 120	10.80%

Compound	Calibration Range (µg/mL)	Average %RSD of Response Factors
2,6-Dinitrotoluene	1 - 120	7.80%
Acenaphthylene	1 - 120	4.10%
1,2-Dinitrobenzene	1 - 120	8.10%
3-Nitroaniline	1 - 120	5.80%
Acenaphthene	1 - 120	3.30%
2,4-Dinitrophenol	2.5 - 120	17.30%
4-Nitrophenol	1 - 120	7.90%
Dibenzofuran	1 - 120	3.50%
2,4-Dinitrotoluene	1 - 120	11.60%
2,3,5,6-Tetrachlorophenol	1 - 120	10.40%
2,3,4,6-Tetrachlorophenol	1 - 120	7.30%
Diethyl phthalate	1 - 120	4.50%
4-Chlorophenyl phenyl ether	1 - 120	3.60%
Fluorene	1 - 120	4.40%
4-Nitroaniline	1 - 120	9.10%
4,6-Dinitro-2-methylphenol	2.5 -120	15.10%
N-nitrosodiphenylamine	1 - 120	4.60%
Diphenylhydrazine	1 - 120	4.60%
(SS) 2,4,6-Tribromophenol	1 - 120	5.50%
4-Bromophenyl phenyl ether	1 - 120	5.50%
Hexachlorobenzene	1 - 120	4.30%
Pentachlorophenol	1 - 120	10.60%
Phenanthrene	1 - 120	3.70%

Compound	Calibration Range (µg/mL)	Average %RSD of Response Factors
Anthracene	1 - 120	4.80%
Carbazole	1 - 120	5.30%
di-*n*-Butyl phthalate	1 - 120	7.90%
Fluoranthene	1 - 120	5.10%
Benzidine	1 - 120	9.30%
(SS) Pyrene-D10	1 - 120	1.50%
Pyrene	1 - 120	4.30%
(SS) *p*-Terphenyl-d14	1 - 120	1.80%
3,3'-Dimethylbenzidine	1 - 120	9.50%
Butyl benzyl phthalate	1 - 120	8.60%
Bis(2-ethylhexyl)adipate	1 - 120	10.50%
3,3'-Dichlorobenzidine	1 - 120	8.50%
Benz[a]anthracene	1 - 120	3.20%
Chrysene	1 - 120	3.70%
Bis(2-ethylhexyl)phthalate	1 - 120	10.40%
Di-*n*-octyl phthalate	1 - 120	13.20%
Benzo[b]fluoranthene	1 - 120	5.60%
Benzo[k]fluoranthene	1 - 120	4.90%
Benzo[a]pyrene	1 - 120	6.30%
Indeno[123-cd]pyrene	1 - 120	7.20%
Dibenz[a,h]anthracene	1 - 120	7.50%
Benzo[ghi]perylene	1 - 120	6.40%
	Average %RSD:	**6.00%**

Figure 2: Highly inert Rxi-SVOCms columns produce excellent peak shapes and consistent retention times, even for low levels of failure-prone reactive compounds, such as pyridine (basic amine) and pentachlorophenol (acidic phenol).



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Restore Performance Easily with Rugged, Long Life Rxi-SVOCms Columns

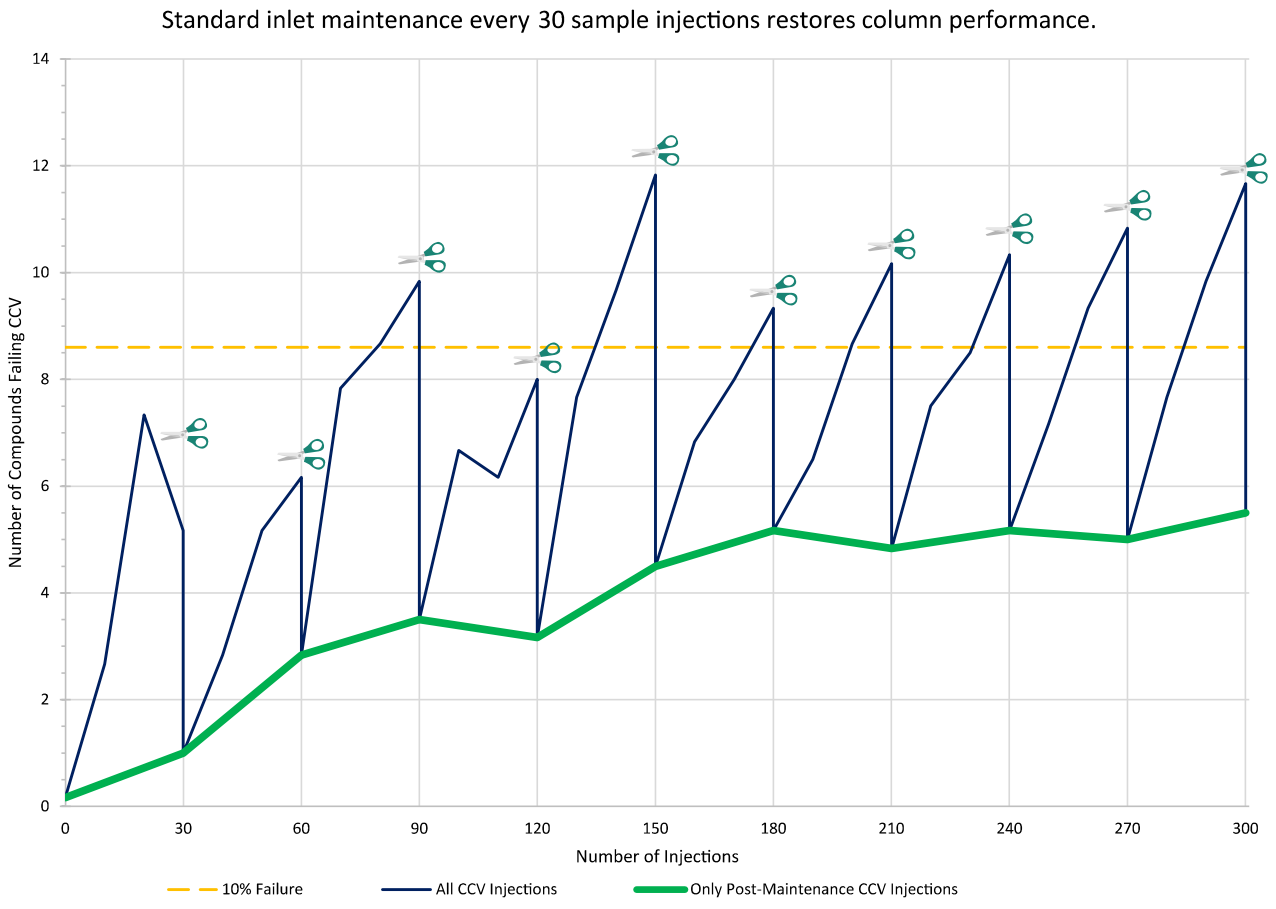
Accumulation of components from highly complex environmental samples is a routine challenge, but it doesn't have to be a column killer. Improved column chemistry ensures that Rxi-SVOCms column performance is durable even under very aggressive conditions. In Figure 3, we subjected columns to repeated injections of a dirty sample, monitored calibration performance and cut off contaminated sections after every 30 sample injections. Even after 300 injections, performance was easily restored with a quick column trim as evidenced by fewer than 10% of compounds failing the post-trim calibration check. Bringing back performance with simple routine maintenance means more samples can be analyzed with less downtime and fewer column replacements.

Figure 3: Column performance is completely restored by trimming following repeated exposure to a highly complex sample. Rugged Rxi-SVOCms columns come back to life, so you can keep running samples instead of changing columns and recalibrating.

300-Sample Ruggedness Test Experimental Design

Each day, 30 injections of a diesel particulate extract (NIST SRM 1975) were made, and a continuing calibration verification (CCV) standard was run after every 10 sample injections. After the third daily CCV, the column was trimmed, and the liner, septum, and inlet seal were replaced. This sequence was repeated for 10 days, and the entire experiment was repeated on a second column.

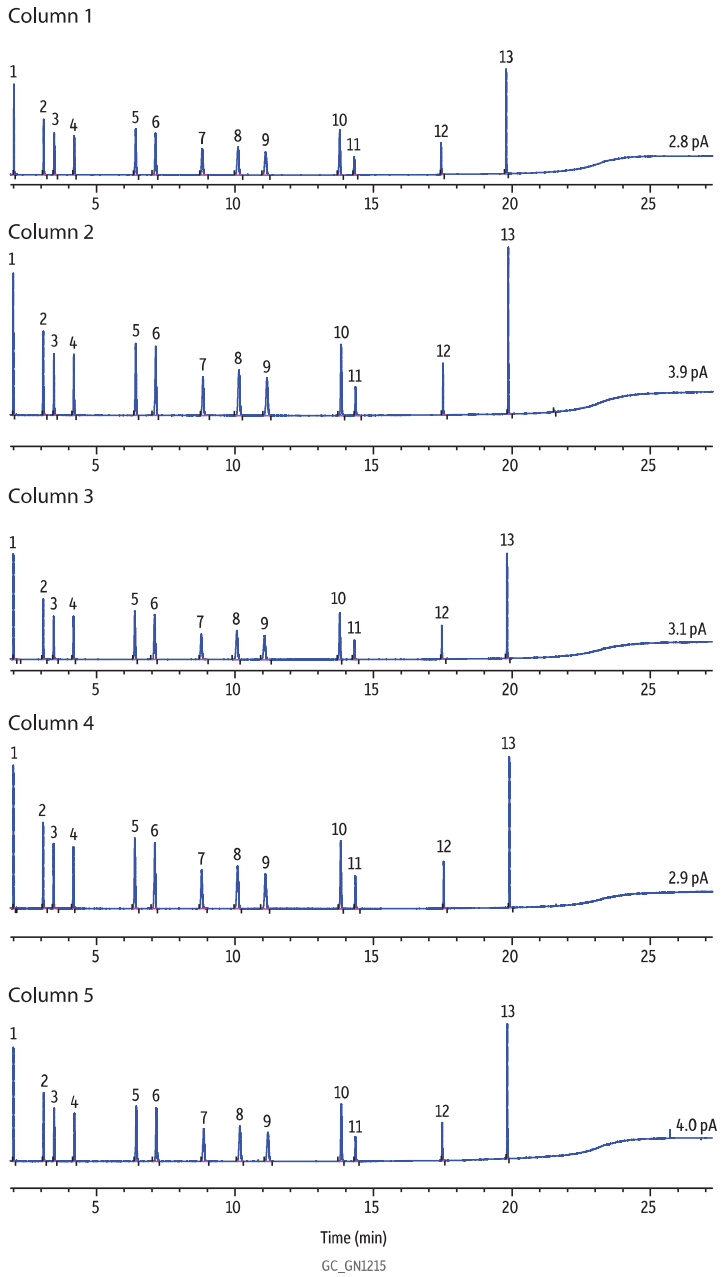
- The **blue line** includes all CCV injections and demonstrates that performance was first lost, as expected due to contamination from the sample matrix, and then fully restored following maintenance.
- The **green line** plots only post-maintenance CCV injections and demonstrates calibration performance stability.



Consistent Performance Is Built into Every Column

From our proprietary polymer chemistry to the final QC test, every aspect of manufacturing Rxi-SVOCms columns is tightly controlled and stringently tested. The result is extremely consistent column-to-column performance, so you get the same chromatography from every column you install. Stable retention times, even for 2,4-dinitrophenol, which is an active and often problematic compound, and extremely low-bleed profiles characterize Rxi-SVOCms columns (Figure 4).

Figure 4: Every Rxi-SVOCms column provides consistent retention times and a low-bleed profile, resulting in dependable chromatographic performance from every column you receive.



Peaks
1. 4-Picoline
2. 2-Ethylhexanoic acid
3. 1,6-Hexanediol
4. 4-Chlorophenol
5. *n*-Tridecane
6. 1-Methylnaphthalene
7. 1-Undecanol
8. *n*-Tetradecane
9. Dicyclohexylamine
10. Acenaphthene-d10
11. 2,4-Dinitrophenol
12. Pentachlorophenol
13. Benzidine

200:1 split results in approximately 1 ng on column.

Column	Rxi-SVOCms, 30 m, 0.25 mm ID, 0.25 µm (cat.# 16623)
Standard/Sample	Low-level activity test mix
Diluent:	Dichloromethane
Conc.:	200 µg/mL
Injection	
Inj. Vol.:	1 µL split (split ratio 200:1)
Liner:	Topaz 4.0 mm ID Precision inlet liner with wool (cat.# 23305)
Inj. Temp.:	250 °C
Split Vent Flow Rate:	236 mL/min
Oven	
Oven Temp.:	125 °C (hold 12.5 min) to 340 °C at 20 °C/min (hold 4 min)
Carrier Gas	He, constant flow
Linear Velocity:	32 cm/sec @ 125 °C
Dead Time:	1.5885 min @ 125 °C
Detector	FID @ 350 °C
Make-up Gas Flow Rate:	40 mL/min
Make-up Gas Type:	N_2
Hydrogen flow:	40 mL/min
Air flow:	400 mL/min
Data Rate:	50 Hz
Instrument	Agilent 7890B GC
Sample Preparation	Samples were aliquoted into amber 2 mL, 9 mm short-cap, screw-thread vials (cat.# 21143) containing glass Big Mouth inserts (cat.# 21782) and sealed with 2.0 mL, 9 mm short-cap, screw-vial closures (cat.# 23842).

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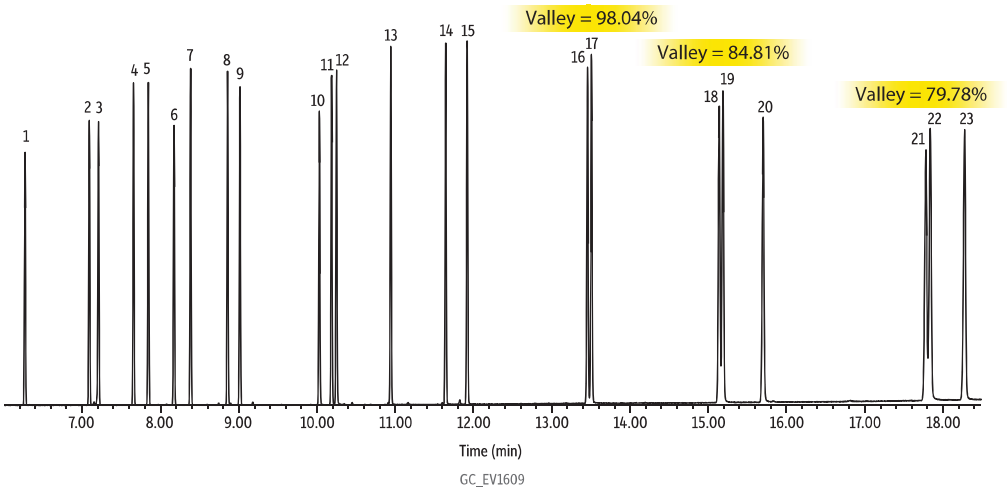
Reliably Resolve Challenging Environmental PAH Compounds

Polycyclic aromatic hydrocarbons (PAH) are some of the most difficult compounds to separate in semivolatiles methods. Reporting accurate results at trace-levels requires a highly selective and efficient column that can reliably separate closely eluting compounds. Figure 5 demonstrates that the Rxi-SVOCms column provides optimized resolution of 23 priority pollutants, including benzo[b]fluoranthene and benzo[k]fluoranthene, which must be separated chromatographically in order to be reported individually.

Figure 5: Rxi-SVOCms columns provide optimized separation of closely eluting priority PAH pollutants, including critical isobars that cannot be distinguished by MS alone.



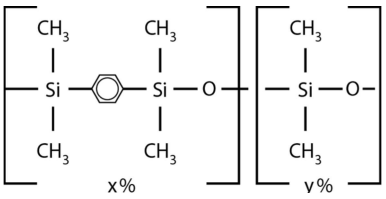
Peaks	t_R (min)
1. Naphthalene	6.27
2. 2-Methylnaphthalene	7.09
3. 1-Methylnaphthalene	7.20
4. Biphenyl	7.65
5. 2,6-Dimethylnaphthalene	7.84
6. Acenaphthylene	8.17
7. Acenaphthene	8.38
8. 2,3,5-Trimethylnaphthalene	8.85
9. Fluorene	9.01
10. Dibenzothiophene	10.02
11. Phenanthrene	10.18
12. Anthracene	10.24
13. 1-Methylphenanthrene	10.94
14. Fluoranthene	11.64
15. Pyrene	11.91
16. Benz[a]anthracene	13.45
17. Chrysene	13.50
18. Benzo[b]fluoranthene	15.13
19. Benzo[k]fluoranthene	15.18
20. Benzo[a]pyrene	15.69
21. Indeno[1,2,3-cd]pyrene	17.77
22. Dibenz[a,h]anthracene	17.82
23. Benzo[ghi]perylene	18.26

The internal standard and surrogate standard mass on column is 20 pg.

Column	Rxi-SVOCms, 30 m, 0.25 mm ID, 0.25 µm (cat.# 16623)
Standard/Sample	Custom PAH SIM standard
Diluent:	Dichloromethane
Conc.:	40 µg/mL
Injection	
Inj. Vol.:	1 µL split (split ratio 20:1)
Liner:	Topaz 4.0 mm ID single taper inlet liner with wool (cat.# 23303)
Inj. Temp.:	250 °C
Split Vent Flow Rate:	24 mL/min
Oven	
Oven Temp.:	40 °C (hold 0.5 min) to 280 °C at 20 °C/min to 330 °C at 6 °C/min (hold 4 min)
Carrier Gas	He, constant flow
Flow Rate:	1.2 mL/min
Detector	MS
Mode:	SIM
SIM Program:	

Group	Start Time (min)	Ion(s) (m/z)	Dwell (ms)
1	5.00	127.05, 128.05, 129.00	25
2	6.75	115.10, 139.00, 141.00, 142.05	25
3	7.47	141.00, 152.00, 153.05, 154.05, 155.05, 156.10, 162.10, 164.10	15
4	8.03	150.00, 151.05, 152.05, 153.05, 154.10, 162.10, 164.10	15
5	8.66	153.05, 155.10, 163.05, 164.10, 165.05, 166.05, 169.10, 170.10	15
6	9.62	139.00, 151.95, 176.10, 177.10, 178.10, 179.10, 183.95, 185.00, 188.10, 189.10	15
7	10.71	189.05, 190.05, 191.10, 192.10	25
8	11.37	200.10, 201.10, 202.10, 203.05	20
9	11.81	200.10, 201.05, 202.05, 203.05	20
10	12.84	114.00, 120.00, 226.10, 227.10, 228.10, 229.10, 240.10	15
11	14.48	126.00, 132.00, 250.10, 252.10, 253.10, 264.00	15
12	15.51	126.00, 132.00, 250.05, 252.05, 253.05, 264.00	20
13	16.95	134.50, 137.95, 139.00, 274.05, 276.10, 277.10, 278.10, 279.10	20
14	18.10	138.00, 139.00, 274.05, 276.10, 277.10, 278.1	25
15	18.80	150.00, 151.00, 156.00, 600.00, 302.00, 312.00	25

Transfer Line Temp.:	280 °C
Analyzer Type:	Quadrupole
Source Type:	Extractor
Extractor Lens:	6 mm ID
Source Temp.:	330 °C
Quad Temp.:	150 °C
Tune Type:	DFTPP
Ionization Mode:	EI
Instrument	Agilent 7890B GC & 5977A MSD
Sample Preparation	200 ppm standard diluted 5x, then analyzed at 20:1 split. Samples were aliquoted into amber 2 mL, 9 mm short-cap, screw-thread vials (cat.# 21143) containing glass Big Mouth inserts (cat.# 21782) and sealed with 2.0 mL, 9 mm short-cap, screw-vial closures (cat.# 23842).



Rxi-SVOCms Columns (fused silica)

Proprietary 5% phenyl-type-phase

ID	df	Length	Temp. Limits	qty.	Similar to Part #	cat.#
0.15 mm	0.15 µm	20 m	to 340/340 °C	ea.		46616
0.18 mm	0.18 µm	20 m	to 340/340 °C	ea.	Phenomenex 7FD-G027-08	46602
	0.36 µm	20 m	to 330/340 °C	ea.	Agilent 121-9723; Phenomenex 7FD-G027-53	46604
0.25 mm	0.25 µm	15 m	to 340/340 °C	ea.	Phenomenex 7EG-G027-11	16620
	0.25 µm	30 m	to 340/340 °C	ea.	Agilent 122-9732; Phenomenex 7HG-G027-11	16623
	0.50 µm	30 m	to 330/340 °C	ea.	Agilent 122-9736; Phenomenex 7HG-G027-17	16638
0.32 mm	0.25 µm	30 m	to 340/340 °C	ea.	Phenomenex 7HM-G027-11	16624
	0.50 µm	30 m	to 330/340 °C	ea.		16639

View chromatograms and optimized run conditions for each column format on the product web page or in our online chromatogram library.

Analyzing PAH lists in food? We recommend the Rxi-PAH column, which is optimized for detailed PAH analysis, when triphenylene; chrysene; cyclopenta[cd]pyrene; and all the benzofluoranthene isomers must be resolved.
www.restek.com/rxi-pah

Rxi Guard/Retention Gap Columns (fused silica)

ID	Length	OD	qty.	Similar to Part #	cat.#
0.25 mm	5 m	0.37 ± 0.04 mm	ea.	Agilent CP802505; Phenomenex 7AG-G000-00-GZ0	10029
	5 m	0.37 ± 0.04 mm	6-pk.		10029-600
	10 m	0.37 ± 0.04 mm	ea.	Agilent CP802510; Phenomenex 7CG-G000-00-GZ0	10059
	10 m	0.37 ± 0.04 mm	6-pk.		10059-600
0.32 mm	5 m	0.45 ± 0.04 mm	ea.	Agilent CP803205; Phenomenex 7AM-G000-00-GZ0	10039
	5 m	0.45 ± 0.04 mm	6-pk.		10039-600
	10 m	0.45 ± 0.04 mm	ea.	Agilent CP803210; Phenomenex 7CM-G000-00-GZ0	10064
	10 m	0.45 ± 0.04 mm	6-pk.		10064-600

Topaz 4.0 mm ID Single Taper Inlet Liner w/ Wool

for Agilent GCs equipped with split/splitless inlets

ID x OD x Length	Packing	qty	Similar to Part #	cat.#
4.0 mm x 6.5 mm x 78.5 mm	Quartz Wool	5-pk.	Agilent 5062-3587 (ea.); 5183-4693 (5-pk.); 5183-4694 (25-pk.); 5190-2293 (ea.); 5190-3163 (5-pk.); 5190-3167 (25-pk.); 5190-3171 (100-pk.)	23303

23882

SGE SilTite µ-Union Connectors

Includes	Fits Column ID	Vendor cat.#	qty.	cat.#
µ-Union connectors (2); double taper ferrules (5); and installation tools	0.32 mm to 0.32 mm	073563RE	kit	23882
µ-Union connectors (2); double taper ferrules (5); and installation tools	0.18/0.25 mm to 0.18/0.25 mm	073560RE	kit	23885
µ-Union connectors (2); double taper ferrules (5); and installation tools	0.18/0.25 mm to 0.32 mm	073561RE	kit	23886

RESTEK

Fox Scientific, Inc.

8270 Benzidines Mix

Benzidine (92-87-5)
3,3'-Dichlorobenzidine (91-94-1)
3,3'-Dimethylbenzidine (*o*-tolidine) (119-93-7)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
2000 µg/mL each in methylene chloride, 1 mL/ampul	Yes	6 months	55 months	Ambient	10 °C or colder	ea.	31852

8270 MegaMix Standard

- Fewest mixtures needed for calibration and matrix spikes.

Acenaphthene (83-32-9)
Acenaphthylene (208-96-8)
Aniline (62-53-3)
Anthracene (120-12-7)
Azobenzene (103-33-3)*
Benz[a]anthracene (56-55-3)
Benzo[a]pyrene (50-32-8)
Benzo[b]fluoranthene (205-99-2)
Benzo[g,h,i]perylene (191-24-2)
Benzo[k]fluoranthene (207-08-9)
Benzyl alcohol (100-51-6)
Benzyl butyl phthalate (85-68-7)
Bis(2-chloroethoxy)methane (111-91-1)
Bis(2-chloroethyl)ether (111-44-4)
Bis(2-ethylhexyl)adipate (103-23-1)
Bis(2-ethylhexyl)phthalate (117-81-7)
4-Bromophenyl phenyl ether (101-55-3)
Carbazole (86-74-8)
4-Chloroaniline (106-47-8)
4-Chloro-3-methylphenol (59-50-7)
2-Chloronaphthalene (91-58-7)
2-Chlorophenol (95-57-8)
4-Chlorophenyl phenyl ether (7005-72-3)
Chrysene (218-01-9)
Dibenz[a,h]anthracene (53-70-3)
Dibenzofuran (132-64-9)
1,2-Dichlorobenzene (95-50-1)
1,3-Dichlorobenzene (541-73-1)
1,4-Dichlorobenzene (106-46-7)
2,4-Dichlorophenol (120-83-2)
Diethylphthalate (84-66-2)
2,4-Dimethylphenol (105-67-9)
Dimethylphthalate (131-11-3)
Di-*n*-butyl phthalate (84-74-2)
1,2-Dinitrobenzene (528-29-0)
1,3-Dinitrobenzene (99-65-0)
1,4-Dinitrobenzene (100-25-4)
4,6-Dinitro-2-methylphenol (Dinitro-*o*-cresol) (534-52-1)
2,4-Dinitrophenol (51-28-5)
2,4-Dinitrotoluene (121-14-2)
2,6-Dinitrotoluene (606-20-2)
Di-*n*-octyl phthalate (117-84-0)
Diphenylamine (122-39-4)**
Fluoranthene (206-44-0)
Fluorene (86-73-7)
Hexachlorobenzene (118-74-1)
Hexachlorobutadiene (87-68-3)
Hexachlorocyclopentadiene (77-47-4)
Hexachloroethane (67-72-1)
Indeno[1,2,3-cd]pyrene (193-39-5)
Isophorone (78-59-1)
1-Methylnaphthalene (90-12-0)
2-Methylnaphthalene (91-57-6)
2-Methylphenol (*o*-cresol) (95-48-7)
3-Methylphenol (*m*-cresol) (108-39-4)
4-Methylphenol (*p*-cresol) (106-44-5)
Naphthalene (91-20-3)
2-Nitroaniline (88-74-4)
3-Nitroaniline (99-09-2)
4-Nitroaniline (100-01-6)
Nitrobenzene (98-95-3)
2-Nitrophenol (88-75-5)
4-Nitrophenol (100-02-7)
N-Nitrosodimethylamine (62-75-9)
N-Nitroso-di-*n*-propylamine (621-64-7)
2,2'-Oxybis(1-chloropropane) (108-60-1)
Pentachlorophenol (87-86-5)
Phenanthrene (85-01-8)
Phenol (108-95-2)
Pyrene (129-00-0)
Pyridine (110-86-1)
2,3,4,6-Tetrachlorophenol (58-90-2)
2,3,5,6-Tetrachlorophenol (935-95-5)
1,2,4-Trichlorobenzene (120-82-1)
2,4,5-Trichlorophenol (95-95-4)
2,4,6-Trichlorophenol (88-06-2)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
1000 µg/mL each in methylene chloride (3-methylphenol and 4-methylphenol at 500 µg/mL), 1 mL/ampul	Yes	6 months	18 months	Ambient	0 °C or colder	ea.	31850

*1,2-diphenylhydrazine (8270-listed analyte) decomposes to azobenzene (mix component) in the injector.
**N-nitrosodiphenylamine (8270-listed analyte) decomposes to diphenylamine (mix component) in the injector.

Easier calibration! 8270 MegaMix and 8270 Matrix Spike Mix include 3-methylphenol and 4-methylphenol at 1/2x concentration of other components.

Revised SV Internal Standard Mix

Acenaphthene-d10 (15067-26-2)
Chrysene-d12 (1719-03-5)
1,4-Dichlorobenzene-d4 (3855-82-1)
1,4-Dioxane-d8 (17647-74-4)
Naphthalene-d8 (1146-65-2)
Perylene-d12 (1520-96-3)
Phenanthrene-d10 (1517-22-2)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
4000 µg/mL each in methylene chloride, 1 mL/ampul	Yes	6 months	71 months	Ambient	10 °C or colder	ea.	31886

Benzoic Acid

Benzoic acid (65-85-0)

CAS #	Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
65-85-0	2000 µg/mL in methylene chloride, 1 mL/ampul	Yes	6 months	48 months	Ambient	10 °C or colder	ea.	31879

Revised B/N Surrogate Mix

2-Fluorobiphenyl (321-60-8)
Nitrobenzene-d5 (4165-60-0)
p-Terphenyl-d14 (1718-51-0)
Pyrene-d10 (1718-52-1)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
5000 µg/mL each in methylene chloride, 1 mL/ampul	Yes	6 months	71 months	Ambient	10 °C or colder	ea.	31888

Acid Surrogate Mix (4/89 SOW)

2-Fluorophenol (367-12-4)
Phenol-d6 (13127-88-3)
2,4,6-Tribromophenol (118-79-6)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
10,000 µg/mL each in methanol, 1 mL/ampul	Yes	6 months	60 months	Ambient	10 °C or colder	ea.	31063

Appendix IX Mix #1, Revised

2-Acetylaminofluorene (53-96-3)
4-Aminobiphenyl (92-67-1)
p-Dimethylaminoazobenzene (60-11-7)
3,3'-Dimethylbenzidine (*o*-tolidine) (119-93-7)
α,α-Dimethylphenethylamine (phentermine) (122-09-8)
1-Naphthylamine (1-aminonaphthalene) (134-32-7)
2-Naphthylamine (2-aminonaphthalene) (91-59-8)
N-Nitrosodibutylamine (924-16-3)
N-Nitrosodiethylamine (55-18-5)
N-Nitrosomethylethylamine (10595-95-6)
N-Nitrosomorpholine (59-89-2)
N-Nitrosopiperidine (100-75-4)
N-Nitrosopyrrolidine (930-55-2)
5-Nitro-*o*-toluidine (99-55-8)
1,4-Phenylenediamine (106-50-3)
2-Picoline (109-06-8)
o-Toluidine (95-53-4)

Conc. in Solvent	CRM?	DEA Status	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
2000 µg/mL each in methylene chloride, 1 mL/ampul	Yes	Exempt	6 months	55 months	Ambient	0 °C or colder	ea.	32459

Appendix IX Mix #2

Acetophenone (98-86-2)
Aramite (140-57-8)
Atrazine (1912-24-9)
Benzaldehyde (100-52-7)
Biphenyl (92-52-4)
ε-Caprolactam (105-60-2)
Chlorobenzilate (510-15-6)
1-Chloronaphthalene (90-13-1)
Diallate (2303-16-4)
Dibenz[a,j]acridine (224-42-0)
2,6-Dichlorophenol (87-65-0)
7,12-Dimethylbenz[a]anthracene (57-97-6)
1,4-Dioxane (123-91-1)
Diphenyl ether (101-84-8)
Ethyl methacrylate (97-63-2)
Ethyl methanesulfonate (62-50-0)
Hexachloropropene (1888-71-7)
Isodrin (465-73-6)
Isosafrole (*cis* & *trans*) (120-58-1)
Kepone (143-50-0)
3-Methylcholanthrene (56-49-5)
Methyl methanesulfonate (66-27-3)
1,4-Naphthoquinone (130-15-4)
4-Nitroquinoline-N-oxide (56-57-5)
Pentachlorobenzene (608-93-5)
Pentachloroethane (76-01-7)
Pentachloronitrobenzene (Quintozene) (82-68-8)
Phenacetin (62-44-2)
Propyzamide (23950-58-5)
Safrole (94-59-7)
1,2,4,5-Tetrachlorobenzene (95-94-3)
1,3,5-Trinitrobenzene (99-35-4)

Conc. in Solvent	CRM?	Min Shelf Life on Ship Date	Max Shelf Life on Ship Date	Shipping Conditions	Storage Temp.	qty.	cat.#
1000 µg/mL each in methylene chloride, 1 mL/ampul	Yes	6 months	18 months	Ambient	0 °C or colder	ea.	31806

24048

Resprep-C18 and Resprep-C8 SPE Disks

Description	Diameter	Packing	qty.	cat.#
Resprep SPE Disks	47 mm	Resprep-C8	24-pk.	24048
	47 mm	Resprep-C18	20-pk.	24004
	90 mm	Resprep-C18	12-pk.	25988

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Extraction Cell Bodies

for ASE Systems

Description	Instrument	Material	Volume	qty.	Similar to Part #	cat.#
Extraction Cell Body	for ASE 150/350	Stainless Steel	1 mL	ea.	Thermo/Dionex 068261	25993
	for ASE 200	Stainless Steel	1 mL	ea.	Thermo/Dionex 054973	26110
	for ASE 150/350	Stainless Steel	5 mL	ea.	Thermo/Dionex 068262	25994
	for ASE 200	Stainless Steel	5 mL	ea.	Thermo/Dionex 054974	26112
	for ASE 150/350	Stainless Steel	10 mL	ea.	Thermo/Dionex 068263	25995
	for ASE 200	Stainless Steel	11 mL	ea.	Thermo/Dionex 048820	26114
	for ASE 150/350	Stainless Steel	22 mL	ea.	Thermo/Dionex 068264	25996
	for ASE 200	Stainless Steel	22 mL	ea.	Thermo/Dionex 048821	26098
	for ASE 200	Stainless Steel	33 mL	ea.	Thermo/Dionex 048822	26116
	for ASE 100/300 and 150/350	Stainless Steel	34 mL	ea.	Thermo/Dionex 056646	26176
	for ASE 100/300 and 150/350	Stainless Steel	66 mL	ea.	Thermo/Dionex 056696	26178
	for ASE 100/300 and 150/350	Stainless Steel	100 mL	ea.	Thermo/Dionex 056693	26132

For our full line of SPE and ASE sample extraction products, visit **www.restek.com**

2.0 mL, 9 mm Short-Cap, Screw-Thread Vials (vial only)

Fit all 2.0 mL, 12 x 32 mm, screw-thread 9 mm/425 vial-based autosamplers.

Description	Type	Volume	Color	Size	qty.	Similar to Part #	cat.#
Short-Cap Vial, w/White Graduated Marking Spot	9-425 Screw-Thread	2.0 mL	Amber	12 x 32 mm	1000-pk.	Agilent 5183-2069	21143

Inserts for 2.0 mL, 11 mm Crimp-Top, 2.0 mL, 9 mm Short-Cap, Screw-Thread, and 2.0 mL, 10 mm Big Mouth Screw-Thread Vials

Description	Volume	Material	Used with	qty.	cat.#
Big Mouth Insert, w/Bottom Spring	50 µL	Glass	2.0 mL, 11 mm Crimp-Top, 2.0 mL, 9 mm Short-Cap, Screw-Thread Vials	1000-pk.	21782

2.0 mL, 9 mm Short-Cap, Screw-Vial Closures (Polypropylene, preassembled)

Type	Cap Size	Color	Septa Material	qty.	cat.#
Ribbed, Screw-Thread	9-425	Blue	PTFE/Silicone, for Agilent 7693A	1000-pk.	23842

24668

2.0 mL, 11 mm Crimp Vial Convenience Kits (Vials, Caps, & Septa)

Vials packaged in a clear-lid tray. Caps with septa packaged in a plastic bag.

Description	Includes	qty.	cat.#
Crimp Vial Convenience Kit,	Clear 2.0 mL Vial, Deactivated, Silver Seal, PTFE/Natural Rubber Septa	100-pk.	24671
	Clear 2.0 mL Vial, Deactivated, Silver Seal, PTFE/Natural Rubber Septa	1000-pk.	24672
	Amber 2.0 mL Vial, Deactivated, Silver Seal, PTFE/Natural Rubber Septa	100-pk.	24673
	Amber 2.0 mL Vial, Deactivated, Silver Seal, PTFE/Natural Rubber Septa	1000-pk.	24674
	Clear 2.0 mL Vial, Untreated, Silver Seal, PTFE/Natural Rubber Septa	100-pk.	21196
	Clear 2.0 mL Vial, Untreated, Silver Seal, PTFE/Natural Rubber Septa	1000-pk.	21197
	Amber 2.0 mL Vial, Untreated, Silver Seal, PTFE/Natural Rubber Septa	100-pk.	21198
	Amber 2.0 mL Vial, Untreated, Silver Seal, PTFE/Natural Rubber Septa	1000-pk.	21199
	Clear 2.0 mL Vial, Untreated, Silver Seal, PTFE/Silicone Septa	100-pk.	24646
	Clear 2.0 mL Vial, Untreated, Silver Seal, PTFE/Silicone Septa	1000-pk.	24647
	Amber 2.0 mL Vial, Untreated, Silver Seal, PTFE/Silicone Septa	100-pk.	24648
	Amber 2.0 mL Vial, Untreated, Silver Seal, PTFE/Silicone Septa	1000-pk.	24649

21196

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