

# Fast GC/MS Analysis of Semivolatile Organic Compounds

Using a 0.18mm ID / 0.36 $\mu$ m Film Rtx<sup>®</sup>-5Sil MS Column

by Gary Stidsen, GC Columns Marketing Manager

- Meets resolution and response factors for many methods, including EPA Method 8270.
- Split injections and thick phase film help prolong column life when analyzing dirty extracts.
- Low bleed, thermally stable.
- Column and method optimized for conventional scanning detectors, such as Agilent 5973.

A high sample throughput is important to most analysts, and is essential to those in environmental laboratories. Chromatographers following US EPA methods 8270, 625, or 525, or other methods for equivalent lists of semivolatile organic pollutants, now can take advantage of advances in mass spectrometer and GC column technology, to reduce analytical time and increase sample throughput while also obtaining good lifetimes from their columns.

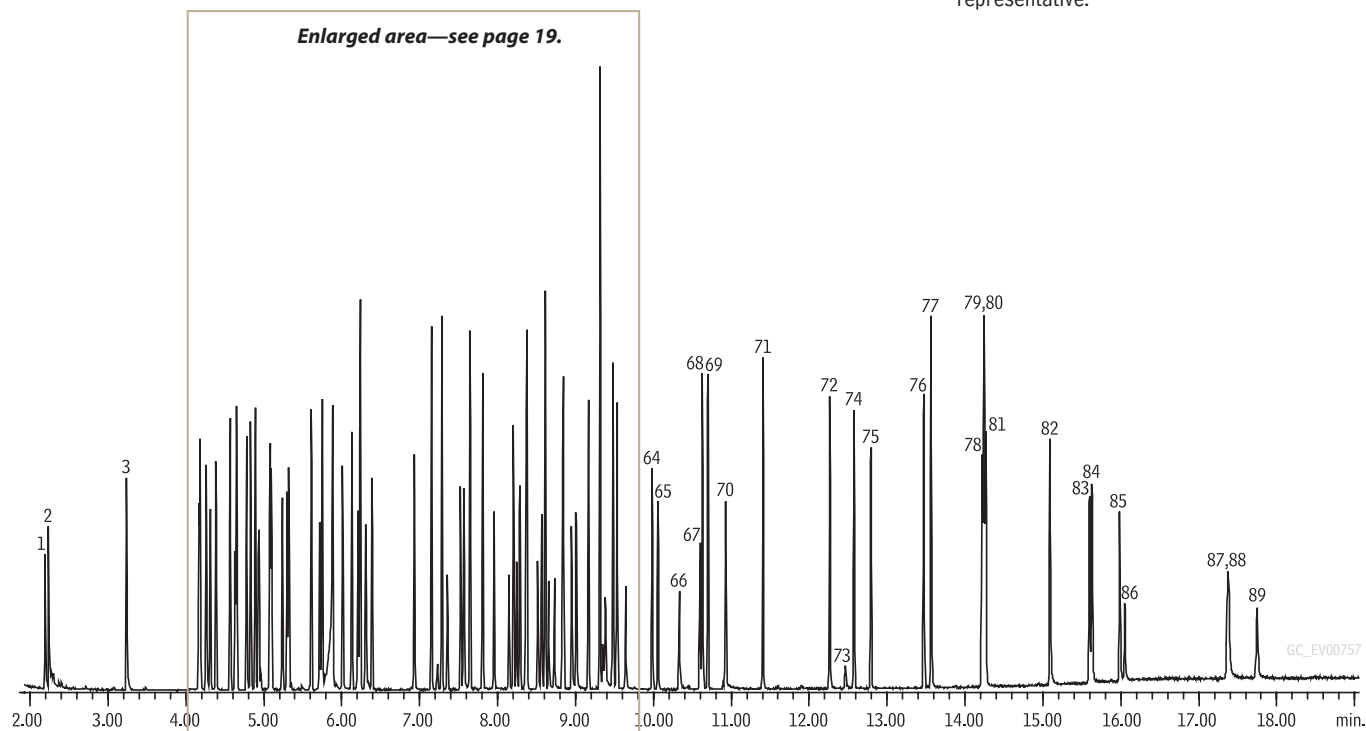
The new generation of high sensitivity mass spectrometers enables analysts to reduce the amount of sample injected onto the column. In analyses of semivolatiles, this has led to using split injections and columns having smaller internal diameter, resulting in shorter analysis times. Split injection contributes to good chromatographic resolution, but also helps improve sensitivity by reducing the degradation of acidic and basic compounds in the hot injection port.

Further, because less sample is transferred onto the column in split injections, transfer of non-volatile contaminants from the extracts is minimized, and column lifetime is prolonged.

In our laboratories, we have been evaluating various combinations of column length, ID, and film thickness for suitability for shortening analysis time while meeting the resolution requirements of the various methods. The latest product of our research is the 20m, 0.18mm ID, 0.36 $\mu$ m film Rtx<sup>®</sup>-5Sil MS column. Figure 1 shows the results of an analysis on this new column. Under the conditions listed, resolution of these 89 compounds meets the resolution criteria of method 8270, 625, or 525. A split injection was used to obtain Figure 1, but the column also can be used with splitless injections.

The 20m, 0.18mm ID, 0.36 $\mu$ m film Rtx<sup>®</sup>-5Sil MS column is the latest product of our application lab chemists' continuing efforts to combine rapid analysis with good column lifetime, and give you the best available column for analyzing semivolatile pollutants. To discuss this application, call our technical support staff at 800-356-1688 or 814-353-1300, ext. 4, or contact your Restek representative.

**Figure 1** 89 semivolatile pollutants, surrogates, and internal standards separated in less than 18 minutes on a 20m, 0.18mm ID, 0.36 $\mu$ m film Rtx<sup>®</sup>-5Sil MS column.



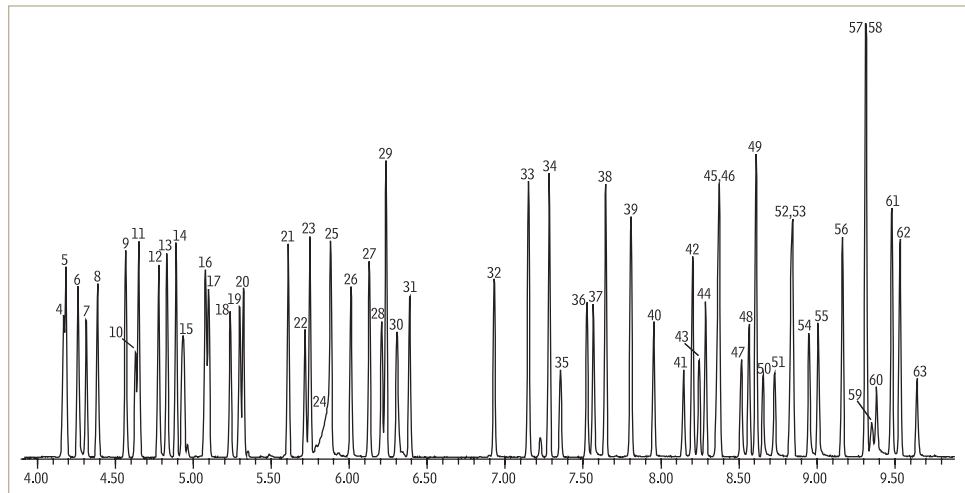
- |                                  |                                     |
|----------------------------------|-------------------------------------|
| 1. N-nitrosodimethylamine        | 75. <i>p</i> -terphenyl-d14         |
| 2. pyridine                      | 76. butyl benzyl phthalate          |
| 3. 2-fluorophenol                | 77. bis(2-ethylhexyl)adipate        |
| peaks 4-63: see page 19          | 78. benzo(a)anthracene              |
| 64. 4-bromophenyl phenyl ether   | 79. chrysene-d12                    |
| 65. hexachlorobenzene            | 80. bis(2-ethylhexyl)phthalate      |
| 66. pentachlorophenol            | 81. chrysene                        |
| 67. phenanthrene-d10             | 82. di- <i>n</i> -octyl phthalate   |
| 68. phenanthrene                 | 83. benzo(b)fluoranthene            |
| 69. anthracene                   | 84. benzo(k)fluoranthene            |
| 70. carbazole                    | 85. benzo(a)pyrene                  |
| 71. di- <i>n</i> -butylphthalate | 86. perylene-d12                    |
| 72. fluoranthene                 | 87. indeno(1,2,3- <i>cd</i> )pyrene |
| 73. benzidine                    | 88. dibenzo(a,h)anthracene          |
| 74. pyrene                       | 89. benzo(ghi)perylene              |

Column: Rtx<sup>®</sup>-5Sil MS, 20m, 0.18mm ID, 0.36 $\mu$ m (cat.# 557810)  
Sample: US EPA Method 8270D analytes, 10ppm each (10ng on column); 8270 MegaMix<sup>™</sup> (cat.# 31850); Benzidine (cat.# 31441); Benzoic Acid (cat.# 31415); 2,4-Dinitrophenol (cat.# 31291); Acid Surrogate Mix (4/89 SOW) (cat.# 31063); B/N Surrogate Mix (4/89 SOW) (cat.# 31062)  
Inj.: 1.0 $\mu$ L, splitless, 4mm ID gooseneck splitless inlet liner (cat.# 20798), splitless hold time 0.20 min., pressure pulse 0.15 min. @ 30psi  
GC: Agilent 6890  
Inj. temp.: 250°C  
Carrier gas: helium, constant flow  
Flow rate: 1.2mL/min.  
Oven temp.: 50°C(hold 0.5 min.) to 330°C @ 18°C/min. (hold 3 min.)  
Det.: Agilent 5973 GC/MS  
Transfer line temp.: 280°C  
Scan range: 35-550 amu  
Solvent Delay: 1 min.  
Tune: DFTPP  
Ionization: EI

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(cont. from page 14)



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- |                                 |                                |                               |                                 |
|---------------------------------|--------------------------------|-------------------------------|---------------------------------|
| 4. phenol-d6                    | 21. isophorone                 | 39. 2-chloronaphthalene       | 57. fluorene                    |
| 5. phenol                       | 22. 2-nitrophenol              | 40. 2-nitroaniline            | 58. 4-chlorophenyl phenyl ether |
| 6. aniline                      | 23. 2,4-dimethylphenol         | 41. 1,4-dinitrobenzene        | 59. 4-nitroaniline              |
| 7. bis(2-chloroethyl)ether      | 24. benzoic acid               | 42. dimethylphthalate         | 60. 4,6-dinitro-2-methylphenol  |
| 8. 2-chlorophenol               | 25. bis(2-chloroethoxy)methane | 43. 1,3-dinitrobenzene        | 61. diphenylamine               |
| 9. 1,3-dichlorobenzene          | 26. 2,4-dichlorophenol         | 44. 2,6-dinitrotoluene        | 62. azobenzene                  |
| 10. 1,4-dichlorobenzene-d4      | 27. 1,2,4-trichlorobenzene     | 45. 1,2-dinitrobenzene        | 63. 2,4,6-tribromophenol        |
| 11. 1,4-dichlorobenzene         | 28. naphthalene-d8             | 46. acenaphthylene            |                                 |
| 12. benzyl alcohol              | 29. naphthalene                | 47. 3-nitroaniline            |                                 |
| 13. 1,2-dichlorobenzene         | 30. 4-chloroaniline            | 48. acenaphthene-d10          |                                 |
| 14. 2-methylphenol              | 31. hexachlorobutadiene        | 49. acenaphthene              |                                 |
| 15. bis(2-chloroisopropyl)ether | 32. 4-chloro-3-methylphenol    | 50. 2,4-dinitrophenol         |                                 |
| 16a. 4-methylphenol             | 33. 2-methylnaphthalene        | 51. 4-nitrophenol             |                                 |
| 16b. 3-methylphenol             | 34. 1-methylnaphthalene        | 52. 2,4-dinitrotoluene        |                                 |
| 17. N-nitroso-di-n-propylamine  | 35. hexachlorocyclopentadiene  | 53. dibenzofuran              |                                 |
| 18. hexachloroethane            | 36. 2,4,6-trichlorophenol      | 54. 2,3,4,6-tetrachlorophenol |                                 |
| 19. nitrobenzene-d5             | 37. 2,4,5-trichlorophenol      | 55. 2,3,5,6-tetrachlorophenol |                                 |
| 20. nitrobenzene                | 38. 2-fluorobiphenyl           | 56. diethyl phthalate         |                                 |

Searching for a chromatogram?

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