

Applications Guide



Environmental



Chemical



Food, Flavors and
Fragrances



Fuels and
Petrochemical

SGE Capillary Columns

SGE Analytical Science

Few companies can claim to be able to provide a total solution for analytical science; SGE is one of those few. From sample preparation, to injection, the separation and throughout the chromatographic process in either LC or GC there is a SGE product that has been designed to provide you with the results you need time and again.

This brochure highlights some of SGE's capabilities in capillary gas chromatography, specifically in the technically demanding area of capillary columns. SGE columns are engineered for consistent separation performance and can be found in many laboratories being tasked to perform everything from routine analyses to the latest R&D challenges.

forte[™] GC Capillary Columns

With over 30 year's experience, GC capillary columns truly are SGE's strength, its forte.

SGE is the only independent manufacturer of GC capillary columns that has the skill and technology to control all critical processes from producing the fused silica capillary tubing, through the phase synthesis, to the validation of the performance of each column.

SGE offers a comprehensive range of *forte* GC capillary columns for almost any chromatographic application providing the best possible combination of, Performance, Robustness, Reproducibility, Low Bleed and Inertness.

With this brochure we bring to you a small taste of the applications you might consider running on an SGE GC capillary column. If the application is not in this guide, please visit our website www.sge.com

forte[™]; Now with added capabilities

SilGuard[™] is a new option for the *forte*[™] line of GC capillary columns, which further enhances column robustness and endurance whilst adding additional analytical capabilities to the standard GC column. It is a unique integrated guard column system, developed using SGE's renowned SilTite[™] ferrule technology.

SilGuard[™] technology stands to benefit chromatographers by reducing the amount of non volatiles entering the analytical column and as a result, *forte*[™] columns can now offer enhanced endurance with no loss of sensitivity.

For more information on SilGuard contact you local SGE office, distributor or visit www.sge.com



Silguard equipped GC Capillary Column

Guidelines for Choosing Columns	1-2
---------------------------------	-----

Recommended Column by Application	3
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Environmental	4-11
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Food, Flavours and Fragrances	12-17
-------------------------------	-------



Fuels and Petrochemical	18-21
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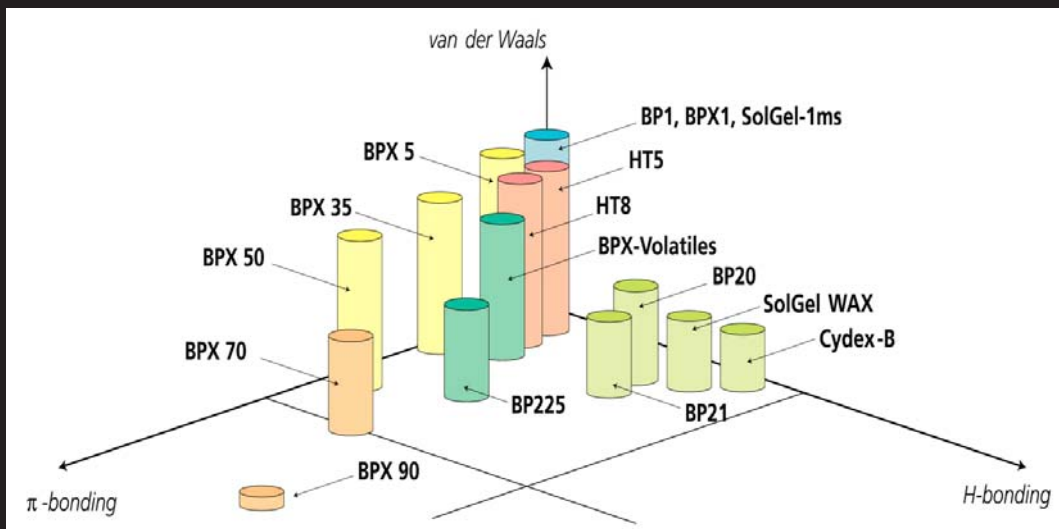


Chemical	22-26
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SGE Capillary Column Part Number Listing	27-29
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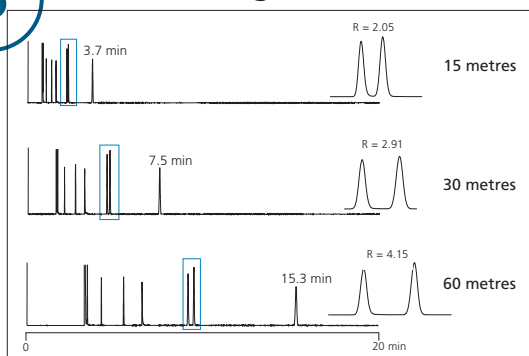
GC Column Replacement Guide	29
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GC Troubleshooting and Maintenance	30
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3

Column Length



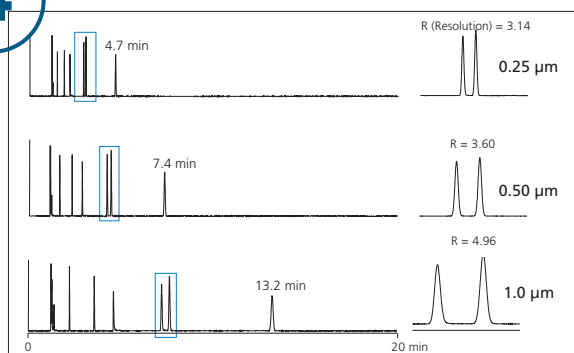
Effect of Length

resolution for the application. If the maximum column length available is being used, and resolution of the sample mixture is still inadequate then try changing the stationary phase or internal diameter.

Therefore, doubling the column length will only increase the resolving power of the column by approximately 40%.

4

Film thickness



Effect of Film Thickness.

column is recommended. This will reduce the possibility of broad overloaded peaks co-eluting with other compounds of interest. If the separation of two solutes is sufficient and co-elution is still unlikely, even with large differences in concentration, then a thinner film can be used.

therefore the higher the elution temperature.

As a rule, doubling the film thickness results in an increase in elution temperature of approximately 15-20 ° under isothermal conditions. Using a temperature program, the increase in elution temperature is slightly less.

$$\beta = \frac{id}{4d_f}$$

where

β = ratio

id = column internal diameter (μm)

d_f = film thickness (μm)

Formula to calculate Phase Ratio

β , a column can be categorized for the type of application it would best suit. The smaller the β value, the greater the ratio of phase to the column inner diameter, making it better suited for analyzing volatile compounds. Columns which have thin films are generally better suited for high molecular weight compounds and are characterized by large β values

PHASE RATIO

Film thickness (μm)	Column ID (mm)					
	0.1	0.15	0.22	0.25	0.32	0.53
0.10	250	-	550	625	800	1325
0.15	-	250	-	-	-	883
0.25	-	150	220	250	320	530
0.50	-	75	110	125	160	265
1.00	-	-	55	63	80	132
3.00	-	-	-	-	27	44
5.00	-	-	-	-	16	26

Above shows the phase ratio (β) available for the SGE range of capillary columns. Keeping a similar phase ratio when changing column internal diameters will ensure that your chromatographic parameters will not need substantial changes.



Environmental

The widespread use of GC-MS for Environmental analyses requires both low bleed and inertness. The broad range of compounds of interest means that medium polarity phases become more useful. BPX5, BPX35, and BPX50 provide a range of polarities, all with low bleed, high temperature limits, and robustness. Use of the optional SilGuard™ integrated guard column technology with *forte*™ BPX5 capillary GC columns provides additional protection by reducing the amount of non volatiles entering the analytical column.

For specialised applications such as PCBs, SGE's HT8 delivers unique separation capabilities.

Applications

[Analysis of PBDE'S, PCDT'S, and other complex mixtures using BPX5 and SolGel-1ms](#)

[HT8: The perfect PCB Column](#)

[Fast Pesticide Screening using a BPX5 GC Capillary Column](#)

[Analysis of Polychlorinated Dibenzodioxins & Furans on BPX5](#)

[Analysis of Polynuclear Aromatic Hydrocarbons on BPX35](#)

[Analysis of Polynuclear Aromatic Hydrocarbons on BPX5](#)

[Analysis of Volatile Organic Pollutants on BPX-Volatiles](#)

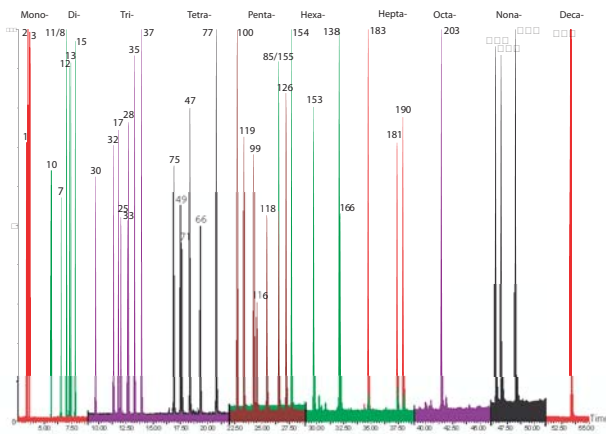
[Applications using BPX90](#)

[Analysis of Volatiles in Drinking Water on 25 m BP624 Column](#)

[Polychlorinated Biphenyls PCB Analysis](#)

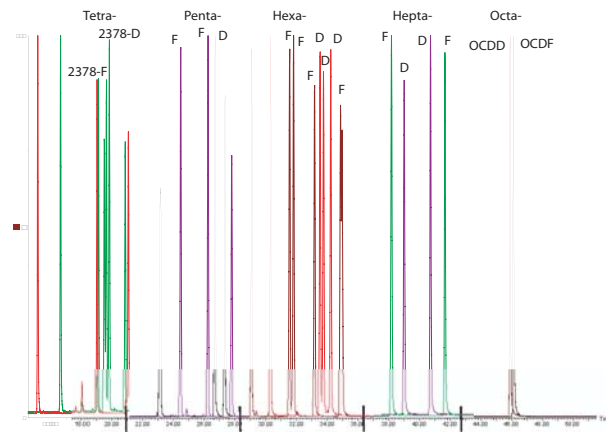


ANALYSIS OF PBDE'S, PCDT'S, AND OTHER COMPLEX MIXTURES USING BPX5 AND SOLGEL-1ms



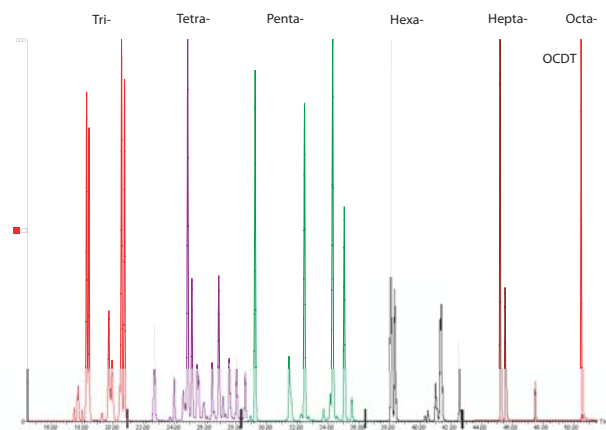
SIM 7-Group Analysis of 44 mono- to deca-PBDE's via cool-on-column (3- μ L). Deca-PBDE 209 at 310 min

- 44 Mono-Deca-PBDEs
- Cool-on-column inlet
- (No liner but 0.53 mm retention gap)
- 12.5 m BPX5 0.15 mm ID 0.1 μ m
- 0.25 m 0.53 mm ID plus
- 2 m 0.25 mm retention gaps
- He programmed 245-415 kPa



SIM 2-Group Analysis for non-o-PCBs. Tetra-PCB's 77 and 81 (A) are resolved from residual o-PCB's (97, 87, 110, and 136). Penta-126 (B), and hexa-169 (C) also detected in eluate 2-basic alumina of DX-3 QC sediment extract (5 of 500 μ L) Ion chromatograms (not smoothed). PBDE's are in same eluate (Peterman et al., 2006). Tetra-PBDE 47 from (M-2 Br)+

- Dioxin-like non-ortho PCBs
- Heated (275 $^{\circ}$ C) Direct inlet
- 4 mm Siltek Cyclo-Uniliner
- 30 m SolGel-1ms 0.15 mm ID 0.1 μ m
- 2.5 m x 0.25 mm ID retention gap
- He constant at 415 kPa



ACKNOWLEDGEMENT

Paul H. Peterman, US Geological Survey, Columbia Environmental Research Center. For additional information see SGE application note AN-0030-C.

EXPERT TIP

SGE liners undergo a high temperature de-activation process making them ideal for using with active compounds



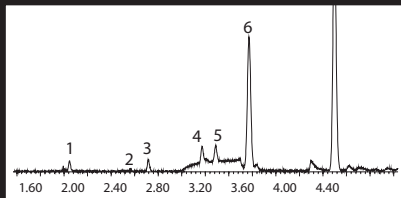


EXPERT TIP

Remember : the lower the temperature, the longer your column will last.



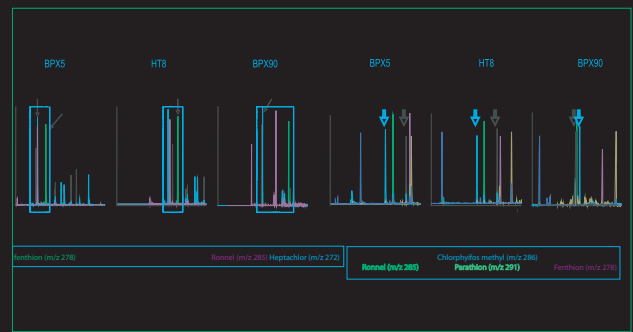
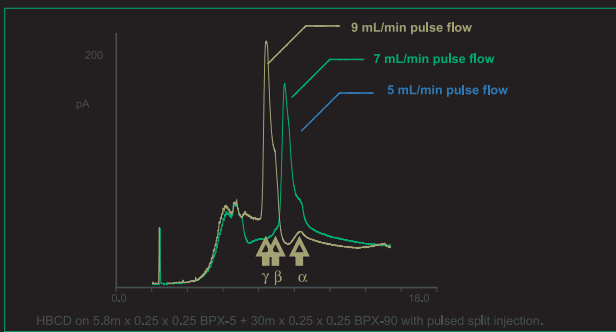
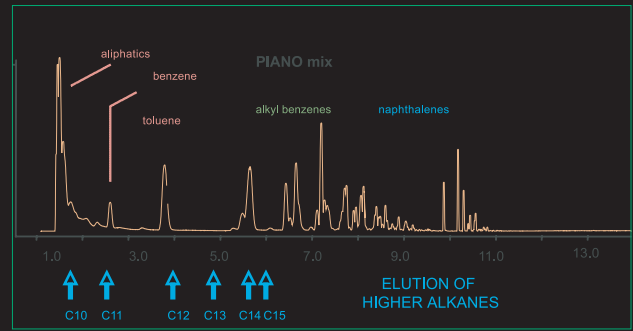
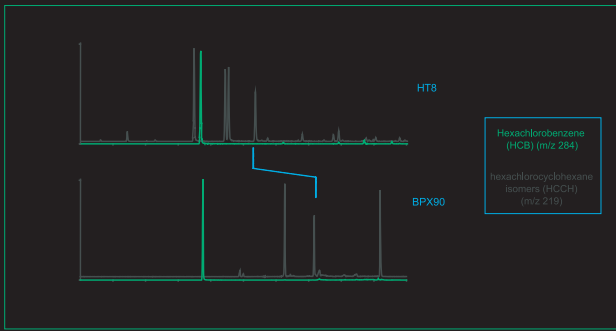
ANALYSIS OF VOLATILE ORGANIC POLLUTANTS ON BPX-VOLATILES



Components

- | | |
|-------------------------------|---------------------------------|
| 1. Dichlorodifluoromethane | 31. 1,2-Dibromethane |
| 2. Chloromethane | 32. Chlorobenzene |
| 3. Vinyl chloride | 33. Ethylbenzene |
| 4. Bromomethane | 34. 1,1,2-Dibromochloromethane |
| 5. Chloromethane | 35. p-Xylene |
| 6. Trichlorofluoromethane | 36. m-Xylene |
| 7. 1,1-Dichloroethene | 37. o-Xylene |
| 8. Dichloromethane | 38. Styrene |
| 9. trans-1,2-Dichloroethene | 39. Bromoform |
| 10. 1,1-Dichloroethane | 40. Isopropylbenzene |
| 11. 2,2-Dichloropropane | 41. Bromobenzene |
| 12. cis-1,2-Dichloroethene | 42. 1,1,2,2-Tetrachlorethane |
| 13. Bromochloromethane | 43. 1,2,3-Trichloropropane |
| 14. Chloroform | 44. n-Propyl benzene |
| 15. 1,1,1-Trichloroethane | 45. 2-Chlorotoulene |
| 16. 1,1-Dichloropropene | 46. 1,3,5-Trimethylbenzene |
| 17. Carbon tetrachloride | 47. 4-Chlorotoulene |
| 18. Benzene | 48. tert-Butylbenzene |
| 19. 1,2-Dichloroethane | 49. 1,2,4-Trimethylbenzene |
| 20. Trichloroethene | 50. sec-Bythlbenzene |
| 21. 1,2-Dichloropropane | 51. 1,3-Dichlorobenzene |
| 22. Dibromomethane | 52. p-Isopropyltoulene |
| 23. Bromodichloromethane | 53. 1,2-Dichlorobenzene |
| 24. cis-1,3-Dichloropropene | 54. n-Butylbenzene |
| 25. Toluene | 55. 1,4-Dichlorobenzene |
| 26. trans-1,3-Dichloropropene | 56. 1,2-Dibromo-3-chloropropane |
| 27. 1,1,2-Trichloroethane | 57. 1,2,4-Trichlorobenzene |
| 28. Tetrachloroethene | 58. Hexachlorobutadiene |
| 29. 1,3-Dichloropropane | 59. Naphthalene |
| 30. Dibromochloromethane | 60. 1,2,3-Trichlorobenzene |

APPLICATIONS USING BPX90



- Components**
1. Difluorobenzene
 2. Benzene
 3. Toluene - (d8)
 4. Toluene
 5. Chlorobenzene - (d5)
 6. Ethyl benzene
 7. p- & m-Xylene
 8. o-Xylene
 9. Bromofluorobenzene



EXPERT TIP

Condition column at either 20 ° above the maximum method temperature or the recommended maximum column temperature (whichever is lower).



Food, Flavours and Fragrances

GC analysis in the Food, Flavours and Fragrances area covers a diverse range of compounds that vary in both polarity and boiling point. As a consequence a range of different columns are often required. Chromatograms are often complex, and any single column may not give enough separation of all of the compounds that may be present. Pairs of columns such as BPX5 and SolGel-WAX™ may be used to overcome this problem.

For specific classes of compounds such as fatty acids, specialised columns are often necessary. Short chain fatty acids may be analyzed as free acids on the Nitroterephthalic acid (TPA) modified Polyethylene Glycol BP21 phase. Longer chain fatty acids are usually analyzed as fatty acid methyl esters on wax phases such as BP20 and SolGel-WAX™, or for more demanding applications, BPX70 or BPX90.

Applications

Comparison of Geranium Oils on SolGel-WAX™

Analysis of Eucalyptus Oil on SolGel-WAX™

Analysis of Lavender Oil on Cydex-B

Analysis of Lavender Oil on BPX-5

Analysis of Tasmanian Lavender Oil on SolGel-WAX™

Analysis of Wine on BP20

Analysis of Scotch Whisky on BP20

Analysis of Teatree oil on BPX5

Analysis of Omega-3 Fatty Acids using BPX70

BPX90 – a Highly Polar Phase for FAME Analysis

Analysis of PUFA-1 Marine FAME on BPX70

Analysis of PUFA-2 Animal FAME on BPX70

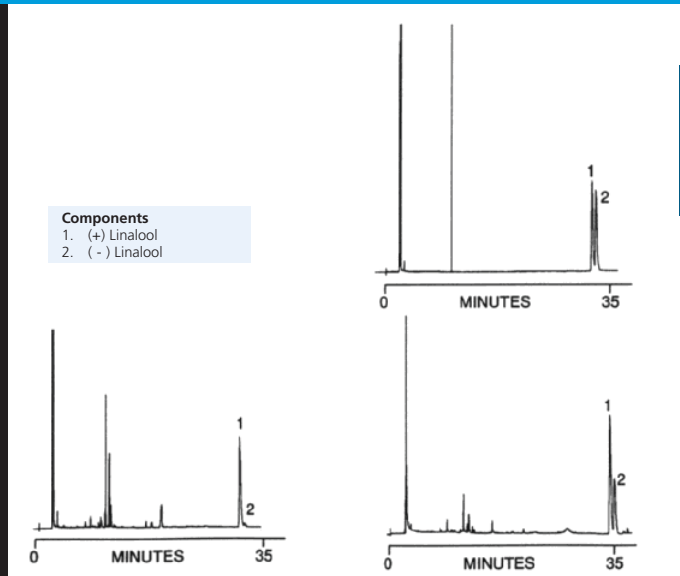
Analysis of PUFA-1 Marine FAME on BPX70

Components

1. α -Pinene
2. β -Pinene
3. Sabinene
4. Limonene
5. 1,8-Cineole
6. p-Cymene
7. Linalool L
8. Terpinen-4-ol
9. α -Terpineol
10. α -Terpinenyl acetate
11. d-Carvone



ANALYSIS OF LAVENDER OIL ON CYDEX-B



Components

- 1. (+) Linalool
- 2. (-) Linalool

EXPERT TIP

Better resolution is often obtained from chiral columns by using lower temperatures and higher carrier gas velocities than for conventional columns.

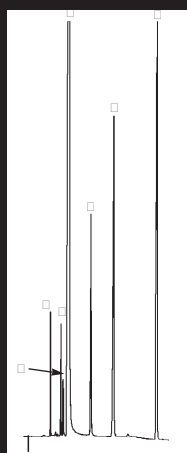
Components

- | | |
|-------------------------|----------------------------|
| 1. β - Pinene | 12. Camphor |
| 2. 1-Octen-3-ol | 13. Lavandulol |
| 3. 3-Octanol | 14. Borneol L |
| 4. 3-Octanol | 15. Terpinen-4-ol |
| 5. p-Cymene | 16. -Terpineol |
| 6. Limonene | 17. Linalyl acetate |
| 7. cis-OCimene | 18. Lavundyl Acetate |
| 8. cis-Linaloxide | 19. Geranyl Acetate |
| 9. trans-Linalool oxide | 20. -Santalene |
| 10. Linalool L | 21. β -Caryophyllene |
| 11. Octenyl acetate | 22. -Cadinine |
| | 23. -Cryophyllene oxide |





Food, Flavours and Fragrances



Components

1. Acetaldehyde
2. Ethyl Acetate
3. Methanol
4. Ethanol
5. Propan-1-ol
6. 2-Methylpropan-1-ol
7. 2-Methylbutan-1-ol+3-Methylbutan-1-ol

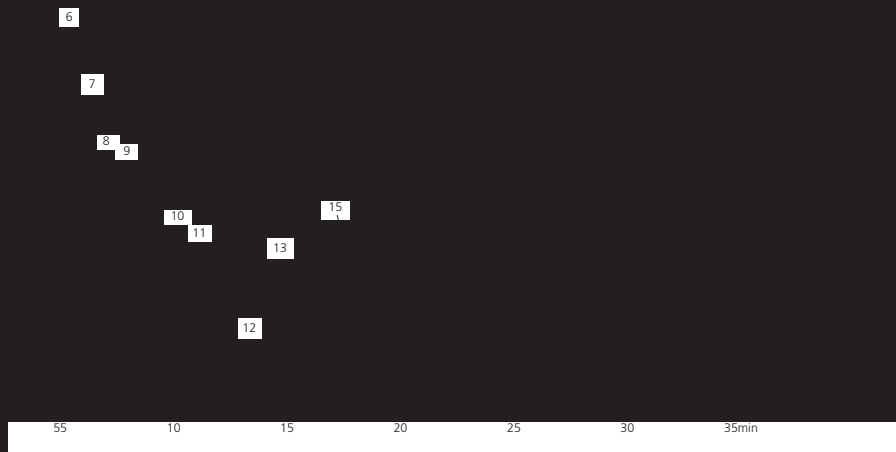
EXPERT TIP

For extended life of polar columns, always use an oxygen trap in the carrier gas line.

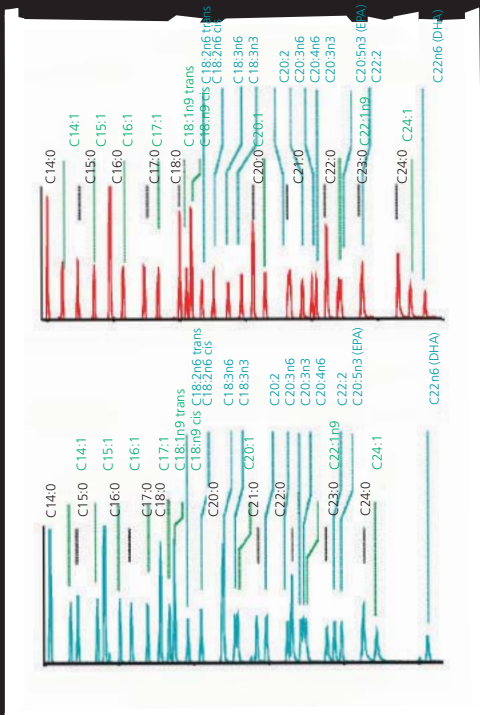


ANALYSIS OF OMEGA-3 FATTY ACIDS USING A BPX70

Components	
1. C6	18. C18:2 trans 9,12
2. C8	19. C18:2 cis 9,12
3. C10	20. C18:3 cis 6,9,12
4. C11	21. C18:3 cis 9,12,15
5. C12	22. C18:4 cis 6,9,12,15
6. C13	23. C20
7. C14	24. C21:1 cis 11
8. C14:1 cis 9	25. C20:2 cis 11,14
9. C15	26. C20:3 cis 8,11,14
10. C16	27. C20:4 cis 5,8,11,14
11. C16:1 cis 9	28. C20:3 cis 11,14,17
12. C17	29. C22
13. C17:1 cis 10	30. C20:5,8,11,14,17
14. C18	31. C22:1 cis 13
15. C18:1 trans 9	32. C22:4 cis 7,10,13,16
16. C18:1 cis 9	33. C24
17. C18:1 cis 12	34. C22:6 cis 4,7,10,13,16,19



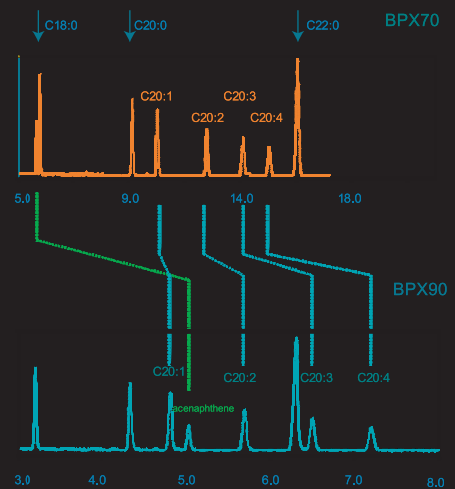
BPX90 – A HIGHLY POLAR PHASE FOR FAME ANALYSIS



WHAT IS DIFFERENT ?

- poly (biscyanopropylsiloxane) type.
- stability and a wide operating range (70 - 280 °C).
- short elution times relative to other polar phases. BPX90 shows low selectivity for non-polar analytes and saturated FAME.
- polyunsaturated FAME and the selectivity can be tuned with film thickness.
- of cis and trans isomers and positional isomers of FAME analytes.

FAME POLARITY TEST





Food, Flavours and Fragrances

Components

1. C14:0
2. C16:0
3. C16:1n7
4. C18:1n9
5. C18:1n7
6. C 18:2n6
7. C18:3n3
8. C18:4n3
9. C20:0
10. C20:1n9
11. C20:4n6
12. C20:5n3

EXPERT TIP

To fully utilize the high thermal stability of BPX70 columns SGE recommend the use of Helium when operating above 220/230 °C for extended periods.



Fuels and Petrochemical

For Fuels and Petrochemical analysis by GC, one of the main considerations is the thermal stability of the column, both physical & chemical. Phases must have high temperature limits to allow the analysis of high boiling point compounds and columns must be able to physically withstand repeated cycling to extreme temperatures. Columns such as SGE's BPX1 and HT5 have been created with these demands in mind.

Where higher polarity is required, such as the separation of aromatic compounds, SolGel-WAX™, and BPX90, provide enhanced selectivity without the unnecessary sacrifice of maximum temperature limits.

Applications

Total Recoverable Petroleum Hydrocarbons (TRPH) Analysis on Standard and Fast BPX5

Analysis of Polywax 655 & Refinery Lubrication Oil on HT5

The Separation of Aromatics from Olefins in Petroleum Samples using BPX90

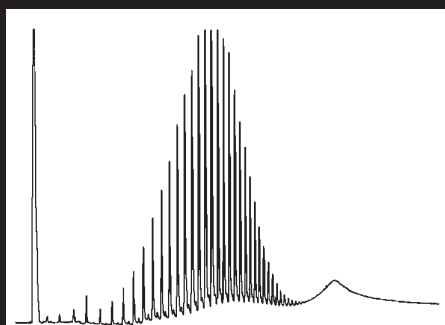
Unleaded Gasoline on BPX5

Fast GC For TPH Analysis

Simulated Distillation using BPX1-SimD



Fuels and Petrochemical



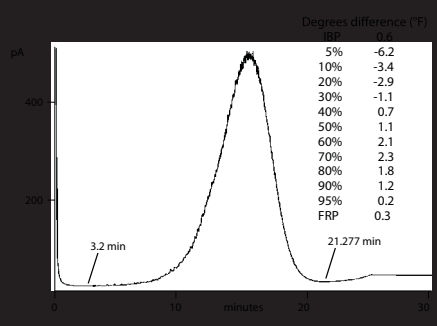
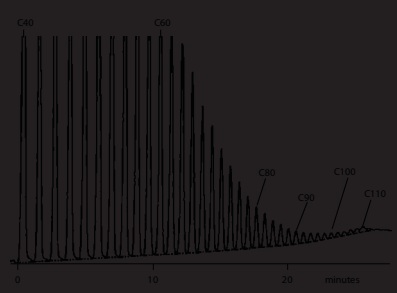
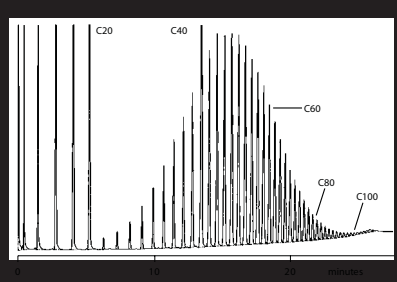


Components

1. Benzene
2. Toluene
3. Ethylbenzene
4. m,p-Xylene
5. o-Xylene



Fuels and Petrochemical





Chemical

For general chemical analysis, a good rule of thumb is to use the lowest polarity column that provides sufficient separation. Particular classes of compounds, such as alcohols, amines, or organic acids, may require thicker film phases, or specific phases such as the BPX35 or BP21 to avoid undue peak tailing.

Applications

Analysis of 18 Alcohols on BP20

Analysis of Aliphatic Alcohols on BP1

Analysis of 15 Organic Acids on BP20

US EPA 625 Phenols Mix on BPX50

Analysis of Organic Acids in Water on BP21

Analysis of Amines on BP1

Analysis of Aromatic Amines on BP5

Analysis of Aromatic Amines from Diazo Dyes on BPX35

Analysis of Ketones on thick film BPX5

Analysis of Triethylamine and Triethanolamine on SolGel-1ms™

**EXPERT TIP**

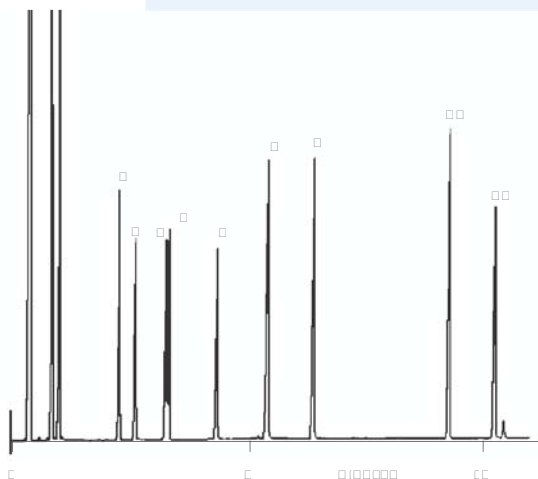
On-column injection and the addition of a 0.03 M Oxalic acid (2 %) to the injection solution increases the acidity of the column to allow lactic acid to be detected.



ANALYSIS OF AROMATIC AMINES ON BP5

Components

- | | |
|----------------------|------------------------|
| 1. Pyridine | 7. 2,6-Dimethylaniline |
| 2. 2-Methyl Pyridine | 8. 1,4-Phenyldiamine |
| 3. gamma - BHC | 9. Nicotine |
| 4. Aniline | 10. Biphenylamine |
| 5. o-Toluidine | 11. Bibenzylamine |
| 6. m-Toluidine | |



EXPERT TIP

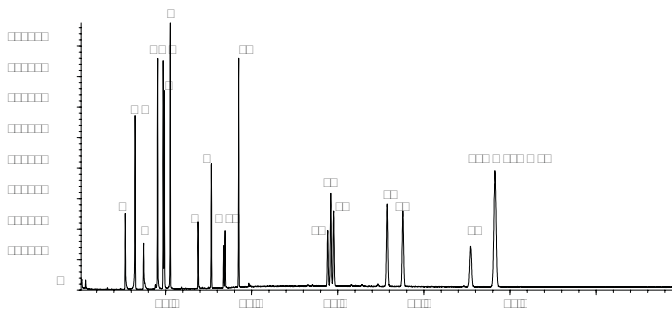
Using a thicker film helps prevent amines from tailing.

Phase: BP5, 1.0 µm film
Column: 12 m x 0.53 mm ID
 Initial Temp: 60 °C, 0 min
 Final Temp: 190 °C, 0 min
 Detector: FID
 Sensitivity: 128 x 10⁻¹²AFS
 Injection Mode: Split
Part No.: 054197

ANALYSIS OF AROMATIC AMINES FROM DIAZO DYES ON BPX35

Components

- | | |
|---------------------------|---|
| 1. Indolin | 13. 4,4'-Diaminodiphenylmethane |
| 2. o-Toluidine | 14. Benzidine |
| 3. 2,4-Diaminoanisole | 15. 3,3'-Dimethyl-4,4'-diaminodiphenylmethane |
| 4. p-Chloroaniline | 16. 3,3'-dimethylbenzidine |
| 5. p-a residue | 17. 4,4'-Thiodianiline |
| 6. 2,4,6-Trimethylaniline | 18. 3,3'-Dichlorobenzidine |
| 7. 4-Chlorotoluidine | 19. 4,4'-Methylenebis(2chloroaniline) |
| 8. Unknown | 20. 3,3'-Dimethoxybenzidine |
| 9. 2-Naphthylamine | |
| 10. Unknown | |
| 11. 4-Aminodiphenyl | |
| 12. 4,4'-Oxydianiline | |



Phase: BPX35 0.25 µm film
Azo Dyes Standard: 10 ppm solution in DCM
Column: 30 m x 0.25 mm ID
 Initial Temp: 50 °C, 2 min
 Final Temp: 280 °C, 25 min
 Detector Type: MSD
 Carrier Gas: He, 7.1 psi
 Constant Flow: On
 Injection Mode: Splitless
 Purge On Time: 1.0 min
 Injection Volume: 1 µL
 Injection Temperature: 250 °C
 Autosampler: No
 Liner Type : 4 mm ID Double Taper
Part No.: 092018
Column Part Number: 054701

EXPERT TIP

SilTite ferrules eliminate the need for re-tightening following temperature cycling and reduce oxygen levels with in the system improving performance





EXPERT TIP

To prevent decreasing retention times in your chromatography, replace the septum daily.



SGE Capillary Column Part Number Listing

Phase	Length (m)	ID (mm)	Film Thickness (µm)	Part No.
BP1	10	0.1	0.1	054022
BP1	12	0.15	0.25	054028
BP1	25	0.15	0.25	054029
BP1	12	0.22	0.1	054040
BP1	12	0.22	0.25	054046
BP1	12	0.22	1	054052
BP1	15	0.22	0.25	054049
BP1	25	0.22	0.1	054041
BP1	25	0.22	0.25	054047
BP1	25	0.22	1	054053
BP1	30	0.22	0.25	054050
BP1	50	0.22	0.1	054042
BP1	50	0.22	0.25	054048
BP1	50	0.22	1	054054
BP1	60	0.22	0.25	054051
BP1	15	0.25	0.1	054039
BP1	15	0.25	0.25	054043
BP1	30	0.25	0.25	054044
BP1	30	0.25	0.5	054820
BP1	30	0.25	1	054056
BP1	60	0.25	0.25	054045
BP1	60	0.25	0.5	054812
BP1	60	0.25	1	054815
BP1	12	0.32	0.25	054058
BP1	12	0.32	0.5	054064
BP1	12	0.32	1	054070
BP1	15	0.32	0.25	054061
BP1	25	0.32	0.25	054059
BP1	25	0.32	0.5	054065
BP1	25	0.32	1	054071
BP1	25	0.32	4	054076
BP1	25	0.32	5	054081
BP1	30	0.32	0.25	054062
BP1	30	0.32	0.5	054068
BP1	30	0.32	1	054813
BP1	30	0.32	1.5	054811
BP1	30	0.32	3	054073
BP1	30	0.32	4	054077
BP1	50	0.32	0.25	054060
BP1	50	0.32	0.5	054066
BP1	50	0.32	1	054072
BP1	50	0.32	5	054082
BP1	60	0.32	0.25	054067
BP1	60	0.32	0.5	054069
BP1	60	0.32	1	054810
BP1	60	0.32	5	054085
BP1	12	0.53	1	054086
BP1	12	0.53	3	054097
BP1	15	0.53	0.5	054870
BP1	15	0.53	1	054089
BP1	25	0.53	1	054087
BP1	25	0.53	3	054098
BP1	25	0.53	5	054095
BP1	30	0.53	0.5	054092
BP1	30	0.53	1	054090
BP1	30	0.53	2.6	054819
BP1	30	0.53	3	054808
BP1	30	0.53	5	054806
BP1	50	0.53	1	054088
BP1	50	0.53	5	054096
BP1	60	0.53	0.5	054871
BP1	60	0.53	3	054809
BP1	60	0.53	5	054807
BP1-PONA	50	0.15	0.5	054950
BP1-PONA	100	0.25	0.5	054818
BPX1	10	0.1	0.1	054777
BPX1	6	0.53	2.65	0548025
BPX1	10	0.53	0.1	054803
BPX1	10	0.53	0.9	054801
BPX1	10	0.53	2.65	054802
BPX1 Aluminum Clad	5	0.53	0.1	054800
BPX1 Aluminum Clad	5	0.53	0.17	054782
BPX1 Aluminum Clad	10	0.53	0.1	054779
BPX1	10	0.53	2.65	054802
BPX1 Aluminum Clad	5	0.53	0.1	054800
BPX1 Aluminum Clad	5	0.53	0.17	054782
BPX1 Aluminum Clad	10	0.53	0.1	054779
SolGel-1ms	30	0.25	0.25	054795

Phase	Length (m)	ID (mm)	Film Thickness (µm)	Part No.
SolGel-1ms	60	0.25	0.25	054793
SolGel-1ms	30	0.32	0.25	054798
SolGel-1ms	60	0.32	0.25	054794
BP5	12	0.22	0.25	054167
BP5	25	0.22	0.25	054168
BP5	30	0.22	0.25	054171
BP5	50	0.22	0.25	054169
BP5	50	0.22	1	054175
BP5	15	0.25	0.25	054182
BP5	30	0.25	0.25	054183
BP5	30	0.25	1	054203
BP5	60	0.25	0.25	054184
BP5	60	0.25	1	054215
BP5	12	0.32	0.25	054179
BP5	15	0.32	0.25	054176
BP5	25	0.32	0.25	054180
BP5	25	0.32	0.5	054186
BP5	25	0.32	1	054192
BP5	30	0.32	0.25	054177
BP5	30	0.32	0.5	054216
BP5	30	0.32	1	054189
BP5	50	0.32	0.5	054187
BP5	50	0.32	1	054193
BP5	60	0.32	0.25	054178
BP5	60	0.32	1	054188
BP5	12	0.53	1	054197
BP5	15	0.53	1	054194
BP5	15	0.53	1.5	054199
BP5	25	0.53	1	054198
BP5	30	0.53	0.5	0541935
BP5	30	0.53	1	054195
BP5	30	0.53	5	054196
BP5	60	0.53	1.5	054204
BPX5	10	0.1	0.1	054099
BPX5	10	0.15	1.2	054106
BPX5	12	0.15	0.25	054103
BPX5	12	0.15	0.4	054107
BPX5	25	0.15	0.25	054104
BPX5	25	0.15	0.4	054108
BPX5	30	0.15	0.15	054110
BPX5	50	0.15	0.25	054105
BPX5	40	0.18	0.18	054229
BPX5	12	0.22	0.25	054112
BPX5	25	0.22	0.25	054113
BPX5	25	0.22	1	054116
BPX5	30	0.22	0.25	054142
BPX5	50	0.22	0.25	054114
BPX5	50	0.22	1	054117
BPX5	7	0.25	0.25	054149
BPX5	15	0.25	0.1	0542170
BPX5	15	0.25	0.25	054100
BPX5	15	0.25	1	054121
BPX5	30	0.25	0.1	0541011
BPX5	30	0.25	0.25	054101
BPX5	30	0.25	0.5	0541025
BPX5	30	0.25	1	054122
BPX5	60	0.25	0.25	054102
BPX5	60	0.25	1	054123
BPX5	6	0.32	1	0541261
BPX5	12	0.32	0.25	054118
BPX5	12	0.32	0.5	054124
BPX5	12	0.32	1	054127
BPX5	15	0.32	0.25	054144
BPX5	15	0.32	1	054152
BPX5	25	0.32	0.25	054119
BPX5	25	0.32	0.5	054125
BPX5	25	0.32	1	054128
BPX5	25	0.32	3	054136
BPX5	30	0.32	0.25	054145
BPX5	30	0.32	0.5	0541205
BPX5	30	0.32	1	054153
BPX5	50	0.32	0.25	054120
BPX5	50	0.32	0.5	054126
BPX5	50	0.32	1	054129
BPX5	60	0.32	0.25	054146
BPX5	60	0.32	1	054154
BPX5	12	0.53	0.25	054133
BPX5	12	0.53	1	054130

SGE Capillary Column Part Number Listing

Phase	Length (m)	ID (mm)	Film Thickness (µm)	Part No.
BPX5	12	0.53	3	054138
BPX5	15	0.53	0.5	0541344
BPX5	15	0.53	1	054147
BPX5	15	0.53	1.5	0541347
BPX5	15	0.53	3	054159
BPX5	25	0.53	0.25	054134
BPX5	25	0.53	1	054131
BPX5	25	0.53	3	054139
BPX5	30	0.53	0.5	0541345
BPX5	30	0.53	1	054148
BPX5	30	0.53	1.5	0541348
BPX5	30	0.53	3	054160
BPX5	50	0.53	1	054132
BPX5	60	0.53	1	054158
HT5	12	0.22	0.1	054631
HT5	25	0.22	0.1	054632
HT5	15	0.25	0.1	054633
HT5	30	0.25	0.1	054634
HT5	12	0.32	0.1	054641
HT5	15	0.32	0.5	054667
HT5	25	0.32	0.1	054642
HT5	30	0.32	0.5	054668
HT5	6	0.53	0.1	054655
HT5	10	0.53	0.5	054670
HT5	12	0.53	0.15	054657
HT5	15	0.53	0.5	054671
HT5	25	0.53	0.15	054658
HT5	30	0.53	0.5	054672
HT5 Aluminum Clad	12	0.22	0.1	054635
HT5 Aluminum Clad	25	0.22	0.1	054636
HT5 Aluminum Clad	12	0.32	0.1	054651
HT5 Aluminum Clad	25	0.32	0.1	054652
HT5 Aluminum Clad	50	0.32	0.1	054653
HT5 Aluminum Clad	5	0.53	0.075	054673
HT5 Aluminum Clad	6	0.53	0.1	054661
HT5 Aluminum Clad	12	0.53	0.15	054662
HT5 Aluminum Clad	25	0.53	0.15	054665
HT8	10	0.1	0.1	054690
HT8	40	0.18	Proprietary	054686
HT8	12	0.22	0.25	054674
HT8	25	0.22	0.25	054675
HT8	50	0.22	0.25	054676
HT8	30	0.25	0.25	054677
HT8	60	0.25	0.25	054683
HT8	12	0.32	0.25	054679
HT8	25	0.32	0.25	054680
HT8	50	0.32	0.25	054681
HT8	60	0.32	0.25	054682
HT8	12	0.53	0.5	054684
HT8	25	0.53	0.5	054685
BPX35	10	0.1	0.1	054699
BPX35	15	0.22	0.25	054713
BPX35	25	0.22	0.25	054711
BPX35	30	0.22	0.25	054714
BPX35	50	0.22	0.25	054712
BPX35	15	0.25	0.25	054700
BPX35	15	0.25	1	054703
BPX35	30	0.25	0.25	054701
BPX35	30	0.25	0.5	0547025
BPX35	30	0.25	1	054704
BPX35	60	0.25	0.25	054702
BPX35	60	0.25	1	054705
BPX35	15	0.32	0.25	054723
BPX35	15	0.32	0.5	054718
BPX35	15	0.32	1	054716
BPX35	25	0.32	0.25	054721
BPX35	30	0.32	0.25	054724
BPX35	30	0.32	0.5	0547158
BPX35	30	0.32	1	054717
BPX35	50	0.32	0.25	054722
BPX35	60	0.32	0.25	054725
BPX35	15	0.53	0.5	054734
BPX35	15	0.53	1	054736
BPX35	30	0.53	0.5	054735
BPX35	30	0.53	1	054737
BPX608	25	0.32	0.4	054823
BP624	25	0.22	1.2	054826
BP624	30	0.22	1.2	054827

Phase	Length (m)	ID (mm)	Film Thickness (µm)	Part No.
BP624	15	0.25	1.4	054839
BP624	30	0.25	1.4	054840
BP624	60	0.25	1.4	054842
BP624	25	0.32	1.8	054830
BP624	30	0.32	1.8	054832
BP624	50	0.32	1.8	054831
BP624	60	0.32	1.8	054841
BP624	25	0.53	3	054834
BP624	30	0.53	3	054836
BP624	50	0.53	3	054835
BP624	60	0.53	3	054838
BPX-Volatiles	20	0.18	1	054978
BPX-Volatiles	40	0.18	1	054979
BPX-Volatiles	30	0.25	1.4	054980
BPX-Volatiles	60	0.25	1.4	054981
BPX-Volatiles	30	0.32	1.8	054982
BPX-Volatiles	60	0.32	1.8	054983
BPX-Volatiles	30	0.53	3	054984
BPX-Volatiles	60	0.53	3	054985
BP10	12	0.22	0.25	054252
BP10	25	0.22	0.25	054253
BP10	50	0.22	0.25	054254
BP10	15	0.25	0.25	054255
BP10	30	0.25	0.25	054256
BP10	30	0.25	1	054271
BP10	60	0.25	0.25	054257
BP10	15	0.32	0.25	054258
BP10	15	0.32	0.5	054264
BP10	25	0.32	0.25	054262
BP10	25	0.32	0.5	054268
BP10	30	0.32	0.25	054259
BP10	30	0.32	0.5	054265
BP10	30	0.32	1	054270
BP10	50	0.32	0.5	054269
BP10	60	0.32	0.25	054260
BP10	60	0.32	0.5	054266
BP10	15	0.53	1	054282
BP10	25	0.53	1	054280
BP10	30	0.53	1	054283
BPX50	10	0.1	0.05	054739
BPX50	10	0.1	0.07	054738
BPX50	10	0.1	0.1	054740
BPX50	30	0.15	0.15	054741
BPX50	15	0.25	0.25	054750
BPX50	30	0.25	0.25	054751
BPX50	60	0.25	0.25	054752
BPX50	15	0.32	0.25	054760
BPX50	30	0.32	0.25	054761
BPX50	60	0.32	0.25	054762
BPX50	15	0.53	0.5	054770
BPX50	30	0.53	0.5	054771
BPX50	30	0.53	1	054772
BP225	25	0.22	0.25	054352
BP225	50	0.22	0.25	054353
BP225	25	0.32	0.25	054358
BP225	25	0.53	0.5	054364
BP20	10	0.1	0.1	054405
BP20	12	0.22	0.25	054420
BP20	25	0.22	0.25	054421
BP20	30	0.22	0.25	054424
BP20	50	0.22	0.25	054422
BP20	60	0.22	0.25	054425
BP20	15	0.25	0.25	054426
BP20	30	0.25	0.25	054427
BP20	30	0.25	0.5	054415
BP20	30	0.25	1	054439
BP20	60	0.25	0.25	054428
BP20	60	0.25	0.5	054458
BP20	15	0.32	0.25	054432
BP20	25	0.32	0.25	054430
BP20	25	0.32	0.5	054436
BP20	25	0.32	1	054442
BP20	30	0.32	0.25	054433
BP20	30	0.32	0.5	054438
BP20	30	0.32	1	054444
BP20	50	0.32	0.25	054431
BP20	50	0.32	0.5	054437
BP20	50	0.32	1	054443

GC Column Replacement Guide

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