

Chromatography

GC

OPTIMA[®] 1-MS Accent

OPTIMA[®] 5-MS Accent

OPTIMA[®] XLB

The new
ultra low bleed
high performance GC columns

MACHERY-NAGEL

www.mn-net.com



Since 1911

Demands on state-of-the-art fused silica capillary GC columns:

- ✓ lowest column bleed for ultra trace analysis applications
- ✓ excellent signal-to-noise ratio for increased sensitivity
- ✓ suitability for ion-trap- and quadrupol-MS applications
- ✓ high temperature stability
- ✓ perfect inertness for basic compounds
- ✓ short column conditioning times (<2 h → „ready to use“)

MACHEREY-NAGEL is proud to introduce now:

OPTIMA® 1-MS Accent

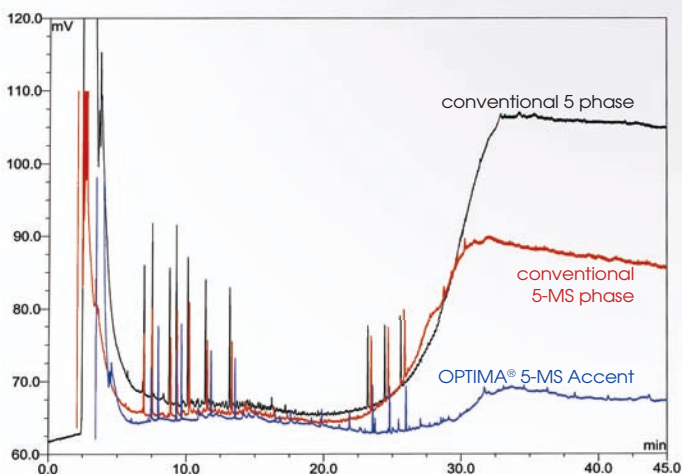
OPTIMA® 5-MS Accent

OPTIMA® XLB

as three **100% ion-trap compatible ultra low bleed capillary GC columns based on silarylene technology.**

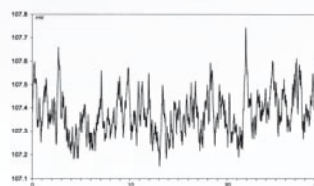
Lowest column bleed ➤ reduced contamination of the detection system
 ➤ improved detectability of solutes in trace analysis

In a bleed comparison test between OPTIMA® 5-MS Accent with a conventional "5"-phase and a column designated explicitly as "5-MS", the outmatched performance of the silarylene phase can be shown.

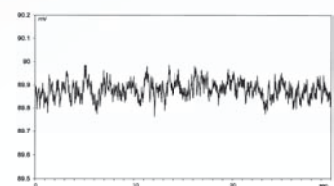


Injection: 1 µl, split 1:50
 Carrier gas: 80 kPa He, 80 °C → 360 °C at 8 °C/min

The unmatched low background level of the OPTIMA® 5-MS Accent column which is approximately three times lower compared with a "5-MS brand" provides significantly increased sensitivity and allows the use for trace analysis applications particularly of high boiling compounds.



Competitor 5-MS column
 (FID signals in mV)



OPTIMA® 5-MS Accent

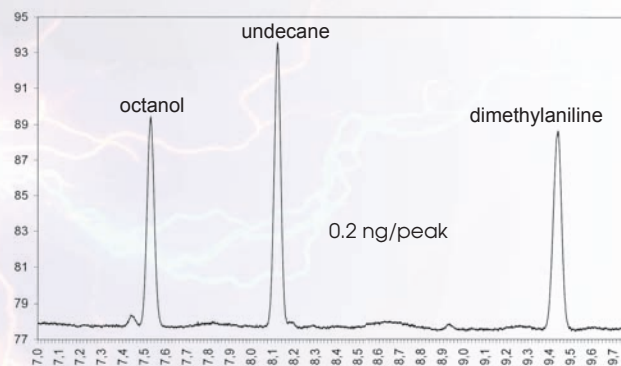
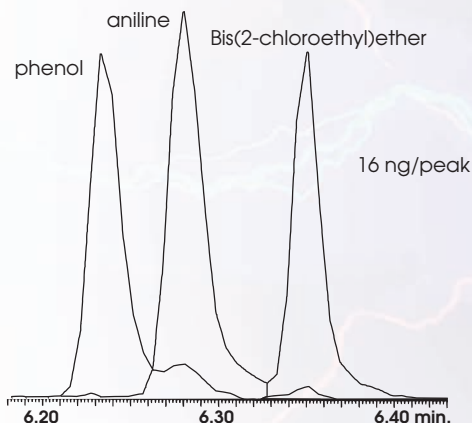
High temperature stability ➔ **extended column lifetime**
 ➔ **applicable for high boiling compounds**

	T _{max} (during isothermal operation)	T _{max} (in temperature-programmed GC for short periods of time)
OPTIMA® 1-MS ACCENT	340 °C	360 °C
OPTIMA® 5-MS ACCENT	340 °C	360 °C
OPTIMA® XLB	340 °C	360 °C
Varian VF-5MS	325 °C*	350 °C*
Agilent DB-5MS	325 °C*	350 °C*
Agilent HP-5MS	325 °C*	350 °C*
Restek RTX-5MS	330 °C*	350 °C*

*as indicated from manufacturers in 2005 product catalogs

Optimized tubing surface deactivation ➔ **reduced tailing of polar compounds**

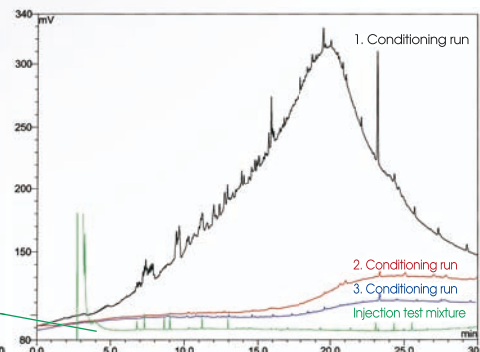
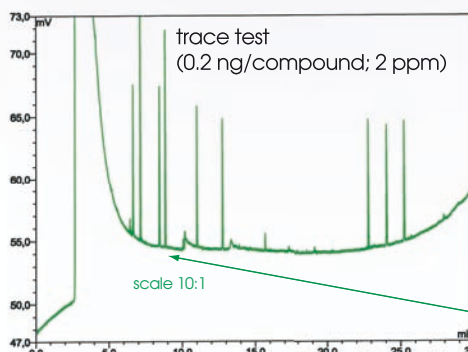
OPTIMA® 5-MS Accent exhibits excellent peak shapes and – asymmetries for i.e. phenol, aniline or dimethylaniline even without previous derivatization.



Short column conditioning times ➔ **time and cost saving during column replacement**

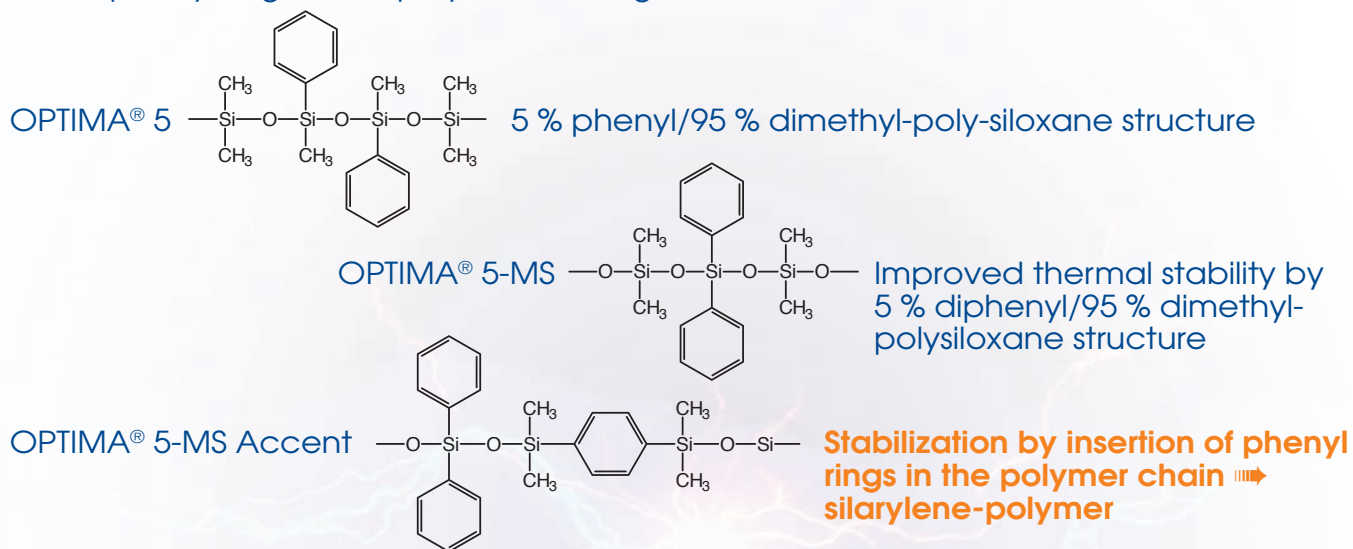
OPTIMA® 5-MS Accent is **ready for use** in low concentration analysis yet after three conditioning runs (80 °C -> 360 °C at 8 °C/min, a total of 1.5 h)!

1. Conditioning run (brand new column after installation)
2. Conditioning run (after 30 min.)
3. Conditioning run (after 1 h)



How to explain the differences between standard OPTIMA® 5, OPTIMA® 5 MS and OPTIMA® 5-MS Accent?

Basically all three stationary phases have identical polarity and from that also similar selectivity features provided that a calculated ratio of 5 % phenyl groups in the polysiloxane layer to all of the above mentioned phases. However on what are the differences based in terms of the column bleed? This can be explained by the different constitution of the phenyl rings in the polysiloxane ring structure.

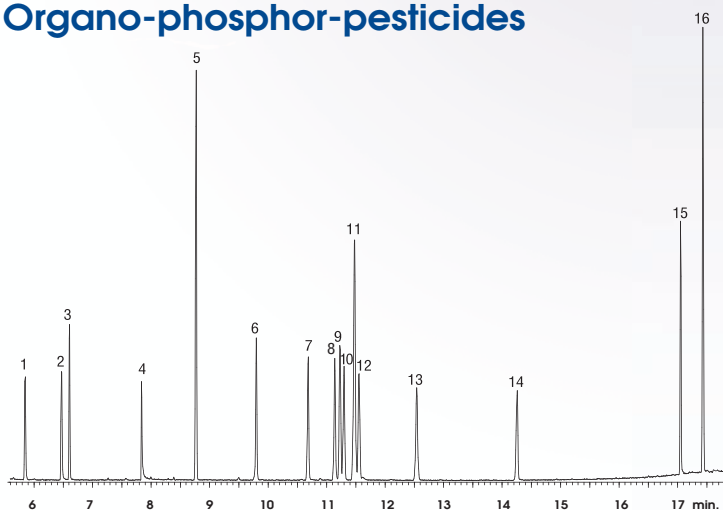


OPTIMA® XLB \Rightarrow larger ratio of phenyl rings \Rightarrow slightly increased polarity

Improved thermal stability and significantly minimized column bleed has been attained by the insertion of arylene groups in the polymeric siloxane chain!!!

The following application examples exhibit the outstanding performance of the new OPTIMA® Accent columns and Optima® XLB

Organo-phosphor-pesticides



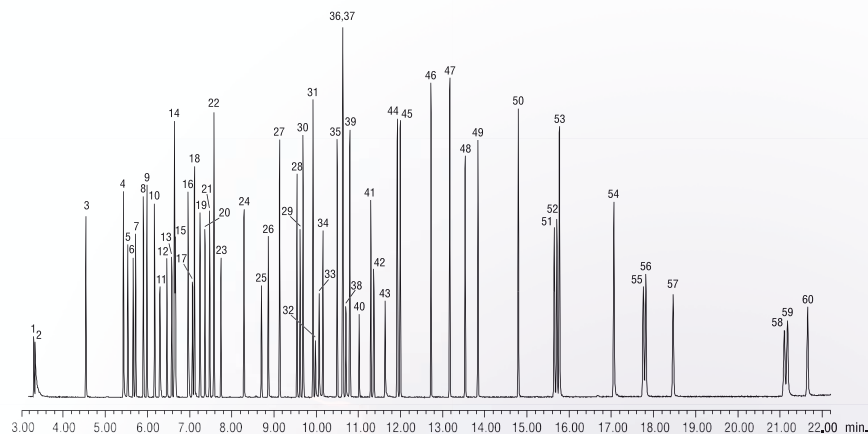
1. nitrobenzene
 2. 2,4-dichlorophenol,
 3. 1,3-dimethyl-2-nitrobenzene,
 4. 2,4,6-trichlorophenol,
 5. acenaphthene-d10 (IS1),
 6. azobenzene*,
 7. prometon,
 8. terbufos,
 9. diazinon,
 10. fonofos,
 11. phenanthrene-d10 (IS2),
 12. disulfoton,
 13. acetochlor,
 14. cyanazine,
 15. triphenylphosphate,
 16. chrysene-d12
- * Decomposition product of 1,2-diphenylhydrazine

OPTIMA® 5-MS Accent, 30 m, 0.25 mm ID, 0.25 μ m (Cat. No. 725820.30)

Sample: EPA method 526 Mix 10 ppm (20 ppm IS) · Injection: 1.0 μ L splitless (hold 0.3 min.) · Inj. temp.: 300 °C
Carrier gas: helium, 0.8 ml/min. · Temperature: 50 °C (hold 1 min.) \rightarrow 200 °C at 20 °C/min. (hold 5 min.) \rightarrow 310 °C
at 30 °C/min. (hold 3 min.) · Detection: GC/MS, 280 °C, scan range: 35-550 amu

MN Appl. No. 212820

EPA method 625 (phenols, pesticides)



OPTIMA® 5-MS Accent, 30 m, 0.25 mm ID, 0.25 µm (Cat. No. 725820.30)

Sample: US EPA method 625 Mix, 10 ppm (20 ppm IS)

Injection: 1.0 µl, 20 psi 0.3 min, pulsed splitless (hold 0.3 min.)

Inj. temp.: 300 °C

Carrier gas: helium, 1.0 ml/min.

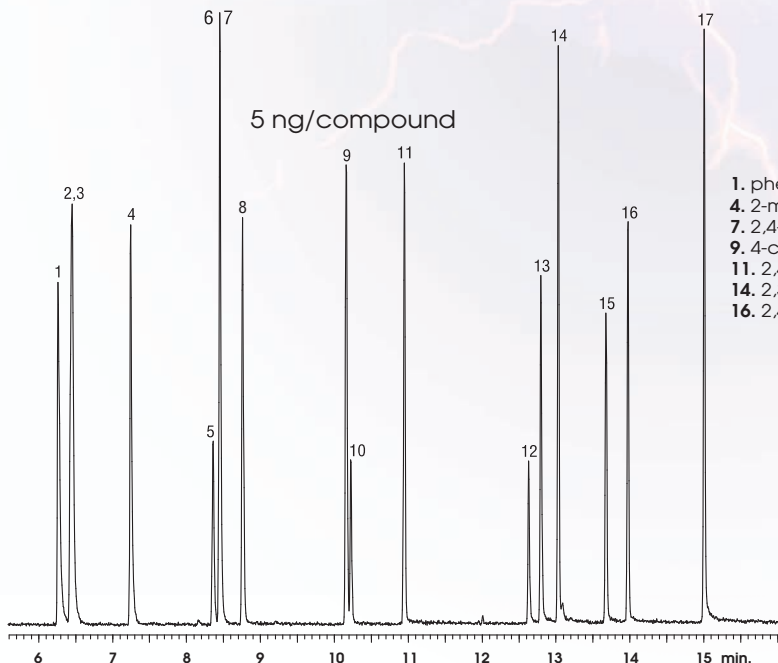
Temperature: 35 °C (hold 1 min.) -> 270 °C at 18 °C/min. -> 305 °C at 5 °C/min. (hold 0 min.) -> 330 °C at 30 °C/min. (hold 1 min.)

Detection: GC/MS, 280 °C, scan range: 35-450 amu

1. N-nitrosodimethylamine, 2. pyridine-d5,
3. 2-fluorophenol (SS), 4. pentafluorophenol (IS),
5. phenol, 6. bis-(2-chloroethyl)ether,
7. 2-chlorophenol, 8. 1,3-dichlorobenzene,
9. 1,4-dichlorobenzene, 10. 1,2-dichlorobenzene,
11. bis(2-chloroisopropyl)ether, 12. N-nitroso-di-n-propylamine,
13. hexachloroethane, 14. nitrobenzene-d5 (IS), 15. nitrobenzene,
16. isophorone, 17. 2-nitro-phenol, 18. 2,4-dimethylphenol, 19. bis(2-chloroethoxy)methane,
20. 2,4-dichlorophenol, 21. 1,2,4-trichlorobenzene,
22. naphthalene, 23. hexachlorobutadiene,
24. 4-chloro-3-methylphenol, 25. hexachlorocyclopentadiene,
26. 2,4,6-trichlorophenol, 27. 2-chloro-naphthalene,
28. dimethylphthalate, 29. 2,6-dinitrotoluene, 30. acenaphthylene, 31. acenaphthene,
32. 2,4-dinitrophenol, 33. 4-nitrophenol, 34. 2,4-dinitrotoluene,
35. diethylphthalate, 36. fluorene, 37. 4-chlorophenyl phenyl ether,
38. 4,6-dinitro-2-methylphenol, 39. diphenylamine,
40. 4,4'-dibromooctafluorobiphenyl, 41. 4-bromophenyl phenyl ether,
42. hexachlorobenzene, 43. pentachlorophenol,
44. phenanthrene, 45. anthracene,
46. di-n-butylphthalate, 47. 4,4'-dibromobiphenyl (IS),
48. fluoranthene, 49. pyrene, 50. butyl benzyl phthalate,
51. benzo-(a)anthracene, 52. chrysene, 53. bis(2-ethylhexyl) phthalate,
54. di-n-octyl phthalate, 55. benzo(b)fluoranthene,
56. benzo(k)fluoranthene, 57. benzo(a)pyrene, 58. indeno(1,2,3-cd)pyrene,
59. dibenzo(a,h)anthracene, 60. benzo(ghi)perylene

MN Appl. No. 212830

Phenols



1. phenol, 2. 2-chlorophenol-3,4,5,6-d4, 3. 2-chlorophenol,
4. 2-methylphenol, 5. 2-nitrophenol, 6. 2,4-dimethylphenol-3,5,6-d3,
7. 2,4-dimethylphenol, 8. 2,4-dichlorophenol, 9. 4-chloro-3-methylphenol,
10. 1,2-dimethyl-3-nitrobenzene (IS1), 11. 2,4,6-trichlorophenol,
12. 2,4-dinitrophenol, 13. 4-nitrophenol, 14. 2,3,4,5-tetrachlorophenol (IS2),
15. 2-methyl-4,6-dinitrophenol, 16. 2,4,6-tribromophenol (SS), 17. pentachlorophenol

OPTIMA® 5-MS Accent, 30 m, 0.25 mm ID, 0.25 µm (Cat. No. 725820.30)

Sample: US EPA method 528 Mix 1µL 5 ppm, 5 ng/compound

Injection: 1.0 µl pulsed splitless (hold 0.5 min.), pulsed pressure 50 psi (hold 0.5 min.)

Inj. temp.: 220 °C

Carrier gas: helium, 1.3 ml/min.

Temperature: 40 °C (hold 1 min.) -> 200 °C at 12 °C/min. (hold 0 min.) -> 300 °C at 30 °C/min. (hold 1 min.)

Detection: GC/MS, 280 °C, scan range: 35-550 amu

MN Appl. No. 212840

EPA 8140 / 8141 / 8141 A Organo-phosphor-pesticides

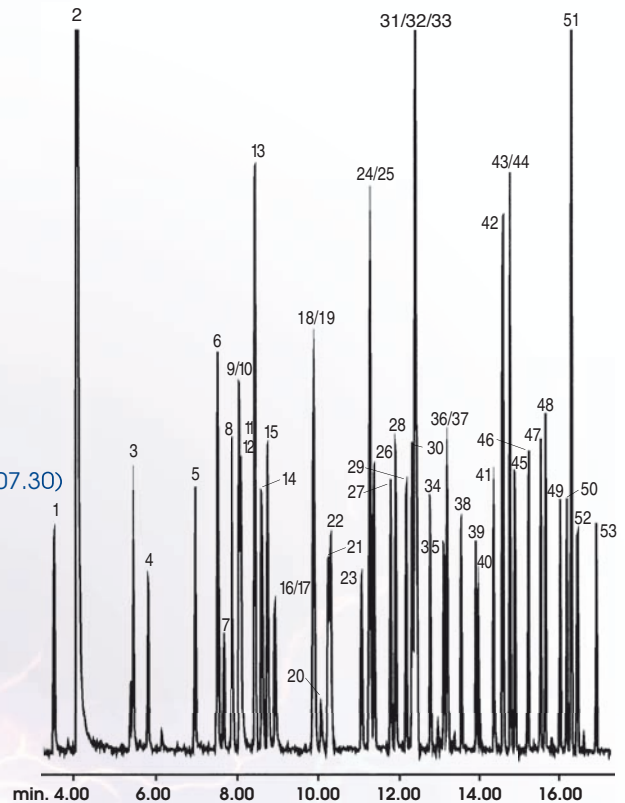
1. Dichlorvos, 2. Hexamethylphosphoramide, 3. Mevinphos,
4. Trichlorfon, 5. TEPP, 6. Thionazin, 7. Demeton-0, 8. Ethoprop
9. Tributyl phosphate (IS), 10. Dicrotophos, 11. Monocrotophos,
12. Naled, 13. Sulfotepp, 14. Phorate, 15. Dimethoate,
16. Demeton-S, 17. Dioxathion, 18. Terbufos, 19. Fonophos,
20. Phosphamidon isomer, 21. Diazinon, 22. Disulfoton,
23. Phosphamidon, 24. Dichlorofenthion, 25. Parathion-methyl,
26. Chlorpyrifos methyl, 27. Ronnel, 28. Fenitrothion,
29. Malathion, 30. Fenthion, 31. Aspon, 32. Parathion-ethyl,
33. Chlorpyrifos, 34. Trichloronate, 35. Chlorfenvinphos,
36. Merphos, 37. Crotoxyphos, 38. Stirofos, 39. Tokuthion,
40. Merphos oxidation product, 41. Fensulfothion,
42. Famphur, 43. Ethion, 44. Bolstar, 45. Carbophenothion,
46. Triphenyl phosphate (IS), 47. Phosmet, 48. EPN,
49. Azinphos-methyl, 50. Leptophos, 51. Tri-o-Cresyl phosphate
52. Azinphos-ethyl, 53. Coumaphos

OPTIMA® 1-MS Accent, 30 m, 0.32 mm ID, 0.50 µm (Cat. No. 725807.30)

Sample: 0.2 µg/ml in hexane
 8140/8141 OP pesticides calibration mix A
 8141 OP pesticides calibration mix B
 IS: Triphenyl phosphate and Tributyl phosphate

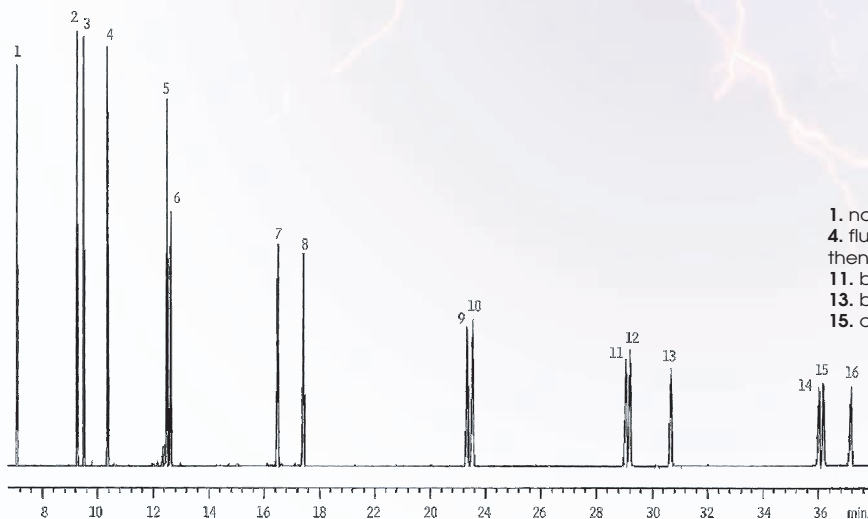
Injection: splitless, (hold 1 min.)
 Inj. Temp.: 250 °C
 Carrier gas: helium, 1 ml/min., constant pressure
 Temperature: 100 °C -> 180 °C (10 °C/min.) (hold 2 min.)
 -> 300 °C (18 °C/min.) (hold 3 min.)

Detector: FPD (Flame Photometric Detector), 280 °C



MN Appl. No. 213030

Separation of PAHs



1. naphthalene, 2. acenaphthylene, 3. acenaphthene,
4. fluorene, 5. phenanthrene, 6. anthracene, 7. fluoranthene,
8. pyrene, 9. benzo(a)anthracene, 10. chrysene,
11. benzo(b)fluoranthene, 12. benzo(k)fluoranthene,
13. benzo(a)pyrene, 14. indeno(1,2,3-cd)pyrene,
15. dibenzo(a,h)anthracene, 16. benzo(ghi)perylene

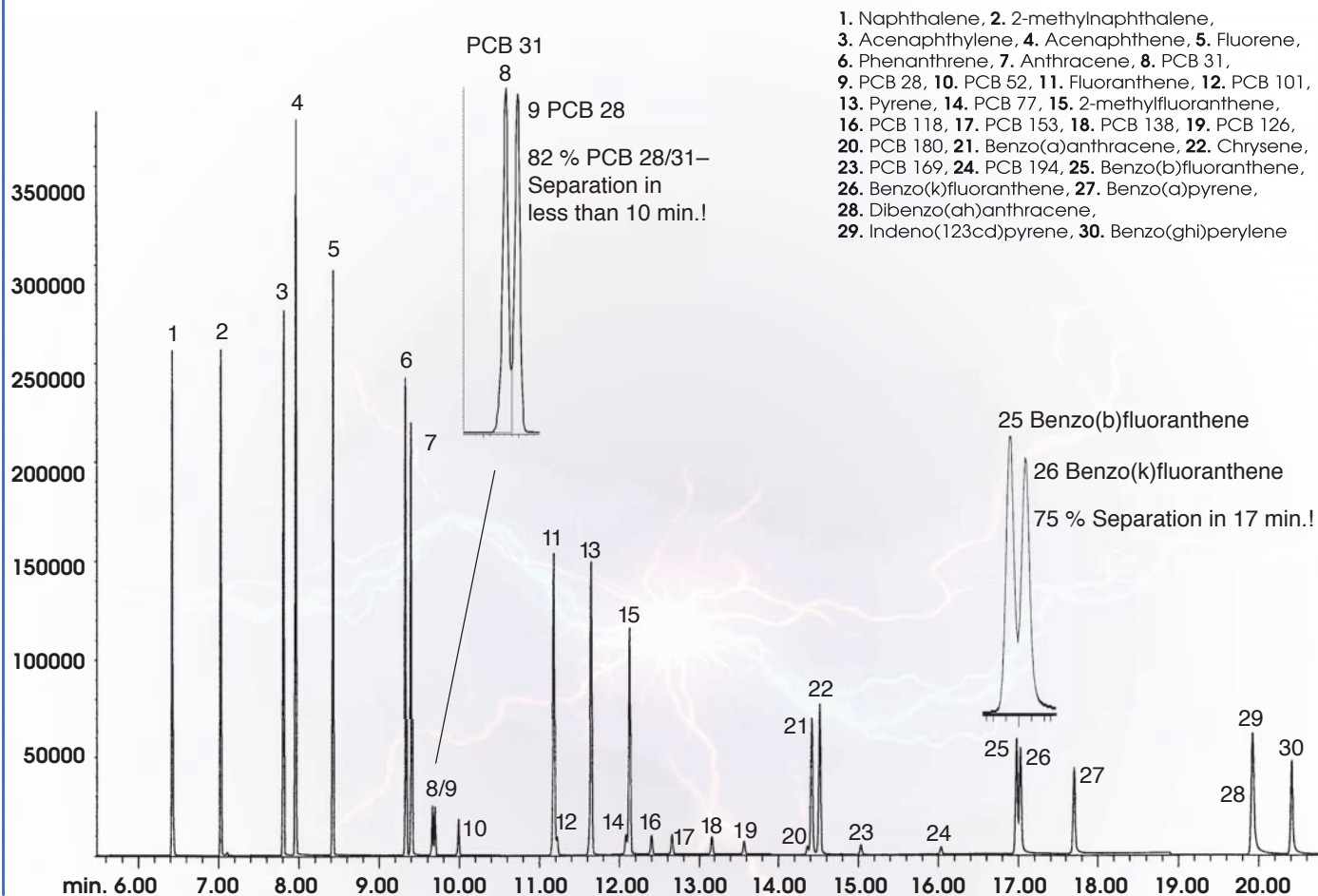
OPTIMA® 5-MS Accent, 30 m, 0.25 mm ID, 0.25 µm (Cat. No. 725820.30)

Sample: 1 µl of 20 ng/µl, PAH Mix
 Injection: splitless (hold 1 min.)
 Inj. temp.: 300 °C
 Carrier gas: hydrogen, 40 cm/sec.
 Temperature: 40 °C (hold 1 min.) -> 200 °C at 20 °C/min. -> 310 °C at 4 °C/min. (hold 5 min.)
 Detection: FID, 310 °C

MN Appl. No. 212800

Rapid separation of PCBs and PAHs

Centre d'Analyses de Recherche, Lab. D'Hydrologie, 67400 Illkirch, France



OPTIMA® XLB, 30 m, 0.25 mm ID, 0.25 µm (Cat. No. 725850.30)

Inj. Vol.: 1 µl, standard 0.005 ng/µl

Inj. Temp.: 250 °C

Inj.: pulsed, splitless

Inj. Pulse: 1.38 bar in 1 min.

Purge flow: 60 ml/min.

Carrier gas: helium

Temperature: 40 °C/(hold 2 min.), -> 30 °C/min. -> 240 °C/(hold 2 min.). -> 10 °C/min. -> 340 °C/(hold 5 min.).

Detection

MS source: 230 °C

Interface: 280 °C

Quadrupol: 150 °C

OPTIMA® 1-MS Accent / OPTIMA® 5-MS Accent / OPTIMA® XLB

- high temperature stability (340 °C for isothermally operated runs / 360 °C for short isothermal runs in temperature programmed GC), columns with film-thicknesses > 0.5 µm have temperature limits of 320 °C / 340 °C
- Very low bleed characteristics, non-polar phases, suitable for ion-trap detection systems
- Application areas: "allround" phases for environmental analysis, trace analysis, EPA methods, pesticides, PCBs, food and drug analysis

OPTIMA® 1-MS Accent

Chemically bonded, cross-linked phase, polarity index according to 100 % Dimethyl-Polysiloxane

- similar phases: OV-1, DB-1 MS, SE-30, HP-1 MS, Ultra-1, SPB-1, CP-SIL 5 CB MS, Rtx®-1 MS, 007-1, BPX-1, MDN-1, AT™-1 MS, ZB-1, OV-101, VF-1 MS
- USP G 2

OPTIMA® 5-MS Accent

Chemically bonded, cross-linked silylarylene phase, polarity index according to 5 % Diphenyl / 95 % Dimethyl-Polysiloxane

- similar phases: SE-54, SE-52, DB-5 MS, HP-5 MS, Ultra-2, Equity™-5, CP-SIL 8 CB low bleed/MS, Rtx®-5 SIL-MS, Rtx®-5 MS, 007-5 MS, BPX-5, MDN-5S, AT™-5 MS, ZB-5, VF-5 MS
- USP G 27, 36

OPTIMA® XLB

Chemically bonded, cross-linked silylarylene phase with higher ratio of silylarylene

- similar phases: DB-XLB, Rtx®-XLB, MDN-12, VF-XMS

Ordering information

Optima 1-MS Accent		Cat. No. for Column length of				
0.2 mm ID	12 m	15 m	25 m	30 m	50 m	60 m
0.20 µm film			725801.25		725801.50	
0.25 mm ID						
0.25 µm film		725805.15		725805.30		725805.60
0.50 µm film				725806.30		725806.60
0.32 mm ID						
0.25 µm film				725802.30		725802.60
0.50 µm film				725807.30		725807.60
Optima 5-MS Accent						
0.2 mm ID	12 m	15 m	25 m	30 m	50 m	60 m
0.20 µm film			725810.25		725810.50	
0.35 µm film	725815.12				725815.50	
0.25 mm ID						
0.25 µm film		725820.15		725820.30		725820.60
0.50 µm film				725825.30		725825.60
1.00 µm film				725826.30		725826.60
0.32 mm ID						
0.25 µm film				725811.30		725811.60
0.50 µm film				725813.30		
1.00 µm film			725812.25			725812.60
Optima XLB						
0.25 mm ID						
0.25 µm film				725850.30		725850.60

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