SHIMADZU
Excellence in Science

S-COS-B18B
#2021 Issue

Shimadzu Consumables Catalogue

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CoreFocus
The Smart Choice In Consumables SHIMADZU

For over 140 years, Shimadzu has continued to be your trusted partner by providing leading-edge analytical instruments. Now we further support your success through borderless delivery of the high quality consumable products that solve everyday challenges. All this is for the pursuit of our corporate philosophy "Contributing to Society through Science and Technology".

Table of Contents

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UHPLC/HPLC Columns and LC Accessories

Column Selection Guide

Selection by Support Materials

- **Packing Materials**
  - **Silica Gel Type**
    - Shim-pack XR, VP, MAqC-ODS, G Series, FC-ODS, Velox Series, Arata C18
    - Shim-pack UC Series
    - Shim-pack Diol Series
    - Shim-pack WAX/WCX Series
  - **Organic Silica Hybrid**
    - Shim-pack Scepter Series
  - **Polymer Type**
    - Shim-pack GPC Series
    - Shim-pack IC Series
    - Shim-pack Amino, SCR, ISA/ISC Series

Selection by Separation Modes

- **Silica Gel Type**
  - **Reversed Phase** — Low molecular-weight compounds
    - ODS/C18 (Shim-pack XR, VP, MAqC, G, FC Series, Velox, Scepter)
    - Shim-pack GIST C18-AQ
    - Shim-pack GIS C18-P
    - Shim-pack GIS RP-Shield
    - C8 (Shim-pack XR, VP, G Series)
    - Phenyl (Shim-pack XR, VP, G Series)
    - Shim-pack GIST Phenyl-Hexyl
    - Shim-pack Velox Biphenyl
    - Shim-pack Velox PFPP, Shim-pack Scepter PFPP
  - **Normal Phase**
    - Shim-pack GIS CN .... Steroid hormones
    - Shim-pack XR-SIL .... Phospholipids
    - Shim-pack GIST NH2 .... Saccharides, tocopherols
  - **HILIC Mode**
    - Shim-pack GIS HILIC, Velox HILIC, Scepter HILIC........ Polar compounds
  - **Ion Exchange**
    - Shim-pack WAX (weakly basic anion exchange)........ Nucleotides, proteins
    - Shim-pack WCX (weakly acidic cation exchange) .... Proteins
  - **Gel Filtration**
    - Shim-pack Diol Series........ Proteins
    - Shim-pack Bio Diol Series........ MAb, oligonuclestides, carbonydrates, proteins
- **Polymer Type**
  - **Ion Exchange**
    - Shim-pack IC Series........ Inorganic ions
    - Shim-pack Amino, ISC Series........ Amino acids, guanidines
    - Shim-pack ISA Series .... Saccharides
    - Shim-pack Bio IEX........ Peptides, oligonuclestides, biopharmaceutical, proteins, nucleic acids
  - **Ion Exclusion**
    - Shim-pack SCR-101H, SCR-102H .... Organic acids
    - Shim-pack Fast-OA .... Organic acids
  - **GPC**
    - Shim-pack GPC Series........ Synthetic high polymers

Selection by Column Particle Sizes

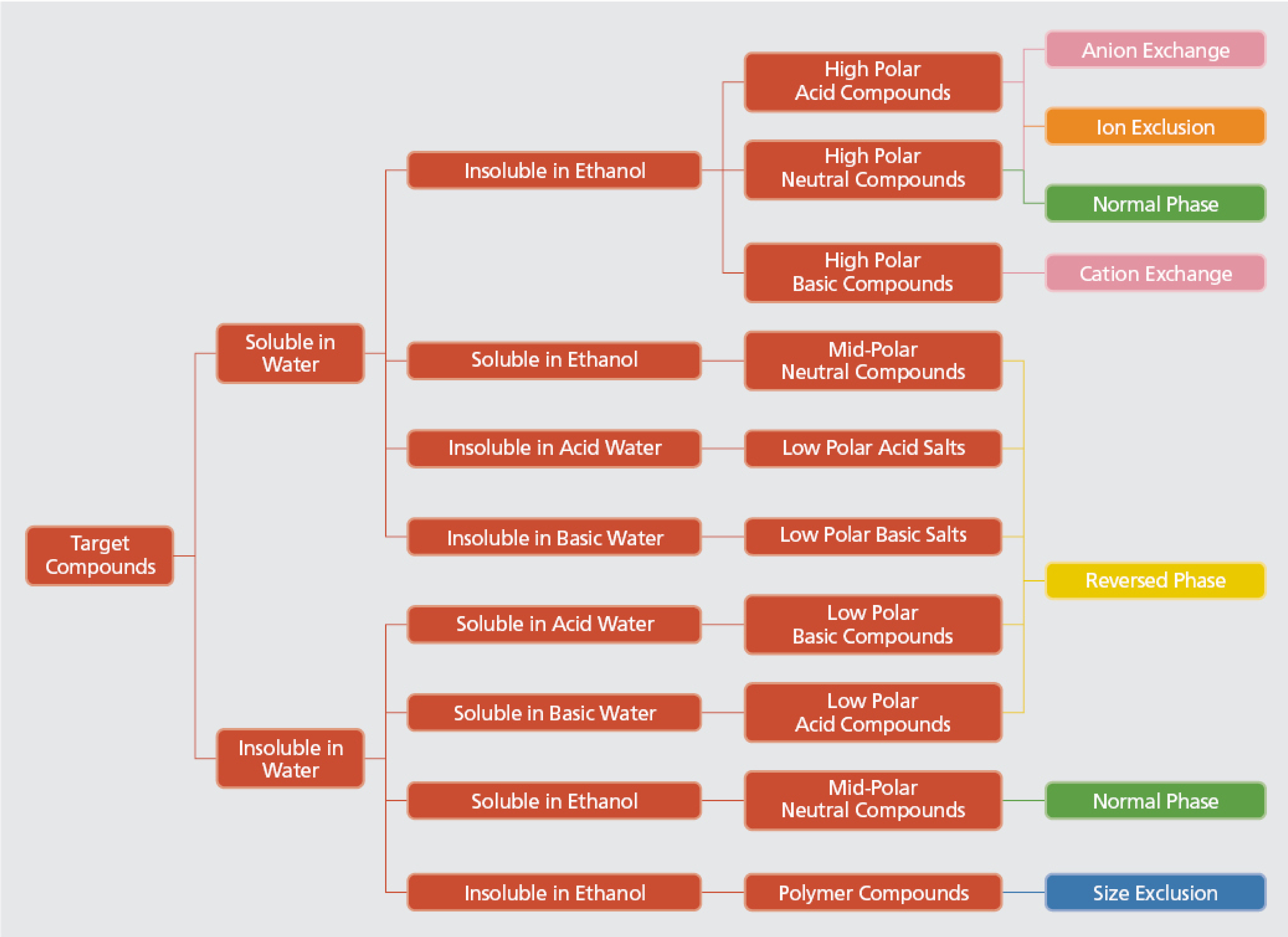
- HPLC Columns
  - Analytical Columns
    - High-Speed Analysis
      - 1.6 µm, 2.2 µm — Shim-pack XR-ODS III, Arata C18
      - 1.8 µm, 2.7 µm — Shim-pack Velox Series
      - 1.9 µm, 2 µm, 2.2 µm, 3 µm — Shim-pack G, XR Series, Scepter Series
    - Conventional Analysis
      - ≥3 µm — Shim-pack VP, MAqC-ODS, G Series, FC-ODS, Arata C18, Velox Series, Scepter Series
  - Preparative Columns
    - 5 µm, 10 µm — Shim-pack G Series, Scepter Series
    - 15 µm — Shim-pack PREP Series

Selection of ODS columns

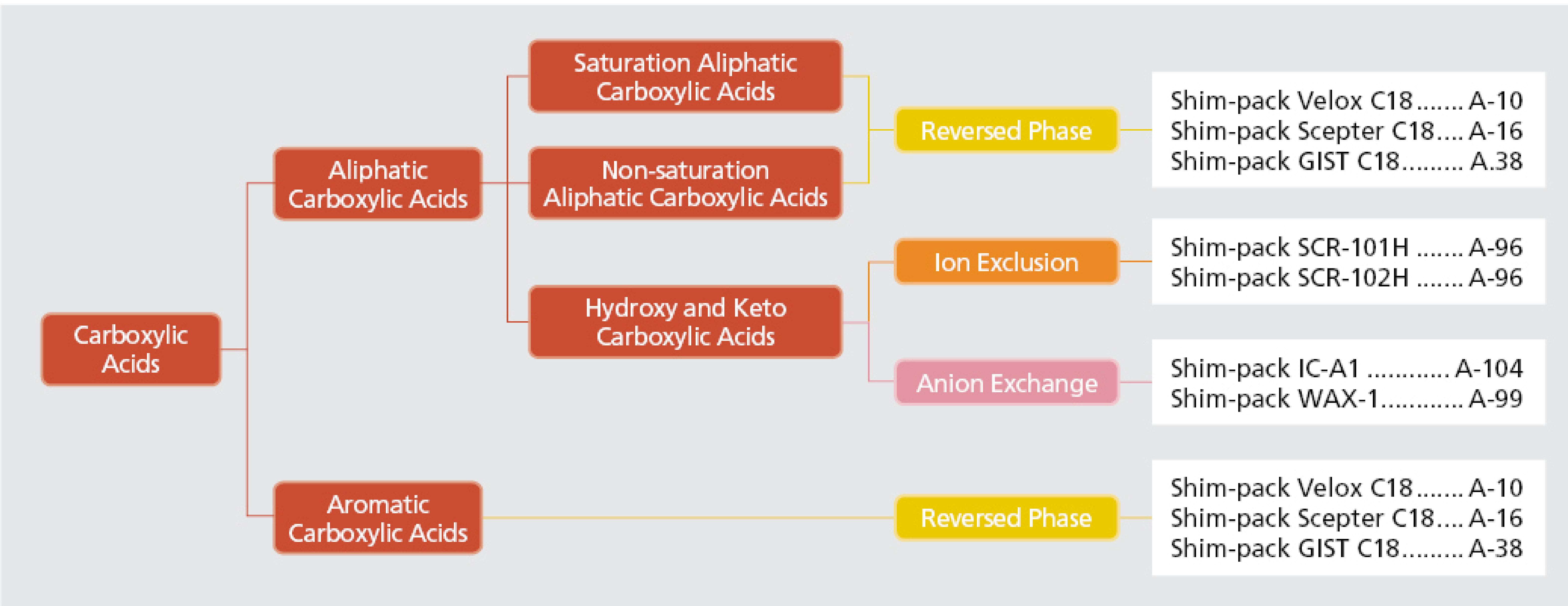
- High-Speed Analysis
  - With Certificate of Compliance for Validation
    - Shim-pack XR-ODS (Pressure tolerance: 35MPa) A-28
    - Shim-pack XR-ODS II (Pressure tolerance: 60MPa) A-30
    - Shim-pack XR-ODS III (Pressure tolerance: 100MPa) A-30
  - Wider pH Range
    - Shim-pack Scepter C18 / HD-C18 (pH range: 1 - 12) A-16
    - Shim-pack GIST/GIST-HP C18 (pH range: 1 - 10) A-38
  - Rapid Separation and Wider pH Range
    - Shim-pack GISS/GISS-HP C18 (pH range: 1 - 10) A-42
  - Stronger Retentivity
    - Shim-pack Scepter C18 / HD-C18 .... A-16
    - Shim-pack GIS/GIS-HP C18 .... A-44
  - Strong Retentivity of Highly Polar Compounds
    - Shim-pack GIST/GIST-HP C18-AQ A-38
- Conventional Analysis
  - Strong Retentivity of Highly Polar Compounds
    - Shim-pack GIST/GIST-HP C18-AQ A-38
  - With Certificate of Compliance for Validation
    - Shim-pack VP-ODS A-32
  - Wider pH Range
    - Shim-pack Scepter C18 / HD-C18 (pH range: 1 - 12) A-16
    - Shim-pack GIST C18 (pH range: 1 - 10) A-38
  - Stronger Retentivity
    - Shim-pack GIS C18 .... A-44
    - Shim-pack FC-ODS (pH range: 1.5 - 9) A-67
    - Shim-pack Scepter HD C18 .... A-17
  - Higher Steric Selectivity
    - Shim-pack GIS C18-P A-46
  - Different Elution Pattern
    - Shim-pack GIS RP-Shield A-48
  - Higher Cost-Performance
    - Shim-pack GWS C18 .... A-49
  - Strong Retentivity of Basic Compounds
    - Shim-pack MAqC-ODS A-36

Column Selection Guide

Column Selection by Target Compounds



Column Selection by Target Compounds



Column Selection by Target Compounds

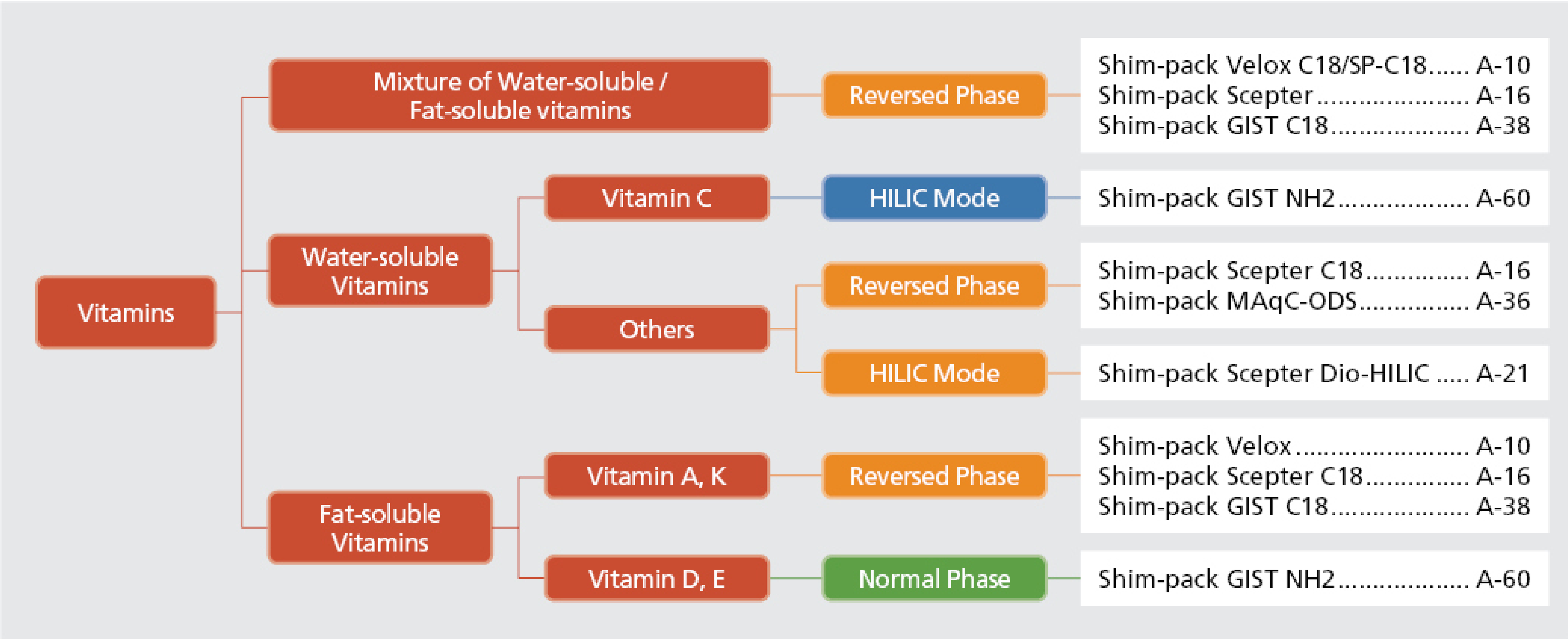
- **Amino Acids**
  - **Free Amino Acids**
    - HILIC Mode
      - Shim-pack Scepter Dio-HILIC A-21
    - Cation Exchange
      - Shim-pack AMINO-LI .... A-95 (Post-column derivation fluorescing with OPA)
  - **Protein-hydrolyzed Amino Acids**
    - Cation Exchange
      - Shim-pack AMINO-NA .... A-95 (Post-column derivation fluorescing with OPA)
    - Reversed Phase (Pre-column derivatization)
      - Shim-pack Velox C18 .... A-10
      - Shim-pack Scepter C18 .... A-16
      - Shim-pack GIST C18 .... A-38
    - Reversed Phase + Ion Pair
      - Shim-pack Velox C18 .... A-10
      - Shim-pack Scepter C18 .... A-16
      - Shim-pack GIST C18 .... A-38

- **Peptides Proteins**
  - **Peptides**
    - Reversed Phase
      - Shim-pack Velox C18 .... A-10
      - Shim-pack Scepter C18 .... A-16
      - Shim-pack Arata Peptide C18 .... A-27
      - Shim-pack GIST C18 .... A-38
      - Shim-pack GISS C18 .... A-42
  - **Proteins**
    - Reversed Phase
      - Shim-pack Scepter C4 .... A-22
    - Gel Filtration
      - Shim-pack Diol Series A-85
      - Shim-pack Bio Diol A-77
    - Cation Exchange
      - Shim-pack Bio IEX SP/SP-NP A-77
      - Shim-pack WCX-1 .... A-99
    - Anion Exchange
      - Shim-pack Bio IEX Q/Q-NP A-77
      - Shim-pack WAX-2 .... A-99
    - Hydrophobic Interaction
      - Shim-pack Bio HIC A-133

- **Sugars**
  - **Monosaccharides**
    - HILIC Mode
      - Shim-pack GIST NH2 .... A-60
    - Gel Filtration + Ligand Exchange
      - Shim-pack SCR-101N/C/P A-96
  - **Mono- to tri-saccharides**
    - Anion Exchange
      - Shim-pack ISA-07 .... A-97
  - **Oligosaccharides**
    - HILIC Mode
      - Shim-pack GIST NH2 .... A-60
  - **Derivatized Sugars**
    - Reversed Phase
      - Shim-pack Velox C18 .... A-10
      - Shim-pack Scepter C18 .... A-16
      - Shim-pack GIST C18 .... A-38

Column Selection Guide

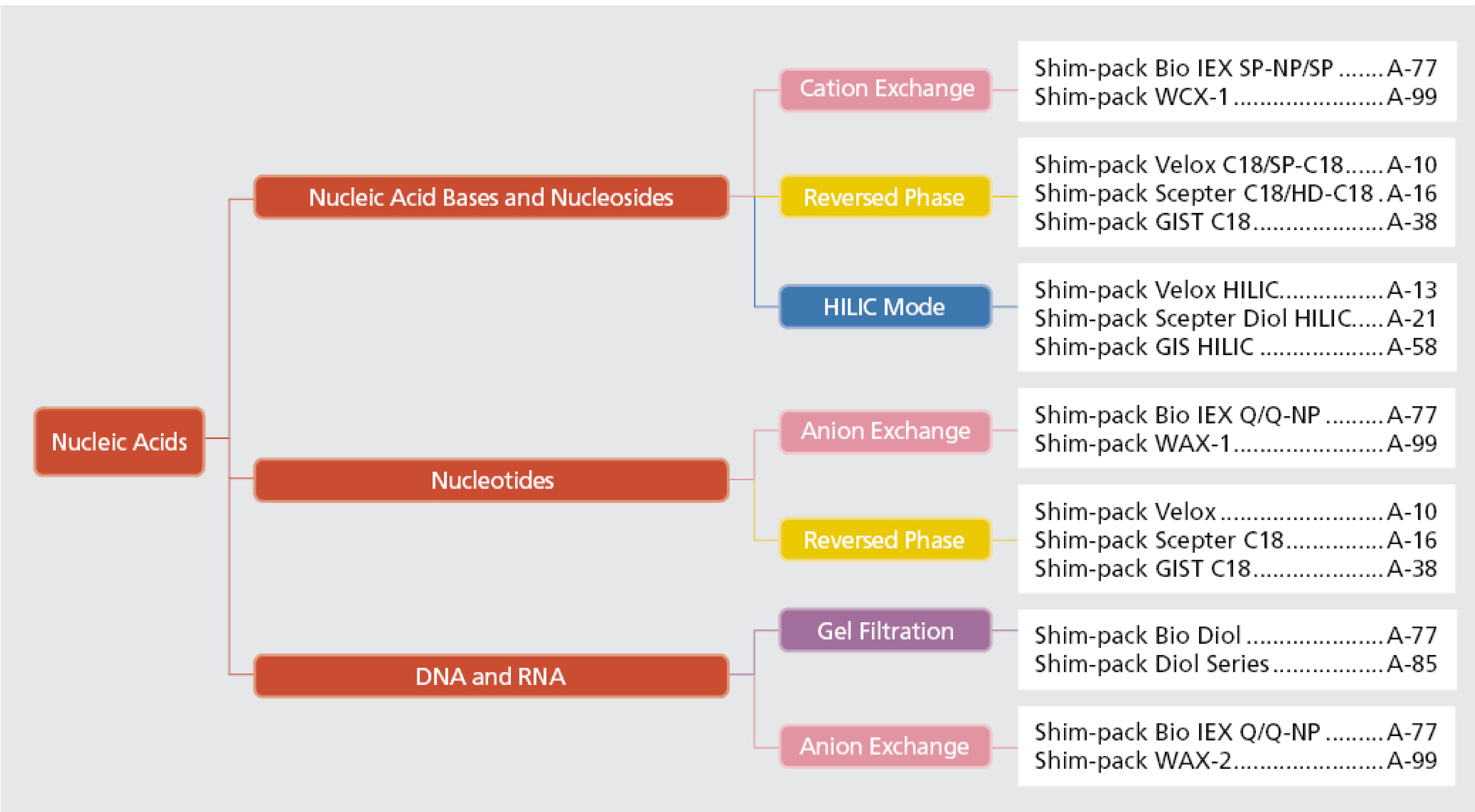
Column Selection by Target Compounds



Water-soluble Vitamins	
Vitamin B1 (thiamin)	UV (270 nm) RF (Post-column derivatization)
Vitamin B2 (riboflavin)	UV (270 nm) RF (Post-column derivatization)
Vitamin B3 (niacin)	UV (260 nm)
Vitamin B5 (pantothenic acid)	UV (205 nm)
Vitamin B6 (pyridoxine)	UV (290 nm)
Vitamin B12 (cyanocobalamine)	UV (280 nm)
Vitamin BT (carnitine)	UV (210 nm) RI
Vitamin C (ascorbic acid)	UV (245 nm)
Vitamin H (biotin)	UV (210 nm)
Vitamin M (folic acid)	UV (280 nm)
Vitamin P (hesperidin)	UV (265 nm)

Fat-soluble Vitamins	
Vitamin A (retinol)	UV (325 nm) RF (Ex. 340 nm, Em. 460 nm)
Vitamin D	UV (265 nm)
Vitamin E (tocopherol)	UV (295 nm) RF (Ex. 295 nm, Em. 325 nm)
Vitamin K	UV (250 nm) RF (Post-column derivatization)

* The above wavelength values are approximate values. It is possible to be influenced by the state of mobile phase.



Selection by USP

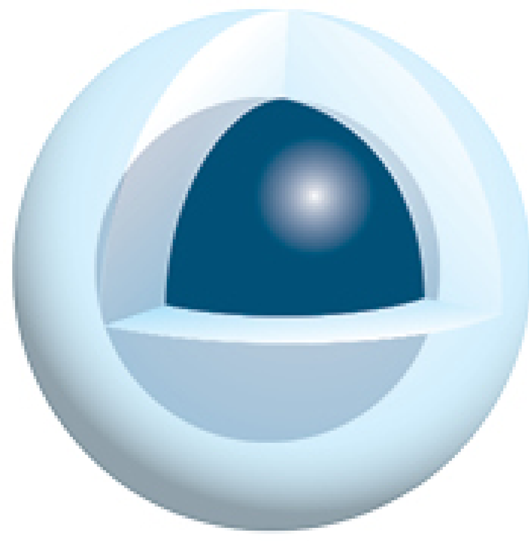
USP Code	Packing	Shim-pack HPLC Columns	Page
L1	Octadecyl silane chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.	Shim-pack Velox C18	A-10
		Shim-pack Velox SP-C18	A-11
		Shim-pack Scepter C18	A-16
		Shim-pack Scepter HD-C18	A-17
		Shim-pack Arata C18	A-25
		Shim-pack XR-ODS	A-28
		Shim-pack XR-ODS II	A-30
		Shim-pack XR-ODS III	A-30
		Shim-pack VP-ODS	A-32
		Shim-pack GIST C18	A-38
		Shim-pack GIST C18-AQ	A-40
		Shim-pack GISS C18	A-42
		Shim-pack GIS C18	A-44
		Shim-pack GIS C18-P	A-46
		Shim-pack GIS RP-Shield	A-48
		Shim-pack GWS C18	A-49
		Shim-pack Solar C18	A-66
		Shim-pack FC-ODS	A-67
		Shim-pack UC GIS II	A-90
		Mastro2™ C18	A-88
		ULTRON VX-ODS	A-116
		STR ODS-II	A-119
		STR ODS-M	A-120
L3	Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack Velox HILIC	A-13
		Shim-pack XR-SIL	A-28
		Shim-pack UC Sil	A-90
		Shim-pack UC Sil II	A-91
		ULTRON VX-SIL	A-115
L7	Octylsilane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack Scepter C8	A-18
		Shim-pack XR-C8	A-28
		Shim-pack VP-C8	A-33
		Shim-pack GIST C8	A-50
		Shim-pack Solar C8	A-66
		ULTRON VX-Octyl	A-117
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack GIST NH2	A-60
		Shim-pack UC NH2	A-90
L10	Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack GIS CN	A-64
		Shim-pack UC CN	A-90
L11	Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack Velox Biphenyl	A-12
		Shim-pack Scepter Phenyl	A-20
		Shim-pack XR-Phenyl	A-28
		Shim-pack VP-Phenyl	A-32
		Shim-pack GIST Phenyl	A-52
		Shim-pack GIST Phenyl-Hexyl	A-54
		Shim-pack UC Phenyl	A-90
L17	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	Shim-pack SCR-101H	A-96
		ULTRON PS-80H	A-105
L19	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, 5 - 15 µm in diameter.	Shim-pack SCR-101C	A-96
		ULTRON PS-80C	A-113
L20	Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack Scepter Diol-HILIC	A-21
		Shim-pack GIS HILIC	A-58
		Shim-pack UC Diol	A-90
		Shim-pack UC Diol II	A-91
		Shim-pack Diol-150	A-85
		Shim-pack Diol-300	A-85
		Shim-pack Bio Diol	A-77
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	Shim-pack GPC Series	A-83
L22	A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 - 15 µm in diameter.	Shim-pack IC-C1	A-101
		Shim-pack AMINO-LI	A-95
		Shim-pack AMINO-NA	A-95
		Shim-pack ISC	A-97
L23	An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quartenary ammonium groups, 7 - 12 µm in size.	Shim-pack IC-A1	A-104
L26	Butyl silane chemically bonded to totally porous silica particles, 1.5 to 10 µm in diameter.	Shim-pack Scepter C4	A-22
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 Da. It is spherical, silica-based, and processed to provide pH stability.	Shim-pack Bio Diol	A-77
L34	Strong cation exchange resin consisting of sulfonated crosslinked styrene-divinylbenzene copolymer in the lead form, 9µm in diameter.	ULTRON PS-80P	A-113
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 1.5 to 10 µm in diameter.	Shim-pack Velox PFPP	A-12
		Shim-pack Scepter PFPP	A-19
		Shim-pack GIST PFPP	A-56
		Mastro2™ PFP	A-88
L45	Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter.	ULTRON ES-CD	A-112
		ULTRON ES-PhCD	A-112
L57	A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 µm in diameter, with a pore size of 120 Å.	ULTRON ES-OVM	A-110
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm diameter.	Shim-pack SCR-101N	A-96
		ULTRON PS-80N	A-113
L59	Packing for the size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7000 kDa. The packing is spherical 1.5 - 10 µm, silica or hybrid packing with a hydrophilic coating.	Shim-pack Diol-150	A-85
		Shim-pack Diol-300	A-85
		Shim-pack Bio Diol	A-77
L68	Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.	Shim-pack GIST Amide	A-62
L101	Cholesteryl groups bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.	Shim-pack UC-Choles	A-91
L104	Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.	Shim-pack UC-Triazole	A-91

Maximize LC Separation Performance with Core Shell Technology

Designed to maximize performance of LC systems, Shimadzu's Shim-pack Velox columns with core shell technology enable you to achieve increased separations and faster analysis times on any LC platform.

Whether developing a high efficiency LC separation method, transferring an existing method for increased throughput while maintaining resolution, or are trying to improve the resolution of a complex separation, Shim-pack Velox columns will satisfy your needs.

Column ruggedness is critical to any LC analysis and Shim-pack Velox core-shell columns deliver excellent column lifetime for even the most challenging sample matrices.



Shim-pack Velox column will deliver

- Increased resolution with maximum efficiency → improving separation and detection
- Faster separation without sacrificing performance → maximizing laboratory productivity and reducing cost of analysis
- Increased sample throughput → reducing overall analysis time
- Superior ruggedness → reducing cost of analysis
- Excellent reproducibility → maintaining analysis and data integrity

Column Selection Guide for Different LC Platforms

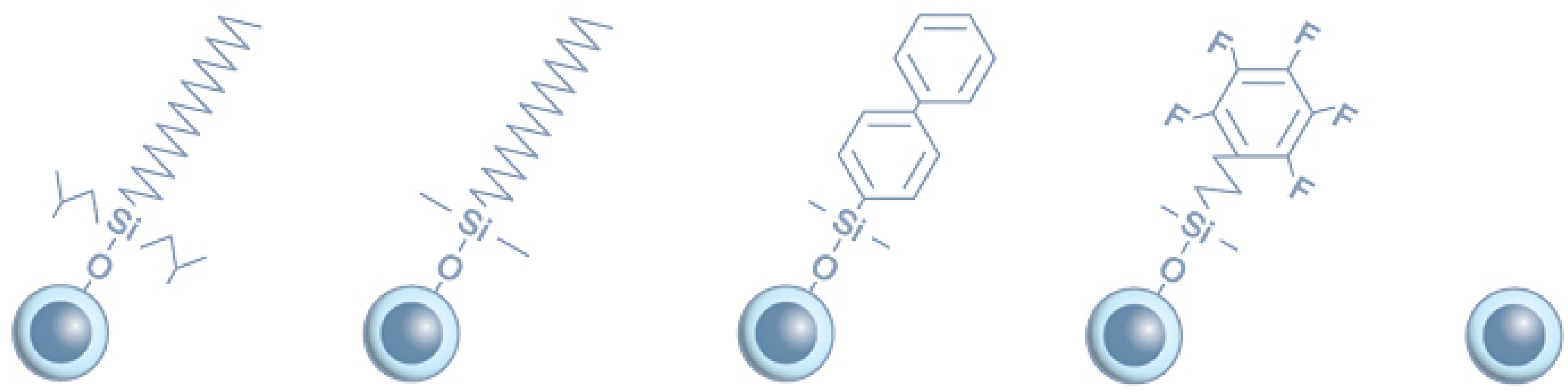
Column particle sizes and column volumes affect chromatography results significantly if the column configuration does not match the LC system. As column particle size is reduced, or the column volume (ID and/or the length of the columns) decreases, the necessity for a lower dispersion system is increased.

Choosing the optimal column configuration for your LC system allows you to achieve improved chromatography. The following table summarizes the starting recommendations of column configuration for each LC system.

	Prominence	Prominence-i plus	Nexera XR	Nexera-i plus	Nexera X2
LC System	HPLC		UHPLC-like	UHPLC	
Particle size	2.7 µm & 5 µm		2.7 µm	1.8 µm & 2.7 µm	
Column I.D.	4.6 mm (3.0 mm)		3.0 mm (2.1 mm)	2.1 mm	
Column Length	100-250 mm		50-100 mm	150 mm	

Column Chemistries

Combining highly efficient core shell particle technology with a wide range of surface chemistries provides you with the best opportunity for optimal resolution. With different chemistry characteristics, Shim-pack Velox columns are suitable for use in a wide variety of applications and challenging separations.

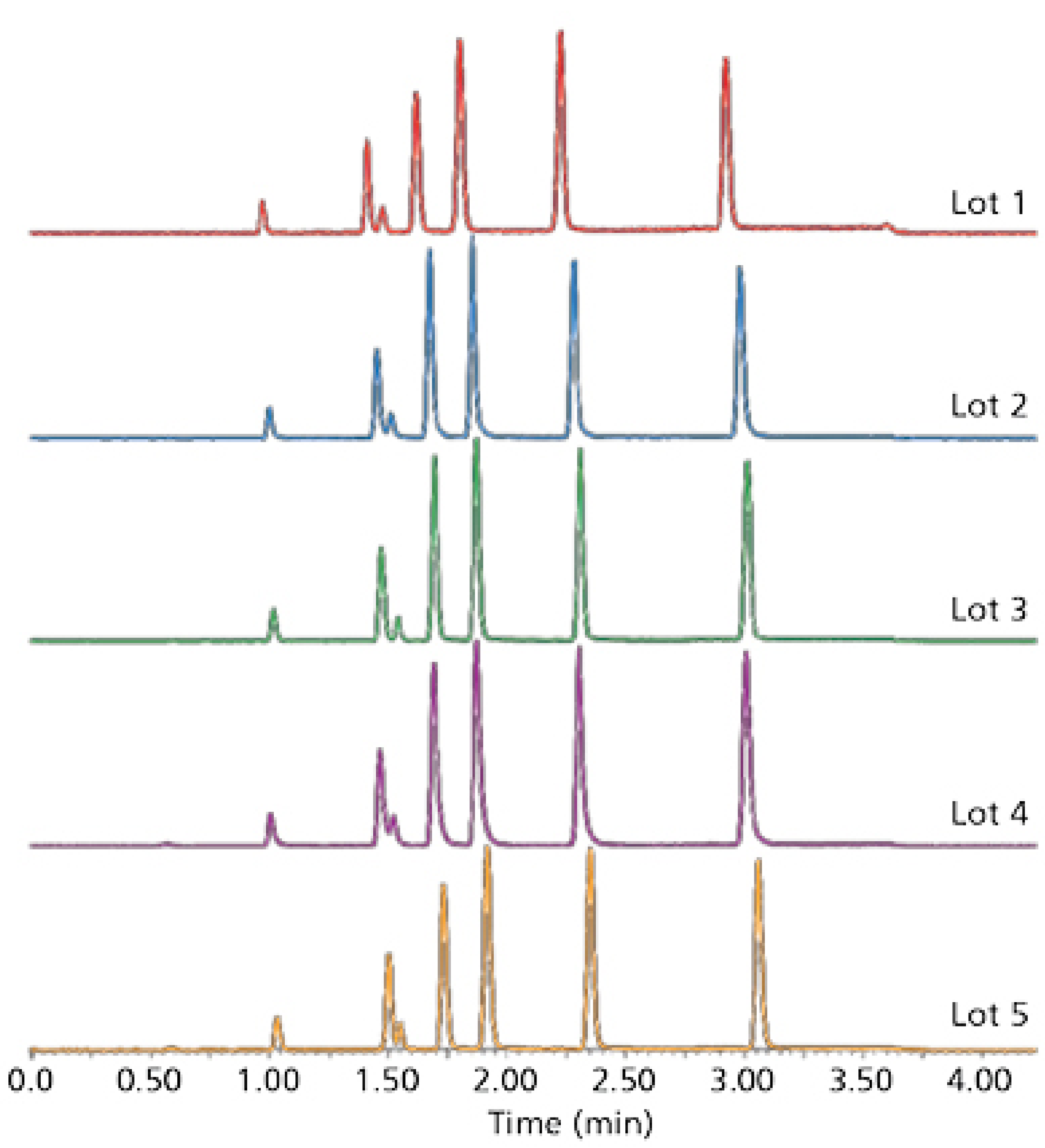


		SP-C18	C18	Biphenyl	PFPP	HILIC
USP Classification		L1	L1	L11	L43	L3
Ligand type		Sterically protected C18	C18	Biphenyl	Pentafluorophenyl propyl	None
Particle Size (μm)		1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	2.7
Pore size (Å)		90	90	90	90	90
Suraface Area	1.8 μm	125 m²/g	125 m²/g	125 m²/g	125 m²/g	-
	2.7 μm	130 m²/g	130 m²/g	130 m²/g	130 m²/g	130 m²/g
	5 μm	100 m²/g	100 m²/g	100 m²/g	100 m²/g	-
Carbon Load	1.8 μm	7 %	9 %	7 %	4 %	-
	2.7 μm	7 %	7 %	7 %	4 %	NA
	5 μm	5 %	5 %	5 %	3 %	-
End-Cap		No	YES	YES	No	No
pH range		1.0-8.0	2.0-8.0	1.5-8.0	2.0-8.0	2.0-8.0
Max Pressure	1.8 μm	100 MPa*	100 MPa*	100 MPa*	100 MPa*	-
	2.7 μm	60 MPa	60 MPa	60 MPa	60 MPa	60 MPa
	5 μm	40 MPa	40 MPa	40 MPa	40 MPa	-

* For maximum lifetime, recommended maximum pressure for 1.8 μm particles is 80MPa.

Lot to Lot Reproducibility

We understand that lot to lot consistent performance of columns is required to maximize your laboratory performance. From one lot to the next, every Shim-pack Velox column you purchase will perform consistently.



Compounds (50 ng/mL)

1. Cortisol
2. 11-Deoxycortisol
3. Estradiol
4. Boldenone
5. Testosterone
6. Androstenedione
7. Progesterone

Conditions

Column : Shim-pack Velox Biphenyl 2.7 μm, 3.0×100 mm (P/N: 227-32016-03)
Flow Rate : 0.7 mL/min
Column Temp. : 30 °C
Sample Dilulent : Initial mobile phase
Injection Volume : 5 μL
Mobile Phase A : 0.1 % formic acid in water
Mobile Phase B : 0.1 % formic acid in acetonitrile Gradient: 40 % B (0 min) 80 % B (3 min)

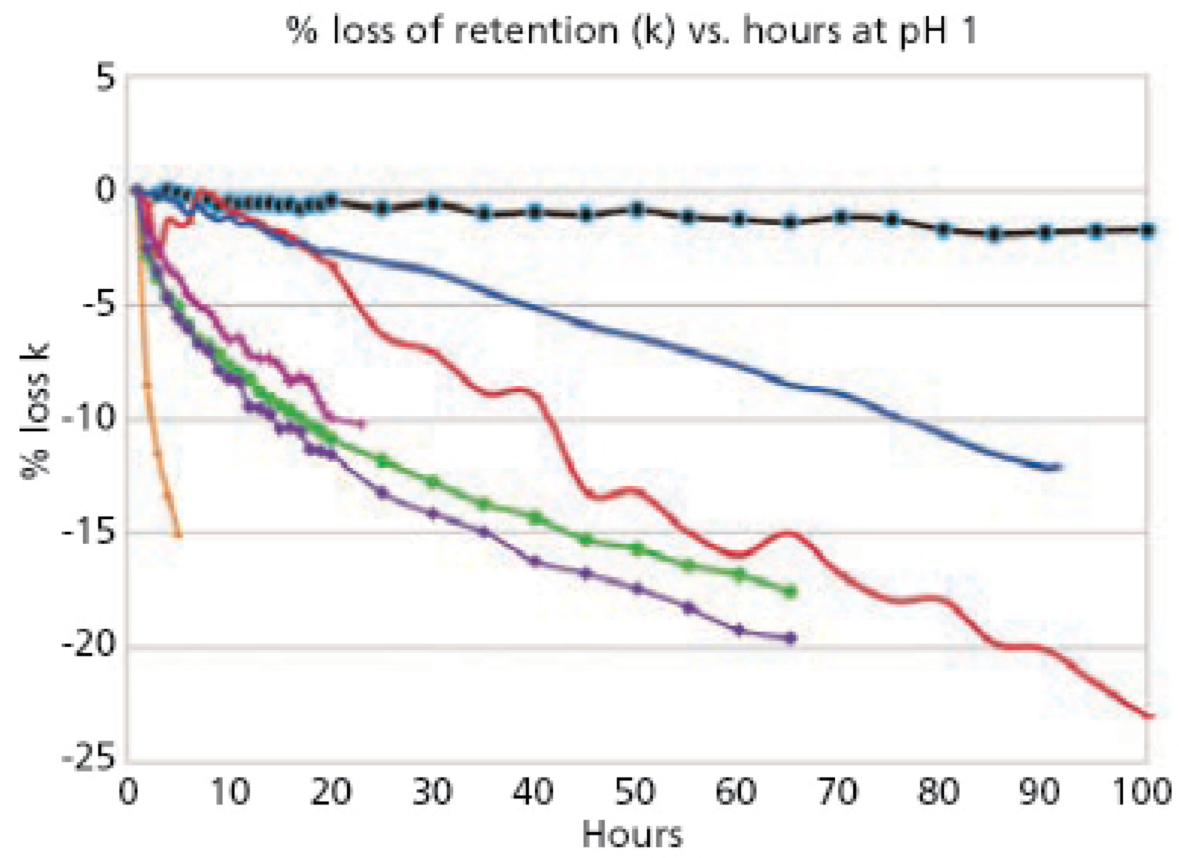
Shim-pack Velox SP-C18

Designed and intended specifically for use under low pH condition, Shim-pack Velox SP (Sterically Protected)-C18 offers a well balanced retention profile with a long life time even under harsh, acidic condition needed for LC/MS(/MS) analysis.

- Sterically protected to resist strongly acidic (pH 1-8) mobile phase condition
- Well balanced retention profile
- Suitable for LC/MS(/MS) analysis

Low pH Stability

Sterically protected ligand provides extended low pH stability for the core shell particle. Shim-pack Velox SP-C18 columns maintain a stable retention profile under strongly acidic mobile phase condition (pH1) .



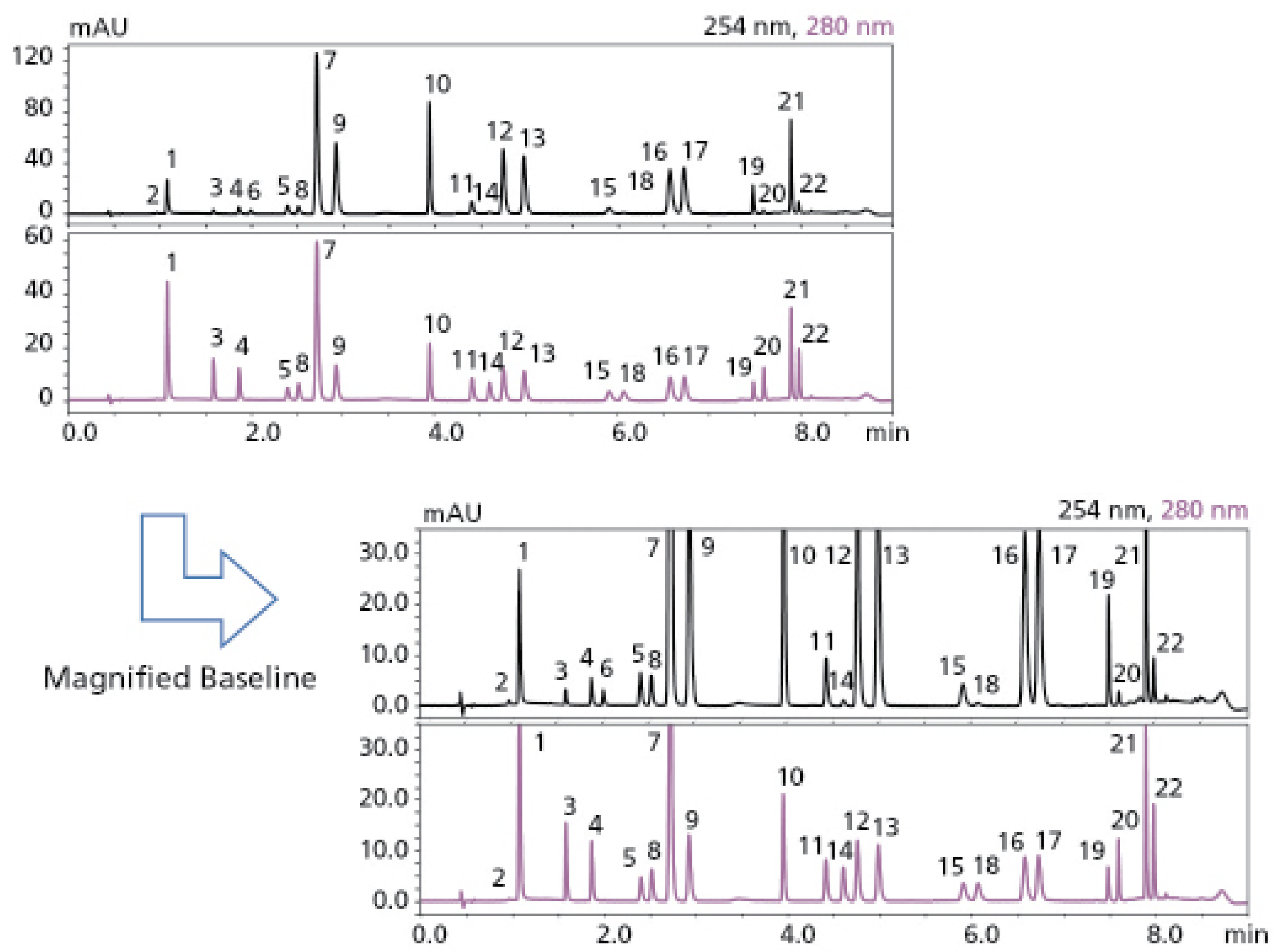
Conditions

Flow Rate	:	0.6 mL/min
Column Temp.	:	60 °C
Mobile Phase A	:	0.1 % TFA in water
Mobile Phase B	:	Acetonitrile
Gradient	:	45 % B (0 min – 7.5 min) → 5 % B (7.51 min – 50 min) 100 % B (55 min) → 45 % B (55.01 min → 60 min)

- Shim-pack Velox SP-C18 Brand A FPP C18
- Brand B FPP C18
- Brand C FPP C18
- Brand D Core-shell C18
- Brand E Core-shell C18
- Brand F Core-shell C18

Simultaneous Analysis of 22 Preservative Agents

More than 20 compounds used as the preservative agent for industrial products like foods and cosmetics can can be separated by Shim-pack Velox SP-C18. The simultaneous determination and quantitation of multiple target compounds are possible in a wide range of commercial product within acceptable analytical times.



Preservative agents

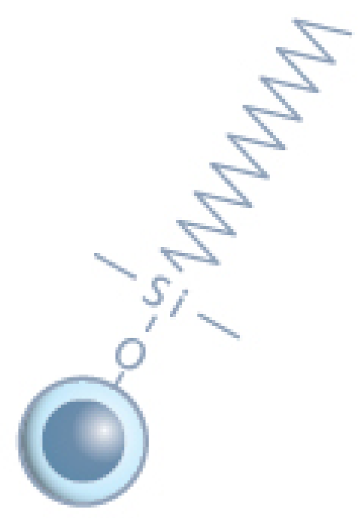
1. 2-methyl-4-Isothiazolin-3-one
2. 2-Bromo-2-Nitro-1,3-propanediol
3. Salicylic Acid
4. Isothiazolinones
5. Benzoic Acid
6. Benzyl Alcohol
7. Sorbic Acid
8. 2-Phenoxyethanol
9. Methyl Paraben
10. Ethyl Paraben
11. Methyl Benzoate
12. Isopropyl Paraben
13. Propyl Paraben
14. 4-Chloro-3-Methylphenol
15. Ethyl Benzoate
16. Isobutyl 4-Hydroxybenzoate
17. Butyl Paraben
18. Chloroxylenol
19. Phenyl Benzoate
20. Clorofene
21. Triclocarban
22. Triclosan

LC Conditions

Column	:	Shim-pack Velox SP-C18, 2.7 µm, 3.0×100 mm (PN: 227-32004-03)
Flow Rate	:	1.0 mL/min
Column Temp.	:	45 °C
Mobile Phase A	:	NaH2PO4 aq. (25 mM, pH3.8)
Mobile Phase B	:	MeOH/ACN = 9/1
Gradient	:	8 %B (0 min) → 30 % B (0.7 min – 2.7 min) 47 % B (2.71 min – 5min) → 52 % B (6 min) 80 %B (7 min – 8 min) → 8 %B (9.01 min -10 min)
Injection Volume	:	1 µL
Conc.	:	50 mg/L

Shim-pack Velox SP-C18

Shim-pack Velox C18 is a traditional end-capped C18-bonded phase which offers the highest hydrophobic retention of any Shim-pack Velox phases and is applicable to a wide range of applications such as pharmaceutical, food, environmental and clinical and neutrals at moderately low and mid-range pH.



- General purpose column for reversed-phase chromatography
- Highest hydrophobic retention among Shim-pack Velox series
- Compatible with moderately acidic to neutral mobile phases (pH 2-8)

Method Transfer for Cyanocobalamin Analysis within the USP Allowable Adjustment

The assay of cyanocobalamin (a synthetic form of vitamin B12) with 5 µm fully-porous ODS column described in the USP monograph is transferred to a new method with Shim-pack Velox C18 2.7 µm column, within USP allowable adjustments. Analytical time and solvent consumption can be saved with transferred methods while meeting the requirements of system suitability.

USP requirement of Chromatography <621>

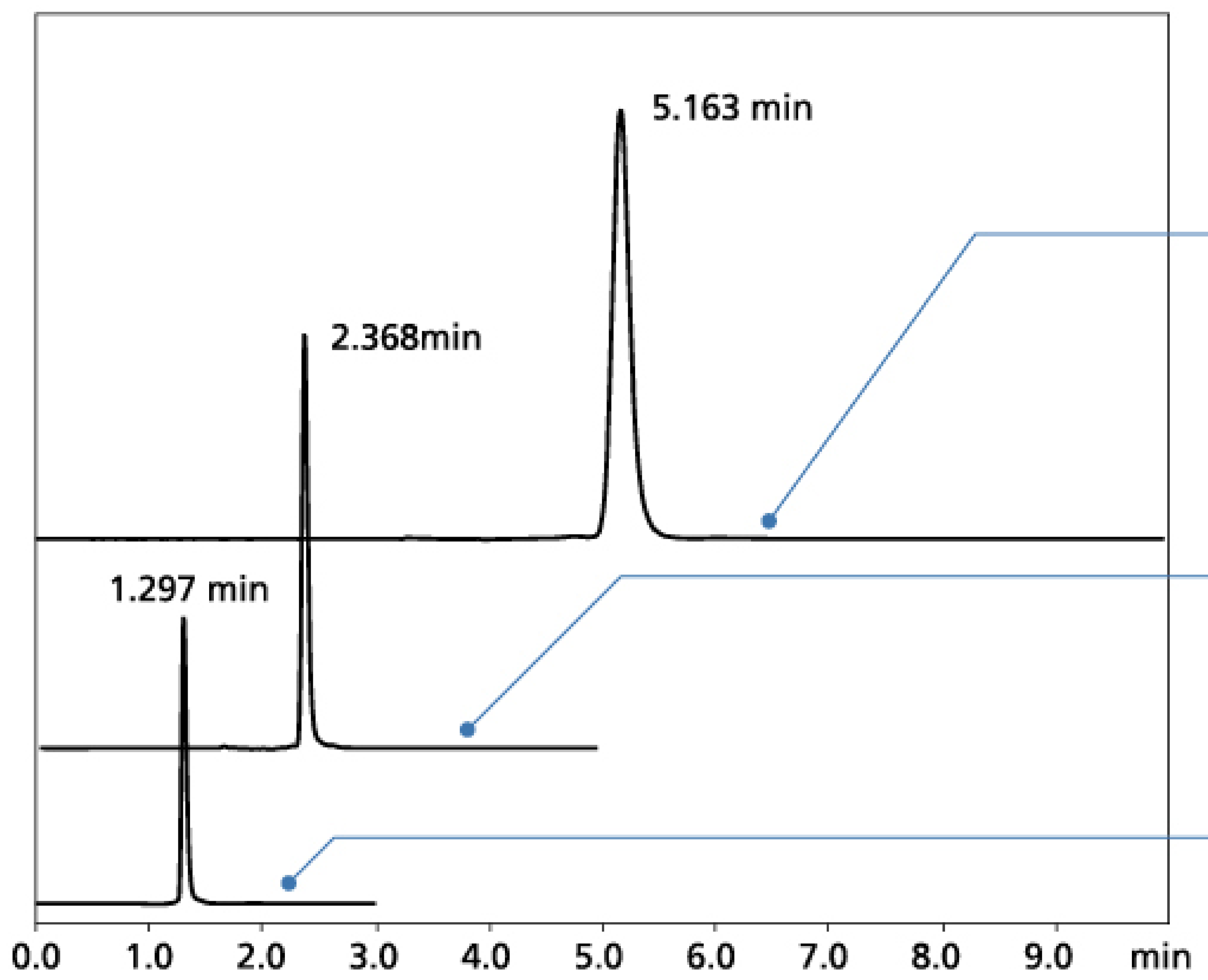
When the column size is changed, the following conditions should be met;

1) *L/dp* ratio : within -25 % to +50 %
or
Number of theoretical plates (N): within -25 % to +50 % (For SPP)

2) Flow rate : *Based on particle size and internal diameter and ±50%

$$* F_2 = F_1 \times \frac{dc_2^2 \times dp_1}{dc_1^2 \times dp_2}$$

L : Column length
dp : Particle size
F : Flow rate
dc : Internal diameter of the column



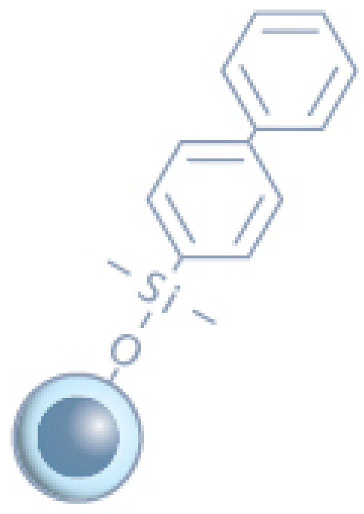
Original Method
Column : Shim-pack VP-ODS (5 µm, 4.6×150 mm)
Flow rate : 0.5 mL/min
Injection Volume : 100 µL
Column temp. : 25 °C
Detection : UV 361 nm

Faster Method
Column : Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate : 0.50 mL/min
Injection Volume : 67 µL
Column temp. : 25 °C
Detection : UV 361 nm

Optimized Method
Column : Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate : 0.93 mL/min
Injection Volume : 67 µL
Column temp. : 25 °C
Detection : UV 361 nm

Column	L/dp	Flow rate (mL/min)	N	System suitability test result (Requirement: %RSD < 2.0 %)
VP-ODS (5 µm, 4.6×150 mm)	30,000	0.50	5,244	tR: 0.025 % Area: 0.175 % (n=6)
Velox C18 (2.7 µm, 4.6×100 mm)	37,037 (+23 %)	0.50	9,497 (+81 %)	tR: 0.035 % Area: 0.103 % (n=6)
		0.93	4,466 (-15 %)	tR: 0.084 % Area: 0.220 % (n=6)

Shim-pack Velox Biphenyl

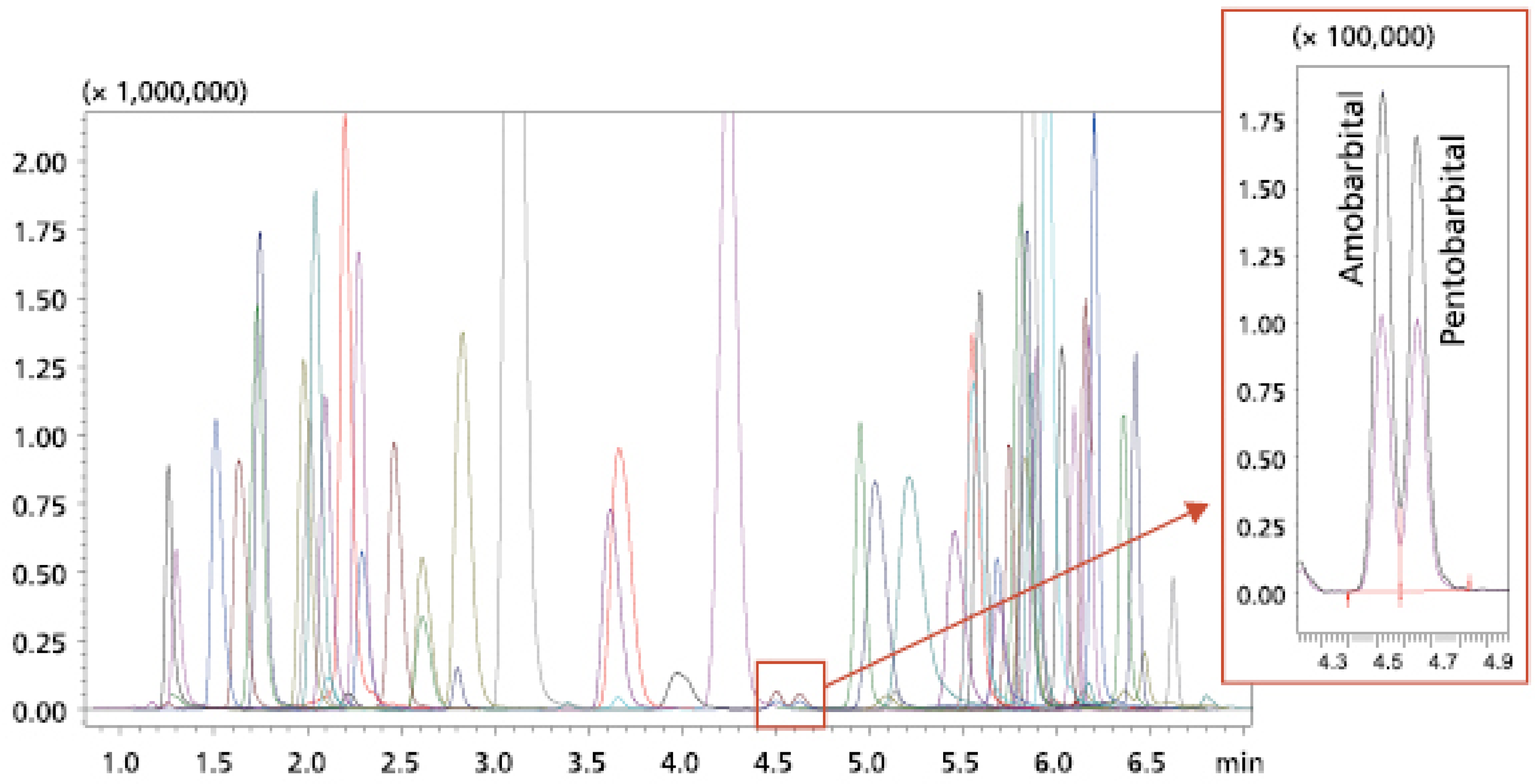


Shim-pack Velox Biphenyl provides enhanced retention of aromatic compounds. It is useful for fast separations in bioanalytical applications due to the increased retention of early eluting analytes such as dipolar, unsaturated and conjugated analytes.

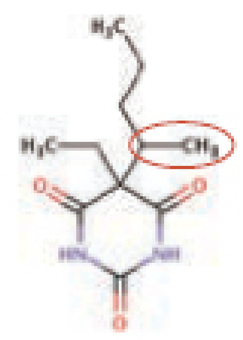
- Complementary selectivity to alkyl phases
- Enhanced separation of aromatic compounds
- Ideal for increasing sensitivity and selectivity in LC/MS(/MS) analysis

Separating the Structural Isomers

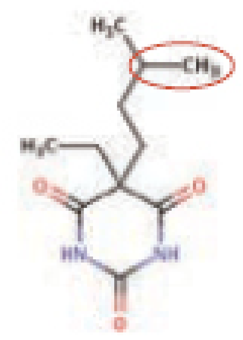
Even under the condition where 56 drugs of abuse and metabolites in human urine are quantitated within 10 minutes, two structural isomers, amobarmital and pentobarbital, which have been historically difficult to separate due to their similarity in chemical structures, could be relatively well resolved with shim-pack Velox Biphenyl column.



Chromatogram of 56 compounds in human urine spiked at the cut off concentration



Amobarbital
5-ethyl-5-(3-methylbutyl)-1,3-diazinane-2,4,6-trione

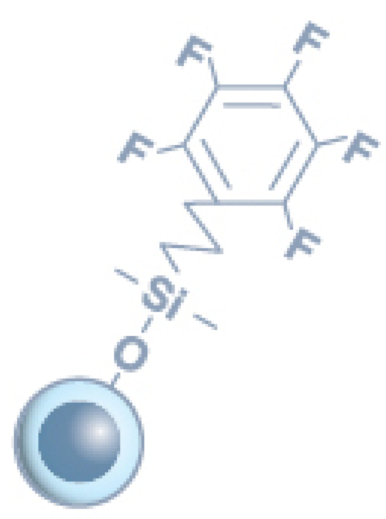


Pentobarbital
5-ethyl-5-pentan-2-yl-1,3-diazinane-2,4,6-trione

Conditions

System	:	Nexera UHPLC System / LCMS-8050
Column	:	Shim-pack Velox Biphenyl 2.7 µm, 2.1 mm × 100 mm (PN: 227-32015-03)
Column Temp.	:	30 °C
Flow Rate	:	0.5 mL/min
Mobile Phase A	:	0.15 mM ammonium fluoride in water
Mobile Phase B	:	Methanol
Gradient	:	20 % B (0 min) → 48 % B (1.5 min) → 53 % B (4 min) 100 %B (6 min - 7.5 min) → 20 % B (7.51 min - 9.5 min)
Sample preparation	:	Enzymatically hydrolyzed human urine was spiked with target compounds between 10 - 1000 % of the required cut off concentration. Samples were subsequently diluted 5x with 0.1 % formic acid.

Shim-pack Velox PFPP

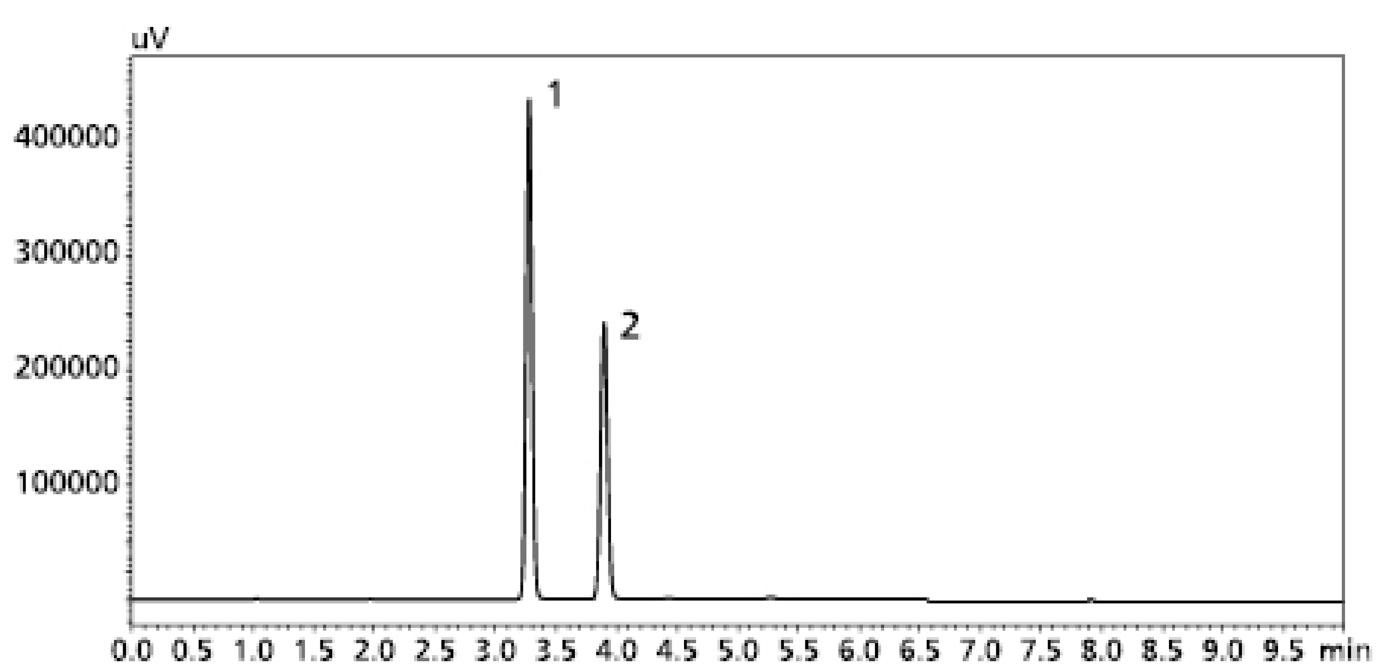


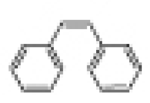
Shim-pack Velox PFPP (Pentafluorophenylpropyl) provides an alternative selectivity to C18 columns and is suitable for the analysis of halogenated compounds, positional isomers and charged bases.

- Alternative selectivity to C18 columns
- Suitable for positional isomers and halogenated compounds
- Offers increased retention for charged bases

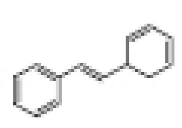
Good Separation of Cis / Trans Stilbene

Cis and trans isomers of stilbene that are difficult to resolve with an ODS column due to their similarity in hydrophobicity can be well separated with Shim-pack Velox PFPP column.





1. cis-Stilbene



2. trans-Stilbene

LC Conditions

Column	:	Shim-pack Velox PFPP, 2.7 µm, 3.0×100 mm (PN: 227-32022-04)
Column Temp.	:	40 °C
Flow Rate	:	0.4 mL/min
Mobile Phase	:	Methanol/Water = 9/1
Detection	:	UV 254 nm
Sample	:	1. cis-Stilbene, 2. trans-Stilbene
Injection Volume	:	1 µL

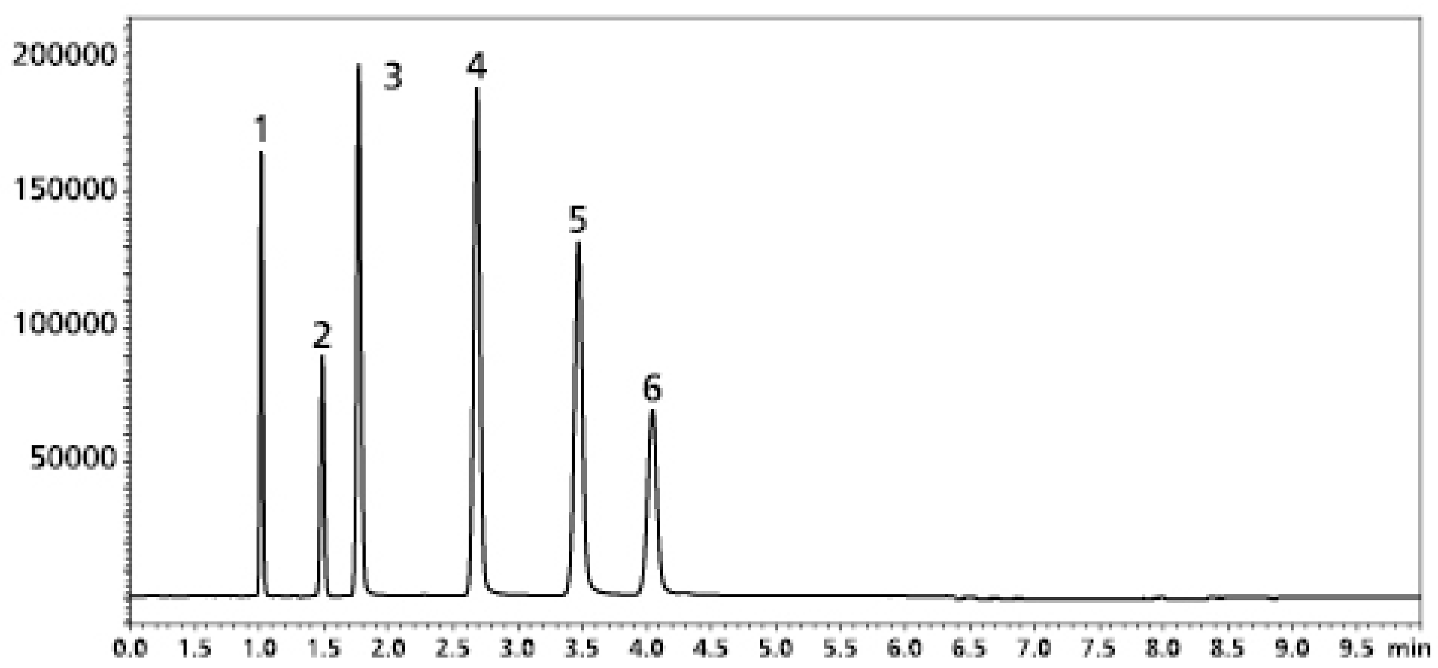
Shim-pack Velox HILIC

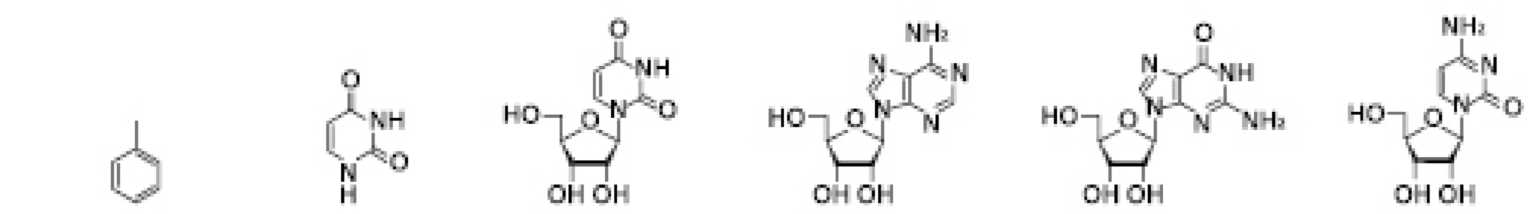
Hydrophilic interaction chromatography (HILIC) is an increasingly popular separation mode that can be used to improve the retention of challenging polar analytes. Shim-pack Velox HILIC using unbonded core shell particles is specifically designed for this application.

- Orthogonal selectivity to reversed phase chromatography
- Increased retention of polar analytes
- Increased MS sensitivity
- Direct compatibility with sample preparation eluates

Retention of Nucleosides

Nucleosides are polar molecules that are not well retained on reversed phase LC columns due to their hydrophilic nature are well retained and separated with Shim-pack Velox HILIC column.





1. Toluene 2. Uracil 3. Uridine 4. Adenosine 5. Guanosine 6. Cytidine

LC Conditions

Column	:	Shim-pack Velox HILIC, 2.7 µm, 3.0×100 mm (PN: 227-32026-02)
Column Temp.	:	30 °C
Flow Rate	:	0.4 mL/min
Mobile Phase	:	Acetonitrile/20mM AcONH4aq.=9/1
Detection	:	UV 254 nm
Sample	:	1. Toluene, 2. Uracil, 3. Uridine, 4. Adenosine, 5. Guanosine, 6. Cytidine
Injection Volume	:	1 µL

Shim-pack Velox 1.8 µm Columns

Chemistry	SP-C18		C18		Biphenyl		PFPP	
I.D. (mm) / Length (mm)	2.1	3.0	2.1	3.0	2.1	3.0	2.1	3.0
30	227-32001-01	-	227-32007-01	-	227-32013-01	-	227-32019-01	-
50	227-32001-02	227-32002-01	227-32007-02	227-32008-01	227-32013-02	227-32014-01	227-32019-02	227-32020-01
100	227-32001-03	227-32002-02	227-32007-03	227-32008-02	227-32013-03	227-32014-02	227-32019-03	227-32020-02
150	227-32001-04	-	227-32007-04	-	227-32013-04	-	227-32019-04	-

Shim-pack Velox 2.7 µm Columns

Chemistry	SP-C18			C18			Biphenyl		
I.D. (mm) / Length (mm)	2.1	3.0	4.6	2.1	3.0	4.6	2.1	3.0	4.6
30	227-32003-01	227-32004-01	227-32005-01	227-32009-01	227-32010-01	227-32011-01	227-32015-01	227-32016-01	227-32017-01
50	227-32003-02	227-32004-02	227-32005-02	227-32009-02	227-32010-02	227-32011-02	227-32015-02	227-32016-02	227-32017-02
100	227-32003-03	227-32004-03	227-32005-03	227-32009-03	227-32010-03	227-32011-03	227-32015-03	227-32016-03	227-32017-03
150	227-32003-04	227-32004-04	227-32005-04	227-32009-04	227-32010-04	227-32011-04	227-32015-04	227-32016-04	227-32017-04

Chemistry	PFPP			HILIC		
I.D. (mm) / Length (mm)	2.1	3.0	4.6	2.1	3.0	4.6
30	227-32021-01	227-32022-01	227-32023-01	227-32025-01	-	-
50	227-32021-02	227-32022-02	227-32023-02	227-32025-02	227-32026-01	227-32027-01
100	227-32021-03	227-32022-03	227-32023-03	227-32025-03	227-32026-02	227-32027-02
150	227-32021-04	227-32022-04	227-32023-04	227-32025-04	227-32026-03	227-32027-03

Core Shell Columns

Shim-pack Velox 5 µm Columns

Chemistry	SP-C18	C18	Biphenyl	PFPP
I.D. (mm) / Length (mm)	4.6			
30	227-32006-01	227-32012-01	227-32018-01	227-32024-01
50	227-32006-02	227-32012-02	227-32018-02	227-32024-02
100	227-32006-03	227-32012-03	227-32018-03	227-32024-03
150	227-32006-04	227-32012-04	227-32018-04	227-32024-04

Shim-pack Velox EXP Guard Column Cartridge (3 pk)

Type	1.8 µm				2.7 µm				
I.D. x L (mm)	SP-C18	C18	Biphenyl	PFPP	SP-C18	C18	Biphenyl	PFPP	HILIC
2.1 x 5	227-32028-01	227-32031-01	227-32034-01	227-32037-01	227-32029-01	227-32032-01	227-32035-01	227-32038-01	227-32040-01
3.0 x 5	227-32028-02	227-32031-02	227-32034-02	227-32037-02	227-32029-02	227-32032-02	227-32035-02	227-32038-02	227-32040-02
4.6 x 5	-	-	-	-	227-32029-03	227-32032-03	227-32035-03	227-32038-03	227-32040-03

Type	5 µm			
I.D. x L (mm)	SP-C18	C18	Biphenyl	PFPP
4.6 x 5	227-32030-01	227-32033-01	227-32036-01	227-32039-01

*Shim-pack Velox EXP Direct Connect Holder : 227-32041-01

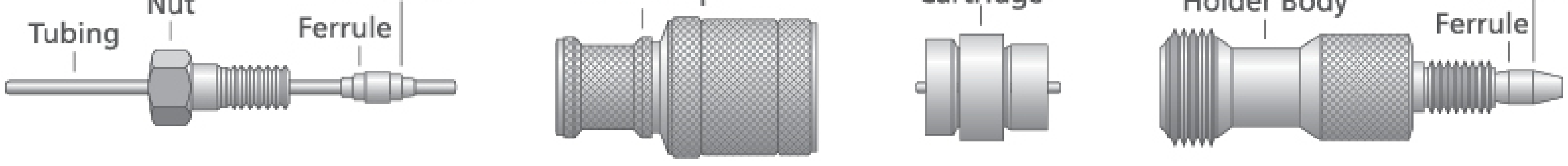
Shim-pack Velox UHPLC Pre-column (0.2 µm)

1pc	227-32042-01
5pcs	227-32042-02
10pcs	227-32042-03

*For more pre-column options, please refer to page 110

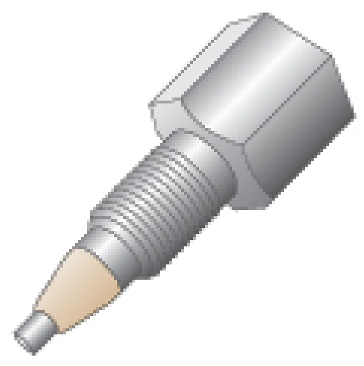
Shim-pack Velox EXP Guard Column

Free-turning architecture lets you change cartridges by hand without breaking inlet / outlet fluid connections — no tools needed. Guard column cartridges require Shim-pack Velox EXP Direct Connect Holder (227-32041-01)



Shim-pack Velox UHPLC Precolumn Filter (0.2 µm)

To minimize extra column volume and maximize UHPLC sample throughput with SPE, SLE, or other sample preparation techniques, pair 1.8 µm Shim-pack Velox UHPLC columns with an Shim-pack Velox UHPLC Precolumn filter instead of a guard cartridge.



Shim-pack Scepter LC Columns

Excellent stability & performance could be achieved under a wide range of LC conditions

Excellent stability and performance could be achieved under a wide range of LC conditions with Shim-pack Scepter LC columns, which are the next generation organic silica hybrid based columns. With different chemistry characteristics, Shim-pack Scepter columns are effective for method development/scouting with suitability for use in a wide variety of applications.

With different particle sizes (1.9 µm, 3 µm, 5 µm) and different column dimensions, Shim-pack Scepter LC columns are fully scalable between UHPLC, HPLC and preparative LC making method transfer seamless between different laboratory instrumentation.

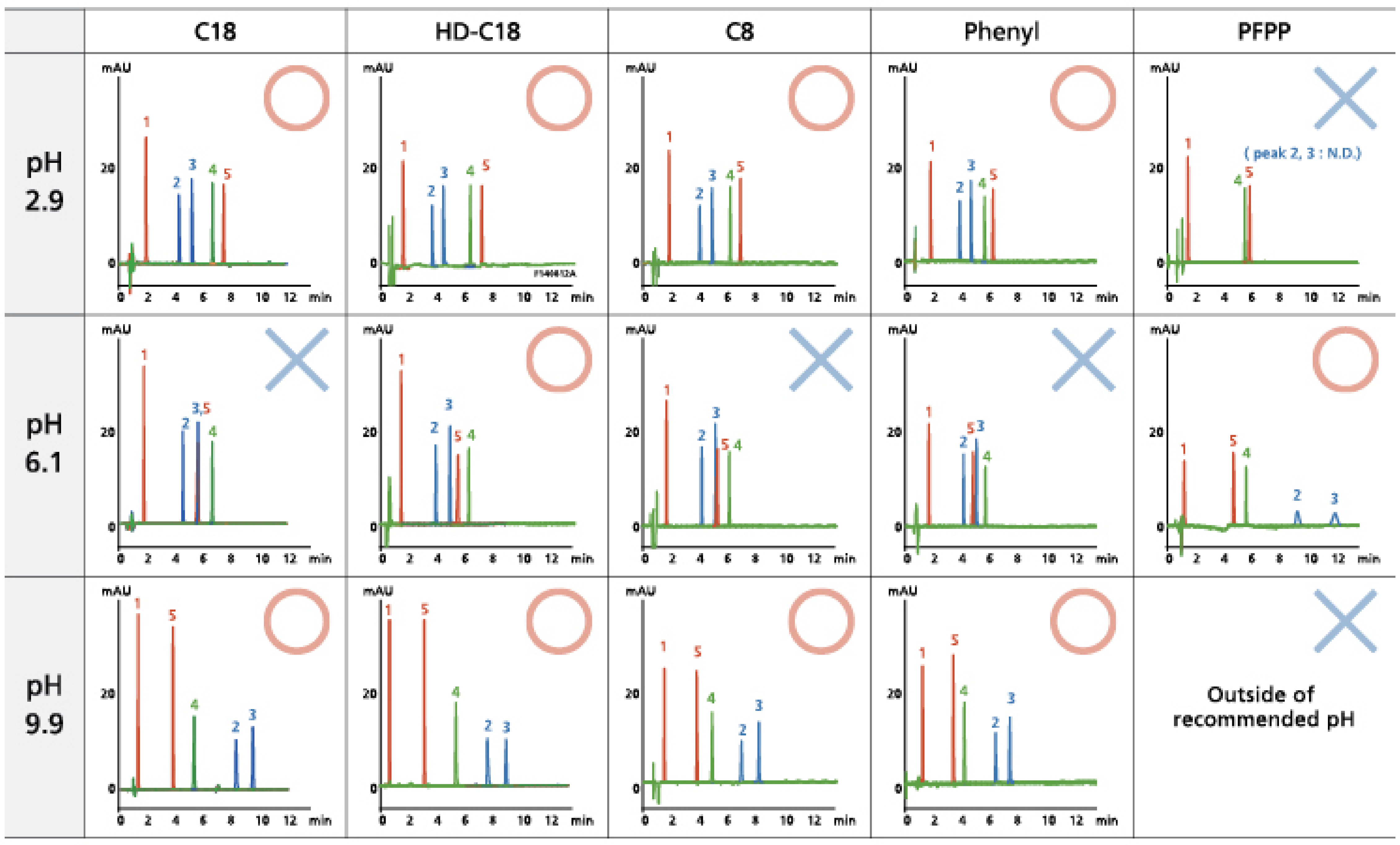
Shim-pack Scepter Chemistries

Shim-pack Scepter	Reversed Phase						HILIC
	C18	HD-C18	C8	Pheny	PFPP	C4	Diol-HILIC
Ligand Type	Trifunctional C18 Generic Purpose Type	Trifunctional C18 High Density Type	Trifunctional C8	Trifunctional Phenylbutyl	Trifunctional Pentafluorophenylpropyl	Butyl group	Trifunctional Dihydroxypropyl
Particle	Organic Silica Hybrid						
Particle Size	1.9 µm, 3 µm, 5 µm						
Pore Size	12 nm	8 nm	12 nm			30 nm	12 nm
End Capping	Proprietary				None	Proprietary	None
pH Range	1 - 12			1 - 10	1 - 8	1 - 10	2 - 10
100% aqueous condition	Yes	No	No	Yes	Yes	No	N/A
USP Classification	L1	L1	L7	L11	L43	L26	L20

Method Scouting Utilize excellent stability & performance under a wide range of LC conditions

With excellent stability under a wide range of LC conditions, Shim-pack Scepter LC columns are effective for method scouting combining mobile phase pH and organic modifier.

Comparison of Chromatograms using Gradient condition with Acetonitrile



Analytes

1. Saccharin (pKa = 2.2)
2. Dextromethorphan (pKa = 8.3)
3. Amitriptyline (pKa = 9.4)
4. N-Butyl paraben (pKa = 8.3)
5. Ibupurofen (pKa = 4.4)

For Shim-pack Scepter C4, please refer to page A-22

Shim-pack Scepter C18

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31011-01	227-31012-01	-	-	-	100
	30	227-31011-02	227-31012-02	-	-	-	
	50	227-31011-03	227-31012-03	227-31013-01	-	-	
	75	227-31011-04	227-31012-04	227-31013-02	-	-	
	100	227-31011-05	227-31012-05	227-31013-03	-	-	
	150	227-31011-06	227-31012-06	227-31013-04	-	-	
3	20	-	227-31014-01	-	-	-	45
	33	-	227-31014-02	-	-	227-31016-01	
	50	-	227-31014-03	227-31015-01	-	227-31016-02	
	75	-	227-31014-04	227-31015-02	-	227-31016-03	
	100	-	227-31014-05	227-31015-03	-	227-31016-04	
	150	-	227-31014-06	227-31015-04	-	227-31016-05	
	250	-	-	-	-	227-31016-06	
5	20	-	227-31017-01	-	-	-	45
	33	-	227-31017-02	-	-	227-31020-01	
	50	-	227-31017-03	227-31018-01	-	227-31020-02	
	75	-	227-31017-04	227-31018-02	-	227-31020-03	
	100	-	227-31017-05	227-31018-03	-	227-31020-04	
	150	-	227-31017-06	227-31018-04	227-31019-01	227-31020-05	
	250	-	-	-	227-31019-02	227-31020-06	

Analytical Guard cartridge columns and holder

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31120-01	227-31120-02	-	227-31170-01
3	10	227-31121-01	227-31122-01	227-31123-01	227-31172-03
	20	227-31121-02	227-31122-02	227-31123-02	227-31172-04
5	10	227-31124-01	227-31125-01	227-31126-01	227-31172-03
	20	227-31124-02	227-31125-02	227-31126-02	227-31172-04

Preparative columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	20.0	30.0	Pressure Tolerance (MPa)
5	50	-	227-31102-01	227-31103-01	30
	75	-	-	227-31103-02	
	100	-	227-31102-02	227-31103-03	
	150	227-31101-01	227-31102-03	227-31103-04	
	250	227-31101-02	227-31102-04	227-31103-05	

Prep Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	Holder
5	10	227-31127-01	227-31171-01

Shim-pack Scepter HD-C18

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31025-01	227-31026-01	-	-	-	100
	30	227-31025-02	227-31026-02	-	-	-	
	50	227-31025-03	227-31026-03	227-31027-01	-	-	
	75	227-31025-04	227-31026-04	227-31027-02	-	-	
	100	227-31025-05	227-31026-05	227-31027-03	-	-	
	150	227-31025-06	227-31026-06	227-31027-04	-	-	
3	20	-	227-31028-01	-	-	-	45
	33	-	227-31028-02	-	-	227-31030-01	
	50	-	227-31028-03	227-31029-01	-	227-31030-02	
	75	-	227-31028-04	227-31029-02	-	227-31030-03	
	100	-	227-31028-05	227-31029-03	-	227-31030-04	
	150	-	227-31028-06	227-31029-04	-	227-31030-05	
	250	-	-	-	-	227-31030-06	
5	20	-	227-31031-01	-	-	-	45
	33	-	227-31021-01	-	-	227-31024-01	
	50	-	227-31021-02	227-31022-01	-	227-31024-02	
	75	-	227-31021-03	227-31022-02	-	227-31024-03	
	100	-	227-31021-04	227-31022-03	-	227-31024-04	
	150	-	227-31021-05	227-31022-04	227-31023-01	227-31024-05	
	250	-	-	-	227-31023-02	227-31024-06	

Analytical Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31128-01	227-31128-02	-	227-31170-01
3	10	227-31129-01	227-31130-01	227-31131-01	227-31172-03
	20	227-31129-02	227-31130-02	227-31131-02	227-31172-04
5	10	227-31132-01	227-31133-01	227-31134-01	227-31172-03
	20	227-31132-02	227-31133-02	227-31134-02	227-31172-04

Preparative columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	20.0	30.0	Pressure Tolerance (MPa)
5	50	-	227-31105-01	227-31106-01	30
	75	-	-	227-31106-02	
	100	-	227-31105-02	227-31106-03	
	150	227-31104-01	227-31105-03	227-31106-04	
	250	227-31104-02	227-31105-04	227-31106-05	

Prep Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	Holder
5	10	227-31135-01	227-31171-01

Shim-pack Scepter C8

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31032-01	227-31033-01	-	-	-	100
	30	227-31032-02	227-31033-02	-	-	-	
	50	227-31032-03	227-31033-03	227-31034-01	-	-	
	75	227-31032-04	227-31033-04	227-31034-02	-	-	
	100	227-31032-05	227-31033-05	227-31034-03	-	-	
	150	227-31032-06	227-31033-06	227-31034-04	-	-	
3	20	-	227-31035-01	-	-	-	45
	33	-	227-31035-02	-	-	227-31037-01	
	50	-	227-31035-03	227-31036-01	-	227-31037-02	
	75	-	227-31035-04	227-31036-02	-	227-31037-03	
	100	-	227-31035-05	227-31036-03	-	227-31037-04	
	150	-	227-31035-06	227-31036-04	-	227-31037-05	
	250	-	-	-	-	227-31037-06	
5	20	-	227-31038-01	-	-	-	45
	33	-	227-31038-02	-	-	227-31041-01	
	50	-	227-31038-03	227-31039-01	-	227-31041-02	
	75	-	227-31038-04	227-31039-02	-	227-31041-03	
	100	-	227-31038-05	227-31039-03	-	227-31041-04	
	150	-	227-31038-06	227-31039-04	227-31040-01	227-31041-05	
	250	-	-	-	227-31040-02	227-31041-06	

Analytical Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31136-01	227-31136-02	-	227-31170-01
3	10	227-31137-01	227-31138-01	227-31139-01	227-31172-03
	20	227-31137-02	227-31138-02	227-31139-02	227-31172-04
5	10	227-31140-01	227-31141-01	227-31142-01	227-31172-03
	20	227-31140-02	227-31141-02	227-31142-02	227-31172-04

Preparative columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	20.0	30.0	Pressure Tolerance (MPa)
5	50	-	227-31108-01	227-31109-01	30
	75	-	-	227-31109-02	
	100	-	227-31108-02	227-31109-03	
	150	227-31107-01	227-31108-03	227-31109-04	
	250	227-31107-02	227-31108-04	227-31109-05	

Prep Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	Holder
5	10	227-31143-01	227-31171-01

Shim-pack Scepter PFPP

Analytical columns

Particle Size (μm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31052-05	227-31053-01	-	-	-	100
	30	227-31052-06	227-31053-02	-	-	-	
	50	227-31052-01	227-31053-03	227-31054-01	-	-	
	75	227-31052-02	227-31053-04	227-31054-02	-	-	
	100	227-31052-03	227-31053-05	227-31054-03	-	-	
	150	227-31052-04	227-31053-06	227-31054-04	-	-	
3	20	-	227-31055-01	-	-	-	45
	33	-	227-31055-02	-	-	227-31057-01	
	50	-	227-31055-03	227-31056-01	-	227-31057-02	
	75	-	227-31055-04	227-31056-02	-	227-31057-03	
	100	-	227-31055-05	227-31056-03	-	227-31057-04	
	150	-	227-31055-06	227-31056-04	-	227-31057-05	
	250	-	-	-	-	227-31057-06	
5	20	-	227-31058-01	-	-	-	45
	33	-	227-31058-02	-	-	227-31061-01	
	50	-	227-31058-03	227-31059-01	-	227-31061-02	
	75	-	227-31058-04	227-31059-02	-	227-31061-03	
	100	-	227-31058-05	227-31059-03	-	227-31061-04	
	150	-	227-31058-06	227-31059-04	227-31060-01	227-31061-05	
	250	-	-	-	227-31060-02	227-31061-06	

Analytical Guard cartridge columns

Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31150-01	227-31150-02	-	227-31170-01
3	10	227-31151-01	227-31152-01	227-31153-01	227-31172-03
	20	227-31151-02	227-31152-02	227-31153-02	227-31172-04
5	10	227-31154-01	227-31155-01	227-31156-01	227-31172-03
	20	227-31154-02	227-31155-02	227-31156-02	227-31172-04

Preparative columns

Particle Size (μm)	I.D. (mm) / Length (mm)	10.0	20.0	30.0	Pressure Tolerance (MPa)
5	50	-	227-31111-01	227-31112-01	30
	75	-	-	227-31112-02	
	100	-	227-31111-02	227-31112-03	
	150	227-31110-01	227-31111-03	227-31112-04	
	250	227-31110-02	227-31111-04	227-31112-05	

Prep Guard cartridge columns

Particle Size (μm)	I.D. (mm) / Length (mm)	10.0	Holder
5	10	227-31157-01	227-31171-01

Shim-pack Scepter Phenyl

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31062-05	227-31063-01	-	-	-	100
	30	227-31062-06	227-31063-02	-	-	-	
	50	227-31062-01	227-31063-03	227-31064-01	-	-	
	75	227-31062-02	227-31063-04	227-31064-02	-	-	
	100	227-31062-03	227-31063-05	227-31064-03	-	-	
	150	227-31062-04	227-31063-06	227-31064-04	-	-	
3	20	-	227-31065-01	-	-	-	45
	33	-	227-31065-02	-	-	227-31067-01	
	50	-	227-31065-03	227-31056-01	-	227-31067-02	
	75	-	227-31065-04	227-31066-02	-	227-31067-03	
	100	-	227-31065-05	227-31066-03	-	227-31067-04	
	150	-	227-31065-06	227-31066-04	-	227-31067-05	
	250	-	-	-	-	227-31067-06	
5	20	-	227-31068-01	-	-	-	45
	33	-	227-31068-02	-	-	227-31071-01	
	50	-	227-31068-03	227-31069-01	-	227-31071-02	
	75	-	227-31068-04	227-31069-02	-	227-31071-03	
	100	-	227-31068-05	227-31069-03	-	227-31071-04	
	150	-	227-31068-06	227-31069-04	227-31070-01	227-31071-05	
	250	-	-	-	227-31070-02	227-31071-06	

Analytical Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31158-01	227-31158-02	-	227-31170-01
3	10	227-31159-01	227-31160-01	227-31161-01	227-31172-03
	20	227-31159-02	227-31160-02	227-31161-02	227-31172-04
5	10	227-31162-01	227-31163-01	227-31164-01	227-31172-03
	20	227-31162-02	227-31163-02	227-31164-02	227-31172-04

Preparative columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	20.0	30.0	Pressure Tolerance (MPa)
5	50	-	227-31114-01	227-31115-01	30
	75	-	-	227-31115-02	
	100	-	227-31114-02	227-31115-03	
	150	227-31113-01	227-31114-03	227-31115-04	
	250	227-31113-02	227-31114-04	227-31115-05	

Prep Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10.0	Holder
5	10	227-31165-01	227-31171-01

Diol-HILIC

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	-	-	-	-	-	100
	30	-	-	-	-	-	
	50	227-31042-03	227-31043-03	227-31044-03	-	-	
	75	227-31042-01	227-31043-01	227-31044-01	-	-	
	100	227-31042-02	227-31043-02	227-31044-02	-	-	
	150	-	-	-	-	-	
3	20	-	227-31045-01	-	-	-	45
	33	-	227-31045-02	-	-	227-31047-01	
	50	-	227-31045-03	227-31046-01	-	227-31047-02	
	75	-	227-31045-04	227-31046-02	-	227-31047-03	
	100	-	227-31045-05	227-31046-03	-	227-31047-04	
	150	-	227-31045-06	227-31046-04	-	227-31047-05	
	250	-	-	-	-	227-31047-06	
5	20	-	227-31048-01	-	-	-	45
	33	-	227-31048-02	-	-	227-31051-01	
	50	-	227-31048-03	227-31049-01	-	227-31051-02	
	75	-	227-31048-04	227-31049-02	-	227-31051-03	
	100	-	227-31048-05	227-31049-03	-	227-31051-04	
	150	-	227-31048-06	227-31049-04	227-31050-01	227-31051-05	
	250	-	-	-	227-31050-02	227-31051-06	

Analytical Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
3	10	227-31144-01	227-31145-01	227-31146-01	227-31172-03
	20	227-31144-02	227-31145-02	227-31146-02	227-31172-04
5	10	227-31147-01	227-31148-01	227-31149-01	227-31172-03
	20	227-31147-02	227-31148-02	227-31149-02	227-31172-04

Shim-pack Scepter C4

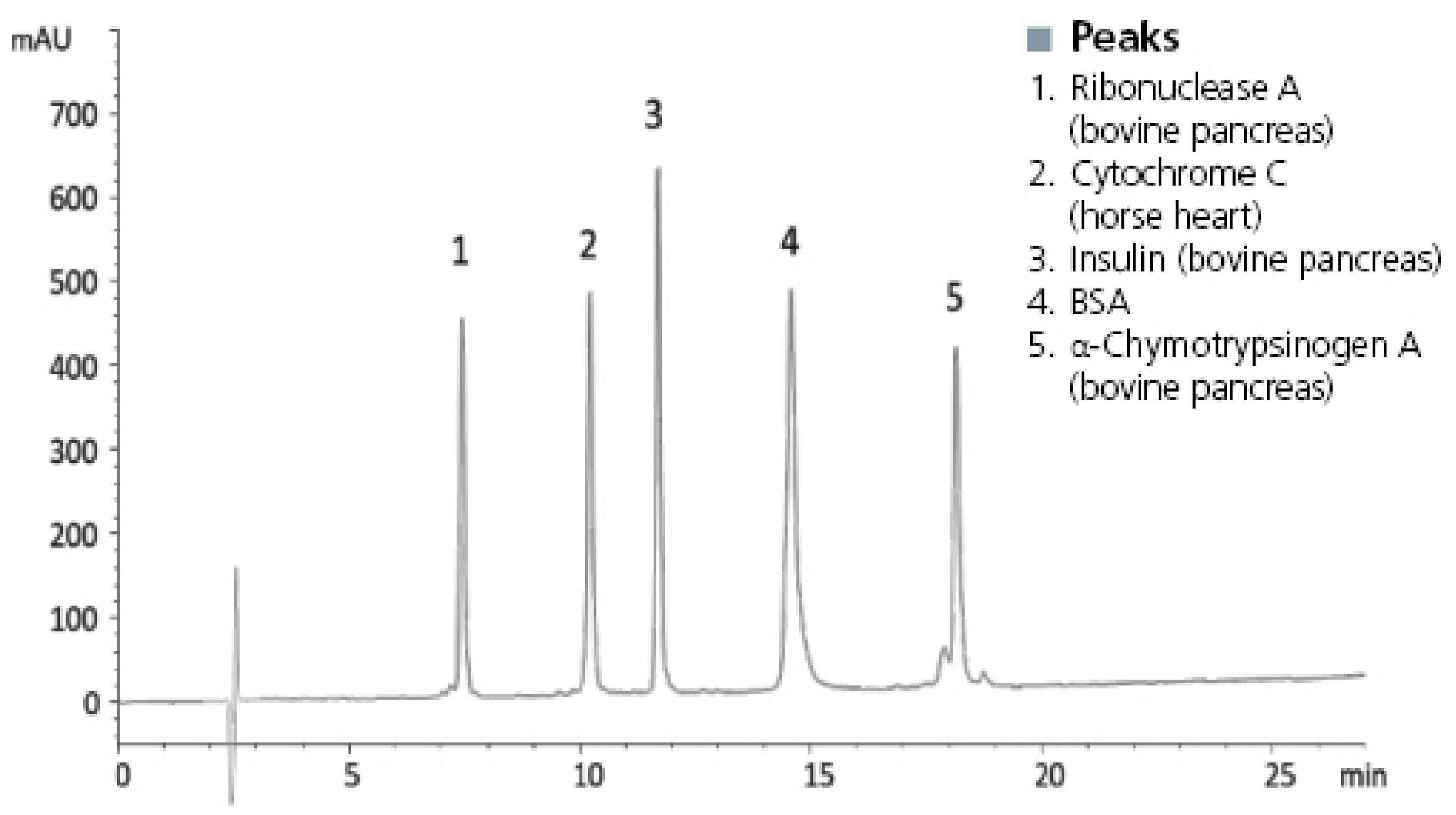
Design for biomolecules separations

Bonded Phase	Butyl Groups
Particle Size	1.9µm, 3µm, 5µm
Pore Size	30 nm
End-capping	Yes
pH Range	1 to 10
USP Code	L26

Shim-pack Scepter C4 is a wide-bore C4 column that uses an organic silica hybrid base which is suitable for separation of proteins such as monoclonal antibodies. The column can be used for analysis of proteins with a molecular weight of up to approximately 150,000 and is suitable for analysis of antibodies as it is very stable even under acidic or high-temperature conditions because an organic silica hybrid base is used. It is also effective for high-sensitivity analysis on LC/MS as it provides good peak shapes even when using a formic acid mobile phase with low ion paring effect. In addition, it is effective for separation of highly-hydrophobic proteins, nucleotides and small molecules that are hard to separate using a regular C18 column.

Analysis Examples

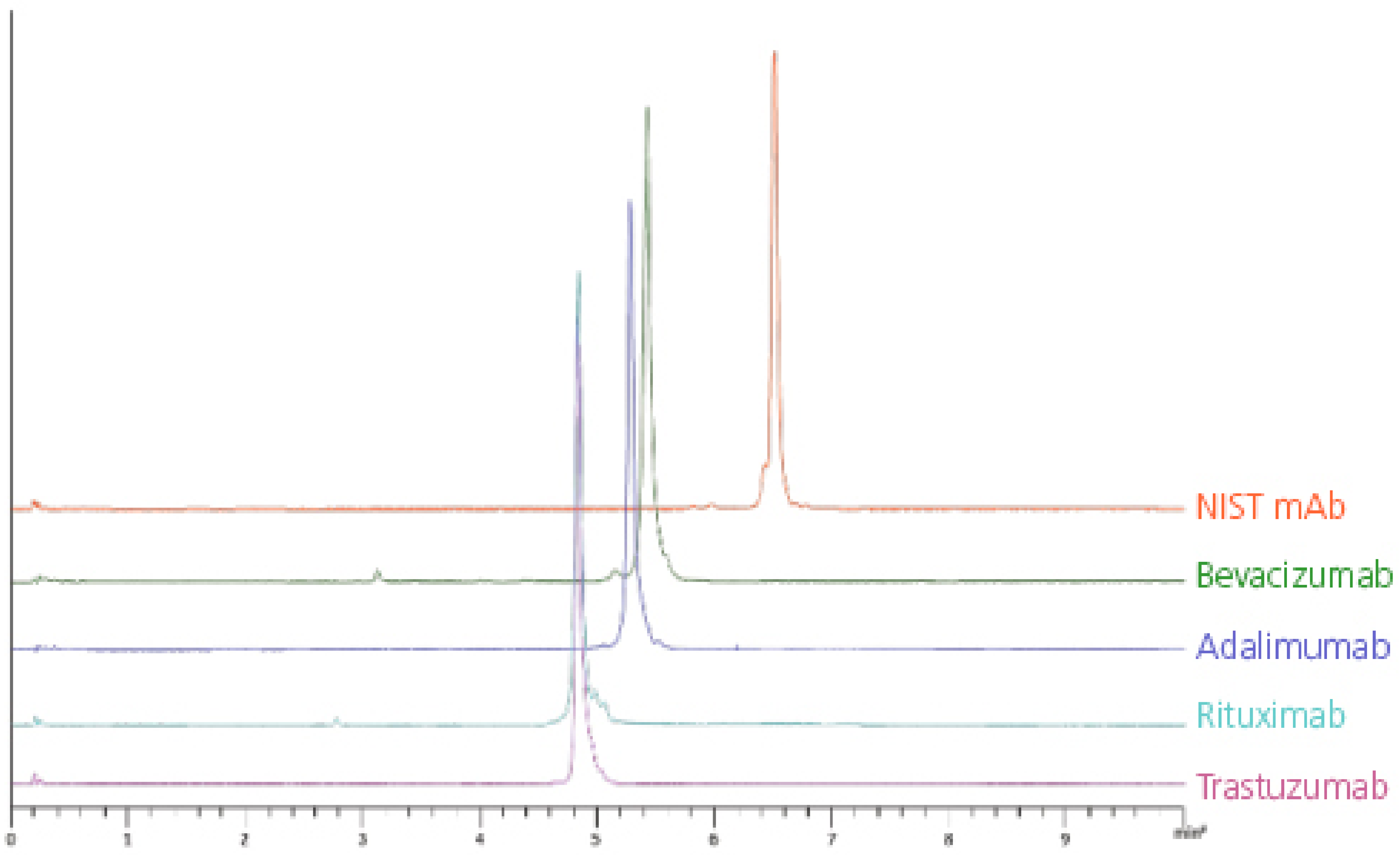
Analysis of Proteins



Conditions

Column : Shim-pack Scepter C4 (5 µm, 150 x 3.0 mm I.D.) (P/N: 227-31181-04)
Mobile Phase : A) Water/TFA (100/0.1)
B) Acetonitrile/TFA (100/0.1)
20-60%B (0-27 min), 90%B (27-35 min), 20%B (35-50 min)
Flow Rate : 0.4 mL/min
Col. Temp. : 70 °C
Detection : UV at 220 nm
Injection Vol. : 10 µL (0.25 – 0.50 mg/mL) Column

Analysis of Monoclonal Antibodies



Conditions

Column : Shim-pack Scepter C4 (1.9 µm, 50 x 2.1 mm I.D.) (P/N: 227-31175-03)
Mobile Phase : A) Water/TFA (100/0.1)
B) Acetonitrile/TFA (100/0.1)
25-45%B (0-10 min)
Flow Rate : 0.4 mL/min
Col. Temp. : 80 °C
Detection : UV at 280 nm
Injection Vol. : 2 µL
Sample Conc. : 0.2 mg/mL

Analytical columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31175-01	-	-	-	100
	30	227-31175-02	227-30817-02	-	-	
	50	227-31175-03	227-31176-01	-	-	
	100	227-31175-04	227-31176-02	-	-	
	125	227-31175-05	227-31176-03	-	-	
	150	227-31175-06	227-31176-04	-	-	
3	20	227-31177-01	-	-	-	45
	33	227-31177-02	-	-	227-31179-01	
	50	227-31177-03	227-31178-01	-	227-31179-02	
	75	227-31177-04	227-31178-02	-	227-31179-03	
	100	227-31177-05	227-31178-03	-	227-31179-04	
	150	227-31177-06	227-31178-04	-	227-31179-05	
	250	-	-	-	227-31179-06	
5	20	227-31180-01	-	-	-	45
	33	227-31180-02	-	-	227-31183-01	
	50	227-31180-03	227-31181-01	-	227-31183-02	
	75	227-31180-04	227-31181-02	-	227-31183-03	
	100	227-31180-05	227-31181-03	227-31182-01	227-31183-04	
	150	227-31180-06	227-31181-04	227-31182-02	227-31183-05	
	250	-	-	-	227-31183-06	

Analytical Guard cartridge columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31187-01	227-31187-02	-	227-31170-01
3	10	227-31188-01	227-31189-01	227-31190-01	227-31172-01
	20	227-31188-02	227-31189-02	227-31190-02	227-31172-02
5	10	227-31191-01	227-31192-01	227-31193-01	227-31172-01
	20	227-31191-02	227-31192-02	227-31193-02	227-31172-02

Preparative columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	30	Pressure Tolerance (MPa)
5	50	-	227-31185-01	227-31186-01	30
	75	-	-	227-31186-02	
	100	-	227-31185-02	227-31186-03	
	150	227-31184-01	227-31185-03	227-31186-04	
	250	227-31184-02	227-31185-04	227-31186-05	

Preparative guard cartridges columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	30	Holder
5	10	227-31194-01	227-31195-01	227-31196-01	227-31171-01

Shim-pack Arata LC Columns

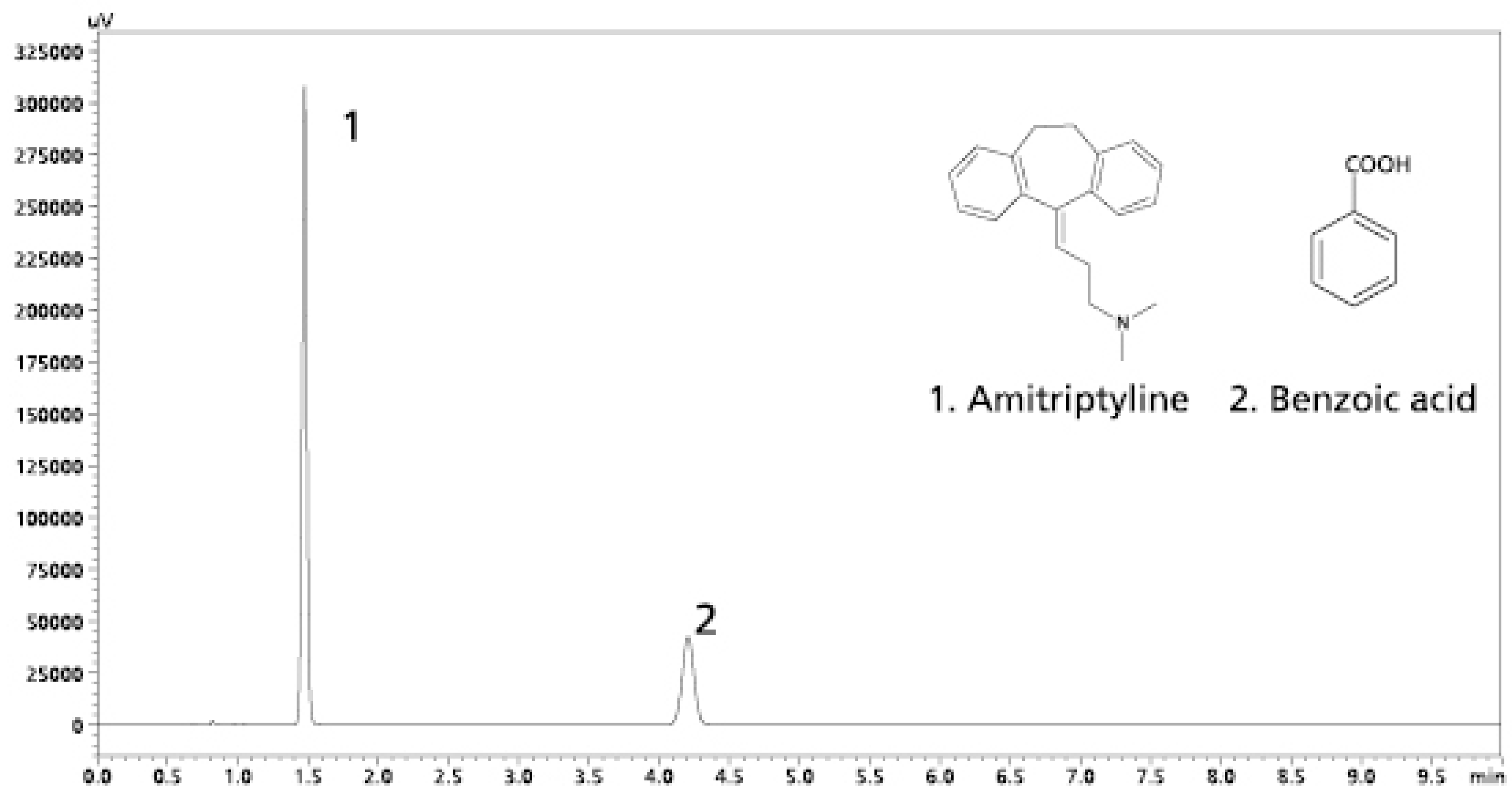
Unprecedented Resolution and Peak Shape of Basic Compounds

Even for LC columns that claim to be designed for basic compounds, adequate resolution often can not be obtained due to problems such as leading of highly polar basic compounds, peak shape deterioration of acidic compounds, or long equilibration time required for low ionic strength acidic mobile phase.

All of these issues have been solved with Shim-pack Arata that was specifically designed to give unmatched peak shape for basic compounds.

Unmatched Peak Shape (Elegantly Designed for A Wide Range of Compounds)

Unmatched peak shape of basic compounds could be achieved while maintaining good peak shape for acidic compounds with Shim-pack Arata LC columns. Even with low ionic strength acidic mobile phase, such as 0.1% formic acid containing mobile phase, excellent peak shape of both amitriptyline (a basic compound) and benzoic acid (an acidic compound) could be achieved.



Analysis of Amitriptyline and Benzoic Acid with The Mobile Phase with 0.1% Formic Acid

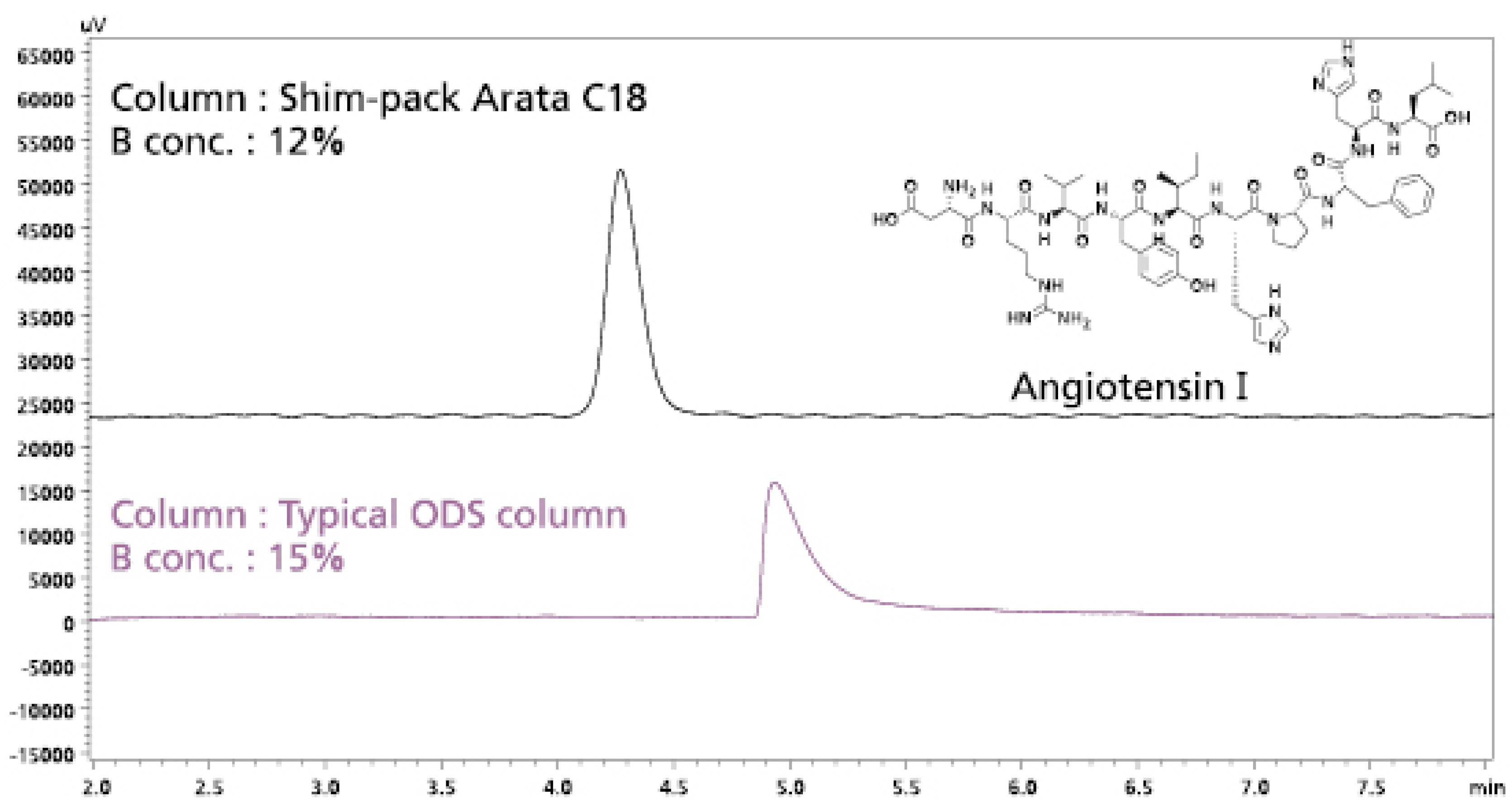
■ **Analytical Conditions**

Column	:	Shim-pack Arata C18
Mobile Phase	:	0.1% HCOOH in H2O / CH3CN = 70 / 30
Flow Rate	:	0.4 mL/min
Detection	:	254 nm
Column Temp.	:	40 °C
Inj. Volume	:	2 µL

* Gel Lot QC test analytical condition

Excellent Separation Performance for Peptides (Even with Weak Ion Paring Acids)

In order to obtain good peak shape of peptides under reversed phase chromatography, TFA containing mobile phases are frequently used which the ion pairing effect is relatively strong. However, TFA could cause ion suppression in LC/MS (/MS) analysis. Excellent peak shape and separation performance for peptides could be achieved on the Shim-pack Arata LC column even with 0.1 % formic acid (weak ion paring acid) containing mobile phase.



Analysis of Angiotensin I Using Isocratic Mobile Phase
with 0.1% Formic Acid (Shim-pack Arata C18 vs. Typical ODS)

■ **Analytical Conditions**

Column	:	Shim-pack Arata C18
Mobile Phase	:	A: 0.1% HCOOH in H2O
	:	B: 0.1% HCOOH in CH3CN
Flow Rate	:	0.4 mL/min
Detection	:	214 nm
Column Temp.	:	40 °C
Inj. Volume	:	1 µL
Sample	:	Angiotensin
Vial	:	TORAST-H™ Bio Vial

* Gel Lot QC test analytical condition

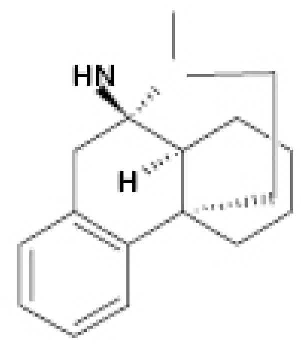
Column	Asymmetry
Shim-pack Arata C18	1.26
Typical ODS column	6.94

* Peptide is usually analyzed using gradient condition. Isocratic condition was used for this application in order to show the difference of LC columns more clearly. Result using gradient condition on Shim-pack Arata C18 was also evaluated and it was confirmed that angiotensin was fully eluted from the column with isocratic condition.

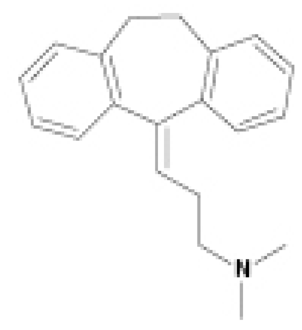
** Acetonitrile concentration was adjusted in order that the retention time of peptide on each column become similar.

Rapid Equilibration (Even with Low Ionic Strength Acidic Mobile Phases)

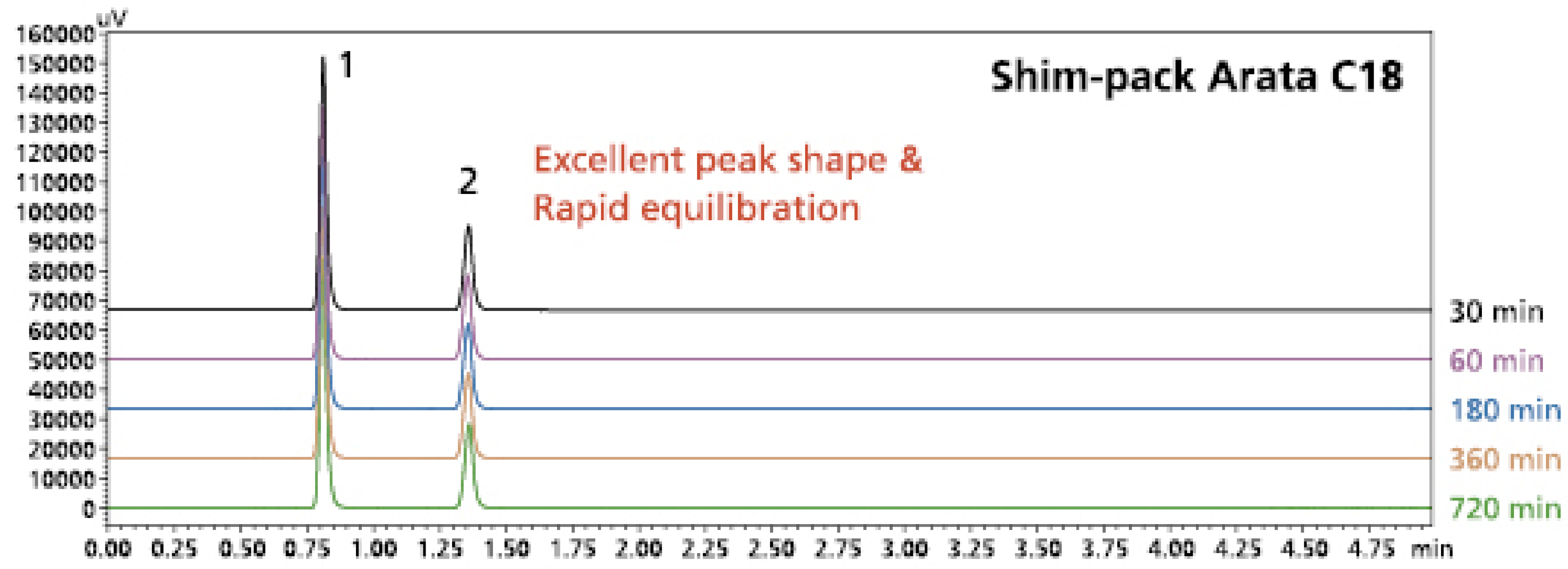
When analyzing basic compounds on a typical ODS column with low ionic strength acidic mobile phase, peak shape and long equilibration times are common problems. Shim-pack Arata LC columns can be rapidly equilibrated in low ionic strength acidic mobile phases yielding excellent peak shape and stable retention times.



1. Dextromethorphan



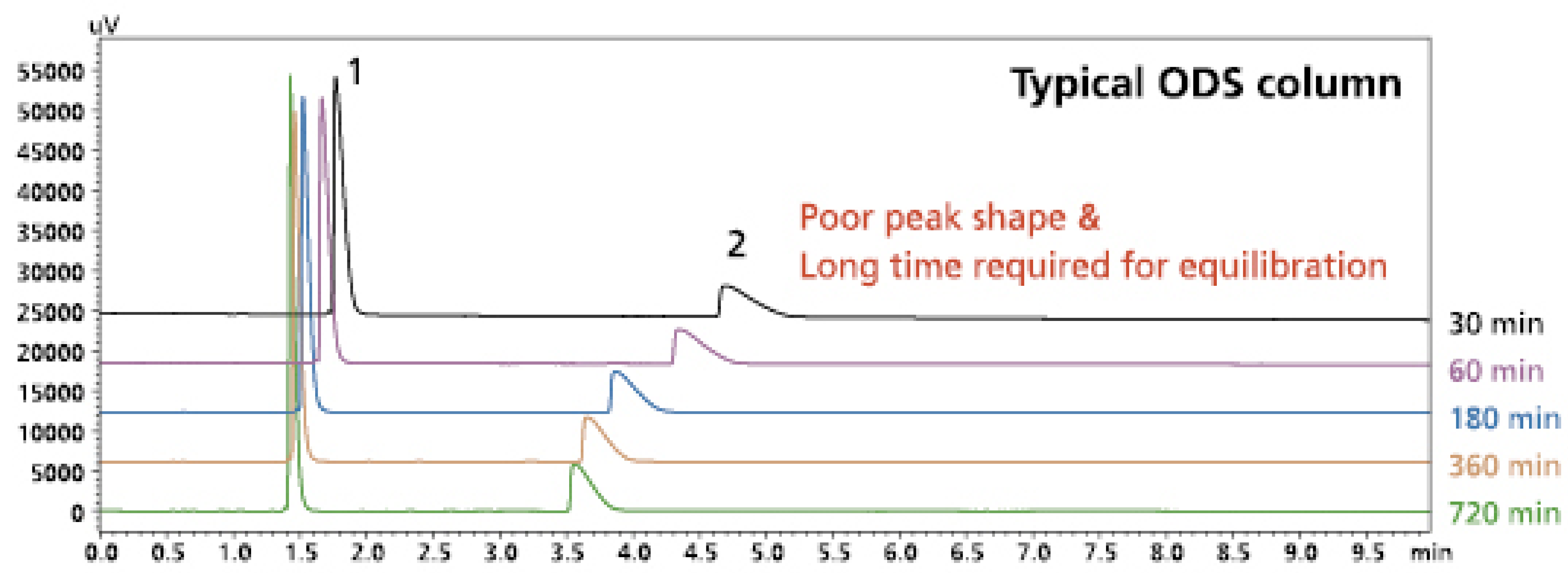
2. Amitriptyline



Analytical Conditions

Instruments	:	NexeraX2MP_M30A (STD Cell)
Column	:	Shim-pack Arata C18 (3.0 × 75 mm, 2.2 µm) Typical ODS column (3.0 × 75 mm, sub 2 µm),
Mobile Phase	:	0.1% HCOOH in H2O / CH3CN = 70 / 30
Flow Rate	:	0.4 mL/min
Detection	:	280 nm
Column Temp.	:	40 °C
Inj. Volume	:	2 µL
Sample	:	Amitriptyline, Dextromethorphan

	Compounds	Equilibration Time (min)	10	30	60	120	180	240	360	480	600	720	CV(%)
1	Dextromethorphan	Retention Time (min)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.2
		Symmetry Factor	1.20	1.19	1.19	1.18	1.18	1.18	1.18	1.18	1.18	1.18	0.6
2	Amitriptyline	Retention Time (min)	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	0.3
		Symmetry Factor	1.06	1.07	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	0.3



* Both were new columns (shipping solvent : acetonitrile) and equilibrated with mobile phase without any conditioning. Basic drugs were analyzed after a certain period of time of equilibration and RT and symmetry factor of the drugs were compared.

	Compounds	Equilibration Time (min)	10	30	60	120	180	240	360	480	600	720	CV(%)
1	Dextromethorphan	Retention Time (min)	1.9	1.8	1.7	1.6	1.5	1.5	1.5	1.4	1.4	1.4	10.4
		Symmetry Factor	3.28	3.14	3.01	2.70	2.63	2.56	2.51	2.49	2.56	2.49	10.2
2	Amitriptyline	Retention Time (min)	5.3	4.7	4.3	4.0	3.9	3.8	3.7	3.6	3.5	3.6	13.5
		Symmetry Factor	4.23	4.23	4.35	4.22	4.13	4.17	4.09	4.02	3.99	3.90	3.1

Comparison of Column Equilibration in The Mobile Phase with 0.1% Formic Acid (Shim-pack Arata C18 vs. Typical ODS Column)

Shim-pack Arata C18

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	3.0	4.6
2.2	50	227-32801-01	227-32802-01	-
	75	227-32801-02	227-32802-02	-
	100	227-32801-03	227-32802-03	-
	150	227-32801-04	227-32802-04	227-32805-04
	250	-	-	227-32805-05
5.0	50	227-32803-01	227-32804-01	227-32805-01
	75	227-32803-02	227-32804-02	227-32805-02
	100	227-32803-03	227-32804-03	227-32805-03
	150	227-32803-04	227-32804-04	227-32805-04
	250	-	-	227-32805-05

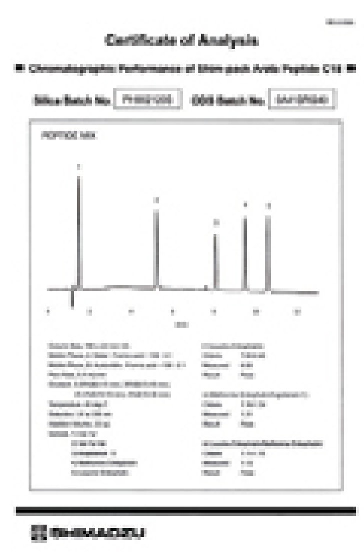
Shim-pack Arata Peptide Columns

Excellent Seperation Performance of Peptides

Typically, in order to obtain good peak shape of peptides under reversed phase chromatography, TFA containing mobile phases are frequently used which the ion pairing effect is relatively strong. However, TFA could cause ion suppression in LC/MS(/MS) analysis. Excellent peak shape and separation performance for peptides could be achieved on the Shim-pack Arata LC column even under formic acid (weak ion paring acid) containing mobile phase conditions, which are suitable for LC/MS(/MS) without the use of typical ion pairing agents.

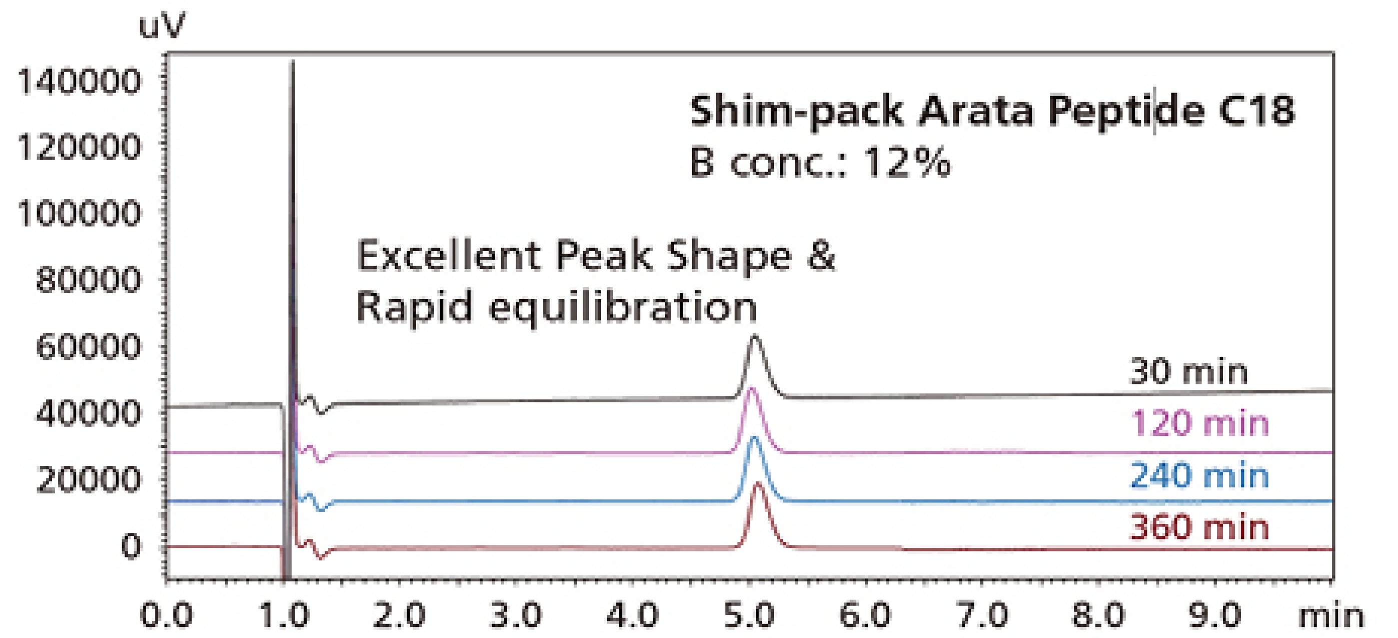
Increased Assurance of Peptide Analysis ~ Shim-pack Arata Peptide C 18 column ~

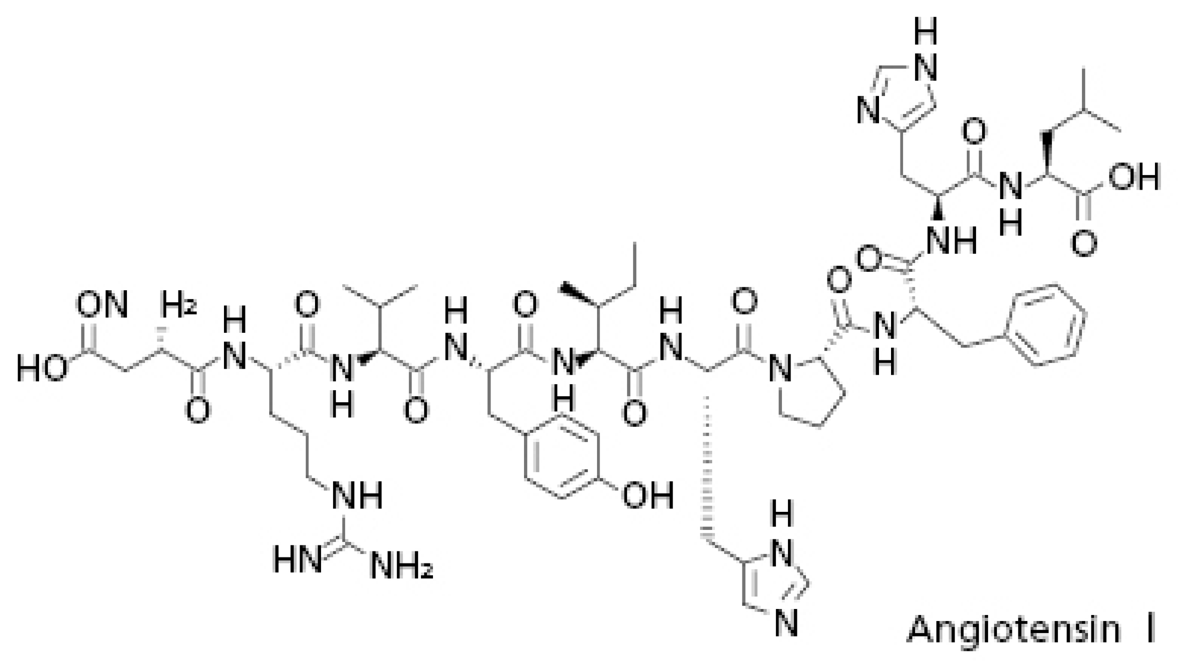
In order to ensure lot-to-lot reproducibility in peptide analysis, each lot of Shim-pack Arata Peptide C18material is tested using a mixture of peptide standards in addition to the standard Shim-pack Arata C18 lot QCtest. This test is carried out under severe condition using 0.1 % formic acid mobile phase to help ensure consistent column performance for requirements of customers under regulated requirements.use of typical ion pairing agents.



Excellent Seperation Performance of Peptides

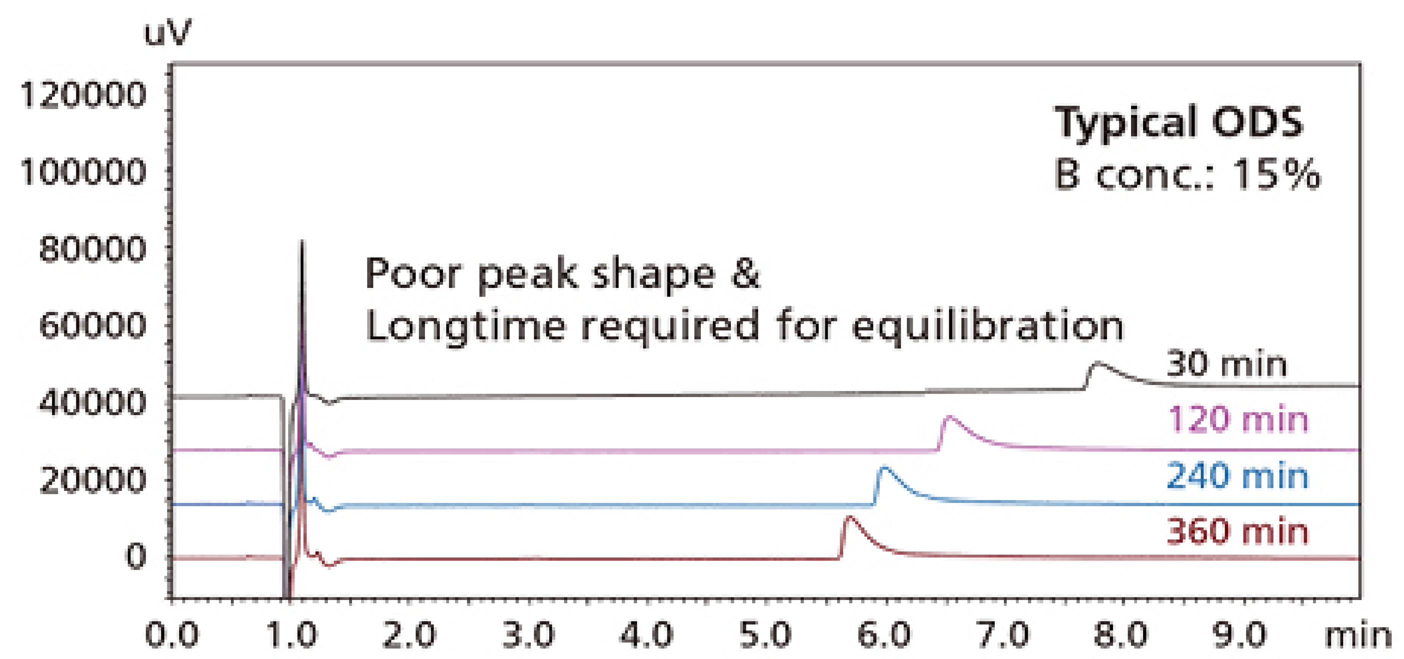
When analyzing peptides on a typical ODS column with 0.1% formic acid mobile phase, not only poor peak shape but also long equilibration time required to obtain stable retention times and area is a common problem. Shim-pack Arata Peptide C18 columnscan be rapidly equilibrated even in 0.1% formic acid containing mobile phase, achieving excellent peak shape, stable retention andarea of peptides at the same time.





Angiotensin Ⅰ

Compounds	Equilibration time (min)	30	60	120	180	240	360	CV
Angiotensin Ⅰ	Retention time (min)	5.05	5.03	5.03	5.03	5.04	5.06	0.3
	Symmetry factor	1.26	1.24	1.25	1.25	1.24	1.25	0.4
	Area	$2.17{\times}10^5$	$2.13{\times}10^5$	$2.26{\times}10^5$	$2.25{\times}10^5$	$2.23{\times}10^5$	$2.24{\times}10^5$	1.9



Analytical Conditions
LC system : NexeraX2 MP_SPD20A (Semi-micro Cell)
LC column :
Shim-pack Arata Peptide C18 (3.0 × 75 mm, 2.2 µm)
Typical ODS (3.0 × 75 mm, Sub 2 µm)
Mobile Phase A : 0.1% HCOOH in H2O
Mobile Phase B : 0.1% HCOOH in CH3CN
Flow rate : 0.4 mL/min

Detection : 214 nm
Column temp. : 40 °C
Injection volume : 1 µL
Sample : Angiotensin I
Vial : Torast-H Bio Vial

*Peptide is usually analyzed using gradient conditions. Isocratic condition was used for this application in order to show the difference of LC columns more clearly. Acetonitrile concentration was adjusted in order that the retention time of peptide on each column become similar.

Compounds	Equilibration time (min)	30	60	120	180	240	360	CV
Angiotensin Ⅰ	Retention time (min)	7.78	7.15	6.53	6.20	5.98	5.82	11.0
	Symmetry factor	4.89	4.38	4.85	4.87	4.93	4.92	3.9
	Area	$1.65{\times}10^5$	$1.58{\times}10^5$	$1.76{\times}10^5$	$1.78{\times}10^5$	$1.83{\times}10^5$	$1.84{\times}10^5$	5.3

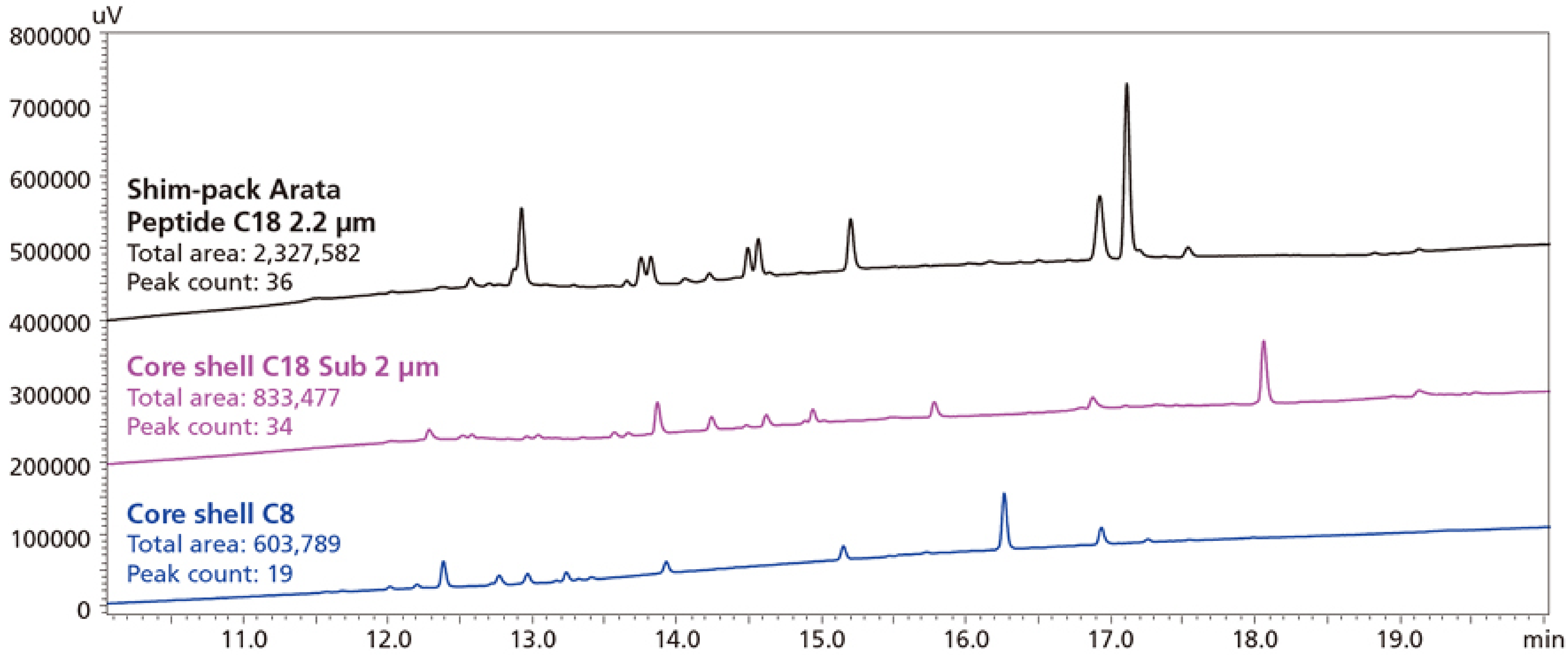
Both columns were new columns (shipping solvent: acetonitrile) and equilibrated with mobile phase without any conditioning. Angiotensin I was analyzed after a certain period of equilibration and retention time, symmetry factor and area of Angiotensin I were compared. The typical ODS showed poor peak symmetry and unstable retention time even after 360 minutes of equilibration. In contrast, Shim-pack Arata peptide C18 already showed stable retention after 30 minutes of equilibration and excellent peak shape was obtained.

High Peptide Recovery enabled by Shim-pack Arata technology

Since the adsorption of peptides to particles is minimized, high recovery of peptides is ensured and excellent peptide analysis can be provided by Shim-pack Arata Peptide C18 column.

Analysis of Tryptic Digest of Myoglobin

Peptides are known to show non-specific adsorption to particles of LC columns. A Shim-pack Arata Peptide C18 column showed high recovery of peptides.



Analytical Conditions

LC System : NexeraX2MP_M30A (STD Cell)
LC Column : Shim-pack Arata Peptide C18 (2.0 × 150 mm, 2.2 µm)
Core shell Peptide C18 (2.1×150 mm, sub 2 µm)
Core shell C8 (2.1 ×150 mm, sub 4 µm)
Mobile Phase A : 0.1% HCOOH in H2O
Mobile Phase B : 0.1% HCOOH in CH3CN
Gradient : 2%B (0-5 min)→45%B (20 min)→100%B (20.01 – 25 min) →2%B (25.01 – 30 min)

Detection : 214 nm
Column temp. : 40 °C
Injection volume : 1 µL
Sample : Angiotensin I
Vial : Torast-H Bio Vial

Tryptic digest of myoglobin was analyzed using Shim-pack Arata Peptide C18 (2.2 µm), Core shell C18 (sub 2 µm) and a Core shell C8 (sub 4 µm). Compared to the other two columns, Shim-pack Arata Peptide C18 showed significantly larger peak area, which suggests that higher recovery could be obtained with Shim-pack Arata Peptide C18 column.

Shim-pack Arata Peptide C18

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0
2.2	50	227-32806-01
	100	227-32806-02
	150	227-32806-03

Shim-pack XR Series

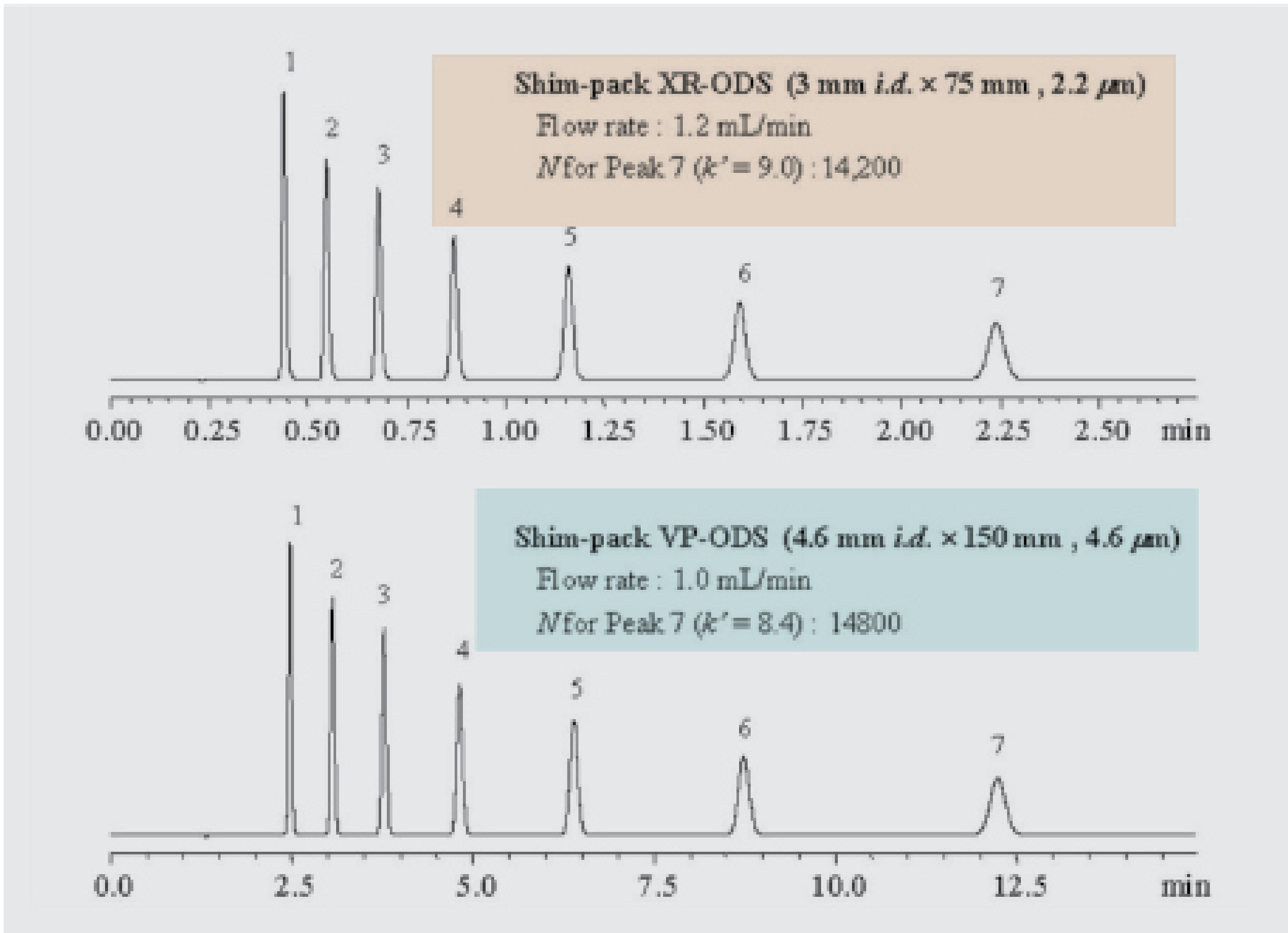
Shim-pack XR Series Columns Offer Versatility and Fast Analysis

Shim-pack XR Series columns use a 2.2 µm packing particle size and offer a skillful balance between resolution efficiency and pressure. An XR Series column provides resolution equivalent to a general-purpose column with 5 µm packing particle size (Shim-pack VP-ODS), but significantly reduces the analysis time. The pressure on the column under many analysis conditions does not exceed 35 MPa. Consequently, ultrafast analysis can be comfortably performed on an existing instrument.

	Shim-pack XR-ODS	Shim-pack XR-C8	Shim-pack XR-Phenyl	Shim-pack XR-SIL
Particle Size (µm)	2.2	2.2	2.2	2.2
Pore Size (nm)	12	12	12	12
Surface Area (m2/g)	340	340	340	340
Carbon Loading	18%	11%	11%	–
Pressure Tolerance (MPa)	35	35	35	20
Pore Volume (mL/g)	1.05	1.05	1.05	1.05
End-capping	Yes	Yes	Yes	–
Bonding Type	Monomeric	Monomeric	Monomeric	–
pH Range	2 - 7.5	2 - 7.5	2 - 7.5	–
USP Code	L1	L7	L11	L3

Shim-pack XR-ODS Permits Simple Switching from Conventional Analysis

The two chromatograms to the right show differences in analysis times when using different columns. The lower chromatogram is the result of analysis using a Shimadzu Shim-pack VP-ODS general-purpose column. The upper chromatogram is from analysis with a Shim-pack XR-ODS fast analysis column. As both Shim-pack VP-ODS and Shim-pack XR-ODS offer identical resolution properties, Shim-pack XR-ODS maintains the resolution while significantly reducing analysis times.



For more information of smooth transfer of methods from high-speed analysis to conventional analysis, please refer to page A-34

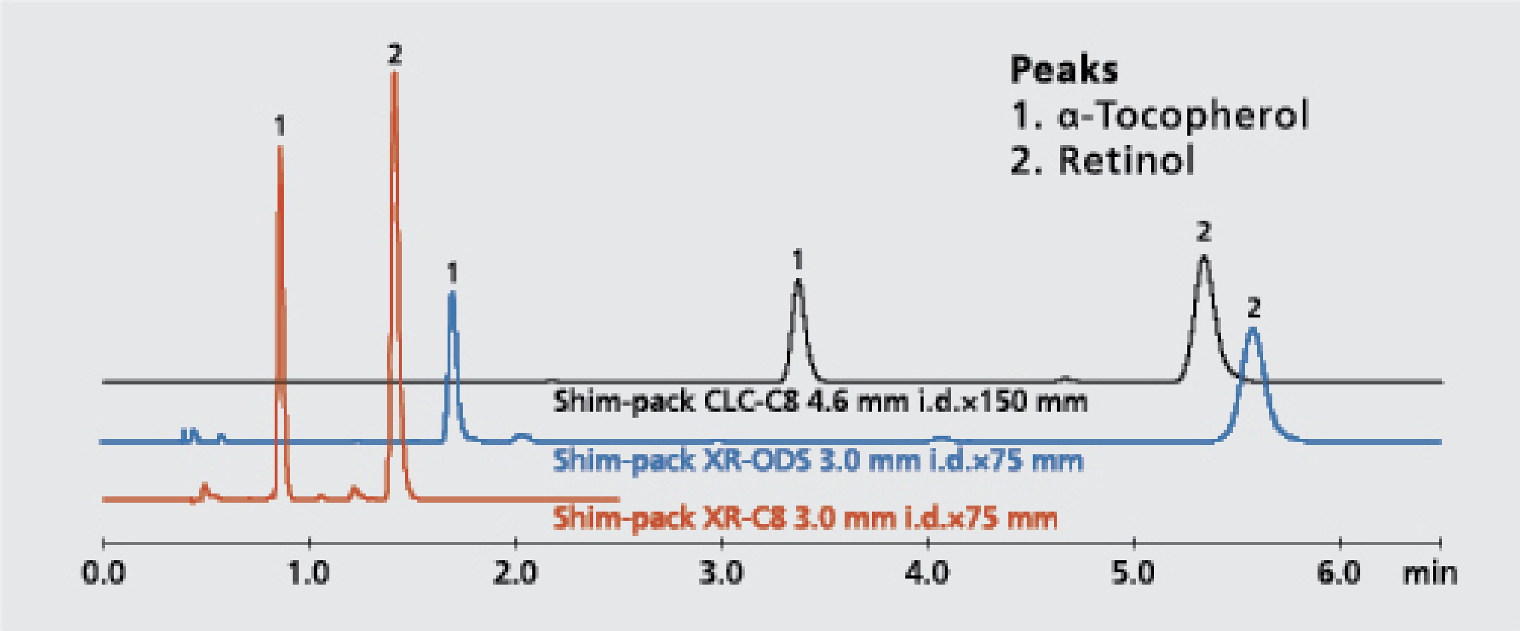
Shim-pack XR Series Comprehensive Product Range

In addition to the versatile Shim-pack XR-ODS that is bonded with the C18 group, the comprehensive Shim-pack XR Series product range includes the Shim-pack XR-C8 that is bonded with the C8 group to give different retention behavior to ODS, Shim-pack XR-Phenyl that is bonded with the phenylpropyl group, and the normal-phase Shim-pack XR-SIL silica column that achieves higher speeds.

Analysis Examples

Analysis of Fat-Soluble Vitamins

The fat-soluble vitamins E (tocopherol) and A (retinol) were analyzed. The Shim-pack XR-C8 column achieves higher speed than a conventional C8 column.

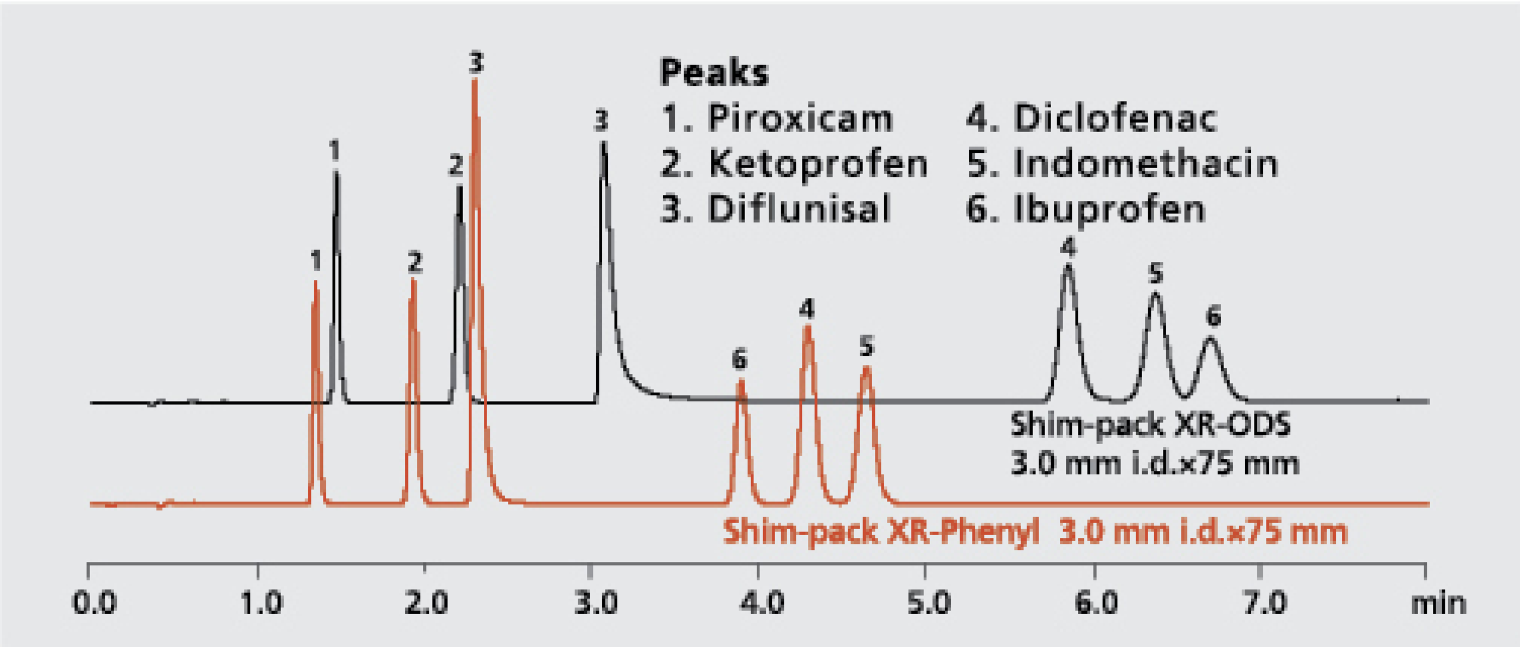


■ **Conditions**

Column	: Shim-pack XR-C8 (75 mmL. × 3.0 mmI.D., 2.2 µm) (P/N: 228-59902-93)
Mobile Phase	: Methanol
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 290 nm

Analysis of Non-Steroidal Anti-Inflammatory Drug

The column was switched from Shim-pack XR-ODS to Shim-pack XR-Phenyl to improve the resolution.
The difference in retention properties between the ODS group and the phenylpropyl group improves the peak shape, controls the resolution, and reduces the analysis time.

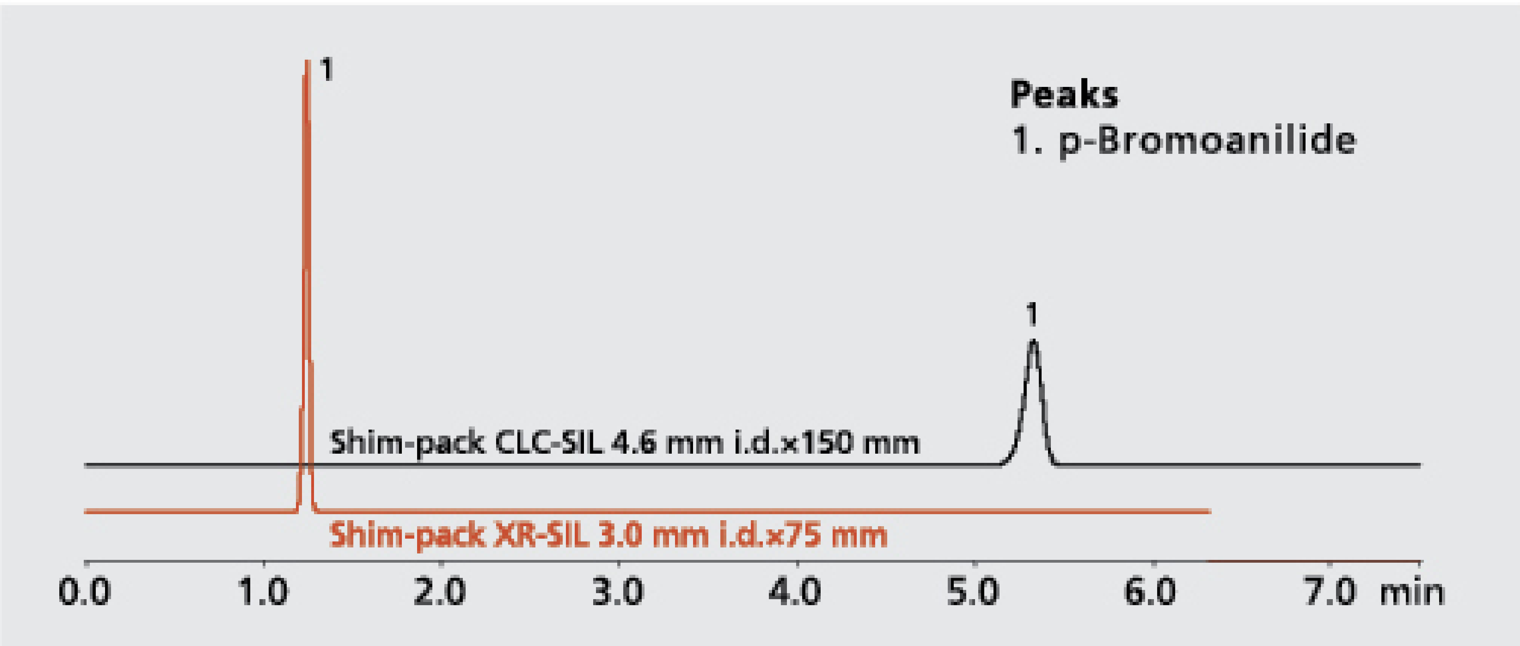


■ **Conditions**

Column	: Shim-pack XR-Phenyl (75 mmL. × 3.0 mmI.D., 2.2 µm) (P/N: 228-59904-93)
Mobile Phase	: A) 20 mmol/L Phosphate buffer solution (pH 2.5) B) Acetonitrile A/B = 30/20 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 220 nm

Fast Normal-Phase Analysis

Organic solvents are used as the mobile phase for normal-phase analysis. Due to environmental considerations, it is necessary to reduce the consumption of mobile phase compared with normal reversed-phase analysis. The Shim-pack XR-SIL silica column increases the speed of normal-phase analysis while reducing the consumption of mobile phase. In this example, the analysis time is reduced by 80 % while maintaining the flow rate, thereby reducing the overall mobile phase consumption to 20 % or less.



■ **Conditions**

Column	: Shim-pack XR-SIL (75 mmL. × 3.0 mmI.D., 2.2 µm) (P/N: 228-59906-92)
Mobile Phase	: Hexane / Ethanol = 90/10 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 254 nm

Shim-pack XR Series

Shim-pack XR Series, Shim-pack XR-ODS II and XR-ODS III High-Pressure Columns for Higher Resolution and Sensitivity

While the Shim-pack XR-ODS II and XR-ODS III use the same 2.2 µm packing particle size as the Shim-pack XR Series columns, they have higher 60 and 100MPa pressure tolerance. This allows them to achieve high-resolution fast analysis in a long column using a water/methanol mobile phase. This column significantly extends the range of applications of high-resolution fast analysis to include analysis near room temperature. The Shim-pack XR-ODSII and XR-ODS III columns are ideal for the Nexera UHPLC or Prominence UFLC. This combination achieves both faster speed and higher resolution.

	Shim-pack XR-ODS II	Shim-pack XR-ODS III	
Length (mm)	30, 50, 75, 100, 150	50, 75	150, 200
Particle Size (µm)	2.2	1.6	2.2
Pore Size (nm)	8	7.5	8
Surface Area (m2/g)	470	500	470
Carbon Loading	20%	22%	20%
Pressure Tolerance (MPa)	60	100	100
Pore Volume (mL/g)	1	0.95	1
End-capping	Yes	Yes	Yes
Bonding Type	Monomeric	Monomeric	Monomeric
pH Range	2 - 7.5	2 - 7.5	2 - 7.5
USP Code	L1	L1	L1

Extensive product range, including 1.5 mmI.D. column to reduce mobile phase consumption

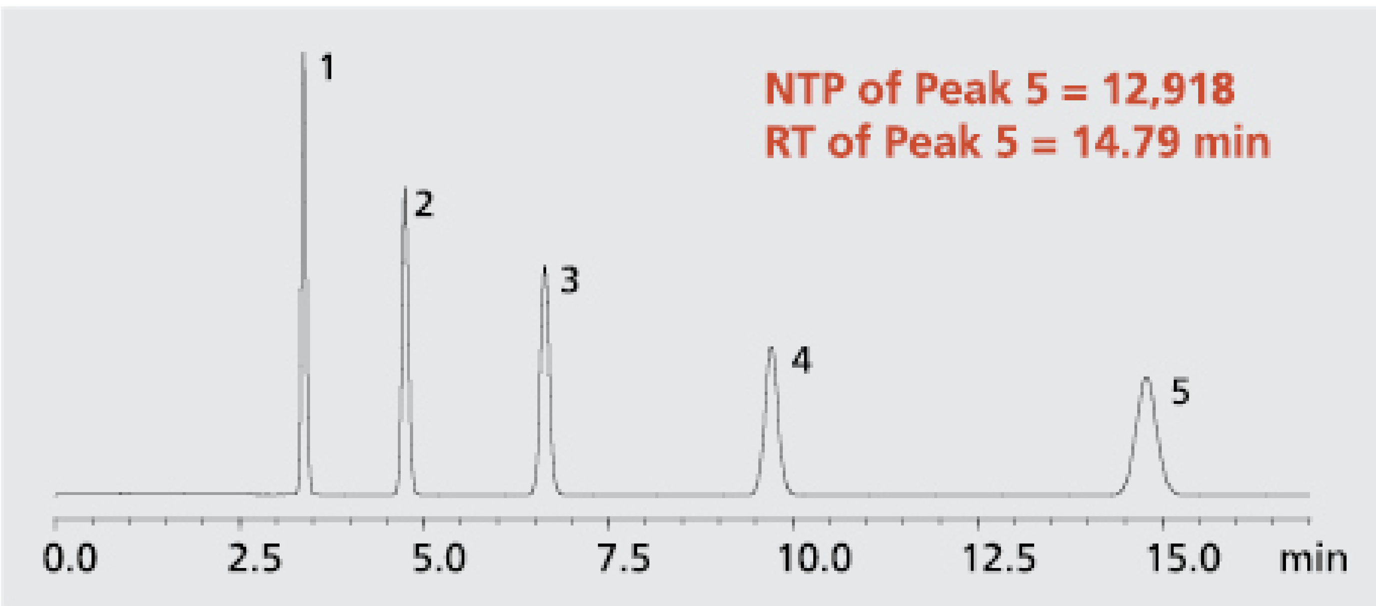
The Shim-pack XR-ODS II range includes a 1.5 mmI.D. model in addition to normal 2 mm and 3 mmI.D. columns. With an optimal flow rate of 0.2 to 0.3 mL/min, the 1.5 mmI.D. column offers the optimal flow rate for LC/MS and reduces mobile phase consumption.

Select a column to suit your purpose, whether shorter analysis times or high resolution

The Shim-pack XR-ODS III lineup features two columns: a short one utilizing a packing material with a particle size of 1.6 µm and a long one utilizing a 2.2 µm particle size, which is equivalent to the conventional XR column. This extensive lineup allows users to select a column according to analysis objectives, whether it's a short size to further shorten analysis times, or a long size to achieve high resolution while retaining the ease of use of the conventional XR column.

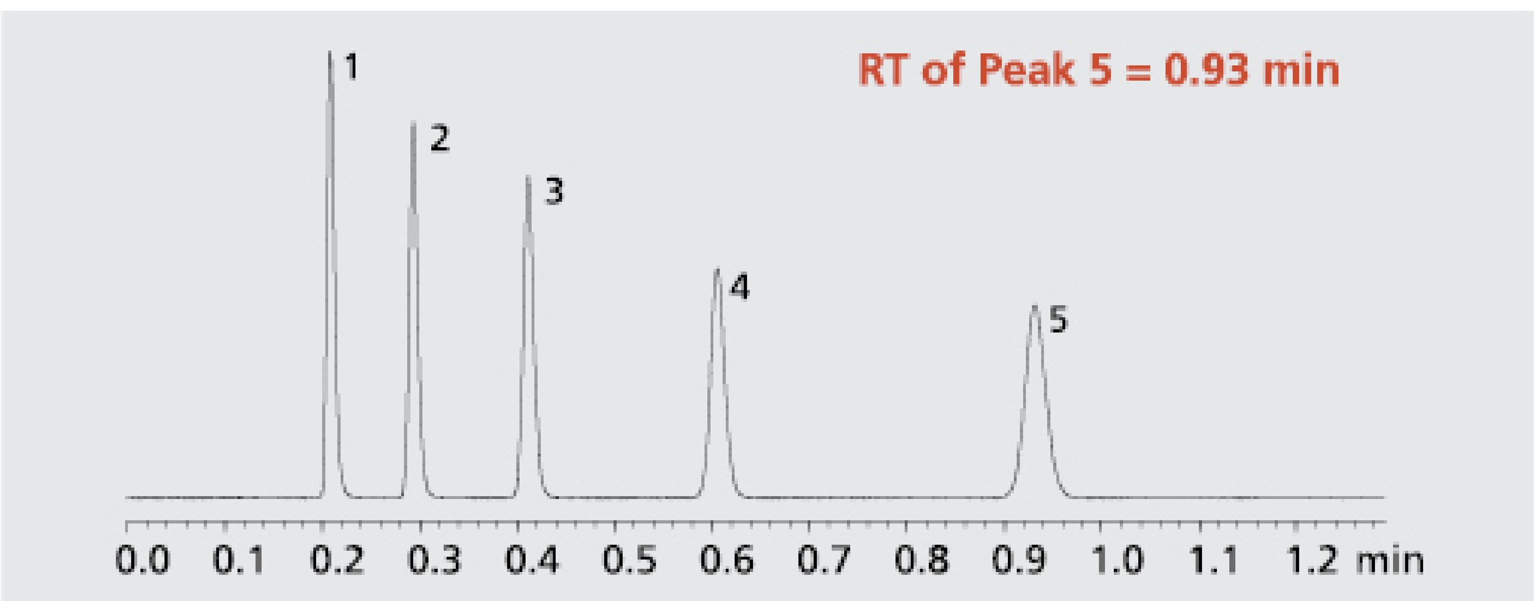
Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm, P/N: 228-34937-91)

Peaks
1. Acetophenone
2. Propiophenone
3. Butyrophenone
4. Valerophenone
5. Hexanophenone



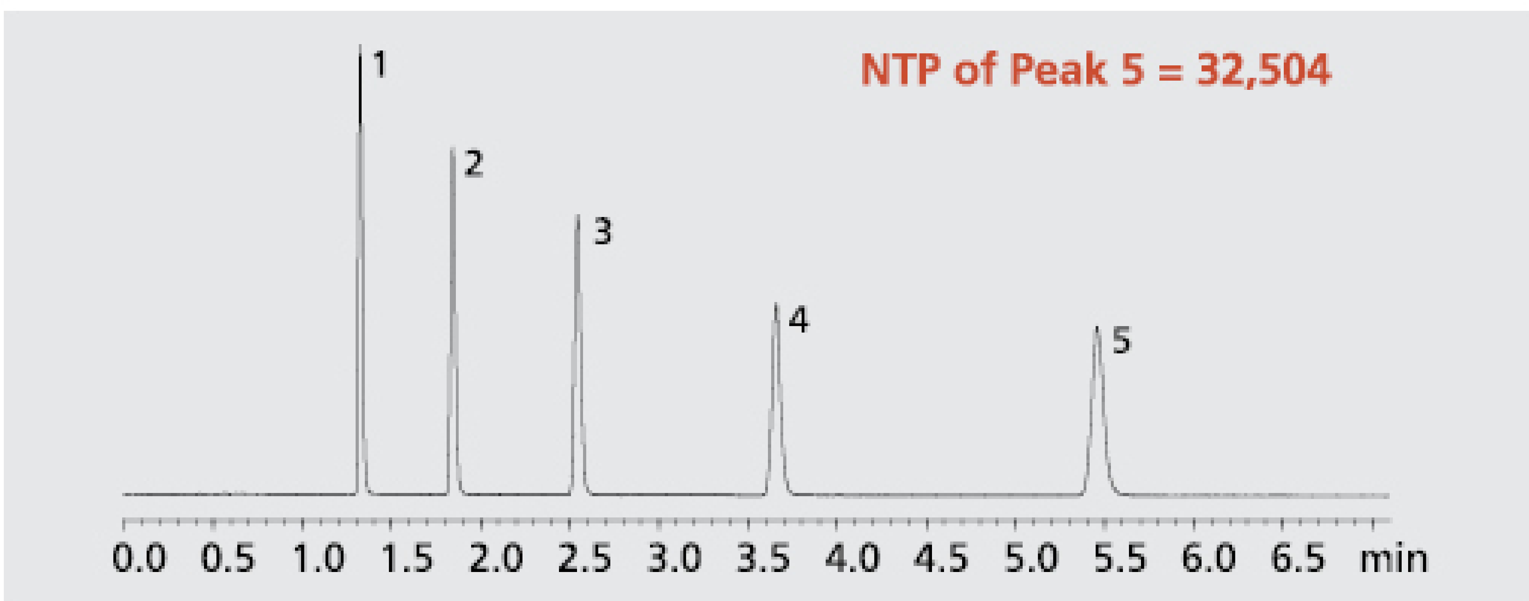
Conditions
Mobile Phase : 55 % Aqueous Acetonitrile Solution
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Injection Vol. : 5 µL

Shim-pack XR-ODS III (50 mmL. × 2 mmI.D., 1.6 µm, P/N: 228-59922-91)



Conditions
Mobile Phase : 55 % Aqueous Acetonitrile Solution
Flow Rate : 1.1 mL/min
Col. Temp. : 40 °C
Injection Vol. : 5 µL

Shim-pack XR-ODS III (200 mmL. × 2 mmI.D., 2.2 µm, P/N: 228-59910-92)



Conditions
Mobile Phase : 55 % Aqueous Acetonitrile Solution
Flow Rate : 0.6 mL/min
Col. Temp. : 50 °C
Injection Vol. : 5 µL

Product Information

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	1.5	2.0	3.0	4.6	Pressure Tolerance (MPa)
Shim-pack XR-ODS	2.2	20	-	228-50459-91	-	-	35
		30	-	228-41605-91	228-41606-91	228-41607-91	
		50	-	228-41605-92	228-41606-92	228-41607-92	
		75	-	228-41605-93	228-41606-93	228-41607-93	
		100	-	228-41605-94	228-41606-94	228-41607-94	
Shim-pack XR-C8	2.2	30	-	228-59901-91	228-59902-91	-	35
		50	-	228-59901-92	228-59902-92	-	
		75	-	228-59901-93	228-59902-93	-	
		100	-	228-59901-94	228-59902-94	-	
Shim-pack XR-Phenyl	2.2	30	-	228-59903-91	228-59904-91	-	35
		50	-	228-59903-92	228-59904-92	-	
		75	-	228-59903-93	228-59904-93	-	
		100	-	228-59903-94	228-59904-94	-	
Shim-pack XR-Sil	2.2	50	-	228-59905-91	228-59906-91	-	20
		75	-	228-59905-92	228-59906-92	-	
		100	-	228-59905-93	228-59906-93	-	
Shim-pack XR-ODS II	2.2	30	228-59907-91	-	-	-	60
		50	228-59907-92	228-41623-94	-	-	
		75	228-59907-93	228-41623-91	228-41624-91	-	
		100	228-59907-94	228-41623-92	228-41624-92	-	
		150	228-59907-95	228-41623-93	228-41624-93	-	
Shim-pack XR-ODS III	1.6	50	-	228-59922-91	-	-	100
		75	-	228-59922-92	-	-	
	2.2	150	-	228-59910-91	-	-	
		200	-	228-59910-92	-	-	

For Pre-column Filters, please refer to page A-123

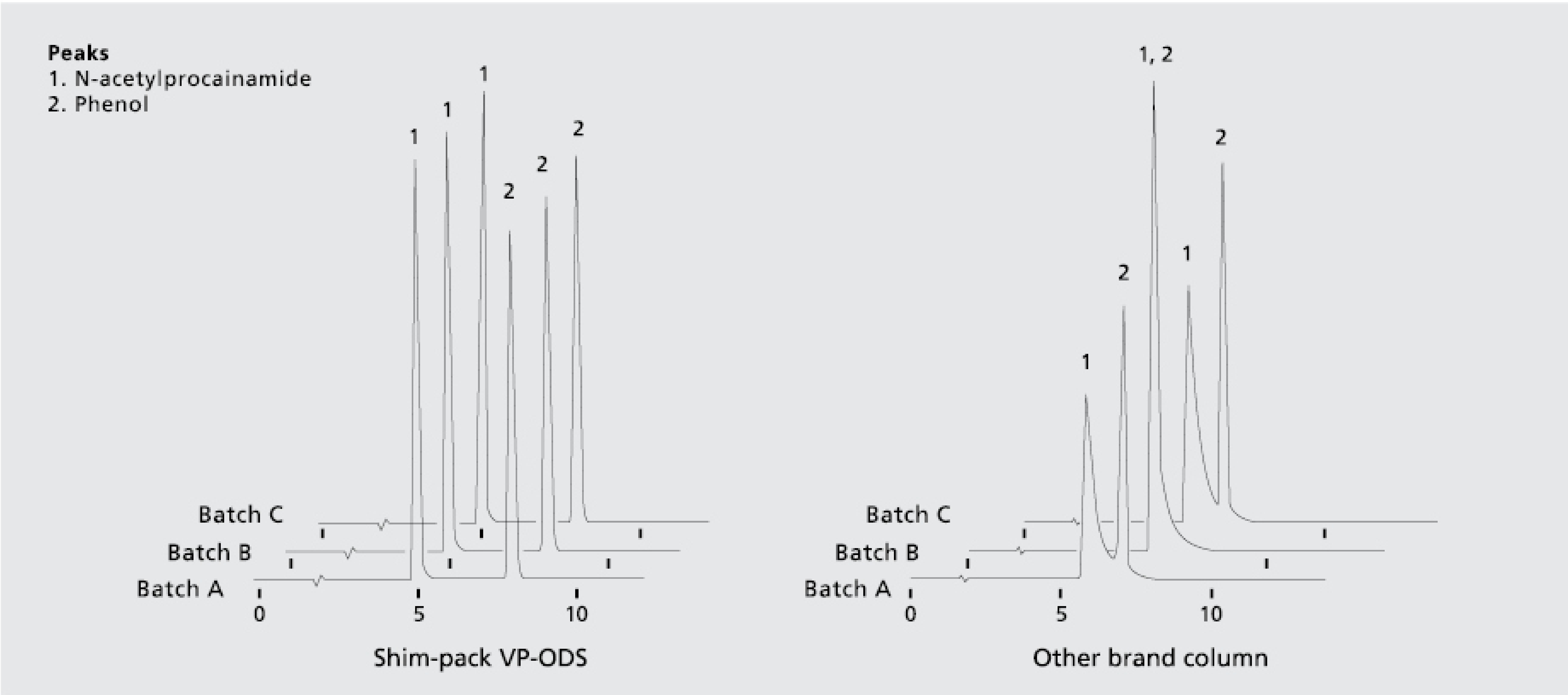
Shim-pack VP Series

Shim-pack VP series is designed for the development and validation of analytical methods.

	Shim-pack VP-ODS	Shim-pack VP-C8	Shim-pack VP-Phenyl
Particle Size (µm)	5	5	5
Pore Size (nm)	12	12	12
Surface Area (m2/g)	410	410	410
Carbon Loading	20%	12.5%	12.3%
Pressure Tolerance (MPa)	Approx. 20	Approx. 20	Approx. 20
Pore Volume (mL/g)	1.25	1.25	1.25
End-capping	Yes	Yes	Yes
Bonding Type	Monomeric	Monomeric	Monomeric
pH Range	2 - 7.5	2 - 7.5	2 - 7.5
USP Code	L1	L7	L11

Strict Manufacturing Uniformity

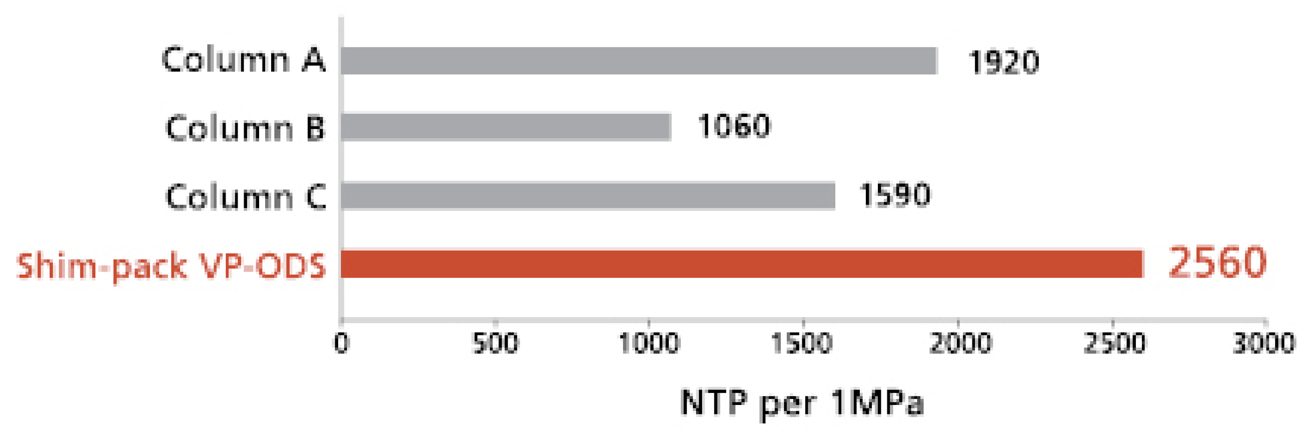
Shim-pack VP series ensures high column-to-column performance reproducibility, which is ideal for method development and validation. Silica-bases, surface treatment and packing procedures are subjected to a strict array of quality criteria tests and controlled respectively. Each column is delivered together with Certificate of Compliance and Column Performance Report.



Comparison of reproducibility between three batches of silica-based materials

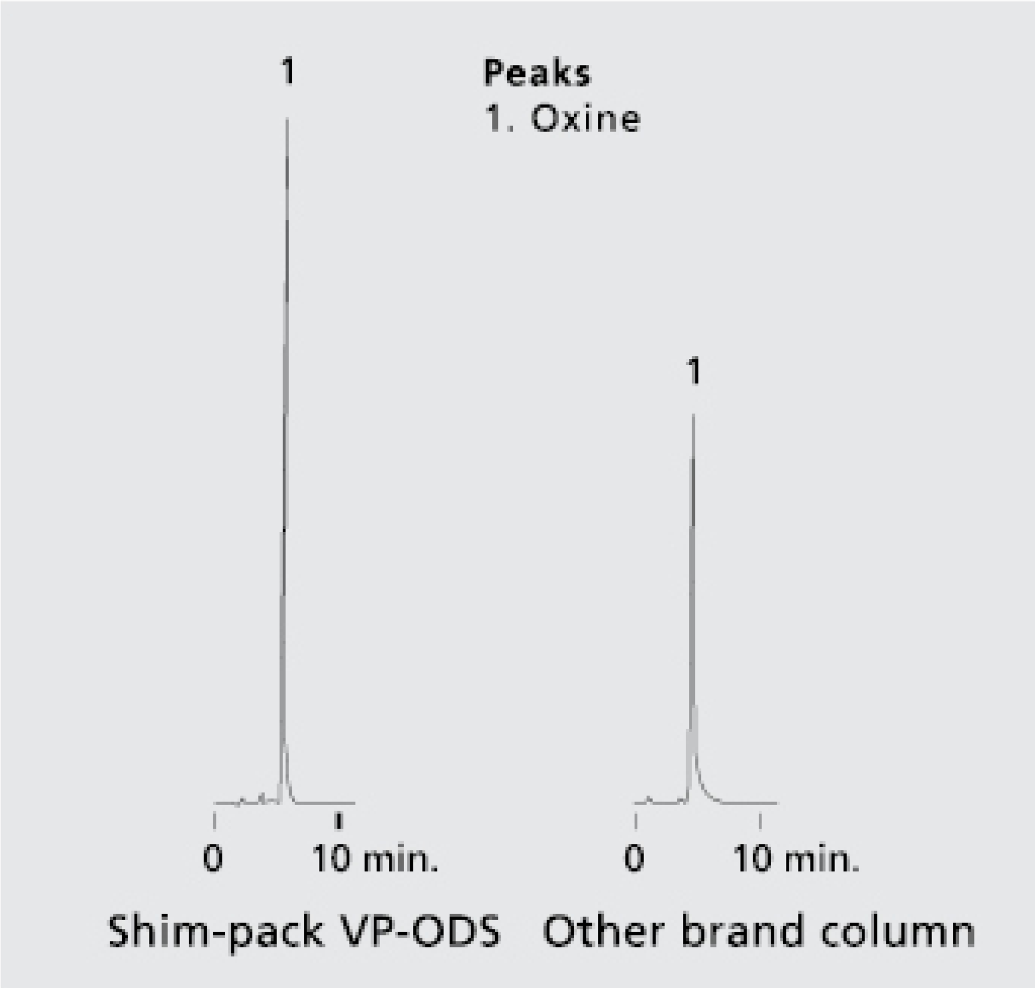
Balance of Column Efficiency and Column Backpressure

Shim-pack VP series achieves a higher column efficiency while maintaining low pressure. It provides superior performance shown by NTP (Number of Theoretical Plates) per 1MPa.

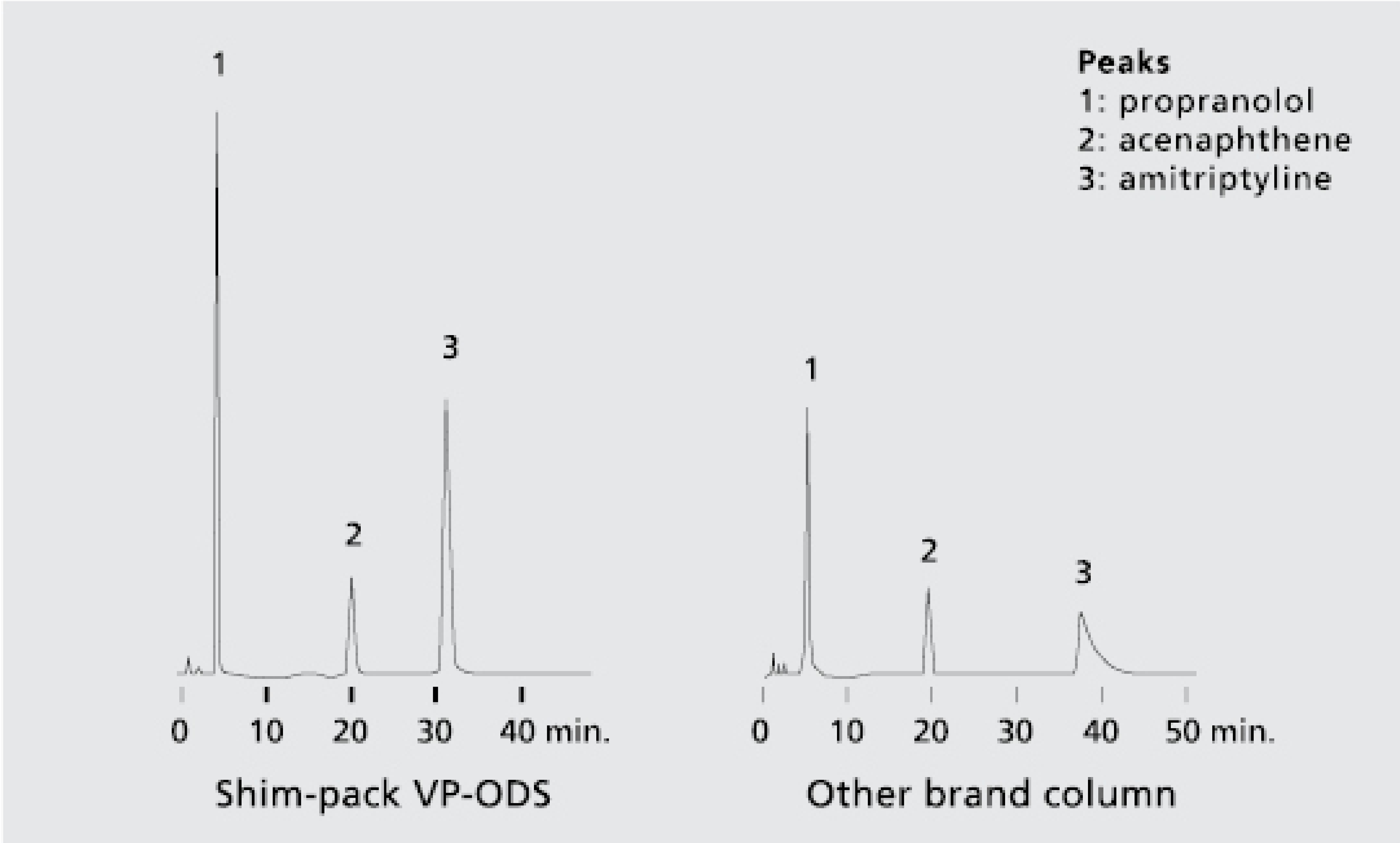


Column Size: 4.6 x 150 mm, Mobile Phase: Methanol/Water=70/30,
Flow Rate: 1.0 mL/min., Sample: Naphthalene

Excellent Peak Shape



Packing materials with less metal impurities achieve excellent peak shape of coordination compounds.



Completed end-capping achieves excellent peak shape of basic compounds.

Product Information

Analytical Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	4.6	6.0
Shim-pack VP-ODS	5	50	-	228-36849-91	-
		150	228-34937-94	228-34937-91	228-34937-93
		250	228-34937-95	228-34937-92	-
Shim-pack VP-C8	5	150	228-59927-93	228-59927-91	-
		250	228-59927-94	228-59927-92	-
Shim-pack VP-Phenyl	5	150	228-59928-93	228-59928-91	-
		250	228-59928-94	228-59928-92	-

Cartridge Guard Columns

Column	I.D. (mm) / Length (mm)	2.0	4.6
Guard Column Holder	-	228-34938-94	228-34938-92
GVP-ODS Cartridges (2 pcs)	5	228-34938-93	-
	10	-	228-34938-91

Shim-pack VP Series

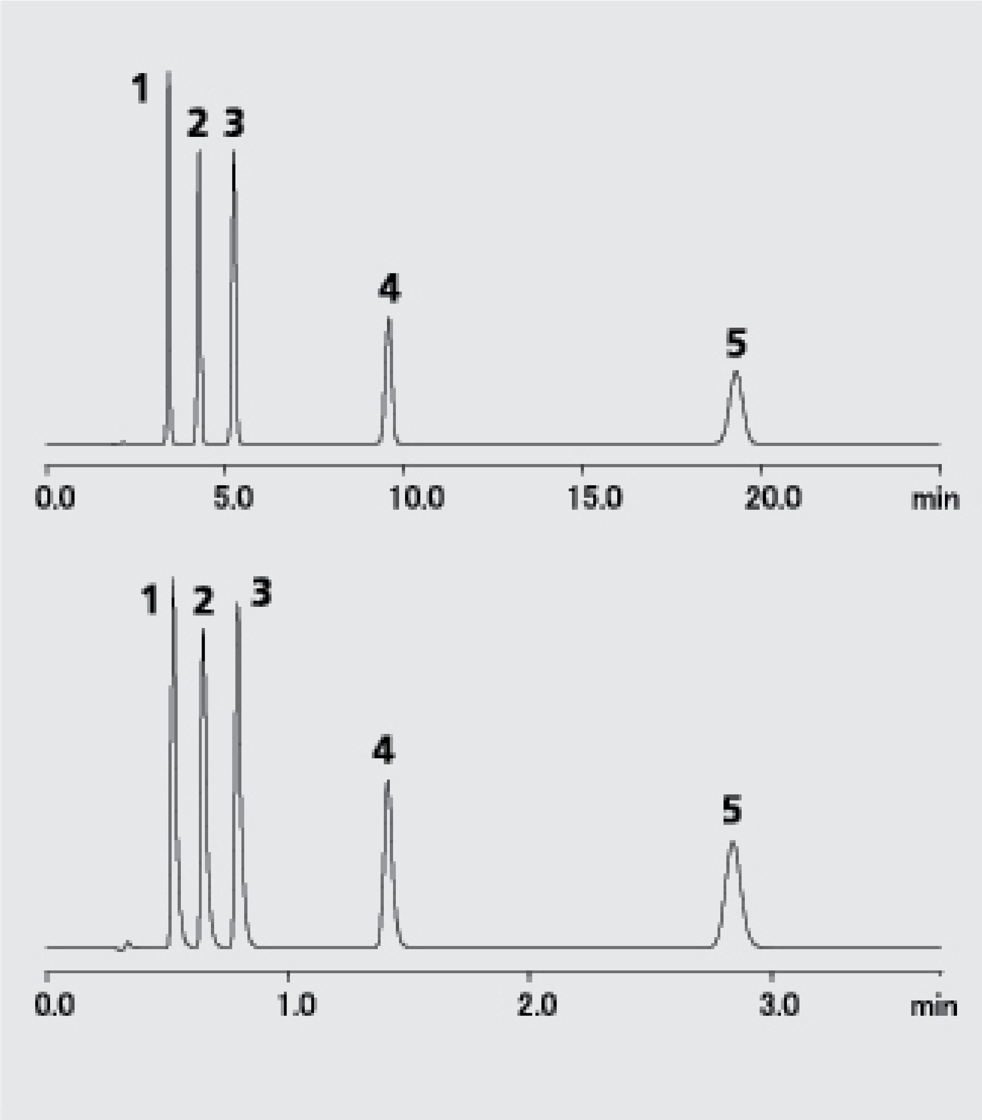
Smooth Transfer of Methods from High-Speed Analysis to Conventional Analysis

By using the Shim-pack VP series of conventional columns in combination with the Shim-pack XR series of high-speed columns, which offer the equivalent separation performance, it is possible to perform method development via high-speed analysis, and then smoothly transfer to conventional analysis. Utilizing these columns with Nexera Method Scouting provides strong support for method development.

Example of High-Speed/Conventional Analysis Using Columns with Equivalent Retention Behavior

Examples of analysis with the Shim-pack VP and Shim-pack XR columns are shown below. In each example, analysis was achieved while maintaining essentially the same relative retention time. In method transfer, this equivalency is important, making the combination of the Shim-pack VP series and Shim-pack XR series optimal for method development.

Example of the Batch Analysis of 6 Sulfa Drugs



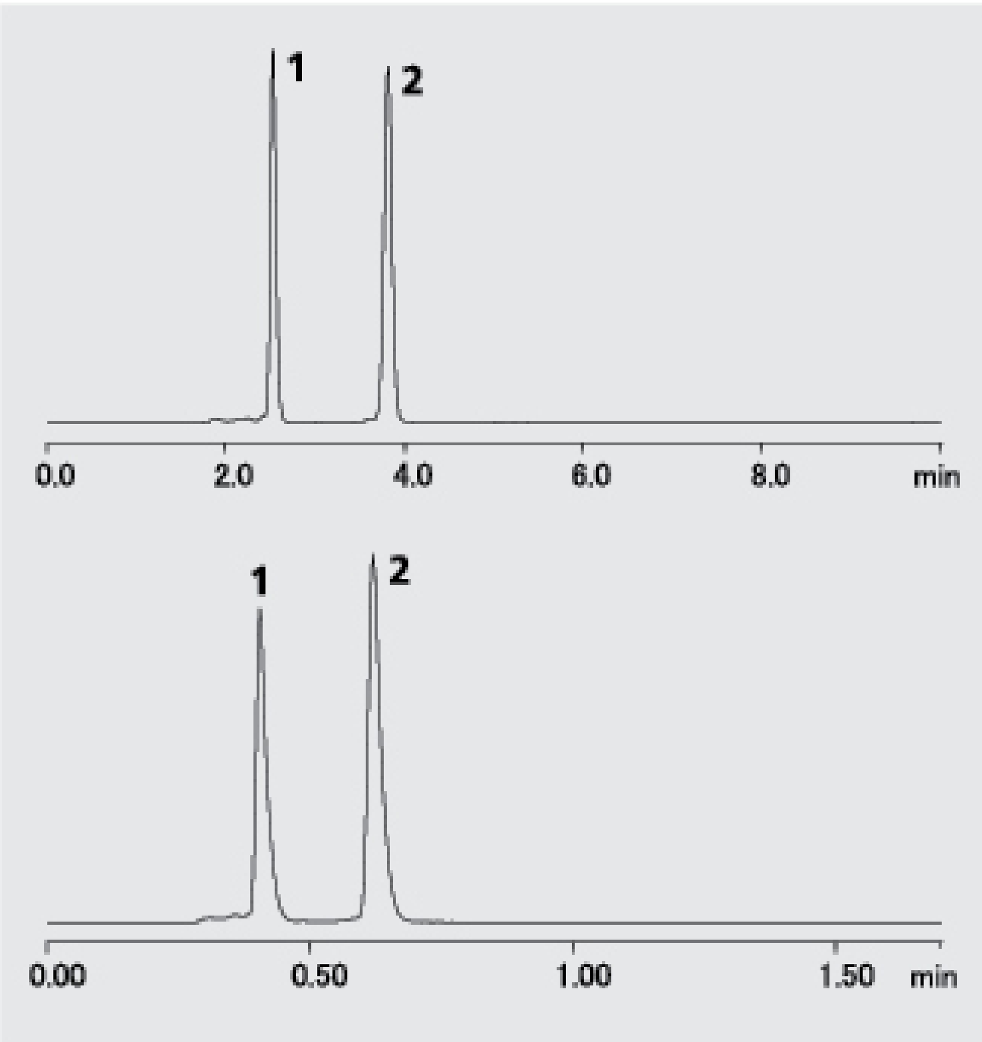
■ Conditions

Column : Top : Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-34937-91)
Bottom : Shim-pack XR-ODS (50 mmL. × 3.0 mmI.D., 2.2 µm) (P/N: 228-41606-92)
Mobile Phase : A) 0.1 % formic acid
B) Acetonitrile
A/B = 8/2 (v/v)
Flow Rate : Top : 1.0 mL/min
Bottom : 1.0 mL/min

Relative Retention Times

Peak	Shim-pack VP-ODS	Shim-pack XR-ODS
1. Sulfadiamine	1.000	1.000
2. Sulfamerazine	1.252	1.238
3. Sulfadimidine	1.537	1.509
4. Sulfamethoxazole	2.809	2.699
5. Sulfaquinoxaline	5.668	5.432

Example of the Analysis of Fat-Soluble Vitamins



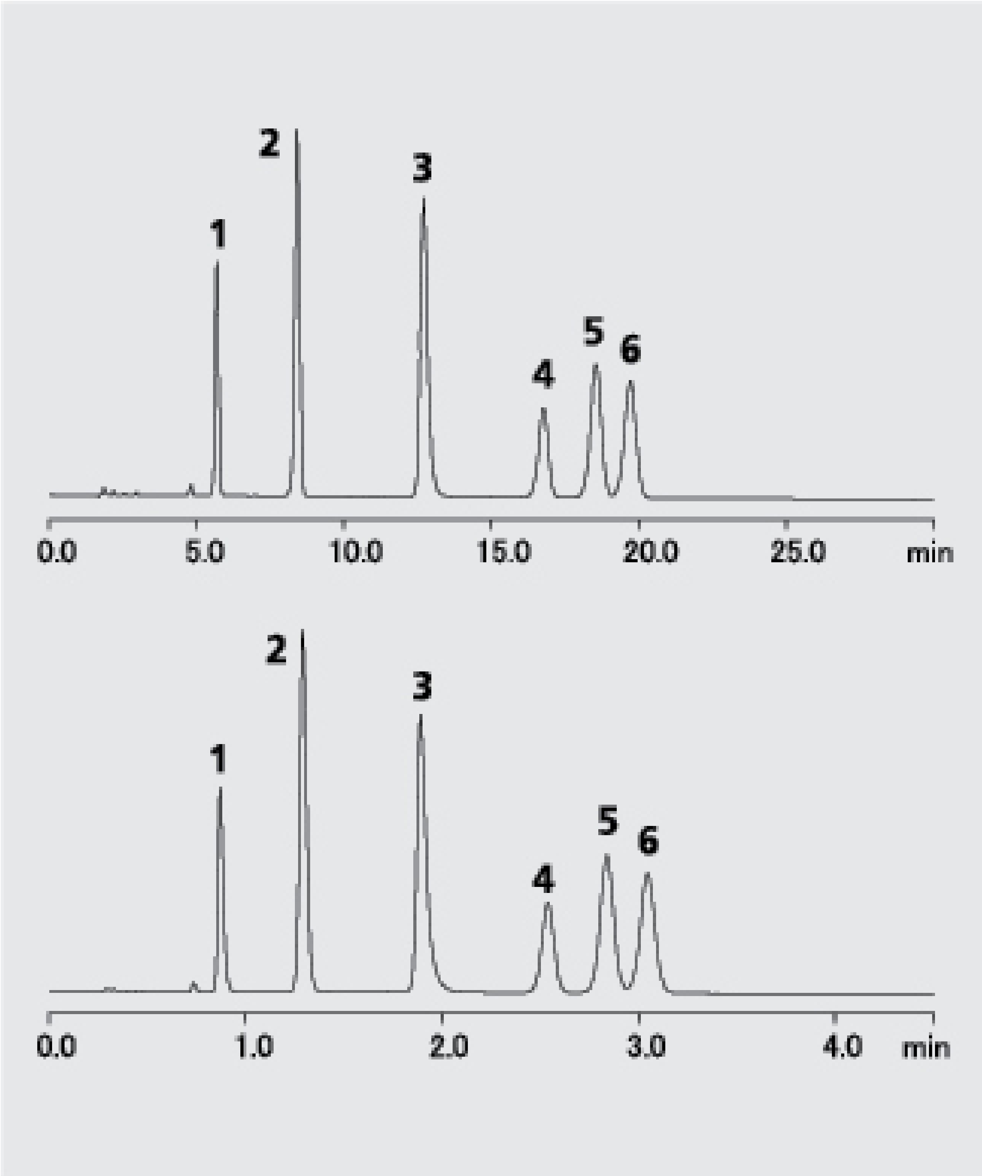
■ Conditions

Column : Top : Shim-pack VP-C8 (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-59927-91)
Bottom : Shim-pack XR-C8 (50 mmL. × 3.0 mmI.D., 2.2 µm) (P/N: 228-59902-92)
Mobile Phase : Methanol
Flow Rate : Top : 1.0 mL/min
Bottom : 1.0 mL/min

Relative Retention Times

Peak	Shim-pack VP-C8	Shim-pack XR-C8
1. Retinol	1.000	1.000
2. α±-tocopherol	1.509	1.531

Example of the Batch Analysis of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)



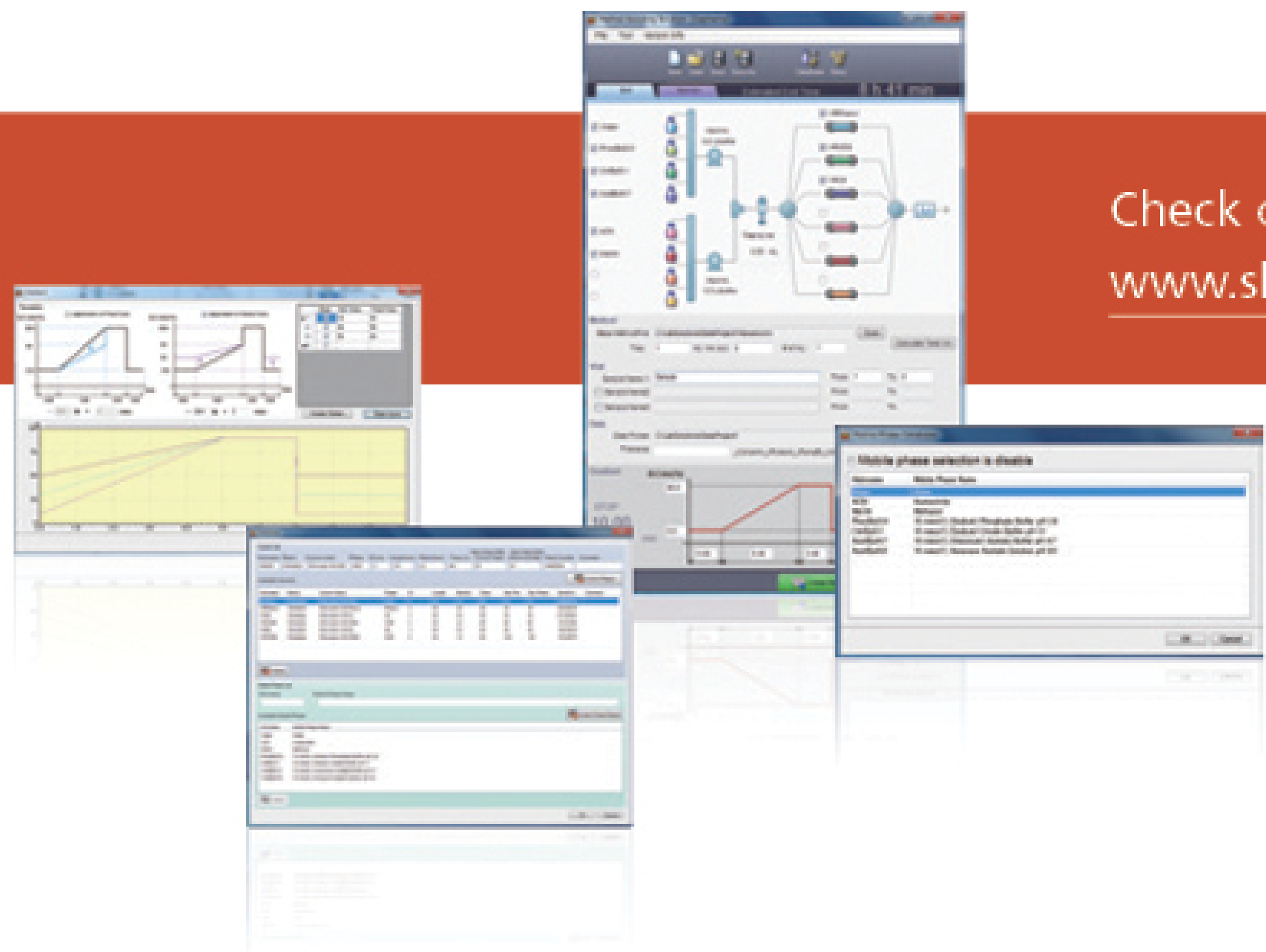
■ **Conditions**

Column	: Top :	Shim-pack VP-Phenyl (150 mmL. × 4.6 mmI.D., 5 μm) (P/N: 228-59928-91)
	Bottom :	Shim-pack XR-Phenyl (50 mmL. × 3.0 mmI.D., 2.2 μm) (P/N: 228-59904-92)
Mobile Phase	: A) 20 mmol/L Phosphoric acid (Na) buffer (pH 2.5)	
	B) Acetonitrile	
	A/B = 3/7 (v/v)	
Flow Rate	: Top :	1.0 mL/min
	Bottom :	1.0 mL/min

Relative Retention Times

Peak	Shim-pack VP-Phenyl	Shim-pack XR-Phenyl
1. Piroxicam	1.000	1.000
2. Ketoprofen	1.480	1.483
3. Diflunisal	2.233	2.172
4. Diclofenac	2.949	2.916
5. Indomethacin	3.263	3.262
6. Ibuprofen	3.470	3.501

Columns with the same size but different bonded phases are available as a set for the purpose of method development.
Please contact your local Shimadzu representative for details.



Check out the Nexera Method Scouting System at
www.shimadzu.com/an/hplc

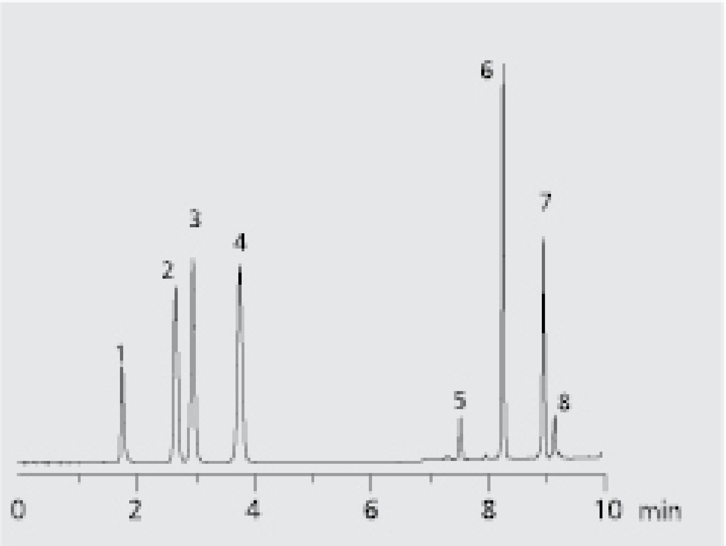
Shim-pack MAqC-ODS

Shim-pack MAqC-ODS I reversed-phase columns are packed with a silica gel containing metal and bonded octadecylsilyl group.
In addition to the hydrophobic characteristics of the ODS, the metal content also provides cation-exchange effects. This increases the retention of basic compounds. Therefore, this allows use with only a buffer solution as the mobile phase for analyses that previously required using an ion pair reagent and enables using gradient elution. These characteristics are especially beneficial for analyzing water soluble vitamins and pharmaceuticals that contain a large amount of basic compounds.

Example of Simultaneous Analysis of Water Soluble Vitamins

Water soluble vitamins contain many highly polar basic components, which are known to exhibit weak retention in the reversed-phase mode. Consequently, with typical ODS columns, such as the Shim-pack VP-ODS, an ion pair reagent is added to the mobile phase for analysis. However, using an ion pair reagent makes gradient elution difficult, resulting in peak broadening for components that take longer to elute and making it difficult to improve sensitivity. In addition, the effort required to prepare the mobile phases and condition the column is also an issue. However, because the Shim-pack MAqC-ODS I enables using gradient elution, it can shorten analysis times and result in sharp peaks even for components that elute slowly. For example, riboflavin, which elutes as the final peak with a typical ODS column, is detected with approx. 2.3 times higher sensitivity by the Shim-pack MAqC-ODS I.

Shim-pack MAqC-ODS I

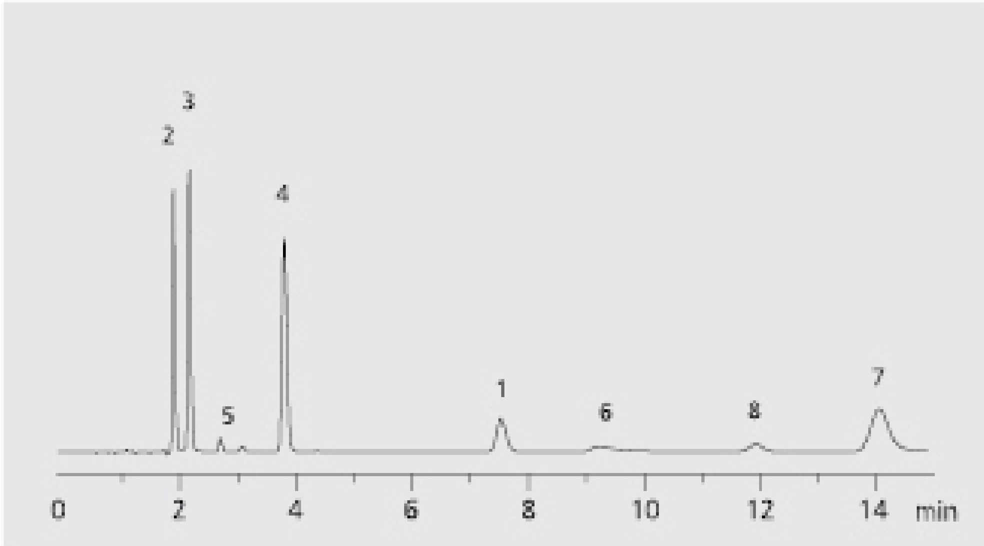


■ Peaks
1. Thiamine
2. Niacin
3. Nicotinamide
4. Pyridoxine
5. Ca Pantothenate
6. Folic acid
7. Riboflavin
8. Biotin

■ Conditions

Column	:	Shim-pack MAqC-ODS I (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-59936-91)
Mobile Phase	:	A) 10 mmol/L phosphate (Na) buffer solution (pH 2.6) B) Acetonitrile A/B = 99/1 - 2.5min - 99/1 - 7.5min - 50/50 - 0.01min - 99/1 - 5 min
Flow Rate	:	1.2 mL/min
Col. Temp.	:	40 °C
Detection	:	UV 210 nm
Injection Vol.	:	10 µL

Shim-pack VP-ODS



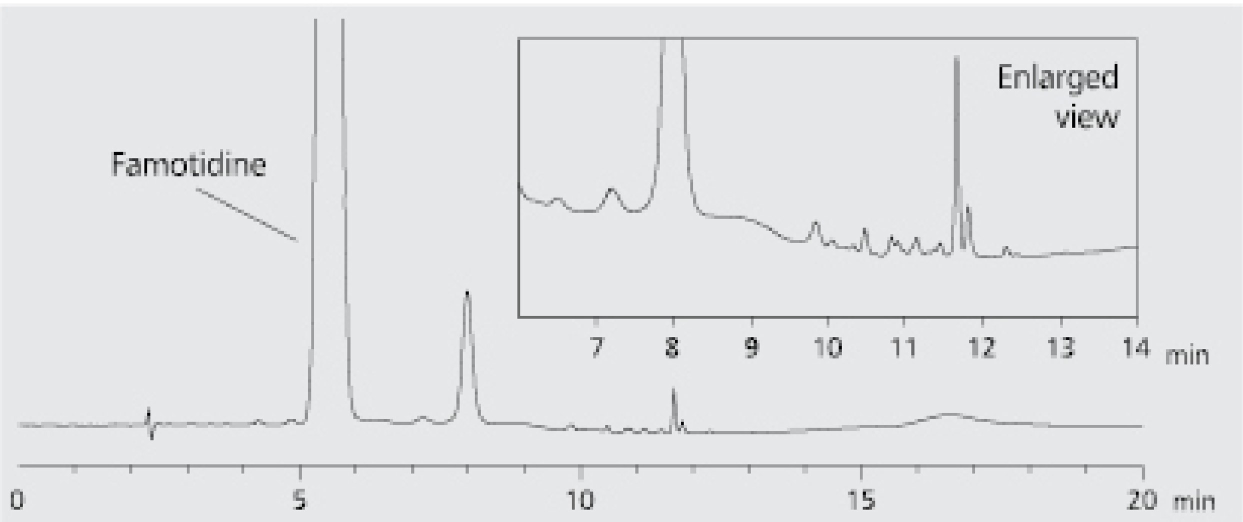
■ Conditions

Column	:	Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-34937-91)
Mobile Phase	:	A) 100 mmol/L phosphate (Na) buffer solution (pH 2.1) containing 0.8 mmol/L sodium 1-octanesulfonate B) Acetonitrile A/B = 10/1 (v/v)
Flow Rate	:	1.2 mL/min
Col. Temp.	:	40 °C
Detection	:	UV 210 nm
Injection Vol.	:	10 µL

Example of Analyzing Impurities in a Pharmaceutical

Many pharmaceuticals are basic compounds. The majority of impurities in pharmaceuticals, such as unreacted ingredients, by-products, and decomposition products, are highly polar basic substances. Consequently, analyzing impurity peaks using LC/MS can be difficult if a non-volatile ion pair reagent is contained. In the following example of analyzing famotidine, using a Co-Sense for LC/MS automatic pretreatment system to desalt the mobile phase used with the Shim-pack MAqC-ODS I column enabled analysis by LC/MS. While a typical ODS column (Shim-pack VP-ODS) detects 12 types of impurities, the Shim-pack MAqC-ODS I detects 20 types of impurities due to separation specificity and gradient elution.

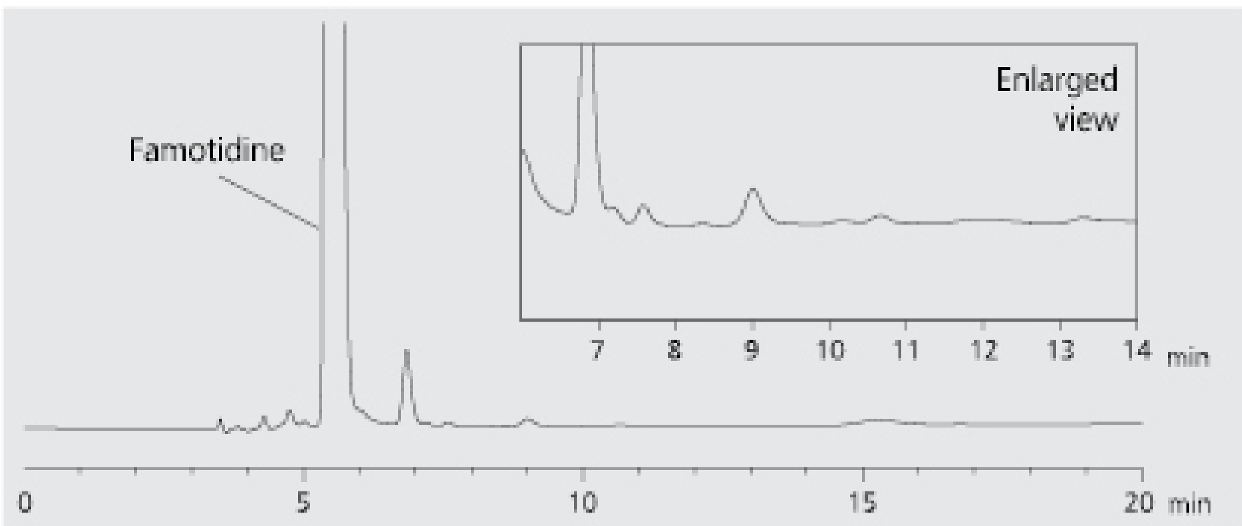
Shim-pack MAqC-ODS I



■ Conditions

Column	:	Shim-pack MAqC-ODS I (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-59936-91)
Mobile Phase	:	A) 10 mmol/L phosphate (Na) buffer solution (pH 2.6) B) Acetonitrile A/B = 92/8 - 5min - 92/8 - 7min - 50/50 - 0.01min - 92/8 - 8 min
Flow Rate	:	1.0 mL/min
Col. Temp.	:	25 °C
Detection	:	UV 254 nm
Injection Vol.	:	5 µL

Shim-pack VP-ODS

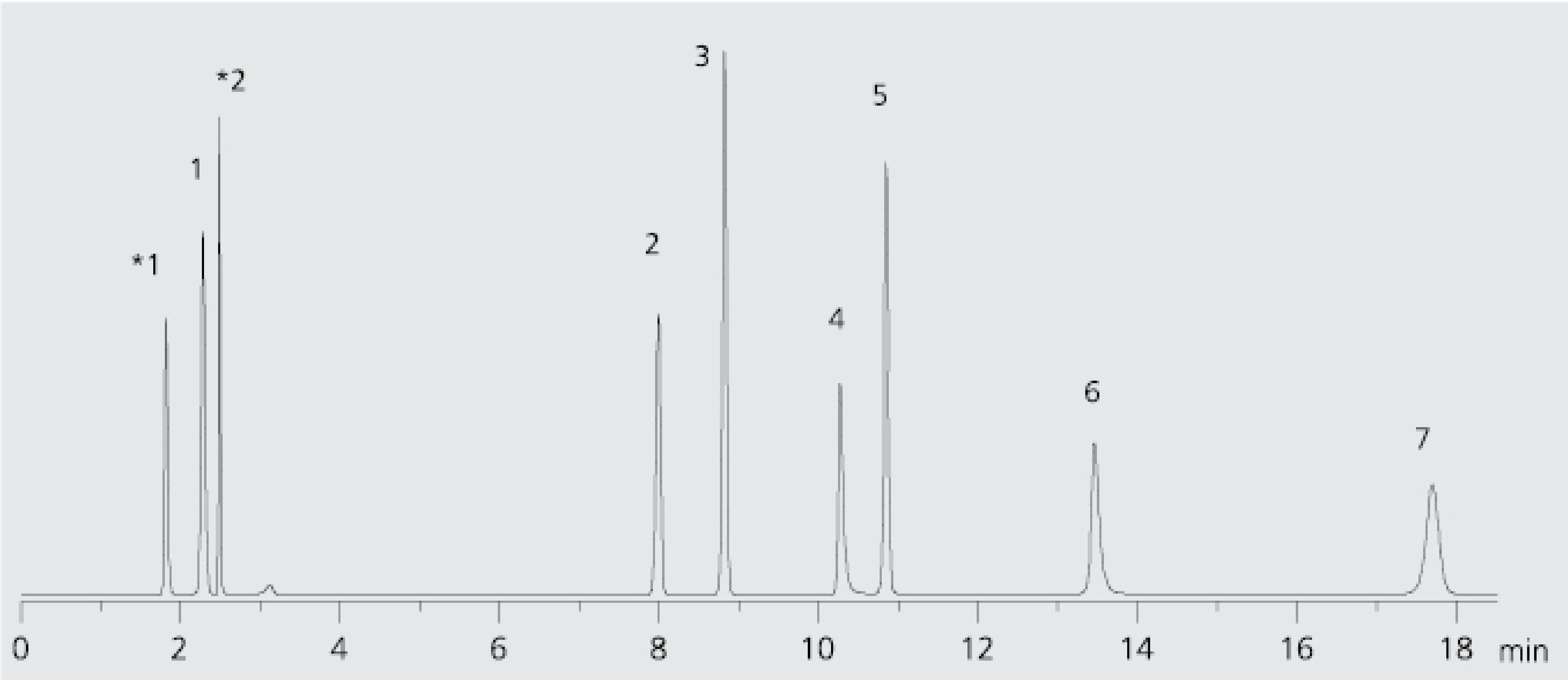


■ Conditions

Column	:	Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-34937-91)
Mobile Phase	:	2 g of sodium 1-heptanesulfonate was dissolved in 900 mL of water and acetic acid (100) was added to produce a pH of 3.0. Then water was added to make 1000 mL. 240 mL of acetonitrile and 40 mL of methanol were added to this solution.
Flow Rate	:	0.5 mL/min
Col. Temp.	:	25 °C
Detection	:	UV 254 nm
Injection Vol.	:	5 µL

Example of Analyzing a Cold Remedy

Gradient elution with a Shim-pack MAqC-ODS I column was used for simultaneous analysis of components contained in an over-the-counter commercial cold remedy. The ability to use gradient elution enables the acquisition of sharp peaks, even for components that eluted slowly, similar to the water soluble vitamin and drug impurity examples on the prior page.



Peaks

1. Thiamine
2. Acetaminophen
3. Caffeine
4. Chlorpheniramine
5. Ethenzamide
6. Isopropylantipyrine
7. Ibuprofen

*1 Nitric acid
*2 Maleic acid

Conditions

Column	: Shim-pack MAqC-ODS I (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 228-59936-91)
Mobile Phase	: A) 20 mmol/L phosphate (Na) buffer solution (pH 2.5) B) Acetonitrile A/B = 99/1 - 2min – 99/1 – 6min – 50/50 – 10min – 50/50 - 0.01min - 99/1 - 5 min
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 220 nm
Injection Vol.	: 10 µL

Product Information

Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	4.6
5	150	228-59936-94	228-59936-91

* To use this column efficiently:
1) To increase the retention of basic compounds, please use a buffer solution within the pH 2 to 4 range.
2) In the case of a basic substance tailing, it may be possible to improve the peak shape by increasing the salt concentration of a buffer solution.
3) The elution of basic compounds is faster by increasing the salt concentration, and it is possible to adjust retention by salt concentration.

This product developed by collaboration with Eisai Co., Ltd.

Shim-pack GIST C18

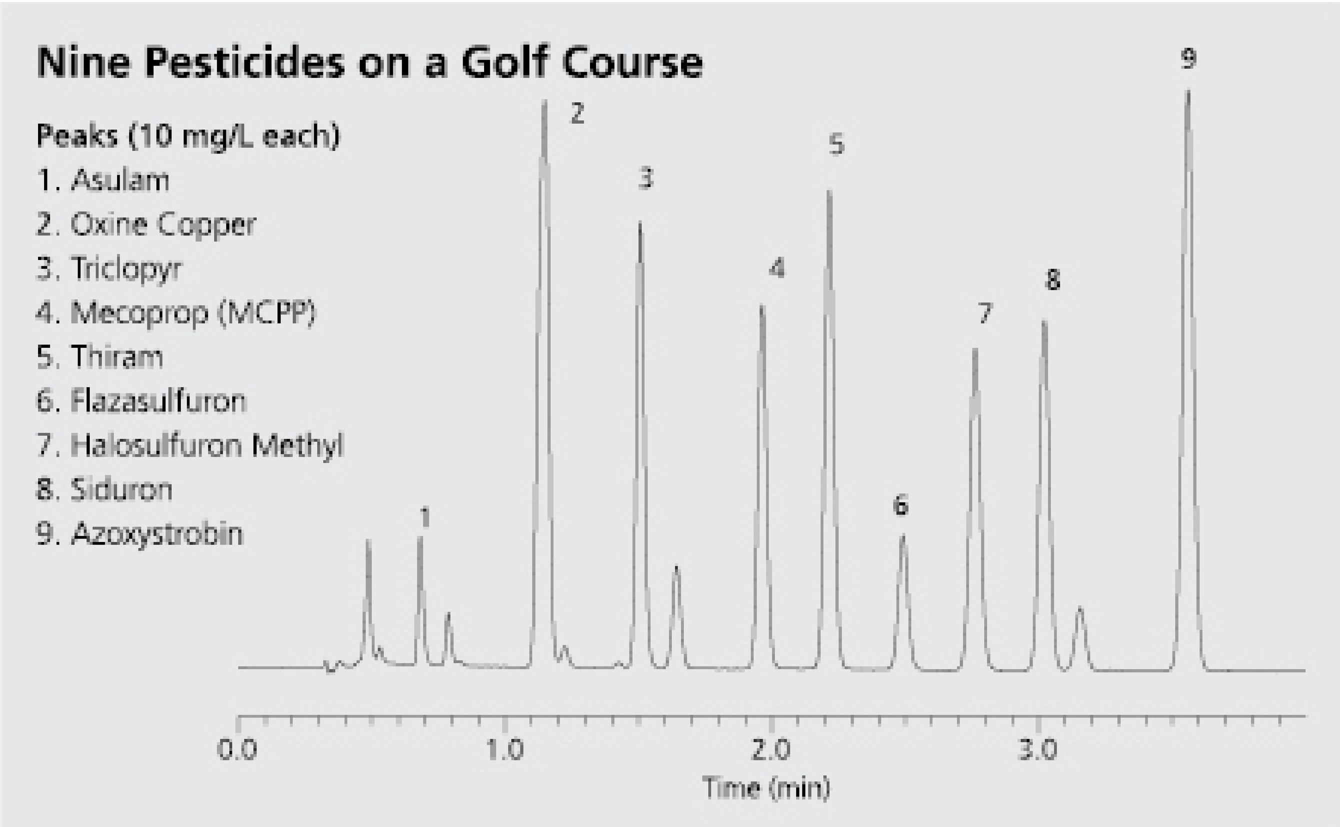
Ultra High Inertness, High Durability

Shim-pack GIST C18 has superior inertness, which improves analysis precision and increases column durability. In addition, it can be used to analyze strong ionic compounds and difficult to absorb samples, which helps to obtain symmetrical peaks and high reproducibility.

Furthermore, because of the new silica gel, Shim-pack GIST C18 is suitable for wider pH (1-10) analysis at a consistent performance. This enables use of a silica-based column under alkaline conditions.

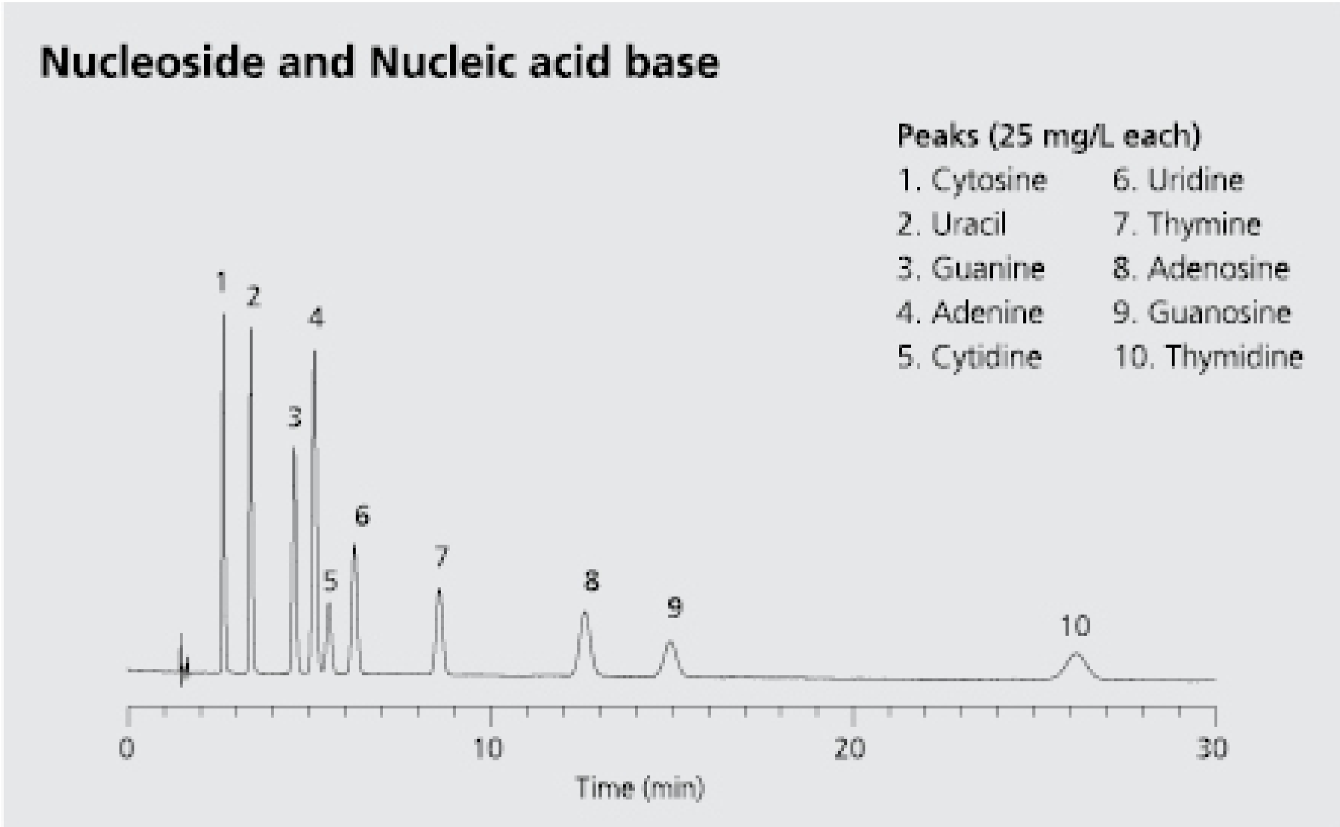
Bonded Phase	Octadecyl Groups
Particle Size	2 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	14 %
End-capping	Yes
pH Range	1 to 10
USP Code	L1

Analysis Examples



Conditions

Column : Shim-pack GIST-HP C18 (150 mmL. × 3.0 mmI.D., 3 µm) (P/N: 227-30040-05)
Mobile Phase : A) 50 mM KH2PO4 (pH 3.5, H3PO4)
B) Acetonitrile
A/B = 60/40 - 4 min - 40/60
Flow Rate : 1.5 mL/min
Col. Temp. : 40 °C
Detection : UV 235 nm
Injection Vol. : 5.0 µL



Conditions

Column : Shim-pack GIST C18 (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30017-07)
Mobile Phase : 0.1 mol/L Ammonium phosphate, 0.2 mol/L Sodium perchlorate buffer solution (pH 2.0)
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 260 nm
Injection Vol. : 1 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30008-01	227-30009-01	227-30010-01	227-30011-01
	30	227-30006-01	227-30007-01	227-30008-02	227-30009-02	227-30010-02	227-30011-02
	50	227-30006-02	227-30007-02	227-30008-03	227-30009-03	227-30010-03	227-30011-03
	75	227-30006-03	227-30007-03	227-30008-04	227-30009-04	227-30010-04	227-30011-04
	100	227-30006-04	227-30007-04	227-30008-05	227-30009-05	227-30010-05	227-30011-05
	125	-	-	227-30008-06	227-30009-06	227-30010-06	227-30011-06
	150	227-30006-05	227-30007-05	227-30008-07	227-30009-07	227-30010-07	227-30011-07
	250	227-30006-06	227-30007-06	227-30008-08	227-30009-08	227-30010-08	227-30011-08
5	20	-	-	227-30014-01	227-30015-01	227-30016-01	227-30017-01
	30	227-30012-01	227-30013-01	227-30014-02	227-30015-02	227-30016-02	227-30017-02
	50	227-30012-02	227-30013-02	227-30014-03	227-30015-03	227-30016-03	227-30017-03
	75	227-30012-03	227-30013-03	227-30014-04	227-30015-04	227-30016-04	227-30017-04
	100	227-30012-04	227-30013-04	227-30014-05	227-30015-05	227-30016-05	227-30017-05
	125	-	-	227-30014-06	227-30015-06	227-30016-06	227-30017-06
	150	227-30012-05	227-30013-05	227-30014-07	227-30015-07	227-30016-07	227-30017-07
	250	227-30012-06	227-30013-06	227-30014-08	227-30015-08	227-30016-08	227-30017-08

Cartridge Guard Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) 1.0	1.5	3.0	4.0	Holder
3	10	227-30023-01	227-30024-01	227-30025-01	227-30027-01	227-30532-01
	20	-	-	227-30026-01	227-30028-01	227-30532-02
5	10	227-30029-01	227-30030-01	227-30031-01	227-30032-03	227-30532-01
	20	-	-	227-30032-01	227-30033-01	227-30532-02

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder 1.0	1.5	3.0	4.0
3	10	227-30023-02	227-30024-02	227-30025-02	227-30027-02
	20	-	-	227-30026-02	227-30028-02
5	10	227-30029-02	227-30030-02	227-30031-02	227-30032-04
	20	-	-	227-30032-02	227-30033-02

Pre-column Type Guard Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	1.0	1.5	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
3	10	-	-	-	-	227-30906-01	-	20
	33	-	-	227-30904-01	227-30905-01	227-30906-02	227-30907-01	
	50	227-30903-01	227-30903-02	227-30904-02	227-30905-02	227-30906-03	227-30907-02	
5	10	-	-	-	-	227-30912-01	-	
	33	227-30908-01	227-30909-01	227-30910-01	227-30911-01	227-30912-02	227-30913-01	
	50	227-30908-02	227-30909-02	227-30910-02	227-30911-02	227-30912-03	227-30913-02	

Analytical Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30001-01	227-30002-01	-	50
	50	227-30001-02	227-30002-02	-	
	75	227-30001-03	227-30002-03	-	
	100	227-30001-04	227-30002-04	-	80
	150	227-30001-05	227-30002-05	-	
3	30	227-30039-01	227-30040-01	227-30041-01	50
	50	227-30039-02	227-30040-02	227-30041-02	
	75	227-30039-03	227-30040-03	227-30041-03	
	100	227-30039-04	227-30040-04	227-30041-04	
	150	227-30039-05	227-30040-05	227-30041-05	
	250	227-30039-06	227-30040-06	227-30041-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) 1.5	2.1	3.0	Pressure Tolerance (MPa)	Holder
2	10	227-30042-01	227-30043-01	227-30044-01	80	227-30533-01
3	10	227-30045-01	227-30046-01	227-30047-01		

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder 1.5	2.1	3.0	Pressure Tolerance (MPa)
2	10	227-30042-02	227-30043-02	227-30044-02	80
3	10	227-30045-02	227-30046-02	227-30047-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30771-01	227-30772-01	227-30773-01	80
3		227-30774-01	227-30775-01	227-30776-01	50

Shim-pack GIST C18-AQ

Excellent Retentivity of Highly Polar Compounds

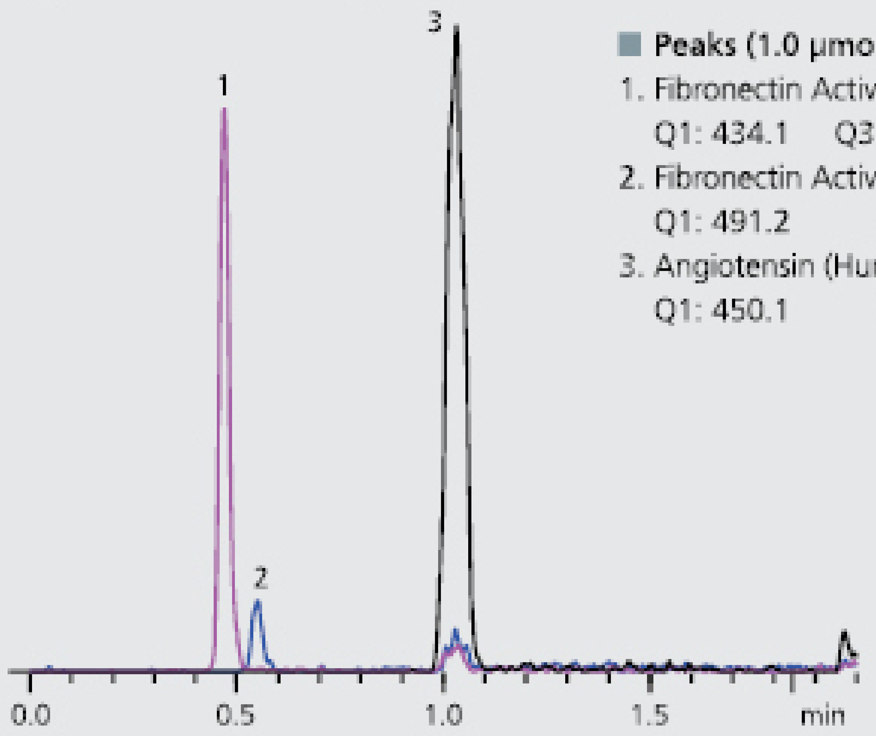
Shim-pack GIST C18-AQ achieves strong retention of hydrophilic highly polar compounds compared to general C18 columns, while maintaining high inertness and durability in highly or 100% aqueous mobile phases.

Shim-pack GIST C18-AQ is also able to reduce the absorption of basic and acidic compounds and achieve superior peak shapes in the analysis of metal complexes.

Bonded Phase	Octadecyl Groups
Particle Size	1.9 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m^2/g
Carbon Loading	13 %
End-capping	Yes
pH Range	1 to 10
USP Code	L1, L96

Analysis Examples

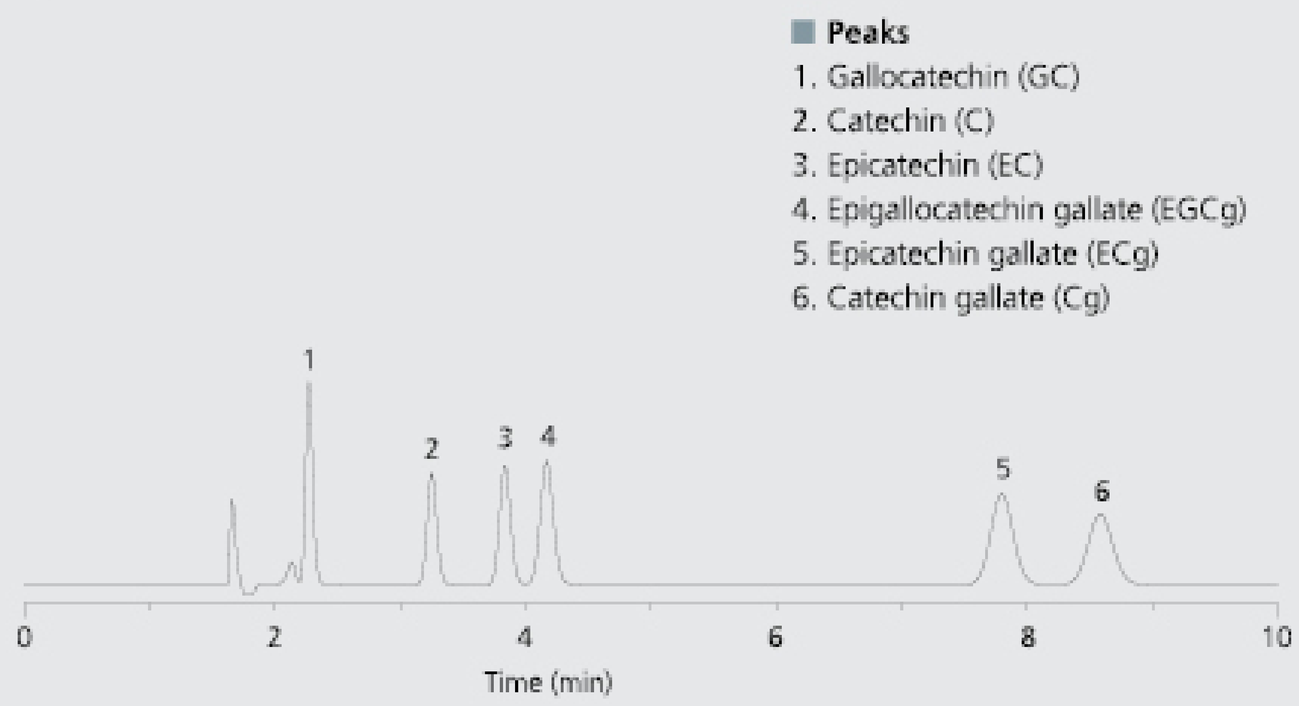
Analysis of Polar Peptides



■ Conditions

Column : Shim-pack GIST C18-AQ (100 mmL.× 2.1 mmI.D., 1.9 µm) (P/N: 227-30807-02)
Mobile Phase : A) 0.1 % Formic acid in Water
B) Acetonitrile
A/B = 100/0 - 0.2 min - 100/0 - 0.5 min - 15/85 - 1.5 min - 15/85 - 1.52 min - 100/0 - 2.5 min - 100/0 (v/v)
Flow Rate : 0.8 mL/min
Col. Temp. : 40 °C
Detection : LC/MS/MS (LCMS-8030, ESI, Positive, SRM)
Injection Vol. : 2 µL

Analysis of Catechin



■ Conditions

Column : Shim-pack GIST C18-AQ (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30742-07)
Mobile Phase : A) 0.1 % Formic acid in Water
B) Acetonitrile
A/B = 80/20 (v/v)
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 280 nm

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30721-01	227-30722-01	227-30723-01	227-30724-01
	30	227-30719-01	227-30720-01	227-30721-02	227-30722-02	227-30723-02	227-30724-02
	50	227-30719-02	227-30720-02	227-30721-03	227-30722-03	227-30723-03	227-30724-03
	75	227-30719-03	227-30720-03	227-30721-04	227-30722-04	227-30723-04	227-30724-04
	100	227-30719-04	227-30720-04	227-30721-05	227-30722-05	227-30723-05	227-30724-05
	125	-	-	227-30721-06	227-30722-06	227-30723-06	227-30724-06
	150	227-30719-05	227-30720-05	227-30721-07	227-30722-07	227-30723-07	227-30724-07
	250	227-30719-06	227-30720-06	227-30721-08	227-30722-08	227-30723-08	227-30724-08
5	20	-	-	227-30739-01	227-30740-01	227-30741-01	227-30742-01
	30	227-30737-01	227-30738-01	227-30739-02	227-30740-02	227-30741-02	227-30742-02
	50	227-30737-02	227-30738-02	227-30739-03	227-30740-03	227-30741-03	227-30742-03
	75	227-30737-03	227-30738-03	227-30739-04	227-30740-04	227-30741-04	227-30742-04
	100	227-30737-04	227-30738-04	227-30739-05	227-30740-05	227-30741-05	227-30742-05
	125	-	-	227-30739-06	227-30740-06	227-30741-06	227-30742-06
	150	227-30737-05	227-30738-05	227-30739-07	227-30740-07	227-30741-07	227-30742-07
	250	227-30737-06	227-30738-06	227-30739-08	227-30740-08	227-30741-08	227-30742-08

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30731-01	227-30732-01	227-30733-01	227-30735-01	227-30532-01
	20	-	-	227-30734-01	227-30736-01	227-30532-02
5	10	227-30759-01	227-30760-01	227-30761-01	227-30763-01	227-30532-01
	20	-	-	227-30762-01	227-30764-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30731-02	227-30732-02	227-30733-02	227-30735-02
	20	-	-	227-30734-02	227-30736-02
5	10	227-30759-02	227-30760-02	227-30761-02	227-30763-02
	20	-	-	227-30762-02	227-30764-02

Analytical Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
1.9	50	227-30807-01	227-30808-01	-	50
	100	227-30807-02	227-30808-02	-	80
	150	227-30807-03	227-30808-03	-	
3	30	-	227-30766-01	227-30767-01	50
	50	227-30765-01	227-30766-02	227-30767-02	
	75	227-30765-02	227-30766-03	227-30767-03	
	100	227-30765-03	227-30766-04	227-30767-04	
	150	227-30765-04	227-30766-05	227-30767-05	
	250	227-30765-05	227-30766-06	227-30767-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
1.9	10	227-30809-01	227-30810-01	227-30811-01	80	227-30533-01
3	10	227-30768-01	227-30769-01	227-30770-01		

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
1.9	10	227-30809-02	227-30810-02	227-30811-02	80
3	10	227-30768-02	227-30769-02	227-30770-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
3	30	227-30801-01	227-30802-01	227-30803-01	50

Shim-pack GISS C18

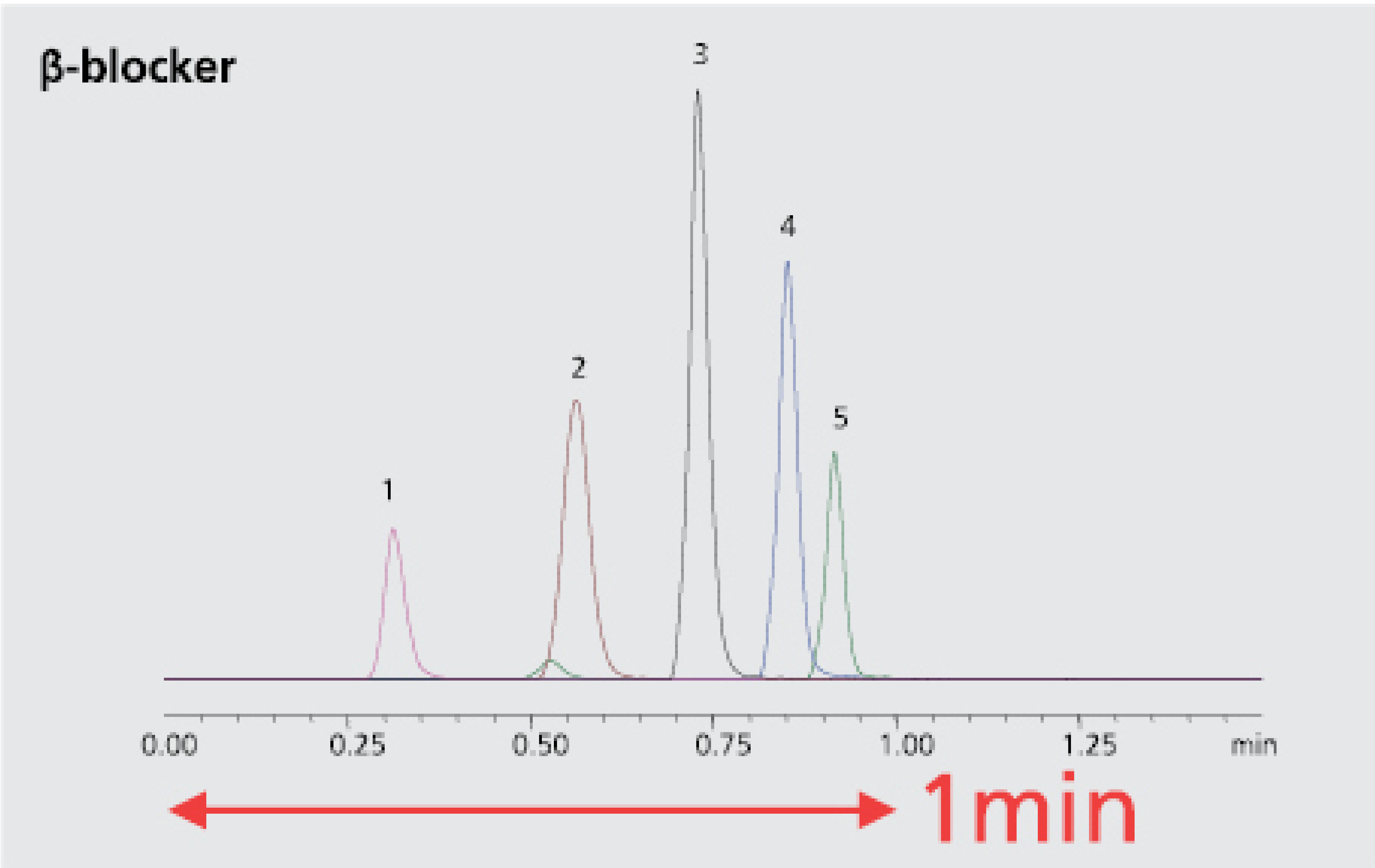
Ideal for Rapid Analysis

Shim-pack GISS C18 maintains the same ultra-high inertness and wider pH range as the Shim-pack GIST C18, while providing rapid separations with symmetrical peaks.

The optimization of surface area, pore size and chemical bonding delivers superior peak shapes. It is ideal for LC/MS/MS analysis and enables MS-compatible buffers to be used due to extremely inert silica gel.

Bonded Phase	Octadecyl Groups
Particle Size	1.9 µm, 3 µm, 5 µm
Pore Size	20 nm
Surface Area	200 m²/g
Carbon Loading	9 %
End-capping	Yes
pH Range	1 to 10
USP Code	L1

Analysis Examples



Peaks (100 µg/L each)

		Q1 > Q3
1. Acebutolol	:	337.10 > 116.05 (+)
2. Atenolol	:	267.25 > 145.00 (+)
3. Labetalol	:	329.00 > 161.95 (+)
4. Nadolol	:	310.05 > 254.00 (+)
5. Pindolol	:	249.80 > 116.00 (+)

Conditions

Column : Shim-pack GISS C18 (50 mmL × 2.1 mmI.D., 1.9 µm) (P/N: 227-30048-01)
Mobile Phase : A) 10 mM Ammonium Formate in Water
B) 10 mM Ammonium Formate in Methanol
A/B = 70/30 - 0.3 min - 40/60 - 0.5 min - 0/100 - 0.1 min - 0/100 - 0.01 min - 70/30 - 0.5 min - 70/30, v/v
Flow Rate : 0.6 mL/min
Col. Temp. : 40 °C
Detection : LC/MS/MS (ESI, Positive, Negative MRM)

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	227-30050-01	227-30051-01	227-30052-01	227-30053-01	227-30054-01	227-30055-01
	50	227-30050-02	227-30051-02	227-30052-02	227-30053-02	227-30054-02	227-30055-02
	75	227-30050-03	227-30051-03	227-30052-03	227-30053-03	227-30054-03	227-30055-03
	100	227-30050-04	227-30051-04	227-30052-04	227-30053-04	227-30054-04	227-30055-04
	125	-	-	227-30052-05	227-30053-05	227-30054-05	227-30055-05
	150	227-30050-05	227-30051-05	227-30052-06	227-30053-06	227-30054-06	227-30055-06
	250	227-30050-06	227-30051-06	227-30052-07	227-30053-07	227-30054-07	227-30055-07
5	30	227-30056-01	227-30057-01	227-30058-01	227-30059-01	227-30060-01	227-30061-01
	50	227-30056-02	227-30057-02	227-30058-02	227-30059-02	227-30060-02	227-30061-02
	75	227-30056-03	227-30057-03	227-30058-03	227-30059-03	227-30060-03	227-30061-03
	100	227-30056-04	227-30057-04	227-30058-04	227-30059-04	227-30060-04	227-30061-04
	125	-	-	227-30058-05	227-30059-05	227-30060-05	227-30061-05
	150	227-30056-05	227-30057-05	227-30058-06	227-30059-06	227-30060-06	227-30061-06
	250	227-30056-06	227-30057-06	227-30058-07	227-30059-07	227-30060-07	227-30061-07

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30067-01	227-30068-01	227-30069-01	227-30070-01	227-30532-01
	20	-	-	227-30071-01	227-30072-01	227-30532-02
5	10	227-30073-01	227-30074-01	227-30075-01	227-30077-01	227-30532-01
	20	-	-	227-30076-01	227-30078-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30067-02	227-30068-02	227-30069-02	227-30070-02
	20	-	-	227-30071-02	227-30072-02
5	10	227-30073-02	227-30074-02	227-30075-02	227-30077-02
	20	-	-	227-30076-02	227-30078-02

Analytical Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
1.9	50	227-30048-01	227-30049-01	-	50
	100	227-30048-02	227-30049-02	-	80
	150	227-30048-03	227-30049-03	-	
3	50	227-30084-01	227-30085-01	227-30086-01	50
	100	227-30084-02	227-30085-02	227-30086-02	
	150	227-30084-03	227-30085-03	227-30086-03	
	250	227-30084-04	227-30085-04	227-30086-04	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
1.9	10	227-30087-01	227-30088-01	227-30089-01	80	227-30533-01
3	10	227-30090-01	227-30091-01	227-30092-01		

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
1.9	10	227-30087-02	227-30088-02	227-30089-02	80
3	10	227-30090-02	227-30091-02	227-30092-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
1.9	30	227-30777-01	227-30778-01	227-30779-01	80
3		227-30780-01	227-30781-01	227-30782-01	50

Shim-pack GIS C18

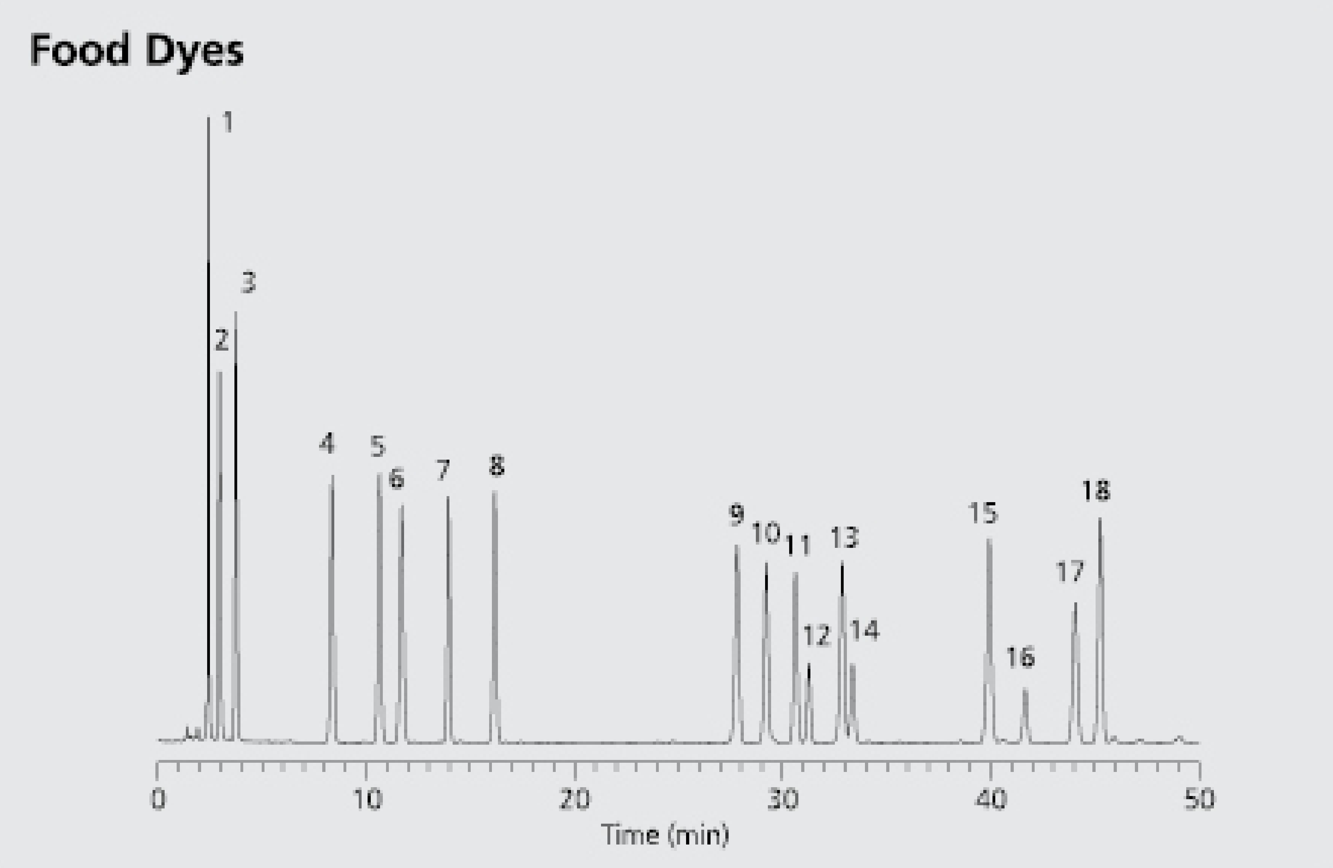
High Retentivity, Lower Column Back Pressure

Widely used octadecyl bonded silica gel enables the Shim-pack GIS C18 to have strong hydrophobic interaction and low absorption of ionic compounds. In addition, highly uniform particles ensure stable mobile phase delivery and outstanding low pressure.

Shim-pack GIS C18 is ideal for preparative separations. Higher surface area silica and strong retentivity provide high preparative loading capacity without sacrificing peak shape.

Bonded Phase	Octadecyl Groups
Particle Size	2µm, 3µm, 4µm, 5µm, 10µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	15%
End-capping	Yes
pH Range	2 to 7.5
USP Code	L1

Analysis Examples



Peaks

1. Tartrazine	7.6 mg/L	10. Ponceau SX	5.3 mg/L
2. Amaranth	3.8 mg/L	11. Orange I	5.3 mg/L
3. Ingigocarmine	7.6 mg/L	12. Fast green FCF	3.0 mg/L
4. New coccine	3.8 mg/L	13. Brilliant blue FCF	3.0 mg/L
5. Sunset Yellow FCF	5.3 mg/L	14. Ponceau 3R	7.6 mg/L
6. Naphthol Yellow S	7.6 mg/L	15. Erythrosine	5.3 mg/L
7. Uranine	3.8 mg/L	16. Azure Blue VX	3.0 mg/L
8. Allura Red AC	5.3 mg/L	17. Orange II	7.6 mg/L
9. Ponceau R	7.6 mg/L	18. Acid red	3.0 mg/L

Conditions

Column : Shim-pack GIS C18 (150 mmL. × 4.6 mmI.D, 4 µm) (P/N: 227-30100-07)
Mobile Phase : A) 10 mmol/L Disodium phosphate buffer solution (pH 6.9)
B) Acetonitrile
A/B = 90/10 - 50 min - 65/35
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 270 nm
Injection Vol. : 10 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	33	227-30095-01	227-30096-01	227-30096-05	227-30096-12	227-30096-19	227-30096-26
	50	227-30095-02	227-30096-02	227-30096-06	227-30096-13	227-30096-20	227-30096-27
	75	227-30095-03	227-30096-03	227-30096-07	227-30096-14	227-30096-21	227-30096-28
	100	227-30095-04	227-30096-04	227-30096-08	227-30096-15	227-30096-22	227-30096-29
	125	-	-	227-30096-09	227-30096-16	227-30096-23	227-30096-30
	150	-	-	227-30096-10	227-30096-17	227-30096-24	227-30096-31
	250	-	-	227-30096-11	227-30096-18	227-30096-25	227-30096-32
4	30	-	-	227-30097-01	227-30098-01	227-30099-01	227-30100-01
	33	-	-	227-30097-02	227-30098-02	227-30099-02	227-30100-02
	50	-	-	227-30097-03	227-30098-03	227-30099-03	227-30100-03
	75	-	-	227-30097-04	227-30098-04	227-30099-04	227-30100-04
	100	-	-	227-30097-05	227-30098-05	227-30099-05	227-30100-05
	125	-	-	227-30097-06	227-30098-06	227-30099-06	227-30100-06
	150	-	-	227-30097-07	227-30098-07	227-30099-07	227-30100-07
	250	-	-	227-30097-08	227-30098-08	227-30099-08	227-30100-08
5	30	-	-	227-30103-01	227-30104-01	227-30105-01	227-30106-01
	33	227-30101-01	227-30102-01	227-30103-02	227-30104-02	227-30105-02	227-30106-02
	50	227-30101-02	227-30102-02	227-30103-03	227-30104-03	227-30105-03	227-30106-03
	75	227-30101-03	227-30102-03	227-30103-04	227-30104-04	227-30105-04	227-30106-04
	100	227-30101-04	227-30102-04	227-30103-05	227-30104-05	227-30105-05	227-30106-05
	125	-	-	227-30103-06	227-30104-06	227-30105-06	227-30106-06
	150	227-30101-05	227-30102-05	227-30103-07	227-30104-07	227-30105-07	227-30106-07
	250	227-30101-06	227-30102-06	227-30103-08	227-30104-08	227-30105-08	227-30106-08

Analytical Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	3.9	4.0	4.6
5	300	227-30812-01	-	-
7	250	-	227-30813-01	-
10	150	-	227-30111-01	227-30112-01
	250	-	227-30111-02	227-30112-02
	300	227-30814-01	-	-

Cartridge Guard Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30117-01	227-30118-01	227-30119-01	227-30121-01	227-30532-01
	20	-	-	227-30120-01	227-30123-01	227-30532-02
4	10	227-30124-01	227-30125-01	227-30126-01	227-30128-01	227-30532-01
	20	-	-	227-30127-01	227-30129-01	227-30532-02
5	10	227-30130-01	227-30131-01	227-30132-01	227-30134-01	227-30532-01
	20	-	-	227-30133-01	227-30135-01	227-30532-02

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30117-02	227-30118-02	227-30119-02	227-30122-02
	20	-	-	227-30120-02	227-30123-02
4	10	227-30124-02	227-30125-02	227-30126-02	227-30128-02
	20	-	-	227-30127-02	227-30129-02
5	10	227-30130-02	227-30131-02	227-30132-02	227-30134-02
	20	-	-	227-30133-02	227-30135-02

Analytical Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30093-01	227-30094-01	-	50
	50	227-30093-02	227-30094-02	-	
	75	227-30093-03	227-30094-03	-	
	100	227-30093-04	227-30094-04	-	80
	150	227-30093-05	227-30094-05	-	
3	30	227-30149-01	227-30150-01	227-30151-01	50
	50	227-30149-02	227-30150-02	227-30151-02	
	75	227-30149-03	227-30150-03	227-30151-03	
	100	227-30149-04	227-30150-04	227-30151-04	
	150	227-30149-05	227-30150-05	227-30151-05	
	250	227-30149-06	227-30150-06	227-30151-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
2	10	227-30152-01	227-30153-01	227-30154-01	80	227-30533-01
3	10	227-30155-01	227-30156-01	227-30157-01		

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
2	10	227-30152-02	227-30153-02	227-30154-02	80
3	10	227-30155-02	227-30156-02	227-30157-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30783-01	227-30784-01	227-30785-01	80
3		227-30786-01	227-30787-01	227-30788-01	50

Shim-pack GIS C18-P

High Steric Selectivity

Shim-pack GIS C18-P is designed with a polymerically bonded octadecy group, which provides high steric selectivity for separation of planar and non-planar compounds. It achieves complete baseline separation of structurally similar compounds such as vitamin D2 and D3 because of the planarity recognition capability.

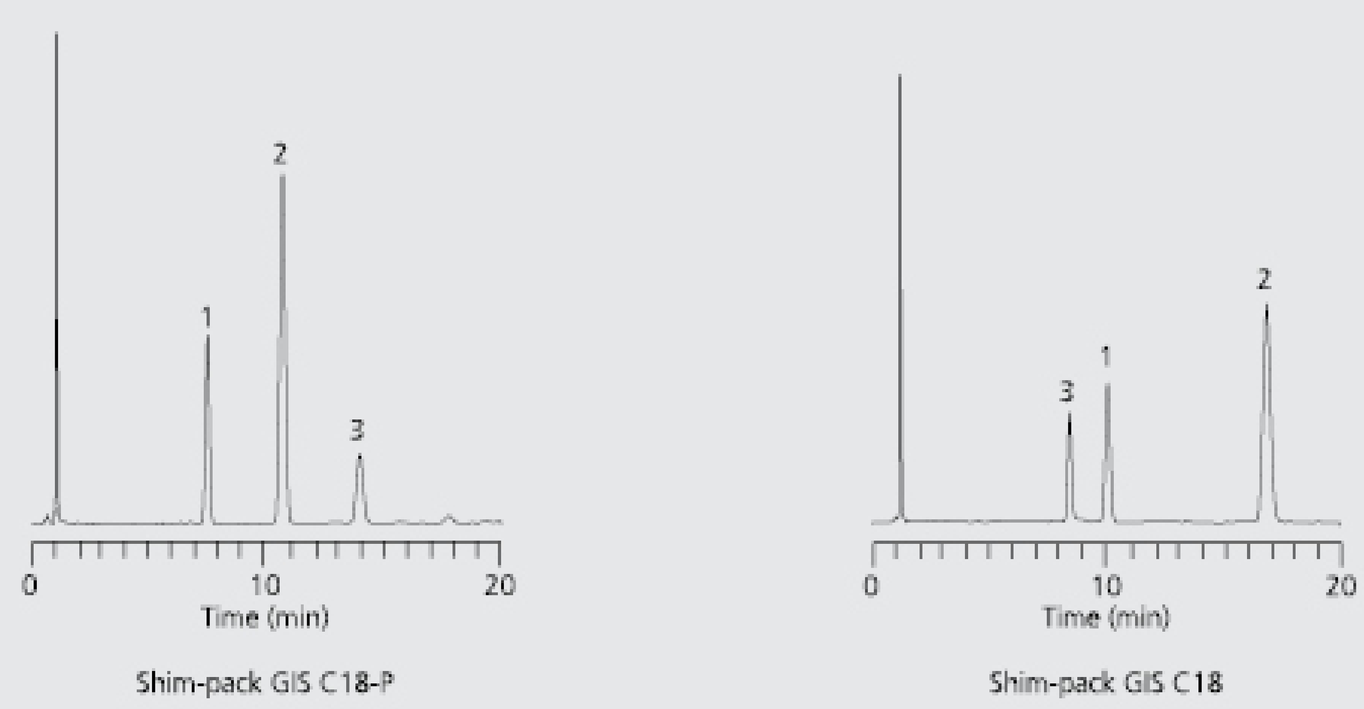
Shim-pack GIS C18-P is also ideal for the HPLC analysis of 16 PAH compounds listed as target pollutants by the U.S. EPA.

Bonded Phase	Octadecyl Groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	29 %
End-capping	-
pH Range	2 - 7.5
USP Code	L1

Analysis Examples

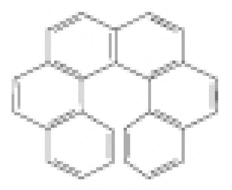
Due to increased retention of planar structural compounds, Shim-pack GIS C18-P shows different selectivity compared to Shim-pack GIS C18.

Analysis of Planar and Non-planar Compounds

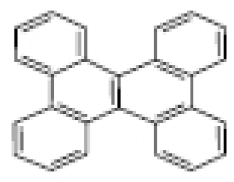


Peaks

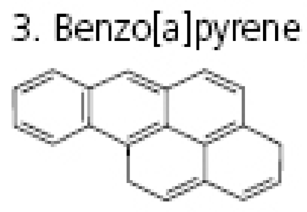
1. Phenanthro[3,4-c]phenanthrene (PhPh)



2. Tetrabenzonaphthalene (TBN)



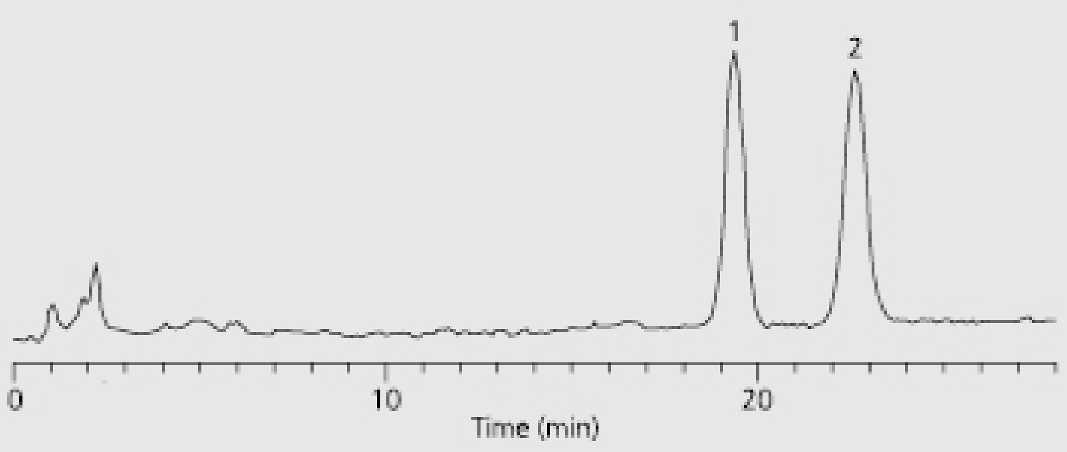
3. Benzo[a]pyrene (BaP)



Conditions

Column	: 250 mmL. × 4.6 mmI.D., 5 µm
Mobile Phase	: A) Water B) Acetonitrile A/B = 15/85 (v/v)
Flow Rate	: 2.0 mL/min
Col. Temp.	: 30 °C
Detection	: UV 254 nm
Samples	: Standard Reference Material 869

Analysis of Vitamin D in Food



Peaks (100 µg/L each)

1. Vitamin D2 (Calciferol)
2. Vitamin D3 (Cholecarciferol)

Conditions

Column	: Shim-pack GIS C18-P (250 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30557-07)
Mobile Phase	: Acetonitrile
Flow Rate	: 1.5 mL/min
Col. Temp.	: 40 °C
Detection	: UV 265 nm
Injection Vol.	: 200 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	-	-	227-30536-01	227-30537-01	227-30538-01	227-30539-01
	33	227-30534-01	227-30535-01	227-30536-02	227-30537-02	227-30538-02	227-30539-02
	50	227-30534-02	227-30535-02	227-30536-03	227-30537-03	227-30538-03	227-30539-03
	75	227-30534-03	227-30535-03	227-30536-04	227-30537-04	227-30538-04	227-30539-04
	100	227-30534-04	227-30535-04	227-30536-05	227-30537-05	227-30538-05	227-30539-05
	150	227-30534-05	227-30535-05	227-30536-06	227-30537-06	227-30538-06	227-30539-06
	250	227-30534-06	227-30535-06	227-30536-07	227-30537-07	227-30538-07	227-30539-07
5	30	-	-	227-30554-01	227-30555-01	227-30556-01	227-30557-01
	33	227-30552-01	227-30553-01	227-30554-02	227-30555-02	227-30556-02	227-30557-02
	50	227-30552-02	227-30553-02	227-30554-03	227-30555-03	227-30556-03	227-30557-03
	75	227-30552-03	227-30553-03	227-30554-04	227-30555-04	227-30556-04	227-30557-04
	100	227-30552-04	227-30553-04	227-30554-05	227-30555-05	227-30556-05	227-30557-05
	150	227-30552-05	227-30553-05	227-30554-06	227-30555-06	227-30556-06	227-30557-06
	250	227-30552-06	227-30553-06	227-30554-07	227-30555-07	227-30556-07	227-30557-07

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	21.5	3.0	4.0	
3	10	227-30546-01	227-30547-01	227-30548-01	227-30550-01	227-30532-01
	20	-	-	227-30549-01	227-30551-01	227-30532-02
5	10	227-30578-01	227-30579-01	227-30580-01	227-30582-01	227-30532-01
	20	-	-	227-30581-01	227-30583-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30546-02	227-30547-02	227-30548-02	227-30550-02
	20	-	-	227-30549-02	227-30551-02
5	10	227-30578-02	227-30579-02	227-30580-02	227-30582-02
	20	-	-	227-30581-02	227-30583-02

For preparative columns, please refer to page A-69

Shim-pack GIS RP-Shield

Embedded with a Polar Functional Group

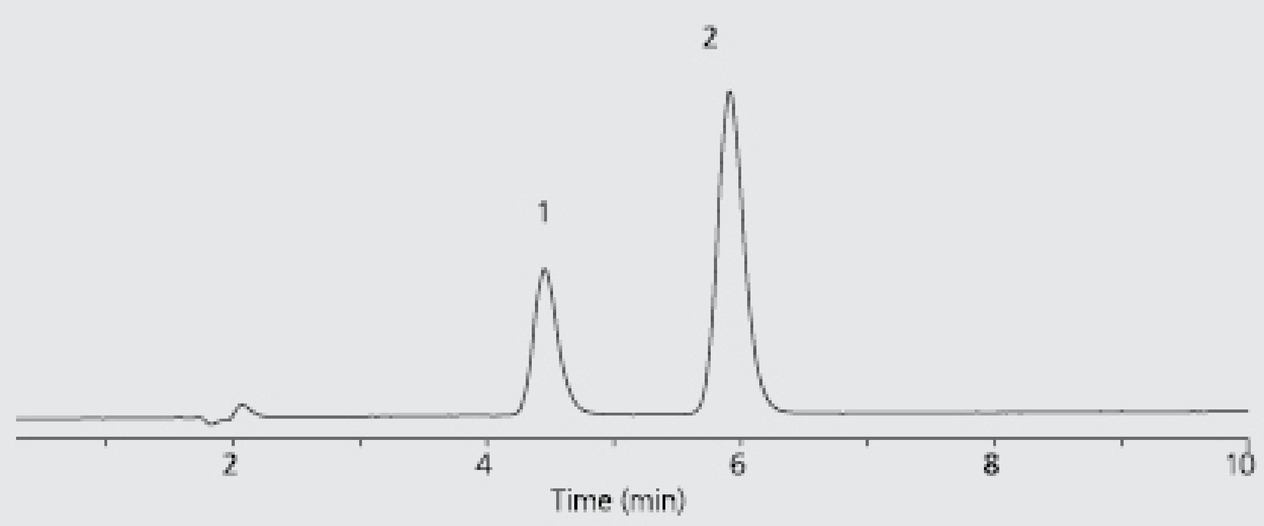
Shim-pack GIS RP-Shield contains a polar functional group embedded between silica surface and an octadecyl group, making it stable in 100% aqueous mobile phases without phase collapse. The embedded polar functional group is also extremely base deactivated, which enables the column to provide superior peak shape for acids.

Shim-pack GIS RP-Shield provides unique selectivity as hydrogen bonding interactions, making it suitable for separations that cannot be achieved by other modes, such as hydrophobic interactions or π-π interactions.

Bonded Phase	Octadecyl Groups
Particle Size	5 µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	9 %
End-capping	-
pH Range	2 - 7.5
USP Code	L1

Analysis Examples

Analysis of Phenoxyacetic Acid and Benzoic Acid



Peaks

1. Phenoxyacetic acid
2. Benzoic acid

Conditions

Column : Shim-pack GIS RP-Shield (150 mmL. × 3.0 mmI.D., 5 µm) (P/N: 227-30587-06)
Mobile Phase : A) 0.1 % Formic acid in Water
B) Acetonitrile
A/B = 50/50 (v/v)
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 254 nm

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
5	30	-	-	227-30586-01	227-30587-01	227-30588-01	227-30589-01
	33	227-30584-01	227-30585-01	227-30586-02	227-30587-02	227-30588-02	227-30589-02
	50	227-30584-02	227-30585-02	227-30586-03	227-30587-03	227-30588-03	227-30589-03
	75	227-30584-03	227-30585-03	227-30586-04	227-30587-04	227-30588-04	227-30589-04
	100	227-30584-04	227-30585-04	227-30586-05	227-30587-05	227-30588-05	227-30589-05
	150	227-30584-05	227-30585-05	227-30586-06	227-30587-06	227-30588-06	227-30589-06
	250	227-30584-06	227-30585-06	227-30586-07	227-30587-07	227-30588-07	227-30589-07

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
5	10	227-30612-01	227-30613-01	227-30614-01	227-30616-01	227-30532-01
	20	-	-	227-30615-01	227-30617-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
5	10	227-30612-02	227-30613-02	227-30614-02	227-30616-02
	20	-	-	227-30615-02	227-30617-02

Shim-pack GWS C18

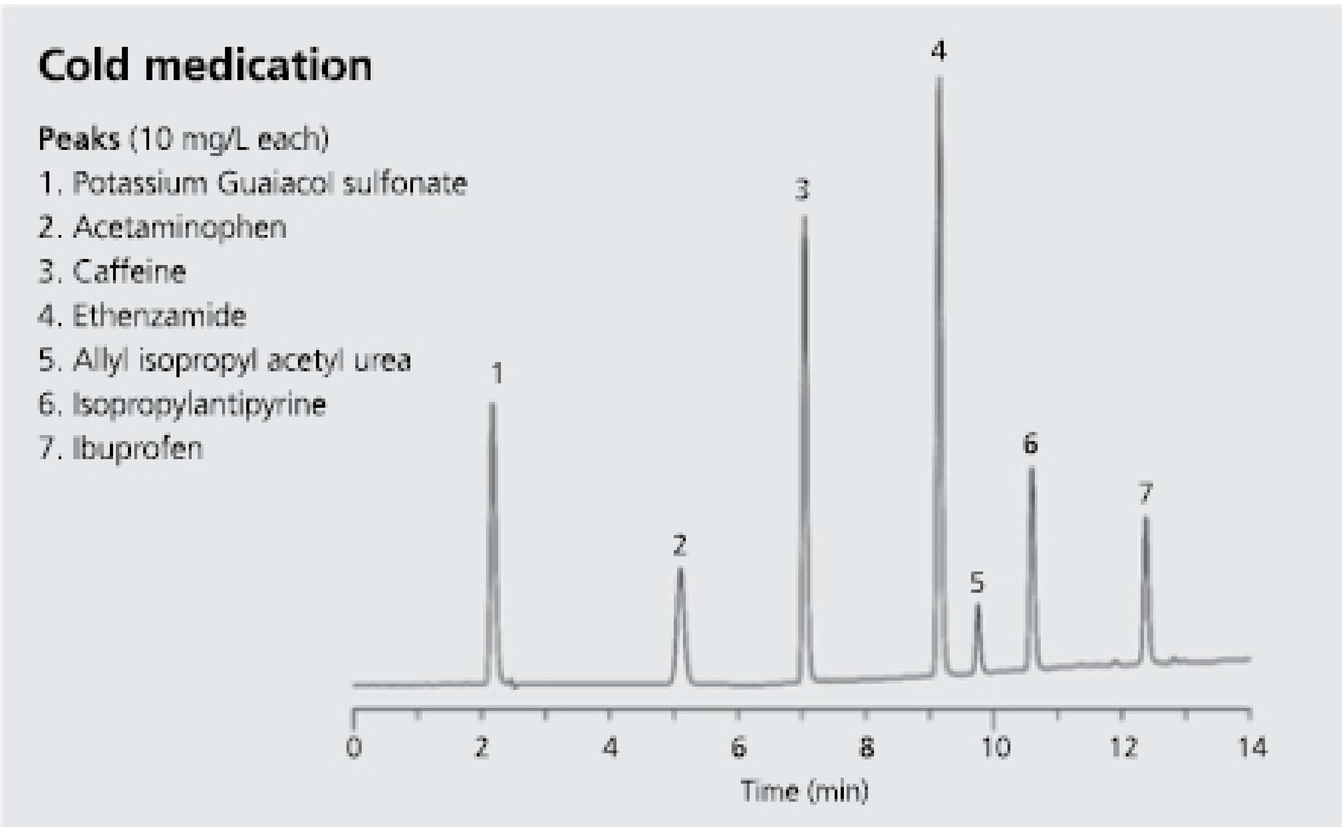
Economical Choice

Shim-pack GWS C18 is packed with high-purity silica gel. A uniform pore size ensures low pressure, while complete end-capping makes it possible for analysis of acidic or basic compounds.

Shim-pack GWS series is an ideal choice for cost control.

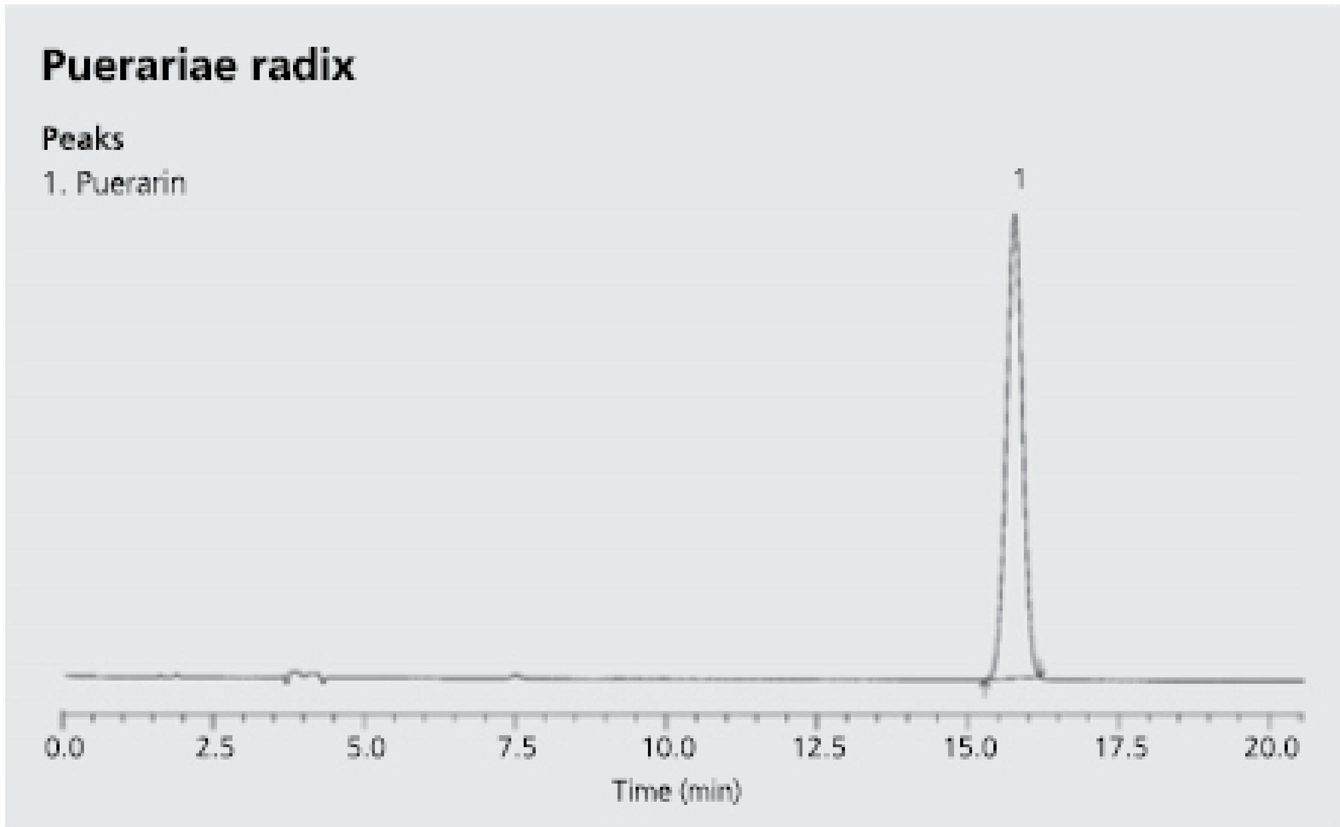
Bonded Phase	Octadecyl Groups
Particle Size	5 µm
Pore Size	10 nm
Surface Area	450 m^2/g
Carbon Loading	9.5 %
End-capping	Yes
pH Range	2 to 7.5
USP Code	L1

Analysis Examples



■ Conditions

Column : Shim-pack GWS C18 (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30158-01)
Mobile Phase : A) 0.1 % Phosphoric acid in Water
B) Acetonitrile
A/B = 90/10 - 2 min - 90/10 - 10 min - 0/100
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 210 nm
Injection Vol. : 10 µL



■ Conditions

Column : Shim-pack GWS C18 (250 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30158-03)
Mobile Phase : A) Water
B) Acetonitrile
A/B = 89/11
Flow Rate : 1.0 mL/min
Col. Temp. : 20 °C
Detection : UV 250 nm
Injection Vol. : 10 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	4.6
5	150	227-30158-01
	200	227-30158-02
	250	227-30158-03

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)	Holder	Cartridge Guard Column (2pcs) and Holder
		4.0		4.0
5	10	227-30159-01	227-30532-01	227-30159-02

Shim-pack GIST C8

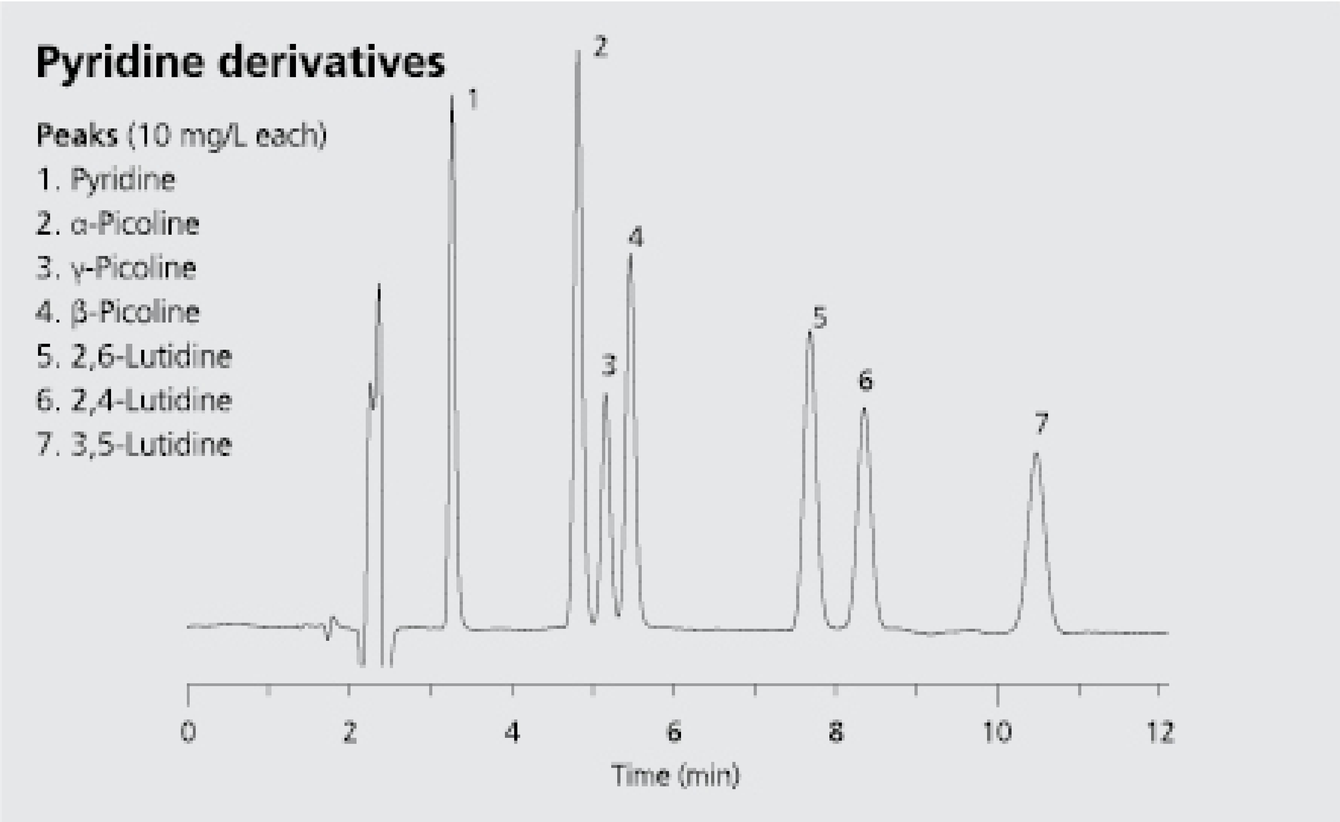
Ultra-High Inertness, High Durability

Shim-pack GIST C8 is packed with high-purity porous spherical silica for delivering the same extreme inertness to elute either basic or acidic compounds without undesired adsorption. Low retentivity and no sample adsorption enable analysis of natural samples.

Shim-pack GIST C8 is the ideal choice for the rapid analysis of hydrophobic compounds.

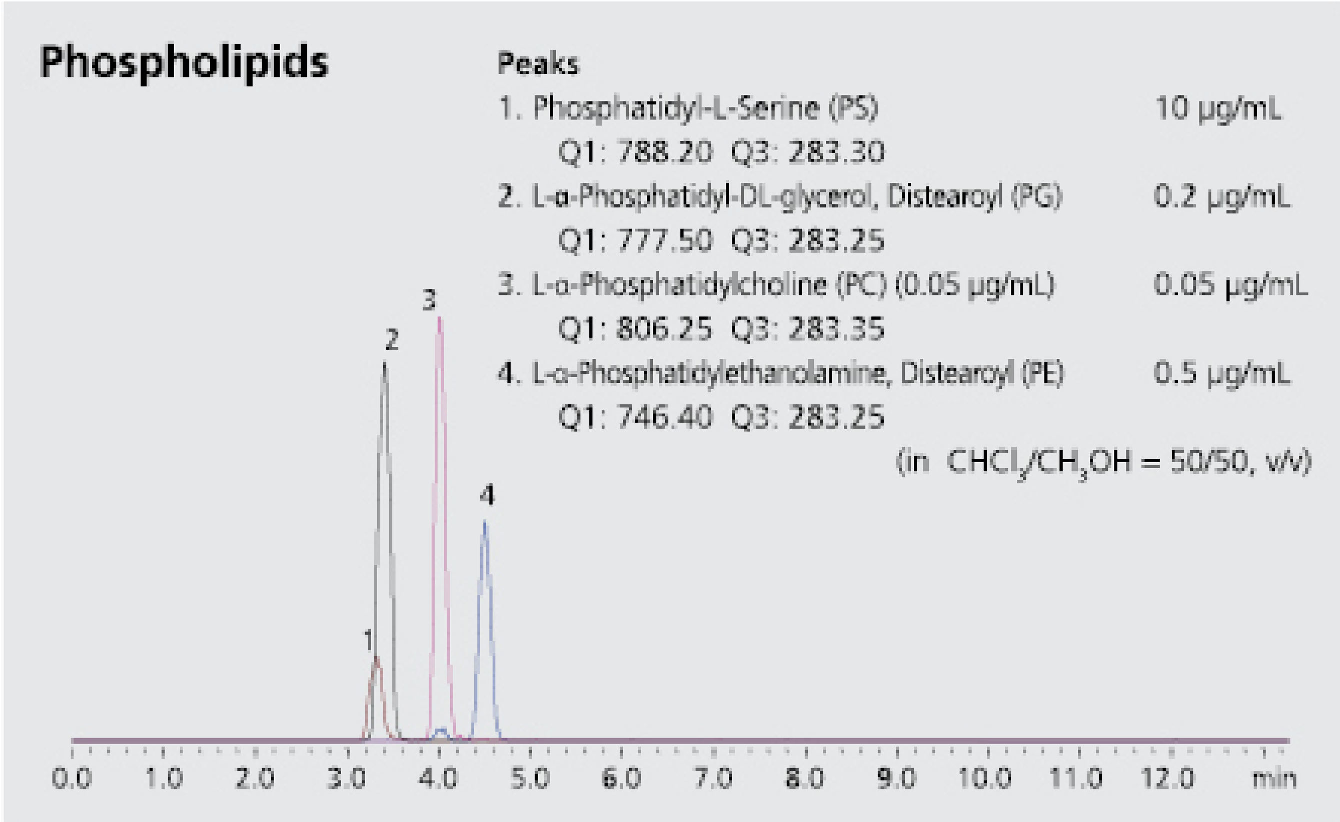
Bonded Phase	Octyl Group
Particle Size	2 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	8 %
End-capping	Yes
pH Range	1 to 10
USP Code	L7

Analysis Examples



Conditions

Column : Shim-pack GIST C8 (150 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30137-07)
Mobile Phase : A) 10 mmol/L Disodium phosphate buffer solution (pH 8.0)
B) Tetrahydrofuran
A/B = 87/13, v/v
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 260 nm
Injection Vol. : 5 µL



Conditions

Column : Shim-pack GIST C8 (150 mmL. × 2.1 mmI.D., 3 µm) (P/N: 227-30164-07)
Mobile Phase : 0.1 % Formic acid, 5 mmol/L Ammonium formate in Methanol
Flow Rate : 0.2 mL/min
Col. Temp. : 40 °C
Detection : LC/MS/MS (ESI, Negative, MRM)
Injection Vol. : 2 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30164-01	227-30165-01	227-30166-01	227-30167-01
	30	227-30162-01	227-30163-01	227-30164-02	227-30165-02	227-30166-02	227-30167-02
	50	227-30162-02	227-30163-02	227-30164-03	227-30165-03	227-30166-03	227-30167-03
	75	227-30162-03	227-30163-03	227-30164-04	227-30165-04	227-30166-04	227-30167-04
	100	227-30162-04	227-30163-04	227-30164-05	227-30165-05	227-30166-05	227-30167-05
	125	-	-	227-30164-06	227-30165-06	227-30166-06	227-30167-06
	150	227-30162-05	227-30163-05	227-30164-07	227-30165-07	227-30166-07	227-30167-07
	250	227-30162-06	227-30163-06	227-30164-08	227-30165-08	227-30166-08	227-30167-08
5	20	-	-	227-30170-01	227-30171-01	227-30172-01	227-30173-01
	30	227-30168-01	227-30169-01	227-30170-02	227-30171-02	227-30172-03	227-30173-02
	50	227-30168-02	227-30169-02	227-30170-03	227-30171-03	227-30172-04	227-30173-03
	75	227-30168-03	227-30169-03	227-30170-04	227-30171-04	227-30172-05	227-30173-04
	100	227-30168-04	227-30169-04	227-30170-05	227-30171-05	227-30172-06	227-30173-05
	125	-	-	227-30170-06	227-30171-06	227-30172-07	227-30173-06
	150	227-30168-05	227-30169-05	227-30170-07	227-30171-07	227-30172-08	227-30173-07
	250	227-30168-06	227-30169-06	227-30170-08	227-30171-08	227-30172-09	227-30173-09

Cartridge Guard Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) 1.0	1.5	3.0	4.0	Holder
3	10	227-30179-01	227-30180-01	227-30181-01	227-30183-01	227-30532-01
	20	-	-	227-30182-01	227-30184-01	227-30532-02
5	10	227-30185-01	227-30187-01	227-30188-01	227-30190-01	227-30532-01
	20	-	-	227-30189-01	227-30191-01	227-30532-02

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder 1.0	1.5	3.0	4.0
3	10	227-30179-02	227-30180-02	227-30181-02	227-30183-02
	20	-	-	227-30182-02	227-30184-02
5	10	227-30186-02	227-30187-02	227-30188-02	227-30190-02
	20	-	-	227-30189-02	227-30192-02

Analytical Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30160-01	227-30161-01	-	50
	50	227-30160-02	227-30161-02	-	
	75	227-30160-03	227-30161-03	-	
	100	227-30160-04	227-30161-04	-	80
	150	227-30160-05	227-30161-05	-	
3	30	227-30198-01	227-30199-01	227-30200-01	50
	50	227-30198-02	227-30199-02	227-30200-02	
	75	227-30198-03	227-30199-03	227-30200-03	
	100	227-30198-04	227-30199-04	227-30200-04	
	150	227-30198-05	227-30199-05	227-30200-05	
	250	227-30198-06	227-30199-06	227-30200-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) 1.5	2.1	3.0	Pressure Tolerance (MPa)	Holder
2	10	227-30201-01	227-30202-01	227-30203-01	80	227-30533-01
3	10	227-30204-01	227-30205-01	227-30206-01		

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder 1.5	2.1	3.0	Pressure Tolerance (MPa)
2	10	227-30201-02	227-30202-02	227-30203-02	80
3	10	227-30204-02	227-30205-02	227-30206-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30789-01	227-30790-01	227-30791-01	80
3		227-30792-01	227-30793-01	227-30794-01	50

Shim-pack GIST Phenyl

Extremely Strong π-π Interactions

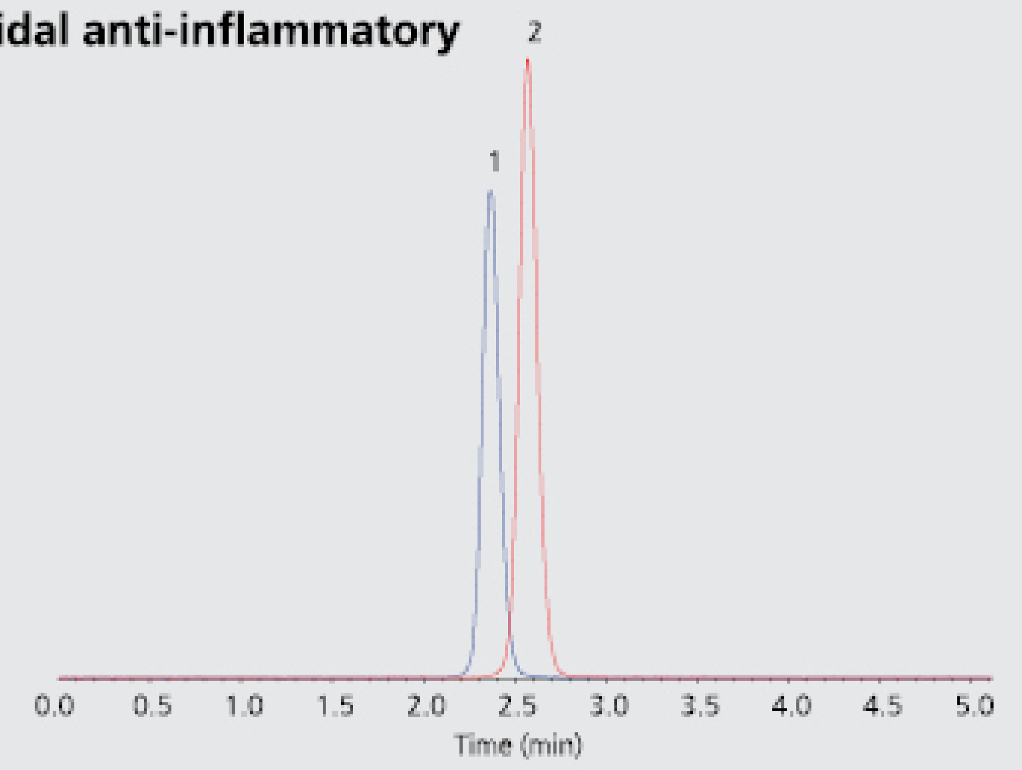
The extremely unique phase characteristics of Shim-pack GIST Phenyl are critical to resolving compounds that could not be separated with a C18 or C8 phase column.

In addition to π-π interactions, Shim-pack GIS Phenyl provides hydrogen bonding secondary interactions, which results in retaining polar compounds at the same time. As the phenyl groups are directly bonded to the silica gel, Shim-pack GIS Phenyl is also capable of the analysis of structural isomers due to its high stereo-selectivity.

Bonded Phase	Phenyl Group
Particle Size	2 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	10 %
End-capping	-
pH Range	2 to 7.5
USP Code	L11

Analysis Examples

Steroidal anti-inflammatory drug



Peaks (0.1 mg/L each)
1. Hydrocortisone
2. Prednisolone

Conditions

Column	: Shim-pack GIST Phenyl (50 mmL. × 2.1 mmI.D., 2 µm) (P/N: 227-30207-02)
Mobile Phase	: A) 0.05 % Formic acid in Water B) 0.05 % Formic acid in Methanol A/B = 60/40, v/v
Flow Rate	: 0.6 mL/min
Col. Temp.	: 40 °C
Detection	: LC/MS/MS (ESI, Positive, MRM)
Injection Vol.	: 5 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30211-01	227-30212-01	227-30213-01	227-30214-01
	30	227-30209-01	227-30210-01	227-30211-02	227-30212-02	227-30213-02	227-30214-02
	50	227-30209-02	227-30210-02	227-30211-03	227-30212-03	227-30213-03	227-30214-03
	75	227-30209-03	227-30210-03	227-30211-04	227-30212-04	227-30213-04	227-30214-04
	100	227-30209-04	227-30210-04	227-30211-05	227-30212-05	227-30213-05	227-30214-05
	150	227-30209-05	227-30210-05	227-30211-06	227-30212-06	227-30213-06	227-30214-06
	250	227-30209-06	227-30210-06	227-30211-07	227-30212-07	227-30213-07	227-30214-07
5	20	-	-	227-30217-01	227-30218-01	227-30219-01	227-30220-01
	30	227-30215-01	227-30216-01	227-30217-02	227-30218-02	227-30219-02	227-30220-02
	50	227-30215-02	227-30216-02	227-30217-03	227-30218-03	227-30219-03	227-30220-03
	75	227-30215-03	227-30216-03	227-30217-04	227-30218-04	227-30219-04	227-30220-04
	100	227-30215-04	227-30216-04	227-30217-05	227-30218-05	227-30219-05	227-30220-05
	150	227-30215-05	227-30216-05	227-30217-06	227-30218-06	227-30219-06	227-30220-06
	250	227-30215-06	227-30216-06	227-30217-07	227-30218-07	227-30219-07	227-30220-08

Cartridge Guard Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) 1.0	1.5	3.0	4.0	Holder
3	10	227-30226-01	227-30227-01	227-30228-01	227-30230-01	227-30532-01
	20	-	-	227-30229-01	227-30231-01	227-30532-02
5	10	227-30232-01	227-30233-01	227-30234-01	227-30236-01	227-30532-01
	20	-	-	227-30235-01	227-30237-01	227-30532-02

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder 1.0	1.5	3.0	4.0
3	10	227-30226-02	227-30227-02	227-30228-02	227-30230-02
	20	-	-	227-30229-02	227-30231-02
5	10	227-30232-02	227-30233-02	227-30234-02	227-30236-02
	20	-	-	227-30235-02	227-30237-02

Analytical Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30207-01	227-30208-01	-	50
	50	227-30207-02	227-30208-02	-	
	75	227-30207-03	227-30208-03	-	
	100	227-30207-04	227-30208-04	-	80
	150	227-30207-05	227-30208-05	-	
3	30	227-30243-01	227-30244-01	227-30245-01	50
	50	227-30243-02	227-30244-02	227-30245-02	
	75	227-30243-03	227-30244-03	227-30245-03	
	100	227-30243-04	227-30244-04	227-30245-04	
	150	227-30243-05	227-30244-05	227-30245-05	
	250	227-30243-06	227-30244-06	227-30245-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) 1.5	2.1	3.0	Pressure Tolerance (MPa)	Holder
2	10	227-30246-01	227-30247-01	227-30248-01	80	227-30533-01
3	10	227-30249-01	227-30250-01	227-30251-01		

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder 1.5	2.1	3.0	Pressure Tolerance (MPa)
2	10	227-30246-02	227-30247-02	227-30248-02	80
3	10	227-30249-02	227-30250-02	227-30251-02	

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
2	30	227-30795-01	227-30796-01	227-30797-01	80
3		227-30798-01	227-30799-01	227-30800-01	50

Shim-pack GIST Phenyl-Hexyl

Alternative Selectivity to C18 Columns

Shim-pack GIST Phenyl-Hexyl columns are bonded with a phenyl ring together with a hexyl (C6) chain, which provides complementary selectivity to straight alkyl-chain columns due to its π-π interactions and hydrophobic interactions. Furthermore, Shim-pack GIST Phenyl-Hexyl maintains the same ultra-high inertness, wide pH range and high durability as the Shim-pack GIST C18, achieving stronger retention than other phenyl columns as well as reducing or eliminating adsorption of polar compounds.

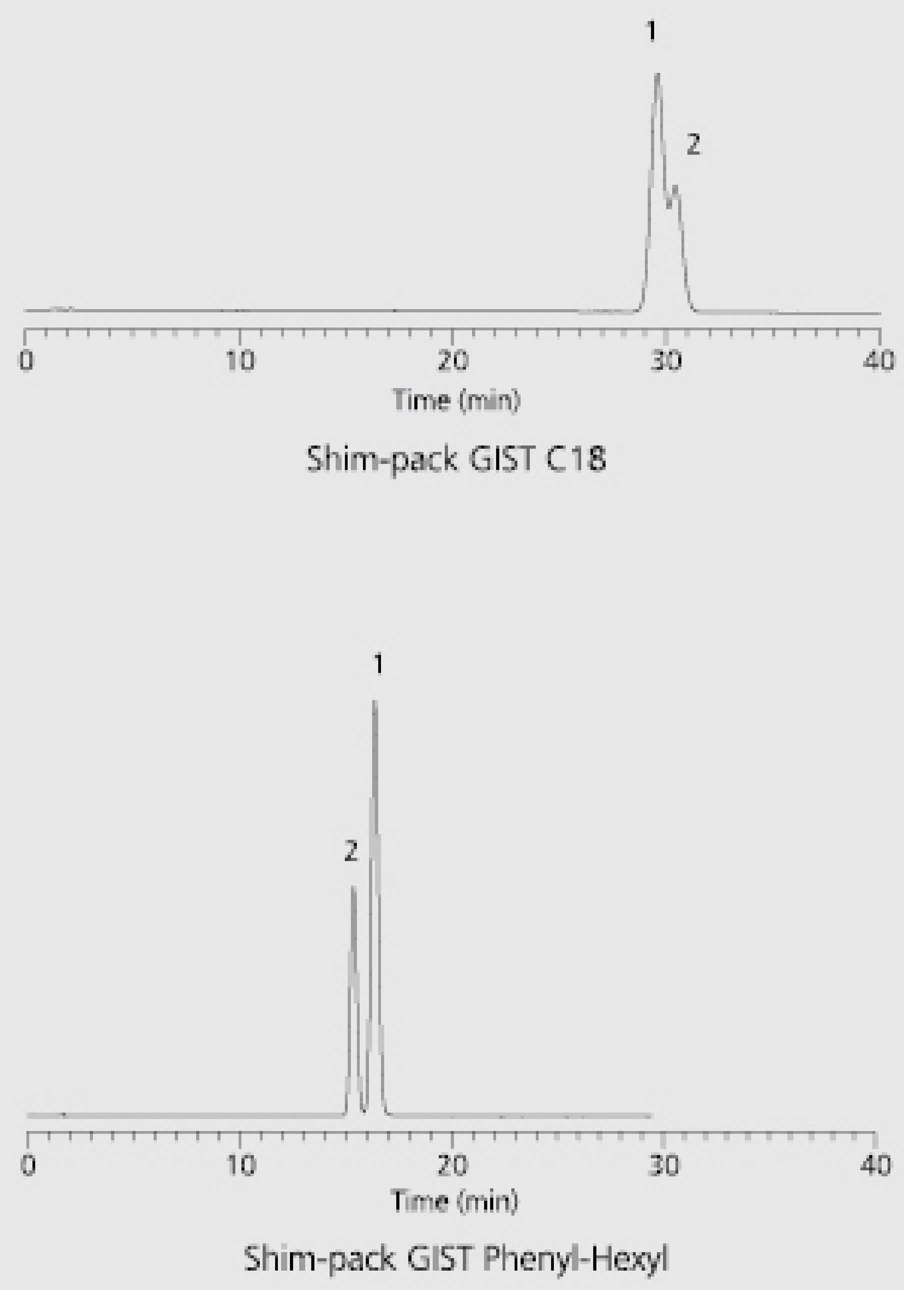
Bonded Phase	Phenylhexyl Groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	9 %
End-capping	Yes
pH Range	1 to 10
USP Code	L11

Analysis Examples

Different Selectivity to Shim-pack GIST C18

Analysis of Analgesic Drugs

■ Peaks
1. Indomethacin
2. Ibuprofen



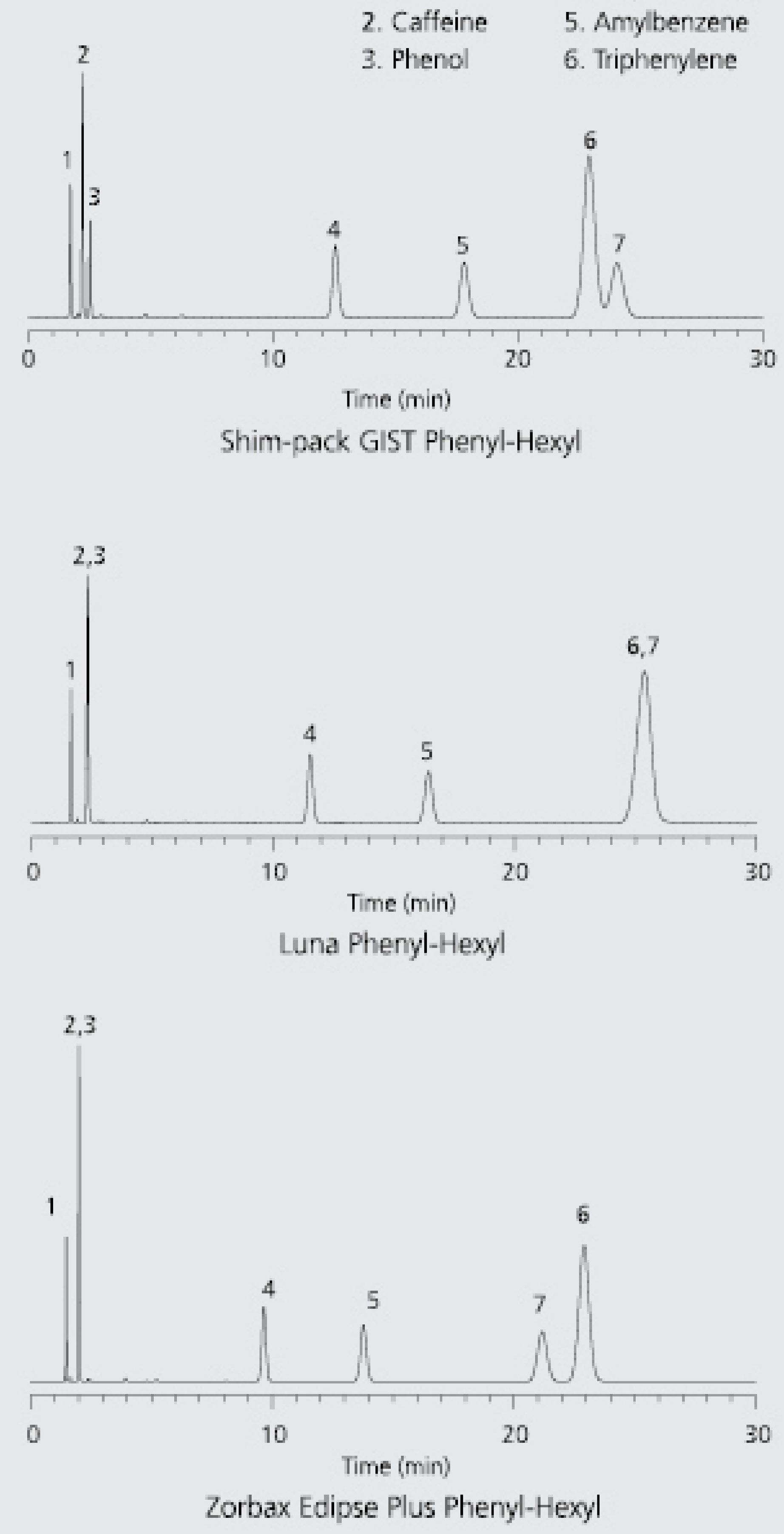
■ Conditions

Column	: 150 mmL. × 4.6 mmI.D., 5 µm
Mobile Phase	: A) Acetonitrile B) 25 mmol/L Monopotassium phosphate buffer solution (pH 3.0)
Flow Rate	: A/B=45/55 (v/v)
Col. Temp.	: 40 °C
Detection	: UV 230 nm

Stronger Retentivity Than Other Phenyl Phase

Analysis of Samples for Column Selectivity

■ Peaks
1. Uracil
2. Caffeine
3. Phenol
4. Butylbenzene
5. Amylbenzene
6. Triphenylene
7. o-Terphenyl



■ Conditions

Column	: 150 mmL. × 4.6 mmI.D., 5 µm
Mobile Phase	: A) Water B) Methanol A/B = 30/70 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 254 nm

Analytical Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	227-30667-01	227-30668-01	227-30669-01	227-30670-01	227-30671-01	227-30672-01
	50	227-30667-02	227-30668-02	227-30669-02	227-30670-02	227-30671-02	227-30672-02
	75	227-30667-03	227-30668-03	227-30669-03	227-30670-03	227-30671-03	227-30672-03
	100	227-30667-04	227-30668-04	227-30669-04	227-30670-04	227-30671-04	227-30672-04
	150	227-30667-05	227-30668-05	227-30669-05	227-30670-05	227-30671-05	227-30672-05
	250	227-30667-06	227-30668-06	227-30669-06	227-30670-06	227-30671-06	227-30672-06
5	30	227-30685-01	227-30686-01	227-30687-01	227-30688-01	227-30689-01	227-30690-01
	50	227-30685-02	227-30686-02	227-30687-02	227-30688-02	227-30689-02	227-30690-02
	75	227-30685-03	227-30686-03	227-30687-03	227-30688-03	227-30689-03	227-30690-03
	100	227-30685-04	227-30686-04	227-30687-04	227-30688-04	227-30689-04	227-30690-04
	150	227-30685-05	227-30686-05	227-30687-05	227-30688-05	227-30689-05	227-30690-05
	250	227-30685-06	227-30686-06	227-30687-06	227-30688-06	227-30689-06	227-30690-06

Cartridge Guard Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30679-01	227-30680-01	227-30681-01	227-30683-01	227-30532-01
	20	-	-	227-30682-01	227-30684-01	227-30532-02
5	10	227-30707-01	227-30708-01	227-30709-01	227-30711-01	227-30532-01
	20	-	-	227-30710-01	227-30712-01	227-30532-02

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.0	1.5	3.0	
3	10	227-30679-02	227-30680-02	227-30681-02	227-30683-02
	20	-	-	227-30682-02	227-30684-02
5	10	227-30707-02	227-30708-02	227-30709-02	227-30711-02
	20	-	-	227-30710-02	227-30712-02

Analytical Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
3	30	-	227-30714-01	227-30715-01	50
	50	227-30713-01	227-30714-02	227-30715-02	
	70	227-30713-02	227-30714-03	227-30715-03	
	100	227-30713-03	227-30714-04	227-30715-04	
	150	227-30713-04	227-30714-05	227-30715-05	
	250	227-30713-05	227-30714-06	227-30715-06	

Cartridge Guard Columns (High Pressure series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
3	10	227-30716-01	227-30717-01	227-30718-01	80	227-30533-01

Particle Size (µm)	Length (mm) \ I.D. (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
3	10	227-30716-02	227-30717-02	227-30718-02	80

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
3	30	227-30804-01	227-30805-01	227-30806-01	50

Shim-pack GIST PFPP

Strong retention for highly polar basic compounds

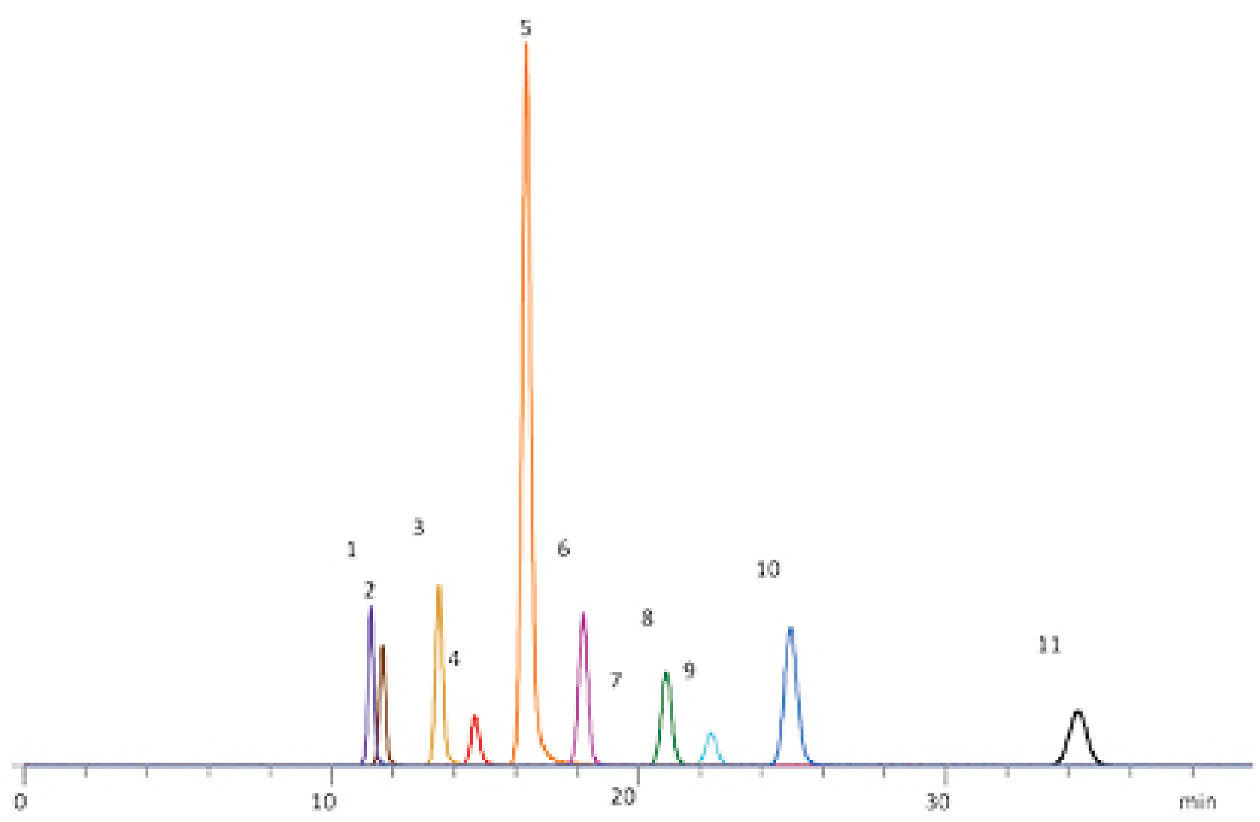
Different from other Shim-pack Series PFPP (pentafluorophenylpropyl) columns, this PFPP column is end-capped so it provides a different selectivity. Durability is a challenge for PFPP columns. However, Shim-pack GIST PFPP provides both high durability, which is a characteristic of the Shim-pack GIST Series, and separation characteristics of PFPP via a unique, advanced end-capping technology.

Generally, PFPP columns retain more highly polar basic compounds. This is more prominent in Shim-pack GIST PFPP and it also provides an extremely high retention performance when compared to other commercially-available PFPP columns.

Bonded Phase	Pentafluorophenyl propyl Group
Particle Size	3µm, 5µm
Pore Size	10 nm
Surface Area	350 m^2/g
Carbon Loading	10 %
End-capping	No
pH Range	2 to 7.5
USP Code	L43

Analysis Examples

Analysis of Antihistamines



Peaks (100 µg/L each)

1. Ketotifen
2. Epinastine
3. Chlorpheniramine
4. Cetirizine
5. Triprolidine
6. Hydroxyzine
7. Fexofenadine
8. Azelastine
9. Loratidine
10. Homoclorcyclizine
11. Clemastine

Conditions

Column : Shim-pack GIST-HP PFPP (3 µm, 150 x 2.1 mm I.D.) (P/N: 227-30890-05)
Mobile Phase : A) Acetonitrile
B) 0.1% Formic acid in water
A/B = 40/60, v/v
Flow Rate : 0.2 mL/min
Col. Temp. : 40 °C
Detection : LCMS-8030 Plus (ESI, Positive, SRM)
Injection Vol. : 1 µL
Sample : Standard

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30858-01	227-30859-01	227-30860-01	227-30861-01
	30	227-30856-01	227-30857-01	227-30858-02	227-30859-02	227-30860-02	227-30861-02
	50	227-30856-02	227-30857-02	227-30858-03	227-30859-03	227-30860-03	227-30861-03
	75	227-30856-03	227-30857-03	227-30858-04	227-30859-04	227-30860-04	227-30861-04
	100	227-30856-04	227-30857-04	227-30858-05	227-30859-05	227-30860-05	227-30861-05
	125	-	-	227-30858-06	227-30859-06	227-30860-06	227-30861-06
	150	227-30856-05	227-30857-05	227-30858-07	227-30859-07	227-30860-07	227-30861-07
	250	227-30856-06	227-30857-06	227-30858-08	227-30859-08	227-30860-08	227-30861-08
5	20	-	-	227-30864-01	227-30865-01	227-30866-01	227-30867-01
	30	227-30862-01	227-30863-01	227-30864-02	227-30865-02	227-30866-02	227-30867-02
	50	227-30862-02	227-30863-02	227-30864-03	227-30865-03	227-30866-03	227-30867-03
	75	227-30862-03	227-30863-03	227-30864-04	227-30865-04	227-30866-04	227-30867-04
	100	227-30862-04	227-30863-04	227-30864-05	227-30865-05	227-30866-05	227-30867-05
	125	-	-	227-30864-06	227-30865-06	227-30866-06	227-30867-06
	150	227-30862-05	227-30863-05	227-30864-07	227-30865-07	227-30866-07	227-30867-07
	250	227-30862-06	227-30863-06	227-30864-08	227-30865-08	227-30866-08	227-30867-08

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30873-01	227-30874-01	227-30875-01	227-30877-01	227-30532-01
	20	-	-	227-30876-01	227-30878-01	227-30532-02
5	10	227-30879-01	227-30880-01	227-30881-01	227-30883-01	227-30532-01
	20	-	-	227-30882-01	227-30884-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30873-02	227-30874-02	227-30875-02	227-30877-02
	20	-	-	227-30876-02	227-30878-02
5	10	227-30879-02	227-30880-02	227-30881-02	227-30883-02
	20	-	-	227-30882-02	227-30884-02

Analytical Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.6	Pressure Tolerance (MPa)
3	20	227-30890-01	-	-	50
	30	-	227-30891-01	227-30892-01	
	50	227-30890-02	227-30891-02	227-30892-02	
	75	227-30890-03	227-30891-03	227-30892-03	
	100	227-30890-04	227-30891-04	227-30892-04	
	150	227-30890-05	227-30891-05	227-30892-05	
	250	227-30890-06	227-30891-06	227-30892-06	

Cartridge Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	4.0		
3	10	227-30893-01	227-30894-01	227-30895-01	80	227-30533-01

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	3.0	4.0	
3	10	227-30893-02	227-30894-02	227-30895-02	80

Shim-pack GIS HILIC

Ideal for the Separation of Highly Polar Basic Compounds

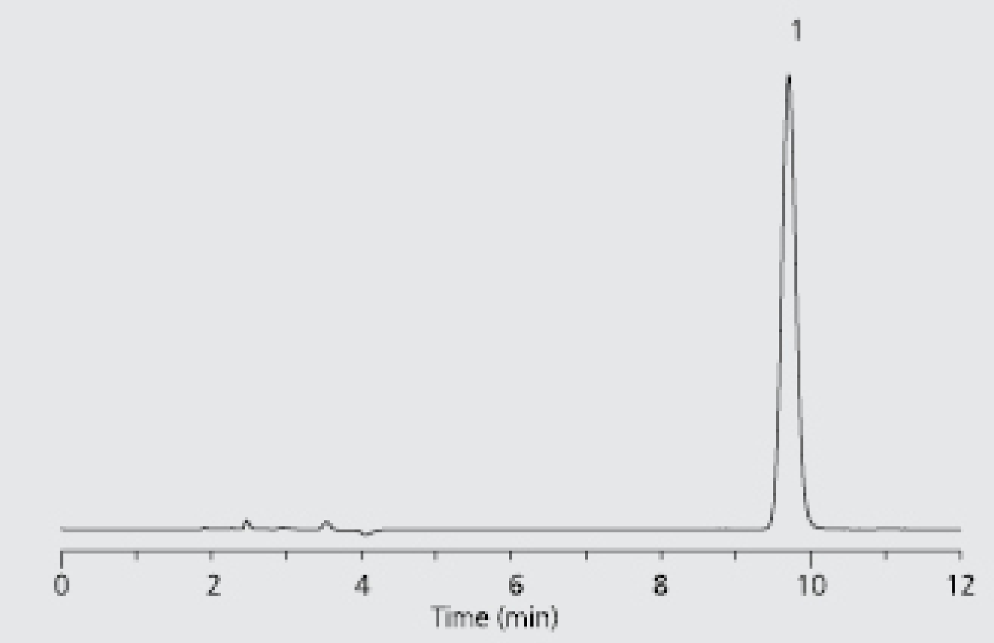
Shim-pack GIS HILIC is designed for Hydrophilic Interaction Liquid Chromatography (HILIC). It is chemically bonded with a diol group, which provides excellent peak shape for basic and neutral polar compounds.

In addition, HILIC is a variation of normal phase mode. It is capable of using organic solvents mixed with water as mobile phase, while normal phase mode uses non-aqueous organic solvents. In HILIC, the higher the organic concentration in the solvents, the greater is the retention of highly polar compounds.

Bonded Phase	Diol Groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	20 %
End-capping	-
pH Range	2 to 7.5
USP Code	L20

Analysis Examples

Analysis of Allantoin

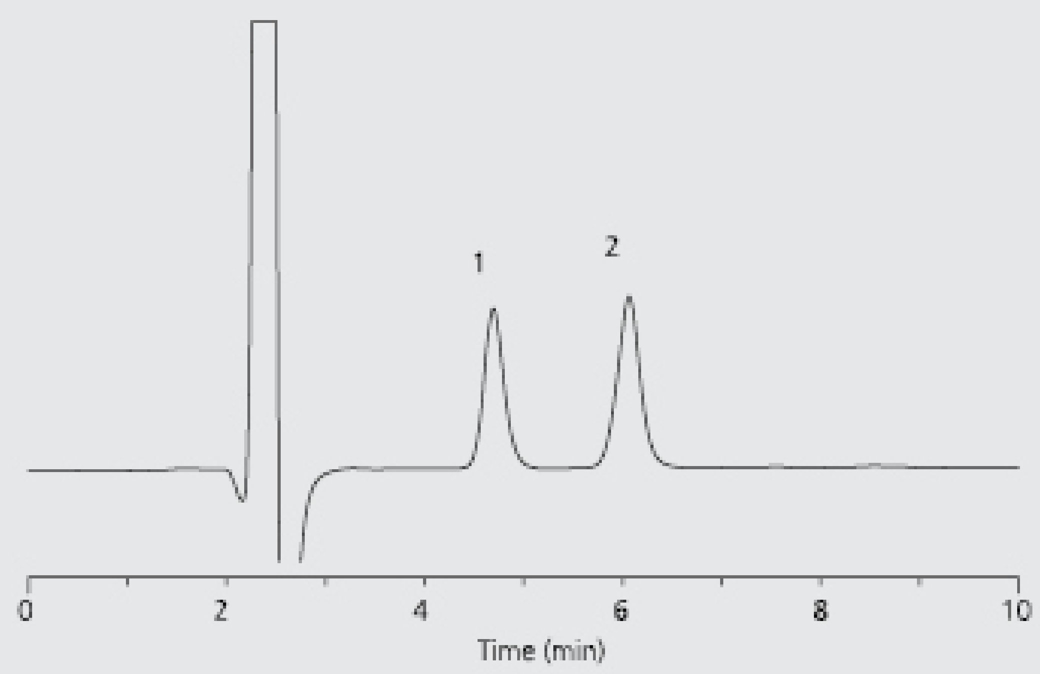


Peaks
1. Allantoin

Conditions

Column : Shim-pack GIS HILIC (250 mmL. × 3.0 mmI.D., 5 µm) (P/N: 227-30639-07)
Mobile Phase : A) 10 mmol/L Ammonium acetate
B) Acetonitrile
A/B = 5/95 (v/v)
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : UV 210 nm

Analysis of Taurine and Inositol



Peaks (500 mg/L each)
1. Taurine
2. Inositol

Conditions

Column : Shim-pack GIS HILIC (150 mmL. × 3.0 mmI.D., 5 µm) (P/N: 227-30639-06)
Mobile Phase : A) Water
B) Acetonitrile
A/B = 20/80 (v/v)
Flow Rate : 0.4 mL/min
Col. Temp. : 40 °C
Detection : RID (35 °C, positive)
Injection Vol. : 20 µL

Analytical Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	-	-	227-30620-01	227-30621-01	227-30622-01	227-30623-01
	33	227-30618-01	227-30619-01	227-30620-02	227-30621-02	227-30622-02	227-30623-02
	50	227-30618-02	227-30619-02	227-30620-03	227-30621-03	227-30622-03	227-30623-03
	75	227-30618-03	227-30619-03	227-30620-04	227-30621-04	227-30622-04	227-30623-04
	100	227-30618-04	227-30619-04	227-30620-05	227-30621-05	227-30622-05	227-30623-05
	150	227-30618-05	227-30619-05	227-30620-06	227-30621-06	227-30622-06	227-30623-06
	250	227-30618-06	227-30619-06	227-30620-07	227-30621-07	227-30622-07	227-30623-07
5	30	-	-	227-30638-01	227-30639-01	227-30640-01	227-30641-01
	33	227-30636-01	227-30637-01	227-30638-02	227-30639-02	227-30640-02	227-30641-02
	50	227-30636-02	227-30637-02	227-30638-03	227-30639-03	227-30640-03	227-30641-03
	75	227-30636-03	227-30637-03	227-30638-04	227-30639-04	227-30640-04	227-30641-04
	100	227-30636-04	227-30637-04	227-30638-05	227-30639-05	227-30640-05	227-30641-05
	150	227-30636-05	227-30637-05	227-30638-06	227-30639-06	227-30640-06	227-30641-06
	250	227-30636-06	227-30637-06	227-30638-07	227-30639-07	227-30640-07	227-30641-07

Cartridge Guard Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30630-01	227-30631-01	227-30632-01	227-30634-01	227-30532-01
	20	-	-	227-30633-01	227-30635-01	227-30532-02
5	10	227-30661-01	227-30662-01	227-30663-01	227-30665-01	227-30532-01
	20	-	-	227-30664-01	227-30666-01	227-30532-02

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30630-02	227-30631-02	227-30632-02	227-30634-02
	20			227-30633-02	227-30635-02
5	10	227-30661-02	227-30662-02	227-30663-02	227-30665-02
	20			227-30664-02	227-30666-02

For preparative columns, please refer to page A-69

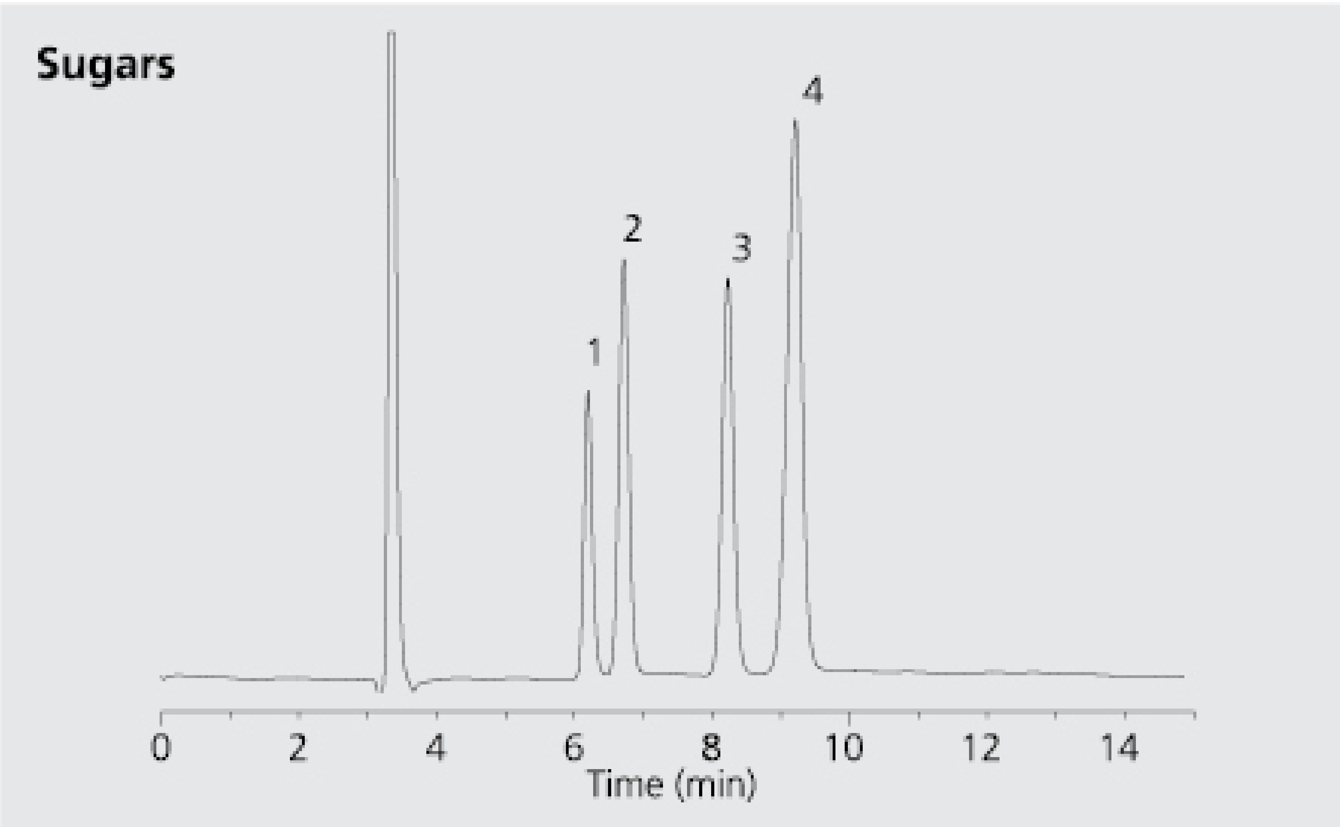
Shim-pack GIST NH2

Ideal for Sugar Analysis

New high-purity porous spherical silica chemically bonded with the aminopropyl group ensures the superior stability of Shim-pack GIST NH2. It is capable of the analysis of vitamin E or simultaneous analysis of sugars that are hard to separate in reversed phase mode. In addition, due to being primarily amine-bound, Shim-pack GIST NH2 can analyze sugars with no separation of anomers, even under low-temperature conditions. Furthermore, Shim-pack GIST NH2 delivers highly reliable reproducibility and stability with accurate qualitative and quantitative results.

Bonded Phase	Aminopropyl Group
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	7 %
End-capping	-
pH Range	2 to 7.5
USP Code	L8

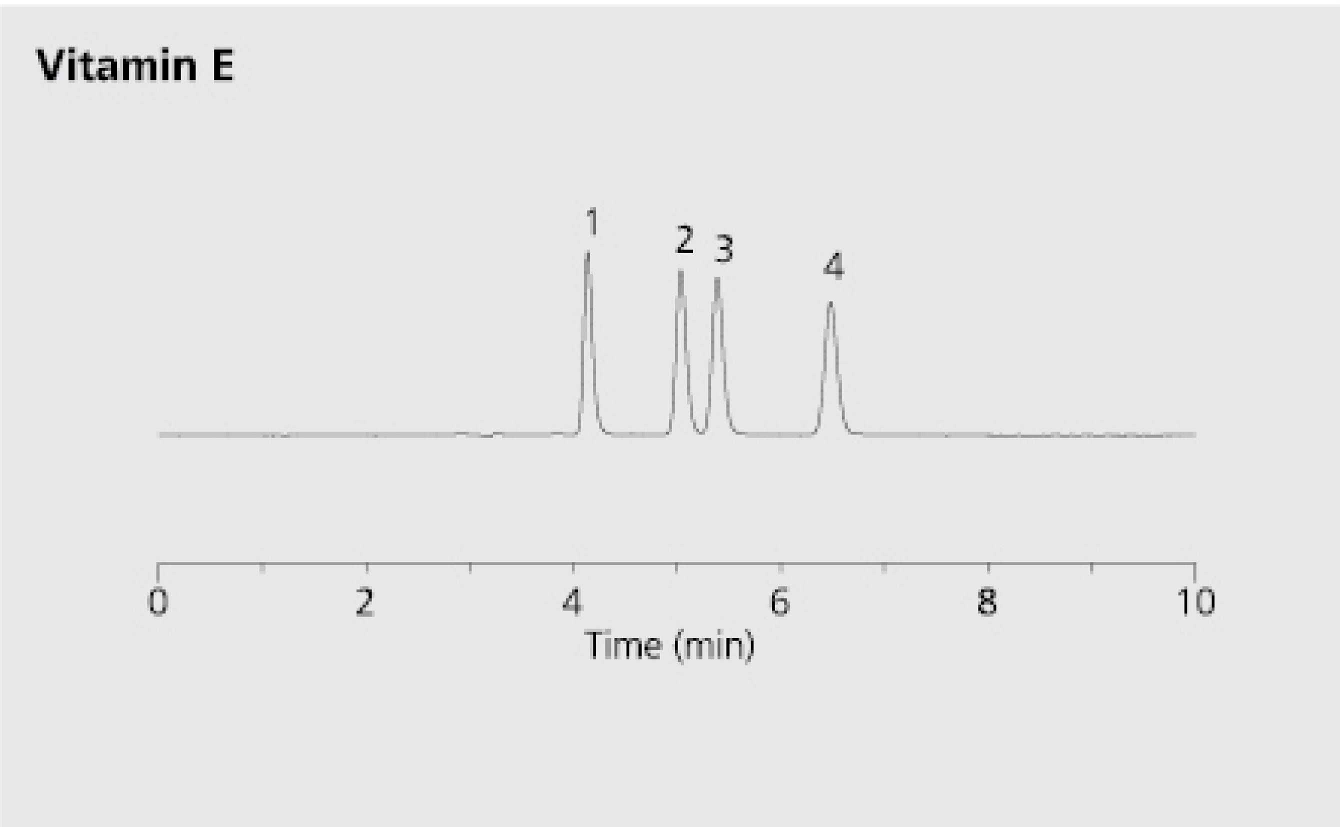
Analysis Examples



Peaks
1. Fructose
2. Glucose
3. Sucrose
4. Maltose

Conditions

Column	: Shim-pack GIST NH2 (250 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30302-08)
Mobile Phase	: A) Water B) Acetonitrile A/B = 25/75, v/v
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: RID
Injection Vol.	: 5 µL



Peaks (25 mg/L each)
1. α-Tocopherol
2. β-Tocopherol
3. γ-Tocopherol
4. δ-Tocopherol

Conditions

Column	: Shim-pack GIST NH2 (250 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30302-08)
Mobile Phase	: A) *n*-Hexane B) Ethyl acetate A/B = 70/30, v/v
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 290 nm
Injection Vol.	: 10 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30293-01	227-30294-01	227-30295-01	227-30296-01
	30	227-30291-01	227-30292-01	227-30293-02	227-30294-02	227-30295-02	227-30296-02
	50	227-30291-02	227-30292-02	227-30293-03	227-30294-03	227-30295-03	227-30296-03
	75	227-30291-03	227-30292-03	227-30293-04	227-30294-04	227-30295-04	227-30296-04
	100	227-30291-04	227-30292-04	227-30293-05	227-30294-05	227-30295-05	227-30296-05
	150	227-30291-05	227-30292-05	227-30293-06	227-30294-06	227-30295-06	227-30296-06
	250	227-30291-06	227-30292-06	227-30293-07	227-30294-07	227-30295-07	227-30296-07
5	20	-	-	227-30299-01	227-30300-01	227-30301-01	227-30302-01
	30	227-30297-01	227-30298-01	227-30299-02	227-30300-02	227-30301-02	227-30302-02
	50	227-30297-02	227-30298-02	227-30299-03	227-30300-03	227-30301-03	227-30302-03
	75	227-30297-03	227-30298-03	227-30299-04	227-30300-04	227-30301-04	227-30302-04
	100	227-30297-04	227-30298-04	227-30299-05	227-30300-05	227-30301-05	227-30302-05
	150	227-30297-05	227-30298-05	227-30299-06	227-30300-06	227-30301-06	227-30302-06
	250	227-30297-06	227-30298-06	227-30299-07	227-30300-07	227-30301-07	227-30302-08

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30308-01	227-30308-03	227-30309-01	227-30310-01	227-30532-01
5	10	227-30311-01	227-30312-01	227-30313-01	227-30315-01	
	20	-	-	227-30314-01	227-30316-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30308-02	227-30308-04	227-30309-02	227-30310-02
5	10	227-30311-02	227-30312-02	227-30313-02	227-30315-02
	20	-	-	227-30314-02	227-30316-02

Shim-pack GIST Amide

Strong retention of polar compounds

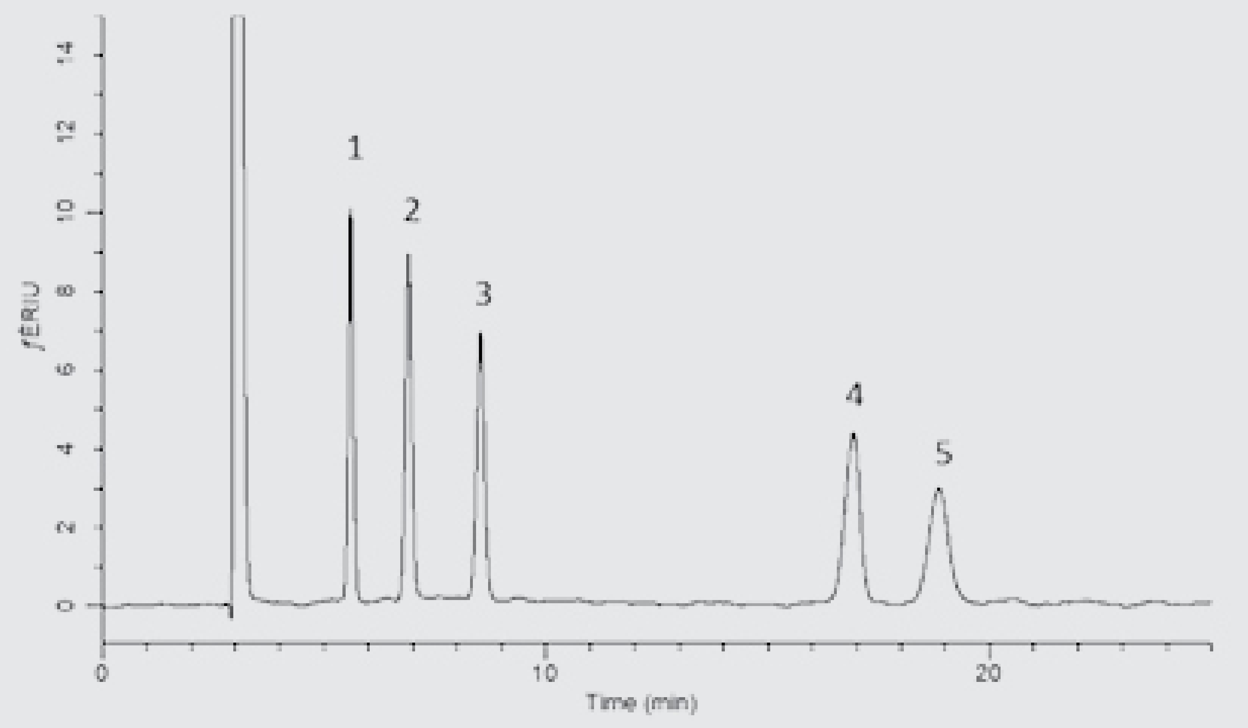
This is the amide type HILIC column in the Shim-pack Series. It shows stronger retention of polar compounds than other HILIC columns such as unmodified silica and Diol type and it provides a different selectivity. It is also highly durable, which is a characteristic of the Shim-pack GIST Series.

In addition to analysis of oligosaccharides and glycans, Amide type HILIC columns are often used as general HILIC columns as they are applicable to a wide range of samples.

Bonded Phase	Amide (Carbamoyl) Groups
Particle Size	3µm, 5µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	15 %
End-capping	No
pH Range	2 to 8.5
USP Code	L68

Analysis Examples

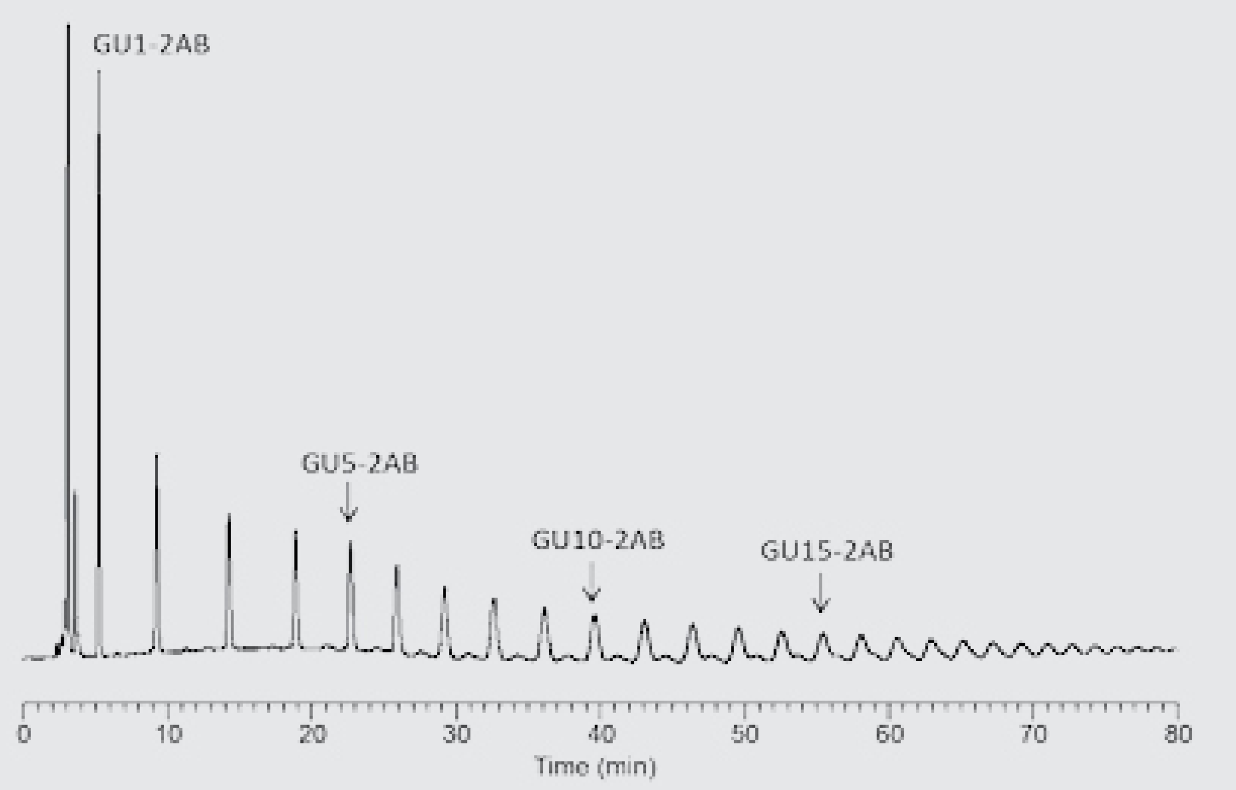
Analysis of Sugar Alcohol



Conditions

Column	: Shim-pack GIST Amide (5 µm, 250 x 4.6 mm I.D.) (P/N: 227-30827-07)
Mobile Phase	: Acetonitrile/Water = 80/20, v/v
Flow Rate	: 1 mL/min
Col. Temp.	: 40 °C
Detection	: RI
Injection Vol.	: 10 µL

Analysis of Oligosaccharides derivatized with 2-AB



Conditions

Column	: Shim-pack GIST Amide (5 µm, 250 x 4.6 mm I.D.) (P/N: 227-30827-07)
Mobile Phase	: Acetonitrile B) 50 mM HCOONH4 (pH 4.4, HCOOH) A/B = 80/20 – 20 min – 65/35 – 60 min – 50/50 – 10 min – 50/50 (v/v)
Flow Rate	: 1 mL/min
Col. Temp.	: 50 °C
Detection	: RI
Injection Vol.	: 25 µL
Sample	: 2-AB Labeled Glucose Homopolymer Ladder

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	227-30816-01	227-30817-01	227-30818-01	227-30819-01	227-30820-01	227-30821-01
	50	227-30816-02	227-30817-02	227-30818-02	227-30819-02	227-30820-02	227-30821-02
	75	227-30816-03	227-30817-03	227-30818-03	227-30819-03	227-30820-03	227-30821-03
	100	227-30816-04	227-30817-04	227-30818-04	227-30819-04	227-30820-04	227-30821-04
	125	-	-	227-30818-05	227-30819-05	227-30820-05	227-30821-05
	150	227-30816-05	227-30817-05	227-30818-06	227-30819-06	227-30820-06	227-30821-06
	250	227-30816-06	227-30817-06	227-30818-07	227-30819-07	227-30820-07	227-30821-07
5	30	227-30822-01	227-30823-01	227-30824-01	227-30825-01	227-30826-01	227-30827-01
	50	227-30822-02	227-30823-02	227-30824-02	227-30825-02	227-30826-02	227-30827-02
	75	227-30822-03	227-30823-03	227-30824-03	227-30825-03	227-30826-03	227-30827-03
	100	227-30822-04	227-30823-04	227-30824-04	227-30825-04	227-30826-04	227-30827-04
	125	-	-	227-30824-05	227-30825-05	227-30826-05	227-30827-05
	150	227-30822-05	227-30823-05	227-30824-06	227-30825-06	227-30826-06	227-30827-06
	250	227-30822-06	227-30823-06	227-30824-07	227-30825-07	227-30826-07	227-30827-07

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30833-01	227-30834-01	227-30835-01	227-30837-01	227-30532-01
	20	-	-	227-30836-01	227-30838-01	227-30532-02
5	10	227-30839-01	227-30840-01	227-30841-01	227-30843-01	227-30532-01
	20	-	-	227-30842-01	227-30844-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30833-02	227-30834-02	227-30835-02	227-30837-02
	20	-	-	227-30836-02	227-30838-02
5	10	227-30839-02	227-30840-02	227-30841-02	227-30843-02
	20	-	-	227-30842-02	227-30844-02

Pre-column Type Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	Pressure Tolerance (MPa)
1.9	30	227-30947-01	227-30948-01	80
	50	227-30947-02	227-30948-02	
	75	227-30947-03	227-30948-03	
	100	227-30947-04	227-30948-04	
	150	227-30947-05	227-30948-05	

Cartridge Guard Column (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)		Pressure Tolerance (MPa)	Holder
		2.1	3.0		
1.9	10	227-30949-01	227-30950-01	80	227-30950-01

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)		Pressure Tolerance (MPa)
		2.1	3.0	
1.9	10	227-30949-02	227-30950-02	80

Shim-pack GIS CN

Suitable in Either Reversed Phase or Normal Phase Mode

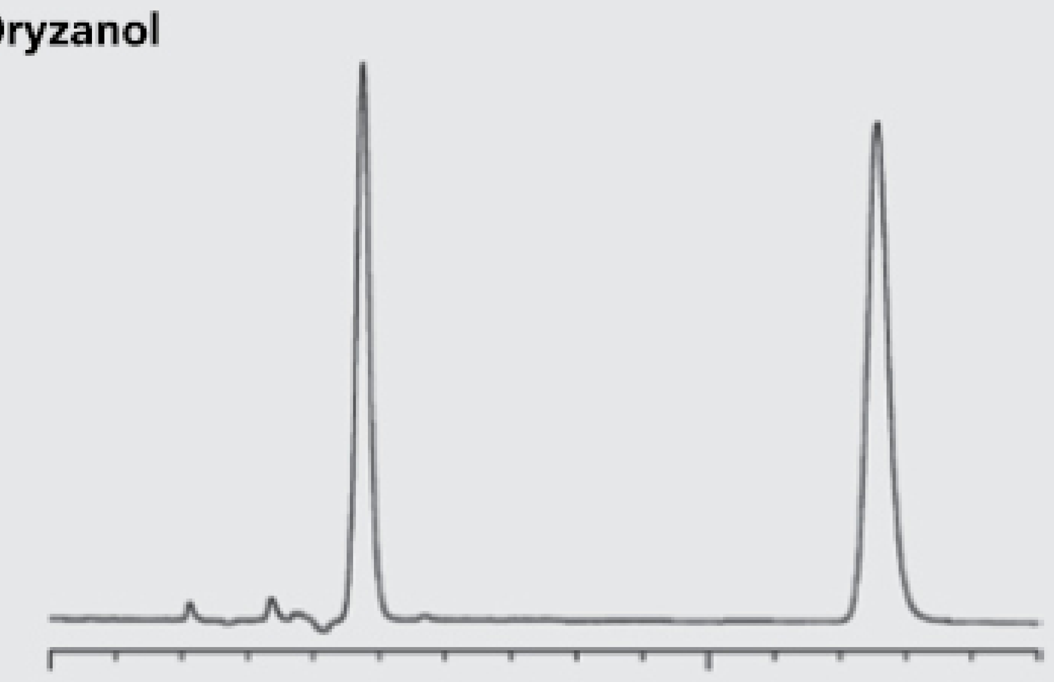
Shim-pack GIS CN is capable of either normal phase or reversed phase analysis. Cyanopropryl groups bonded to silica gel with high density increases the difference recognition of hydrophilicity and the stability. Due to no end-capping, it is capable of analysis utilizing cyano group characteristics.

In reversed phase mode, separation can be achieved for those compounds that could not be separated on straight-chain-alkyl columns, such as C18 or C8 bonded phases. When using the column for reversed phase mode, fully equilibrate the column before use.

Bonded Phase	Cyanoproprыl Group
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	14 %
End-capping	-
pH Range	2 to 7.5
USP Code	L10

Analysis Examples

γ-Oryzanol



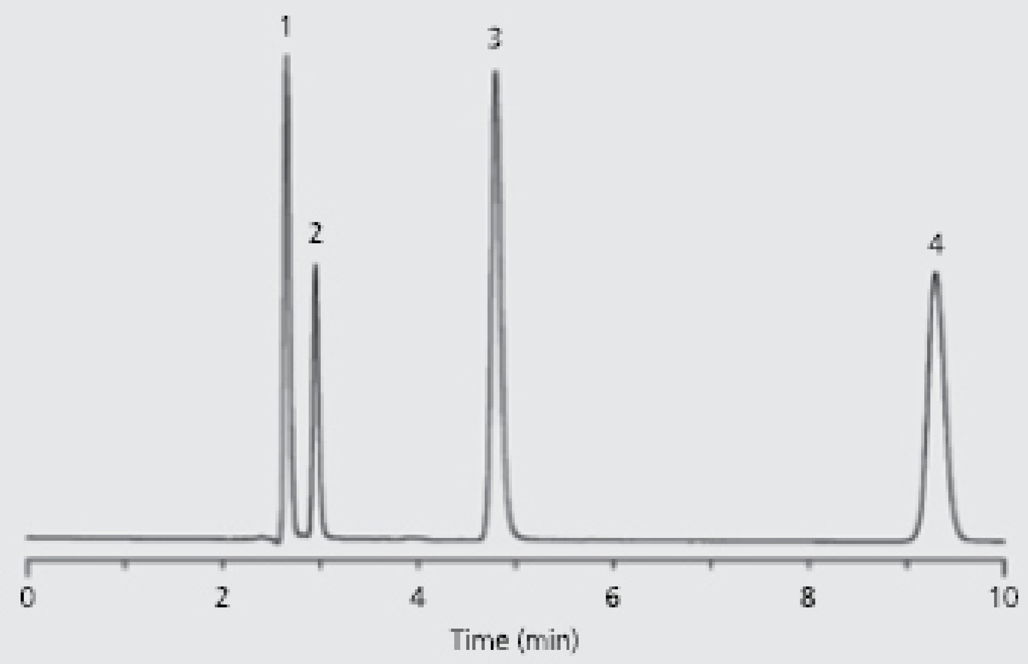
Peaks

1. gamma-oryzanol
2. vanillin

Conditions

Column	: Shim-pack GIS CN (150 mmL. × 4.6 mmI.D, 5 µm) (P/N: 227-30263-06)
Mobile Phase	: A) Hexane B) 2-Propanol C) Acetic acid A/B/C = 94/5/1 (v/v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 30 °C
Detection	: UV 320 nm
Injection Vol.	: 1 µL

Free Amino acids and Organic acids



Peaks

1. Asparagine • H_2O (0.75 mg/mL)
2. Aspartic acid (0.75 mg/mL)
3. Fumaric acid (0.01 mg/mL)
4. Maleic acid (0.01 mg/mL)

Conditions

Column	: Shim-pack GIS CN (250 mmL. × 4.6 mmI.D., 5 µm) (P/N: 227-30263-07)
Mobile Phase	: 20 mmol/L Monopotassium phosphate buffer solution (pH 4.0)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: UV 210 nm
Injection Vol.	: 5 µL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	-	-	227-30254-01	227-30255-01	227-30256-01	227-30257-01
	33	227-30252-01	227-30253-01	227-30254-02	227-30255-02	227-30256-02	227-30257-02
	50	227-30252-02	227-30253-02	227-30254-03	227-30255-03	227-30256-03	227-30257-03
	75	227-30252-03	227-30253-03	227-30254-04	227-30255-04	227-30256-04	227-30257-04
	100	227-30252-04	227-30253-04	227-30254-05	227-30255-05	227-30256-05	227-30257-05
	150	227-30252-05	227-30253-05	227-30254-06	227-30255-06	227-30256-06	227-30257-06
	250	227-30252-06	227-30253-06	227-30254-07	227-30255-07	227-30256-07	227-30257-07
5	30	-	-	227-30260-01	227-30261-01	227-30262-01	227-30263-01
	33	227-30258-01	227-30259-01	227-30260-02	227-30261-02	227-30262-02	227-30263-02
	50	227-30258-02	227-30259-02	227-30260-03	227-30261-03	227-30262-03	227-30263-03
	75	227-30258-03	227-30259-03	227-30260-04	227-30261-04	227-30262-04	227-30263-04
	100	227-30258-04	227-30259-04	227-30260-05	227-30261-05	227-30262-05	227-30263-05
	150	227-30258-05	227-30259-05	227-30260-06	227-30261-06	227-30262-06	227-30263-06
	250	227-30258-06	227-30259-06	227-30260-07	227-30261-07	227-30262-07	227-30263-07

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	227-30270-01	227-30271-01	227-30272-01	227-30274-01	227-30532-01
	20	-	-	227-30273-01	227-30275-01	227-30532-02
5	10	227-30276-01	227-30277-01	227-30278-01	227-30280-01	227-30532-01
	20	-	-	227-30279-01	227-30281-01	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	227-30270-02	227-30271-02	227-30272-02	227-30274-02
	20	-	-	227-30273-02	227-30275-02
5	10	227-30276-02	227-30277-02	227-30278-02	227-30280-02
	20	-	-	227-30279-02	227-30281-02

Shim-pack Solar

Good hydrophobic retention, low absorption of ionic compounds

Shim-pack Solar C18 and C8 columns are packed with high purity silica gel or inertness. The silica gel has higher surface area and fully end-capped with good hydrophobic retention, low absorption of ionic compounds and good peak shapes. Highly uniform particles ensure stable mobile phase delivery and low pressure. The Shim-pack Solar LC columns have a wide pH range of 2 to 9, suitable for a wide range of method development.

	Solar C18	Solar C8
Bonded Phase	Octadecyl Groups	Octyl Groups
Analysis Mode	Reversed Phase	Reversed Phase
Particle Size	5 µm	5 µm
Max. Operating Pressure	20 MPa	20 MPa
Carbon Loading	15%	9%
Pore Size	1.0mL/g	1.0mL/g
End Cap	Y	Y
pH Range	2-9	2-9
USP Code	L1	L7

Analytical Columns

Particle Size (µm)	I.D. (mm)	Length (mm)	Solar C18	Solar C8
5	4.6	150	227-30600-01	227-30601-01
		250	227-30600-02	227-30601-02

Shim-pack FC-ODS

Shortens the Analysis Time Using a Conventional System

Shim-pack FC-ODS is an ideal column to shorten your analysis time using conventional HPLC. Its innovative surface structure and optimized packing method also enable outstanding resolution. Particle size is 3 µm, but the performance of a Shim-pack FC-ODS is equivalent to a 2 µm column while the resolution is twice as that of a 5 µm column. Therefore, Shim-pack FC-ODS can not only shorten analysis times, but also provide a higher number of theoretical plates.

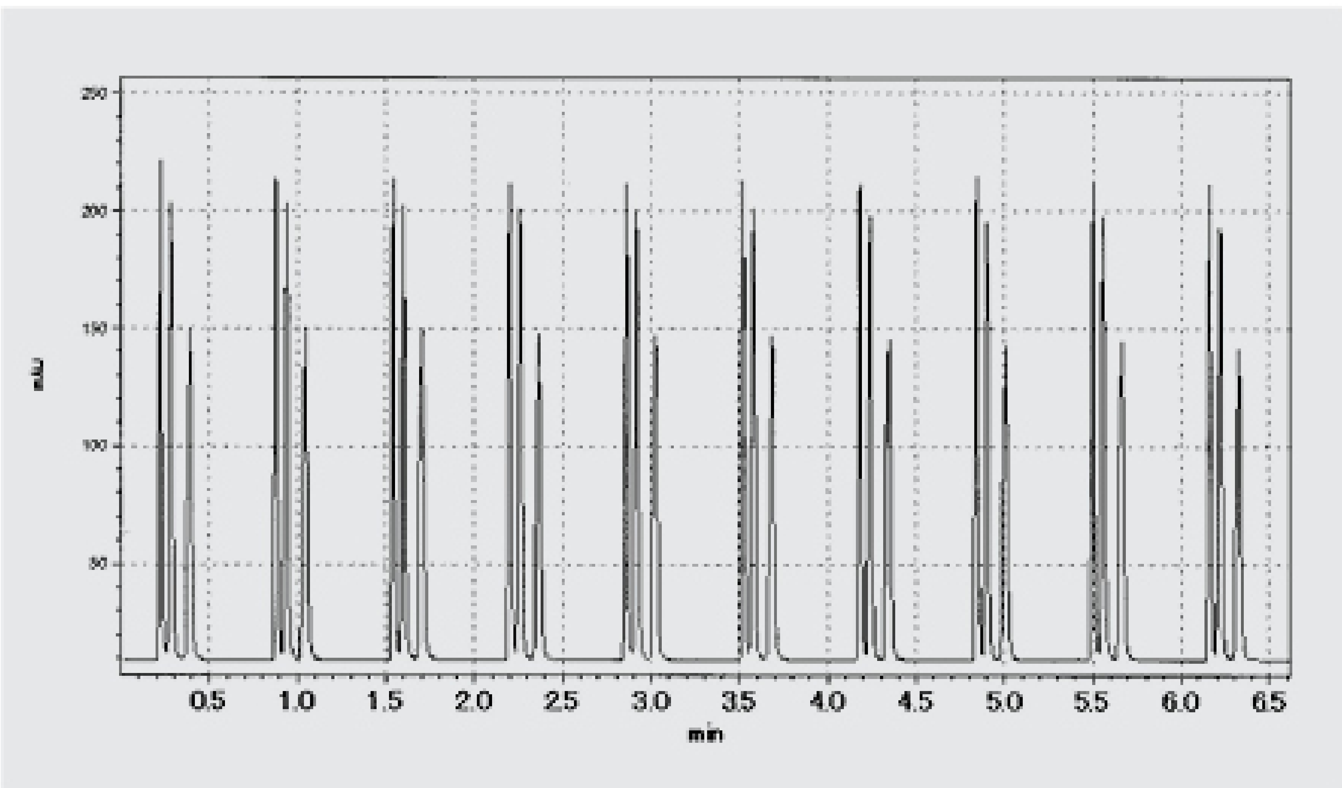
Particle Size	3 µm
Pore Size	12 nm
Surface Area	315 m^2/g
Carbon Loading	18%
Pressure Tolerance	20 MPa
Pore Volume	1 mL/g
End-capping	Yes
Bonding Type	Monomeric
pH Range	1.5 - 9
USP Code	L1

Analysis Examples

Shim-pack FC-ODS separates components by hydrophobic interaction like other ODS columns. It is possible to change to Shim-pack FC-ODS from other ODS columns under the same analytical conditions. On the other hand, hydrophilic interaction (hydrogen bond, coordination bond) has been restricted to a minimum, which ensures significant efficiency when analyzing basic compounds. In addition, Shim-pack FC-ODS has higher steric selectivity (capability to recognize the difference of steric structures), making it possible to separate some components that are difficult to retain in other ODS columns.
Shim-pack FC-ODS is available in three lengths to suit analysis objectives.

- **30mm**
  Recommended for use in high-throughput analysis of samples that do not have a complex matrix.
- **75mm**
  Recommended for shortening the analysis time to that of a 150 mm column. Because Shim-pack FC-ODS retains a similar number of theoretical plates as a 150 mm column, it is possible to obtain the same result within about half of the time without changing the conditions. (In the case of gradient analysis, it is necessary to change the concentration.)
- **150mm**
  Recommended for analyzing samples that are difficult to be retained in other 150 mm ODS columns.

High-Throughput Analysis



10 times repeated analysis in 6.5 minutes is possible.

Conditions

Column	: Shim-pack FC-ODS (30 mmL. × 4.6 mmI.D., 3 µm) (P/N: 228-40511-91)
Mobile Phase	: Water/Acetonitrile = 55/45 (v/v)
Flow Rate	: 3.0 mL/min (Column Pressure ca.8MPa)
Col. Temp.	: 50 °C
Detection	: 254 nm Response 1, AuxRNG×2
Instrument	: LC-2010+C-R8A

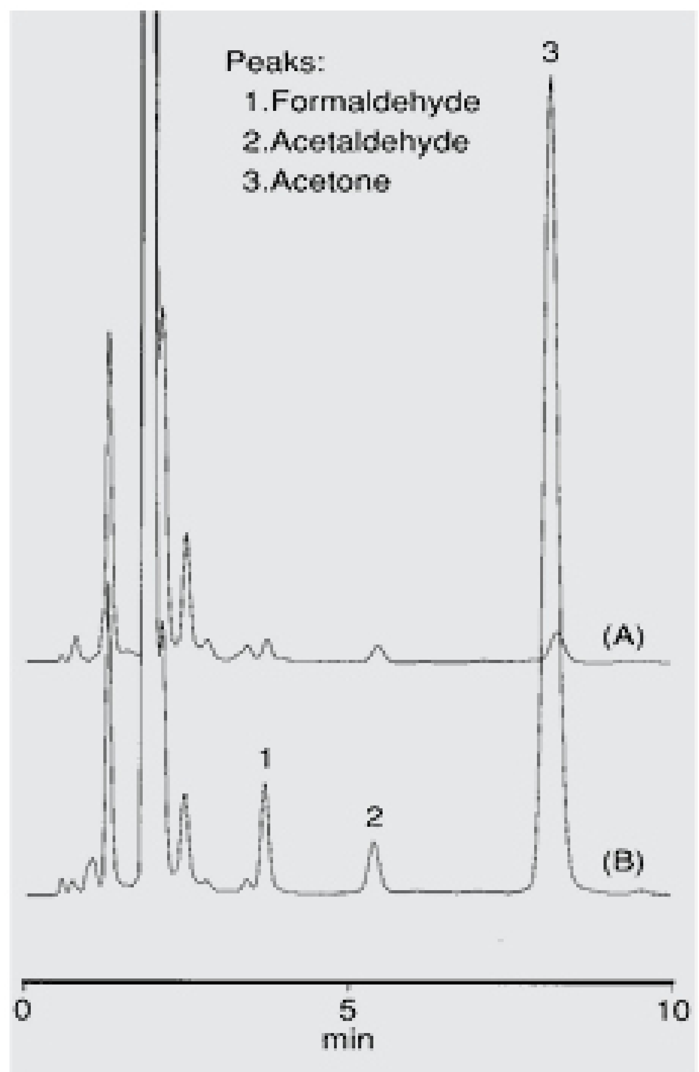
Shim-pack FC-ODS

High-speed analysis of 2,4-DNPH derivatized aldehydes / ketones

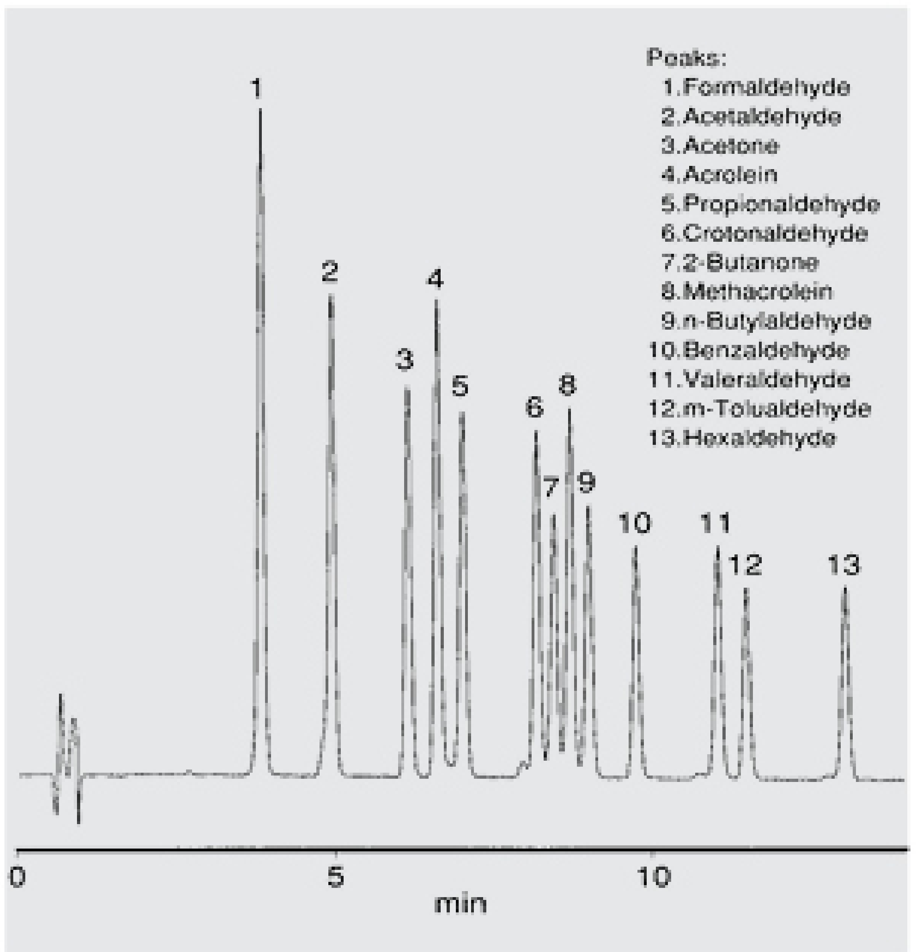
Chromatogram of Standard Sample
(formaldehyde 0.35μg/mL, acetaldehyde 0.55μg/mL, 10μL injected)

■ **Conditions**

Column : Shim-pack FC-ODS (75 mmL. × 4.6 mmI.D., 3 μm) (P/N: 228-40511-92)
Mobile Phase : Water/Acetonitrile = 55/45 (v/v)
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : UV 360 nm



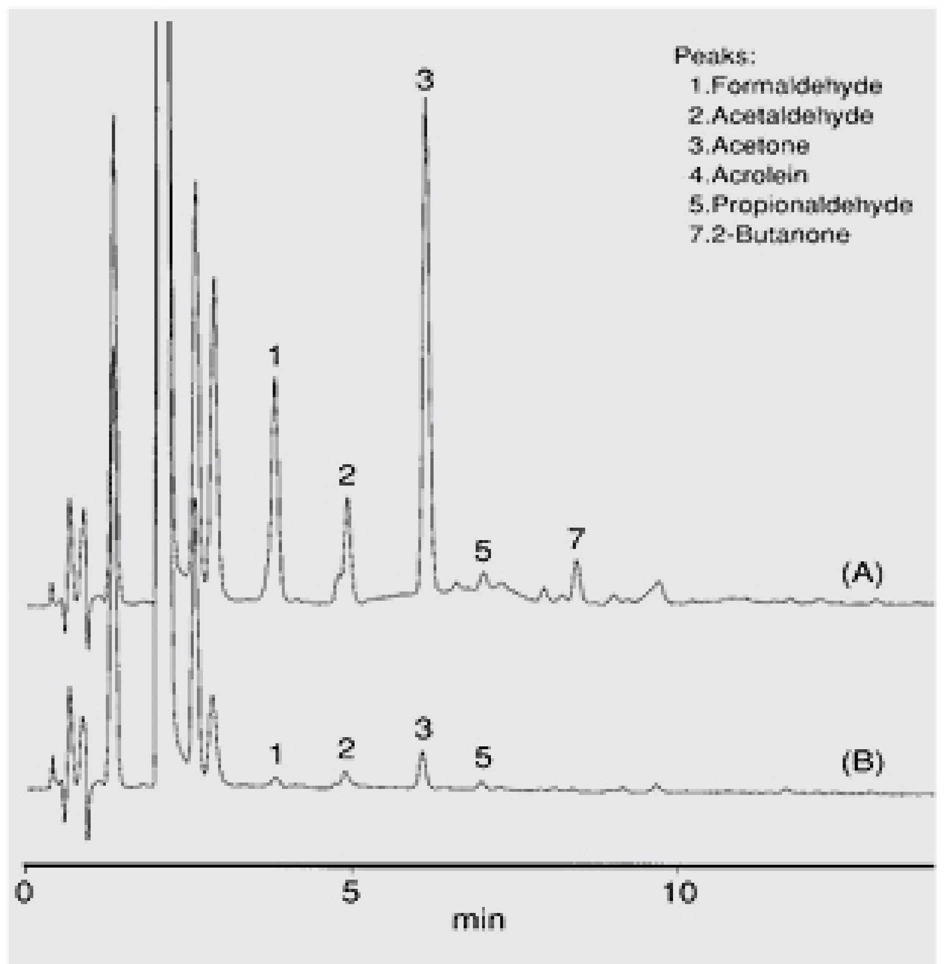
Chromatograms of Environmental Air (A) and Indoor Air at Laboratory (B)



Chromatogram of Standard Sample
(each 0.3 ug/mL as carbonyl compounds, 10uL injection)

■ **Conditions**

Column : Shim-pack FC-ODS (75 mmL. × 4.6 mmI.D., 3 μm) (P/N: 228-40511-92)
Mobile Phase : A) Water/Tetrahydrofuran = 8/2 (v/v)
B) Acetonitrile
A/B = 80/20 - 14min - 40/60 - 0.01min - 80/20 - 6min
Flow Rate : 1.2 mL/min
Col. Temp. : 40 °C
Detection : UV 365 nm



Chromatograms of Indoor Air at Laboratory (A) and Operation blank (B)

■ Product Information

Particle Size (μm)	I.D. (mm) / Length (mm)	2.0	4.6
3	30	-	228-40511-91
	75	228-40511-94	228-40511-92
	150	228-40511-95	228-40511-93

Shim-pack PREP Series

Shim-pack PREP Series

Shim-pack PREP series is packed with fully porous spherical silica particles on which respective stationary phases are chemically bonded. (Except the PREP-SIL which is packed with silica particles without any surface treatment.)

The residual silanol groups are end-capped by the unique silylation method (except the PREP-SIL).

Column	Particle Size (µm)	Length (mm) \ I.D. (mm)	20	30	Guard Column	
Shim-pack PREP-ODS	15	250	228-00815-91	228-18319-91	228-18246-92	228-18321-91
Shim-pack PREP-C8	15	250	228-00816-91	-	228-18248-92	-
Shim-pack PREP-CN	15	250	228-00818-91	-	228-18266-92	-
Shim-pack PREP-SIL	15	250	228-00814-91	-	228-18270-92	-
Shim-pack PREP-NH2	15	250	228-17879-91	-	228-18268-92	-

Shim-pack G Series

Shim-pack G series is also available in preparative columns. (For information of analytical columns, please refer to page 34.)

Column	Particle Size (µm)	Length (mm) \ I.D. (mm)	6.0	7.6	10	14	20
Shim-pack GIST C18	5	50	227-30018-01	227-30019-01	227-30020-01	227-30021-01	227-30022-01
		100	227-30018-02	227-30019-02	227-30020-02	227-30021-02	227-30022-02
		150	227-30018-03	227-30019-03	227-30020-03	227-30021-03	227-30022-03
		250	227-30018-04	227-30019-04	227-30020-04	227-30021-04	227-30022-04
└ Guard Column	5	50	227-30034-01	227-30035-01	227-30036-01	227-30037-01	227-30038-01
Shim-pack GIST C18-AQ	5	50	227-30743-01	227-30744-01	227-30745-01	227-30746-01	227-30747-01
		100	227-30743-02	227-30744-02	227-30745-02	227-30746-02	227-30747-02
		150	227-30743-03	227-30744-03	227-30745-03	227-30746-03	227-30747-03
		250	227-30743-04	227-30744-04	227-30745-04	227-30746-04	227-30747-04
└ Guard Column	5	50	227-30748-01	227-30749-01	227-30750-01	227-30751-01	227-30752-01
Shim-pack GISS C18	5	50	227-30062-01	227-30063-01	227-30064-01	227-30065-01	227-30066-01
		100	227-30062-02	227-30063-02	227-30064-02	227-30065-02	227-30066-02
		150	227-30062-03	227-30063-03	227-30064-03	227-30065-03	227-30066-03
		250	227-30062-04	227-30063-04	227-30064-04	227-30065-04	227-30066-04
└ Guard Column	5	50	227-30079-01	227-30080-01	227-30081-01	227-30082-01	227-30083-01
Shim-pack GIST C8	5	50	227-30174-01	227-30175-01	227-30176-01	227-30177-01	227-30178-01
		100	227-30174-02	227-30175-02	227-30176-02	227-30177-02	227-30178-02
		150	227-30174-03	227-30175-03	227-30176-03	227-30177-03	227-30178-03
		250	227-30174-04	227-30175-04	227-30176-04	227-30177-04	227-30178-04
└ Guard Column	5	50	227-30193-01	227-30194-01	227-30195-01	227-30196-01	227-30197-01
Shim-pack GIST Phenyl	5	50	227-30221-01	227-30222-01	227-30223-01	227-30224-01	227-30225-01
		100	227-30221-02	227-30222-02	227-30223-02	227-30224-02	227-30225-02
		150	227-30221-03	227-30222-03	227-30223-03	227-30224-03	227-30225-03
		250	227-30221-04	227-30222-04	227-30223-04	227-30224-04	227-30225-04
└ Guard Column	5	50	227-30238-01	227-30239-01	227-30240-01	227-30241-01	227-30242-01
Shim-pack GIST Phenyl-Hexyl	5	50	227-30691-01	227-30692-01	227-30693-01	227-30694-01	227-30695-01
		100	227-30691-02	227-30692-02	227-30693-02	227-30694-02	227-30695-02
		150	227-30691-03	227-30692-03	227-30693-03	227-30694-03	227-30695-03
		250	227-30691-04	227-30692-04	227-30693-04	227-30694-04	227-30695-04
└ Guard Column	5	50	227-30696-01	227-30697-01	227-30698-01	227-30699-01	227-30700-01
Shim-pack GIST NH2	5	50	227-30303-01	227-30304-01	227-30305-01	227-30306-01	227-30307-01
		100	227-30303-02	227-30304-02	227-30305-02	227-30306-02	227-30307-02
		150	227-30303-03	227-30304-03	227-30305-03	227-30306-03	227-30307-03
		250	227-30303-04	227-30304-04	227-30305-04	227-30306-04	227-30307-04
└ Guard Column	5	50	227-30317-01	227-30318-01	227-30319-01	227-30320-01	227-30321-01

Shim-pack G Series

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	6.0	7.6	10	14	20
Shim-pack GIS C18	5	50	227-30107-01	227-30107-05	227-30108-01	227-30108-05	227-30109-01
		100	227-30107-04	227-30107-06	227-30108-02	227-30108-08	227-30109-02
		150	227-30107-02	227-30107-07	227-30108-03	227-30108-06	227-30109-03
		250	227-30107-03	227-30107-08	227-30108-04	227-30108-07	227-30109-04
	10	50	-	-	227-30113-01	227-30114-01	227-30115-01
		100	-	-	227-30113-02	227-30114-02	227-30115-02
		150	-	-	227-30113-03	227-30114-03	227-30115-03
		250	-	-	227-30113-04	227-30114-04	227-30115-04
└ Guard Column	5	50	227-30137-01	227-30138-01	227-30139-01	227-30140-01	227-30141-01
	10	50	-	-	227-30144-01	227-30145-01	227-30146-01
Shim-pack GIS C18-P	5	50	227-30558-01	227-30559-01	227-30560-01	227-30561-01	227-30562-01
		100	227-30558-02	227-30559-02	227-30560-02	227-30561-02	227-30562-02
		150	227-30558-03	227-30559-03	227-30560-03	227-30561-03	227-30562-03
		250	227-30558-04	227-30559-04	227-30560-04	227-30561-04	227-30562-04
└ Guard Column	5	50	227-30565-01	227-30566-01	227-30567-01	227-30568-01	227-30569-01
Shim-pack GIS RP-Shield	5	50	227-30590-01	227-30591-01	227-30592-01	227-30593-01	227-30594-01
		100	227-30590-02	227-30591-02	227-30592-02	227-30593-02	227-30594-02
		150	227-30590-03	227-30591-03	227-30592-03	227-30593-03	227-30594-03
		250	227-30590-04	227-30591-04	227-30592-04	227-30593-04	227-30594-04
└ Guard Column	5	50	227-30597-01	227-30598-01	227-30599-01	227-30602-01	227-30603-01
Shim-pack GIS HILIC	5	50	227-30642-01	227-30643-01	227-30644-01	227-30645-01	227-30646-01
		100	227-30642-02	227-30643-02	227-30644-02	227-30645-02	227-30646-02
		150	227-30642-03	227-30643-03	227-30644-03	227-30645-03	227-30646-03
		250	227-30642-04	227-30643-04	227-30644-04	227-30645-04	227-30646-04
└ Guard Column	5	50	227-30648-01	227-30649-01	227-30650-01	227-30651-01	227-30652-01
Shim-pack GIS CN	5	50	227-30264-01	227-30265-01	227-30266-01	227-30267-01	227-30268-01
		100	227-30264-02	227-30265-02	227-30266-02	227-30267-02	227-30268-02
		150	227-30264-03	227-30265-03	227-30266-03	227-30267-03	227-30268-03
		250	227-30264-04	227-30265-04	227-30266-04	227-30267-04	227-30268-04
└ Guard Column	5	50	227-30284-01	227-30285-01	227-30286-01	227-30287-01	227-30288-01

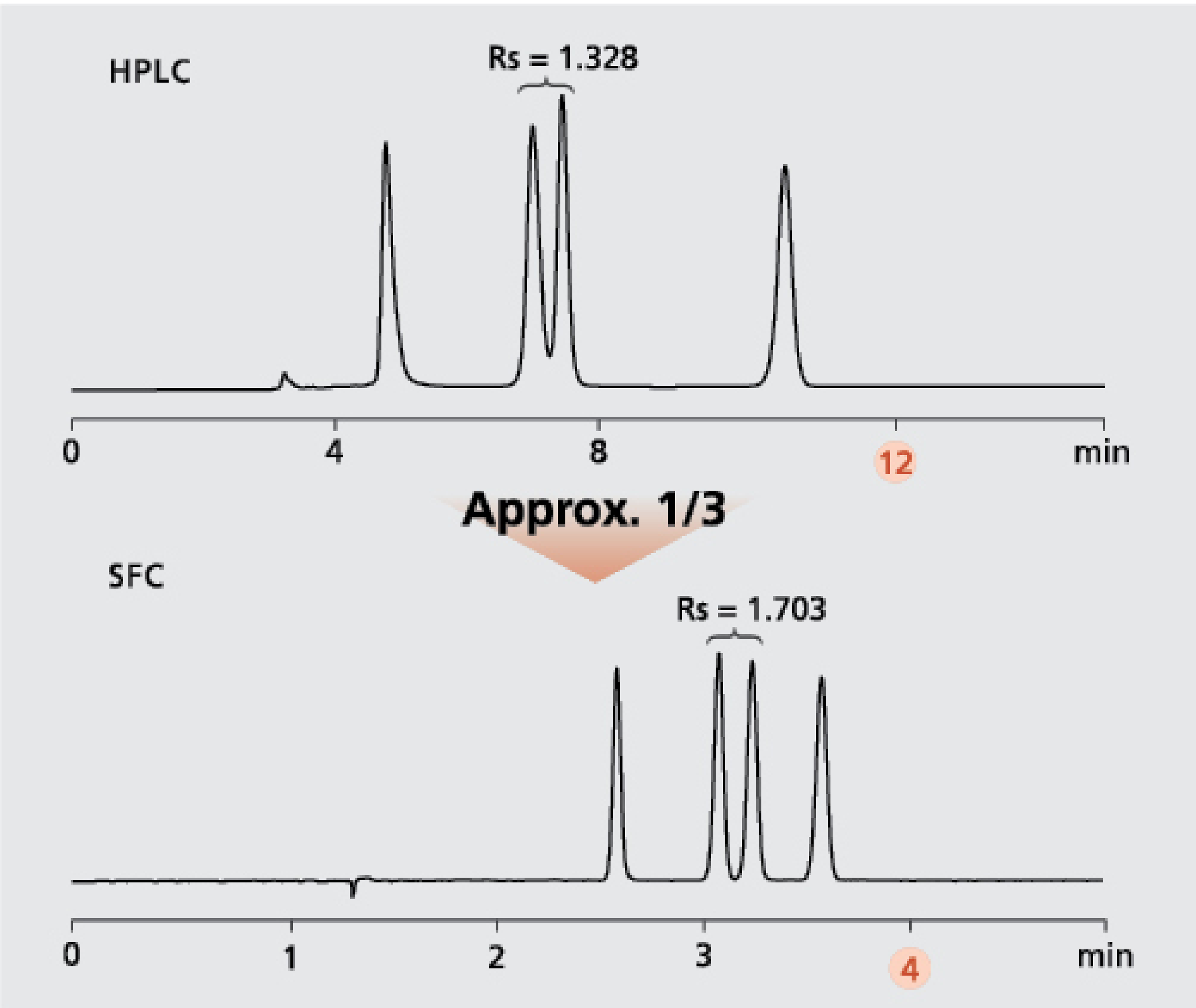
Column	Particle Size (µm)	I.D. (mm) / Length (mm)	30	50
Shim-pack GIS C18	5	50	227-30110-01	-
		100	227-30110-02	-
		150	227-30110-03	-
		250	227-30110-04	227-30110-05
	10	50	227-30116-01	-
		100	227-30116-02	-
		150	227-30116-03	-
		250	227-30116-04	227-30116-05
└ Guard Column	5	50*	227-30142-01	227-30143-01
	10	50*	227-30147-01	227-30148-01
Shim-pack GIS C18-P	5	50	227-30563-01	-
		250	227-30563-02	227-30564-01
└ Guard Column	5	50*	227-30570-01	227-30571-01
Shim-pack GIS RP-Shield	5	50	227-30595-01	-
		250	227-30595-02	227-30596-01
└ Guard Column	5	50*	227-30604-01	227-30605-01
Shim-pack GIS HILIC	5	50	227-30647-01	-
		250	227-30647-02	227-30647-03
└ Guard Column	5	50*	227-30653-01	227-30654-01
Shim-pack GIS CN	5	50	227-30269-01	-
		250	227-30269-02	227-30269-03
└ Guard Column	5	50*	227-30289-01	227-30290-01

* Length of guard columns for 50 mm I.D. preparative columns is 75 mm.

Analysis Examples

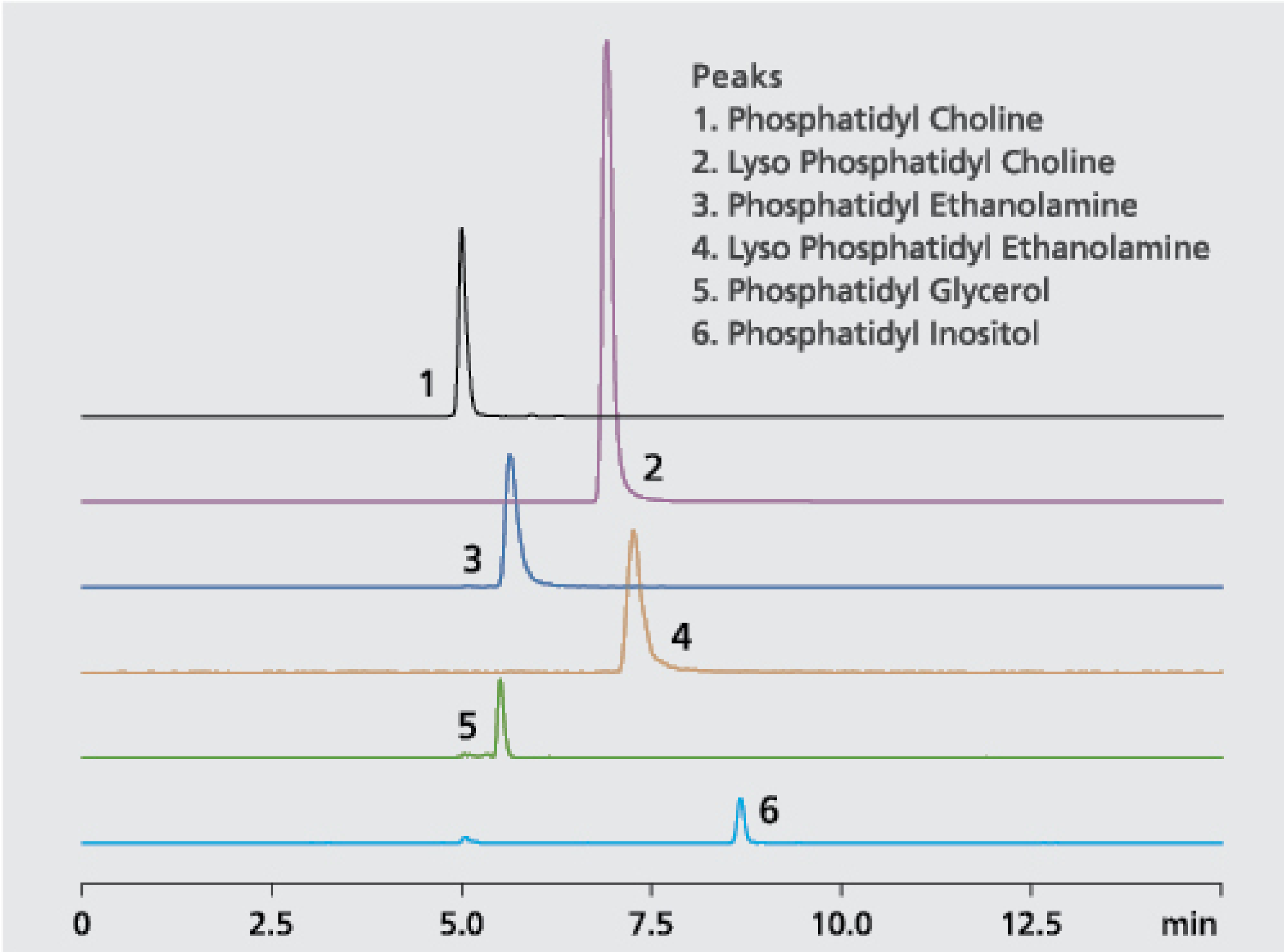
Tocopherol Isomers

Isomers and structurally similar compounds that are difficult to separate can be analyzed by Nexera UC and Shim-pack UC series at a high speed. In the example below, four kinds of tocopherol isomers were analyzed by Nexera UC and Shim-pack UC Sil. As shown below, analysis time was reduced to one-third the time analysis takes with a conventional HPLC method while resolution was improved.



Comparison of retention and resolution of tocopherol isomers between LC conditions and SFC ones

Phospholipid Classes



The example above shows the result of the analysis of phospholipid classes using Shim-pack UC Diol with Nexera UC. The ODS-based Shim-pack UC GIS II can also be used to analyze molecular species of phospholipids with the same modifiers. Nexera UC and Shim-pack UC series are ideal for analyzing complex samples.

Preparative Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	28
Shim-pack UC-HyP	5	250	227-32600-03	227-32600-04	227-32600-05
└ Guard Column	5	20	227-32600-06	-	-
Shim-pack UC-Py	5	250	227-32601-03	227-32601-04	227-32601-05
└ Guard Column	5	20	227-32601-06	-	-
Shim-pack UC-PBr	5	250	227-32602-03	227-32602-04	227-32602-05
└ Guard Column	5	20	227-32602-06	-	-
Shim-pack UC-Choles	5	250	227-32603-03	227-32603-04	227-32603-05
└ Guard Column	5	20	227-32603-06	-	-
Shim-pack UC-PyE	5	250	227-32604-03	227-32604-04	227-32604-05
└ Guard Column	5	20	227-32604-06	-	-
Shim-pack UC-Triazole	5	250	227-32605-03	227-32605-04	227-32605-05
└ Guard Column	5	20	227-32605-06	-	-
Shim-pack UC-Sil II	5	250	227-32607-03	227-32607-04	227-32607-05
└ Guard Column	5	20	227-32607-06	-	-
Shim-pack UC-Diol II	5	250	227-32606-03	227-32606-04	227-32606-05

Shim-pack Ultron VX Series

Column	Particle Size (µm)	I.D (mm)	Length (mm) 250	Guard Column
VX-SIL	5	20.0	226-80016-01	226-80032-01 (15 x 8.0 mm)
	10	20.0	226-80024-01	226-80033-01 (10 x 4.0 mm) 226-80034-01 (15 x 8.0 mm)
	10	30.0	226-80025-01	
	10	50.0	226-80026-01	
	15	4.6	226-80027-01	226-80035-01 (10 x 4.0 mm) 226-80036-01 (5 x 8.0 mm)
	15	20.0	226-80028-01	
	15	30.0	226-80029-01	
	15	50.0	226-80030-01	
VX-ODS	5	20.0	226-80044-01	226-80060-01 (15 x 8.0 mm)
	10	20.0	226-80052-01	226-80062-01 (15 x 8.0 mm)
		30.0	226-80053-01	
		50	226-80054-01	
	15	4.6	226-80055-01	226-80063-01 (10 x 4.0 mm) 226-80064-01 (15 x 8.0 mm)
		20.0	226-80056-01	
		30.0	226-80057-01	
		50.0	226-80058-01	

Shim-pack STR-ODS Series

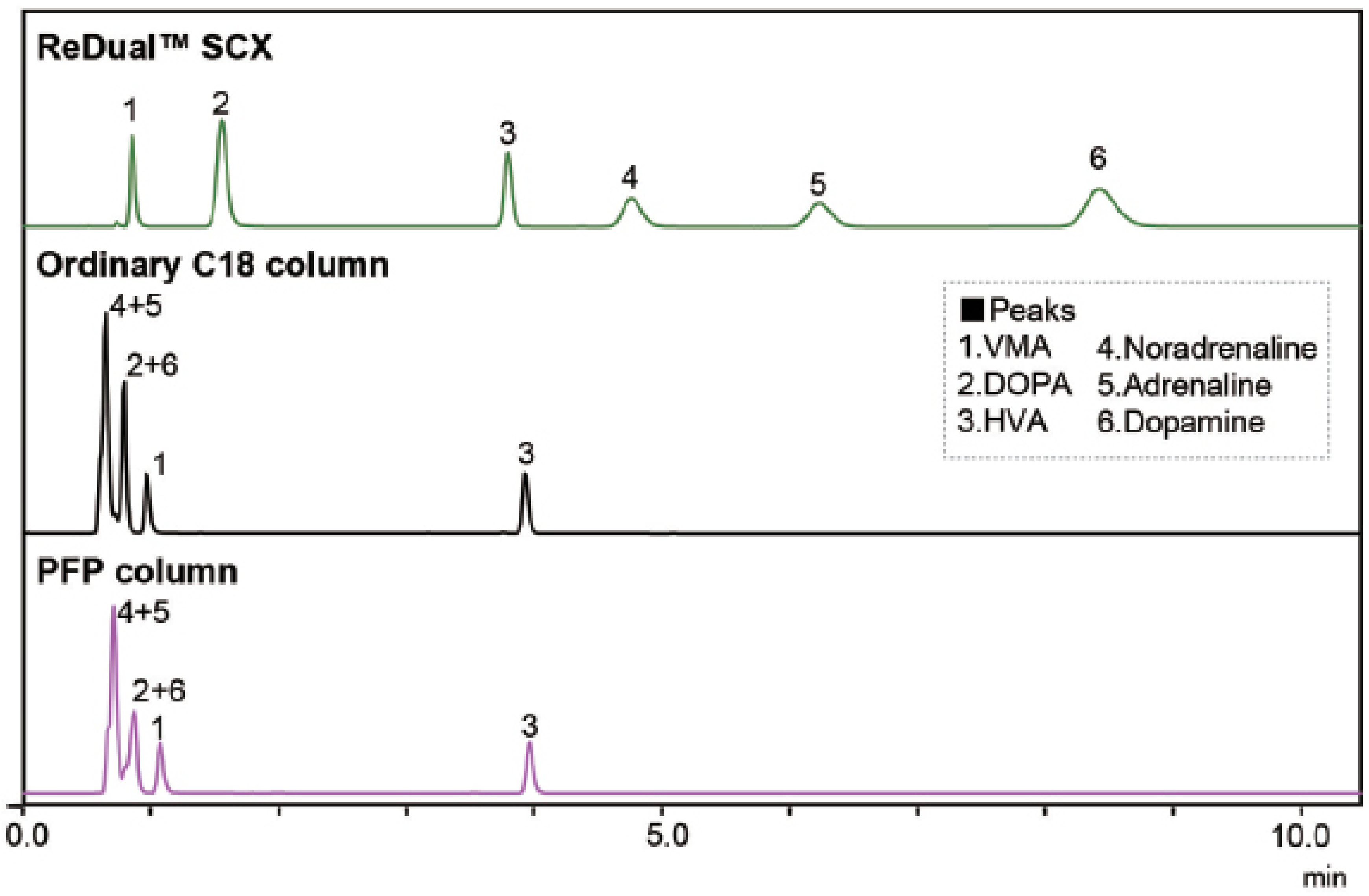
Column	Particle Size (µm)	I.D (mm)	Length (mm) 250	Guard Column
STR ODS-II	5	20.0	226-80087-01	226-80088-91 (50 x 20.0 mm)

Shimadzu Redual™ LC column

The Shimadzu Redual™ LC columns are mixed-mode (reversed phase-Ion exchange) LC columns. These columns can be used to separate ionic compounds without the need of ion-pairing reagents. Highly recommended for LCMS applications

There are three types of Redual LC columns:

1. ReDual™ SCX-C18 - for basic compounds by C18 + SCX
2. ReDual™ CX-C18 - for basic compounds by C18 + WCX
3. ReDual™ AX-C18 - for acidic compounds by C18 + SAX



Column	:	Redual SCX (50 mmL. × 4.6 mmI.D., 5μm) (P/N: SSOT-G20029)
Mobile Phase	:	A: 20 mmol/L Ammonium Formate (pH 3.5) B: Acetonitrile B conc. 10% (0-2 min) to 70% (7-10 min)
Flow Rate	:	1.0 mL/min
Col. Temp.	:	25 °C
Detection	:	UV 280 nm
Injection Vol.	:	5 μL

Column	Particle Size (μm)	I.D (mm)	Length		
			50 mm	100 mm	150 mm
ReDual AX-C18	3	2.0	SSOT-G20001	SSOT-G20002	SSOT-G20003
		4.6	SSOT-G20004	-	SSOT-G20005
	5	2.0	SSOT-G20006	SSOT-G20007	SSOT-G20008
		4.6	SSOT-G20009	-	SSOT-G20010
ReDual CX-C18	3	2.0	SSOT-G20011	SSOT-G20012	SSOT-G20013
		4.6	SSOT-G20014	-	SSOT-G20015
	5	2.0	SSOT-G20016	SSOT-G20017	SSOT-G20018
		4.6	SSOT-G20019	-	SSOT-G20020
ReDual SCX-C18	3	2.0	SSOT-G20021	SSOT-G20022	SSOT-G20023
		4.6	SSOT-G20024	-	SSOT-G20025
	5	2.0	SSOT-G20026	SSOT-G20027	SSOT-G20028
		4.6	SSOT-G20029	-	SSOT-G20030

Shim-pack Scepter C4

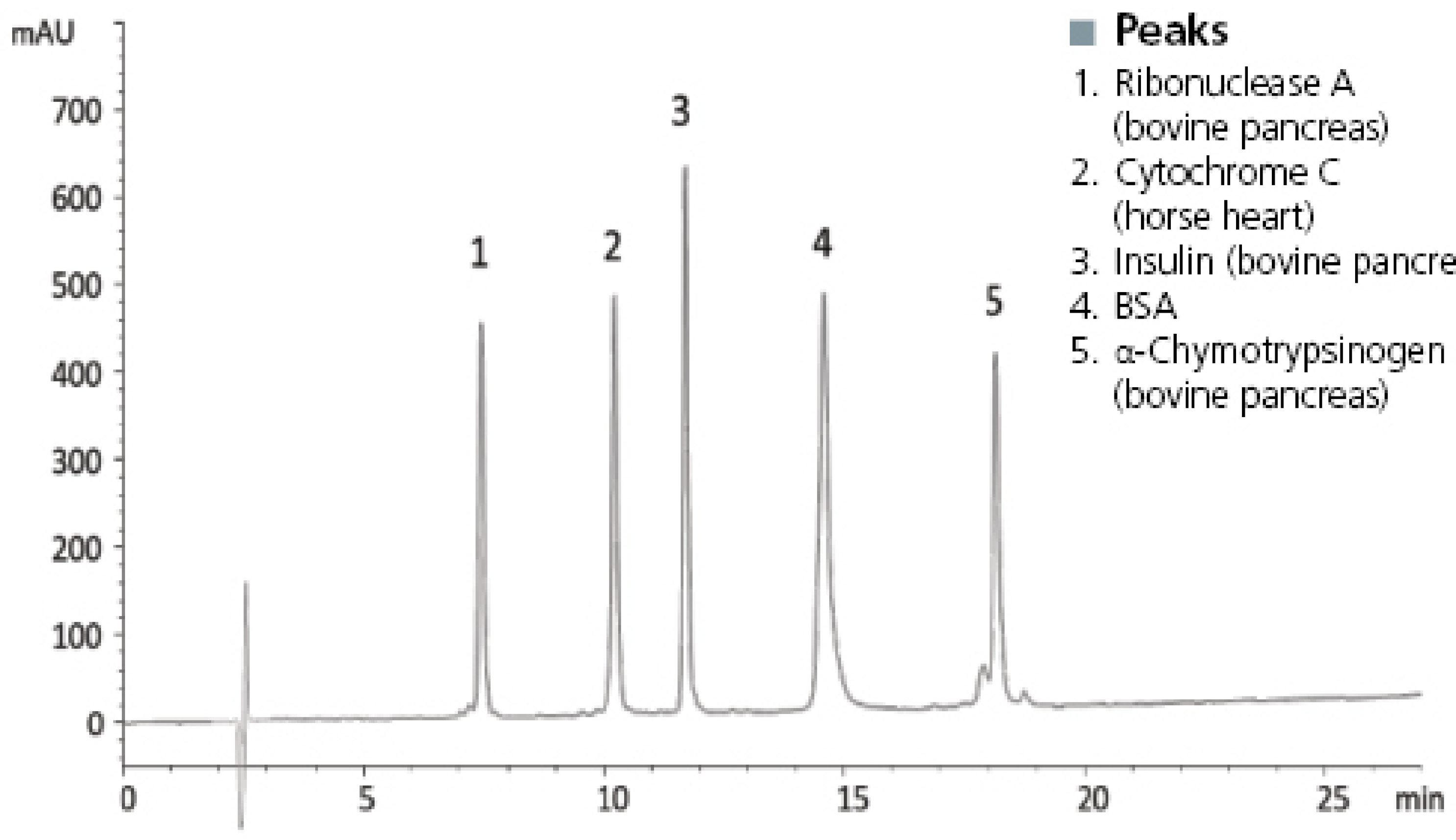
Design for biomolecules separations

Bonded Phase	Butyl Groups
Particle Size	1.9µm, 3µm, 5µm
Pore Size	30 nm
End-capping	Yes
pH Range	1 to 10
USP Code	L26

Shim-pack Scepter C4 is a wide-bore C4 column that uses an organic silica hybrid base which is suitable for separation of proteins such as monoclonal antibodies. The column can be used for analysis of proteins with a molecular weight of up to approximately 150,000 and is suitable for analysis of antibodies as it is very stable even under acidic or high-temperature conditions because an organic silica hybrid base is used. It is also effective for high-sensitivity analysis on LC/MS as it provides good peak shapes even when using a formic acid mobile phase with low ion paring effect. In addition, it is effective for separation of highly-hydrophobic proteins, nucleotides and small molecules that are hard to separate using a regular C18 column.

Analysis Examples

Analysis of Proteins

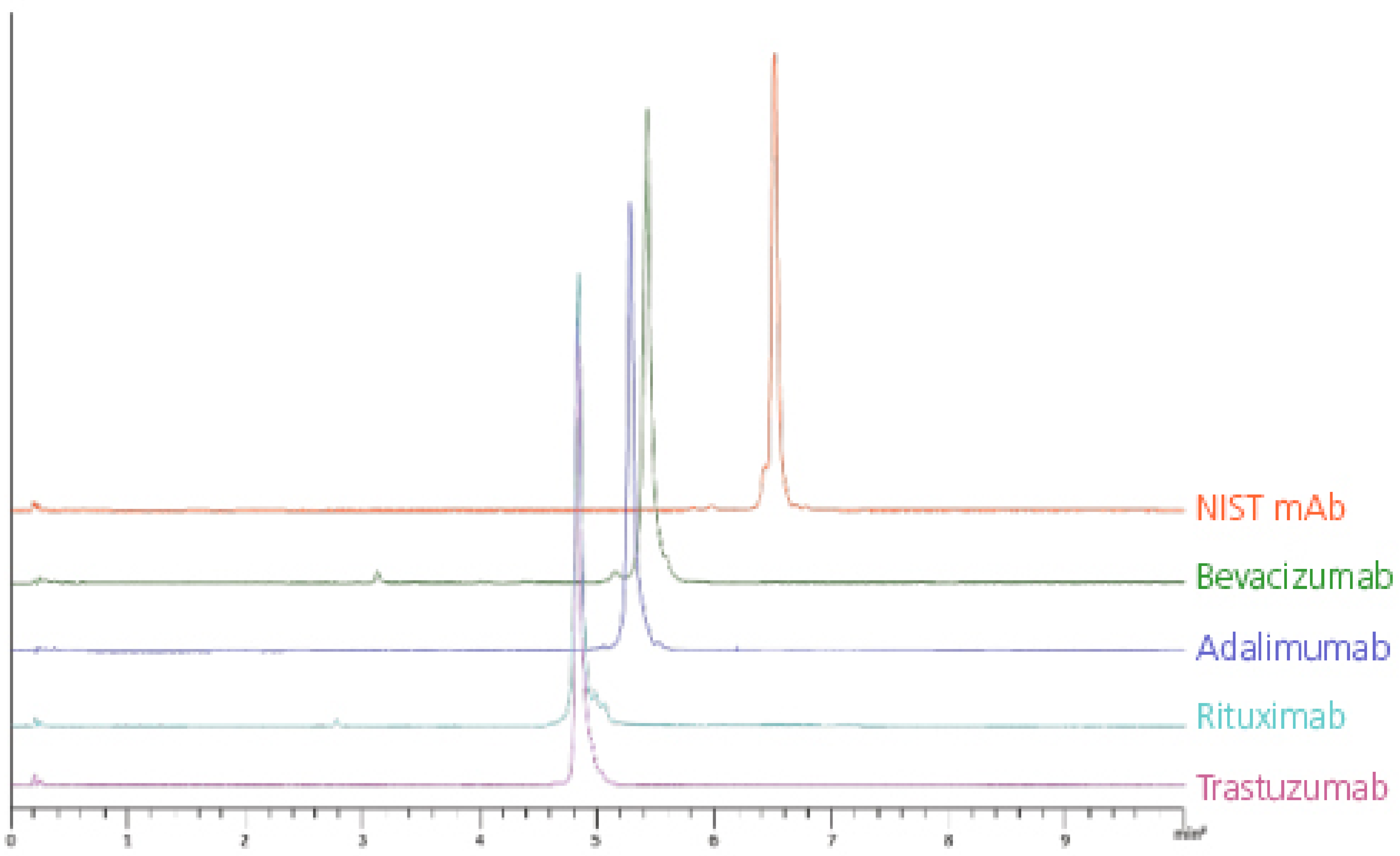


■ Peaks
1. Ribonuclease A (bovine pancreas)
2. Cytochrome C (horse heart)
3. Insulin (bovine pancreas)
4. BSA
5. α-Chymotrypsinogen A (bovine pancreas)

■ **Conditions**

Column : Shim-pack Scepter C4 (5 µm, 150 x 3.0 mm I.D.) (P/N: 227-31181-04)
Mobile Phase : A) Water/TFA (100/0.1)
B) Acetonitrile/TFA (100/0.1)
20-60%B (0-27 min), 90%B (27-35 min), 20%B (35-50 min)
Flow Rate : 0.4 mL/min
Col. Temp. : 70 °C
Detection : UV at 220 nm
Injection Vol. : 10 µL (0.25 – 0.50 mg/mL) Column

Analysis of Monoclonal Antibodies



■ **Conditions**

Column : Shim-pack Scepter C4 (1.9 µm, 50 x 2.1 mm I.D.) (P/N: 227-31175-03)
Mobile Phase : A) Water/TFA (100/0.1)
B) Acetonitrile/TFA (100/0.1)
25-45%B (0-10 min)
Flow Rate : 0.4 mL/min
Col. Temp. : 80 °C
Detection : UV at 280 nm
Injection Vol. : 2 µL
Sample Conc. : 0.2 mg/mL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	4.6	Pressure Tolerance (MPa)
1.9	20	227-31175-01	-	-	-	100
	30	227-31175-02	227-30817-02	-	-	
	50	227-31175-03	227-31176-01	-	-	
	100	227-31175-04	227-31176-02	-	-	
	125	227-31175-05	227-31176-03	-	-	
	150	227-31175-06	227-31176-04	-	-	
3	20	227-31177-01	-	-	-	45
	33	227-31177-02	-	-	227-31179-01	
	50	227-31177-03	227-31178-01	-	227-31179-02	
	75	227-31177-04	227-31178-02	-	227-31179-03	
	100	227-31177-05	227-31178-03	-	227-31179-04	
	150	227-31177-06	227-31178-04	-	227-31179-05	
	250	-	-	-	227-31179-06	
5	20	227-31180-01	-	-	-	45
	33	227-31180-02	-	-	227-31183-01	
	50	227-31180-03	227-31181-01	-	227-31183-02	
	75	227-31180-04	227-31181-02	-	227-31183-03	
	100	227-31180-05	227-31181-03	227-31182-01	227-31183-04	
	150	227-31180-06	227-31181-04	227-31182-02	227-31183-05	
	250	-	-	-	227-31183-06	

Analytical guard cartridges columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	Holder
1.9	5	227-31187-01	227-31187-02	-	227-31170-01
3	10	227-31188-01	227-31189-01	227-31190-01	227-31172-01
	20	227-31188-02	227-31189-02	227-31190-02	227-31172-02
5	10	227-31191-01	227-31192-01	227-31193-01	227-31172-01
	20	227-31191-02	227-31192-02	227-31193-02	227-31172-02

Preparative Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	30	Pressure Tolerance (MPa)
5	50	-	227-31185-01	227-31186-01	30
	75	-	-	227-31186-02	
	100	-	227-31185-02	227-31186-03	
	150	227-31184-01	227-31185-03	227-31186-04	
	250	227-31184-02	227-31185-04	227-31186-05	

Preparative guard cartridges columns

Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	30	Holder
5	10	227-31194-01	227-31195-01	227-31196-01	227-31171-01

Shim-pack Bio LC Columns

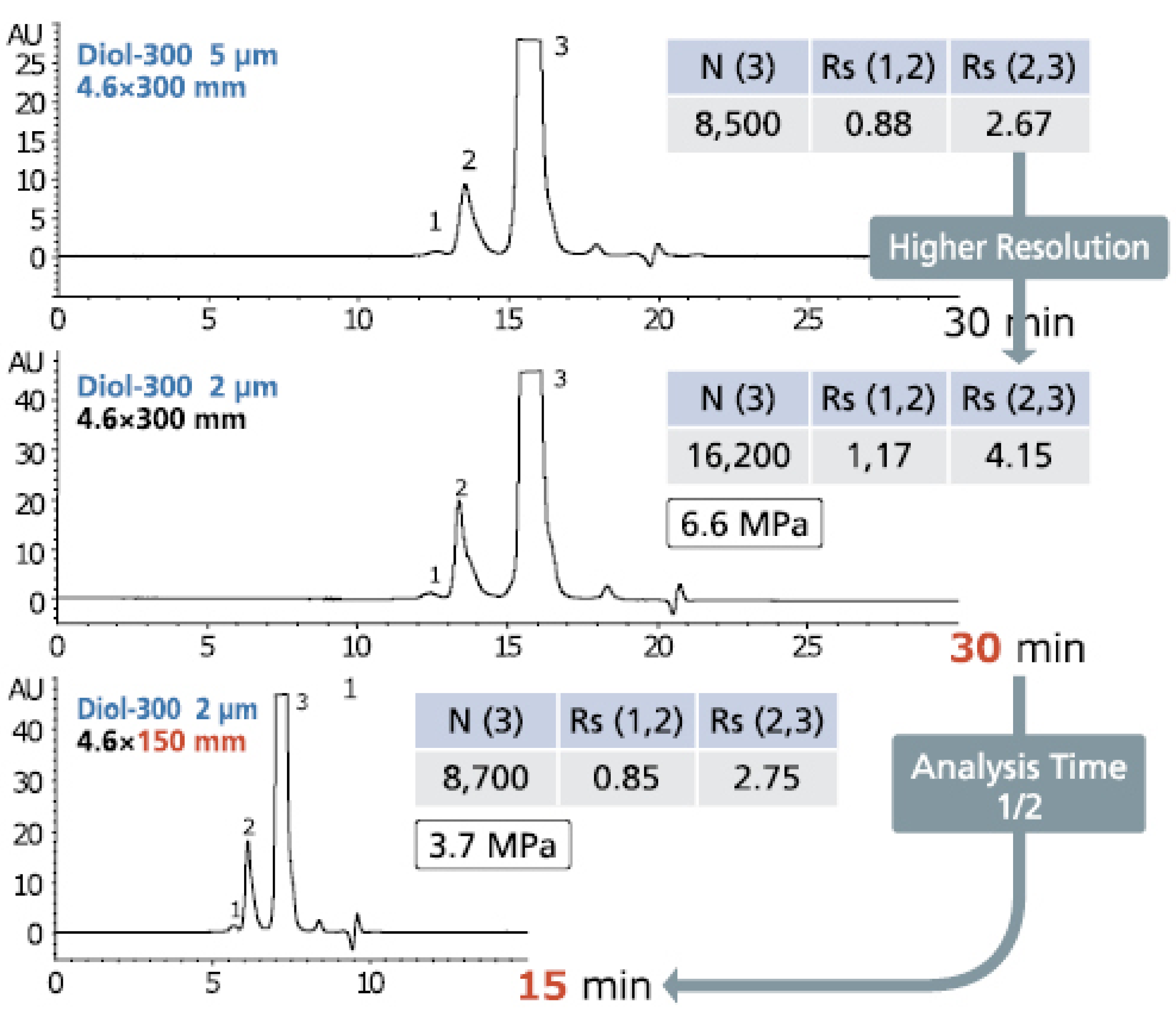
Solution for Analysis of Peptides, Oligonucleotides and Biopharmaceuticals

The accurate analysis of biopharmaceuticals compounds is required for developing higher quality biopharmaceuticals. Shim-pack Bio Diol and IEX columns will improve the accuracy of the characterization of peptides, oligonucleotide and biopharmaceuticals.

Shim-pack Bio Diol : Size Exclusion Chromatography Columns

With different pore sizes, Shim-pack Bio Diol LC columns are effective for analysis of aggregates and fragments of mAb, oligonucleotides and carbohydrates.

Rapid mAb Aggregate Analysis using 2μm Shim-pack Diol-300 column



Shim-pack Bio Diol	Diol-60	Diol-120	Diol-200	Diol-300
Particle	Silica			
Ligand	Dihydroxypropyl(Diol)			
Particle Size	3 μm, 5 μm		2 μm, 3 μm, 5 μm	
Pore Size	6 nm	12 nm	20 nm	30 nm
pH Range	5.0 - 7.5			
Molecular	below 10,000	1,000 - 100,000	5,000 - 300,000	20,000 - 1,000,000

By reducing the particle size from 5 μm to 2 μm, the resolution between aggregates and monomers was greatly improved. Furthermore, by reducing the column length from 300 mm to 150 mm using a 2 μm particle, 50% less run time was achieved, while maintaining resolution as compared to the original method with a 5 μm, 4.6×300 mm column.

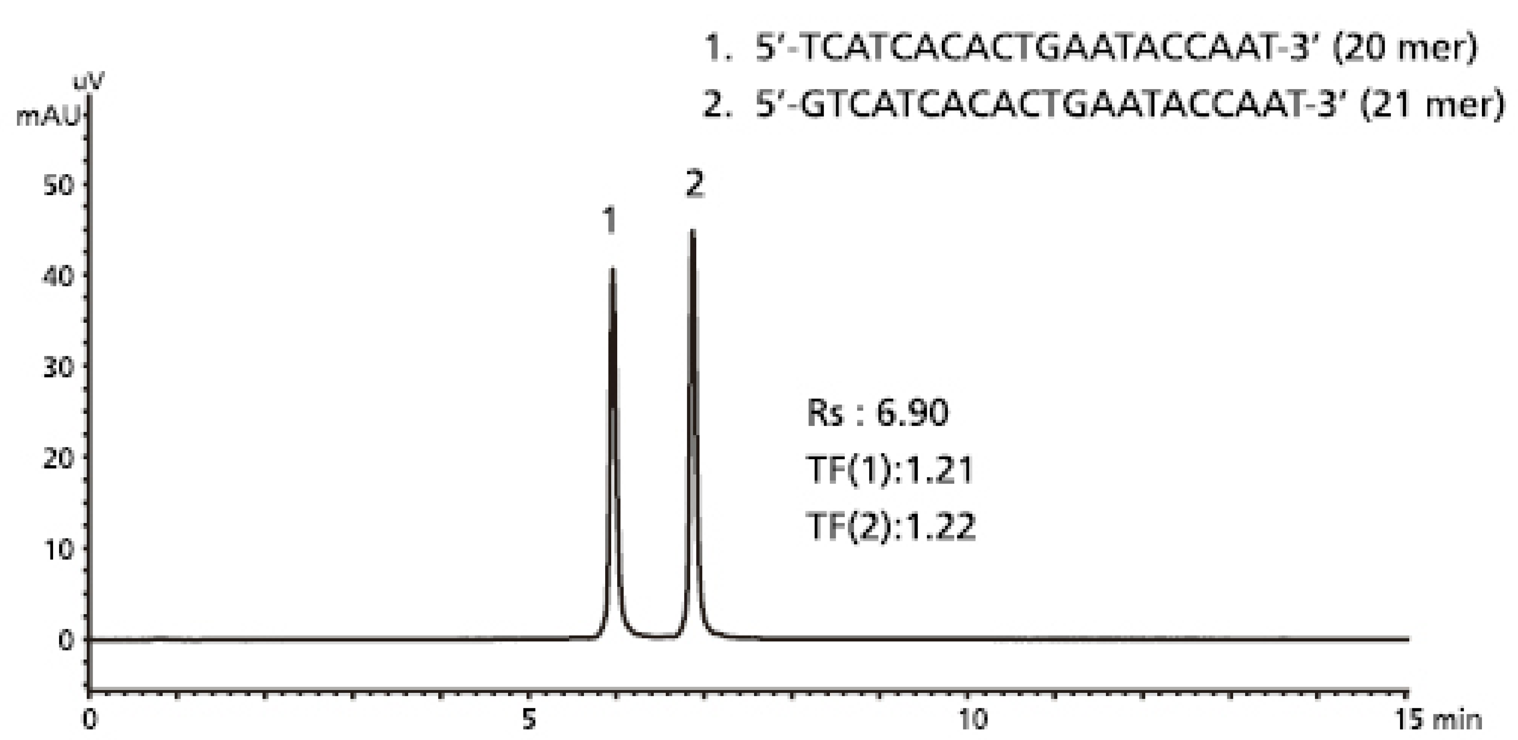
Conditions

Column : Shim-pack Bio Diol-300
Eluent : 0.1 M KH2PO4-K2HPO4 (pH 7.0) with 0.2 M NaCl
Flow rate : 0.2 mL/min
Column Temp. : Ambient
Detection : UV 280 nm
Sample : Humanized monoclonal IgG1

Shim-pack Bio IEX : Ion Exchange Chromatography Columns

Shim-pack Bio IEX Columns are available in Q (quaternary ammonium) and SP (sulfopropyl) chemistries and are based on porous (Q and SP columns) and non-porous (Q-NP and SP-NP columns) hydrophilic polymers with low nonspecific adsorption. The porous particles offer excellent binding capacity with exceptionally high efficiency and the non-porous particles offer high efficiency and exceptional resolution.

Rapid mAb Aggregate Analysis using 2μm Shim-pack Diol-300 column



Shim-pack Bio IEX	Q-NP	SP-NP	Q	SP
Particle	hydrophilic non-porous polymer		hydrophilic porous polymer	
Particle Size	3 μm, 5 μm		5 μm	
Ligand	$-CH_2N^+(CH_3)_3$	$-(CH_2)_3SO_3^-$	$-CH_2N^+(CH_3)_3$	$-(CH_2)_3SO_3^-$
pH Range	2 - 12			

Conditions

Column : Shim-pack Bio IEX Q-NP 5 μm, 4.6×100 mm (P/N : 227-31003-03)
Mobile Phase A : 10 mM NaOH
Mobile Phase B : 10 mM NaOH with 1.0 M NaClO4
Gradient : 25 55%B (0-15 min), 100%B (15-20 min)
Flow Rate : 1.0 mL/min
Column Temp. : 25 °C
Detection : UV 260 nm
Inj. Volume : 4 μL (5 nmol/mL)

Shim-pack Bio Diol Columns

Particle Size	2 µm		3 µm			
Column Dimension \ Chemistry	Diol-200	Diol-300	Diol-60	Diol-120	Diol-200	Diol-300
4.6×150 mm	227-31009-01	227-31010-01				
4.6×300 mm	227-31009-02	227-31010-02	227-31007-01	227-31008-01	227-31009-03	227-31010-03
Max. Pressure	45 MPa		20 MPa			

Particle Size	5 µm			
Column Dimension \ Chemistry	Diol-60	Diol-120	Diol-200	Diol-300
4.6×300 mm	227-31007-02	227-31008-02	227-31009-04	227-31010-04
8.0×300 mm	227-31007-03	227-31008-03	227-31009-05	227-31010-05
8.0×30 mm (Guard Column)	227-31007-04	227-31008-04	227-31009-06	227-31010-06
Max. Pressure	20 MPa			
20×300 mm	227-31097-01	227-31098-01	227-31099-01	227-31100-01
20×500 mm	227-31097-02	227-31098-02	227-31099-02	227-31100-02
20×50 mm (Guard Column)	227-31116-01	227-31117-01	227-31118-01	227-31119-01
Max. Pressure	10 MPa			

Shim-pack Bio IEX Columns

Shim-pack Bio IEX	Q-NP		SP-NP		Q	SP
Porality	Non-Porous				Porous	
Column Dimension \ Chemistry	3 µm	5 µm	3 µm	5 µm	5 µm	
4.6×30 mm	227-31002-01	227-31003-01	227-31005-01	227-31006-01	227-31001-01	227-31004-01
4.6×50 mm	227-31002-02	227-31003-02	227-31005-02	227-31006-02	227-31001-02	227-31004-02
4.6×100 mm	227-31002-03	227-31003-03	227-31005-03	227-31006-03	227-31001-03	227-31004-03

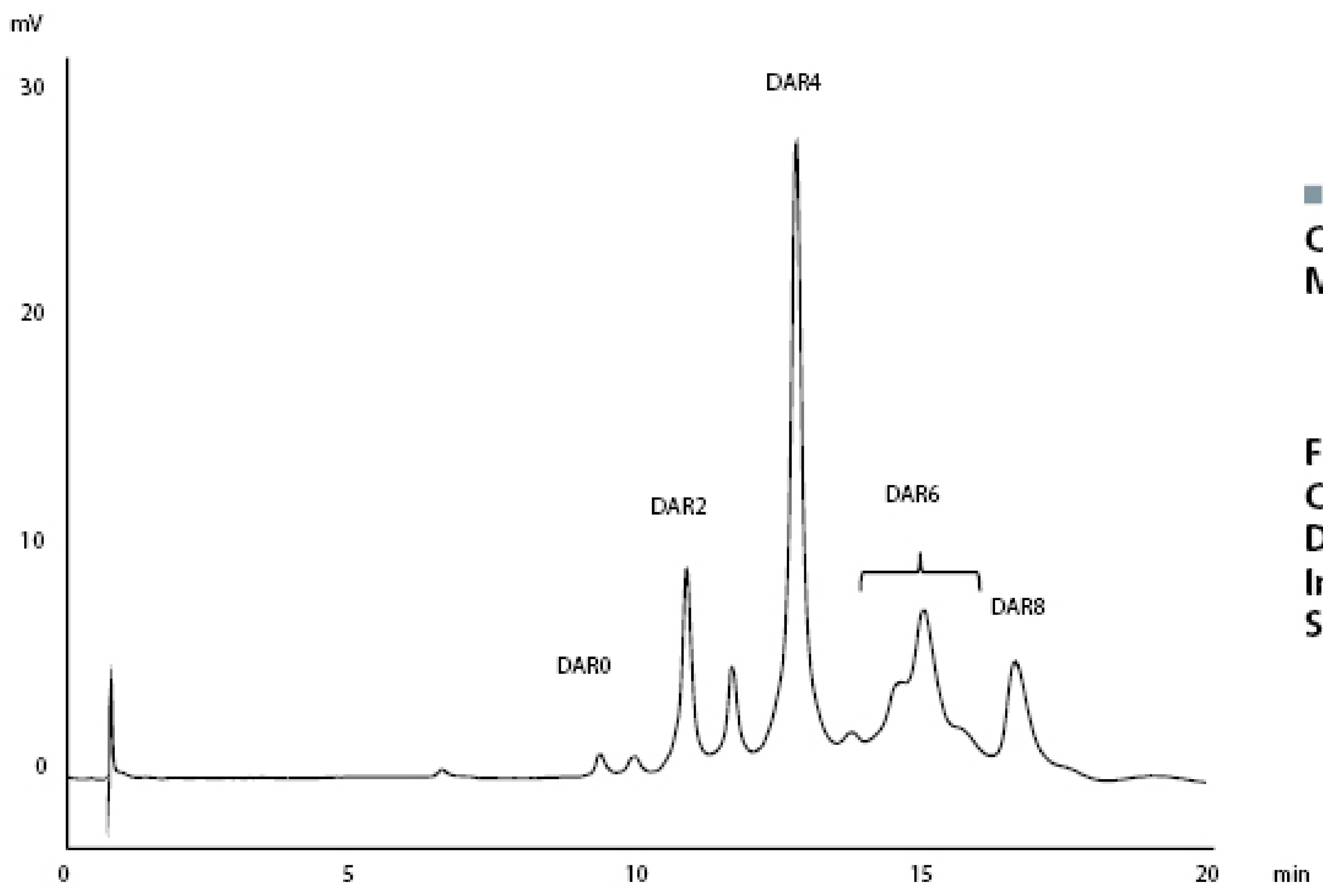
Shim-pack Arata Peptide C18

Particle Size (µm)	Length (mm) \ I.D. (mm)	2.0
2.2	50	227-32806-01
	100	227-32806-02
	150	227-32806-03

Shim-pack Bio HIC: Hydrophobic Interaction Chromatography Column

Antibody-drug conjugate (ADC) is a next-generation antibody drug that is expected to provide strong effects in a wide range of therapeutic treatments as compared to existing chemotherapeutic agents. The drug-to-antibody ratio (DAR) indicates the ratio of addition of the drug that directly influences both efficacy and potential toxicity of ADCs. Analysis of DAR is extremely important when judging important quality attributes of ADCs as it may significantly affect properties such as stability and agglutination. Hydrophobic interaction chromatography (HIC) is suitable for separation of analytes with slightly different hydrophobic properties such as antibody-drug conjugates (ADCs) with a different drug-to-antibody ratio (DAR). Using the Shim-pack Bio HIC, the DAR of ADCs can be analysed with a high separation capacity.

Drug to Antibody Ratio (DAR) analysis of ADCs



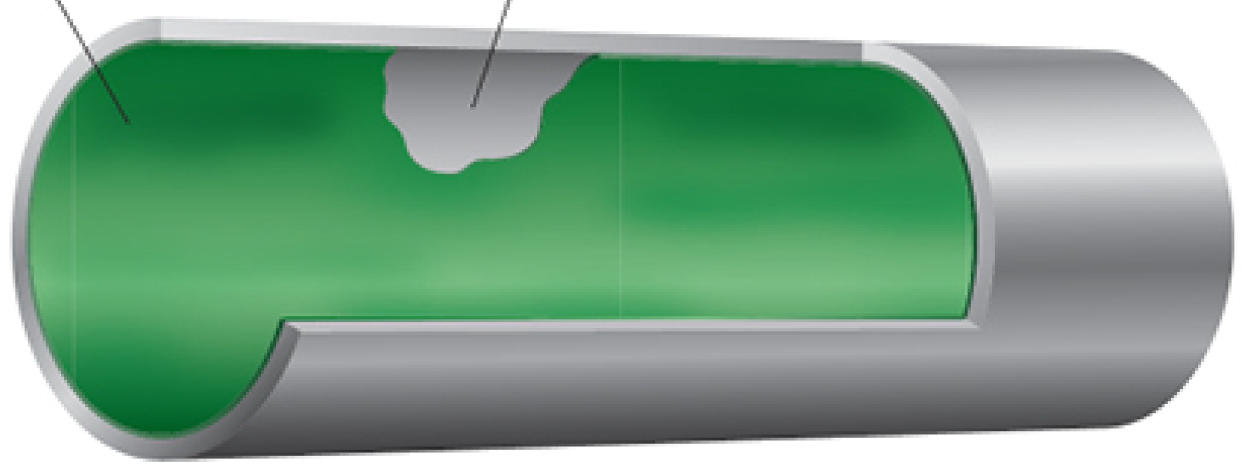
■ **Conditions**

Column	:	Shim-pack Bio HIC, 4 µm, 4.6×100mm
Mobile Phase	:	A) 50 mM NaH_2PO_4-Na_2HPO_4 (pH 7.0) containing 1.5 M $(NH_4)_2SO_4$/2-propanol (95/5) B) 50 mM NaH_2PO_4-Na_2HPO_4 (pH 7.0)/2-propanol (80/20) 0%B (0-1 min), 0-100%B (1-15 min), 100%B (15-20 min)
Flow Rate	:	1.0 mL/min
Col. Temp.	:	25 °C
Detection	:	UV at 280 nm
Injection Vol.	:	5 µL
Sample	:	Cystein-conjugated ADC mimic (5 mg/mL)

Shim-pack Bio HIC Butyl

P/N	Dimensions
227-31174-01	4 µm, 100 x 4.6 mm I.D

Shim-pack ™ MC C18



Versatility

- Shim-pack MC C18 column with 1.9 μm UHPLC particle achieves excellent seperation and peak shape.
- The high pressure rating of 70 MPa llows these columns to be compatible with a range of mobile phase flow rates from 1 to dozens of μL per minute.
- The metal coordinative adsorption is suppressed by deactivating the column parts in contact with the solution.
- Both small and large molecule compounds, such as peptides, can be analyzed.
- Excellent durability can be achieved even if the biological sample analysis.

Shim-pack MC PLONAS Series

Shim-pack MC PLONAS 90Å 2.7 μm

Superior Performances with Superficially Porous Particles (SPP)

- Shim-pack MC PLONAS 2.7 μm columns reduce the back pressure yet maintain teh performance of a sub 2 μm fully porous particle column. The pressure limit is 40 MPa.
- Achieve lower LODs and LOQs, better resolution, and greater reproductibility using the unique superficially porous particle found in Shim-pack MC PLONAS.
- An array of pore sizes designed to meet the needs of any application.
- Increased ruggedness because of larger porosity frits resulting in less clogging compared to competitor columns.
- Excellent column-to-column and lot-to-lot reproducibility.

Shim-pack MC PLONAS Series

Bonded Phase	Features and Benefits	Target Analytes
C18 (dimethyloctadecylsilane)	Suitable for a broad range of analytes	Diverse analytes ranging from polar to non polar
Aqueous-C18 (polar modified)	• Compatible with 100% aqueoumobile phases • Enhanced retention for polar molecules	Acids, bases, polar analytes
C8 (dimethyloctylsilane)	Suitable for a broad range of analytes	Diverse analytes ranging from polar to non-polar
Biphenyl (dimethylbiphenyl)	• Complementary selectivity to alkyl phases • Enhanced selectivity for aromatic compounds	Electron-poor molecules, aromatic or unsaturated compounds (ketones, nitriles, alkenes)
PFPP (pentafluro-phenylpropylsilane	• Complementary selectivity to alkyl phases • Enhanced selectivity for stereoisomers • Can be used in reversed phase and HILIC modes	Electron-rich compounds, aromatics, unsaturated compounds with double and/or triple bonds
HILIC (bare silica)	Can also be used in normal-phase modes	Polar and highly polar acids, bases, and neutrals, especially with log P < 0.5

Order information

Analytical Columns

Shim-pack MC PLONAS Series (particle size 2.7 µm)

Part Number	Bonded Phase	Diameter (mm)	Length (mm)
227-32100-01	C18	0.2	50
227-32100-11		0.3	
227-32100-02		0.2	100
227-32100-12		0.3	
227-32100-03		0.2	150
227-32100-13		0.3	
227-32102-01	AQ-C18	0.2	50
227-32102-11		0.3	
227-32102-02		0.2	100
227-32102-12		0.3	
227-32102-03		0.2	150
227-32102-13		0.3	
227-32101-01	C8	0.2	50
227-32101-11		0.3	
227-32101-02		0.2	100
227-32101-12		0.3	
227-32101-03		0.2	150
227-32101-13		0.3	

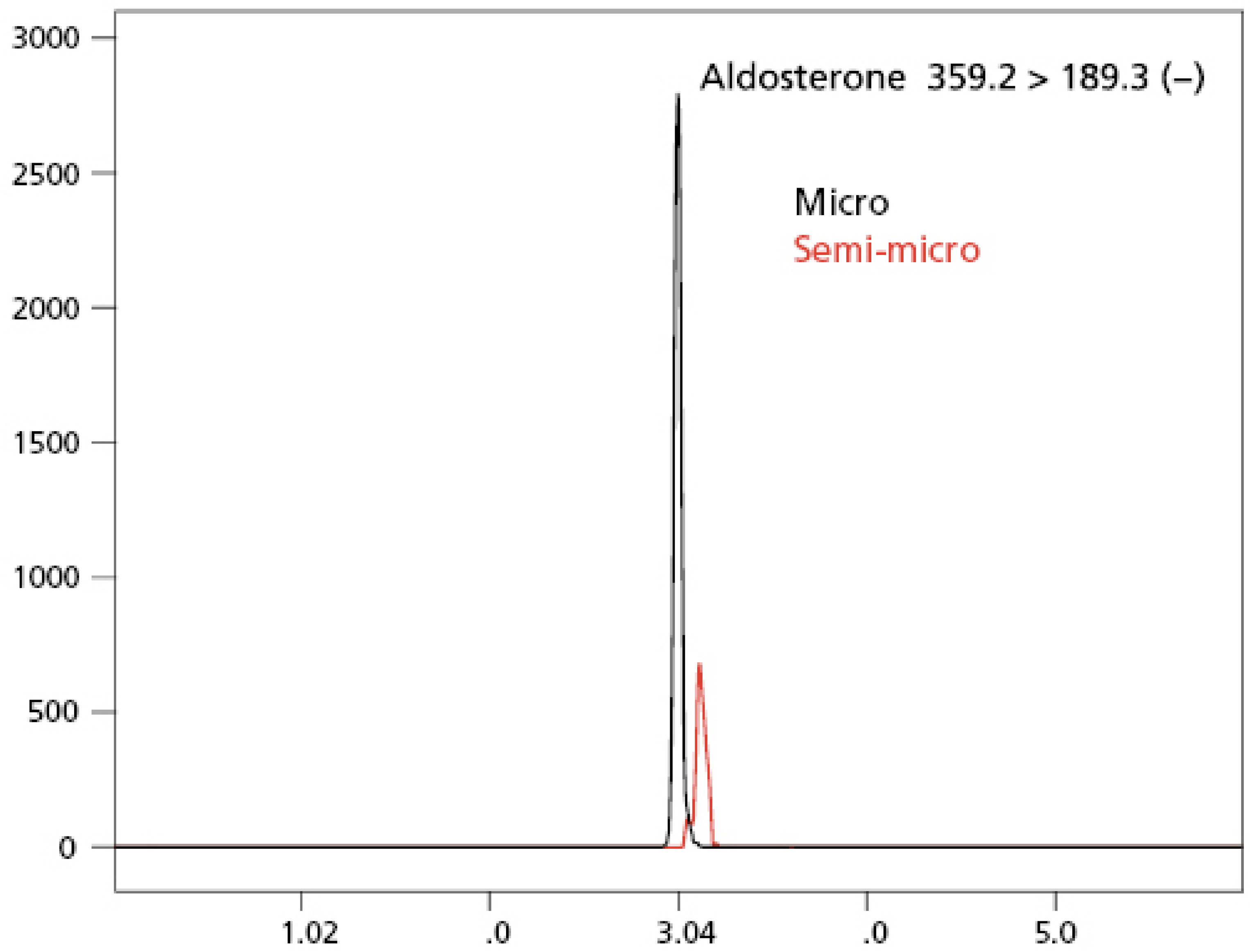
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
227-32104-01	Biphenyl	0.2	50
227-32104-11		0.3	
227-32104-02		0.2	100
227-32104-12		0.3	
227-32104-03		0.2	150
227-32104-13		0.3	
227-32103-01	PFPP	0.2	50
227-32103-11		0.3	
227-32103-02		0.2	100
227-32103-12		0.3	
227-32103-03		0.2	150
227-32103-13		0.3	
227-32105-01	HILIC	0.2	50
227-32105-11		0.3	
227-32105-02		0.2	100
227-32105-12		0.3	
227-32105-03		0.2	150
227-32105-13		0.3	

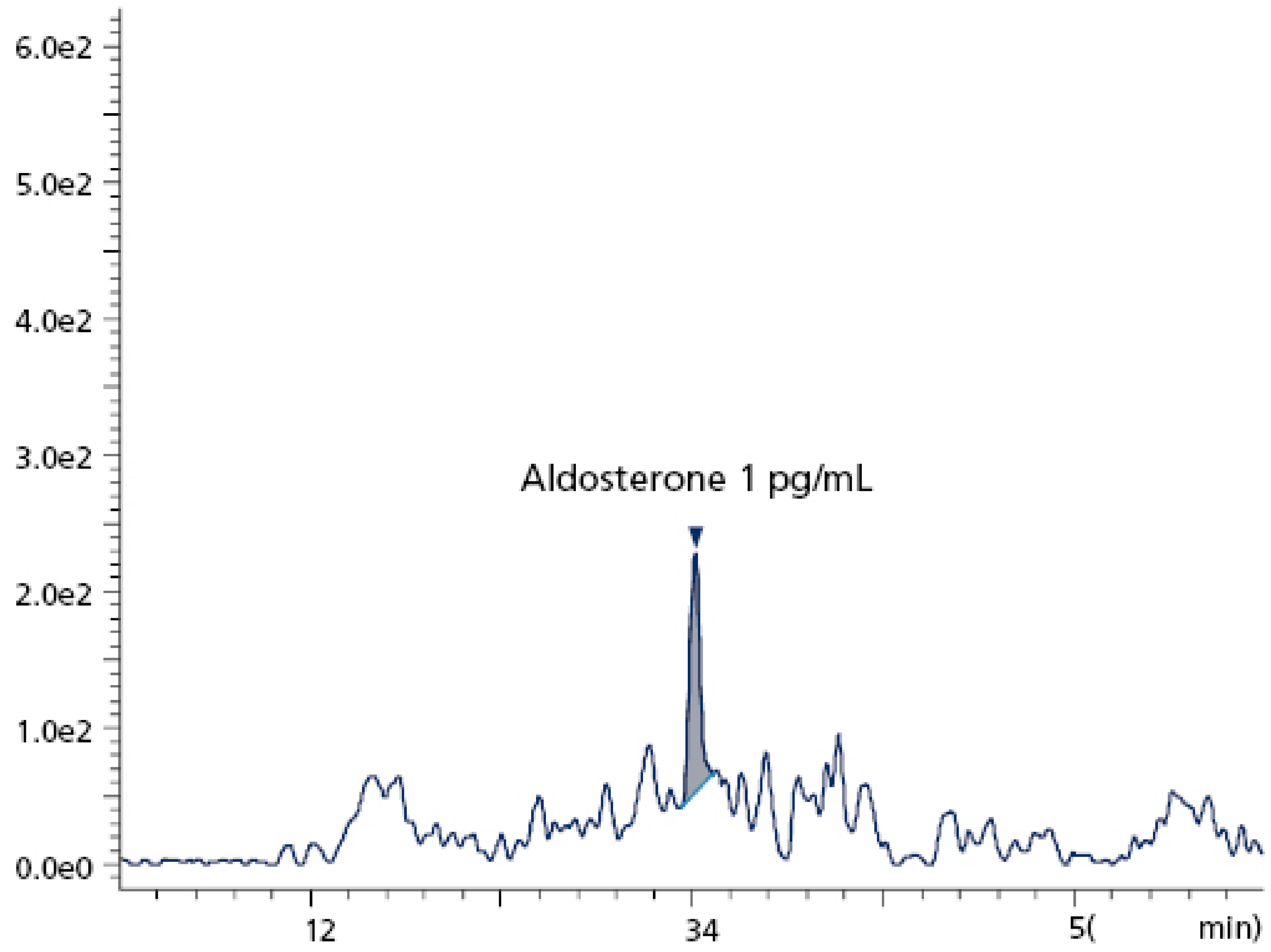
Shim-pack MC C18 (particle size 1.9 µm)

Part Number	Bonded Phase	Diameter (mm)	Length (mm)
228-59937-91	C18	0.3	50
228-59937-93		0.175	
228-59937-95		0.15	

Various molecules give an increase in the peak intensity on Nexera Mikros™ LC-MS/MS platform with an MC PLONAS column.

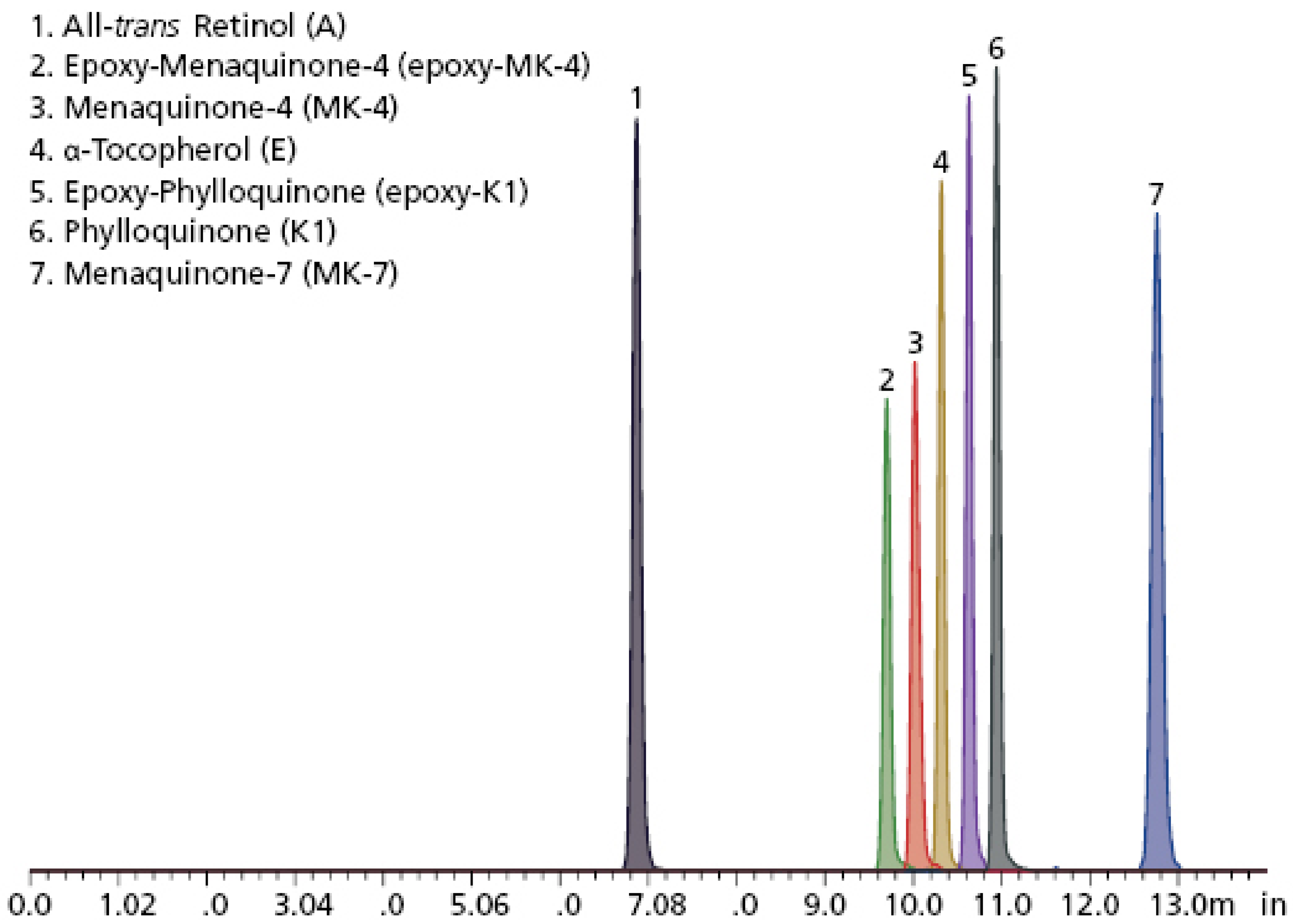
Shim-pack MC PLONAS C18





Column : Shim-pack MC PLONAS C18 (0.2 mm I.D. x 100 mm L., 2.7 µm)
*Semi-micro data acquired with the 2.1 mm I.D. column which has the same chemical profile as an MC PLONAS column.
Mobile phase : A: Water, B: Methanol, gradient elution
Flow rate: : 4 µm/min
Temperature : 50 °C
Injection volume : 1 µL
MS detection : LCMS-8060, with Micro-ESI source, ESI (-)

Shim-pack MC PLONAS C8



Column : Shim-pack MC PLONAS C8 (0.2 mm I.D. x 100 mm L., 2.7 µm)
Mobile phase : A: Ammonium acetate aq.
B: Ammonium acetate in methanol, gradient elution
Flow rate : 4 µL/min
Temperature : 50 °C
Injection volume : 1 µL
MS detection : LCMS-8060, with Micro-ESI source, ESI (-)

20 pg on column
* each peak is in full scale intensity

Shim-pack Trap Columns

Trap Columns Wide Portfolio

- Shim -pack MCT C18/C8

  70 MPa pressure imitation and a unique modification on the column inner surface protects against absorption of the molecule.

- Shim -pack MCT LC18/LC8

  A small-volume cartridge column with 40 MPa pressure limit. Useful in reducing the gradient delay for a low flow rate.

Order information

Shim-pack MCT series

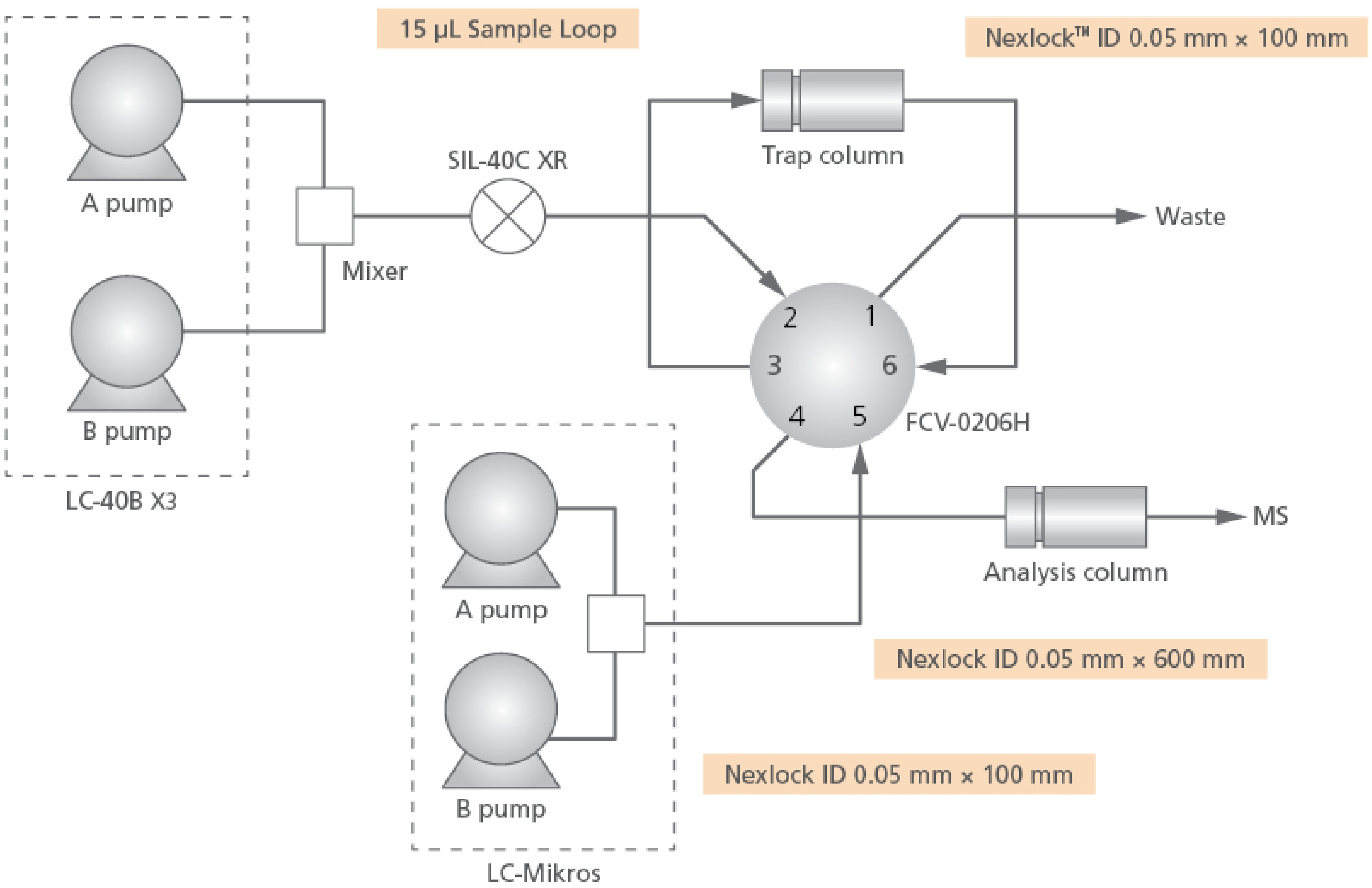
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
228-59938-91	C18	0.3	35
228-59938-92		0.5	
228-59939-91	C8	0.3	35
228-59939-92		0.5	

Shim-pack MCT L series (particle size 5 µm)

Part Number	Bonded Phase	Diameter (mm)	Length (mm)
227-32701-01	Trap column holder for Shim-pack MCT L		
227-32702-01	C18	0.3	5
227-32703-01	C8	0.5	

Nexer Mikros: Trap and Elute Confirguration

The trap and elute system can be constructed by using a dedicated piping kit (228-71751-42).



Shim-pack GPC Series

Shim-pack GPC series columns are used for the determination of tetrahydrofuran (800 Series), chloroform (800C Series), and dimethylformamide (800D series).

The technique of GPC does not utilize such chemical reactions as partition, adsorption, and ion exchange, but a physical reaction consisting of a separation based on molecular size of the sample components. Therefore, this method is suitable for the measurement of molecular weight distribution of high polymers and oligomers.

Shim-pack GPC series are packed with polystyrene polymers with respective degrees of cross-linking in order to meet exact analysis requirements, ranging from analysis of high polymers to that of oligomers. GPC-80M (80MC, 80MD) are mixed gel columns.

Determination of Tetrahydrofuran

Analytical Columns

Column	Exclusion Limit (polystyrene)	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801	1.5×10^3	300 × 8.0	228-20803-91
Shim-pack GPC-802	5×10^3	300 × 8.0	228-20804-91
Shim-pack GPC-8025	2×10^4	300 × 8.0	228-20805-91
Shim-pack GPC-803	7×10^4	300 × 8.0	228-20806-91
Shim-pack GPC-804	4×10^5	300 × 8.0	228-20807-91
Shim-pack GPC-805	4×10^6	300 × 8.0	228-20808-91
Shim-pack GPC-806	4×10^7	300 × 8.0	228-20809-91
Shim-pack GPC-80M	4×10^7, Mixed gel	300 × 8.0	228-20810-91

Guard Columns

Guard Column	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-800P	10 × 4.6	228-20812-91

Determination of Chloroform

Analytical Columns

Column	Exclusion Limit (polystyrene)	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801C	1.5×10^3	300 × 8.0	228-20803-92
Shim-pack GPC-802C	5×10^3	300 × 8.0	228-20804-92
Shim-pack GPC-8025C	2×10^4	300 × 8.0	228-20805-92
Shim-pack GPC-803C	7×10^4	300 × 8.0	228-20806-92
Shim-pack GPC-804C	4×10^5	300 × 8.0	228-20807-92
Shim-pack GPC-805C	4×10^6	300 × 8.0	228-20808-92
Shim-pack GPC-806C	4×10^7	300 × 8.0	228-20809-92
Shim-pack GPC-80MC	4×10^7, Mixed gel	300 × 8.0	228-20810-92

Guard Columns

Guard Column	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-800CP	10 × 4.6	228-20812-92

Shim-pack GPC Series

Determination of Dimethylformamide

Analytical Columns

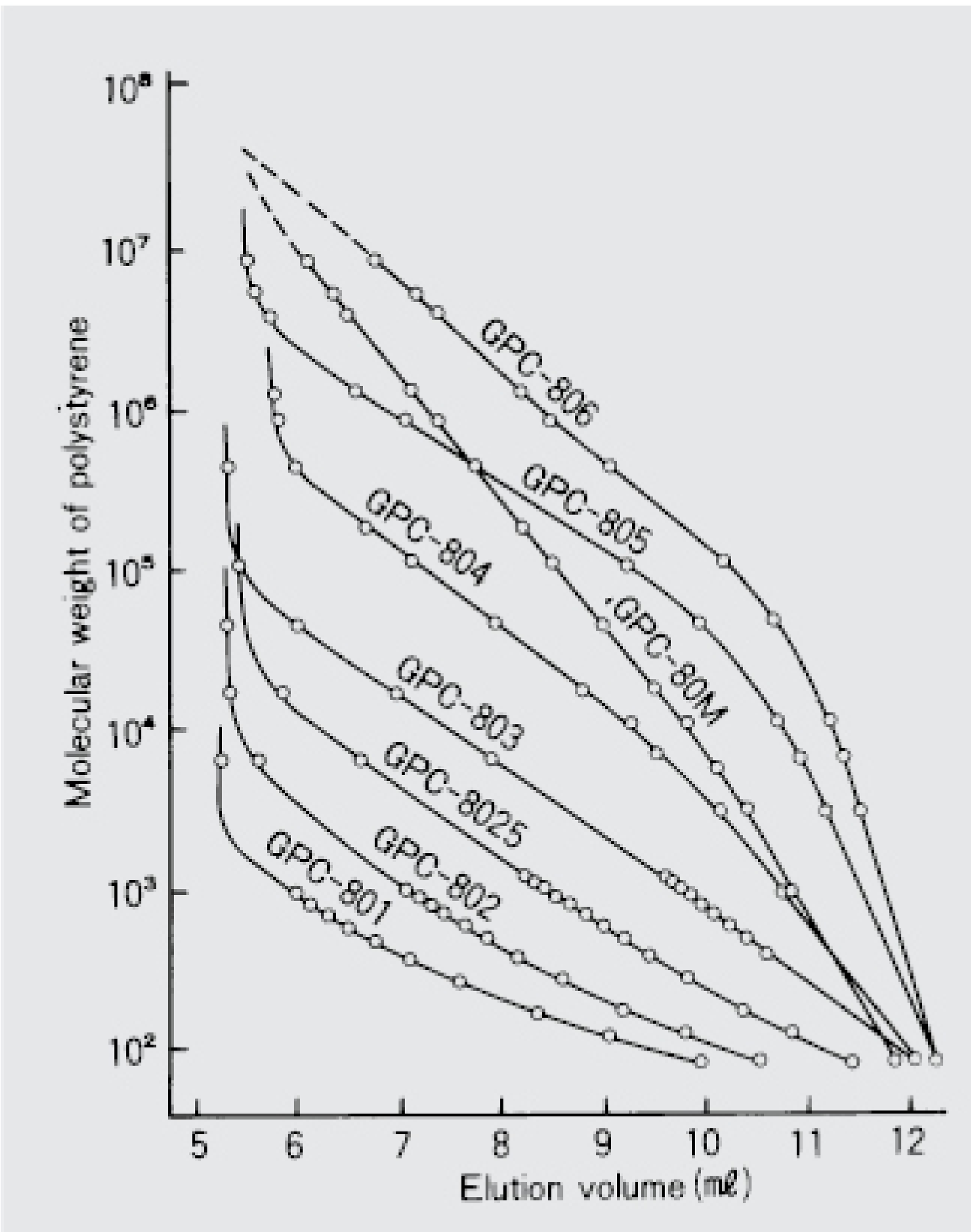
Column	Exclusion Limit (polystyrene)	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801D	1.5×10^3	300 × 8.0	228-20803-93
Shim-pack GPC-802D	5×10^3	300 × 8.0	228-20804-93
Shim-pack GPC-8025D	2×10^4	300 × 8.0	228-20805-93
Shim-pack GPC-803D	7×10^4	300 × 8.0	228-20806-93
Shim-pack GPC-804D	4×10^5	300 × 8.0	228-20807-93
Shim-pack GPC-805D	4×10^6	300 × 8.0	228-20808-93
Shim-pack GPC-806D	4×10^7	300 × 8.0	228-20809-93
Shim-pack GPC-80MD	4×10^7, Mixed gel	300 × 8.0	228-20810-93

Guard Columns

Guard Column	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-800DP	10 × 4.6	228-20812-93

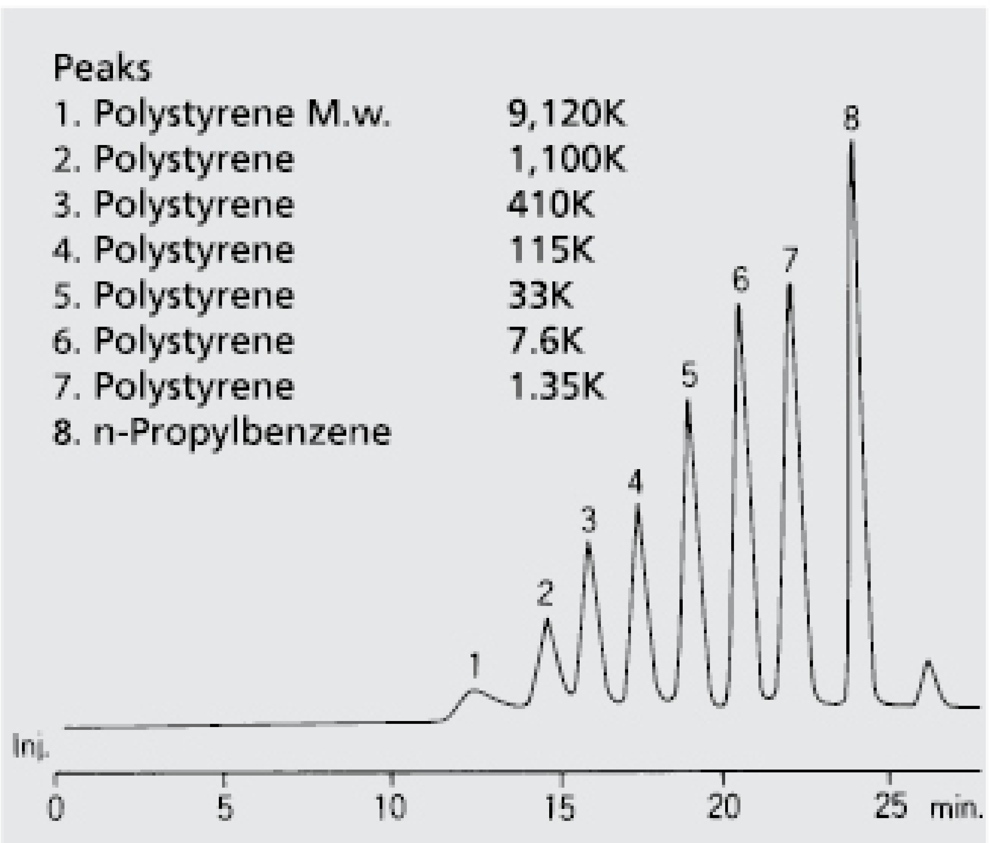
Analysis Examples

Calibration Curves



■ Conditions
Mobile Phase : Tetrahydrofuran
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 254 nm

Analysis of Polystyrene Standard



■ Conditions
Column : Shim-pack GPC-80M (2 columns in series) (P/N: 228-20810-91)
Mobile Phase : Tetrahydrofuran
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 254 nm

Shim-pack Diol Series

Shim-pack Diol series is a kind of gel filtration chromatography (GFC) column. GFC is used to separate water-soluble high polymers such as polysaccharides, proteins, and nucleic acids according to their molecular sizes by using hydrophilic packing materials and aqueous mobile phase.

Shim-pack Diol series is packed with porous spherical silica gel chemically bonded with a hydroxyl group. Due to the hydrophilic hydroxyl group, Shim-pack Diol series can be used in high-speed GFC and provide sharp peaks during the analysis of protein and biochemicals (such as enzymes).

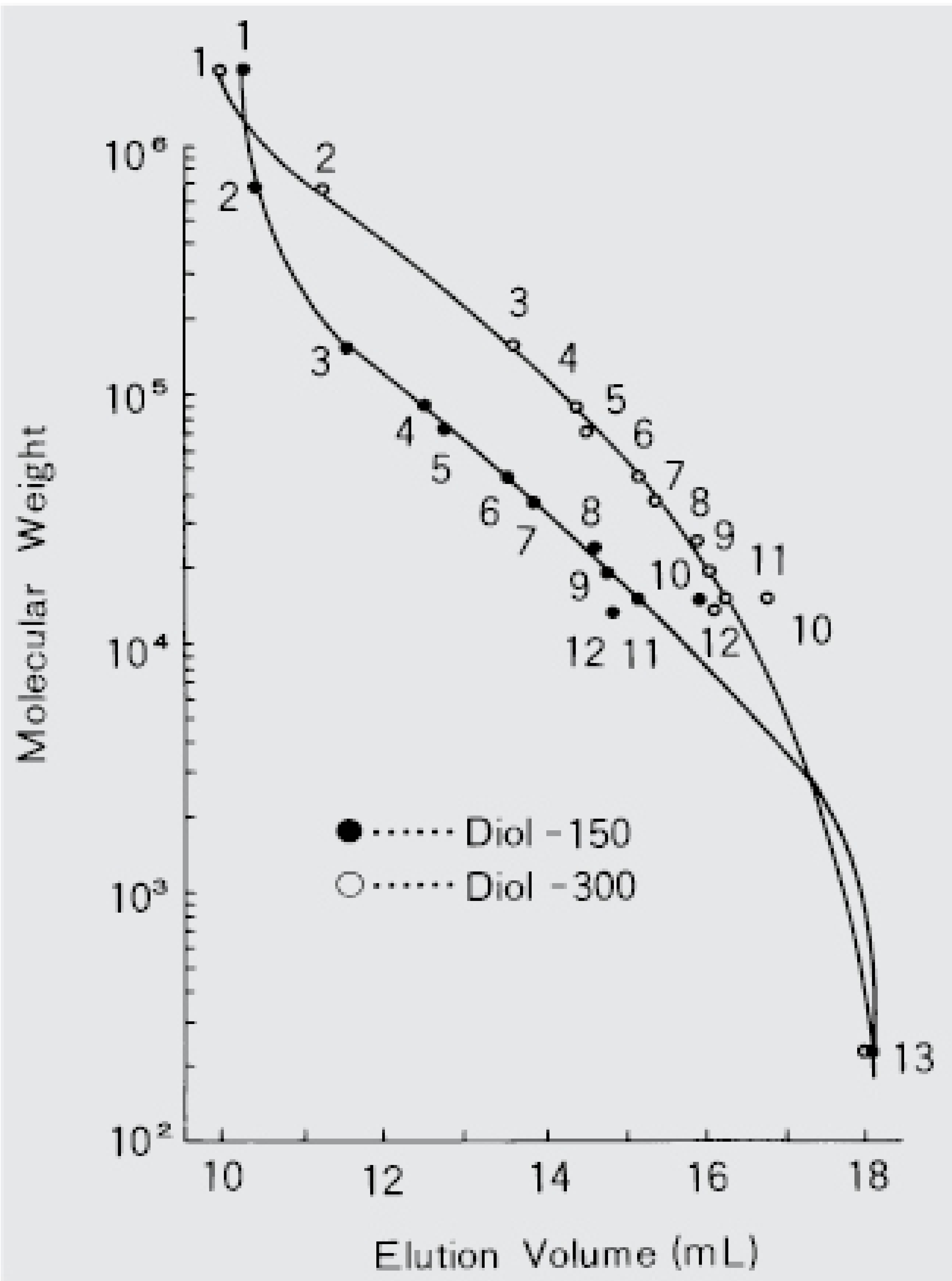
Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack Diol-150	Diol group	5	250 × 7.9	228-14775-91
			500 × 7.9	228-14775-92
Shim-pack Diol-300	Diol group	5	250 × 7.9	228-14776-91
			500 × 7.9	228-14776-92
Pre-column Diol *	Diol group	10	50 × 4.0	228-16367-91

* Installed between the liquid pump and the sample injector to protect the Shim-pack Diol column.

Analysis Examples

Calibration Curves

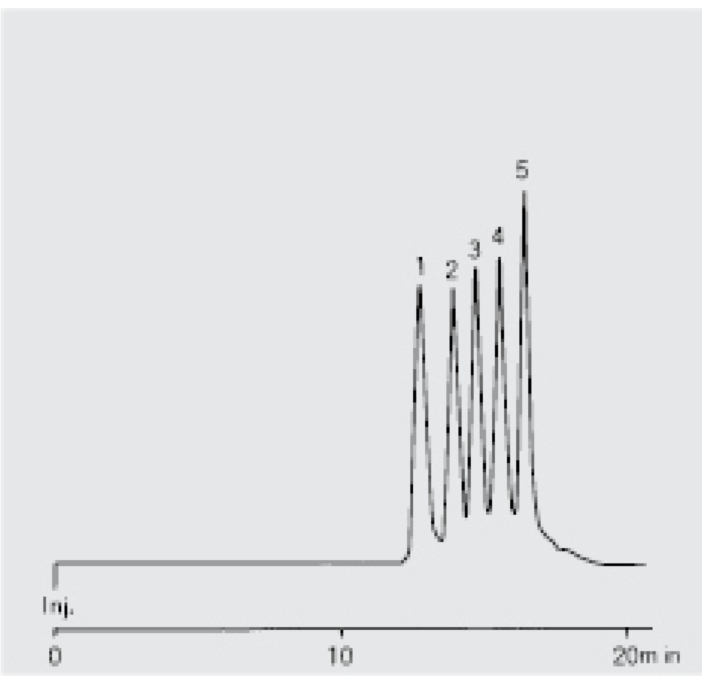


Peaks
1. Blue dextran 2000
2. Thyroglobulin
3. γ-Globulin
4. Transferrin
5. Human serum albumin
6. Ovalbumin
7. β-Lactoglobulin
8. Chymotrypsin
9. Myoglobin
10. Lysozyme
11. Ribonuclease A
12. Cytochrome C
13. Gly-Tyr

Conditions

Column : Shim-pack Diol Series (500 mmL × 7.9 mmI.D., 5 µm)
Mobile Phase : A) 10mM phosphate buffer solution (pH 7)
B) 0.2M sodium sulfate
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 280 nm

Analysis of Protein Standard



Peaks
1. Glutamate dehydrogenase
2. Lactate dehydrogenase
3. Enolase
4. Adenylate kinase
5. Cytochrome C

Conditions

Column : Shim-pack Diol-300 (500 mmL × 7.9 mmI.D., 5 µm) (P/N: 228-14776-92)
Mobile Phase : A) 10mM phosphate buffer solution (pH 7)
B) 0.1M sodium chloride
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 280 nm

Metal Free Columns

Shim-pack Scepter Series

Analytical Columns

Chemistry		C18		HD-C18		C8	
Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6	2.1	4.6	2.1	4.6
1.9	50	227-31072-01	-	227-31173-01	-	227-31166-01	-
	100	227-31072-02	-	227-31173-02	-	227-31166-02	-
	150	-	-	-	-	227-31166-03	-
3	50	227-31073-01	227-31074-01	227-31077-01	227-31078-01	227-31081-01	227-31082-01
	100	227-31073-02	227-31074-02	227-31077-02	227-31078-02	227-31081-02	227-31082-02
	150	227-31073-03	227-31074-03	-	227-31078-03	227-31081-03	227-31082-03
3	50	227-31075-01	227-31076-01	227-31079-01	227-31080-01	227-31083-01	227-31084-01
	100	227-31075-02	227-31076-02	227-31079-02	227-31080-02	227-31083-02	227-31084-02
	150	-	227-31076-03	-	227-31080-03	227-31083-03	227-31084-03

Chemistry		C4-300		Phenyl		PFPP	
Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6	2.1	4.6	2.1	4.6
1.9	50	227-31197-01	-	227-31169-01	-	227-31168-01	-
	100	227-31197-02	-	227-31169-02	-	227-31168-02	-
	150	227-31197-03	-	-	-	-	-
3	50	227-31198-01	227-31199-01	227-31093-01	227-31094-03	227-31089-01	227-31090-03
	100	227-31198-02	227-31199-02	227-31093-02	227-31094-01	227-31089-02	227-31090-01
	150	227-31198-03	227-31199-03	-	227-31094-02	-	227-31090-02
3	50	227-31200-01	227-31201-01	227-31095-01	227-31096-01	227-31091-01	227-31092-01
	100	227-31200-02	227-31201-02	227-31095-02	227-31096-02	227-31091-02	227-31092-02
	150	227-31200-03	227-31201-03	-	227-31096-03	-	227-31092-03

Chemistry		Diol-HILIC	
Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6
1.9	50	227-31167-01	-
	100	227-31167-02	-
	150	-	-
3	50	227-31085-01	227-31086-01
	100	227-31085-02	227-31086-02
	150	-	227-31086-03
3	50	227-31087-01	227-31088-03
	100	227-31087-02	227-31088-01
	150	-	227-31088-02

Shim-pack G Series

Analytical Columns

Chemistry		GIST C18		GIST C18-AQ	GISS C18		Pressure Tolerance (MPa)
Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6	2.1	2.1	4.6	
1.9 or 2	50	227-30914-01	227-30915-01	227-30936-01	227-30922-01	227-30923-01	80
	100	227-30914-02	227-30915-02	227-30936-02	227-30922-02	227-30923-02	
	150	227-30914-03	227-30915-03	227-30936-03	-	227-30923-03	
3	50	227-30916-01	227-30917-01	227-30938-01	227-30924-01	227-30925-01	50
	100	227-30916-02	227-30917-02	227-30938-02	227-30924-02	227-30925-02	
	150	227-30916-03	227-30917-03	227-30938-03	227-30924-03	227-30925-03	
	250	227-30916-04	227-30917-04	227-30938-04	227-30924-04	227-30925-04	
3	50	227-30918-01	227-30919-01	227-30940-01	227-30926-01	227-30927-01	20
	100	227-30918-02	227-30919-02	227-30940-02	227-30926-02	227-30927-02	
	150	227-30918-03	227-30919-03	227-30940-03	227-30926-03	227-30927-03	
	250	227-30918-04	227-30919-04	227-30940-04	227-30926-04	227-30927-04	

Chemistry		GISS C8		GIST PFPP		GIST Amide		Pressure Tolerance (MPa)
Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6	2.1	4.6	2.1	4.6	
1.9 or 2	50	227-30928-01	227-30929-01	-	-	227-30951-01	-	80
	100	227-30928-02	227-30929-02	-	-	227-30951-02	-	
	150	-	227-30929-03	-	-	227-30951-03	-	
3	50	227-30930-01	227-30931-01	227-30896-01	227-30897-01	227-30850-01	227-30851-01	50
	100	227-30930-02	227-30931-02	227-30896-02	227-30897-02	227-30850-02	227-30851-02	
	150	227-30930-03	227-30931-03	227-30896-03	227-30897-03	227-30850-03	227-30851-03	
	250	227-30930-04	227-30931-04	227-30896-04	227-30897-04	227-30850-04	227-30851-04	
3	50	227-30932-01	227-30933-01	227-30898-01	227-30899-01	227-30852-01	227-30853-01	20
	100	227-30932-02	227-30933-02	227-30898-02	227-30899-02	227-30852-02	227-30853-02	
	150	227-30932-03	227-30933-03	227-30898-03	227-30899-03	227-30852-03	227-30853-03	
	250	227-30932-04	227-30933-04	227-30898-04	227-30899-04	227-30852-04	227-30853-04	

Cartridge Guard Columns

Chemistry	Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)		Pressure Tolerance (MPa)	Holder
			2.1	3.0		
GIST C18	5	10	227-30920-01	227-30921-01	20	227-30944-01
GIST C18-AQ			227-30942-01	227-30943-01		
GISS C18			227-30934-01	227-30935-01		
GISS C8			227-30945-01	227-30946-01		
GIST PFPP			227-30900-01	227-30901-01		
GIST Amide			227-30854-01	227-30855-01		

Chemistry	Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs) and Holder		Pressure Tolerance (MPa)
			2.1	3.0	
GIST C18	5	10	227-30920-02	227-30921-02	20
GIST C18-AQ			227-30942-02	227-30943-02	
GISS C18			227-30934-02	227-30935-02	
GISS C8			227-30945-02	227-30946-02	
GIST PFPP			227-30900-02	227-30901-02	
GIST Amide			227-30854-02	227-30855-02	

Metal Free Columns

Mastro™ LC Series

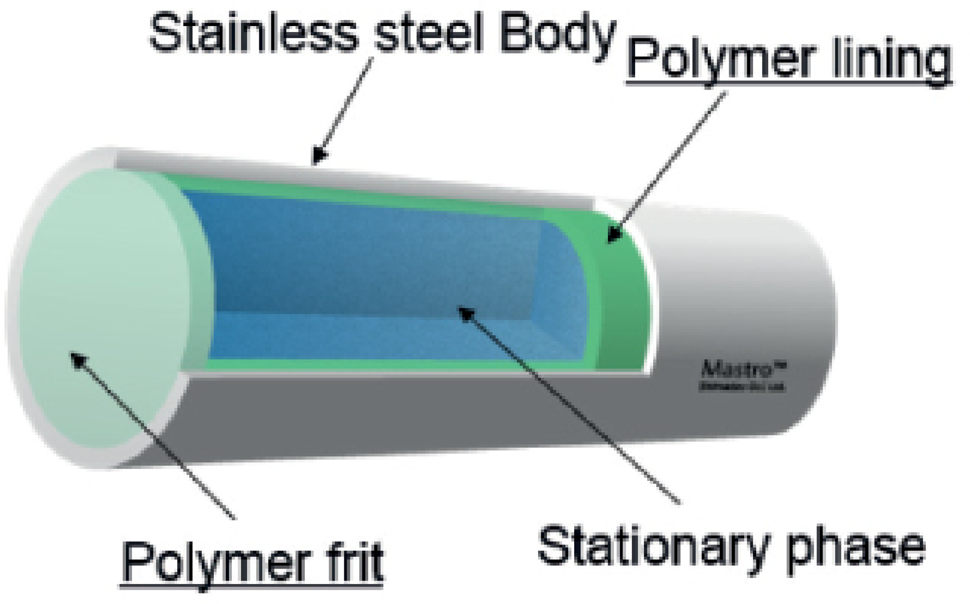
High pressure tolerance metal free column, best solution for chelating compound

	Mastro2 C18	Mastro2 PFP	Mastro SP
Mode	ODS	PFP	ODS + SAX
Particle Size	2.2 um, 5.0um	3.0 um	5.0 um
Max. Press.	40 MPa (2.2 um), 15 MPa (5.0 um)	40 MPa (100 mm), 50 MPa (150 mm)	20 MPa
Max. Temp.	80 °C (*1)		40 °C
pH range	2 to 7.5 (*2)		2.5 to 7.5
I.D. (mm)	2.0		2.1
Length (mm)	50, 100, 150	100, 150	100

(*1) When mixtures of water or acidic aqueous solution (pH 3 or greater) and acetonitrile are used.
(*2) Optimum lifetime is obtained at pH 2.5 – pH 7.0 and at 40°C or less when a buffer is used.

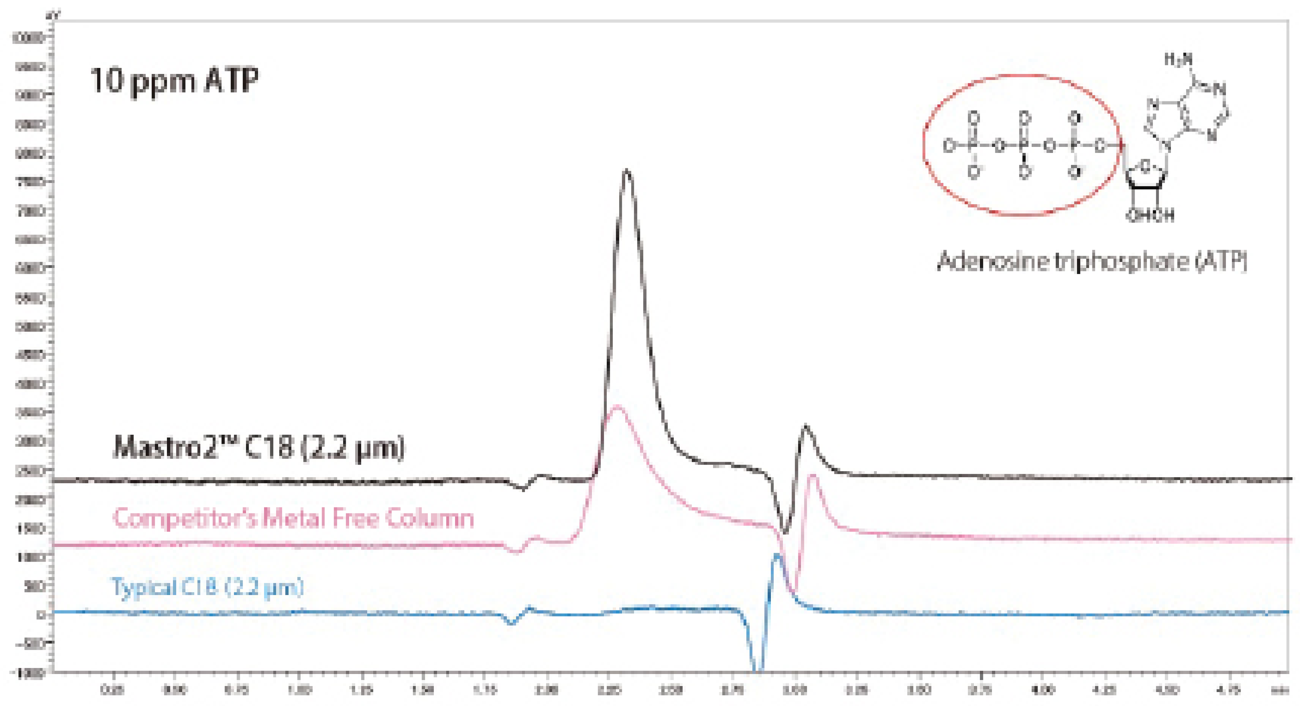
Features

- Manufactured with polymer lining and inlet/outlet frits, Mastro™ range of LC columns are an excellent choice for compounds which have phosphate group, or compounds which chelate binding to metal.
- Mastro™ LC columns is controlled activated of stainless by special internal coating.
- Highly recommended for LCMS applications in which inertness is critical.



Mastro2™ C18

Comparing the SUS body column, the inert body column of other companies, and the Mastro2 ™ column using a phosphate group-containing compound, not only the area value of Mastro2 ™ increases, but also the variability is extremely small from the obtained CV value. In addition, since the peak shape is good, the S / N is large and the detection sensitivity is improved.



Analytical condition

Instruments	: Nexera Bio
Column	: Mastro2 ™ or Typical C18 (150 mmL. X 2.0 mm ID) Competitor (150 mmL. X 2.1 mm ID)
Mobile phase	: 10 mM $HCOONH_4$ in H_2O / CH_3CN = 95/5
Flow rate	: 0.2 mL / min
Detection	: UV 254 nm
Column Oven	: 40°C
Injection vol.	: 1 μL

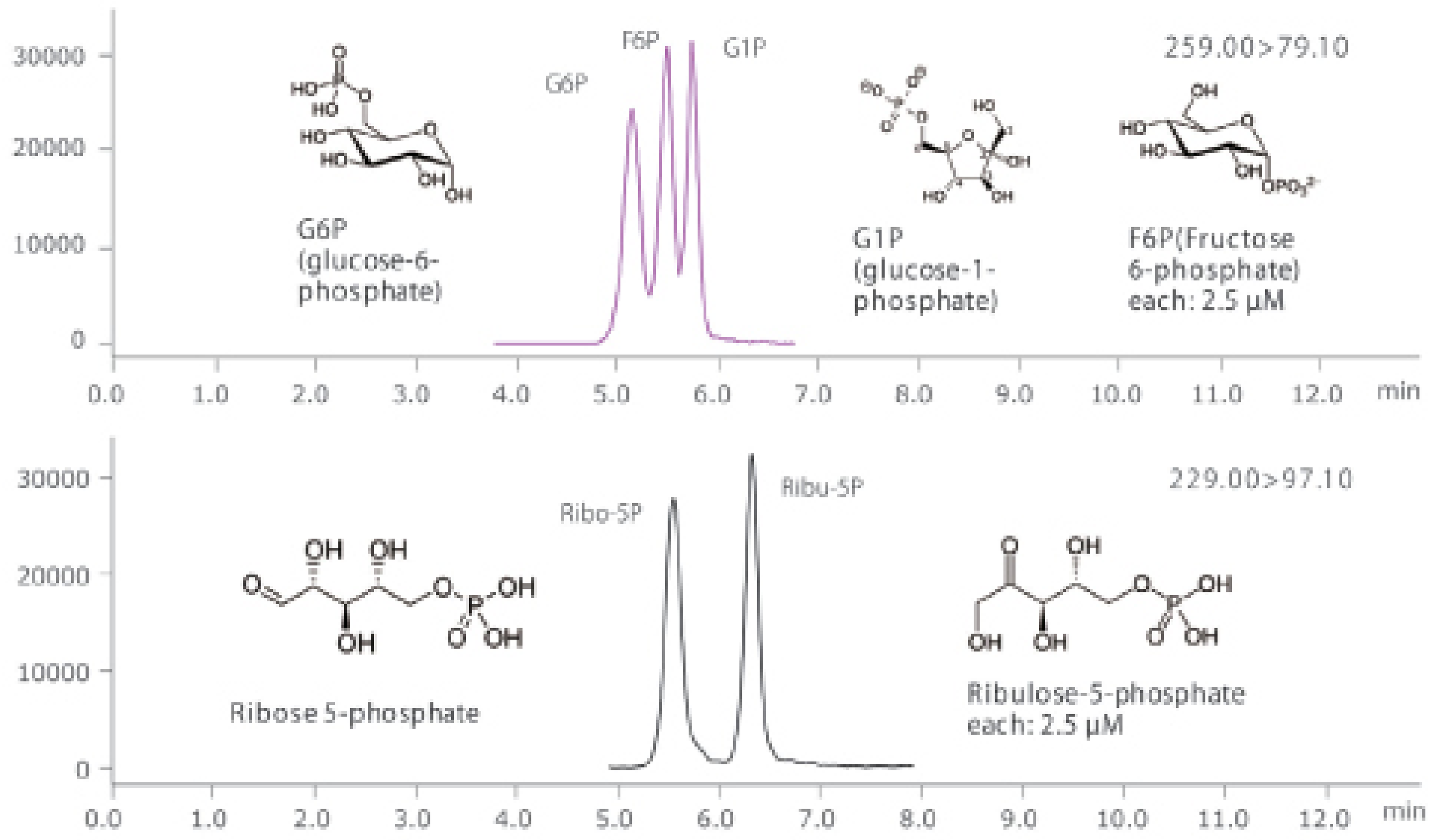
Unlike other products, Mastro2 ™ has a structure that does not generate metal chelates because all liquid contact parts are PEEK resin. In addition, a line-up of 2.2 μm microparticles is introduced as the PEEK resin parts are designed to be resistant to deformation even under high pressure.

	Area average (n=3)	CV	Asymmetry	S/N
Mastro2™ C18	50482	0.4	1.47	109
Competitor's Metal Free Column	38481	4.5	1.83	46
Typical C18	No Data	–	–	–

Particle Size (μm)	I.D (mm)	Length		
		50 mm	100 mm	150 mm
2.2	2.0	370-01003-44	370-01003-64	370-01003-84
5.0		370-01007-44	370-01007-64	370-01007-84

Mastro™ SP

Ion-paring reagents are required to analyze the highly-polar compound such as phosphate groups. However, ion-paring reagents are not ideal for LCMS applications as they as difficult to remove from the flow lines. Mastro™ SP columns are ideal for the analysis of such compounds without the use of ion-paring reagents.



Analytical condition

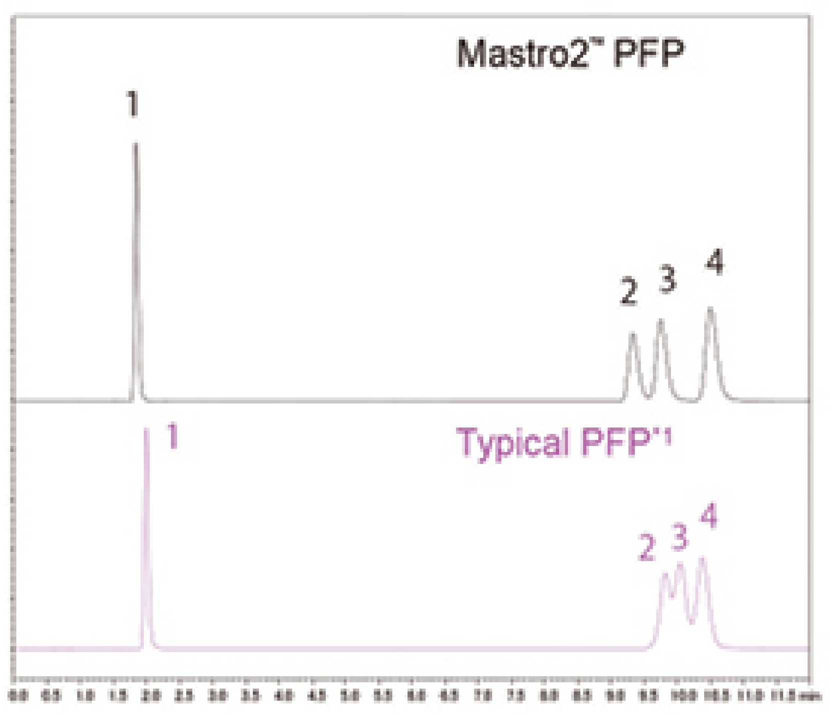
Instruments : Shimadzu Nexera/LCMS-8050
Column : Mastro™ SP (2.1 mmI.D × 100 mmL., 5 μm)
Mobile phase : A) 10 mM Ammonium acetate/ACN=90/10
Mobile phase : B) 50 mM Ammonium acetate/ACN=80/20
0% B (0-4.0 min) ⇒ 60% B (9.0 min)
⇒ 00% B (11.0-20.0 min)
⇒ 0% B (20.1-25.0 min)
T. Flow : 0.5 mL/min
Nebulizing gas : 3.0 L/min
Drying gas : 12 L/min
DL Temp. : 250 °C
BH Temp. : 400 °C
Injection Vol. : 3 μL

Particle Size (μm)	I.D (mm)	Length
		100 mm
5.0	2.1	SSOT-G10005

Mastro2™ PFP

Mastro2 PFP is the column packed with PFP (Penta Fluoro Phenyl) that has high retention capability. Generally, PFP columns have efficiency for retaining and separating regioisomers and halogen compounds that are difficult to be analysed with C18 column.

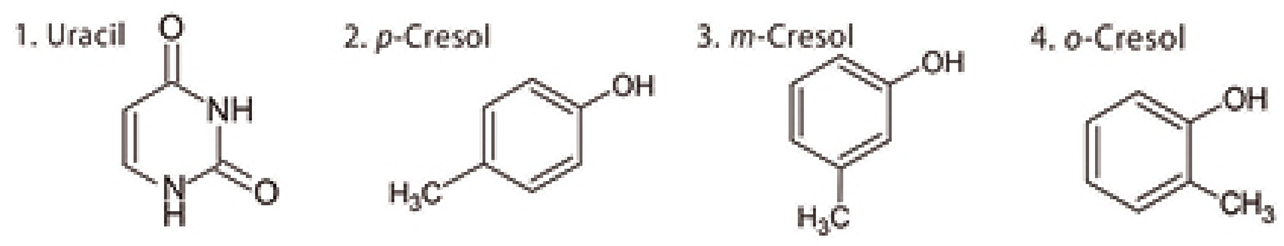
Separation of cresol



Analytical conditions

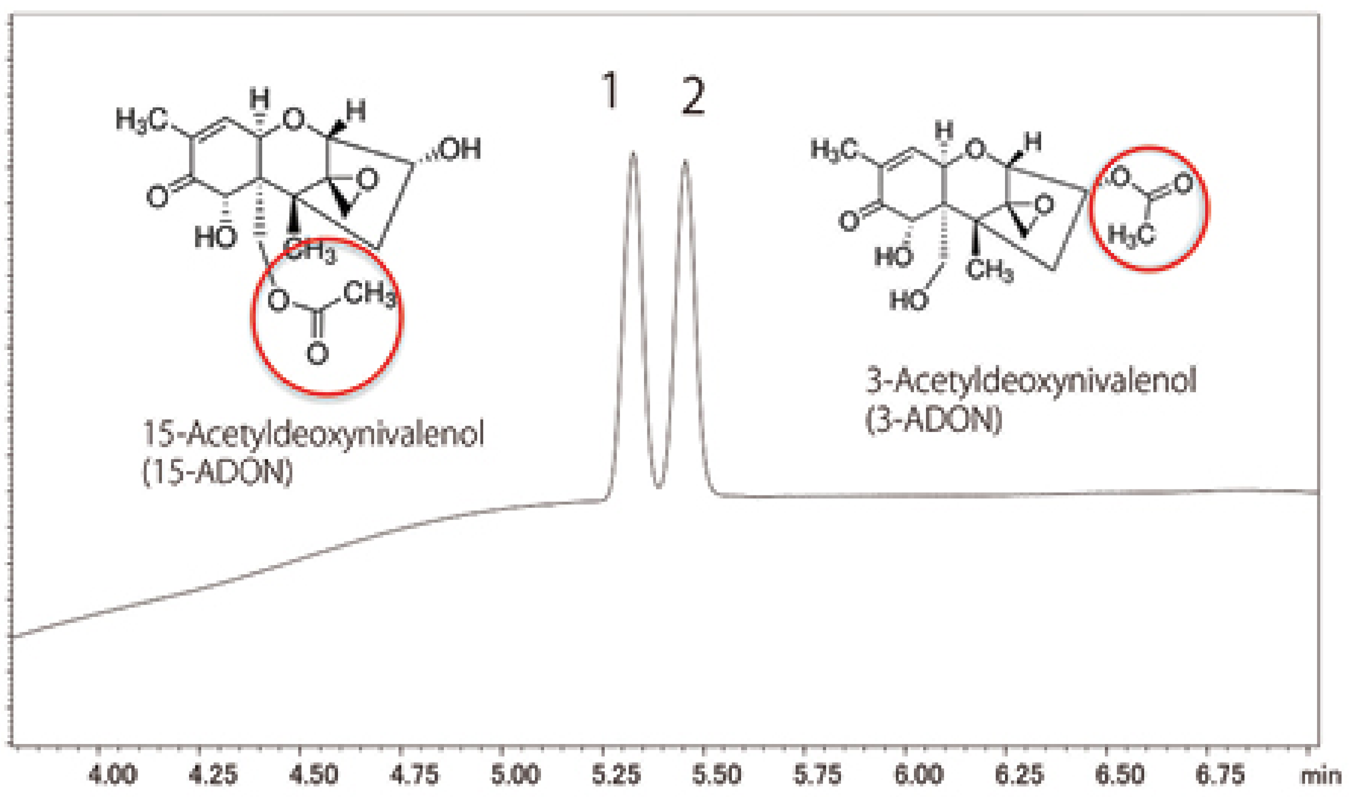
Instrument : NexeraX2_SPD20A(Semi-micro cell)
Column : Mastro2™ PFP (150 mmL. × 2.0 mm I.D. 3 μm)
Typical PFP*1 (150 mmL. × 2.1 mm I.D. 3 μm)
Mobile phase : H_2O / CH_3OH = 60 / 40
Flow rate : 0.2 mL/min
Detection : UV 254 nm
Column oven : 40 °C
Sample : 1. Uracil, 2. p-Cresol, 3. m-Cresol, 4. o-Cresol

*1 *Metal free column*



	Mastro2™ PFP	Typical PFP
α2,3	1.06	1.10
α3,4	1.10	1.82
Rs1	1.50	0.59
Rs2	2.50	0.92

Mycotoxin components (3-ADON, 15-ADON) analysis



Analytical conditions

Instrument : NexeraX2_SPD20A (Semi-micro cell)
Column : Mastro2™ PFP (150 mm L, × 2.0 mm I.D. 3 μm)
Mobile phase : A) 10 mM CH_3COONH_4 in H_2O
B) 2% CH_3COOH in CH_3OH
Gradient condition
Flow rate : 0.4 mL/min
Detection : UV 254 nm
Column oven : 40 °C
Sample : 1. 15-ADON, 2. 3-ADON

Particle Size (μm)	I.D (mm)	Length	
		100 mm	150 mm
3.0	2.0	370-01015-64	370-01015-84

Shim-pack UC Series

Packed Columns for Supercritical Fluid Chromatograph

When conducting analysis with the Nexera UC supercritical fluid chromatography system, because diffusion of the sample band in the mobile phase is high compared with liquid chromatography, separation behavior changes significantly depending on the types of columns used. Shim-pack UC series was designed with a variety of stationary phases, making it suitable for analysis of various compounds.

Achieve high speed and high performance

Shim-pack UC series offers various stationary phases suitable for the mobile phase of high diffusion and low-viscosity liquid carbon dioxide. Analysis time can be reduced at a high flow rate without impairing the separation performance. In addition, analysis speed, which is limited in HPLC, can be increased.

Wide range of stationary phases meets diverse needs

Shim-pack UC series was designed with eight types of stationary phases and sizes to meet diverse research and development needs.

High durability and stable reproducibility

Shim-pack UC series achieves high inertness for improved analysis precision and increased column durability. Its uniform silica surface and stable chemical modification also ensure high analysis reproducibility.

	Shim-pack UC RP	Shim-pack UC GIS II	Shim-pack UC Phenyl	Shim-pack UC CN
Bonded Phase	Octadecyl Groups + Polar Functional Group	Octadecyl Groups	Phenyl Groups	Cyanopropyl Groups
Particle Size (µm)	3, 5	3, 5	3, 5	3, 5
Pore Size (nm)	10	10	10	10
Surface Area (m2/g)	450	450	450	450
Carbon Loading	9%	11%	9.5%	14%
Pressure Tolerance (MPa)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)
Pore Volume (mL/g)	1.05	1.05	1.05	1.05
End-capping	-	Yes	-	-
pH Range	2 - 7.5	2 - 7.5	2 - 7.5	2 - 7.5
USP Code	L1	L1	L11	L10

	Shim-pack UC Diol	Shim-pack UC Sil	Shim-pack UC Amide	Shim-pack UC NH2
Bonded Phase	Diol Group	-	Carbamoyl Groups	Aminopropyl Groups
Particle Size (µm)	3, 5	3, 5	3, 5	3, 5
Pore Size (nm)	10	10	10	10
Surface Area (m2/g)	450	450	450	450
Carbon Loading	20%	-	18%	8%
Pressure Tolerance (MPa)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)
Pore Volume (mL/g)	1.05	1.05	1.05	1.05
End-capping	-	-	-	-
pH Range	2 - 7.5	2 - 7.5	2 - 7.5	2 - 7.5
USP Code	L20	L3	-	L8

	Shim-pack UC-Diol II	Shim-pack UC-Sil II	Shim-pack UC-Choles	Shim-pack UC-PBr
Bonded Phase	Diol Group	-	Cholesteryl Groups	Pentabromobenzyl Group
Particle Size (µm)	3, 5	3, 5	3, 5	3, 5
Pore Size (nm)	12	12	12	12
Surface area (m^2/g)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)
Carbon Loading (%)	-	-	20	8
Pressure Tolerance (MPa)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)
Pore volume (mL/g)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)
End-capping	-	-	Yes	Yes
pH Range	2 - 7.5	-	2 - 7.5	2 - 7.5
USP Code	L20	L3	L101	-

	Shim-pack UC-PyE	Shim-pack UC-HyP	Shim-pack UC-Py	Shim-pack UC-Triazole
Bonded Phase	Pyrenylethyl Group	3-Hydroxyphenyl Group	Pyridinyl Group	Triazolyl group
Particle Size (µm)	3, 5	3, 5	3, 5	3, 5
Pore Size (nm)	12	12	12	12
Surface area (m^2/g)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)
Carbon Loading (%)	18	-	-	-
Pressure Tolerance (MPa)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)	50 (3µm), 30 (5µm)
Pore volume (mL/g)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)	1.00 (3µm), 0.90 (5µm)
End-capping	Yes	Yes	Yes	-
pH Range	2 - 7.5	-	-	2 - 7.5
USP Code	-	-	-	L104

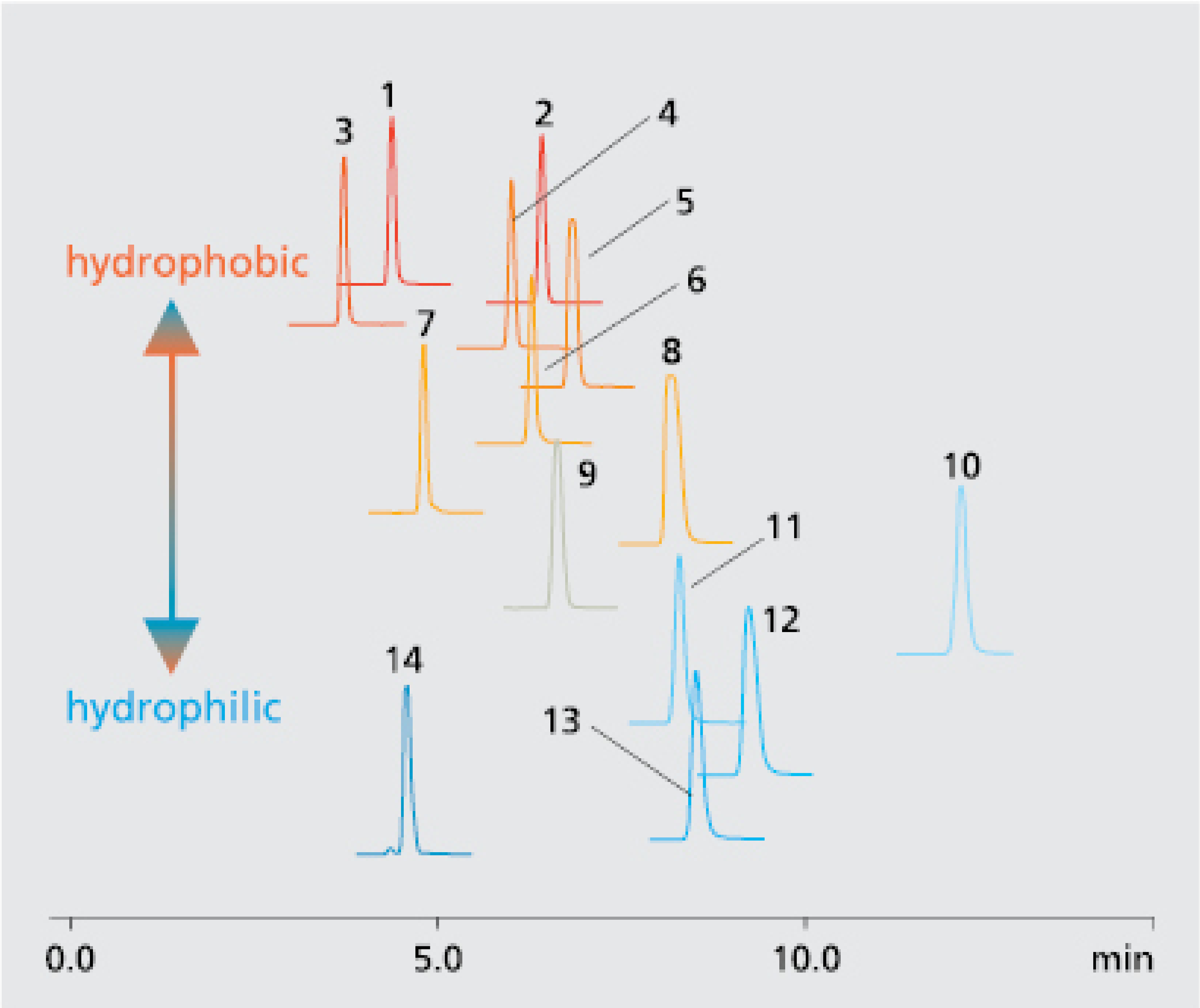
Analysis Examples

Multiple Pesticides with a Wide Polarity Range

Simultaneous analysis of multiple pesticides with a wide polarity range from hydrophobic to hydrophilic has been achieved using the Nexera UC and Shim-pack UC RP. Shim-pack UC RP contains a polar functional group embedded between the silica surface and the C18 group. This allows the column to analyze a wide range of components from hydrophobic to hydrophilic ones.

Simultaneous analysis of multiple components can now be performed more efficiently using the Nexera UC and Shim-pack UC series.

No.	Components	log P
1	Carbofuran	7.4
2	Ethofenprox	6.9
3	Fenpropathrin	6.0
4	Pyriproxyfen	5.0
5	Pyraclostrobin	4.0
6	Linuron	3.0
7	Aminocarb	1.9
8	Ethoxysulfuron	1.0
9	Halosulfuron methyl	0.0
10	Bentazone	–0.5
11	Chlorsulfuron	–1.0
12	Rimsulfuron	–1.5
13	Nicosulfuron	–1.8
14	Vamidothion	–4.2



Shim-pack UC Series

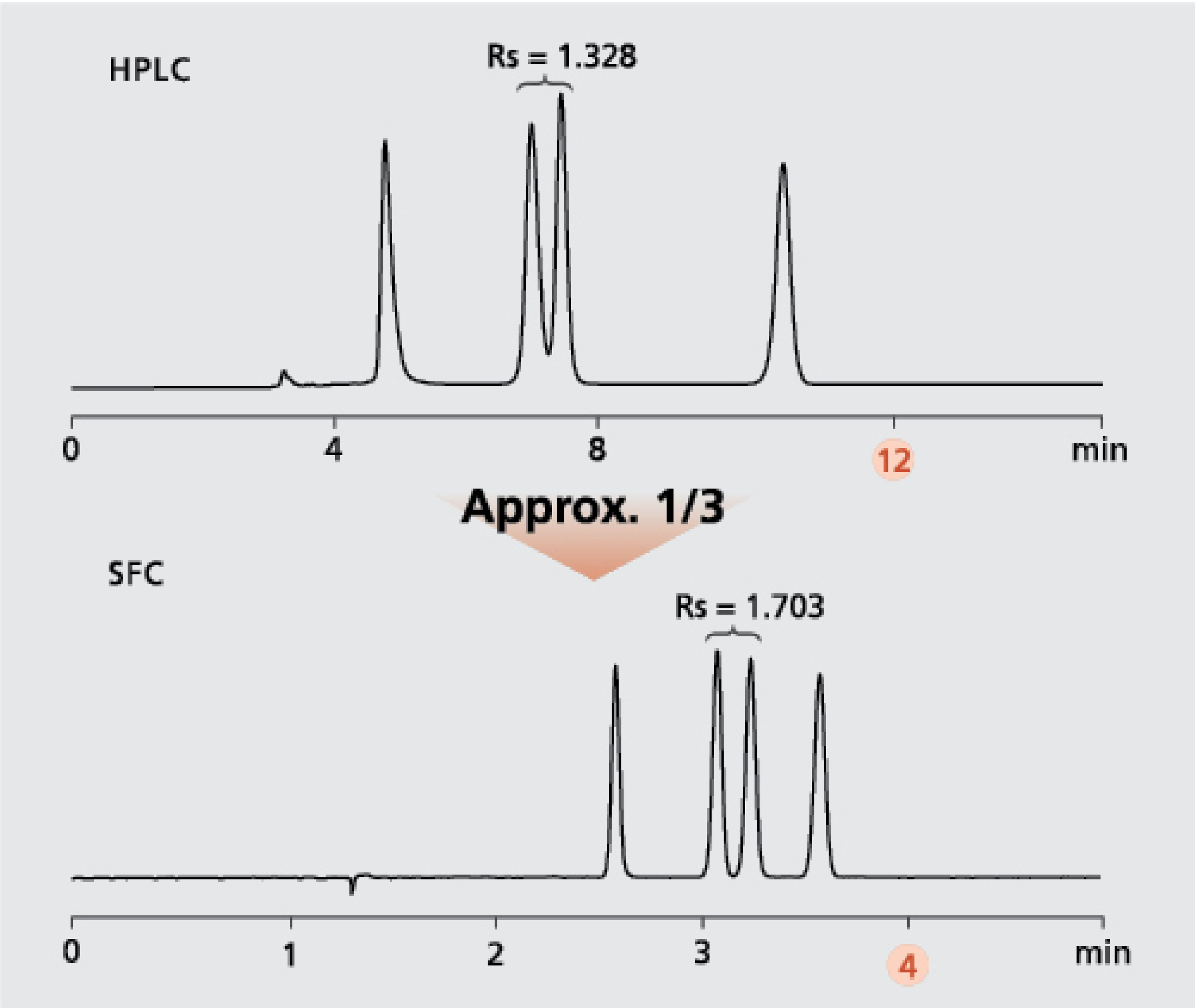
Analytical Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6
Shim-pack UC RP	3	150	227-30400-03	227-30401-03
		250	227-30400-04	227-30401-04
	5	150	227-30402-03	227-30403-03
		250	227-30402-04	227-30403-04
Shim-pack UC GIS II	3	150	227-30404-03	227-30405-03
		250	227-30404-04	227-30405-04
	5	150	227-30406-03	227-30407-03
		250	227-30406-04	227-30407-04
Shim-pack UC Phenyl	3	150	227-30424-03	227-30425-03
		250	227-30424-04	227-30425-04
	5	150	227-30426-03	227-30427-03
		250	227-30426-04	227-30427-04
Shim-pack UC CN	3	150	227-30428-03	227-30429-03
		250	227-30428-04	227-30429-04
	5	150	227-30430-03	227-30431-03
		250	227-30430-04	227-30431-04
Shim-pack UC Diol	3	150	227-30408-03	227-30409-03
		250	227-30408-04	227-30409-04
	5	150	227-30410-03	227-30411-03
		250	227-30410-04	227-30411-04
Shim-pack UC Sil	3	150	227-30412-03	227-30413-03
		250	227-30412-04	227-30413-04
	5	150	227-30414-03	227-30415-03
		250	227-30414-04	227-30415-04
Shim-pack UC Amide	3	150	227-30416-03	227-30417-03
		250	227-30416-04	227-30417-04
	5	150	227-30418-03	227-30419-03
		250	227-30418-04	227-30419-04
Shim-pack UC NH2	3	150	227-30420-03	227-30421-03
		250	227-30420-04	227-30421-04
	5	150	227-30422-03	227-30423-03
		250	227-30422-04	227-30423-04
Shim-pack UC-HyP	3	150	227-32600-01	-
	5	250	-	227-32600-02
Shim-pack UC-Py	3	150	227-32601-01	-
	5	250	-	227-32601-02
Shim-pack UC-PBr	3	150	227-32602-01	-
	5	250	-	227-32602-02
Shim-pack UC-Choles	3	150	227-32603-01	-
	5	250	-	227-32603-02
Shim-pack UC-PyE	3	150	227-32604-01	-
	5	250	-	227-32604-02
Shim-pack UC-Triazole	3	150	227-32605-01	-
	5	250	-	227-32605-02
Shim-pack UC-Sil II	3	150	227-32607-01	-
	5	250	-	227-32607-02
Shim-pack UC-Diol II	3	150	227-32606-01	-
	5	250	-	227-32606-02

Analysis Examples

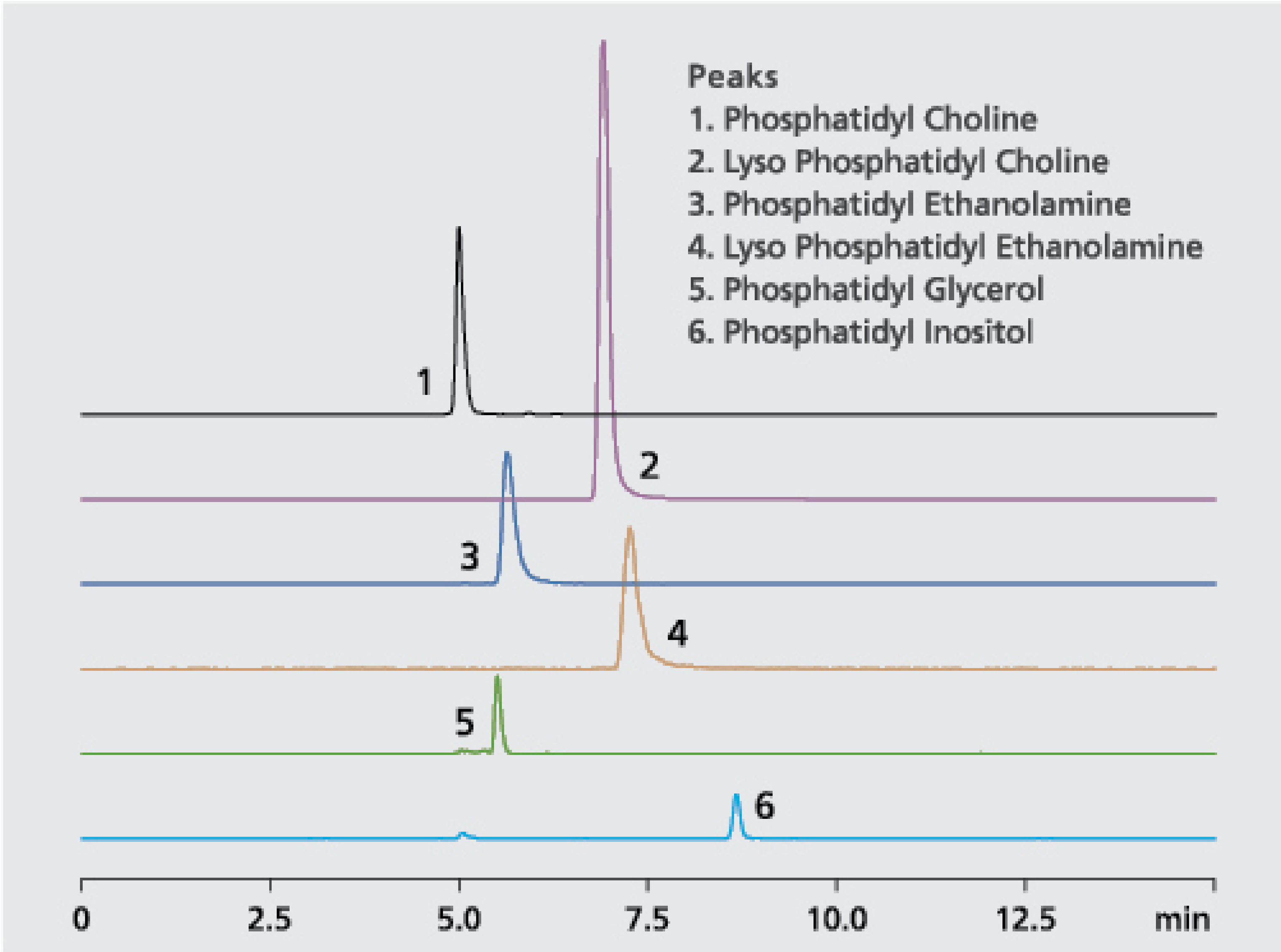
Tocopherol Isomers

Isomers and structurally similar compounds that are difficult to separate can be analyzed by Nexera UC and Shim-pack UC series at a high speed. In the example below, four kinds of tocopherol isomers were analyzed by Nexera UC and Shim-pack UC Sil. As shown below, analysis time was reduced to one-third the time analysis takes with a conventional HPLC method while resolution was improved.



Comparison of retention and resolution of tocopherol isomers between LC conditions and SFC ones

Phospholipid Classes



The example above shows the result of the analysis of phospholipid classes using Shim-pack UC Diol with Nexera UC. The ODS-based Shim-pack UC GIS II can also be used to analyze molecular species of phospholipids with the same modifiers. Nexera UC and Shim-pack UC series are ideal for analyzing complex samples.

Preparative Columns

Column	Particle Size (µm)	I.D. (mm) / Length (mm)	10	20	28
Shim-pack UC-HyP	5	250	227-32600-03	227-32600-04	227-32600-05
└ Guard Column	5	20	227-32600-06	-	-
Shim-pack UC-Py	5	250	227-32601-03	227-32601-04	227-32601-05
└ Guard Column	5	20	227-32601-06	-	-
Shim-pack UC-PBr	5	250	227-32602-03	227-32602-04	227-32602-05
└ Guard Column	5	20	227-32602-06	-	-
Shim-pack UC-Choles	5	250	227-32603-03	227-32603-04	227-32603-05
└ Guard Column	5	20	227-32603-06	-	-
Shim-pack UC-PyE	5	250	227-32604-03	227-32604-04	227-32604-05
└ Guard Column	5	20	227-32604-06	-	-
Shim-pack UC-Triazole	5	250	227-32605-03	227-32605-04	227-32605-05
└ Guard Column	5	20	227-32605-06	-	-
Shim-pack UC-Sil II	5	250	227-32607-03	227-32607-04	227-32607-05
└ Guard Column	5	20	227-32607-06	-	-
Shim-pack UC-Diol II	5	250	227-32606-03	227-32606-04	227-32606-05

Cannabis Analysis Columns

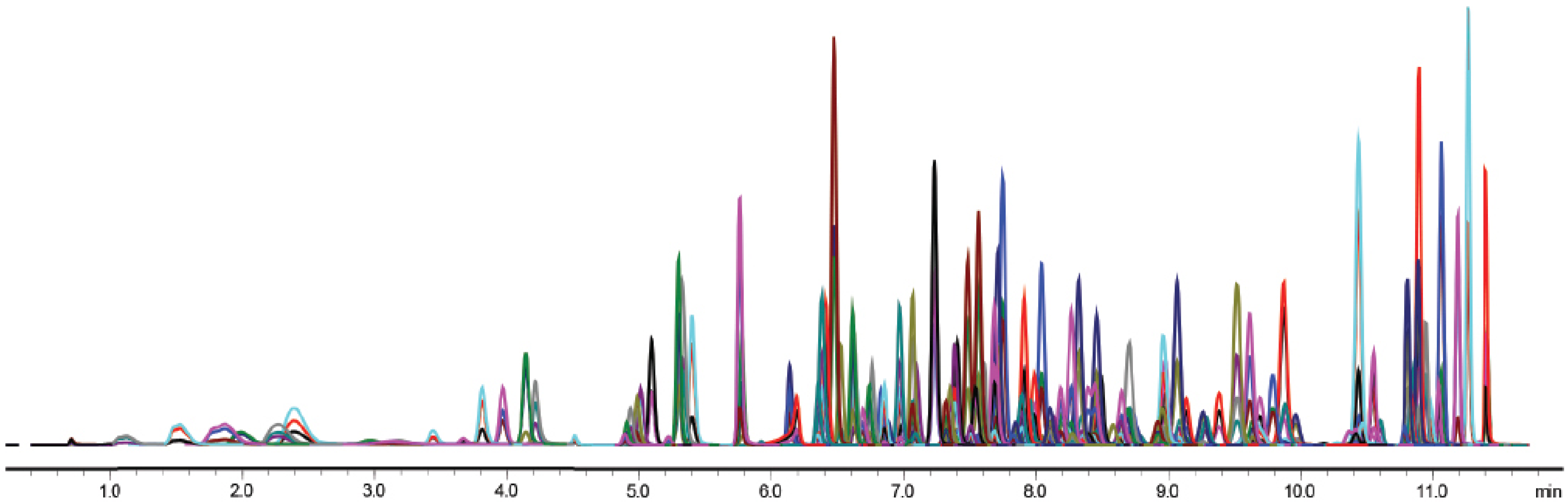
NexLeaf® Columns

Separating the Impossible

NexLeaf®, a superficially porous series of HPLC columns engineered to achieve the ultimate in resolution and sensitivity in the most challenging cannabis matrix. Each NexLeaf® column has both analytical and guard columns available.

NexLeaf® for Pesticides

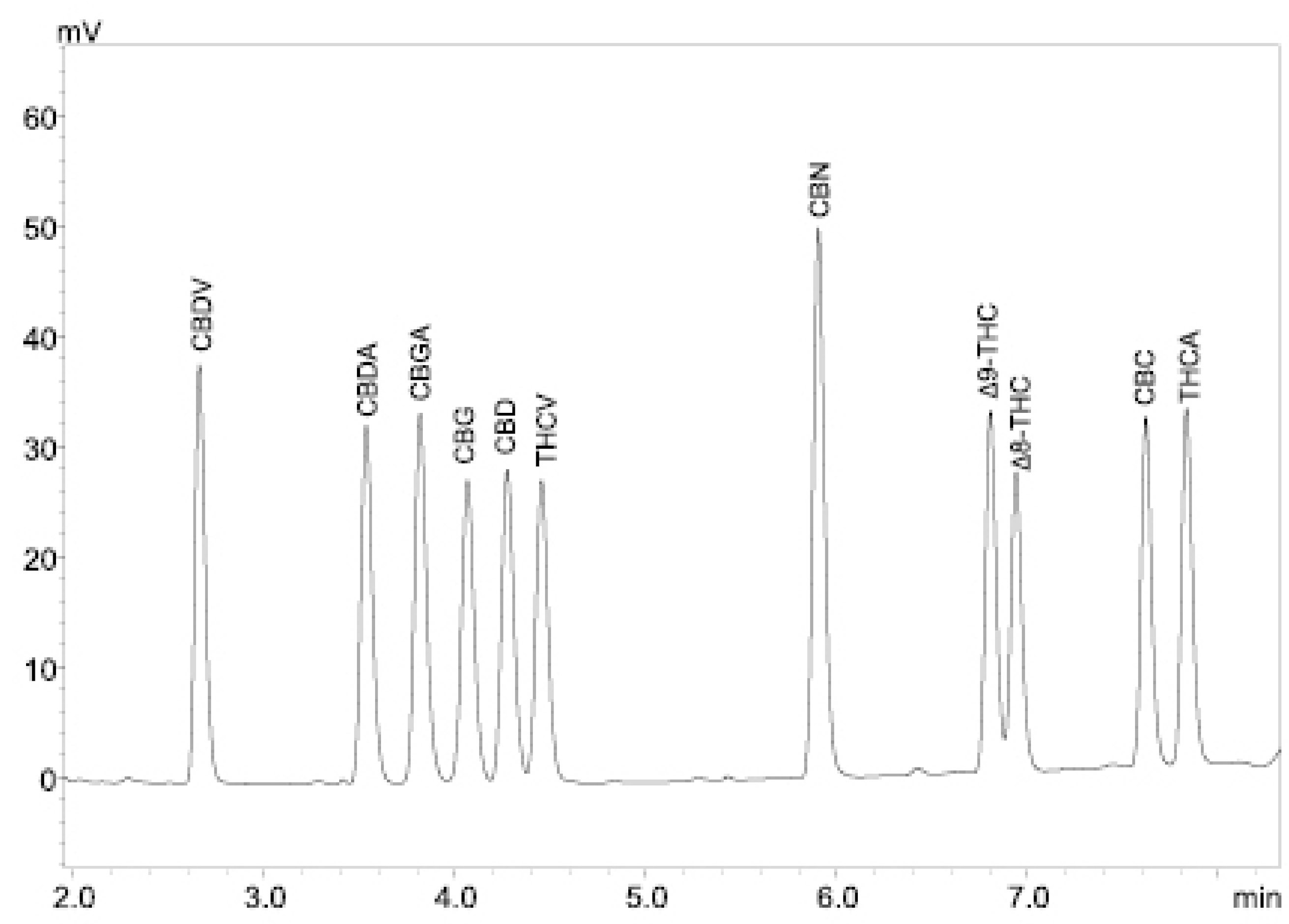
Provides the Ultimate separation for all your multi-residue pesticide analysis needs.



NexLeaf® CBX™ for Potency

Designed for the best separations of cannabinoids allowing for accurate potency determination of each analyte.

Part Number	Description
220-91525-70	NexLeaf CBX for Potency, 2.7µm, 4.6 X 150mm
220-91525-71	NexLeaf CBX for Potency, 2.7µm, 2.1 X 100mm
220-91525-72	NexLeaf CBX for Potency, 2.7µm, Guard Cartridge, 3/pk
220-91525-73	NexLeaf Guard Column Cartridge Holder
220-91525-74	NexLeaf for Pesticides, 2.7µm, 2.1 X 150mm

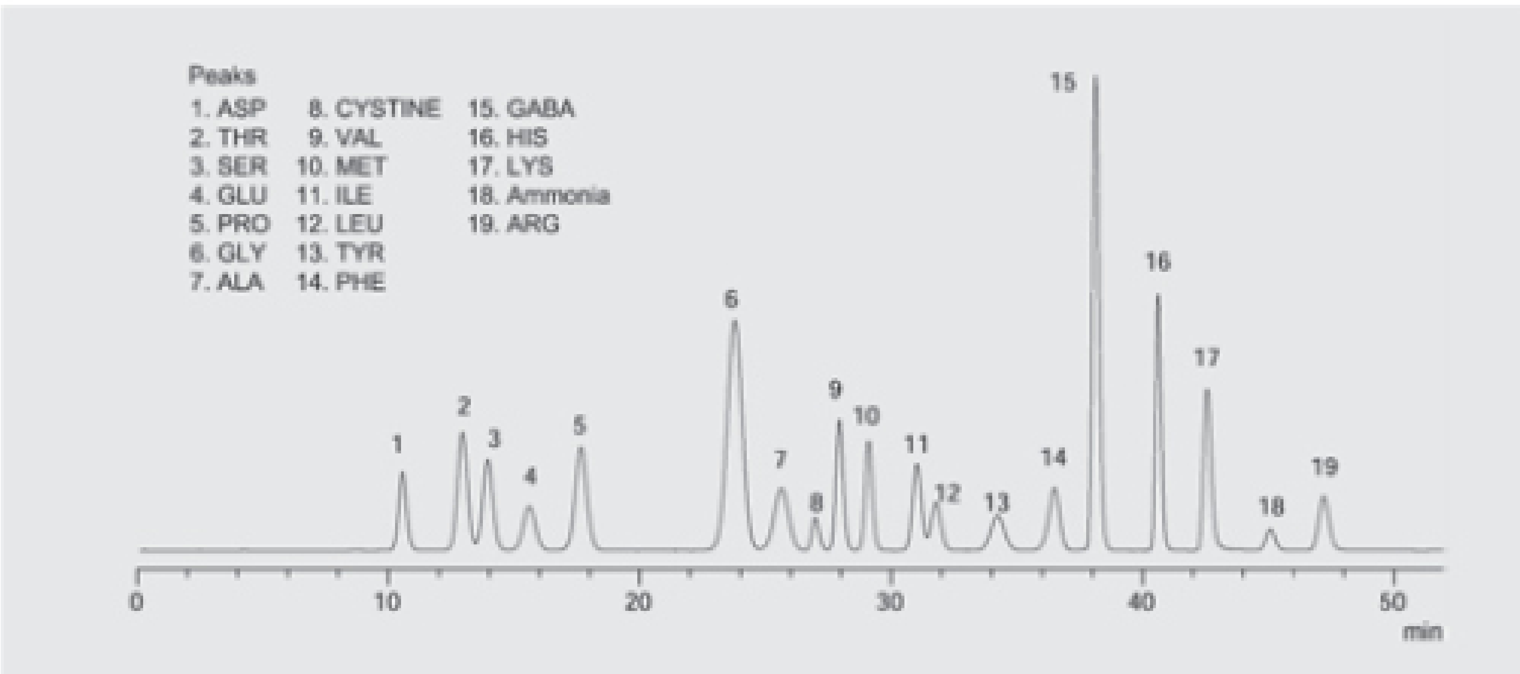


Analysis of Amino Acids

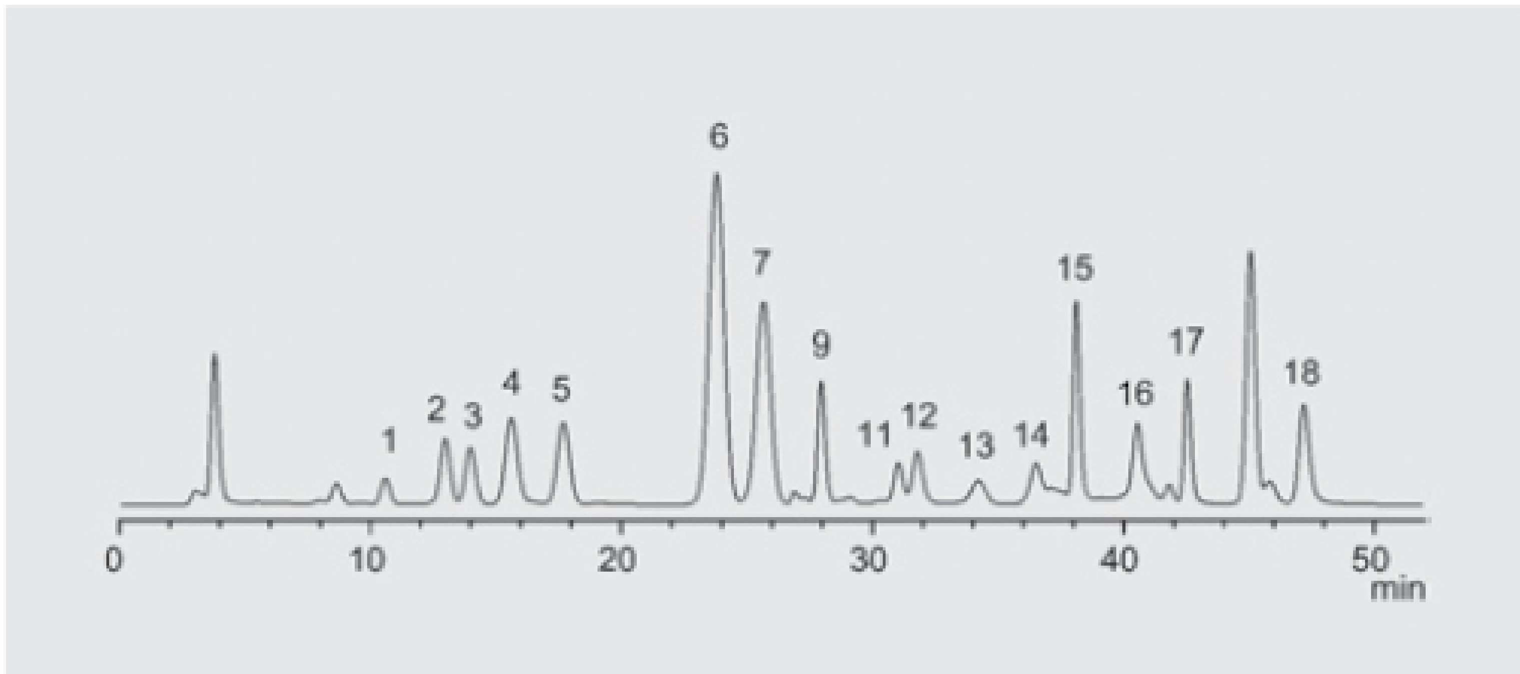
Shim-pack Amino Series

Examples of Cation Analysis

Shim-pack Amino series uses polystyrene gel as solid support, making it possible to utilize both electrostatic reaction and hydrophobic reaction. It is ideal for the analysis of amino acids.



Analysis of Amino Acid Standard



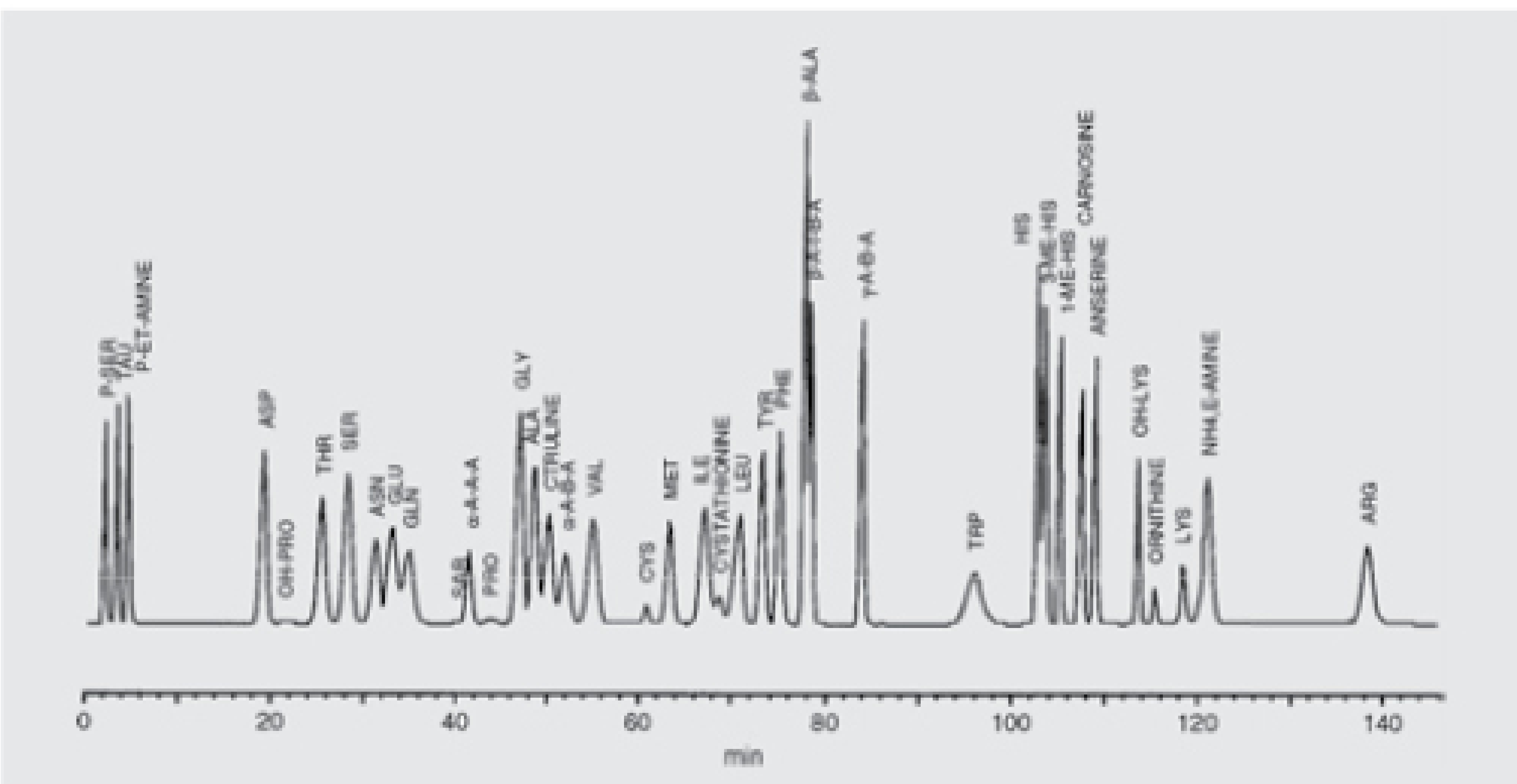
Analysis of Vinegar

Conditions

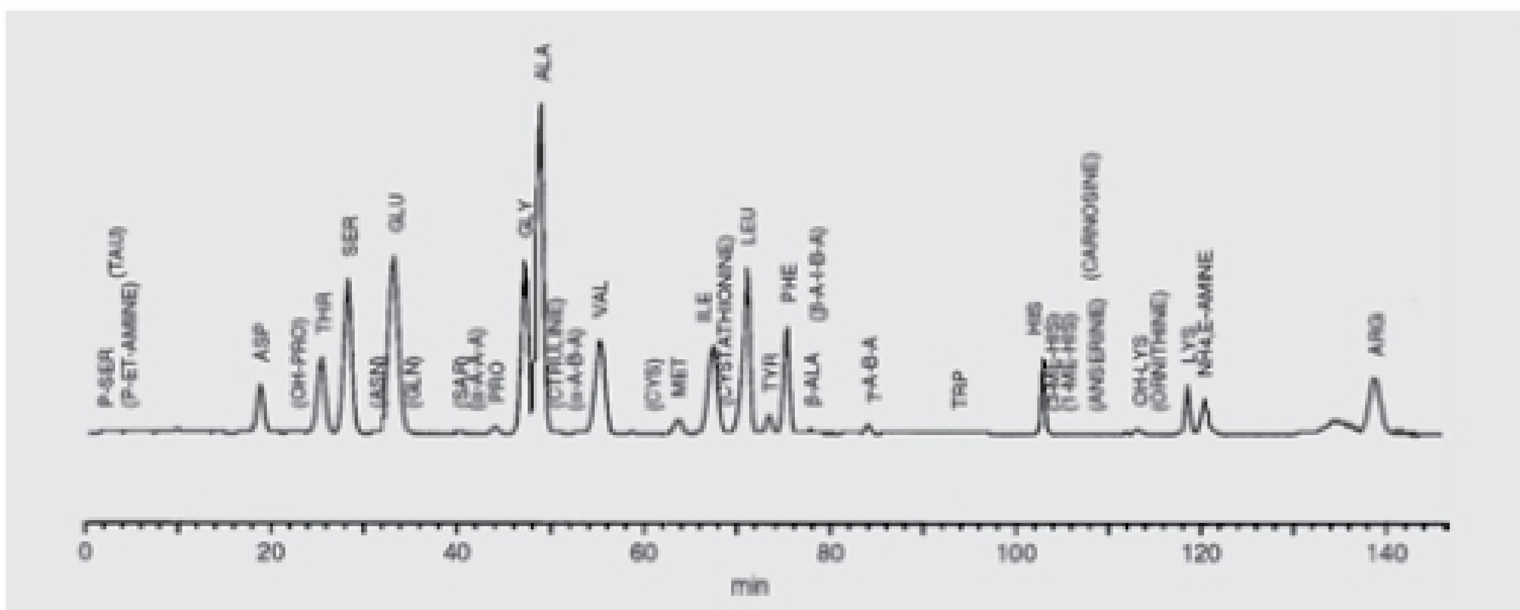
Column : Shim-pack Amino-Na (100 mmL × 6.0 mmI.D., 5 µm) (P/N: 228-18837-91)
Mobile Phase : Mobile phase kit for amino acid analysis (Na Type) (P/N: 228-21195-94)
Flow Rate : 0.4 mL/min
Col. Temp. : 60 °C
Detection : RF (Post-column derivation)

Peaks

1. ASP	6. GLY	11. ILE	16. HIS
2. THR	7. ALA	12. LEU	17. LYS
3. SER	8. CYSTINE	13. TYR	18. ARG
4. GLU	9. VAL	14. PHE	
5. PRO	10. MET	15. GABA	



Simultaneous Analysis of 38 Amino Acids



Analysis of Soy Sauce

Conditions

Column : Shim-pack Amino-Li (100 mmL × 6.0 mmI.D., 5 µm) (P/N: 228-18837-92)
Mobile Phase : Mobile phase kit for amino acid analysis (Li Type) (P/N: 228-21195-95)
Flow Rate : 0.6 mL/min
Col. Temp. : 39 °C
Detection : RF-10AXL Ex. 350 nm, Em. 450 nm

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack AMINO-NA	Na type sulfone group	5	100 × 6.0	228-18837-91	228-18837-93 *
Shim-pack AMINO-LI	Li type sulfone group	5	100 × 6.0	228-18837-92	-

* Dedicated for the analysis of cyanide. Please do not use it in the analysis of amino acids.

In the analysis of amino acids, the following trap columns are required.

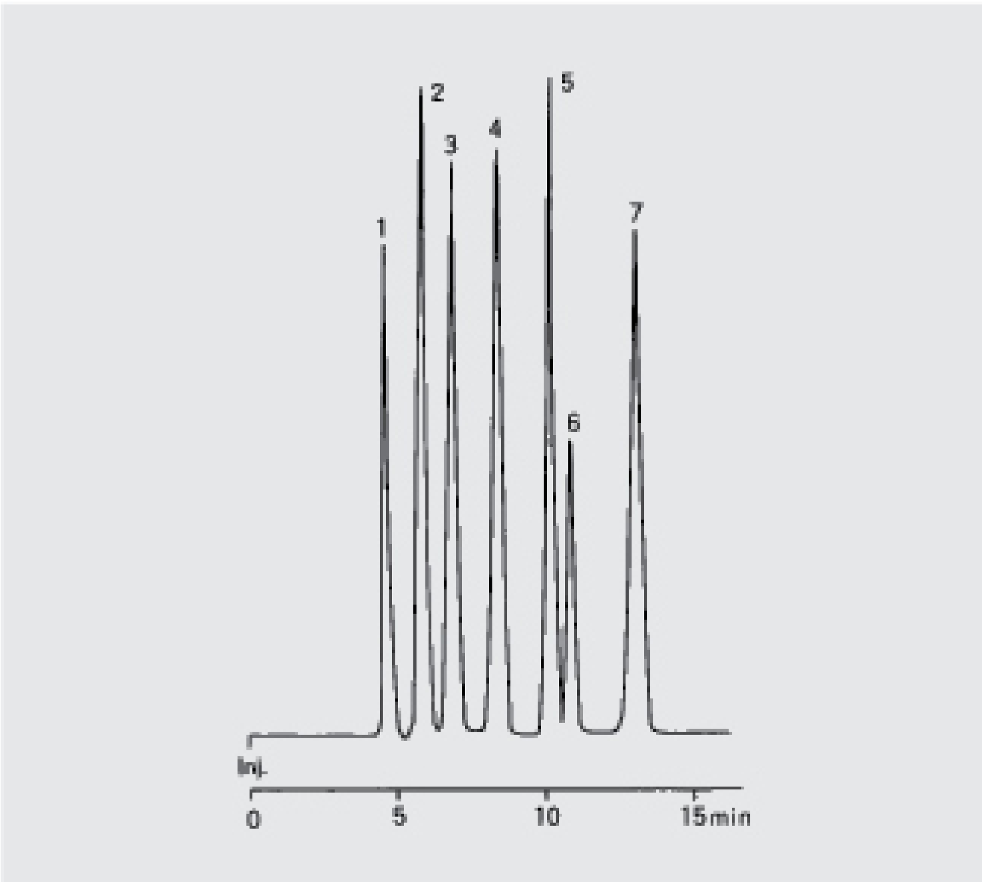
Description	Dimensions (Length × I.D., mm)	P/N
ISC-30/S 0504 NA (For trapping Na type ammonia)	50 × 4.0	228-14206-91
ISC-30/S 0504 LI (For trapping Li type ammonia)	50 × 4.0	228-00821-91

Analysis of Sugar and Organic Acid

Shim-pack SCR Series

Shim-pack SCR-101N/C/P are suitable for the analysis of monosaccharides. Since the samples are separated under a mixed mode of gel filtration and ligand exchange, the selectivity differs depending on the type of cation.

Shim-pack SCR-101H and SCR-102H are ion exclusion chromatography columns, using H type sulfonated styrene polymer as stationary phase. They are ideal for analysis of organic acids using an acid aqueous solution (e.g. aqueous solution of perchloric acid) as mobile phase.



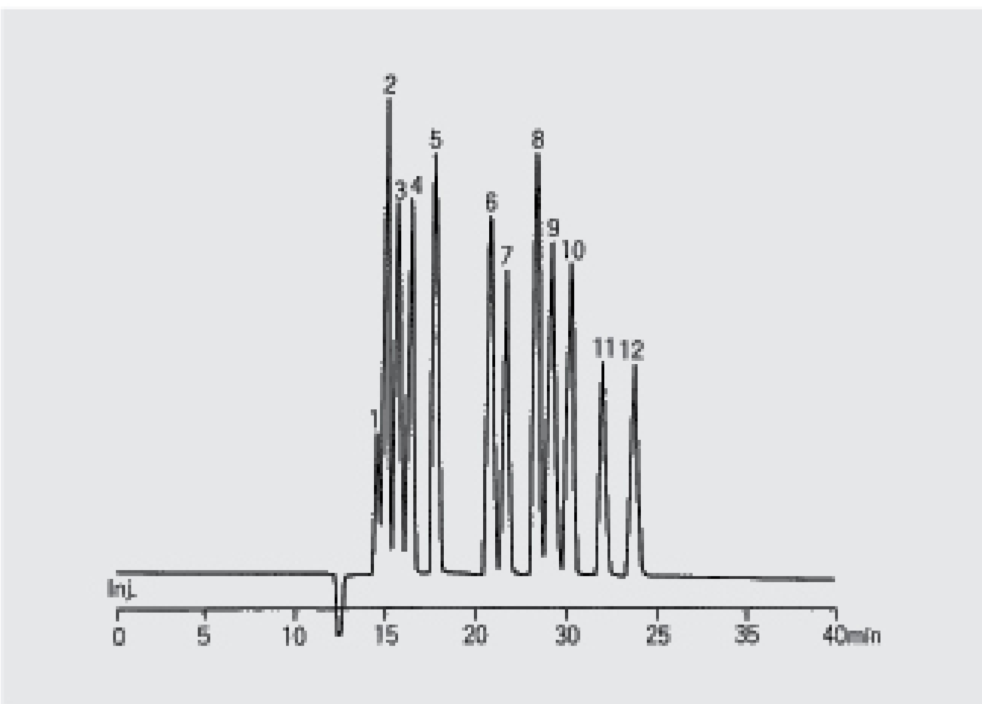
Analysis of Saccharide Standard

Peaks

1. PEG 4000
2. Maltose
3. Glucose
4. Fructose
5. Glycerol
6. Ethanol
7. Sorbitol

Conditions

Column : Shim-pack SCR-101C (300 mmL × 7.9 mmI.D., 10 μm) (P/N: 228-17889-91)
Mobile Phase : Water
Flow Rate : 1.0 mL/min
Col. Temp. : 80 °C
Detection : RID



Analysis of Organic Acids

Peaks

1. Phosphoric acid
2. α-Ketoglutaric acid
3. Citric acid
4. Pyruvic acid
5. Malic acid
6. Succinio acid
7. Lactic acid
8. Formic acid
9. Fumaric acid
10. Acetic acid
11. Levulinic acid
12. Pyroglutamic acid

Conditions

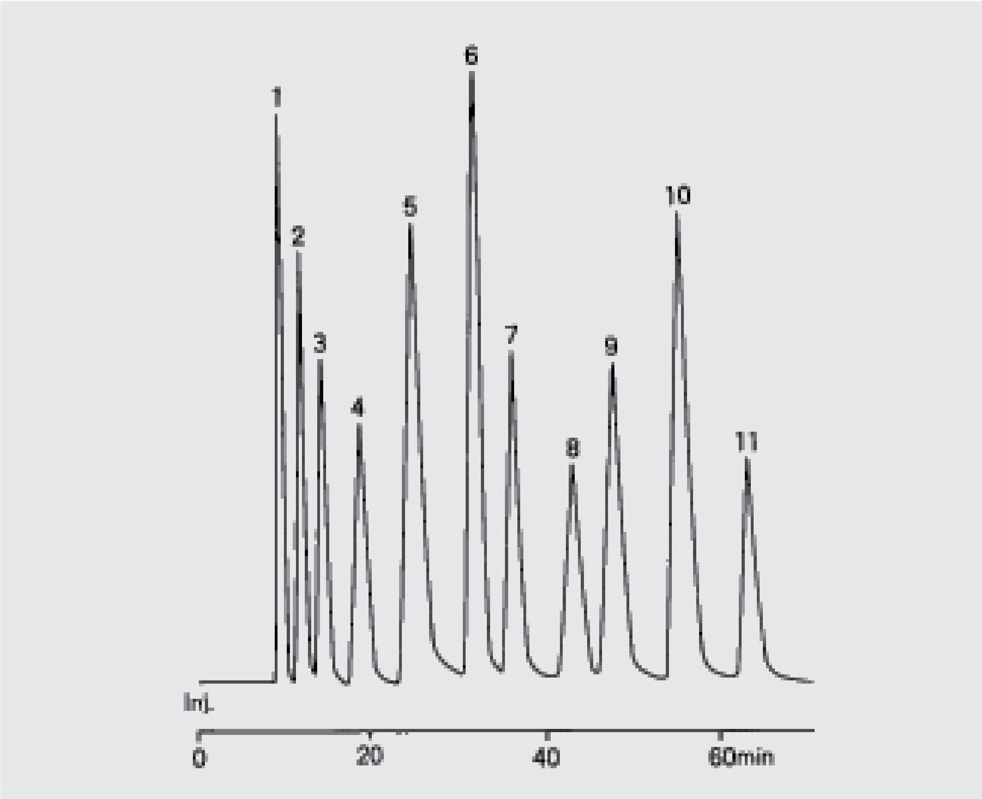
Column : Shim-pack SCR-102H (2 columns in series) (P/N: 228-17893-91)
Mobile Phase : 5 mM p-Toluene sulfonic acids aqueous solution
Flow Rate : 0.8 mL/min
Col. Temp. : 40 °C
Detection : CDD (pH buffer organic acids analysis system)

Product Information

Column	Stationary Phase	Particle Size (μm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack SCR-101N	Na type sulfone group	10	300 × 7.9	228-07730-92	228-09619-92
Shim-pack SCR-101C	Ca type sulfone group	10	300 × 7.9	228-17889-91	228-17891-91
Shim-pack SCR-101P	Pb type sulfone group	10	300 × 7.9	228-17890-91	228-17892-91
Shim-pack SCR-101H	H type sulfone group	10	300 × 7.9	228-07730-93	228-09619-93
Shim-pack SCR-102H	H type sulfone group	7	300 × 8.0	228-17893-91	228-17924-91

Shim-pack ISA/ISC Series

Shim-pack ISA/ISC series uses polystyrene gel as solid support, making it possible to utilize both electrostatic reaction and hydrophobic reaction. They are suitable for the analysis of sugars (ISA) and guanidiono compounds (ISC-05).



Analysis of Saccharides Standards

Peaks

1. Sucrose
2. Cellobiose
3. Maltose
4. Lactose
5. Rhamnose
6. Ribose
7. Mannose
8. Fructose
9. Galactose
10. Xylose
11. Giucose

Conditions

Column : Shim-pack ISA-07/S2504 (250 mmL × 4.0 mmI.D., 7 μm) (P/N: 228-09699-91)
Mobile Phase : Potassium borate buffer solution
gradient elution
Flow Rate : 0.6 mL/min
Col. Temp. : 65 °C
Detection : RF EX. 348 nm, Em. 430 nm
(Post-column derivatization with arginine)

Product Information

Column	Stationary Phase	Particle Size (μm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack ISA-07/S 2504	Quaternery ammonium group	7	250 × 4.0	228-09699-91	228-00823-91
Shim-pack ISC-05/S 0504	Na type sulfone group	5	38 × 4.6	228-09700-91	228-00802-91
Shim-pack ISC-07/S 1504	Na type sulfone group	7	150 × 4.0	228-09328-91	
Shim-pack ISC-07/S 1504 Li	Li type sulfone group	7	150 × 4.0	228-00796-91	228-00797-91

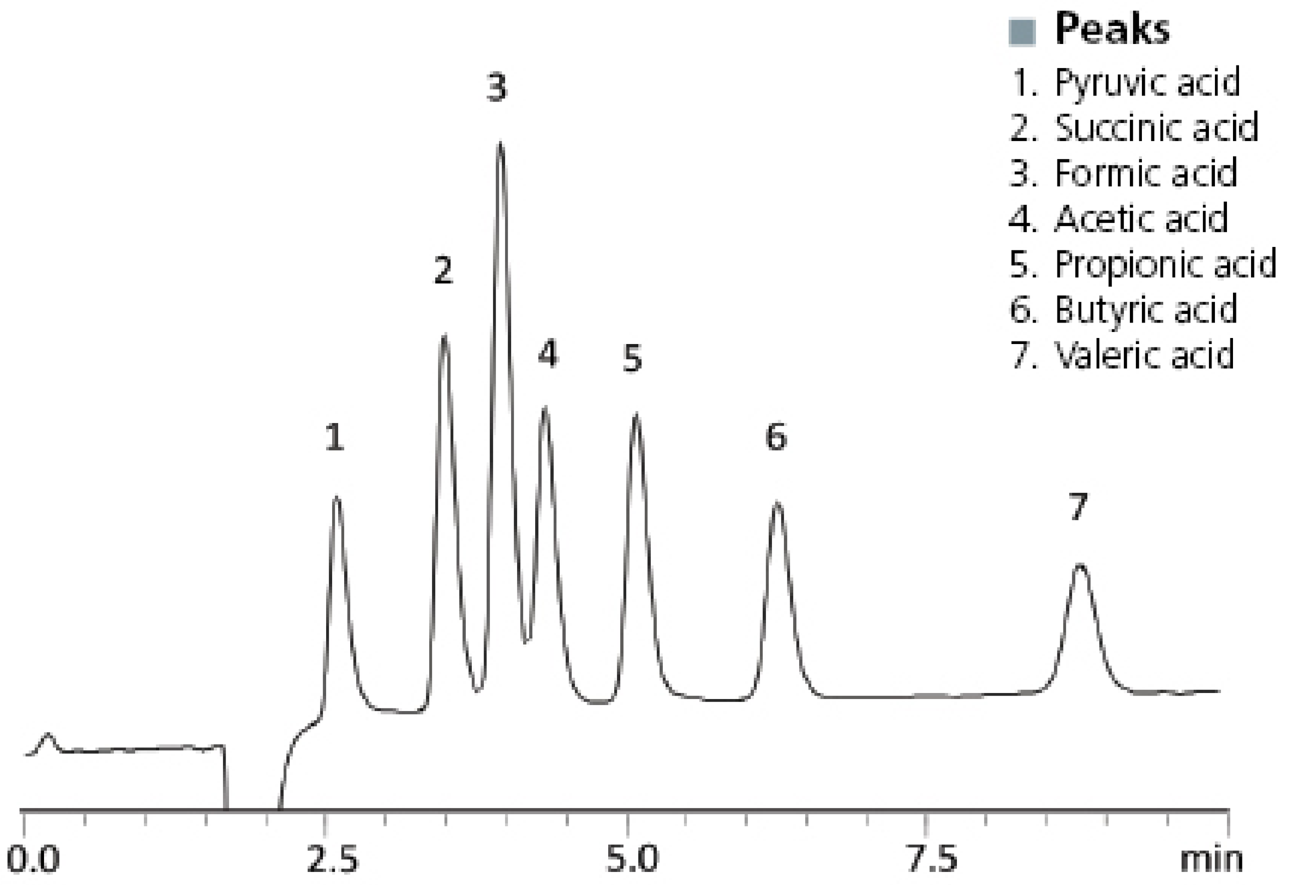
Shim-pack Fast-OA

High-speed analysis of organic acids

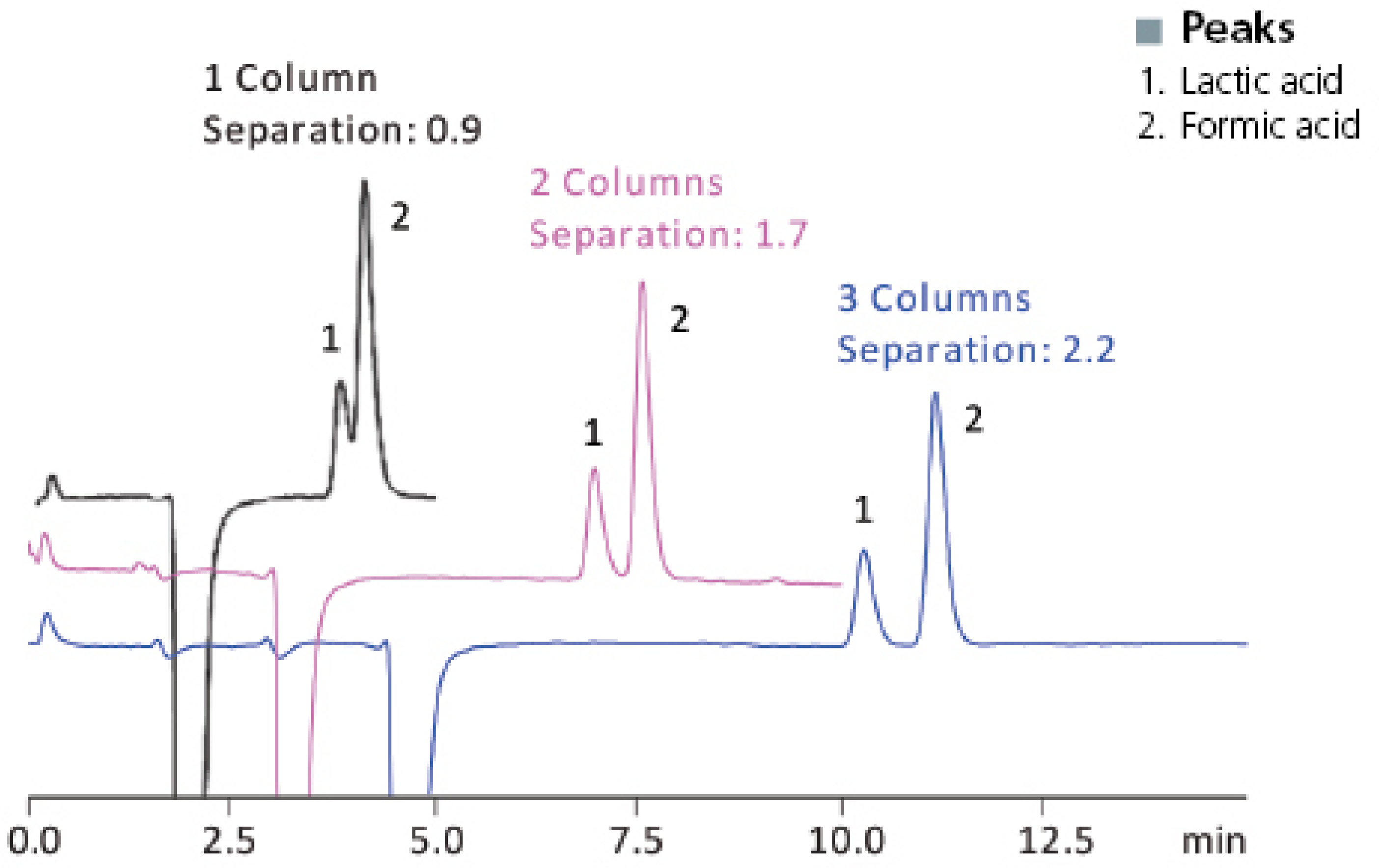
Shim-pack Fast-OA columns are packed with an ion-exclusion polymer, and utilizing an acidic mobile phase, can separate mixture solutions based on the pKa value of each sample component. The Shim-pack Fast-OA is a column for the high speed analysis of organic acids. It can separate multiple organic acids in a short time and supports real-time monitoring of their concentration levels.

Analysis Examples

Analysis of Short-Chain Fatty Acids



Improved Separation: Columns in Series



Because the column design is optimized for the high-speed analysis of organic acids, even short-chain fatty acids such as valeric acid are eluted within 10 minutes. If separation with one column is not enough, up to three Shim-pack Fast-OA columns can be connected in series to improve the separation

Conditions

Column	:	Shim-pack Fast-OA (P/N: 228-59942-41) + Shim-pack Fast-OA (G) (P/N: 228-59942-42)
Mobile Phase	:	5 mmol/L p-Toluenesulfonic acid
pH buffering solution	:	5 mmol/L p-Toluenesulfonic acid, 20 mmol/L Bis- Tris, 0.1 mmol/L EDTA
Flow Rate	:	0.8 mL/min
Detection	:	Conductivity Detector (CDD-10AVP)

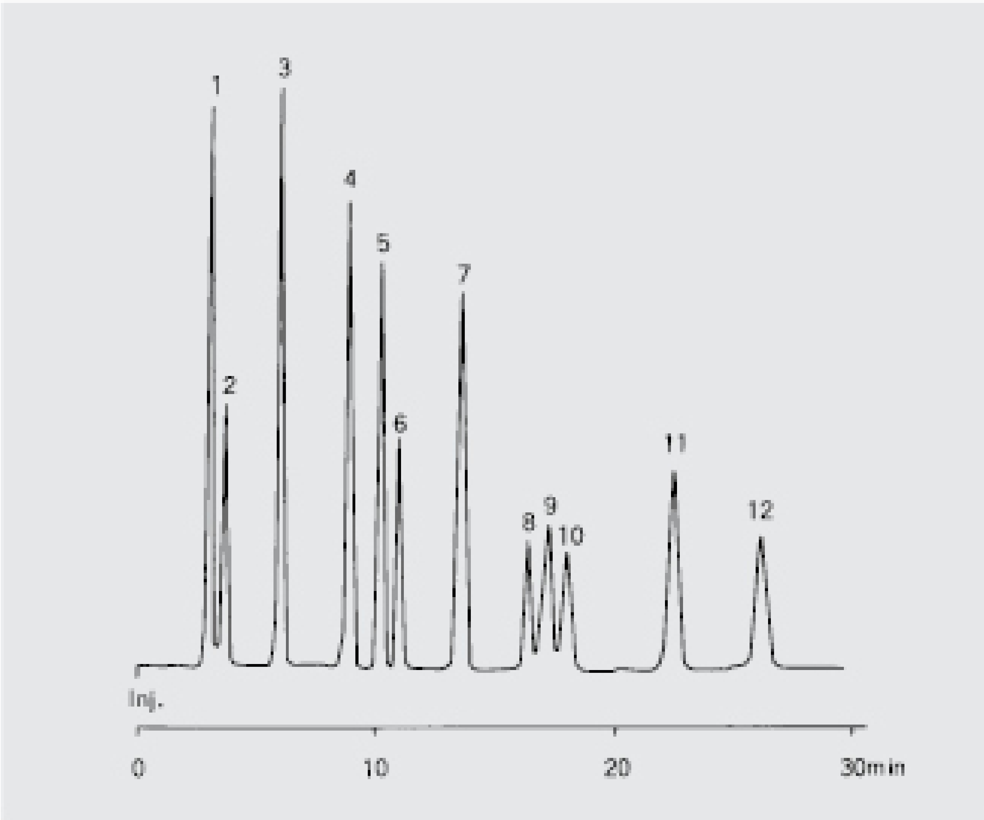
Product Information

Product Name	Length x I.D.	Part Number
Shim-pack Fast OA	100 mm x 7.8 mm	228-59942-41
Guard column + Holder	10 mm x 4.0 mm	228-59942-42
Guard column (4 pcs)	10 mm x 4.0 mm	228-59942-43

Analysis of Nucleotides, Oligonucleotides and Protein

Shim-pack WAX/WCX Series

Shim-pack WAX/WCX series columns are chemically-bonded hydrophilic silica gel based ion exchange columns. Shim-pack WAX-1 is ideal for analysis of nucleotides and oligonucleotides while Shim-pack WAX-2 and WCX-1 is ideal for analysis of proteins.



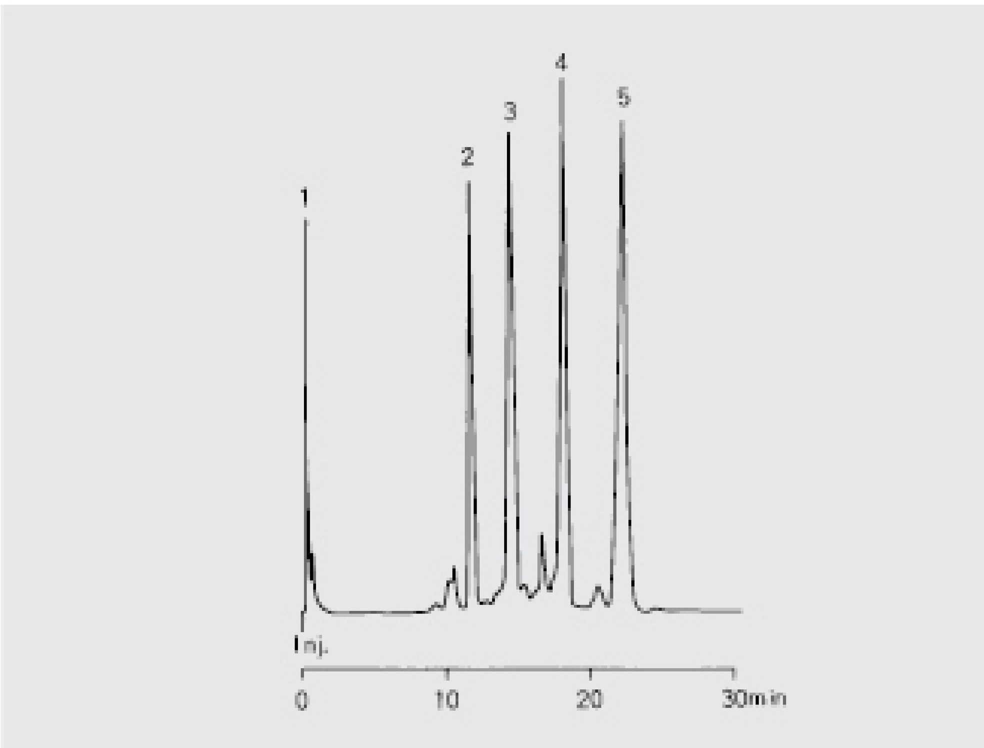
Analysis of Mononucleotides

Peaks

1. UMP
2. CMP
3. AMP
4. GMP
5. UDP
6. CDP
7. ADP
8. UTP
9. GDP
10. CTP
11. ATP
12. GTP

Conditions

Column : Shim-pack WAX-1 (50 mmL × 4.0 mmI.D., 3 µm) (P/N: 228-16225-91)
Mobile Phase : A) 20mM phosphate buffer solution (pH 7)
B) 480mM phosphoric acid buffer solution (pH 6.85)
gradient elution
Flow Rate : 1.0 mL/min
Col. Temp. : 45 °C
Detection : UV 260 nm



Analysis of Protein Standard

Peaks

1. Ovalbumin
2. Myoglobin
3. α-Chymotrypsinogen A
4. Ribonuclease A
5. Lysozyme

Conditions

Column : Shim-pack WCX-1 (50 mmL × 4.0 mmI.D., 5 µm) (P/N: 228-16366-91)
Mobile Phase : A) 20mM phosphate buffer solution (pH 6.0)
B) Sodium sulfate
gradient elution
Flow Rate : 1.0 mL/min
Col. Temp. : Ambient
Detection : UV 415 nm

Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack WAX-1	Tertiary amino group	3	50 × 4.0	228-16225-91
Shim-pack WAX-1	Tertiary amino group	3	150 × 4.6	228-16225-92
Shim-pack WAX-1T	Tertiary amino group	3	50 × 4.6	228-18257-91
Shim-pack WAX-2	Tertiary amino group	5	50 × 4.0	228-16365-91
Shim-pack WCX-1	Carboxyl group	5	50 × 4.0	228-16366-91
Pre-column Diol *	Diol group	10	50 × 4.0	228-16367-91

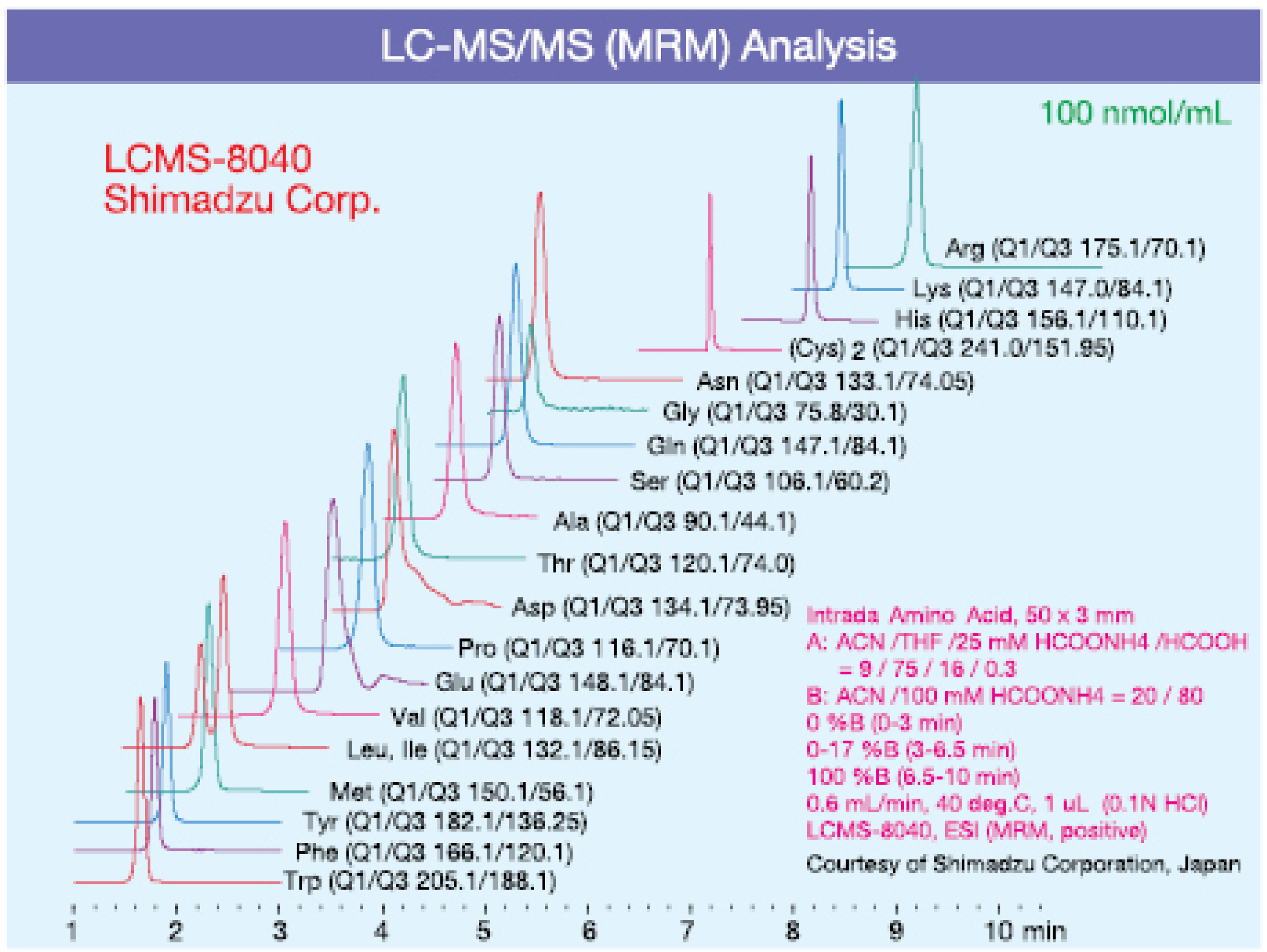
* Installed between the liquid pump and the sample injector to protect the column.

Intrada Amino Acid column

The world's first specialty column for intact amino acid analysis via LC-MS Compatible with conventional LC-MS, providing fast and easy amino acid analysis without sample derivatization. Ability to separate isobaric amino acids such as Leu and Ile. High-throughput (<1 minute) analysis for selected amino acids, 5-10 minutes for standard amino acids analysis.

Features

- For analysis of amino acids that couples well with MS detection and does not require use of an amino acid analysis system:
- When coupled to LCMS the Intrada Amino Acid column achieves high-throughput analysis without requiring tedious pre- or post-labeling methods
- Use of various column dimensions can aid in optimizing analytical time and resolution for different amino acid samples
- Separation of leucine and isoleucine isomers, GABA isomers and dipeptides analysis is now possible
- Separation free amino acids in mixtures
- Study protein amino acid composition
- Isolate amino acid bio-markers



Particle Size (µm)	Length/ mm	ID		
		1 mm	2 mm	3 mm
3	10	-	APAIMT-WAA20	APAIMT-WAA30
	20	-	APAIMT-WAA29	APAIMT-WAA39
	30	APAIMT-WAA11	APAIMT-WAA21	APAIMT-WAA31
	50	APAIMT-WAA12	APAIMT-WAA22	APAIMT-WAA32
	75	APAIMT-WAA13	APAIMT-WAA23	APAIMT-WAA33
	100	APAIMT-WAA14	APAIMT-WAA24	APAIMT-WAA34
	150	APAIMT-WAA15	APAIMT-WAA25	APAIMT-WAA35
	250	APAIMT-WAA16	APAIMT-WAA26	APAIMT-WAA36

Ion Chromatography Columns

Shim-pack IC Series

Ion chromatography (IC) is used for analysis of inorganic and organic ions. It is categorized as suppressor IC and non-suppressor IC. Non-suppressor IC is composed of a conventional HPLC system combined with a conductivity detector, while suppressor IC requires an extra suppressor.

Type	Analysis	Column	Description
Non-Suppressor Type	Anion Analysis	Shim-pack IC-A1	Capable of analyzing inorganic anions. Compatible with acid or basic mobile phases of wide pH range.
		Shim-pack IC-A3	Provides outstanding separation efficiency in the analysis of inorganic anions and acid ions, especially when weakly acid mobile phase is used.
	Cation Analysis	Shim-pack IC-C1	Capable of analyzing cations such as alkaline metal ions, alkali earth metal ions, transition metal ions, rare earth metal ions, and alkyl amines.
		Shim-pack IC-C4	Capable of simultaneous analysis of alkali metal ions and alkaline earth metal ions. Enhances the separation of sodium and ammonium ions.
Suppressor Type	Anion Analysis	Shim-pack IC-SA2	Capable of determining fluoride ions, chloride ions, nitrite ions, bromide ions, nitrate ions, phosphate ions and sulfuric acid ions.
		Shim-pack IC-SA3	Provides high-resolution performance when analyzing fluoride ions, chloride ions, nitrous acid ions, bromide ions, nitric acid ions, phosphate ions and sulfuric acid ions as well as chlorous acid ions, chloric acid ions and bromic acid ions.
	Cation Analysis	Shim-pack IC-SC1	Also can be used in non-suppressor IC. Suitable for the analysis of water quality.

Shim-pack IC Series

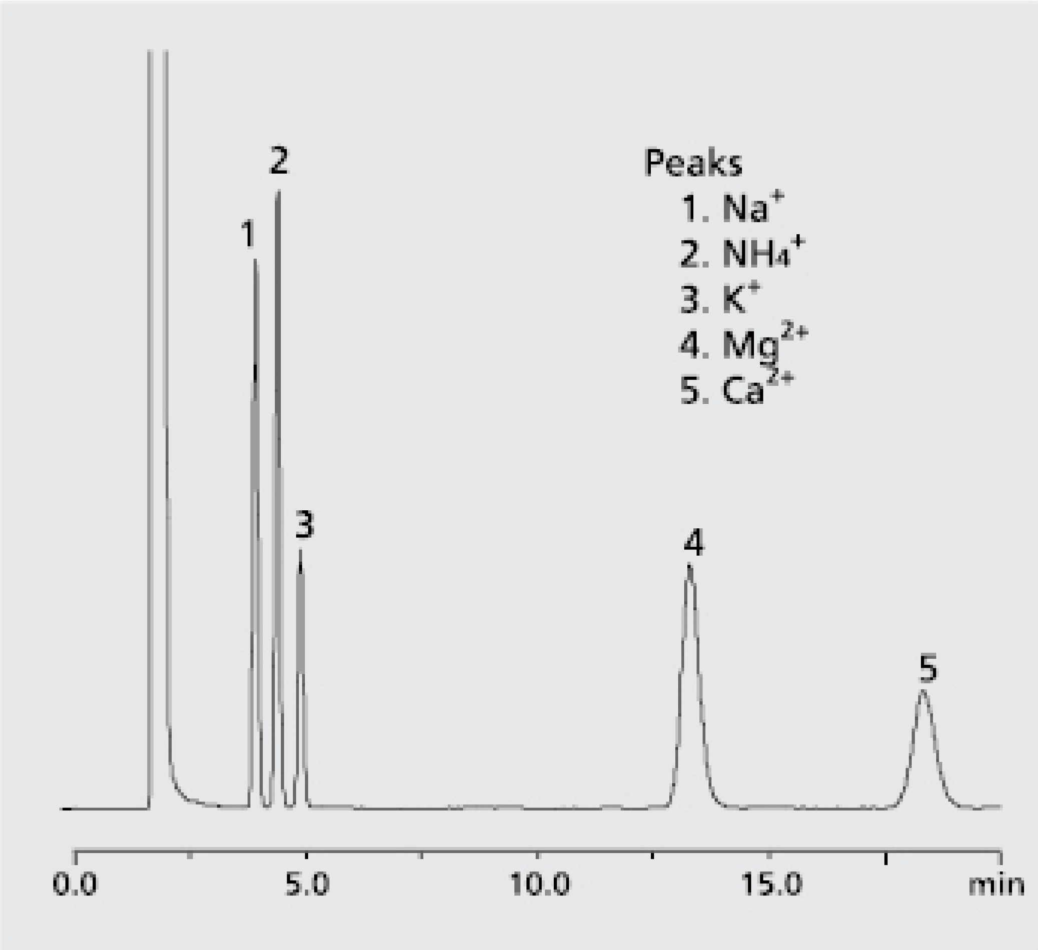
Analysis Examples

Examples of Cation Analysis

Shim-pack IC-C4 is a cation analysis column for non-suppressor IC. Because the pH of the mobile phase can be changed by selecting a different combination of acid and base in eluent, non-suppressor IC enables various kinds of analysis.

High Resolution of Na+ and NH4+

High resolution of Na+ and NH4+ has been achieved by improving the peak shape of Na+. The influence on the peak shape of NH4+ from a high concentration of Na+ has been reduced, making it possible to analyze tap water of normal concentration under standard mobile phase conditions. The resolution can be further improved by using a mobile phase treated with 18-crown-6 additive.



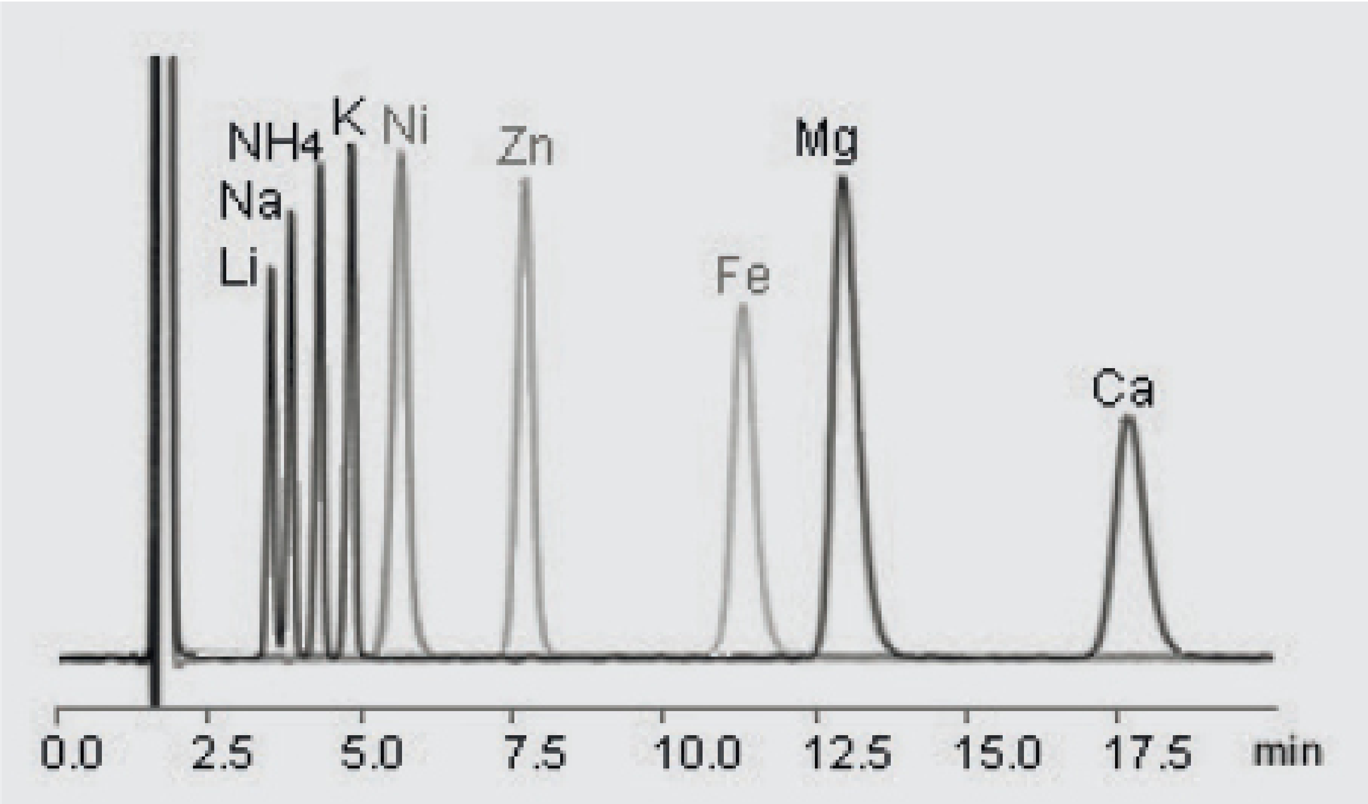
Analyses of a Standard Mixture of 5 Cations

Conditions

Column	: Shim-pack IC-C4 (150 mmL × 4.6 mmI.D., 7 µm) (P/N: 228-41616-91)
Mobile Phase	: 2.5 mmol/L oxalic acid
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: CDD
Injection Vol.	: 50 µL

Flexible Mobile Phase Selection

Due to the features of non-suppressor IC, flexible mobile phase composition can be used. Besides normal inorganic cations, Shim-pack IC-C4 is capable of analyzing transition metals by using a mixed mobile phase.



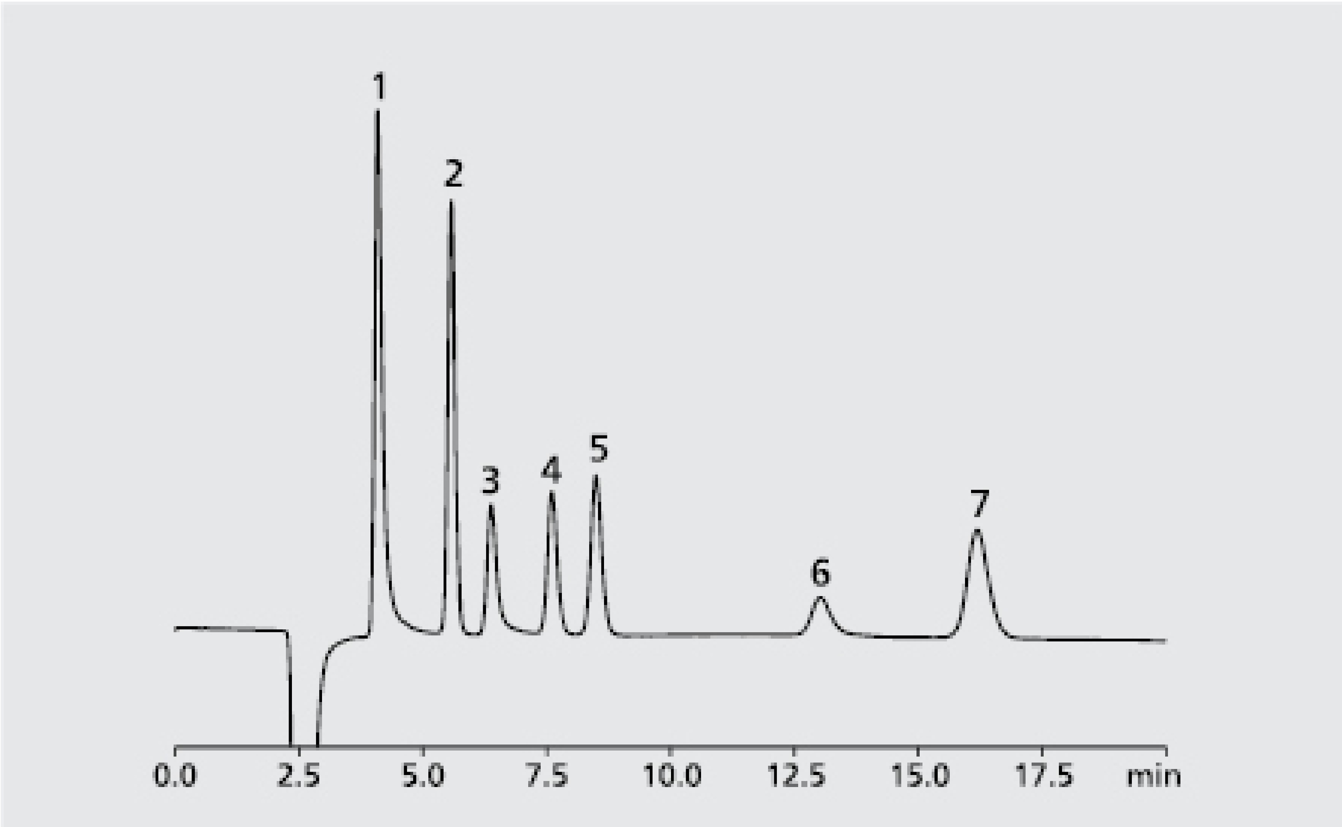
Conditions

Column	: Shim-pack IC-C4 (150 mmL × 4.6 mmI.D., 7 µm) (P/N: 228-41616-91)
Mobile Phase	: A) 2.5 mmol/L oxalic acid B) 2.5 mmol/L methanesulfonic acid A/B = 60/40 (v/v)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 40 °C
Detection	: CDD
Injection Vol.	: 50 µL

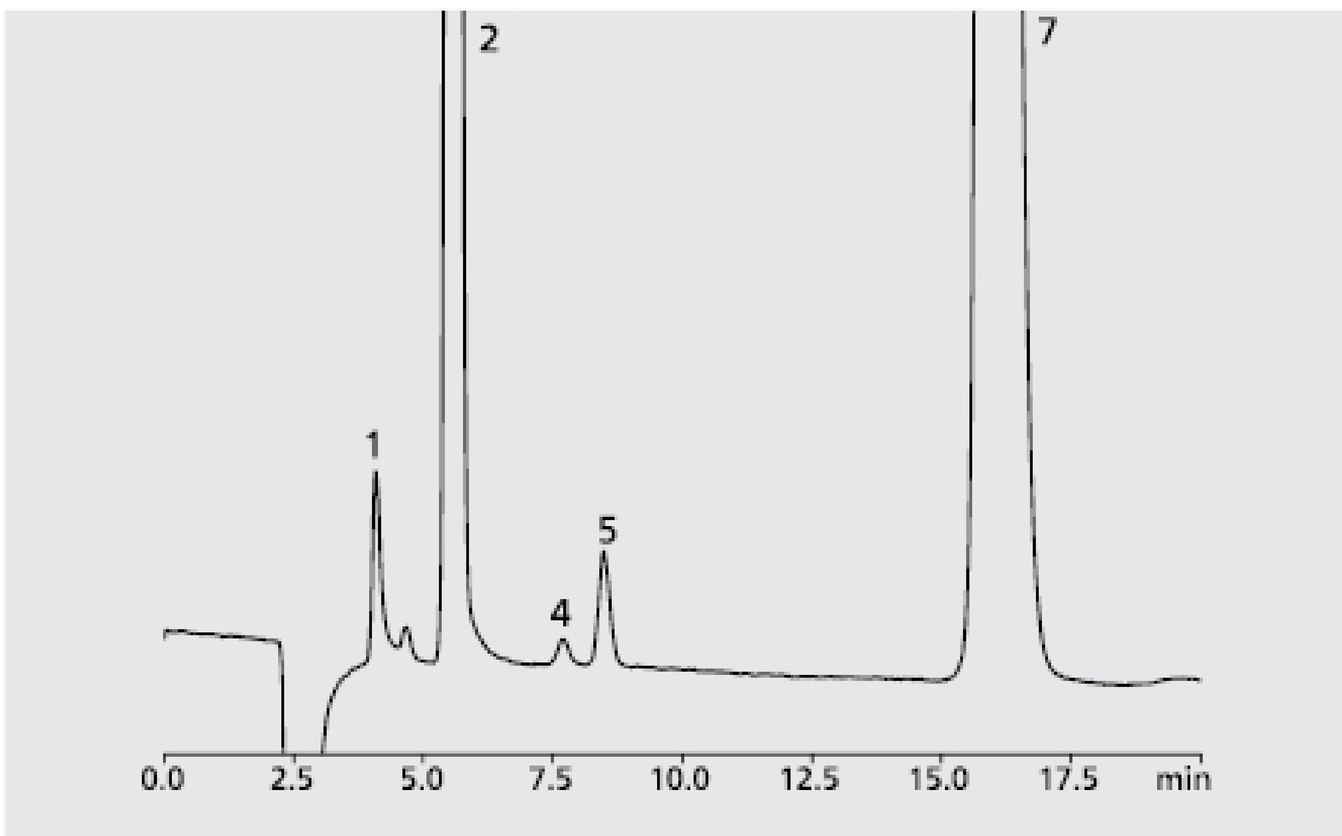
Analysis of Anions in Water

Shim-pack IC-SA2 was developed for anion analysis with a Shimadzu Ion Chromatograph HIC-SP (suppressor type). It is capable of analyzing fluoride ions, chloride ions, nitrite ions, bromide ions, nitrate ions, phosphate ions, sulfate ions, etc., making it possible to be used in both tap water and environmental water analysis.

Analysis Examples



Analysis of Standard Anion Samples



Analysis of Tap Water

Conditions

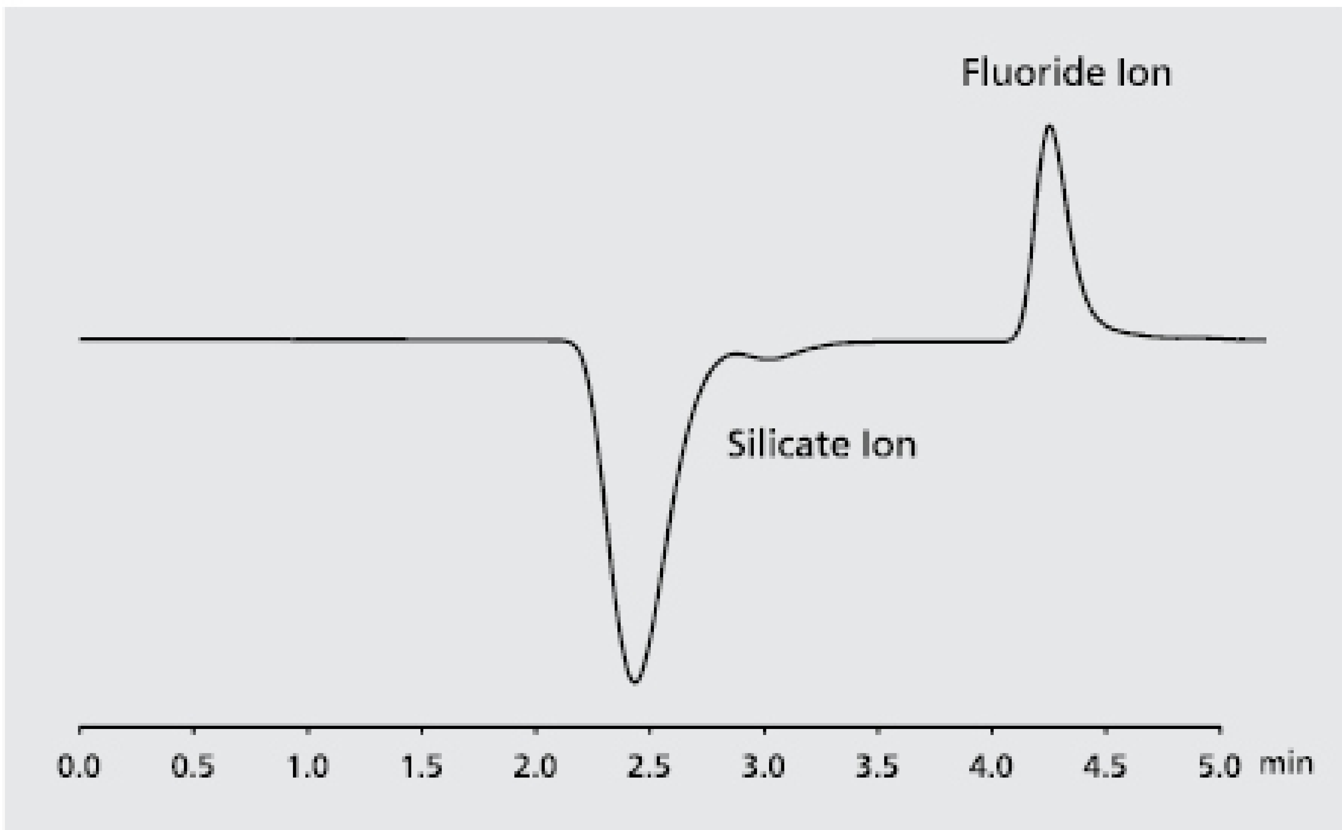
Column	:	Shim-pack IC-SA2 (250 mmL. × 4.0 mmI.D.) (P/N: 228-38983-91)
Mobile Phase	:	A) 12 mmol/L sodium hydrogen carbonate B) 0.6 mmol/L sodium carbonate A/B = 60/40 (v/v)
Flow Rate	:	1.0 mL/min
Col. Temp.	:	30 °C
Detection	:	CDD
Injection Vol.	:	50 µL

Peaks (1 mg/L each)

1. F
2. Cl
3. NO_2
4. Br
5. NO_3
6. PO_4
7. SO_4

High-Resolution Determination of the Components in Water-Quality Analysis

Environmental water and mineral water usually contain silicate. In this kind of analysis, although the water sample contains a large amount of silicic acid, fluoride ions can still be separated and determined with high resolution (same mobile phase as above was used).



Product Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack IC-A1	Quaternary ammonium group	12.5	100 × 4.6	228-17733-91	228-17734-91
Shim-pack IC-A3	Quaternary ammonium group	5	150 × 4.6	228-31076-91	228-31076-92
Shim-pack IC-A3 (S) *1	Quaternary ammonium group	5	150 × 2.0	228-33366-91	
Shim-pack IC-C1 *2	Sulfone group	10	150 × 5.0	228-17737-91	228-17738-91
Shim-pack IC-C1 PEEK	Sulfone group	10	100 × 4.6	228-33497-91	228-33497-92
Shim-pack IC-C4	Carboxyl group	7	150 × 4.6	228-41616-91	228-59900-91 (Cartridge + Holder)
					228-59900-92 (Cartridge only)
Shim-pack IC-SA2	Quaternary ammonium group	9	250 × 4.0	228-38983-91	228-38983-92
Shim-pack IC-SA3	Quaternary ammonium group	5	250 × 4.0	228-41600-91	228-41600-92
Shim-pack IC-SC1	Carboxylic group	6	150 × 4.6	228-36605-91	228-36605-92

*1 Shim-pack IC(S) series are for semi-micro LC. PIA-1000 is required.
*2 During the analysis of alkali metal ions with the Shim-pack IC-C1, it is recommended to use a pre-column Shim-pack IC-PC1 (P/N:228-17744-91) installed between the liquid pump and the sample injector.

Shim-pack Ultron PS-Series

Shim-pack ULTRON PS-80H

Shim-pack ULTRON PS-80H columns are HPLC columns packed with a sulfonic acid type polystyrene cation exchange resin designed for organic acid analyses.

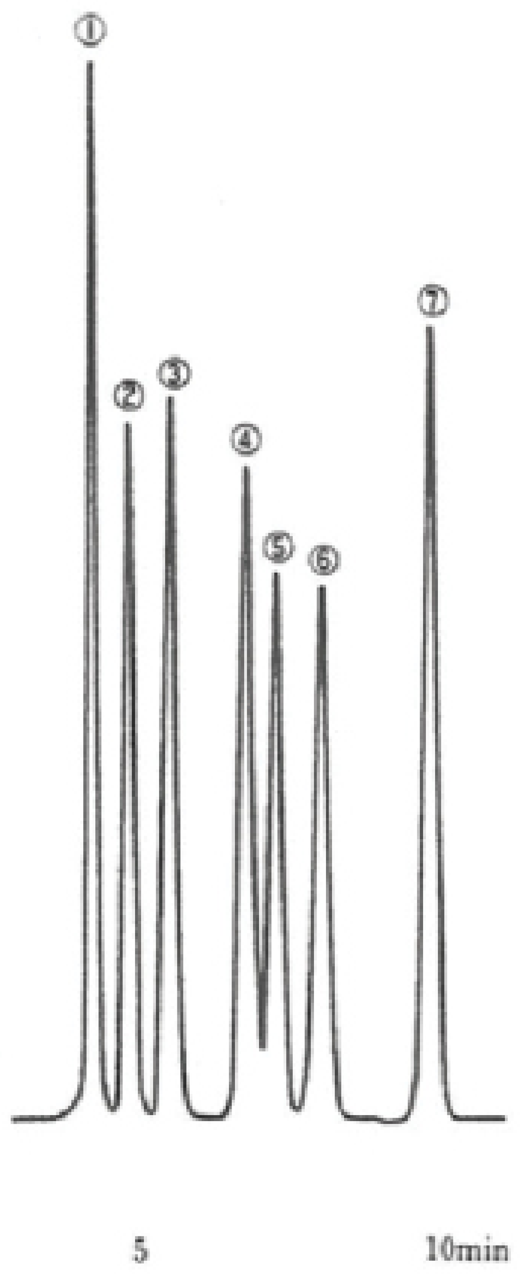
- Utilize electrostatic repulsion interactions.
- Display excellent retention reproducibility.
- Durable due to the use of a mechanically strong polymer gel.
- ph range pH 2-6
- USP L17

Applications: Aliphatic, aromatic organic acids / Alcohols, aldehydes, diols / Monitoring of fermentation processes

Fittings: Waters compatible

Maximum operating pressure: 40 kgf/cm²

Maximum operating temperature: 90°C



Elution Position of Sugar and Sugar Alcohol for PS-80N

1. Dextran T-10
2. Lactose
3. Galactose
4. Ethanol
5. Raffinose
6. Glucose
7. Arabinose

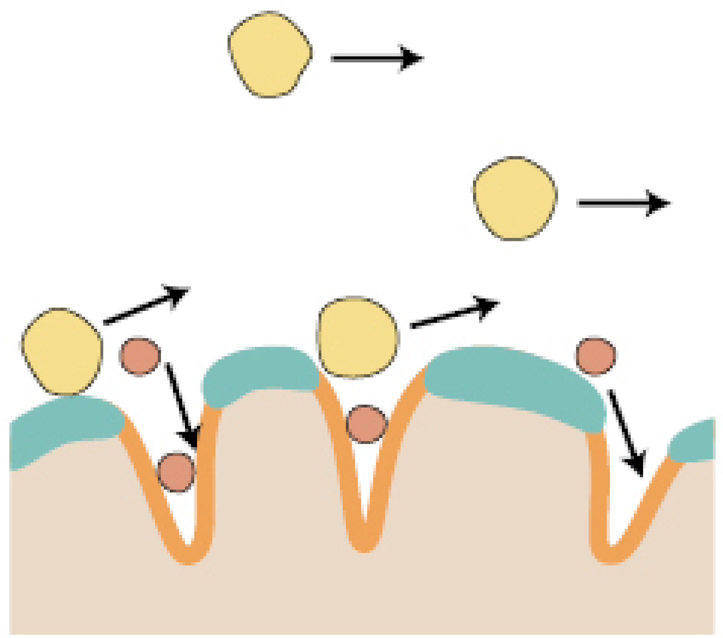
Column : ULTRON PS-80N, 300 mm x 8.0 mm I.D. (P/N: 226-80001-01)
Mobile Phase : H_2O
Flow Rate : 1.0 mL/min
Col. Temp. : 60 °C
Detection : RI, 16x10-5 RIUFS

Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column (50 x 8.0)
			250	300	500	
PS-80H	10	8.0	-	226-80001-01	-	226-80003-91
		2.0	226-80002-01	-	-	-

Shim-pack MAYI Series

Due to optimized particle size and a newly developed coating technology, the MAYI series online pretreatment column is highly effective in deproteinization and offers long-term stability. It provides excellent reproducibility even for continuous analysis of multiple analytes.

How the Shim-pack MAYI Series Works



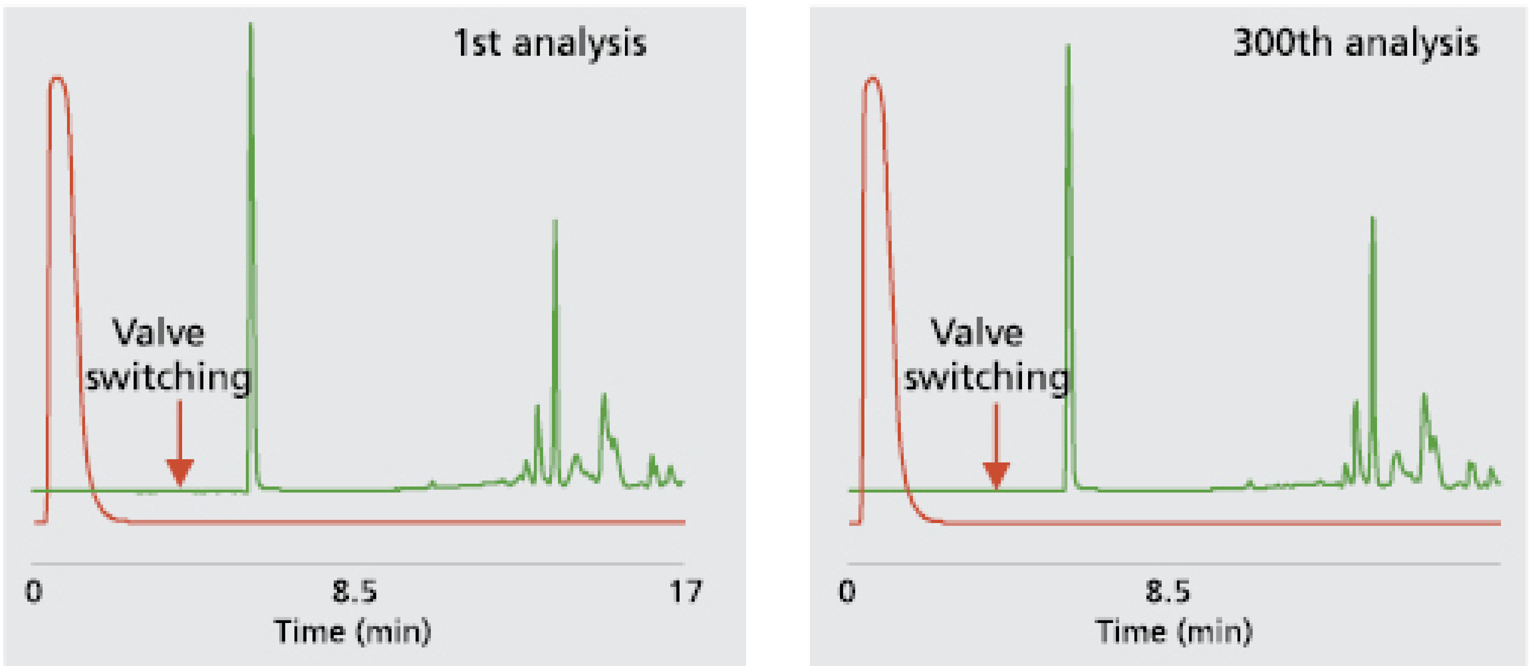
The outer surfaces of silica gel (50 µm) are coated with a hydrophilic polymer, so that only the interior of pores are chemically modified by octadecyl radicals (ODS). Since proteins and other macromolecules cannot enter the pores and are blocked by the hydrophilic polymer on the outer surfaces, they are quickly eluted without being retained by the ODS solid phase. In contrast, pharmaceuticals and other induced low molecular weight compounds penetrate the pores and are retained by the inner surfaces of the stationary phase.

Quick and Reliable Protein Removal

The newly developed hydrophilic polymer coating technology quickly and reliably removes macromolecules, such as protein, from injected biological samples to achieve high recovery rates for target components. In addition to securely protecting analytical columns and LC/MS interfaces, this also helps reduce the time required for finishing the analysis.

Outstanding Durability

Due to the polymer coating technology and particle size optimization, stable data can be obtained for long periods. The figure below shows results from 300 consecutive injections of 100 µL of blood plasma. No decrease in the deproteinization rate or degradation of peak shape was observed.



Comparison of 1st and 300th Analyses

Conditions

Samples : Isopropylantipyrine added Blood plasma
Sample solution: 0.1% phosphoric acid and acetonitrile mixture (95:5)
Dilution: 8 times

Detection : Analysis: 275 nm, Blood plasma matrix: 280 nm

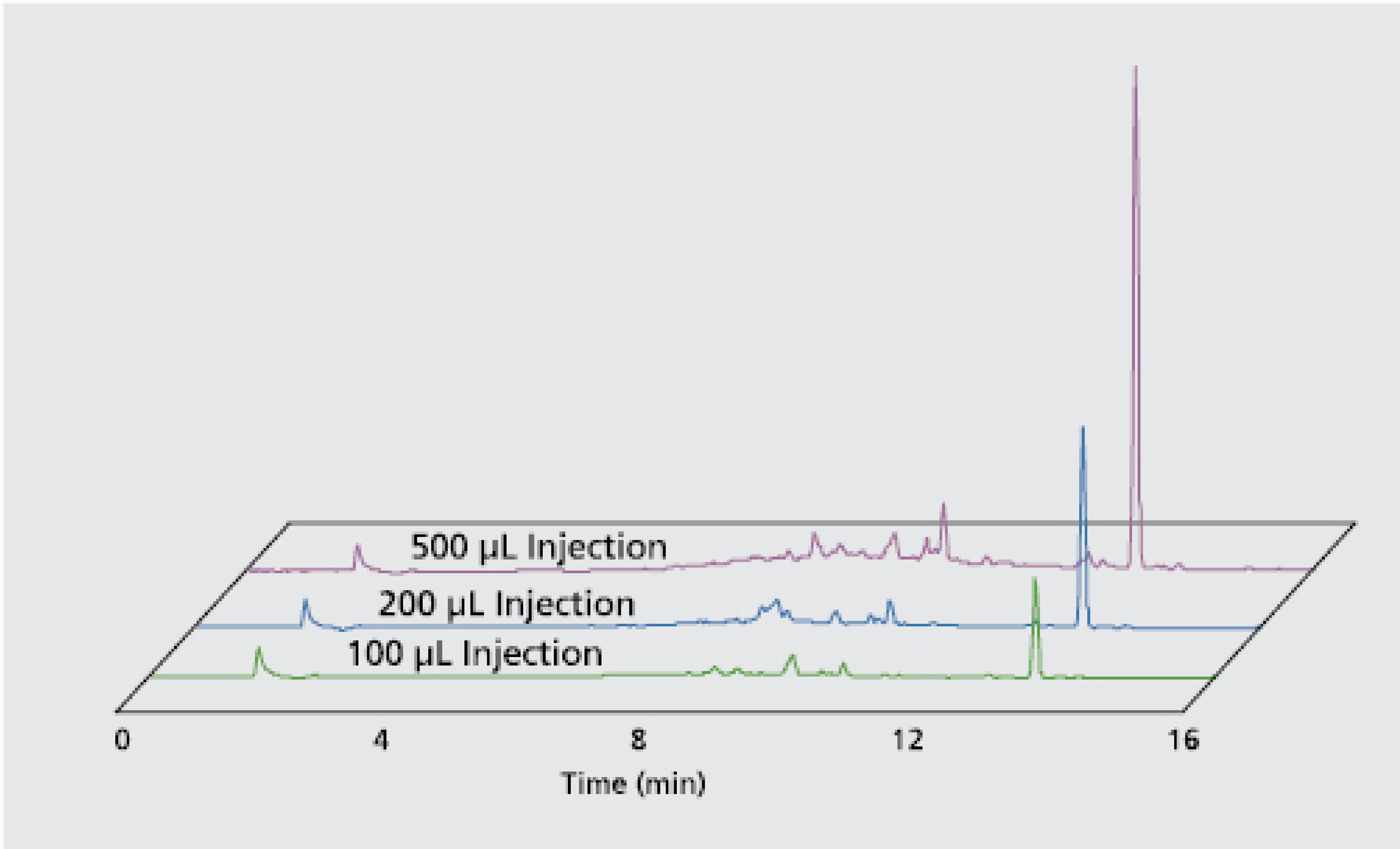
Injection Vol. : 100 µL

Stable Trap Even for Large Injection Volumes

The Shim-pack MAYI-ODS column provides stable component recovery rates and protein removal, even when injecting large volumes. Even when 500 µL of blood plasma was directly injected, a high recovery rate was obtained and no peak distortion was observed.

Conditions

Samples	: Indomethacin added Blood plasma Sample solution: 0.1% phosphoric acid and acetonitrile mixture (95:5) Dilution: 8 times
Detection	: UV 315 nm



Comparison Data for Injecting 100, 200, and 500 µL

Product Information

Column	Stationary Phase	Separation Mode
Shim-pack MAYI-ODS(G)	Octadecyl group	Strongest retentivity in reversed phase mode
Shim-pack MAYI-C14(G)	Tetradecyl group	Retentivity next to ODS in reversed phase mode
Shim-pack MAYI-C8(G)	Octyl group	Retentivity next to C14 in reversed phase mode
Shim-pack MAYI-C4(G)	Butyl group	Retentivity next to C8 in reversed phase mode
Shim-pack MAYI-C1(G)	Methyl group	Weakest retentivity in reversed phase mode
Shim-pack MAYI-SCX(G)	Sulfonic acid group	Strong acid cation exchange mode
Shim-pack MAYI-SAX(G)	Trimethylammonium group	Weakly basic anion exchange mode

Cartridge

Column	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack MAYI-ODS	50	5 × 2.0	228-40835-93
		10 × 2.0	228-40835-95
		10 × 4.6	228-40835-91
		30 × 4.6	228-40835-97
Shim-pack MAYI-C1	50	10 × 4.6	228-46185-91
Shim-pack MAYI-C4	50	10 × 4.6	228-46186-91
Shim-pack MAYI-C8	50	10 × 4.6	228-46187-91
Shim-pack MAYI-C14	50	10 × 4.6	228-46188-91
Shim-pack MAYI-SAX	50	10 × 4.6	228-45366-91
		30 × 4.6	228-45366-93
Shim-pack MAYI-SCX	50	10 × 4.6	228-45370-91
		30 × 4.6	228-45370-93

Column Holder

Dimensions (Length × I.D., mm)	P/N
5 × 2.0	228-34938-94
10 × 2.0	228-34938-98
10 × 4.6	228-34938-92
30 × 4.6	228-34938-96

Shim-pack SPC Series

Shim-pack SPC series is specifically developed for online sample preparation systems that utilize a column switching method.

Shim-pack SPC-RP column is packed with polymer particles and used for reversed phase LC.

Shim-pack SPC-AE1 column is packed with fully porous silica gel particles on which weakly basic anion exchange functions are chemically bonded.

Product Information

Column	Stationary Phase	Separation Mode	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N
Shim-pack SPC-RP3	Polymer	Reversed phase	9	30 × 4.0	228-33713-91
Shim-pack SPC-RP2	Polymer	Reversed phase	10	10 × 4.6	228-18838-91
Shim-pack SPC-AE1	Tertiary amino group	Anion exchange	10	10 × 4.0	228-17990-91

Check out Online Sample Preparation Co-Sense Series at
www.shimadzu.com/an/hplc

Ultron Series LC Columns

Separation Mode	Column	USP Code	Application
Chiral Separation Chromatography	ULTRON ES-OVM	L57	Optical Isomers of Medicines, Pesticides
	ULTRON ES-PEPSIN	-	
	ULTRON ES-BSA	-	
	ULTRON ES-CD	L45	
	ULTRON ES-PhCD	L45	
Ion Exclusion Chromatography	ULTRON PS-80H	L17	Organic Acids and Alcohols
Ligand Exchange Chromatography	ULTRON PS-80N	L58	Monosaccharides, Disaccharides, Alditol
	ULTRON PS-80C	L19	
	ULTRON PS-80P	L34	
	ULTRON CI	-	Inositol
	ULTRON CL	-	Glucuronic Acid
Normal-phase Chromatography	ULTRON VX-SIL	L3	Phosphorus Liquid
Reversed-phase Chromatography	ULTRON VX-ODS	L1	Pharmaceutical Compounds, General Organic Substances, Food Additives, Pesticides, Fatty Acids and Catecholamines
	ULTRON VX-Octyl	L7	
	STR ODS-II	L1	
	STR ODS-M	L1	

Chiral Separation Columns

Ultron ES-Series

The ULTRON ES series are columns for enantiomer separation. Columns which are packed with protein immobilized silica (ULTRON ES-OVM, ULTRON ES-PEPSIN, ULTRON ES-BSA) and chemically bonded cyclodextrin (ULTRON ES-CD, ULTRON ES-PhCD).

ULTRON ES-OVM, ULTRON ES-OVM-C

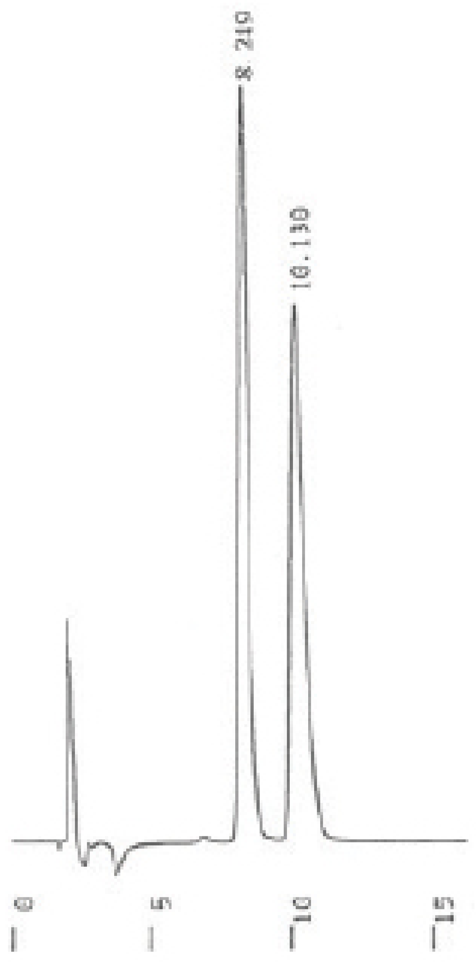
- A chiral separation column immobilized with ovomucoid which is a strong protein for denaturation
- Display a wide range of chiral recognition.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).
- [ULTRON ES-OVM-C]
  Clopidogrel bisulfate evaluation conditions based on USP standards employed for shipping inspections.
- [ULTRON ES-OVM-C]
  Low viscosity 30% acetonitrile aqueous solution used as column storage solvent.
- USP L57

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds

ULTRON ES-OVM-3

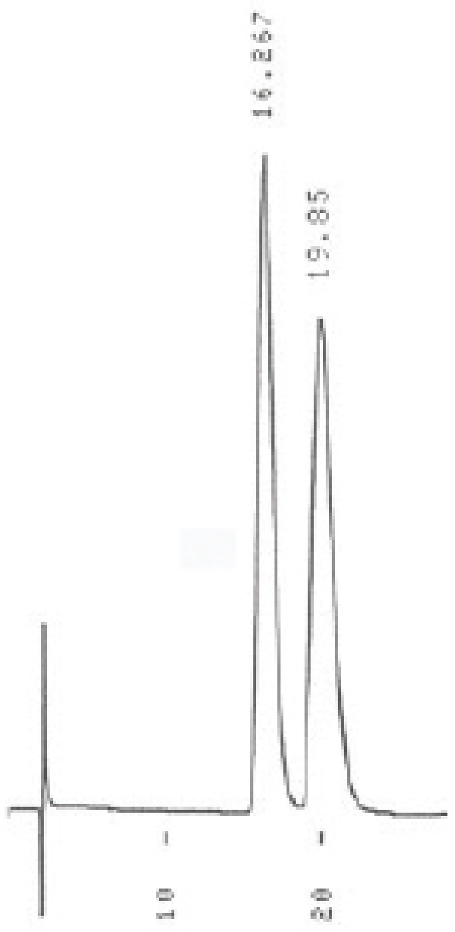
- Maximum operating pressure of 30 MPa.
- Can be used in LC/MS systems as well.
- Employs a 3 µm packing material for higher peak resolution and theoretical plate numbers.
- Enables significant reductions in analysis times while maintaining high theoretical plate numbers.
- Enables further improvements in performance with optimization of LC system tubing and flow cells.
- 9 column length and inner diameter combinations available.
- USP L57

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds



Skeletal Muscle Relaxants: Chlorphenesin

Column : ULTRON ES-OVM
150 mm x 4.6 mm I.D.
Mobile Phase : 20 mM KH2PO4 (pH 5.5)
Flow Rate : 1.0 mL/min
Col. Temp. : 25 °C
Detection : UV-220 nm



Drugs in Peptic Ulcer: Proglumide

Column : ULTRON ES-OVM
150 mm x 4.6 mm I.D.
Mobile Phase : 20 mM KH2PO4 (pH 4.6) / C2H5OH = 100 / 20
Flow Rate : 1.0 mL/min
Col. Temp. : 25 °C
Detection : UV-220 nm

ULTRON ES-PEPSIN

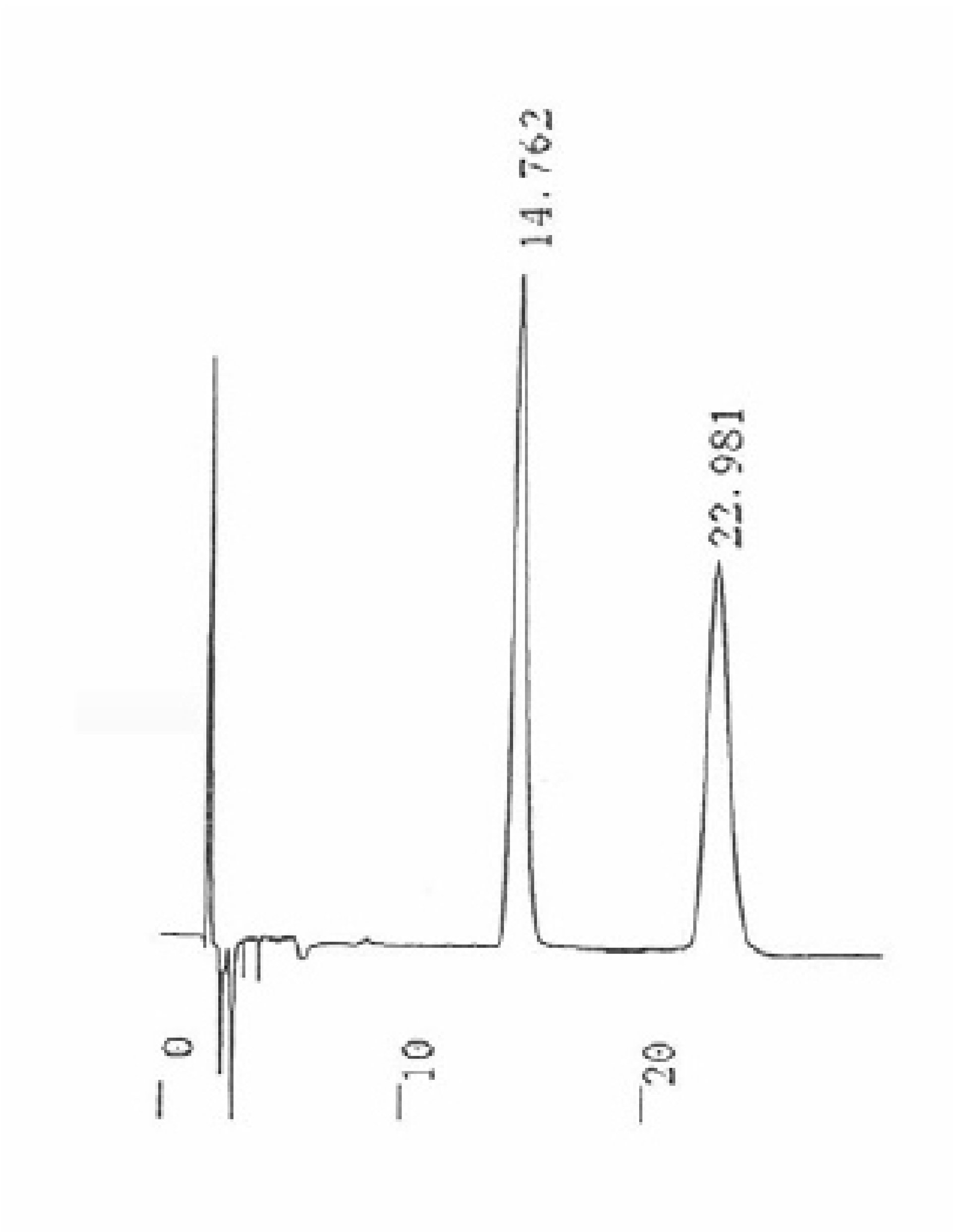
- An enantiomer separation column immobilized with pepsin which is the polypeptide dialytic enzyme of the pig stomach mucous membrane origin.
- Displays superior performance with respect to chiral separations of aminoalcohol pharmaceuticals such as beta blockers.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).

Applications: Pharmaceuticals/Pesticides/Organic synthetic compound

ULTRON ES-BSA

- Employs bovine serum albumin, which is chemically bonded to the base material in an extremely stable manner.
- Provides superior chiral separations of acidic compounds such as arylpropionic acid pharmaceuticals.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).

Applications: Pharmaceuticals/Pesticides/Organic synthetic compound



Antiinflammatories : Ibuprofen

Column	: ULTRON ES-BSA, 150 mm x 4.6 mm I.D
Mobile Phase	: 20 mM KH_2PO_4 (pH 7.0) / 1-Propanol / Caprylic Acid = 98 / 2 / 0.08
Flow Rate	: 1.0 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm

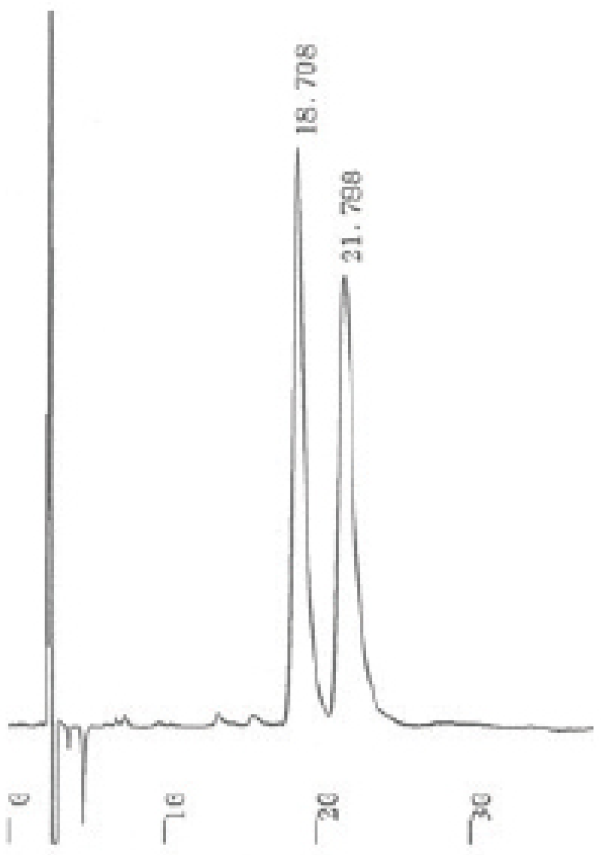
Chiral Separation Columns

ULTRON ES-CD, ULTRON ES-PhCD

ULTRON ES-CD and ULTRON ES-PhCD are enantiomeric separation columns chemically bonded with β-cyclodextrin (CD) and phenylcarbamated β-cyclodextrin (PhCD), respectively.

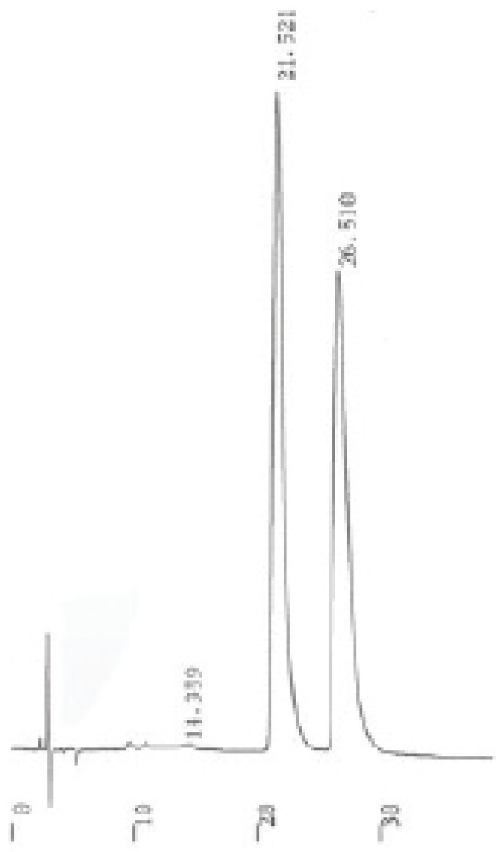
- Capable of chiral separations of hydrophobic cyclic compounds.
- Both reverse and normal phase eluents can be used.
- Chiral separations of a wide range of compounds are possible using these two types of columns.
- Display superior stability and durability.
- USP L45

Applications: Pharmaceuticals/Pesticides/Organic synthetic compounds



β-Blockers: Arotinolol

Column	: ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase	: 20 mM KH_2PO_4 (pH 4.6) / CH_3CN = 75 / 25
Flow Rate	: 1.2 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm



β-Blockers: Alprenolol

Column	: ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase	: 20 mM KH_2PO_4 (pH 4.6) / CH_3CN = 80 / 20
Flow Rate	: 1.2 mL/min
Col. Temp.	: 25 °C
Detection	: UV-220 nm

Column	Particle Size (μm)	I.D (mm)	Length (mm)				Guard Column
			50	100	150	250	
ES-OVM	3	2.1	APASHI-0013	APASHI-0016	APASHI-0019	-	-
		3.0	APASHI-0014	APASHI-0017	APASHI-0020	-	-
		4.6	APASHI-0015	APASHI-0018	APASHI-0021	-	-
	5	2.0	-	-	APASHI-0001	-	APASHI-0005 (5um 10x4.0)
		4.6	-	-	APASHI-0002	-	
ES-OVM-C	5	4.6	-	-	APASHI-0003	-	
		6.0	-	-	APASHI-0004	-	
	10	4.6	-	-	APASHI-0006	-	APASHI-0008 (10um 15x8.0)
ES-OVM-C (prep)	10	20.0	-	-	-	APASHI-0007	
ES-PEPSIN	5	4.6	-	-	APASHI-0022	-	APASHI-0023 (5um 10x4.0)
ES-BSA	5	4.6	-	-	APASHI-0024	-	APASHI-0025 (5um 10x4.0)
ES-CD	5	2.0	-	-	APASHI-0026		-
		6.0	-	-	APASHI-0027	-	APASHI-0028 (5um 10×4.0)
ES-PhCD	5	2.0	-	-	APASHI-0033	-	APASHI-0035 (5um 10×4.0)
ES-PhCD-T	5	6.0	-	-	APASHI-0034	-	

Guard Cartridges (2 pcs)	Particle Size (μm)	I.D (mm)	Length (mm)		Holder (With Adaptor)
			5	10	
ES-OVM	5	2.0	APASHI-0009	-	APASHI-0011
		4.6	-	APASHI-0010	APASHI-0012
ES-CD	5	2.0	APASHI-0029	-	APASHI-0031
		4.6	-	APASHI-0030	APASHI-0032
ES-PhCD	5	2.0	APASHI-0036	-	APASHI-0038
		4.6	-	APASHI-0037	APASHI-0039

Shim-pack Ultron PS-Series

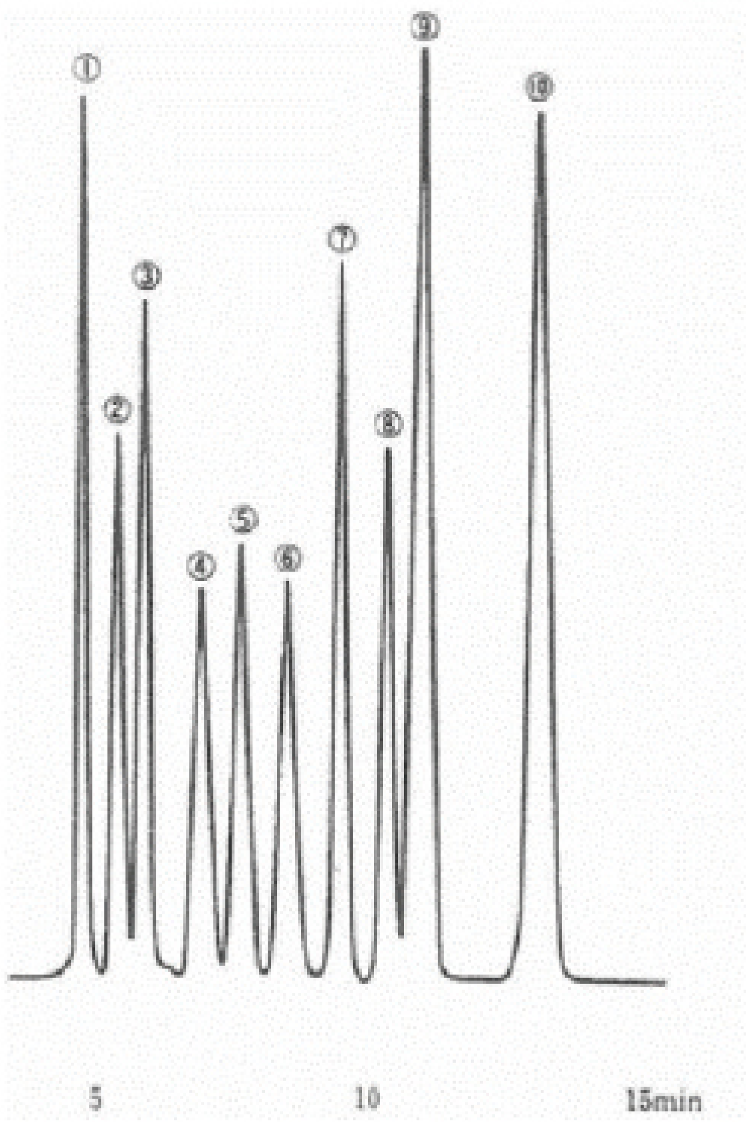
Shim-pack ULTRON PS-80N, ULTRON PS-80C, ULTRON PS-80P

The Shim-pack ULTRON PS series are HPLC columns packed with sulfonic acid type polystyrene cation exchange resin for sugar and sugar alcohol analysis.

Column	PS-80N	PS-80C	PS-80P
Type	Na type	Ca type	Pb type
USP Code	L58	L19	L34
Max. Operation Pressure	4.0 MPa	4.0 MPa	4.0 MPa
Max. Operation Temperature	80 °C	90 °C	90 °C
pH Range	pH 6 - 12	pH 6 - 7.5	pH 6 - 7.5

- PS series columns are effective for quantitative analyses because saccharides are not adsorbed on matrices.
- PS series columns use aqueous mobile phases.
- Durable due to the use of a mechanically strong polymer gel.

Applications: Oligosaccharides, disaccharides, monosaccharides / Sugar alcohols / Monitoring of fermentation hydrolysis of polysaccharides



Elution Position of Sugar and Sugar Alcohol for PS-80C

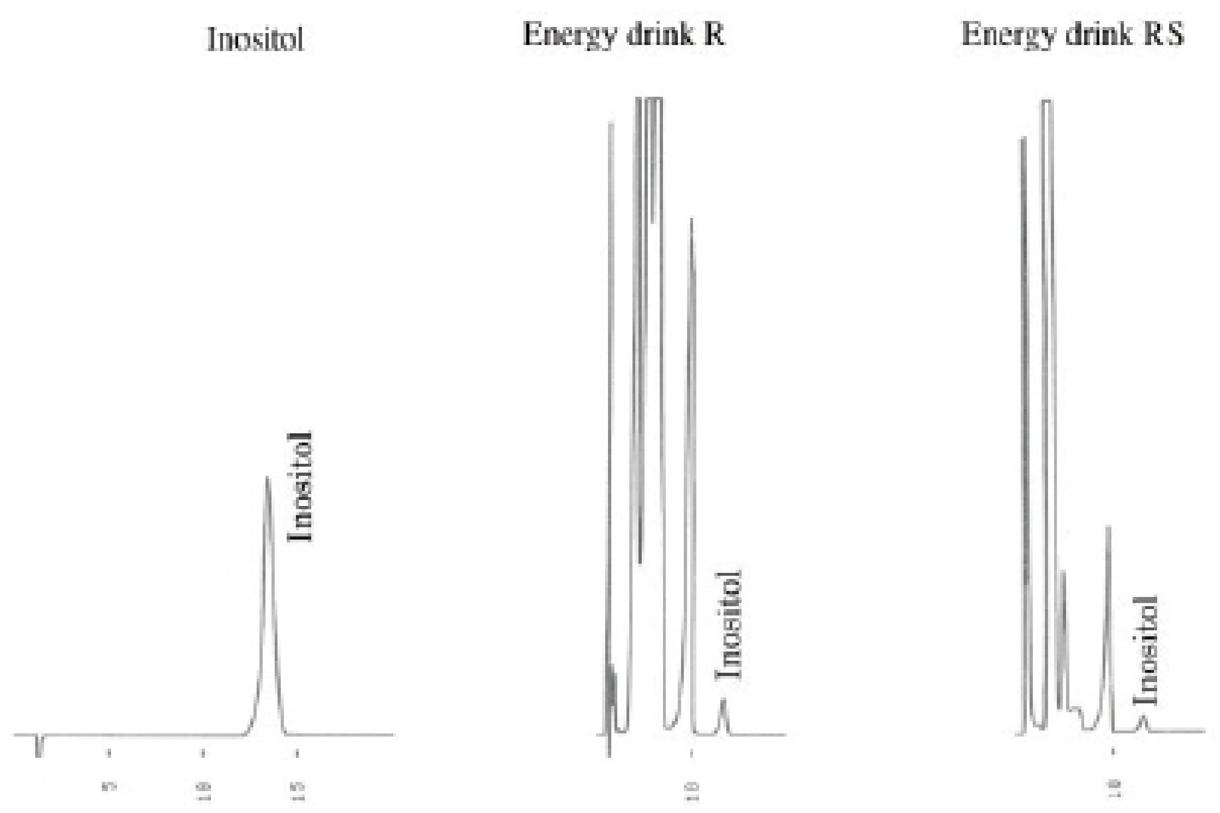
1. Dextran T-10
2. Raffinose
3. Sucrose
4. Glucose
5. Galactose
6. Fructose
7. Adonitol
8. Glycerol
9. Ethanol + Mannitol
10. Xylitol +Sorbitol

Column : ULTRON PS-80C, 300 mm x 8.0 mm I.D.
Mobile Phase : H_2O
Flow Rate : 1.0 mL/min
Col. Temp. : 80 °C
Detection : RI, 16x10-5 RIUFS
Sample : ea. 10 uL/mL

Column	Particle Size (μm)	I.D (mm)	Length (mm)			Guard column (50 x 8.0)
			250	300	500	
PS-80N	10	8.0	-	226-80004-01	226-80005-01	226-80006-91
PS-80C	10	8.0	-	226-80007-01	-	226-80008-91
PS-80P	10	8.0	-	226-80009-01	-	226-80010-91

Shim-pack ULTRON CI

- A strong cation exchange polymer packed HPLC column designed for analyses of inositol.
- Provides excellent quantitative analyses of inositol in energy drinks.
- Displays good retention reproducibility.
- Polymer beads possess good mechanical strength.
- Maximum operating pressure is 8.0 MPa.
- Maximum operating temperature is 90°C.

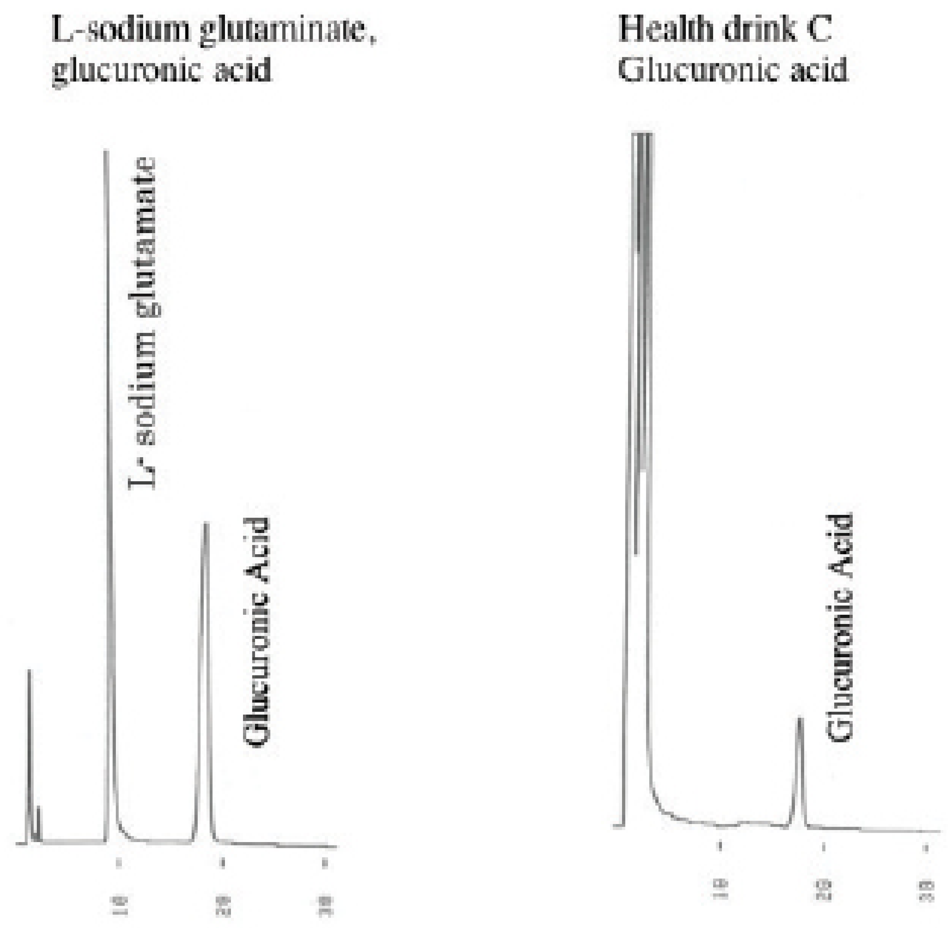


Inositol in Health Drink
Column : ULTRON CI, 200mm x 4.6mm I.D
Mobile Phase : CH3CN/H2O = 60/40
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Detection : RI

Column	I.D (mm)	Length (mm)
		250
ULTRON CI	4.6	226-80011-01

Shim-pack ULTRON CL

- A strong anion exchange polymer packed HPLC column for glucuronic acid.
- Provides excellent quantitative analyses of glucuronic acid in energy drinks.
- Displays good retention reproducibility.
- Polymer beads possess good mechanical strength.
- Maximum operating pressure is 8.0 MPa.
- Maximum operating temperature is 70°C.



Glucuronic acid in Health Drink
Column : ULTRON CL, 150mm x 4.6mm I.D
Mobile Phase : 20 mM KH2PO4
Flow Rate : 0.8 mL/min
Col. Temp. : 70 °C
Detection : UV-210 nm

Column	I.D (mm)	Length (mm)
		150
ULTRON CL	4.0	226-80012-01

Shim-pack Ultron VX Series

Shim-pack ULTRON VX-SIL

Shim-pack ULTRON VX-SIL columns use high purity silica gel (SiO_2 99.99% or higher), thereby reducing sample absorption by metal oxides to the lowest possible levels.

The use of the spherical silica particles reduced column back pressure and prolong column life time.

Bonded Phase	-
Particle Size	5 µm
Pore Size	12 nm
Surface Area	300 m²/g
USP Code	L3

Column	Particle Size (µm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-SIL (Analytical)	5	4.6	226-80013-01	226-80014-01	226-80031-01 (10 x 4.0 mm)
	5	6.0	226-80015-01	-	
	10	4.6	226-80021-01	226-80022-01	-
	10	6.0	226-80023-01	-	-
VX-SIL (Preparative)	5	20.0	-	226-80016-01	226-80032-01 (15 x 8.0 mm)
	10	20.0	-	226-80024-01	226-80033-01 (10 x 4.0 mm) 226-80034-01 (15 x 8.0 mm)
	10	30.0	-	226-80025-01	
	10	50.0	-	226-80026-01	
	15	4.6	-	226-80027-01	226-80035-01 (10 x 4.0 mm) 226-80036-01 (15 x 8.0 mm)
	15	20.0	-	226-80028-01	
	15	30.0	-	226-80029-01	
	15	50.0	-	226-80030-01	
VX-SIL (Narrow Bore)	5	2.0	226-80017-01	226-80018-01	-
	5	1.0	226-80019-01	226-80020-01	-

Guard cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With adaptor)
			5	10	
VX-SIL	5	2.0	226-80037-91	-	226-80039-91
		4.6	-	226-80038-91	226-80040-91

Shim-pack Ultron VX Series

Shim-pack ULTRON VX-ODS

Shim-pack ULTRON VX-ODS is reversed-phase column having monomeric octadecyl group. The bare silica of ULTRON VX-ODS is the same of ULTRON VX-SIL. Our excellent end-capping technology (secondary silylation) lead to the reduction of the influence of the residual silanol groups.

Bonded Phase	Octadecyl Group
Particle Size	5 µm, 10 µm, 15 µm
Pore Size	12 nm
Specific Surface	300 m²/g
Carbon content	16 %
End-cap	Yes
USP Code	L1

Reproducibility between column lots

ULTRON VX-ODS columns are checked using stringent quality control in each manufacturing process.
Only ULTRON VX-ODS columns that pass repeated testing during the manufacturing processes are shipped to customers. k’ and ⍰ values obtained using ULTRON VX-ODS columns display only extremely small differences between lots. ULTRON VX-ODS columns also display excellent reproducibility and stability in other tests between column lots.

Stereoselectivity, distribution equilibria

ULTRON VX-ODS columns, which have monolayers of octadecyl groups, display excellent stereoselectivity with respect to sample molecules. Distribution equilibria are reached rapidly when performing gradient elutions and when mobile phases are changed.

Pressure resistance

Because ULTRON VX-ODS columns use spherical silica gel, they display excellent pressure resistance, and stable separations can be achieved even at fast mobile phase flow rates.

Column	Particle Size (µm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-ODS (for Analytical)	5	4.6	226-80041-01	226-80042-01	226-80059-01 (10 x 4.0 mm)
		6.0	226-80043-01	-	
	10	4.6	226-80049-01	226-80050-01	226-80061-01 (10 x 4.0 mm)
		6.0	226-80051-01	-	-
VX-ODS (Narrow Bore)	5	2.0	226-80045-01	226-80046-01	-
		1.0	226-80047-01	226-80048-01	-
VX-ODS (for Preparative)	5	20.0	-	226-80044-01	226-80060-01 (15 x 8.0 mm)
	10	20.0	-	226-80052-01	226-80062-01 (15 x 8.0 mm)
		30.0	-	226-80053-01	
		50	-	226-80054-01	
	15	4.6	-	226-80055-01	226-80063-01 (10 x 4.0 mm) 226-80064-01 (15 x 8.0 mm)
		20.0	-	226-80056-01	
		30.0	-	226-80057-01	
		50.0	-	226-80058-01	

Guard cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With adaptor)
			5	10	
VX-ODS	5	2.0	226-80065-91	-	226-80067-91
		4.6	-	226-80066-91	226-80068-91

Shim-pack ULTRON VX-Octyl

We have utilized the highly refined synthesizing technology used to manufacture ULTRON VX-ODS columns to produce the ULTRON VX-Octyl column.

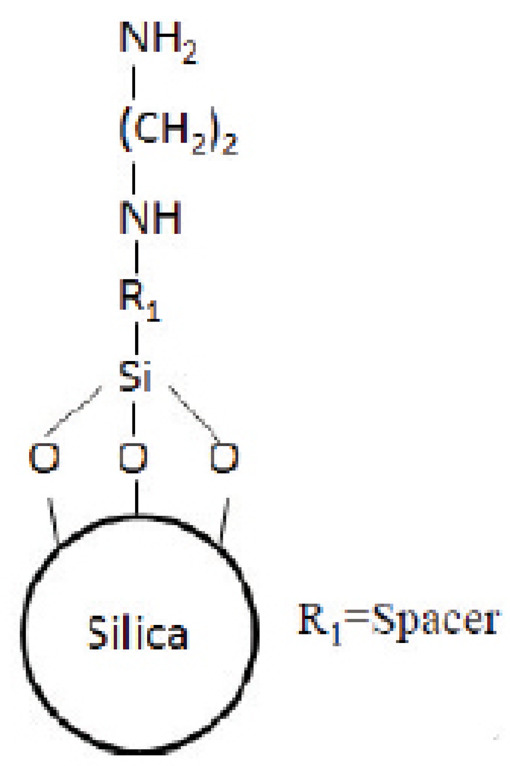
- Column lifetime is greatly improved.
- ULTRON VX-Octyl columns have very low variations between lots and display excellent reproducibility.
- ULTRON VX-Octyl columns provide shorter analysis times than ODS columns and can also maintain high separation capacities.
- Volumes of organic solvents can be reduced.
- Because distribution equilibriums can be achieved quickly and adsorbed materials can be eluted easily in comparison with ODS columns, these columns are perfect for gradient elutions.
- USP L07

Applications: Pharmaceutical compounds / pesticides / chemical compounds / food products / environmental compounds, etc.

Column	Particle Size (μm)	I.D (mm)	Length (mm)		Guard column
			150	250	
VX-Octyl (for Analytical)	5	4.6	226-80069-01	226-80070-01	226-80072-91 (10 x 4.0 mm)
VX-Octyl (for preparative)	5	20.0	-	226-80071-01	226-80073-91 (15 x 8.0 mm)

Shim-pack Ultron AF-HILIC-DA

Shim-pack ULTRON AF-HILIC-DA is the latest addition to the ULTRON series. By introducing a new amino group via a spacer, this column has greatly improved retention while maintaining the characteristics of an amino column. This column also shows selectivity for different separations



- Diamine (primary and secondary) is introduced in packing material that is based on silica gel.
- The retention of polar compounds is strong and have a variety of separation selectivities.
- Have anion exchange as same as amino column

Applications: Separation selectivity of nucleobase and nucleoside

Column	I.D (mm)	Length (mm)	
		100	150
ULTRON AF-HILIC-DA	4.6	226-80105-01	226-80106-01

Shim-pack STR-ODS Series

Shim-pack STR ODS-II

- The effects of metal oxides are suppressed to a minimum due to the use of highly-purified silica gel as a base material in the STR series.
- STR series columns are durable due to the use of mechanically strong silica gel.
- STR series columns are highly resistant to acidic and basic mobile phases.
- STR series columns are easy to operate and display high levels of performance due to low analytical operating pressures.
- Excellent end capping technology provides sharp peak shapes for basic and acidic compounds, and for samples which form complexes with metals.

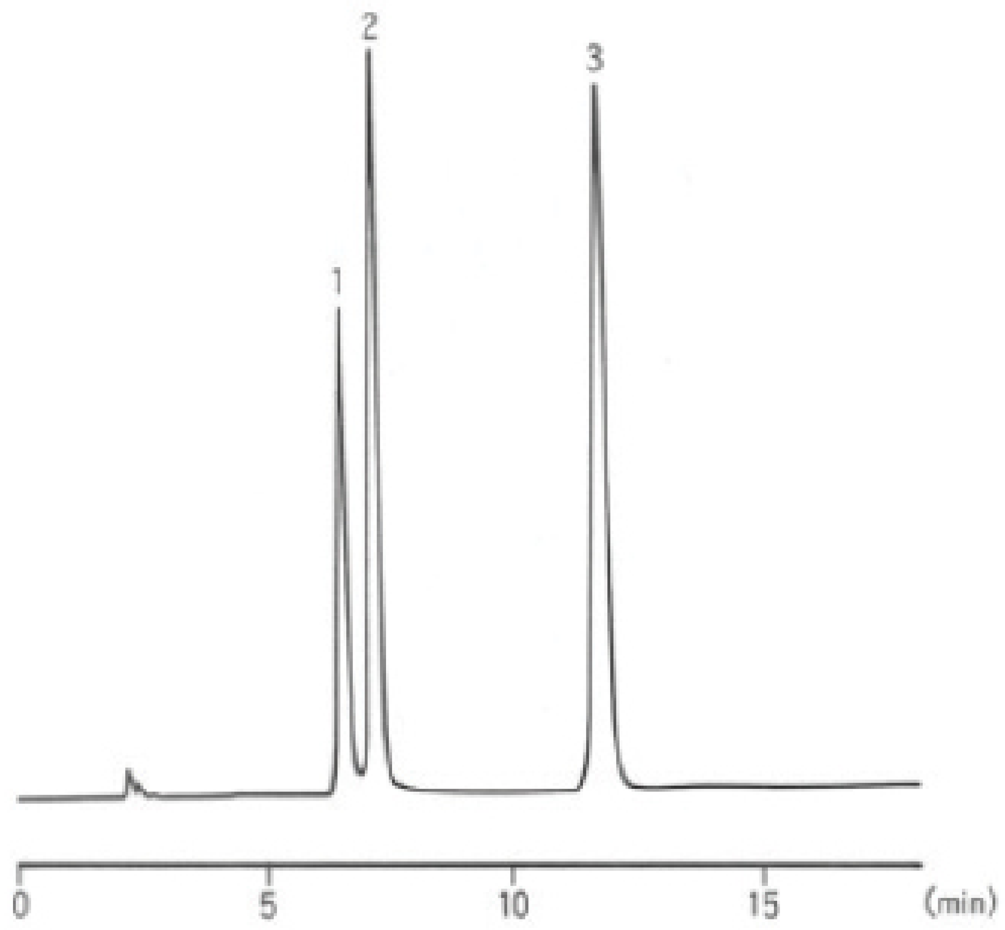
Bonded Phase	Octadecyl Group
Particle Size	5 µm
Particle Shape	Spherical Porous Silica Gel
Pore Size	12 nm
Specific Surface	320 m^2/g
End-Cap	Yes
Carbon content	17 %
USP Code	L1

Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column
			100	150	250	
STR ODS-II (Narrow Bore)	5	2.0	-	226-80074-01	226-80075-01	-
STR ODS-II (for Analytical)	5	3.0	-	226-80076-01	226-80077-01	-
		4.0	226-80078-01	226-80079-01	226-80080-01	226-80084-91 (10 x 4.0 mm)
		4.6	-	226-80081-01	226-80082-01	226-80085-91 (10 x 4.6 mm)
		6.0	-	226-80083-01	-	226-80086-91 (10 x 6.0 mm)
STR ODS-II (for Preparative)	5	20.0	-	-	226-80087-01	226-80088-91 (50 x 20.0 mm)
STR ODS-II PEEK (for Analytical)	5	4.6		226-80089-01	226-80090-01	226-80091-91 (10 x 4.0 mm)

Guard cartridges (2 pcs)	Particle Size (µm)	I.D (mm)	Length (mm)		Holder (With adaptor)
			5	10	
STR ODS-II	5	2.0	226-80092-91	-	226-80095-91
		3.0	-	226-80093-91	226-80096-91
		4.6	-	226-80094-91	226-80097-91

Shim-pack STR ODS-M

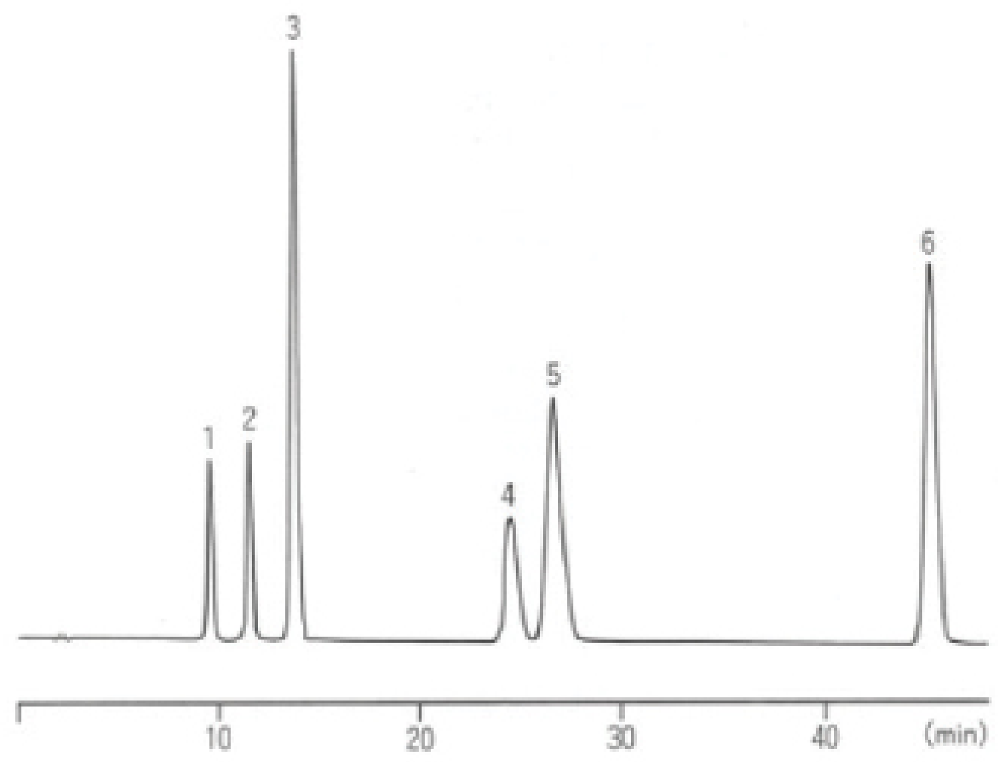
Bonded Phase	Octadecyl Group
Particle Size	5 µm
Particle Shape	Perfectly spherical porous silica gel
Pore Size	10 nm
Specific Surface	350 m^2/g
End-Cap	Yes
Carbon content	15 %
USP Code	L1



AMP, ADP, ATP

1. Adenosine 5'-Monophosphate
2. Adenosine 5'-Diphosphate
3. Adenosine 5'-Triphosphate

Column : STR ODS-M, 150 mm x 4.6 mm, I.D. (226-80100-01)
Mobile Phase : 30 mM 2-Diethylaminoethanol is contained
20 mM Citric Acid Aqueous Solution
Flow Rate : 0.8 mL/min
Col. Temp. : 40 °C
Detection : UV-260 nm



Caffeine and Catechin

1. Epigallocatechin
2. Catechin
3. Caffeine
4. Epigallocatechin Gallate
5. Epicatechin
6. Epicatechin Gallate

Column : STR ODS-M, 150 mm x 4.6 mm, I.D. (226-80100-01)
Mobile Phase : A: 10 mM-Phosphate Buffer (pH2.6)
B: CH3CN
7 % B → 7 % B (30 min) 12 % B (30.01 min) → 12 % B
(45 min) → 50 % B (45.01 min) → 50 % B (50 min) → 7
% B (50.01 min) → 7 % B (80 min)
Flow Rate : 1.0 mL/min
Col. Temp. : 45 °C
Detection : UV-280 nm (0.64 AUFS)

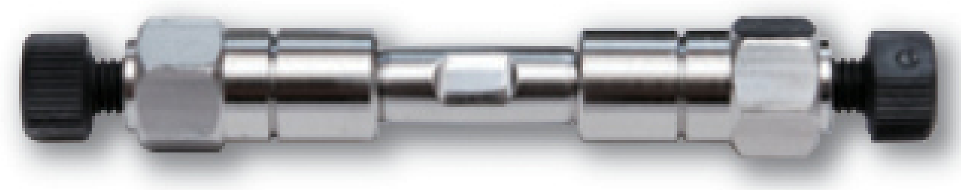
Column	Particle Size (µm)	I.D (mm)	Length (mm)			
			10	50	150	250
STR ODS-M	5	4.0	226-80103-01	226-80104-01	226-80098-01	226-80099-01
		4.6	-	-	226-80100-01	226-80101-01
		6.0	-	-	226-80102-01	-

Ghost Trap DS/DS-HP

A new high-pressure model for the elimination of impurities from organic solvents has been added to the Ghost Trap DS* lineup. The Ghost Trap DS was co-developed with Daiichi Sankyo Co., Ltd. It has been designed to effectively adsorb impurities in the mobile phase in order to reduce the time required for method development and impurity analysis.

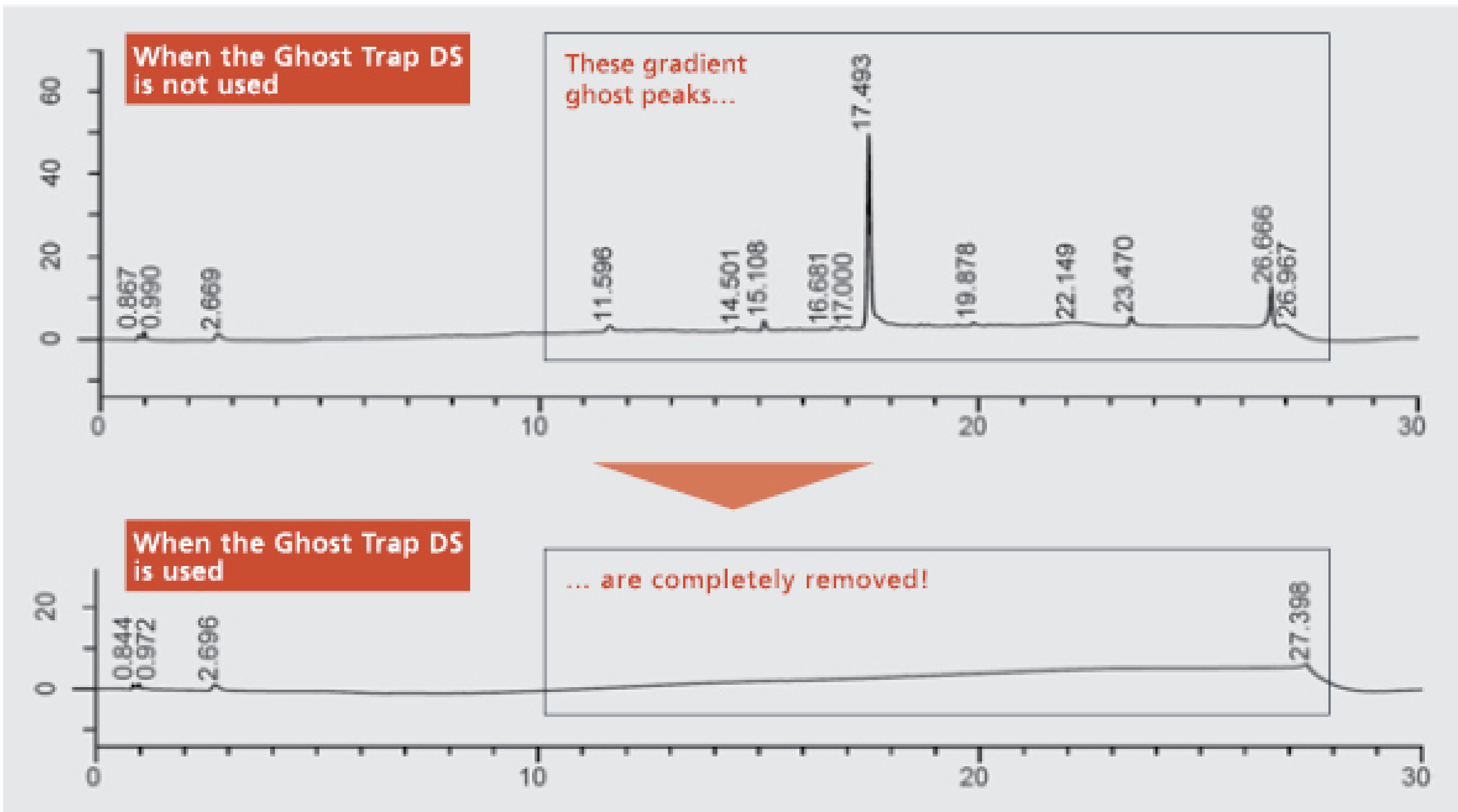
The 100 MPa pressure tolerance of the Ghost Trap DS-HP allows it to be used with UHPLC systems. This permits the effective use of the Ghost Trap DS for method development by UHPLC and subsequent transfer to conventional analysis.

* DS: Abbreviation of Daiichi Sankyo (D) and Shimadzu (S)



Consistently Traps Impurities, Even in Organic Solvents

A major feature of the Ghost Trap DS is the ability to remove impurities, even in organic solvents. When the Ghost Trap DS is installed between the gradient mixer and autosampler in reversed phase gradient analysis, it can trap impurities from the piping and gradient mixer in addition to those from the mobile phase. The example on the right shows that it can effectively trap impurities in mobile phase when the Ghost Trap DS is installed just downstream of the gradient mixer.



Example of removing ghost peaks by Ghost Trap DS
(The data is provided by Daiichi Sankyo Co., Ltd.)

Column : ODS column
Mobile Phase : A) 25 mmol/L Phosphate (Potassium) buffer solution (pH 4.0) / Acetonitrile = 9/1
B) Water/Acetonitrile = 1/9
Flow Rate : 0.65 mL/min
Col. Temp. : 45 °C
Detection : UV 210 nm

Product Information

Item	P/N	Description	Dimensions	Internal Volume *[1]	Pressure Tolerance
Ghost Trap DS	228-59921-91	Cartridge (2pcs)	30 mmL. × 7.6 mmI.D.	Approx. 700 µL	**35 MPa**
	228-59921-92	Cartridge (2pcs) + Holder			
	228-59921-93	Cartridge (2pcs)	4.0 mmI.D. × 20 mmL.	Approx. 150 µL	
	228-59921-94	Cartridge (2pcs) + Holder			
Ghost Trap DS-HP	228-59931-91	Packed type	2.1 mmI.D. × 30 mmL.	Approx. 60 µL	**100 MPa**

*[1] Note that a delay volume equivalent to the internal volume of the product occurs if the product is installed downstream of the gradient mixer or the confluence of two pumps.
* The product service life differs according to analysis conditions, such as the mobile phase used.
* In analysis using an ion-pairing reagent, the ion-pairing reagent may be retained in the product, influencing the retention time and peak shape.
* Before connecting the analytical column, be sure to thoroughly clean the flow path with mobile phase (close to the final concentration for gradient analysis).
* Note that some impurities may not be removed.
* When performing high-pressure analysis exceeding 35 MPa with a UHPLC system, connect the gradient mixer to the Ghost Trap DS-HP with a pipe for UHPLC (e.g.228-53137-97).

GLC Suction Filter 2

■ HPLC Suction filter with mobile phase cleaning function

Features

- Removes contaminants from the mobile phase.
- Does not affect gradient delay* to install this product in front o fthe pump (see Fig. 2).
- Available for LCMS due to low bleed.

(*The delay form the time a gradient begins to be produced in the pump to when it reaches the column inlet).

The GLC Suction Filter 2 is packed with activated carbon which acts as a chemcal trap and removes contaminants present in the mobile phase.
This product is easy to install and user-replaceable.

Note: Connect 3.0mm outer diameter suction tube when you use this product.

i. 1. Structure o the GLC Suction Filter 2

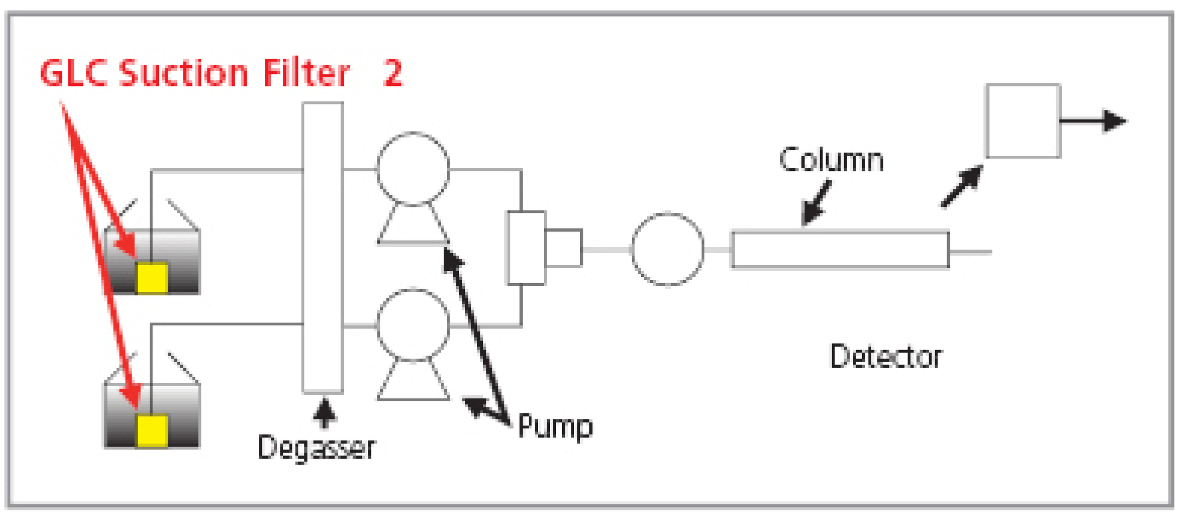
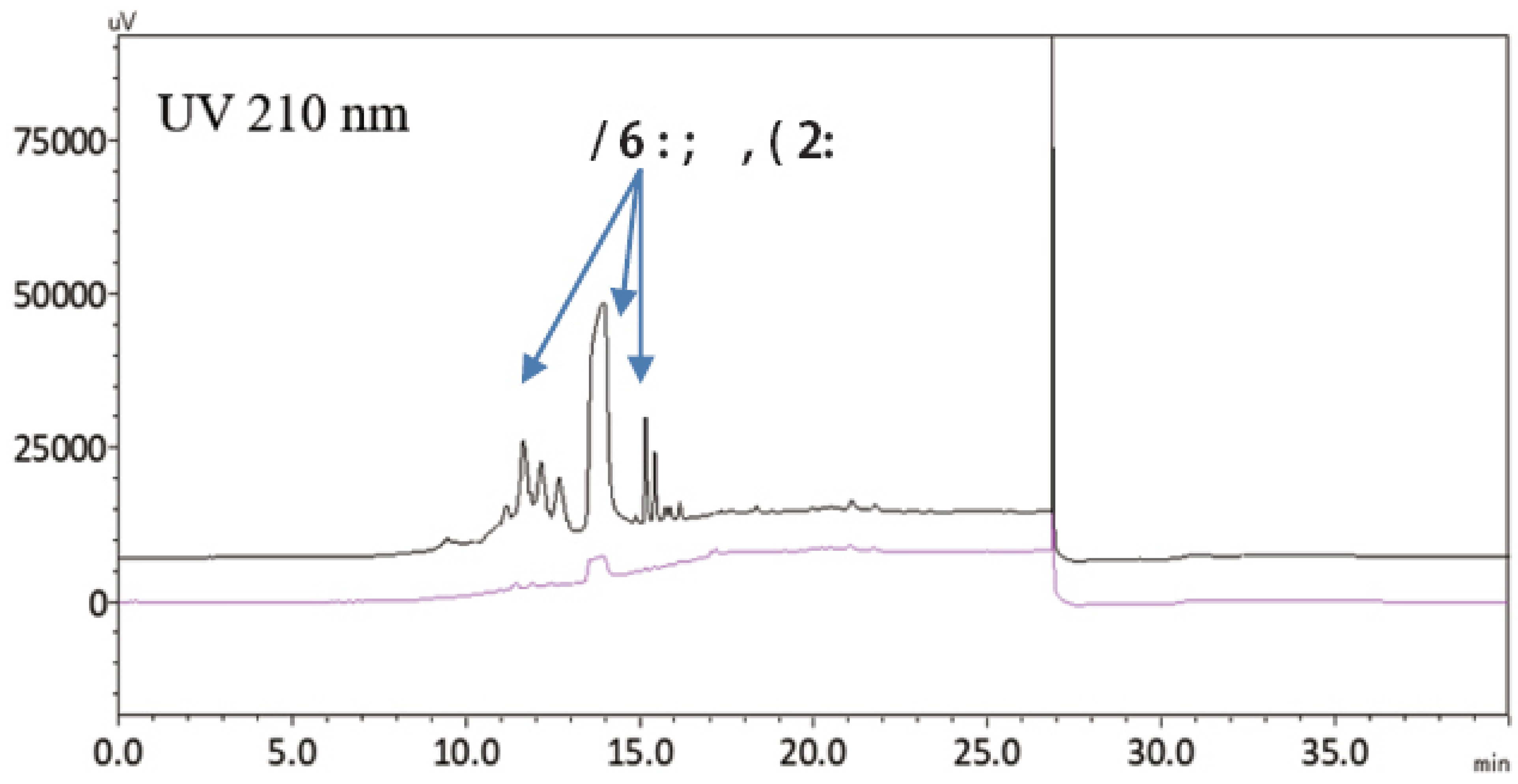


Fig. 2. Attachment position

Removal of contaminants in mobile phase (LC/UV)

■ e.g. Removal of contaminants caused due to the storage of the mobile phase

Ghost peaks are contaminant peaks that appear even when no sample is injected. One of the causes for ghost peaks is contamination in mobile phase due to improper storage or from external sources. We prepared contaminated ultrapure water that was stored in a plastic container (polyethylene) at room temperature for two weeks. Ghost peaks were observed when using the contaminated water as mobile phase. After installing the GLC Suction Filter 2, the previously observed ghost peaks were eliminated.



— Normal Suction Filter
— GLC Suction Filter 2

Analytical Conditions
Instruments : Nexera XR
Column : Shim-pack VP-ODS (150 x 4.6 mm I.D.)
Mobile phase: A ; Contaminated ultrapure water
B ; Acetonitrile
Time prog. : B Conc. 20% (0-5 min.) → 95% (5-25 min.) → 20% (25.01-40 min.)
Flow rate : 1 mL /min.

Product Informatio n

Description	P/N	Spec	Qty.
GLC Suction Filter 2	370-02010-01	Connecting tube: 3.0mm outer diameter suction tube Internal volume: 0.7 mL Pore size:10μm	1

Please read the manual carefully and condition this product before use.
* The suction tube is not included.
* When using ion-pair reagents in the mobile phase, the ion-pair reagents may be adsorbed to this product and may affect the retention time and peak shape.
* Bleeding from this product may be seen.
* This product does not remove all contaminants.
* When the activated carbon reaches breakthrough, "ghost peaks" derived from mobile phase contaminants may be detected. In this case, replace the product.
* The recommended replacement period is after passing 60L of mobile phase or 1 year after use.

Ultrashield UHPLC/HPLC Pre-column Filter

any column and is leak tight to 15,000 psi (1034 bar).

Part number	Description	Porosity	Pack Size
226-50000-01	Ultrashield UHPLC/HPLC Pre-Column Filter	0.5µm	1
226-50000-03	Ultrashield UHPLC/HPLC Pre-Column Filter	0.5µm	3
226-50000-10	Ultrashield UHPLC/HPLC Pre-Column Filter	0.5µm	10
226-50001-05	Pre-Column replacement frit	0.2µm	5
226-50001-99	Holder for Pre-Column replacement frit	-	1

226-50000-01
Ultrashield UHPLC/HPLC Pre-Column Filter

226-50001-99
Holder for Pre-Column replacement frit

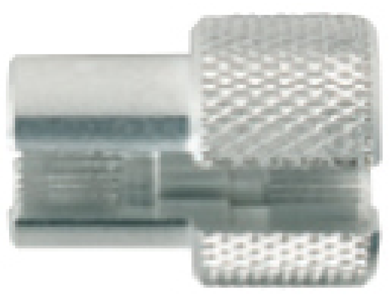
226-50001-05
Pre-Column replacement frit

Use the tightening tool to tighten standard short/long knurl-headed nut like the peek fitting below.

Part number	Description	Pack size
226-50000-01	Ultrashield HPLC Pre-Column Filter	1
226-50106-02	Peek fitting	2
226-50000-99	Tightening Tool	1

Pre-Column Filter

Peek Fitting



Tightening Tool

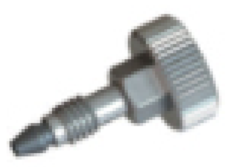
Fittings for HPLC And UHPLC

These innovative fittings solve all of the difficulties of cumbersome LC plumbing issues. Forget cutting old fittings off your SS tubing. Throw away your spanners, make column changes in seconds.

Pressure rated up to 25,000 psi (1,720 bar)

- Patent pending innovative design
- Capable of up to ten repeat assembly cycles with no impact on pressure holding ability or carry-over;
- Available in multiple threaded configurations for use with 1/16 in (1.6 mm) and 1/32 in (0.79 mm) OD tubing
- Materials of construction: Stainless Steel and Proprietary PEEK™ polymer blend (PK)

Shimadzu introduces an innovative line of UHP & VHP fittings, designed to withstand extreme pressures. This patent-pending line of ground-breaking fitting systems is perfect for use within the increasingly demanding requirements of today's high performance analytical systems. The fittings are reusable when following the proper tightening torque specification. With a polymer front ferrule, there is no damage to the tubing or receiving port, also increasing the life of these components.

Type of Fitting	Picture	Can be reused (re swaged)	Pressure rating	Spanner tightened	Tubing used on	Suitable for	One or two piece system
Ultra-High Pressure Fitting. Stainless Steel nut with patented PEEK polymer blend ferrule. **226-50100-02 (2pcs)** **226-50100-10 (10pcs)**		Yes	25,000 psi / 1,720 bar	Yes 8mm hex spanner	S/S	All high pressure 1/16" S/S fittings up to 25,000 psi.	Separate nut and "captured" ferrule.
Ultra-High Pressure Fitting Long bodied version of one above for injection valves. **226-50101-02 (2pcs)** **226-50101-10 (10pcs)**		Yes	25,000 psi / 1,720 bar	Yes 8mm hex spanner	S/S	Particularly suitable for LC injection ports.	Separate nut and "captured" ferrule.
Ultra-High Pressure Fitting With fingertight head and integrated ferule, 10-32 thread. **226-50104-02 (2pcs)** **226-50104-10 (10pcs)**		Yes	25,000 psi / 1,720 bar	Finger tightened.	S/S and PEEK	All fittings up to 25,000 psi. Good fitting especially for changing columns- fast and reusable with no spanners.	Two piece- S/S nut and "captured" PEEK polymer blend ferrule.
Finger 1 – Peek One piece, cone tip, 10-32 thread. **226-50106-02 (2pcs)** **226-50106-10 (10pcs)**		Yes	12,000 psi / 827 bar	Finger tightened with handheld tightening tool.	S/S and PEEK	All fittings up to 12,000 psi. Good fitting for when you are in a hurry.	Single piece PEEK

CoreFocus
SHIMADZU

Vials & Accessories

Features of Shimadzu vials and septa

- 1st hydrolytic class glass
- Vials are packaged in a cleanroom
- Contamination-free septa production

Screw vials, 100/pack

Part number	226-54110-11	226-54110-01	226-54220-11	226-54220-01	226-54305-01
Type	Clear, screw vial	Clear, screw vial	Clear, screw vial	Clear, screw vial	Clear, screw vial with integrated 0.2mL micro-insert, top bonded
Write on spot	√	X	√	X	√
Min. Vol / uL	200	200	200	200	25
Max. Vol / mL	1.5	1.5	1.5	1.5	0.2
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 8, small opening	ND 8, small opening	ND 9, wide opening

Part number	226-54301-01	226-54111-11	226-54111-01	226-54221-11	226-54222-01
Type	Clear, microliter screw vial	Amber, screw vial	Amber, screw vial	Amber, screw vial	Amber, screw vial
Write on spot	X	√	X	√	X
Min. Vol / uL	30	200	200	200	200
Max. Vol / mL	1.5	1.5	1.5	1.5	1.5
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 8, small opening	ND 8, small opening

Part number	226-54307-01	226-54312-01	226-54313-01	226-54308-01	226-54309-01
Type	Clear, 0.9mL LabTotal Recovery vial	Clear, 0.9mL Microliter screw vial	Clear, 1.0mL Total Microliter screw vial	Amber, screw vial with integrated 0.2mL micro-insert, base bonded	Clear, screw vial with integrated 0.2mL micro-insert, base bonded
Write on spot	X	√	X	X	X
Min. Vol / uL	25	25	25	30	30
Max. Vol / mL	1.1	1.1	1.3	0.3	0.3
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	NP 9, wide opening	NP 9, wide opening	ND 9, wide opening	ND 9, wide opening

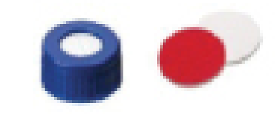
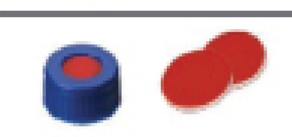
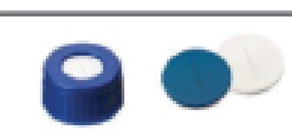
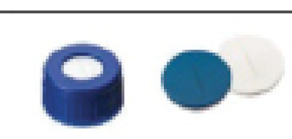
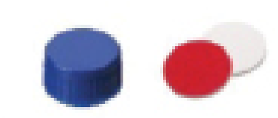
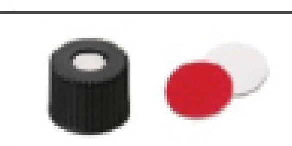
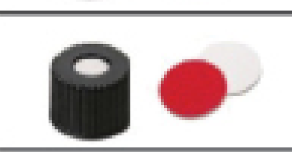
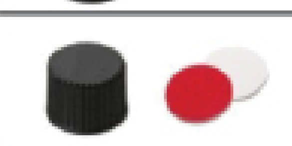
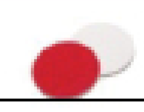
ND9 screw plastic micro-vials, 100/pack

Plastic vials offer low binding for proteins and peptides and are the best choice for Ion Chromatography. Specially made for customers concerned about broken glass.

Part number	226-54310-01	226-54311-01	226-54302-01	226-54303-01	226-54304-01
Type	1.5ml PP screw clear vial, slightly concave shaped bottom	1.5ml PP screw amber vial, slightly concave shaped bottom	PP micro-vial, transparent	TPX micro-vial, crystal clear	PP micro-vial, amber
Write on spot	x	x	X	X	X
Min. Vol / uL	200	200	30	30	30
Max. Vol / mL	1.5	1.5	0.25	0.25	0.25
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening	ND 9, wide opening

Caps/Septa for 1.5mL screw vials, 100/pack

Temperature limit for PTFE/Rubber septa: -40°C up to 110°C
Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for PTFE/Silicone/PTFE septa: -60°C up to 200°C

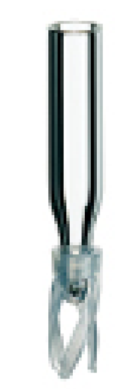
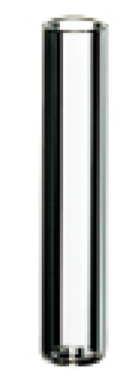
Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Size	Picture
226-54112-01	Blue PP, centre hole	PTFE/Rubber	1.0 mm	45° shore A	ND 9	
226-54113-01	Blue PP, centre hole	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84131-01	Blue PP, centre hole	PTFE/Silicone *	1.3 mm	45° shore A	ND 9	
226-54114-01	Blue PP, centre hole	PTFE/Silicone/PTFE	1.0 mm	45° shore A	ND 9	
226-84129-01	Blue PP, centre hole	PTFE/Silicone, Slit	1.0 mm	55° shore A	ND 9	
226-54113-02	Blue PP, centre hole	PTFE/Silicone, Slit *	1.3 mm	45° shore A	ND 9	
226-84130-01	Blue PP, centre hole	PTFE/Silicone, pre-cut (Y)	1.0 mm	55° shore A	ND 9	
226-84128-01	Gold Magnetic, centre hole	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84132-01	Blue PP, closed top	PTFE/Silicone, ultra-clean	1.0 mm	55° shore A	ND 9	
226-84220-01	Black PP, centre hole	PTFE/Silicone, ultra-clean	1.3 mm	45° shore A	ND 8	
226-84221-01	Black PP, centre hole	PTFE/Silicone, ultra-clean	1.3 mm	55° shore A	ND 8	
226-54221-01	Black PP, closed top	PTFE/Silicone, ultra-clean	1.3 mm	45° shore A	ND 8	
226-54221-02	Black PP, closed top	–	–	–	ND 8	
226-54221-03	–	PTFE/Silicone	1.3 mm	45° shore A	ND 8	

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

1.5mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-54110-31	Clear with write on spot	226-54110-11	PTFE/Silicone, ultra-clean	226-54113-01
226-54110-41	Clear	226-54110-01	PTFE/Silicone, ultra-clean	226-54113-01
226-54110-51	Clear	226-54110-01	PTFE/Rubber	226-54112-01
226-54111-41	Amber with write on spot	226-54111-11	PTFE/Silicone, ultra-clean	226-54113-01
226-54111-31	Amber	226-54111-01	PTFE/Silicone, ultra-clean	226-54113-01
226-54111-51	Amber	226-54111-01	PTFE/Rubber	226-54112-01

Micro-insert for 1.5mL screw vials, 100/pack

Part number	Min. sample vol	Max. sample vol	Usage	Assembled plastic spring	Type	Picture
226-84201-11	30 uL	250 uL	ND9 wide opening vials	√	Conical	
226-84202-11	25 uL	150 uL	ND8 small opening vials	√	Conical	
226-84203-11	40 uL	350 uL	ND9 wide opening vials	X	Flat bottom	
226-84204-11	40 uL	260 uL	ND8 small opening vials	X	Flat bottom	

1.5 mL amber screw vial kit

1.5 mL clear screw vial kit

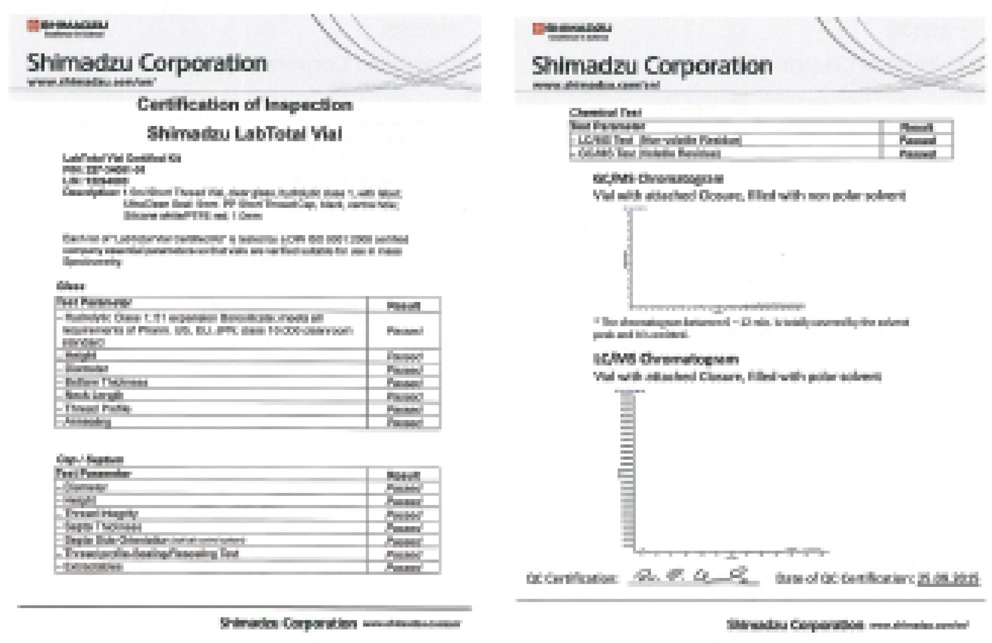
Shimadzu LabTotal Vial MS Certified Kit

- Reduces the Adsorption of Basic Compounds on the Surface of the Glass Vial.
  – This improves quantitative accuracy in the analysis of trace basic compounds.
- Quality certificate proving suitability to LCMS / GCMS
  – This product can be used as a vial for high-sensitivity analysis in GCMS and LCMS
- Wide Mouth with Preset Cap and Septum Improves Ease of Use
  – This shortens the time needed for sample preparation and reduces human error.

Part number	Description
227-34001-01	LabTotal Vial Certified Kit for LCMS, 100/pk
227-34001-02	Blue PP cap, Silicone white/PTFE red for LabTotal vial LCMS, 50/pk
226-84340-01	Black PP cap, Silicone white/PTFE red for LabTotal vial LCMS, 100/pk
227-34002-01	LabTotal Vial Certified Kit for GCMS, 100/pk

Mass Spec Quality Certificate Provided

This confirms that there was an absence of elution components from the vial in random inspections using LC/MS and GC/MS. Therefore, this product can be used with confidence, with no concern for ghost peaks originating from the vial.



Shimadzu LabTotal Recovery Vial kit

- Shimadzu LabTotal Recovery vials offers maximum recovery for GC and HPLC/UHPLC with a residual volume <1uL for valuable samples
- Minimun working volume 25uL up to 1.6mL (Maximum possible volume) for reproducible results
- Can be used as a concentration vial, because the solid glass bottom offers excellent heat transfer and vial-stability.
- Compactible with universal autosampler
- Available in Deactivated, HPLC/GC and Mass Spec certified kits

<table>
<tr><th>Kit part number</th><th>Vial</th><th>Vial part number</th><th>Septa material</th><th>Cap/Septa part number</th><th>Kit Type</th></tr>
<tr><td>226-54307-31</td><td rowspan="8">0.9mL Recovery vial</td><td rowspan="8">226-54307-01</td><td rowspan="4">Silicone beige/PTFE white*</td><td rowspan="4">226-84131-01</td><td>-</td></tr>
<tr><td>226-55001-71</td><td>Deactivated</td></tr>
<tr><td>226-55001-81</td><td>HPLC/GC certified</td></tr>
<tr><td>226-55001-91</td><td>MS certified</td></tr>
<tr><td>226-54308-31</td><td rowspan="4">Silicone beige/PTFE white pre-slit*</td><td rowspan="4">226-54113-02</td><td>-</td></tr>
<tr><td>226-55002-71</td><td>Deactivated</td></tr>
<tr><td>226-55002-81</td><td>HPLC/GC certified</td></tr>
<tr><td>226-55002-91</td><td>MS certified</td></tr>
</table>

*UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

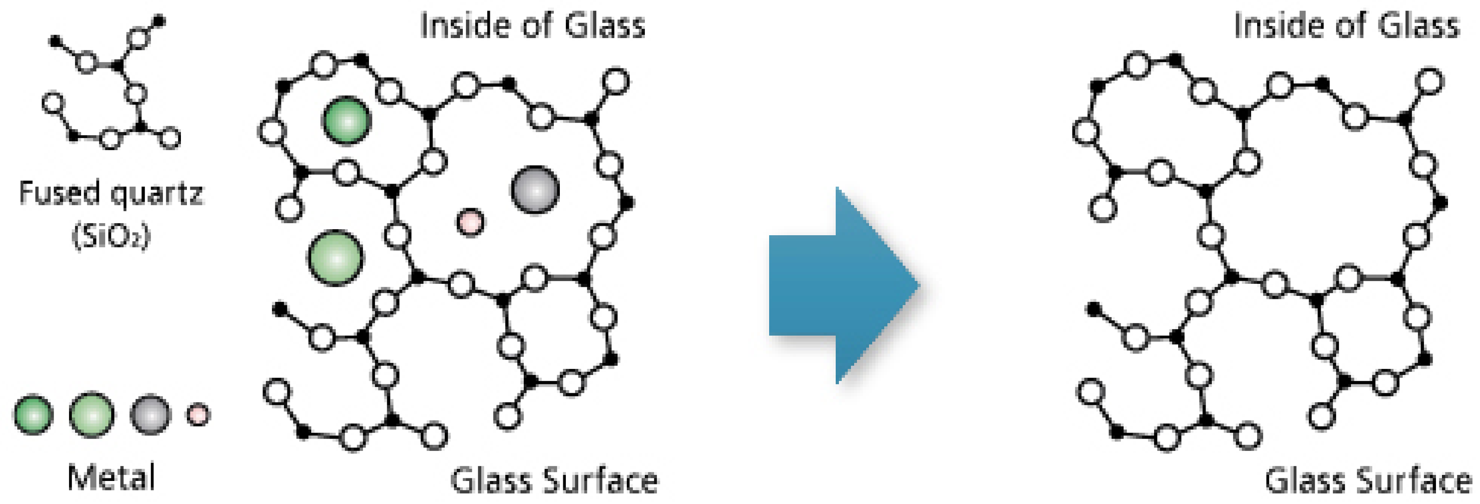
TORAST-H Glass Vial

Features

- Low adsorption vessels treated specially
- Minimized adsorption of bases, acids and neutrals
- Superior quality control

TORAST -H Glass Technology eliminates the risk of adsorption to the glass surface of the vials

Glass, the material of vials, contains metal oxides. Oxides of metals have a high ionizing tendency to be Si-O-M (metal silanolate), which may cause ionic adsorption with basic compounds in the sample. TORAST-H Glass Technology uses special processing to remove metals from the glass and suppress adsorption of basic compounds.

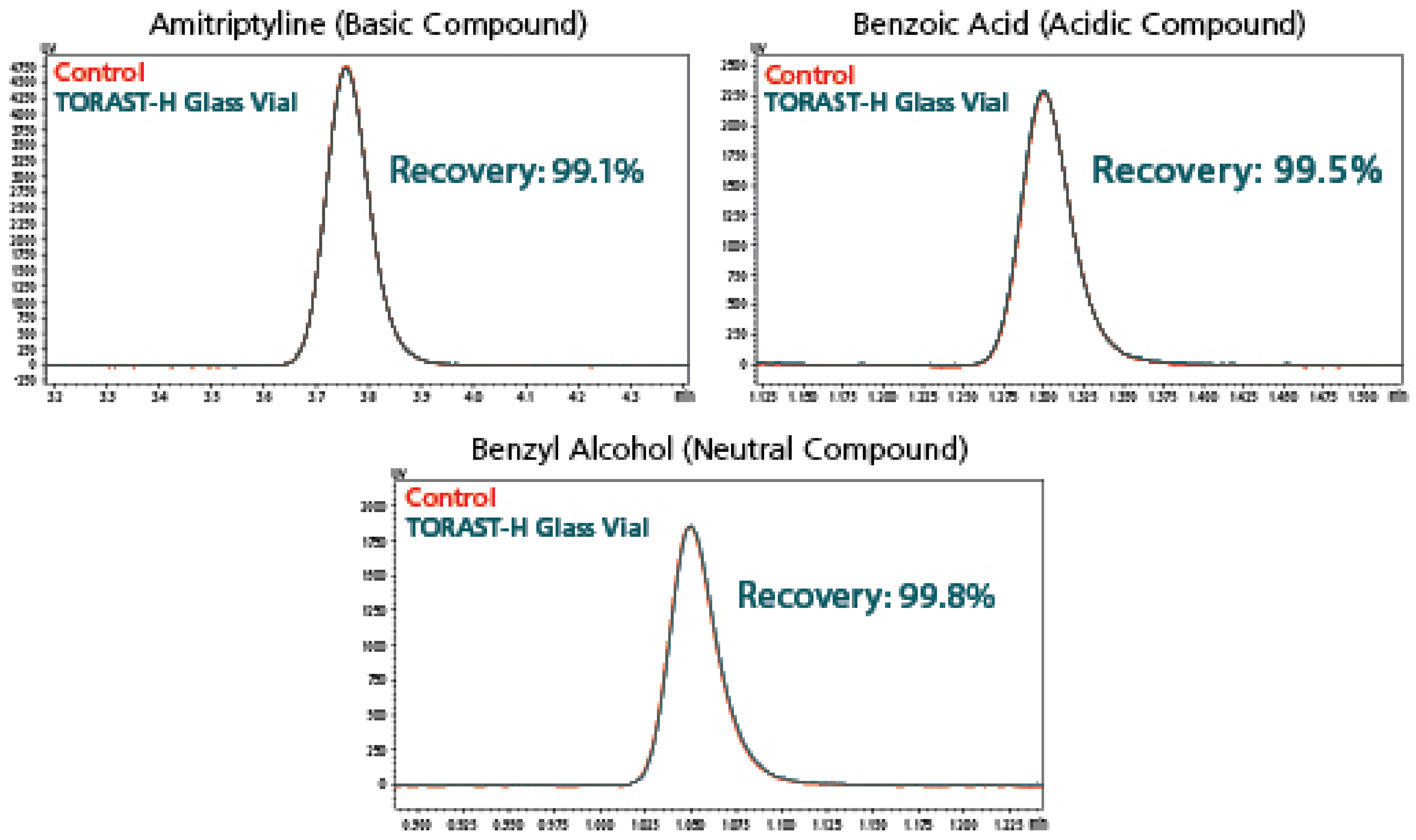


Conventional Vials (including metal)

TORAST-H Glass Vial

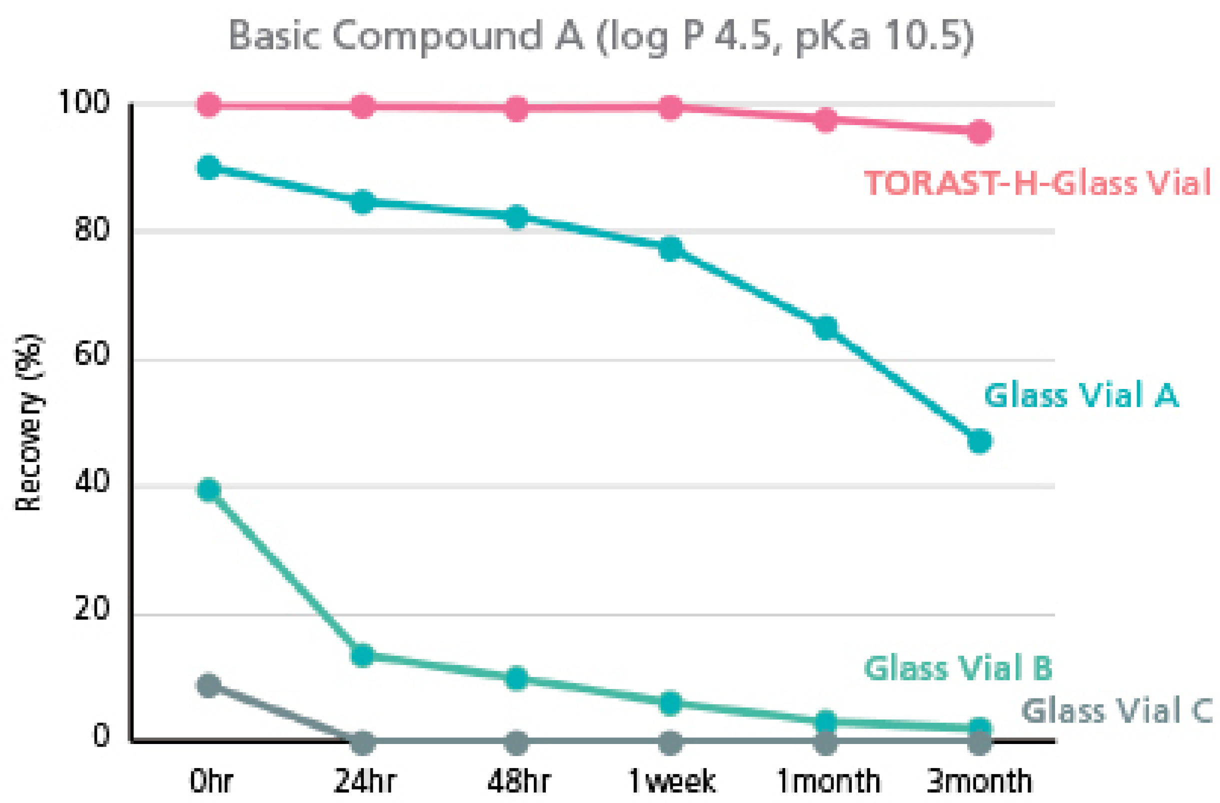
Minimized adsorption of bases, acids & neutrals

In general, giving a positive charge to the glass surface suppresses the adsorption of the basic compounds, but conversely, it causes the adsorption of the acidic compounds. TORAST-H Glass Vials minimize adsorption of both types of compounds.



Low adsorption for long-term storage

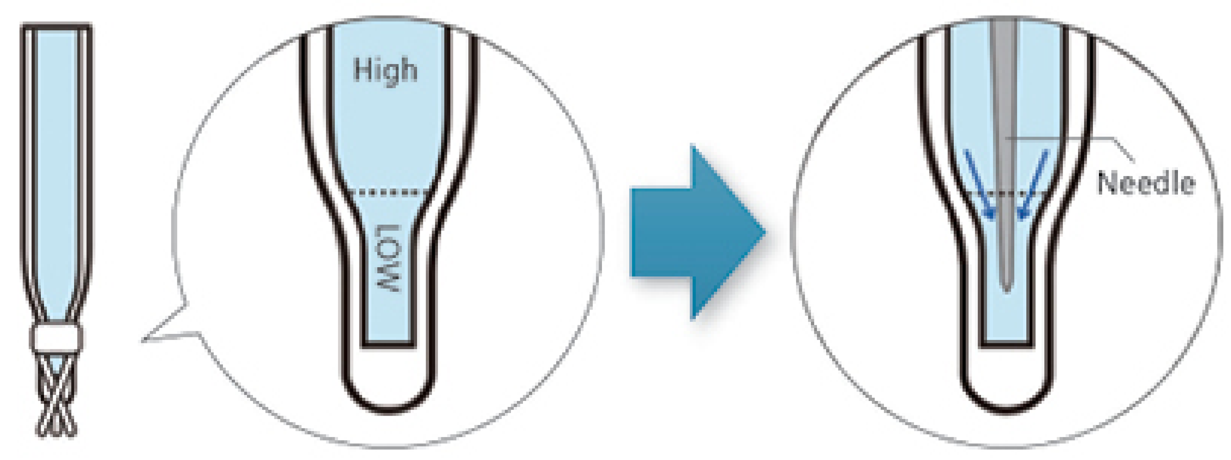
When a sample is stored in a general vial for a long time, the sample may adsorb into the surface of the vial, causing the reproducibility to be poor. The TORAST-H Glass Vial contains low adsorption characteristics that makes it excellent for long term sample storage.



Adsorption test for long-term storage

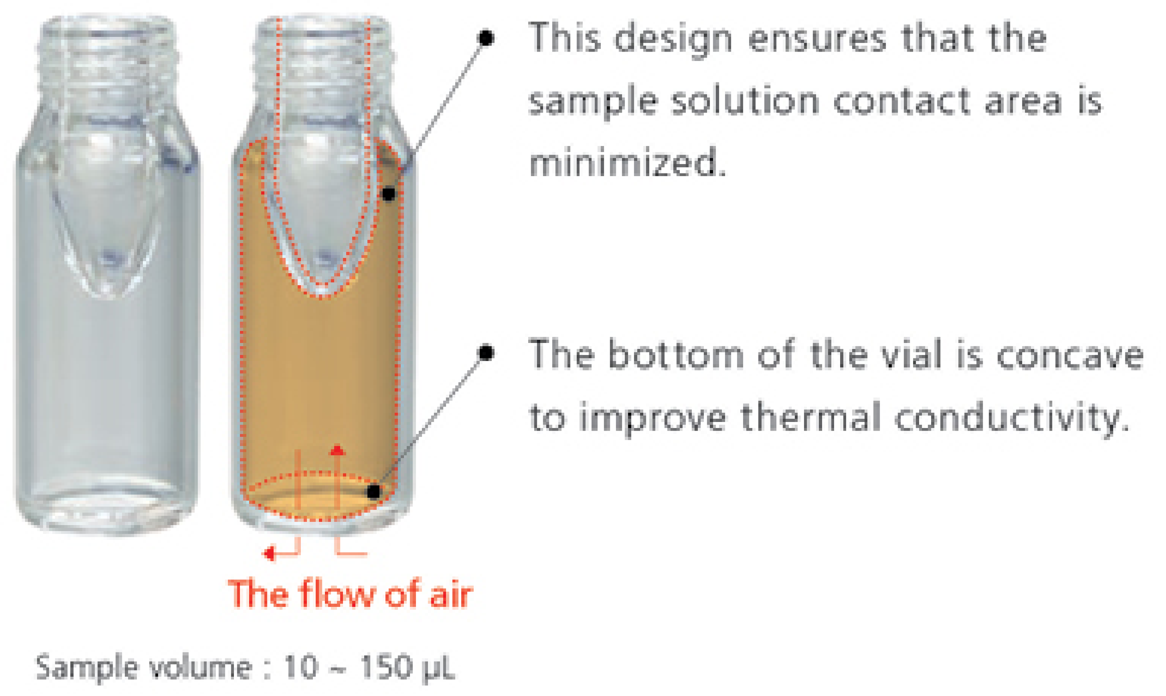
Small-Volume Vials

Insert vials (small capacity) may produce concentration gradients at the top and bottom due to sample adsorption, causing variation over time.



The lower sample has a large contact area with the insert vial and low concentration due to retention.

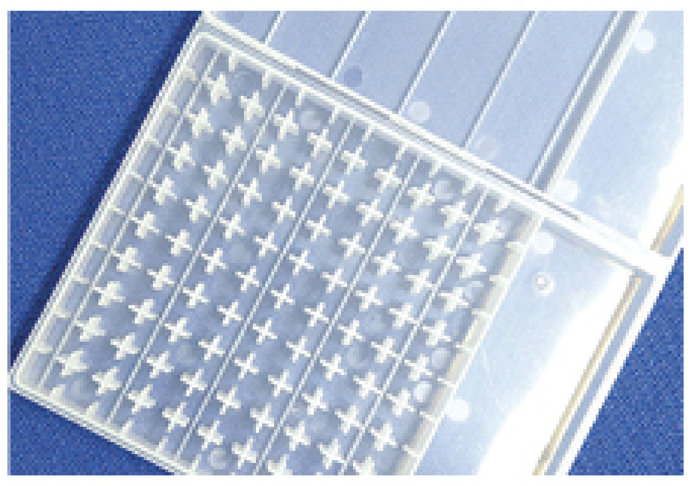
Sampling increases temporarily the recovery rate because the upper sample flows into the lower part.



Small-volume vials have a large contact area; therefore, the rate of loss due to adsorption is greater than with a standard vial. TORAST-H Glass Vials shows dramatically less adsorption compared to other small-volume glass vials.

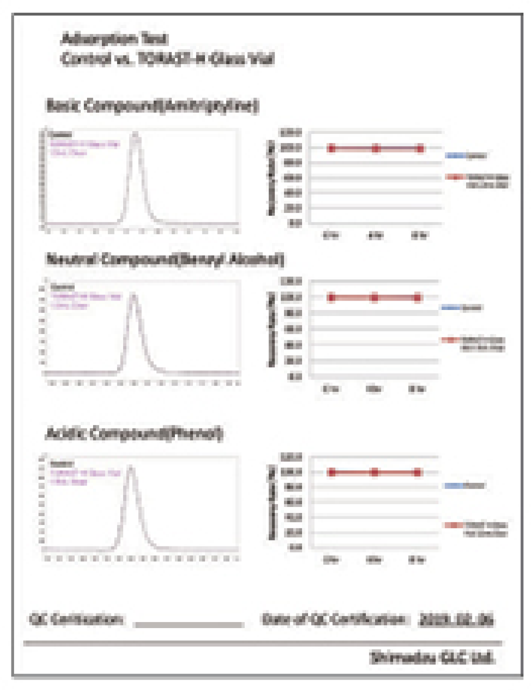
Medical Grade Packaging Materials

Reduce the adhesion of organic substances from the packaging and the formation of organic layers.



Superior Quality Control

- Hydrolytic Class 1; 51 expansion Borosilicate
- Comes with quality certificates for lot management.
- Shape inspection of vials, septa and caps.
- Low adsorption performance testing for basic, acidic and neutral compounds.



Product Information

P/N	Color	Volume	Cap	Septa	Qty
370-04300-01	Clear Glass	1.5 mL	Screw, Black	PTFE/Silicone	100
370-04300-02				Preslit PTFE/Silicone	
370-04300-03	Amber Glass			PTFE/Silicone	
370-04300-04				Preslit PTFE/Silicone	
370-04301-01	Clear Glass	150 µL		PTFE/Silicone	
370-04301-02				Preslit PTFE/Silicone	
370-04301-03	Amber Glass			PTFE/Silicone	
370-04301-04				Preslit PTFE/Silicone	

* Avoid sunlight and store at room temperature.

TORAST-H Bio Vial

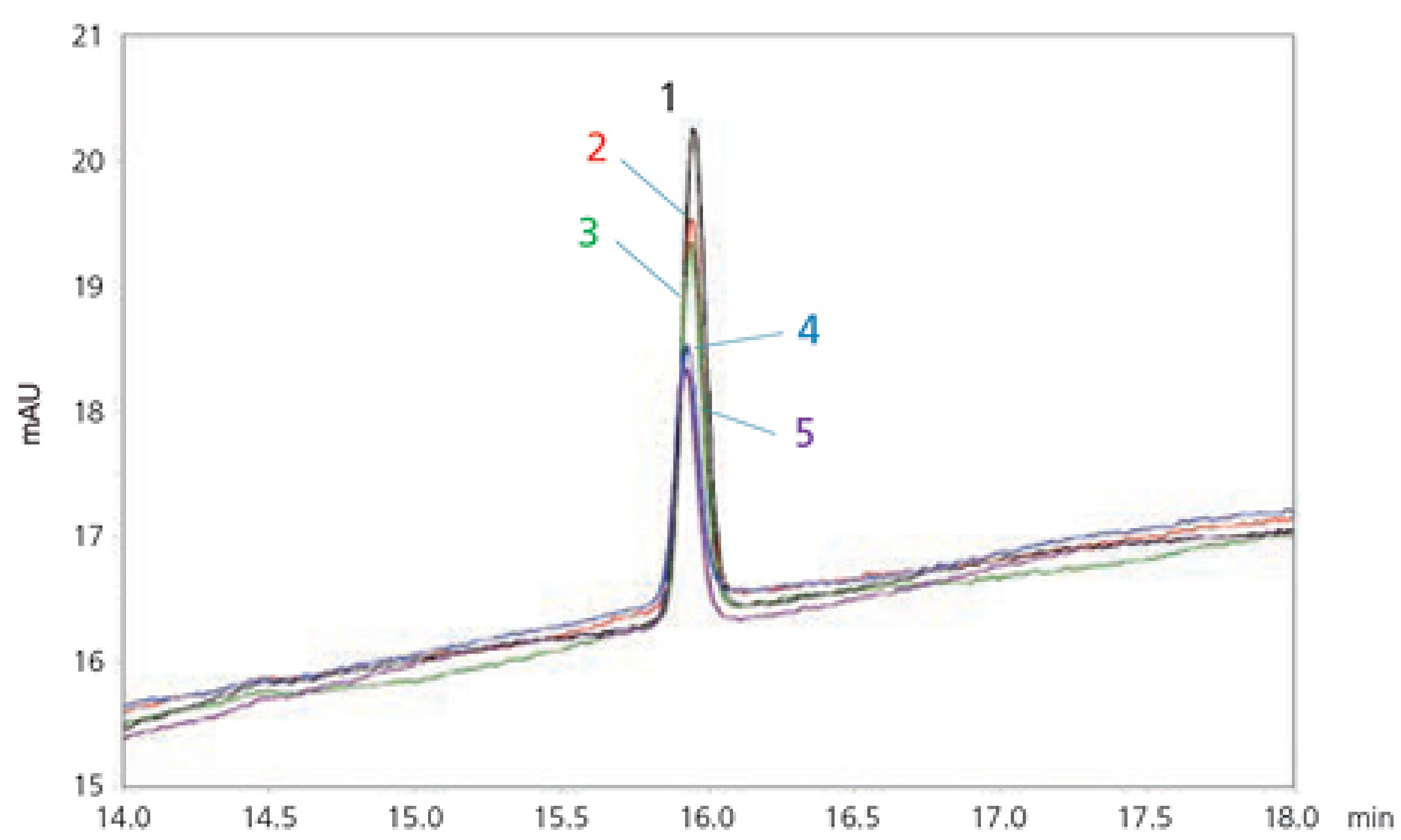
Features

- Prevents the adsorption of organic compounds
- Reduces the adsorptive loss of the precious sample
- Ideal for peptide and basic compounds analysis

Reduces the adsorption of peptides

The peptide used as a medium molecule pharmaceutical product is likely to be adsorbed on the polypropylene resin by the hydrophobic interaction. The TORAST-H Bio Vial prevents the adsorption of organic compounds.

No.	Vial Type	Sample Vol. (μL)	Recovery (%)
1	TORAST-H Bio VIal	200	100
2	Glass Vial by Company A	1500	81.1
3	Glass Vial by Company B	1500	78
4	PP Vial by Company B	200	52.1
5	PP Vial by Company C	200	53.3



Adsorption test on Ghrelin with various type of vials

Product Information

Name	P/N	Volume (μL)	Material	Qty./Unit
TORAST-H Bio Vial with cap	370-04350-00	300	Polypropylene	100

TORAST-H 96well 500 RU

Features

- Low adsorption polypropylene 96-well plate
- Prevents the adsorption of organic compounds
- Reduces the adsorption loss of the precious sample
- Ideal for peptide and basic compounds analysis

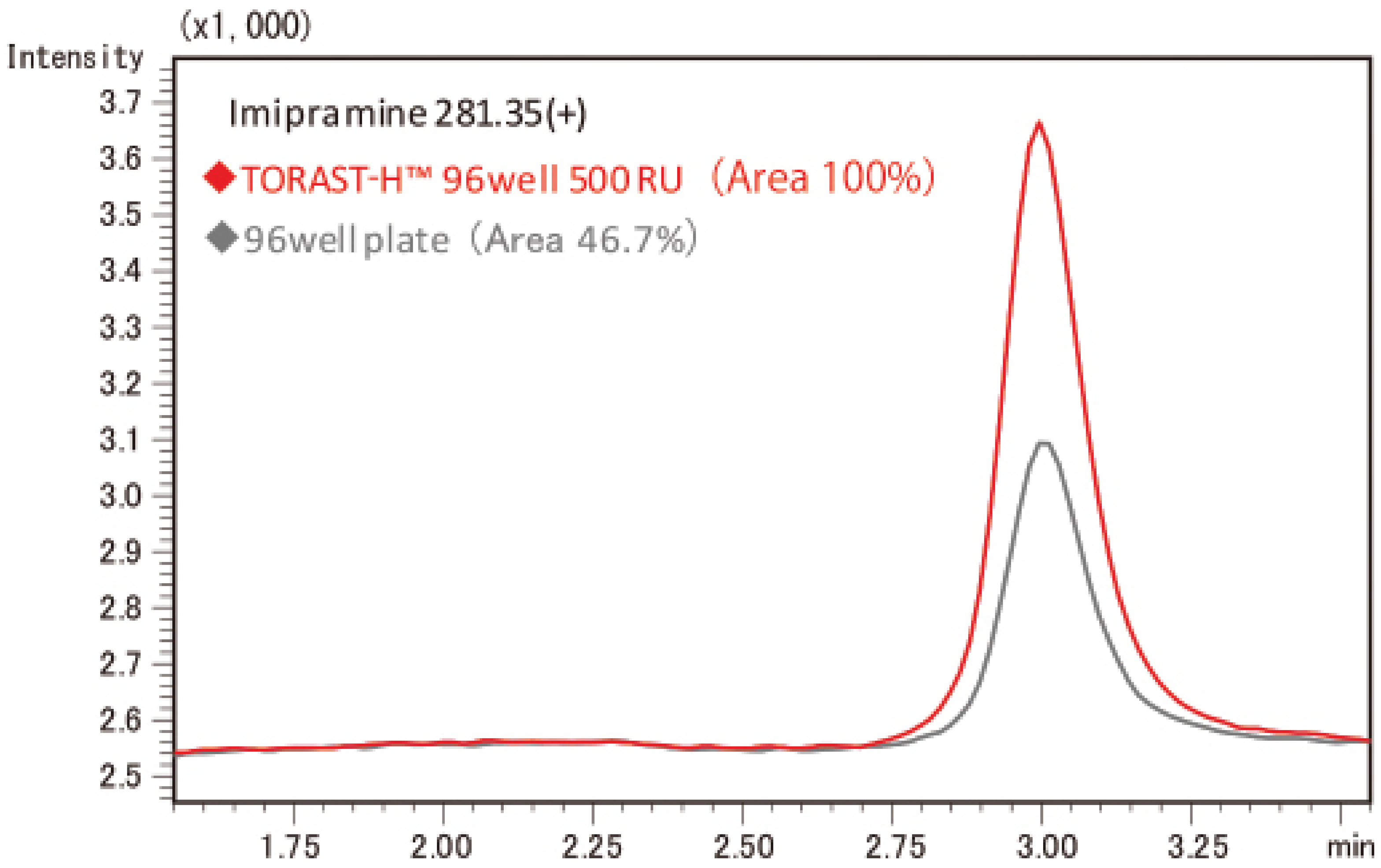
Adsorption Test of Imipramine

Imipramine is used in the treatment of depression and is a hydrophilic and basic compound. (logP: 4.28, pKa: 9.2).

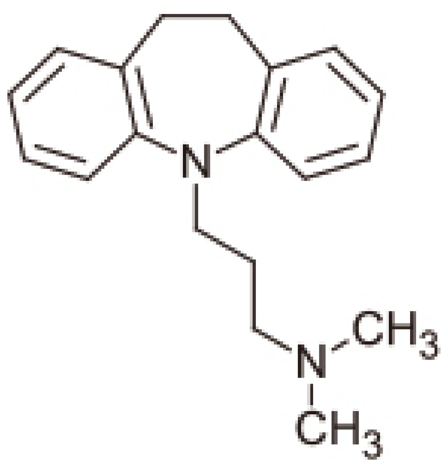
The chromatogram below shows a comparison of the Imipramine peak area with non-coated polypropylene 96-well plate compared to TORAST-H™ 96- well plates.

Non-coated polypropylene 96-well plate show hydrophobic adsorption within the well.

TORAST-H 96well 500 RU plates significantly improved the peak area by preventing the adsorption within the wells. This result indicates that TORAST-H 96well 500 RU well plate is effective in preventing adsorption.



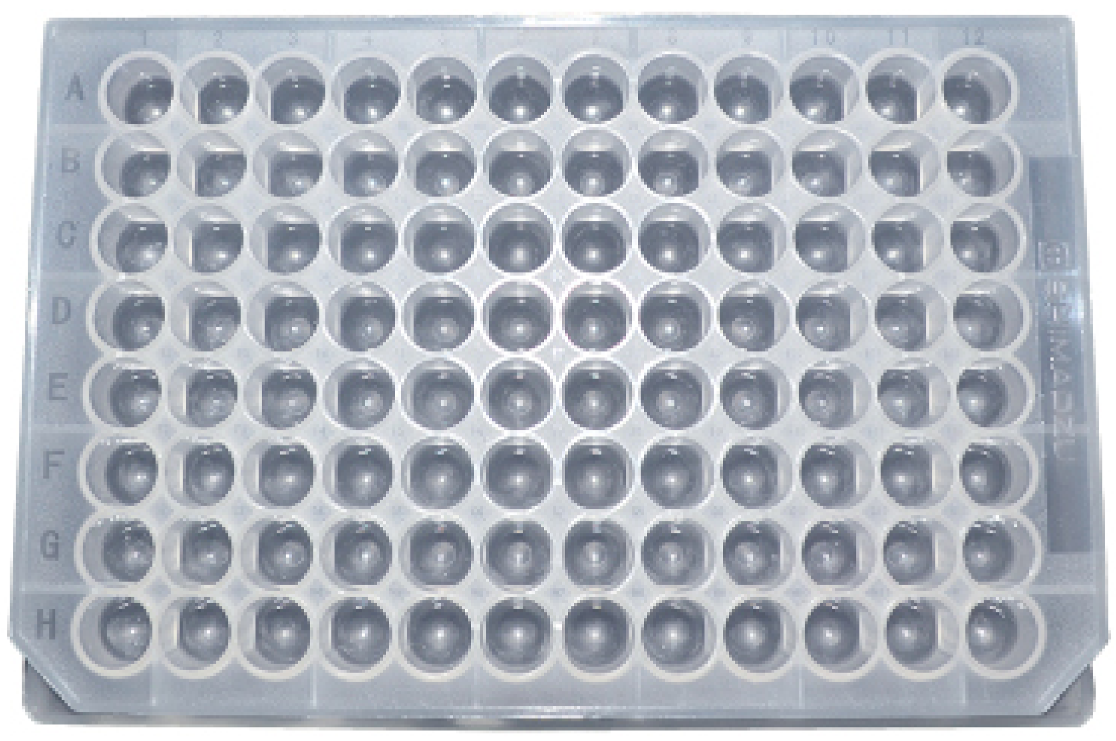
Sample : Imipramine (1 ng/mL)
Instruments : Nexera-i, LCMS-2020
Mobile Phase : 10 mM Ammonium Acetate in Water : MeCN =40:60_Isocratic flow
Flow Rate : 0.2 mL/min



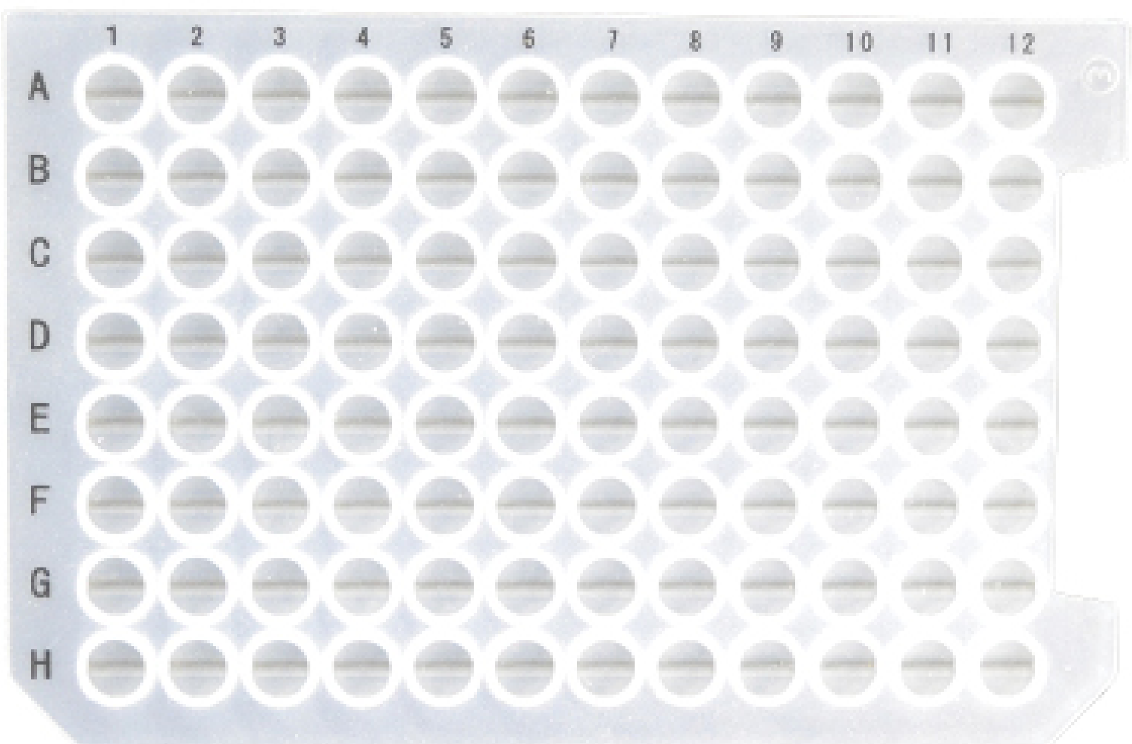
Imipramine Molecular Weight : 280.4

Product Information

Name	P/N	Volume (µL)	Material	Qty./Unit
TORAST-H 96well 500 RU	370-04100-01	500	Polypropylene	10
TORAST 96well Silicon Mat	370-04020-01	-	Silicon	50



TORAST-H 96 well 500 RU



TORAST-H 96 well Silicon Mat

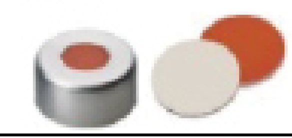
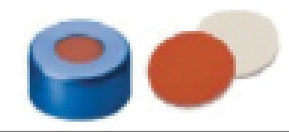
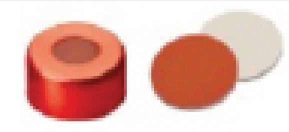
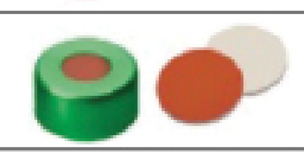
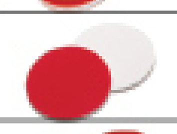
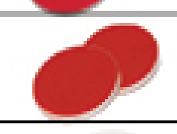
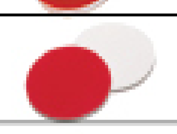
Vials

1.5mL crimp vials, 100/pack

Part number	226-54120-11	226-54120-01	226-54306-01	226-54121-11	226-54121-01
Type	Clear, crimp vial	Clear, crimp vial	Clear, crimp vial with integrated 0.2mL micro-insert, top bonded	Amber, crimp vial	Amber, crimp vial
Write on spot	√	X	√	√	X
Min. Vol / uL	200	200	25	200	200
Max. Vol / mL	1.5	1.5	0.21	1.5	1.5
Dimension	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm	32 x 11.6mm
Size	ND 11	ND 11	ND 11	ND 11	ND 11

Caps/Septa for 1.5mL crimp vials, 100/pack

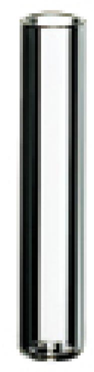
Temperature limit for PTFE/Rubber septa: -40°C up to 110°C
Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for PTFE/Silicone/PTFE septa: -60°C up to 200°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-54123-01	Silver Aluminum	PTFE/Silicone, ultra-Clean	1.3 mm	45° shore A	
226-54124-01	Silver Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-84125-01	Blue Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-84126-01	Red Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-54127-01	Green Aluminum	PTFE/rubber	1.0 mm	45° shore A	
226-54128-01	Gold magnetic	Silicone/PTFE	1.3 mm	45° shore A	
226-54129-01	Gold magnetic	PTFE/ Silicone/PTFE	1.0 mm	45° shore A	
226-54125-01	–	Silicone/PTFE	1.5 mm	55° shore A	
226-54129-02	–	PTFE/ Silicone/PTFE	1.0 mm	45° shore A	
226-54128-02	–	Silicone/PTFE	1.3 mm	45° shore A	

1.5mL crimp vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-54120-51	Clear with write on spot	226-54120-11	PTFE/Silicone, ultra-Clean	226-54123-01
226-54120-31	Clear	226-54120-01	PTFE/Silicone, ultra-Clean	226-54123-01
226-54120-61	Clear	226-54120-01	PTFE/rubber	226-54124-01
226-54121-51	Amber with write on spot	226-54121-11	PTFE/Silicone, ultra-Clean	226-54123-01
226-54121-31	Amber	226-54121-01	PTFE/Silicone, ultra-Clean	226-54123-01
226-54121-41	Amber	226-54121-01	PTFE/rubber	226-54124-01

Micro-insert for 1.5mL crimp vials, 100/pack

Part number	Min. sample vol	Max. sample vol	Usage	Assembled plastic spring	Type	Picture
226-84201-11	30 uL	250 ul	ND9 & ND11 vials	√	Conical	
226-84203-11	40 uL	350 uL	ND9 & ND11 vials	X	Flat bottom	

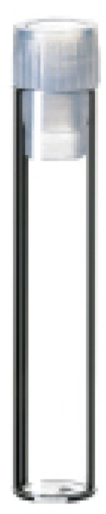
Crimper/Decapper for 1.5mL crimp vials

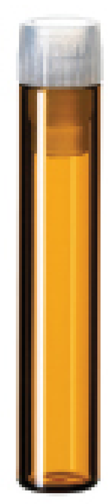
Part number	Description
226-84001-00	11mm Crimper
226-84011-00	11mm Decapper

Vial racks for 1.5mL vials

Part number	Type	Dimension	Cavities
226-84902-10	Acrylic	173 x 95 x 20 mm	50
226-84903-10	Blue PP	200 x 105 x 17 mm	50

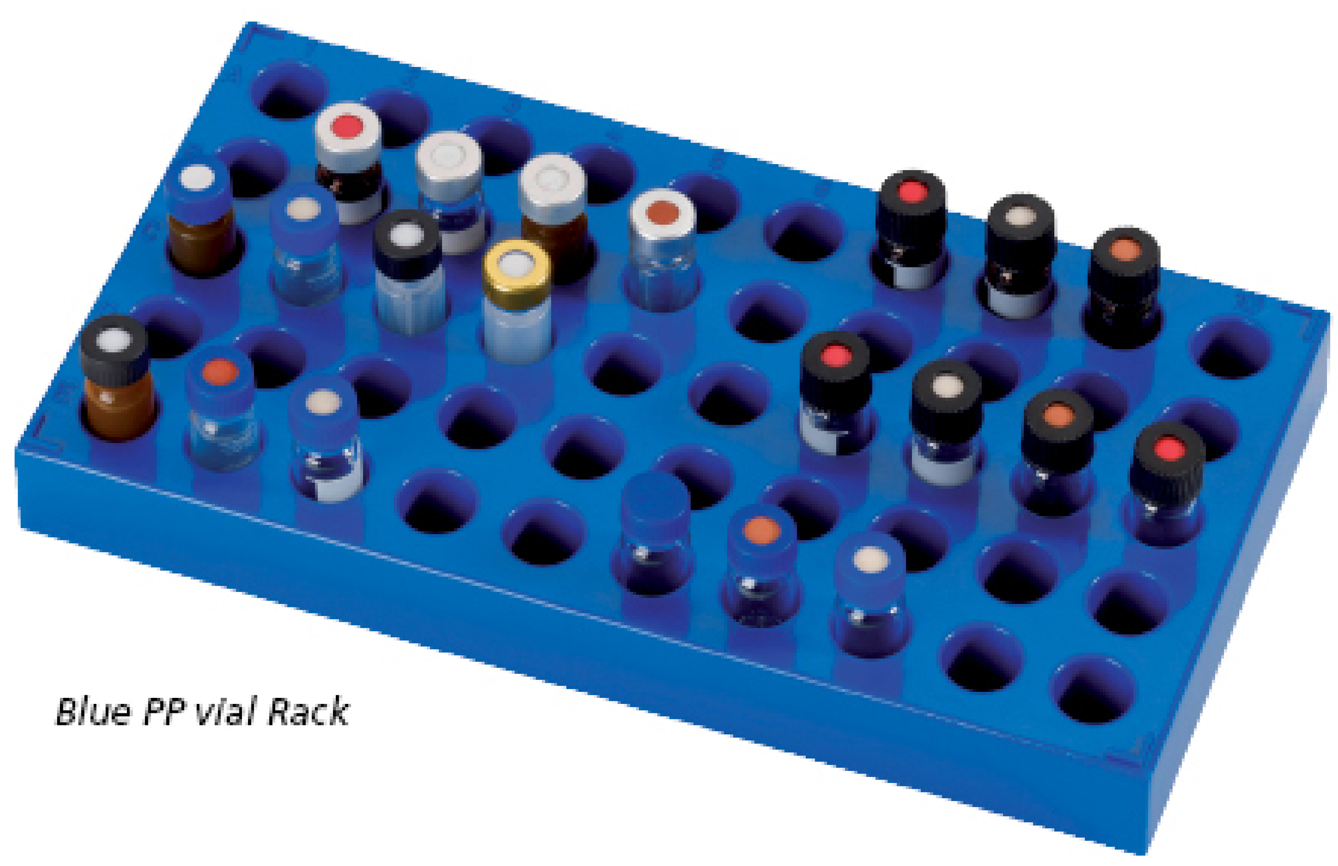
Shell vials, 100/pack





Part number	226-84203-01	226-84204-01
Min. Vol / uL	100	100
Max. Vol / mL	1.0	1.0
Dimension	40 x 8.2mm	40 x 8.2mm

11mm crimper & decapper



Blue PP vial Rack

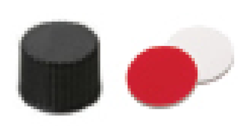
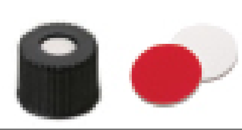
4mL screw vials, 100/pack

Part number	226-84410-01	226-84410-21	226-84411-01	226-84411-21
Type	Clear, screw	Clear, screw	Amber, screw	Amber, screw
Write on spot	√	X	√	X
Min. Vol / uL	800	800	800	800
Max. Vol / mL	4.1	4.1	4.1	4.1
Dimension	45 x 14.7mm	45 x 14.7mm	45 x 14.7mm	45 x 14.7mm
Size	ND 13	ND 13	ND 13	ND 13

Caps/Septa for 4mL vials, 100/pack

Temperature limit for Silicone/PTFE septa: -60°C up to 200°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84413-01	Black PP closed top	Silicone/PTFE	1.5 mm	55° shore A	
226-84413-02	Black PP open top	Silicone/PTFE	1.5 mm	55° shore A	
226-84415-01	White PP open top	-	-	-	
226-84414-01	-	Silicone/PTFE	1.5 mm	55° shore A	

4mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84410-31	Clear with write on spot	226-84410-01	Closed top, Silicone/PTFE	226-84413-01
226-84410-41	Clear	226-84410-21	Closed top, Silicone/PTFE	226-84413-01
226-84412-31	Clear	226-84410-21	Open top, Silicone/PTFE	226-84413-02
226-84411-31	Amber with write on spot	226-84411-01	Closed top, Silicone/PTFE	226-84413-01
226-84411-41	Amber	226-84411-21	Closed top, Silicone/PTFE	226-84413-01

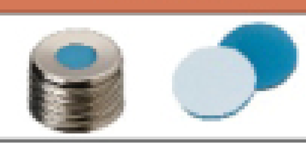
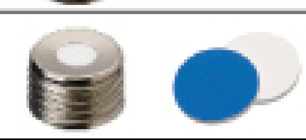
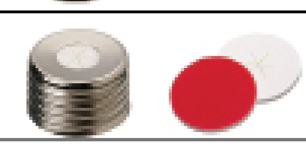
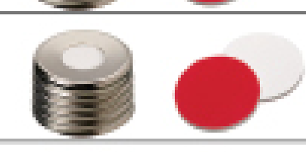
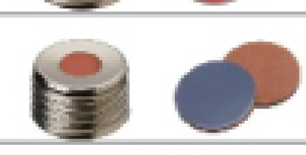
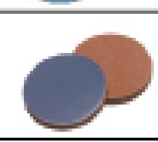
10mL and 20mL Headspace screw vials, 100/pack

Part number	226-84521-01	226-84521-21	226-84510-01	226-84510-21
Volume / mL	10	10	20	20
Type	Round bottom	Round bottom	Round bottom	Round bottom
Dimension	46 x 22.5mm	46 x 22.5mm	75.5 x 22.5mm	75.5 x 22.5mm
For use on instrument	CTC Combi PAL (Varian, Gerstel, Atas, Shimadzu), Agilent, PerkinElmer*			

For TurboMatrix™ 16, 40 and 110, produced after 01.09.2006

Caps/septa for 10mL and 20mL screw vials

Temperature limit for PTFE/Silicone septa: -60°C up to 200°C
Temperature limit for Butyl/PTFE septa: -40°C up to 120°C

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84513-01	Magnetic Screw	Silicone/PTFE	1.3 mm	45° shore A	
226-84514-01	Magnetic Screw	Silicone/PTFE	1.5 mm	55° shore A	
226-84519-01	Magnetic Screw	Silicone/PTFE	1.3 mm	45° shore A	
226-84524-01	Magnetic Screw	Silicone/PTFE, Pre-cut(*)	1.5 mm	55° shore A	
226-84516-01	Magnetic Screw	Butyl/PTFE	1.6 mm	55° shore A	
226-84515-01	-	Silicone/PTFE	1.3 mm	45° shore A	
226-84517-01	-	Butyl/PTFE	1.6 mm	55° shore A	
226-84518-01	-	Silicone/PTFE	1.5 mm	55° shore A	

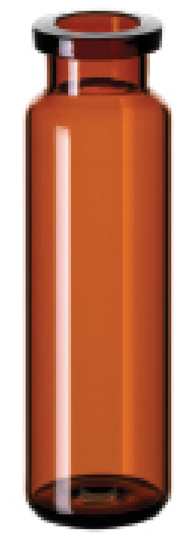
20mL screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84510-31	Clear	226-84510-01	Magnetic Screw, Silicone/ PTFE	226-84513-01

Vials

10mL and 20mL Headspace crimp vials, 100/pack



Part number	226-84520-00	226-84521-00	226-84520-01	226-84520-21
Volume / mL	10	10	20	20
Type	Round bottom	Round bottom	Round bottom	Round bottom
Dimension	46 x 22.5mm	46 x 22.5mm	75.5 x 22.5mm	75.5 x 22.5mm
For use on instrument	Carlo Erba, CTC PAL (Varian, Gerstel, Atas, Shimadzu), Fisons, Varian, Thermo Scientific		CTC PAL (Varian, Gerstel, Atas, Shimadzu), Thermo Scientific TriPlus HS **	

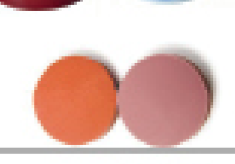
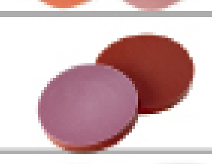
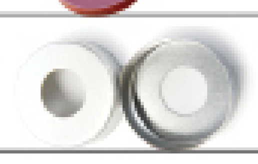
** not suitable for Thermo Scientific HS250/HS500

10mL and 20mL Headspace crimp vials, 100/pack



Part number	226-84522-01	226-84520-02	226-84523-01
Volume / mL	20	20	20
Type	Flat bottom	Round bottom	Round bottom
Dimension	75.5 x 22.5mm	75.5 x 23mm	75.5 x 23mm
For use on instrument	Agilent, Carlo Erba, DANI, Fisons	PerkinElmer, Tekmar	

Caps/septa for 10mL and 20mL crimp vials

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Temperature limit	Picture
226-84523-11	Gold magnetic	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84524-11	Aluminum pressure release	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84525-11	Aluminum silver	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	-60°C up to 200°C	
226-84531-11	Aluminum silver	Butyl/PTFE	3.0 mm	50° shore A	-40°C up to 120°C	
226-84526-11	Aluminum pressure release	Butyl/PTFE	3.0 mm	50° shore A	-40°C up to 120°C	
226-84540-11	Aluminum silver	Silicone/PTFE (HT quality)	3.2 mm	45° shore A	-60°C up to 200°C	
226-84530-11	Aluminum silver 5mm centre hole	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	Up to 300°C	
226-84541-11	Magnetic Bimetal	Silicone/PTFE	3.0 mm	55° shore A	-60°C up to 200°C	
226-84527-11	-	Silicone/PTFE, ultra-clean	3.1 mm	45° shore A	Up to 250°C	
226-84528-11	-	Silicone/PTFE, ultra-clean	3.0 mm	45° shore A	Up to 300°C	
226-84529-11	Aluminum silver	-	-	-	-	

20mL crimp vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Cap / Septa	Cap/Septa part number
226-84520-31	Clear	226-84520-01	Gold magnetic, Silicone/ PTFE, ultra-clean	226-84523-11
226-84521-31	Clear	226-84520-01	Aluminum pressure release, Silicone/PTFE, ultra-clean	226-84524-11

Headspace Wash Kit

Part number	Vial type	Cap Type	Septa Material	Pack size
226-84600-00	10mL crimp vial	PE Snap Cap	Silicone/PTFE, Y-slitted	25

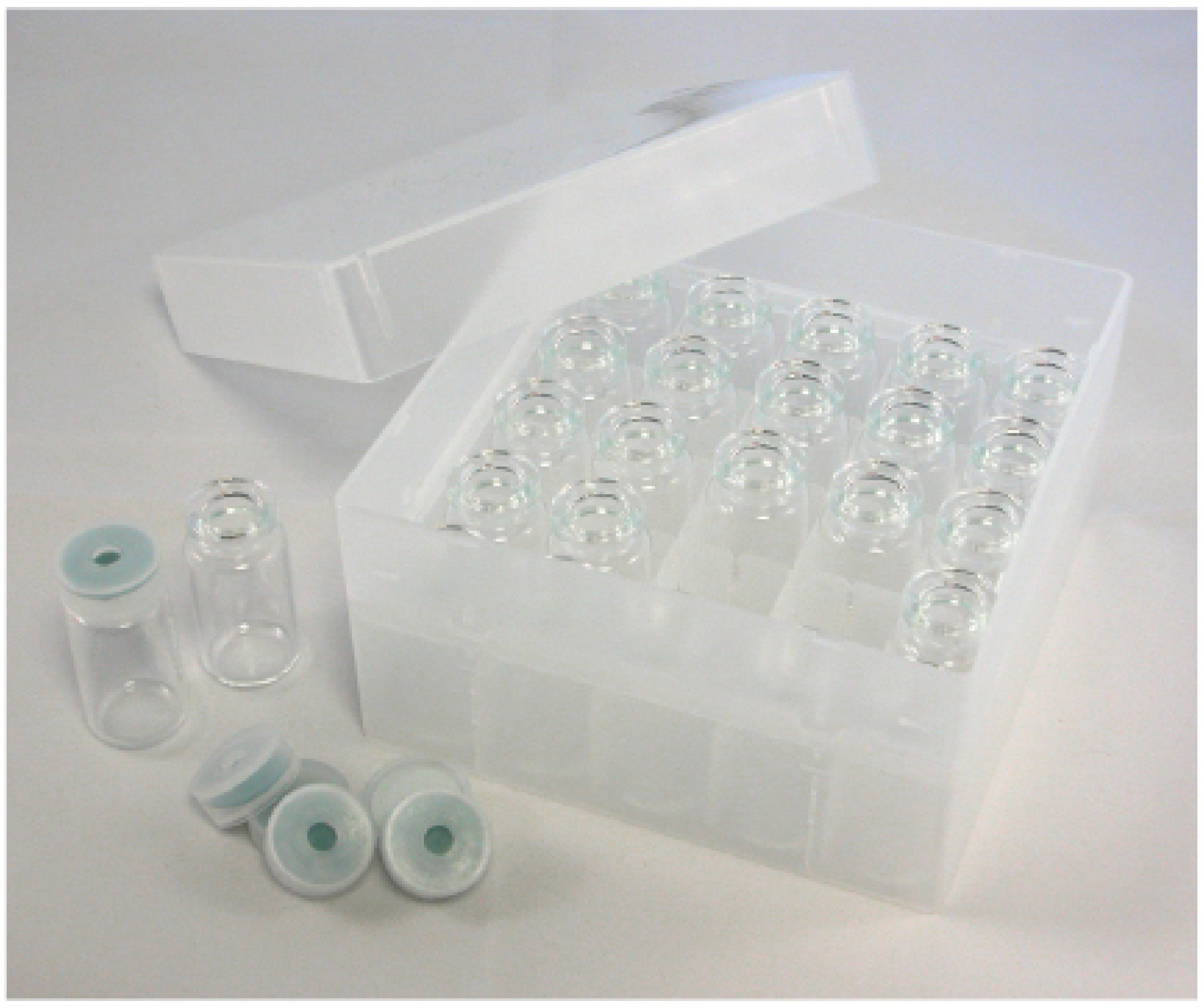
Vial rack for 10mL and 20mL vials

Part number	Type	Dimension	Cavities
226-84901-10	Acrylic	160 x 160 x 30mm	25

Crimper/Decapper for 10mL and 20mL crimp vials

Part number	Description
226-84002-00	20mm Crimper
226-84012-00	20mm Decapper

Acrylic vial rack



Headspace wash kit

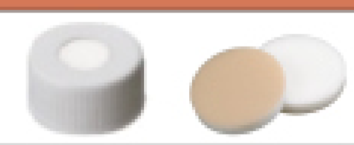
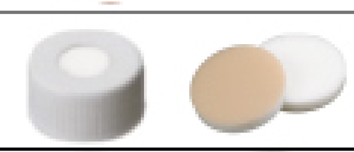
EPA vials

Shimadzu EPA vials are manufactured from 1st hydrolytic class glass, meeting EPA requirement. The flat bottomed EPA screw vials are available in 20 mL, 30 mL, 40 mL and 60 mL sizes in either clear or amber for light sensitive samples. Both injection and solid storage caps pre-assembled with septa are available for these vials. We recommend Ultrabond seals caps where the cap and septa form an inseparable unit, avoiding the issue of septa falling out or pushing into the vial. EPA vials and caps are sold separately in 100 per pack. Convenience vial kits with vials and pre-assembled caps are also available.

EPA screw vials, 100/pack

Part number	Volume	Vial	Size
226-84531-01	20 mL	Clear	ND 24
226-84532-01	20 mL	Amber	ND 24
226-84537-01	30 mL	Clear	ND 24
226-84537-21	30 mL	Amber	ND 24
226-84538-01	40 mL	Clear	ND 24
226-84538-21	40 mL	Amber	ND 24
226-84539-01	60 mL	Clear	ND 24
226-84539-21	60 mL	Amber	ND 24

Caps/septa for EPA screw vials, 100/pack

Part number	Cap	Septa Material	Septa Thickness	Septa Durometer	Picture
226-84533-11	White PP, centre hole	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	
226-84534-11	White PP, closed top	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	
226-84535-11	White PP, centre hole	Silicone/PTFE (EPA-Quality) *	3.2 mm	45° shore A	
226-84537-11	White PP, closed top	Butyl/PTFE	2.5 mm	55° shore A	
226-84538-11	White PP, centre hole	Butyl/PTFE	2.5 mm	55° shore A	
226-84536-11	-	Silicone/PTFE (EPA-Quality)	3.2 mm	45° shore A	

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

EPA screw vial kit, including vial, cap and septa, 100/pack

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number
226-84531-31	20 mL clear	226-84531-01	Centre hole, Silicone/PTFE (EPA-Quality)	226-84533-11
226-84532-31	20 mL clear	226-84531-01	Closed top, Silicone/PTFE (EPA-Quality)	226-84534-11
226-84533-31	20 mL clear	226-84531-01	Centre hole, Silicone/PTFE (EPA-Quality) *	226-84535-11
266-84537-31	30 mL clear	226-84537-01	Centre hole, Silicone/PTFE (EPA-Quality) *	226-84535-11
226-84538-31	40 mL clear	226-84538-01	Centre hole, Silicone/PTFE (EPA-Quality)	226-84533-11

* UltraBond seal, cap & septa form an inseparable unit, so that septa cannot fall out.

Storage screw vials and caps, 100/pack

Part number	Volume	Vial	Size	Cap/Septa part number	Cap Material	Septa Material
226-54220-01	1.5 mL	Clear	ND 8	226-54221-01	PP Black closed top	Silicone/PTFE
226-54222-01	1.5 mL	Amber	ND 8	226-54221-01	PP Black closed top	Silicone/PTFE
226-84410-21	4 mL	Clear	ND 13	226-84413-01	PP Black closed top	Silicone/PTFE
226-84411-21	4 mL	Amber	ND 13	226-84413-01	PP Black closed top	Silicone/PTFE
226-84416-01	8 mL	Clear	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84416-21	8 mL	Amber	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84417-01	12 mL	Clear	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84417-21	12 mL	Amber	ND 15	226-84416-02	PP Black closed top	Silicone/PTFE
226-84418-01	16 mL	Clear	ND 18	226-84418-02	PP Black closed top	Silicone/PTFE

40mL TOC Vial Certified Kits, 72/pack

Part number	Description	Remarks
226-50580-00	40mL TOC Vial Certified Kit, incl. cap and 0.068" Silicon/PTFE septa	Comes with certificate certified <10ppb Carbon, meets USP Method 643
226-50581-00	40mL TOC Vial Certified Kit, incl. cap and 0.125" Silicon/PTFE septa	
226-50582-00	40mL TOC Vial Certified Kit, incl. cap and 0.125" Silicon/PTFE septa,with dust covers	Each vial has an individual dust cover

40mL TOC Vial Kits Separate Components

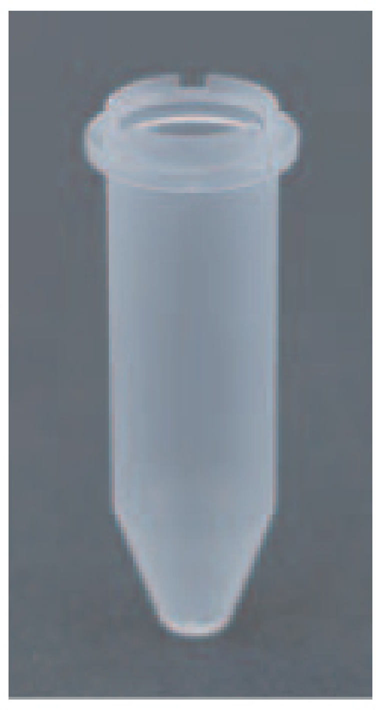
Part number	Description	Consist of
226-50585-00	40mL TOC clear vial, 144/pack	-
226-50586-00	PP Cap, centre hole, with 0.125" Silicon/PTFE septa, for 40mL vial, 72/pack	226-50587-00 & 226-50588-00
226-50587-00	PP cap, centre hole, for 40mL vials, 72/pack	-
226-50588-00	Septa only, 0.125" Silicon/PTFE, for 40mL vial, 72/pack	-
226-50589-00	PP Caps, with welded 0.068" Silicon/PTFE septa, for 40mL vial, 72/pack	-

Dedicated Pretreatment Vials for CLAM-2000

CLAM-2000 is compatible with dedicated disposable pretreatment vials from Shimadzu. Filtration and Collection vials are used as a pair.

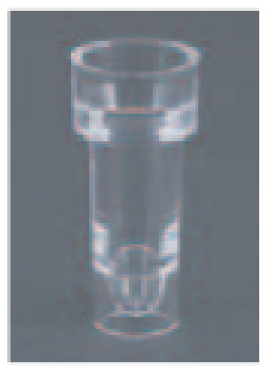
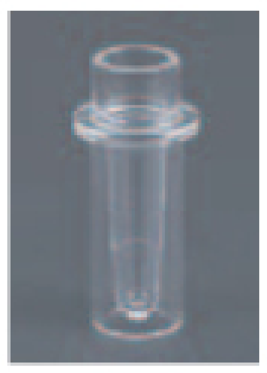
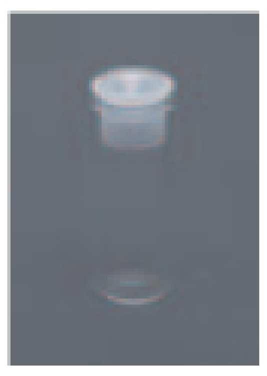
Part number	Description		
241-16531-41	Vial set	Set of 100	* Sold as a set
241-16531-42	Vial set	Set of 500	* Sold as a set

Dedicated
Filtration Vial



Dedicated
Collection Vial

Specifications of Applicable Sample and Reagent Vials

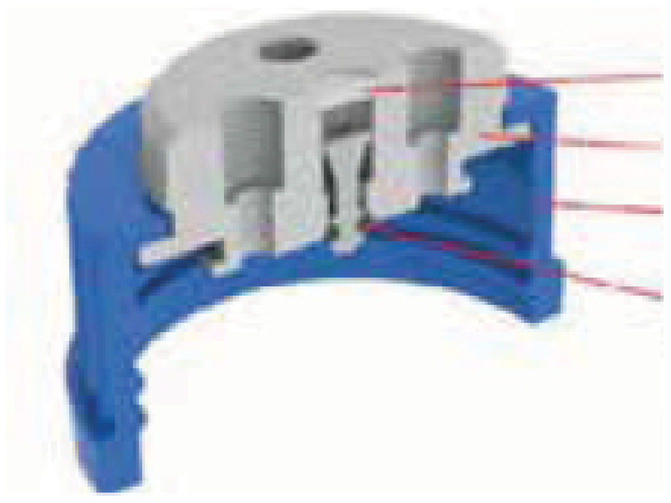
Sample Containers	13 mm body diameter × 75 mm tall Examples: BD brand Vacutainer blood collection tubes Terumo brand Venoject II blood collection tubes Nipro brand Neotube blood collection tubes, etc.	
	2 mL cup P/N 038-00180 Sample Cup, 1270016HIT	
	X Micro-volume cup P/N 241-94045-01 Sample Cup, Micro	
Reagent Vials	2 mL vial P/N 038-00083-01 Vial, 2.0mL Glass Shell Vial	
	6 mL vial P/N 038-00199-04 Vial, SCREW NO.2-C	
	12 mL vial P/N 038-00199-06 Vial, SCREW NO.4-C	

Solvent Kits

Solvent Safety Caps Kit

Features

- Minimize release of solvent odors
- One-way emission control valve allows air to enter the reservoir as solvent is removed
- Valve opens at a low 0.07psi to minimize back pressure



	Part number	Description	Consists of	
①	226-50318-00	4 Ports bottle cap, 1 pc	-	
②	226-50319-00	2 Ports Bottle Cap, 1 pc	-	
③	226-50315-01	Plug, ¼-28, Virgin PTFE, 1pc	-	
④	226-50316-01	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 1pc	-	
⑤	226-50318-01	4 Ports Bottle Caps Kit	226-50315-00	Plug, ¼-28, Virgin PTFE, 2 pcs
			226-50316-00	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 4 pcs
			226-50318-00	Safety Bottle Cap, 1pc
⑥	226-50319-01	2 Ports Bottle Caps Kit	226-50315-01	Plug, ¼-28, Virgin PTFE, 1 pc s
			226-50316-02	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 2 pcs
			226-50319-00	Safety 2 Ports Bottle Cap, 1pc


①


②


③


④


⑤


⑥

LC/LCMS Solvent Waste Kit

Features

- Enclose your LC solvents in the reagent bottles and trap solvent vapours in the waste container
- Collect solvent waste and reduce solvent emissions from HPLC and other laboratory instruments
- Convert an open, venting waste collection point to a "Closed System"
- Can be used with a broad array of standard laboratory solvent container
- Designed for ease of use and adaptability

①


②

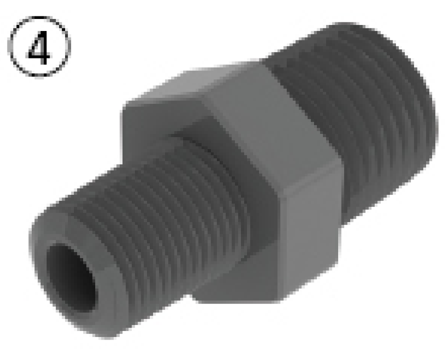

UNEXPOSED EXPOSED OVER EXPOSED

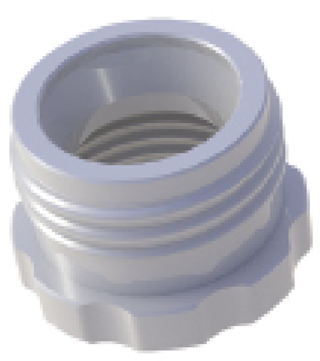
A colour marker label at the top of the indicator tube, marked "EXPOSED," shows the colour at which the indicator has been fully exposed. When the colour approximates this label, the filter should be changed. If the indicator changes to a light yellow colour, it designates a prolonged exposure to solvent and should be replaced immediately.

Part number		Description	Consists of
①	226-50330-00	LC Solvent Waste Kit	GL45 safety cap manifold, exhaust filter, colour indicator, basic tubing connections and one DIN45, 6 litre, HDPE Jerrycan.
②	226-50350-00	LCMS Ion Source Waste Kit	PTFE GL45/DIN45 cap with (2) barbs for 1/2" ID tubing and one DIN45, 6 litre, HDPE Jerrycan.
③	226-50336-00	Activated Carbon exhaust filter for organic solvents	
③	226-50337-00	COLOR INDICATOR for activated carbon vapor filters	
④	226-50338-00	Exhaust Filter Adapter to 1/8" NPT port, 1pc	
⑤	226-50342-00	Bottle Thread Adapter, S40 (Merck) female to GL45 male, polypropylene, 1pc	

③


Carbon exhaust filter with color indicator

④


⑤


Vacuum Filtration System

47 mm, Glass Filtration Set

- Unique filtration adaptor design can connect with GL45 storage bottle.
- Can filtrate and store solution directly in GL45 storage bottle without the need of being transferred from the -filtering flask.

Application: Purification of organic, corrosive liquid such as solvent (mobile phase) for HPLC analysis.

PTFE Coated Chemical Resistant Vacuum Pump

- No air pollution, maintenance free
  Rocker 300C vacuum pumps are driven by diaphragm, without the need of lubricant, regular oil changes and maintenance with no oil pollution.
- Good chemical resistance
  The diaphragm chamber of Rocker 300C is coated with PTFE and the SS # 316 valve plate can offer good resistance to a wide range of corrosive gases
- Thermal protection device
  Every motor of Rocker series pumps has a built-in thermal protection device to shut of the pump automatically when overheated and then resume working when the temperature cools down.
- International safety certification
  CE certification

Application: Vacuum filtration, Solid-Phase Extraction (SPE), Solvent purification

Glass Filtration Set

Filter funnel	Borosilicate glass
Funnel support base	Borosilicate glass
Membrane support	Sintered glass
Clamp	Anodized aluminum
Filtration Adaptor	PP (Autoclavable)
Storage Bottle	Borosilicate glass
Funnel capacity	300 mL
Flask capacity	1000 mL
Filter diameter	47 mm
Effective filtration area	9.6 cm²
Hose barb	5/16 inch (8 mm)

Vacuum Pump

Voltage	220V/50Hz
Max. power	60 W
Max. current	0.3 A
Max. vacuum	- 630 mmHg
Max. flow rate	20 l/min
Dimension (LxWxH)	28.5x13.5x20.4 cm

Part number	Item
226-82000-00	47mm Glass Filtration Set
226-82000-01	PTFE Coated Chemical Resistant Vacuum Pump
226-82000-31	47mm Glass Filtration set with pump

Solvent bottle and cap kit

Solvent bottle kit includes:

- 1 cap, GL45 thread, with three ports
- Safety-coated glass bottle 1L
- Polypropylene male Luer plug

Part number	Description	Pack size
226-88585-31	Solvent bottles with caps and accessories	5
226-88583-01	Cap with accessories	4
226-88585-02	Solvent bottle 1L	5

Membrane and Syringe Filters, 100/pack

Type	Material	Pore Size / um		Diameter			
			4mm*	13mm	25mm	33mm	47mm*
Syringe filter	Nylon	0.22	226-82104-22	226-82113-22	226-52125-22	226-82133-22	
		0.45	226-82104-45	226-82113-45	226-52125-45	226-82133-45	
	Hydrophobic PTFE	0.22	226-82204-22	226-82213-22	226-52225-22	226-82233-22	
		0.45	226-82204-45	226-82213-45	226-52225-45	226-82233-45	
	Hydrophilic PTFE	0.22	226-82604-22	226-82613-22	226-82625-22	226-82633-22	
		0.45	226-82604-45	226-82613-45	226-82625-45	226-82633-45	
	CA	0.22	226-82504-22	226-82513-22	226-82525-22	226-82533-22	
		0.45	226-82504-45	226-82513-45	226-82525-45	226-82533-45	
	PES	0.22	226-82404-22	226-82413-22	226-82425-22	226-82433-22	
		0.45	226-82404-45	226-82413-45	226-82425-45	226-82433-45	
	PVDF	0.22	226-82304-22	226-82313-22	226-82325-22	226-82333-22	
		0.45	226-82304-45	226-82313-45	226-82325-45	226-82333-45	
	MCE	0.22	226-82704-22	226-82713-22	226-82725-22	226-82733-22	
		0.45	226-82704-45	226-82713-45	226-82725-45	226-82733-45	
Membrane filter	Nylon	0.22		226-52113-22	226-82125-22		226-82147-22
		0.45		226-52113-45	226-82125-45		226-52147-45
	Hydrophobic PTFE	0.22		226-52213-22	226-82225-22		226-82247-22
		0.45		226-52213-45	226-82225-45		226-52247-45
	PES	0.22		226-52413-22	226-52425-22		226-52447-22
		0.45		226-52413-45	226-52425-45		226-52447-45
	PVDF	0.22		226-52313-22	226-52325-22		226-52347-22
		0.45		226-52313-45	226-52325-45		226-52347-45

* 200/pack

CoreFocus
SHIMADZU

GC Columns and Consumables

The Shimadzu offers a wide range of GC columns:

Fused silica capillary

Suitable for general purpose through to specific GC and GC/MS application.

- SH-I
- SH-PolarWax, SH-FAME

PLOT – Fused silica and metal

Ideal for efficient, reproducible analyses of permanent gases, solvents, and hydrocarbons

- SH-Alumina BOND/NaSO4, Alumina BOND/KCl
- SH-Msieve 5A
- SH-Q-BOND, SH-U-BOND
- SH-Silica

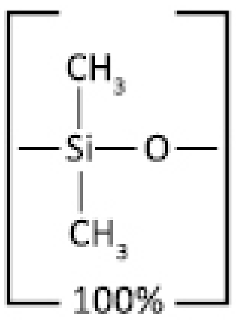
MXT – Metal capillary

Ideal for High-Temperature GC Analysis. General-purpose column for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, and semi-volatiles.

Shimadzu GC columns undergo rigorous testing to ensure they provide you with the best separation possible. Every GC column is tested at the maximum operating temperature for the column, and specific tests are undertaken based on the application the column is targeted for. This means you can be confident of a reliable separation, column after column.

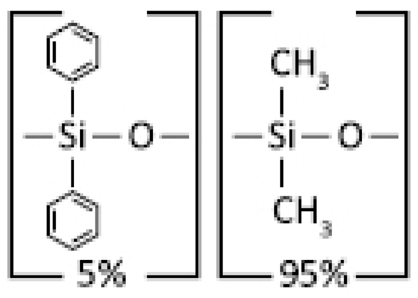
Structures, polarities, properties, and uses for Shimadzu capillary column phases, in order of increasing polarity

SH-I-1Ms, SH-1HT, SH-I-1
Dimethyl polysiloxane



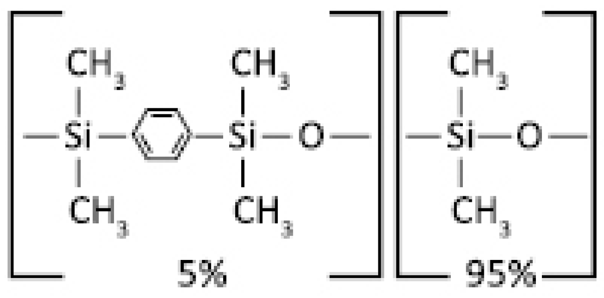
Similar to: (100%-methyl)-polysiloxane Polarity: nonpolar
Uses: solvents, petroleum products, pharmaceutical samples, waxes

SH-I-5Ms, SH-I-5HT, SH-5, SH-5MS
Diphenyl dimethyl polysiloxane



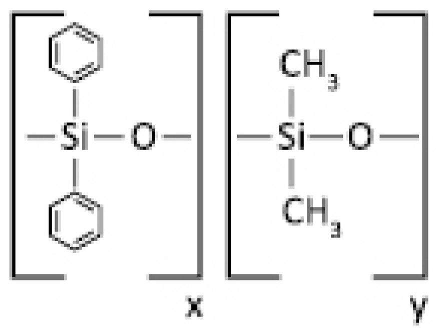
Similar to: (5%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: flavors, environmental, aromatic hydrocarbons

SH-I-5Sil MS
1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane



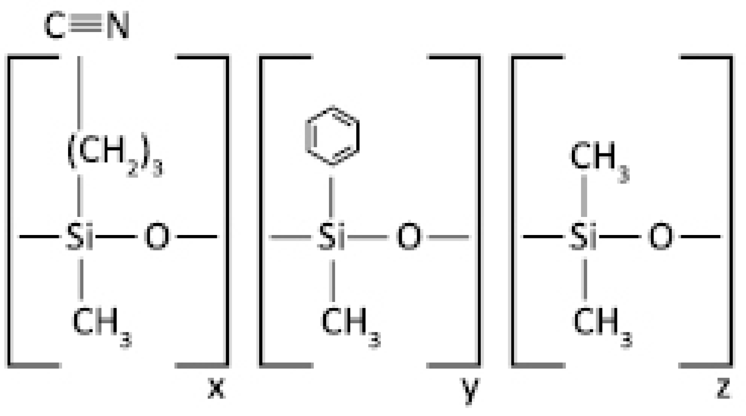
Similar to: (5%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: flavors, environmental, pesticides, PCBs, aromatic hydrocarbons

SH-20, SH-25
Diphenyl dimethyl polysiloxane



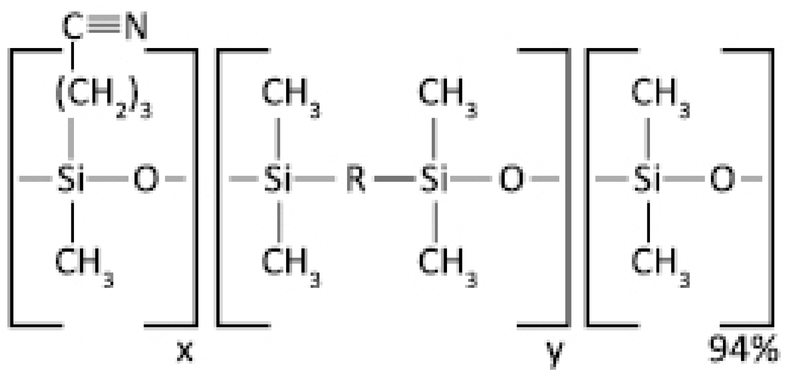
Similar to: (20%-phenyl)-methylpolysiloxane Polarity: slightly polar
Uses: volatile compounds, alcohols

SH-1301, SH-624
Cyanopropylmethyl phenylmethl polysiloxane



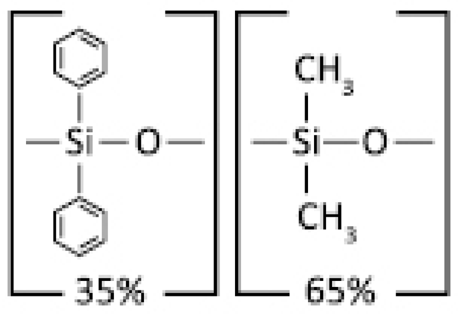
Similar to: (6%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: volatile compounds, insecticides

SH-I-624Sil MS



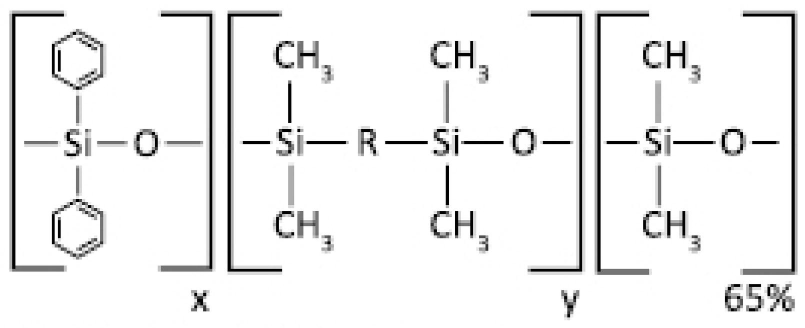
Similar to: (6%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: volatile compounds, insecticides, residue solvents in pharmaceutical products

SH-35
Diphenyl dimethyl polysiloxane



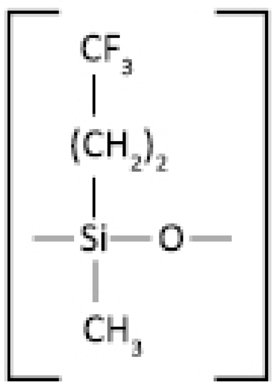
Similar to: (35%-phenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: pesticides, PCBs, amines, nitrogen-containing herbicides

SH-I-35Sil MS



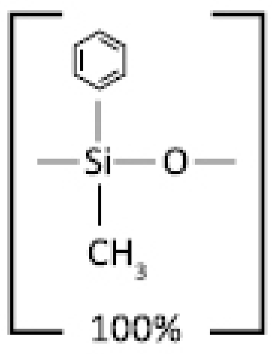
Similar to: (35%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: pesticides, PCBs, amines, nitrogen-containing herbicides

SH-200
Trifluoropropylmethyl polysiloxane



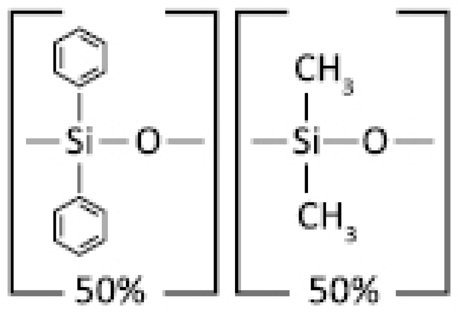
Similar to: (trifluoropropyl)-methylpolysiloxane
Polarity: selective for lone pair electrons Uses: environmental, solvents, Freon® gases, drugs, ketones, alcohols

SH-50
Phenyl methyl polysiloxane



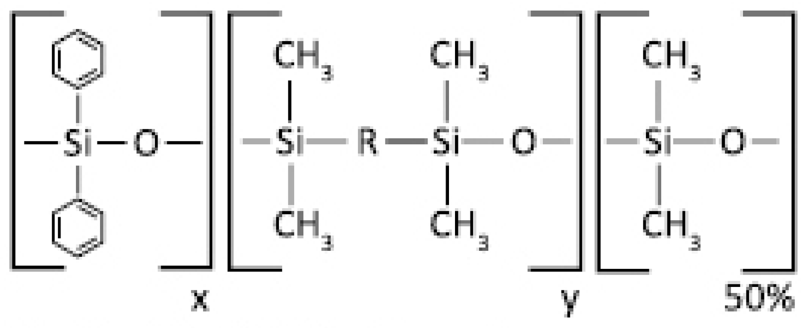
Similar to: (50%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: FAMEs, carbohydrates

SH-I-17
Diphenyl dimethyl polysiloxane



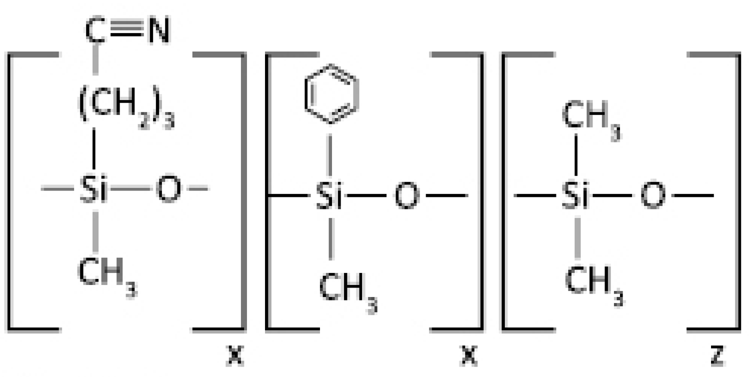
Similar to: (50%-phenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: triglycerides, phthalate esters, steroids, phenols

SH-I-17Sil MS



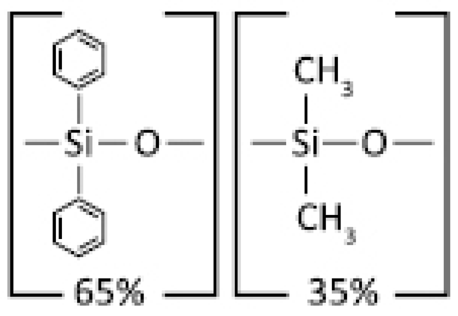
Similar to: (50%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: triglycerides, phthalate esters, steroids, phenols

SH-1701



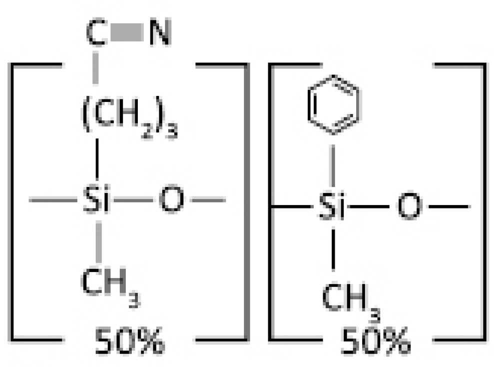
Similar to: (14%-cyanopropylphenyl)-methylpolysiloxane
Polarity: intermediately polar
Uses: pesticides, PCBs, alcohols, oxygenates

SH-65
Diphenyl dimethyl polysiloxane



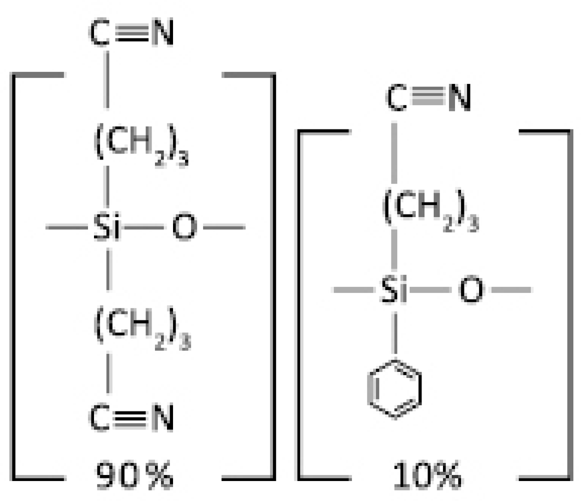
Similar to: (65%-phenyl)-methylpolysiloxane Polarity: intermediately polar
Uses: triglycerides, rosin acids, free fatty acids

SH-225
Cyanopropylmethyl phenylmethyl polysiloxane



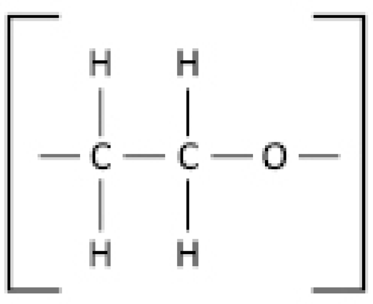
Similar to: (50%-cyanopropylmethyl)-methylphenylpolysiloxane
Polarity: polar
Uses: FAMEs, carbohydrates

SH-2330
Biscyanopropyl cyanopropylphenyl polysiloxane



Similar to: (95%-cyanopropyl)-phenyl polysiloxane Polarity: polar
Uses: cis/trans FAMEs, dioxin isomers, rosin acids

SH-PolarWax, SH-Wax
Polyethylene glycol



Polarity: polar
Uses: FAMEs, flavors, acids, amines, solvents, xylene isomers

**Structures, polarities, and properties also apply to metal MXT® stationary phases.

Capillary Columns

Cross-Reference

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
High-Performance Columns									
SH-I-1MS	100% dimethyl polysiloxane	G1, G2, G38	HP-1ms UI, HP-1ms, DB-1ms UI, DB-1ms, Ultra-1, VF-1ms	SPB-1, Equity-1	BP-1	ZB-1, ZB-1ms	007-1	AT-1ms	C-6
SH-I-1HT	100% dimethyl polysiloxane	–	DB-1HT	–	–	ZB-1HT Inferno		AT-1ht	C-8
SH-I-5MS	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5ms UI, HP-5ms, DB-5, Ultra-2, CP Sil 8 CB	SPB-5, Equity-5	BP-5	ZB-5, ZB-5MSi	007-5	AT-5ms	C-7
SH-I-5HT	5% diphenyl / 95% dimethyl polysiloxane	–	DB-5HT, VF-5HT	–	HT-5	ZB-5HT Inferno	–	–	C-8
SH-I-5Sil MS	1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane	–	DB-5ms UI, DB-5ms, VF-5ms	SLB-5ms	BPX-5	ZB-5MS, ZB-Semi-Volatiles	007-5MS	–	C-9
SH-I-XLB	Unique phase	–	DB-XLB, VF-Xms	–	–	ZB-MR1, ZB-XLB	–	–	C-10
SH-I-17	50% diphenyl / 50% dimethyl polysiloxane	G3	HP-17, DB-17, DB-17HT, DB-608	SPB-17	–	ZB-50	–	–	C-11
SH-I-35Sil MS	Similar to 35% phenyl methyl polysiloxane	–	DB-35ms, DB-35ms UI, VF-35ms	–	BPX-35	ZB-MR2	–	–	C-11
SH-I-17Sil MS	Similar to 50% phenyl methyl polysiloxane	G3, G17	DB-17ms, VF-17ms,	–	BPX-50	–	–	–	C-12
SH-I-PAH	Ideal for EFSA PAH4 analysis	–	–	–	–	–	–	–	C-12
SH-I-624Sil MS	Similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	HP-624, DB-624, VF-624ms, CP-Select	–	BP-624	–	–	–	C-13
SH-I-1301Sil MS	Similar to 6% cyanopropylphenyl / 94% dimethyl polysiloxane	–	VF-1301ms	–	–	–	–	–	C-14
General Purpose Columns									
SH-1	100% dimethyl polysiloxane	G1, G2, G38	HP-1, DB-1, CP-Sil 5 CB	SPB-1	BP-1	ZB-1	007-1	AT-1, EC-1	C-15
SH-5	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5, DB-5, CP-Sil 8 CB	SPB-5	BP-5	ZB-5	007-5	AT-5, EC-5	C-16
SH-5MS	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	HP-5, DB-5, CP Sil 8 CB	SPB-5	BP-5	ZB-5	007-5	AT-5, EC-5	C-17
SH-20	20% diphenyl / 80% dimethyl polysiloxane	G28, G32	–	SPB-20	–	–	007-20	AT-20, EC-20	C-18
SH-25	25% diphenyl / 75% dimethyl polysiloxane	–	–	–	–	–	–	–	C-18
SH-35 / SH-35MS	35% diphenyl / 65% dimethyl polysiloxane	G42	HP-35, DB-35	SPB-35, SPB-608	BPX-35, BPX-608	ZB-35	007-35	AT-35, AT-35ms	C-19
SH-50	100% methyl phenyl polysiloxane	G3	HP-50+, CP-Sil 24 CB	SPB-50	BPX-50	–	007-17	AT-50	C-20
SH-65	65% diphenyl / 35% dimethyl polysiloxane	–	–	–	–	–	007-65HT	–	C-20
SH-1301	6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	DB-1301, CP-1301	SPB-1301	BP-624	ZB-624	007-1301	AT-1301	C-21
SH-624	6% cyanopropylphenyl / 94% dimethyl polysiloxane	G43	HP-624, DB-624, DB-624 UI, VF-624ms	SPB-624	BP-624	ZB-624	007-624	AT-624	C-21
SH-1701	14% cyanopropylphenyl / 86% dimethyl polysiloxane	G46	DB-1701P, DB-1701, CP Sil 19 CB, VF-1701ms, VF-1701 Pesticides	Equity-1701	BP-10	ZB-1701, ZB-1701P	007-1701	AT-1701	C-22

Shimadzu	Stationary Phase	USP	Similar Phases						Page
			Agilent	Supelco	SGE	Phenomenex	Quadrex	Alltech	
SH-200 / SH-200MS	Trifluoropropylmethyl polysiloxane	G6	DB-210, DB-200, VF-200ms	–	–	–	–	AT-210	C-23
SH-225	50% cyanopropylmethyl / 50% phenylmethyl polysiloxane	G7, G19	DB-225, DB-225MS, CP-Sil 43 CB	SPB-225	BP-225	–	007-225	AT-225	C-25
SH-2330	90% biscyanopropyl / 10% cyanopropylphenyl polysiloxane (Non-bonded)	G8, G48	DB-23, VF-23ms	SP-2330, SP-2331, SP-2380	BPX-70	–	007-23	AT-Silar90	C-25
SH-2560	Biscyanopropyl polysiloxane	–	HP-88, CP-Sil 88	SP-2560	–	–	–	–	C-26
SH-Wax	Polyethylene glycol	G14, G15, G16, G20, G39	DB-Wax, CP-Wax 52 CB	–	BP-20	ZB-Wax	007-CW	AT-WAXms, EC-WAX	C-27
SH-PolarWax	Polyethylene glycol	G14, G15, G16, G20, G39	HP-INNOWax, CP-Wax 52 CB, VF-WAX MS	Supelcowax-10	–	ZB-Wax Plus	–	AT-WAX	C-28
Dedicated Columns									
SH-1614	Ideal for analysis of PBDE	–	–	–	–	–	–	–	C-29
SH-OPP2	Ideal for analysis of organophosphorus pesticides	–	–	–	–	–	–	–	C-30
SH-CLP / SH-CLP II	Ideal for analysis of organochlorine pesticides	–	DB-CLP1 / DB-CLP2	–	–	ZB-CLP1 ZB-CLP2	–	–	C-31
SH-VMS	Ideal for analysis of volatile organic pollutants	–	–	–	–	–	–	–	C-32
SH-VRX		–	DB-VRX	–	–	–	–	–	C-33
SH-PCB	Ideal for analysis of PCB congeners	–	–	–	–	–	–	–	C-33
SH-BAC Plus 1 / SH-BAC Plus 2	Ideal for analysis of alcohol compounds in blood	–	DB-ALC1 / DB-ALC2	–	–	ZB-BAC-1 / ZB-BAC-2	–	–	C-34
SH-FAME	Ideal for analysis of FAMEs	G16	Select FAME	Omegawax	–	–	–	AT-AquaWax, AT-FAME	C-35
SH-Volatil Amin	Ideal for analysis of volatile amines	–	–	–	–	–	–	–	C-35
SH-5 Amine / SH-35 Amine	Ideal for analysis of amines	–	–	–	–	–	–	–	C-36
SH-PolarD	Ideal for analysis of free acid	G25, G35	HP-FFAP, DB-FFAP, VF-DA, CP-Wax 58 FFAP CB	SPB-1000, Nukol	BP-21	ZB-FFAP	007-FFAP	AT-AquaWax-DA, AT-1000, EC-1000	C-37
SH-PolarX	Ideal for analysis of amines	–	CAM, CP-Wax 51 for Amines	Carbowax Amine	–	–	–	AT-CAM	C-38
PLOT Columns									
SH-Silica BOND	Bonded silica	–	GS-GasPRO, CP-SilicaPLOT	–	–	–	–	–	C-39
SH-Alumina BOND / Na2SO4	Aluminum oxide with Na2SO4 deactivation	–	GS-Alumina, CP-Al2O3/ Na2SO4	Alumina sulfate PLOT	–	–	–	AT-Alumina	C-40
SH-Alumina BOND / KCl	Aluminum oxide with KCl deactivation	–	GS-Alumina KCl, HP-PLOT Al2O3 KCl, CP-Al2O3/KCl	Alumina chloride PLOT	–	–	PLT-AL2O3	–	C-40
SH-Msieve 5A	Molecular Sieve 5A	–	HP-PLOT Molesieve, CP-Molsieve 5A	Mol Sieve 5A PLOT	–	–	PLT-5A	AT-Mole Sieve	C-41
SH-Q-BOND	100% divinylbenzene porous polymer	–	HP-PLOT Q, CP-PoraPLOT Q, CP-PoraBOND Q	Supel-Q PLOT	–	–	PLT-Q	AT-Q	C-42
SH-U-BOND	Divinylbenzene ethylene glycol / dimethylacrylate porous polymer	–	HP-PLOT U, CP-PoraPLOT U, CP-PoraBOND U	–	–	–	–	–	C-42
Metal Columns									
SH-MetalX-1	100% dimethyl polysiloxane	G1, G2, G38	DB-PS1	–	–	–	UAC-1	–	C-43
SH-MetalX-5	5% diphenyl / 95% dimethyl polysiloxane	G27, G36	DB-PS5, VF-5ht UltiMetal	–	–	–	UAC-5	–	C-43
SH-MetalX-1701	Similar to (14%-cyanopropylphenyl)-methylpolysiloxane	G46	DB-PS1701	–	–	–	–	–	C-43
SH-MetalX-WAX	Carbowax polyethylene glycol	G14, G15, G16, G20, G39	DB-PSWAX	–	–	–	UAC-CW	–	C-43
SH-MetalX Biodiesel TG	Propietary phase	–	Bioiesel, Select Biodiesel	MET-Biodiesel	–	ZB-Bioethanol	–	–	C-43

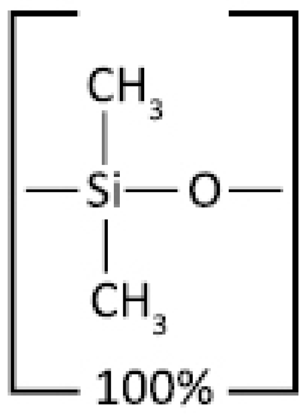
Capillary Columns

High-Performance Columns

SH-I-1MS

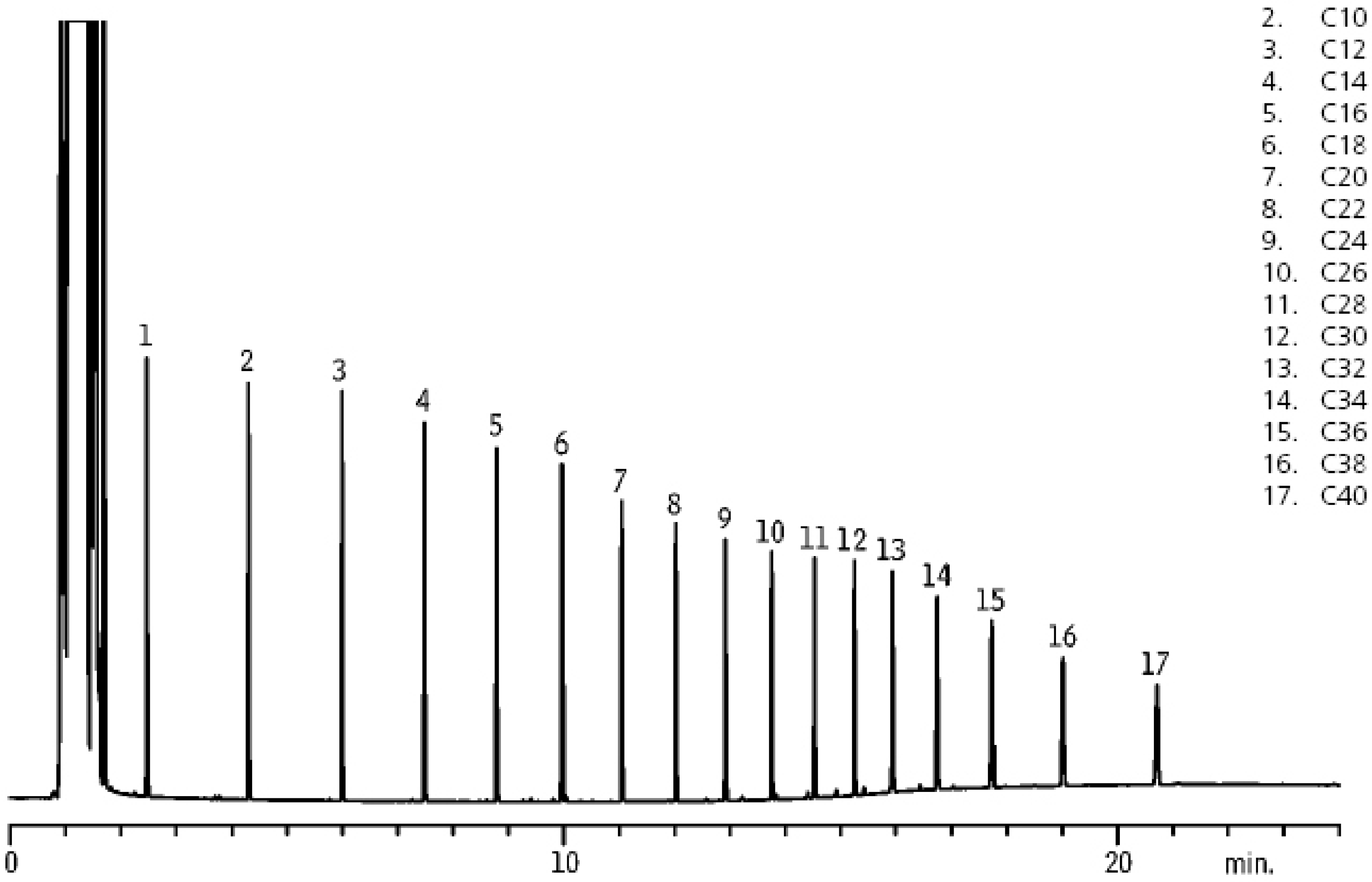
- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for arson accelerants, essential oils, hydrocarbons, pesticides, PCB congeners (e.g., Aroclor mixes), sulfur compounds, amines, solvent impurities, simulated distillation, oxygenates, gasoline range organics (GRO), refinery gases.
- Equivalent to USP G2 phase.
- Similar phases: HP-1ms UI, HP-1ms, DB-1ms UI, DB-1ms, Ultra-1, VF-1ms, SPB-1, Equity-1

SH-I-1MS Structure



ID	df	Temp. Range	20 m	25 m	50 m
0.15 mm	0.15 µm	-60 to 330/350 °C	227-36001-01	–	–
	2.00 µm	-60 to 330/350 °C	227-36002-01	–	–
0.18 mm	0.18 µm	-60 to 330/350 °C	221-75921-20	–	–
	0.36 µm	-60 to 330/350 °C	227-36003-01	–	–
0.20 mm	0.33 µm	-60 to 330/350 °C	–	227-36004-01	227-36004-02
ID	**df**	**Temp. Range**	**15 m**	**30 m**	**60 m**
0.25 mm	0.25 µm	-60 to 330/350 °C	227-36005-01	221-75923-30	227-36005-02
	0.50 µm	-60 to 330/350 °C	227-36006-01	227-36006-02	221-75924-60
	1.00 µm	-60 to 330/350 °C	227-36007-01	227-36007-02	227-36007-03
0.32 mm	0.25 µm	-60 to 330/350 °C	227-36008-01	221-75926-30	227-36008-02
	0.50 µm	-60 to 330/350 °C	227-36009-01	227-36009-02	227-36009-03
	1.00 µm	-60 to 330/350 °C	–	227-36010-01	221-75928-60
	4.00 µm	-60 to 330/350 °C	–	227-36011-01	–
0.53 mm	0.50 µm	-60 to 330/350 °C	227-36012-01	227-36012-02	–
	1.00 µm	-60 to 330/350 °C	227-36013-01	227-36013-02	–
	1.50 µm	-60 to 330/350 °C	227-36014-01	227-36014-02	227-36014-03

Petroleum Hydrocarbons (TPH)



Peaks

1. C8
2. C10
3. C12
4. C14
5. C16
6. C18
7. C20
8. C22
9. C24
10. C26
11. C28
12. C30
13. C32
14. C34
15. C36
16. C38
17. C40

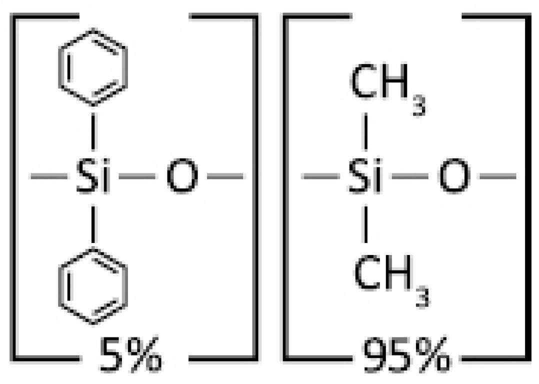
Conditions

Instrument	:	GC-2010
Column	:	SH-I-1Ms, 20 m, 0.18 mm ID, 0.18 µm (P/N: 221-75921-20)
Sample	:	Florida TRPH Standard, 500 µg/mL each component in hexane
Inj. Vol.	:	0.5 µL, split (split ratio 20:1)
Inj. Temp	:	275 °C
Carrier Gas	:	Hydrogen, constant linear velocity mode, 55 cm/sec.
Oven Temp	:	40 °C (hold 1 min) to 330 °C at 20 °C/min (hold 10 min)
Detector	:	FID, 350 °C

SH-I-5MS

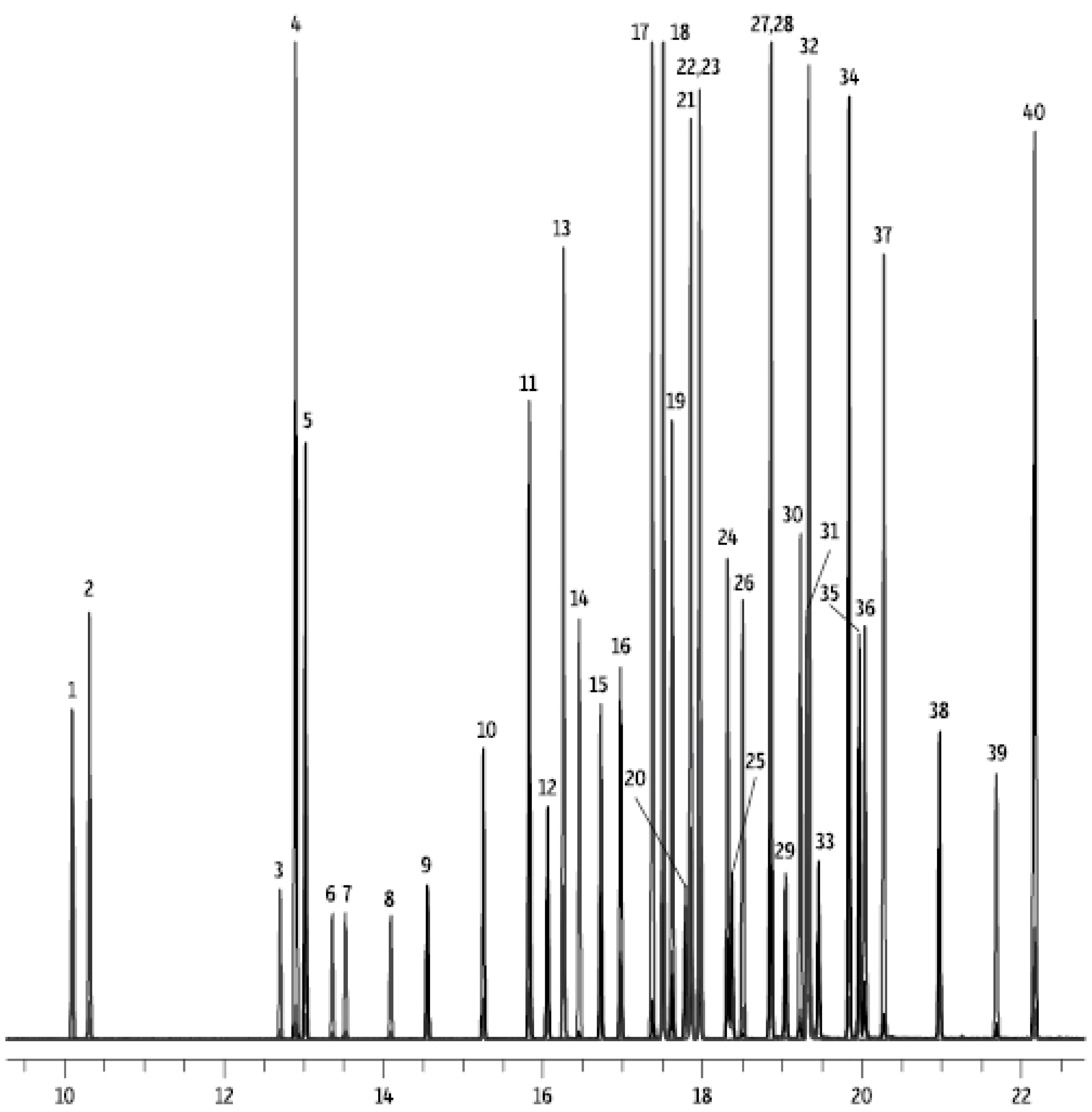
- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- Tested and guaranteed for ultra-low bleed; improved signal-to-noise ratio for better sensitivity and mass spectral integrity.
- General-purpose columns for semi-volatiles, phenols, amines, residual solvents, drugs of abuse, pesticides, PCB congeners (e.g., Aroclor mixes), solvent impurities.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5ms UI, HP-5ms, DB-5, Ultra-2, CP Sil 8 CB, SPB-5, Equity-5

SH-I-5MS Structure



ID	df	Temp. Range	20 m	25 m	50 m
0.18 mm	0.18 µm	-60 to 330/350 °C	227-36015-01	–	–
	0.30 µm	-60 to 330/350 °C	227-36016-01	–	–
	0.36 µm	-60 to 330/350 °C	227-36017-01	–	–
0.20 mm	0.33 µm	-60 to 330/350 °C	–	227-36018-01	227-36018-02
ID	**df**	**Temp. Range**	**15 m**	**30 m**	**60 m**
0.25 mm	0.25 µm	-60 to 330/350 °C	221-75940-15	221-75940-30	227-36019-01
	0.40 µm	-60 to 330/350 °C	–	227-36020-01	–
	0.50 µm	-60 to 330/350 °C	227-36021-01	221-75941-30	221-75942-60
	1.00 µm	-60 to 330/350 °C	227-36022-01	227-36022-02	227-36022-03
0.32 mm	0.25 µm	-60 to 330/350 °C	227-36023-01	221-75943-30	227-36023-02
	0.50 µm	-60 to 330/350 °C	227-36024-01	221-75944-30	227-36024-02
	1.00 µm	-60 to 330/350 °C	227-36025-01	227-36025-02	227-36025-03
0.53 mm	0.25 µm	-60 to 330/350 °C	227-36026-01	227-36026-02	–
	0.50 µm	-60 to 330/350 °C	227-36027-01	227-36027-02	–
	1.00 µm	-60 to 330/350 °C	227-36028-01	227-36028-02	–
	1.50 µm	-60 to 330/350 °C	227-36029-01	227-36029-02	–

GC Multiresidue Pesticide



Peaks

1. Chloroneb
2. Pentachlorobenzene
3. alpha-BHC
4. Hexachlorobenzene
5. Pentachloroanisole
6. beta-BHC
7. gamma-BHC (Lindane)
8. delta-BHC
9. Endosulfan ether
10. Heptachlor
11. Pentachlorothioanisole
12. Aldrin
13. 4,4'-Dichlorobenzophenone
14. Fenson
15. Isodrin
16. Heptachlor epoxide (Isomer B)
17. Chlorbenside
18. *trans*-Chlordane
19. 2,4'-DDE
20. Endosulfan I
21. *cis*-Chlordane
22. *trans*-Nonachlor
23. Chlorfenson (Ovex)
24. 4,4'-DDE
25. Dieldrin
26. 2,4'-DDD
27. Endrin
28. Ethylan (Perthane)
29. Endosulfan II
30. 4,4'-DDD
31. 2,4'-DDT
32. *cis*-Nonachlor
33. Endrin aldehyde
34. 4,4'-Methoxychlor olefin
35. Endosulfan sulfate
36. 4,4'-DDT
37. 2,4'-Methoxychlor
38. Endrin ketone
39. Tetradifon
40. Mirex

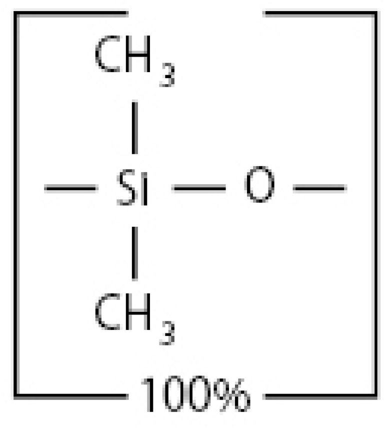
Conditions

Column	: SH-I-5MS, 30 m, 0.25 mm ID, 0.25 um (P/N: 221-75940-30)
Inj. Vol.	: 1 µL split (split ratio 50:1)
Inj. Temp	: 250 °C
Oven Temp	: 90 °C (hold 1 min) to 330 °C at 8.5 °C/min (hold 5 min)
Carrier Gas	: He, constant flow rate 1.4 mL/min
Detector	: MS-QP Transfer Line Temp: 290 °C Source Temp: 325 °C Solvent Delay Time: 5 min Ionization: EI

SH-I-1HT

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- 40% longer lifetime from specially designed fused silica tubing.
- Columns processed for high-temperature applications, such as high molecular weight hydrocarbons.
- Similar phases: DB-1HT, AT-1ht

SH-I-1HT Structure

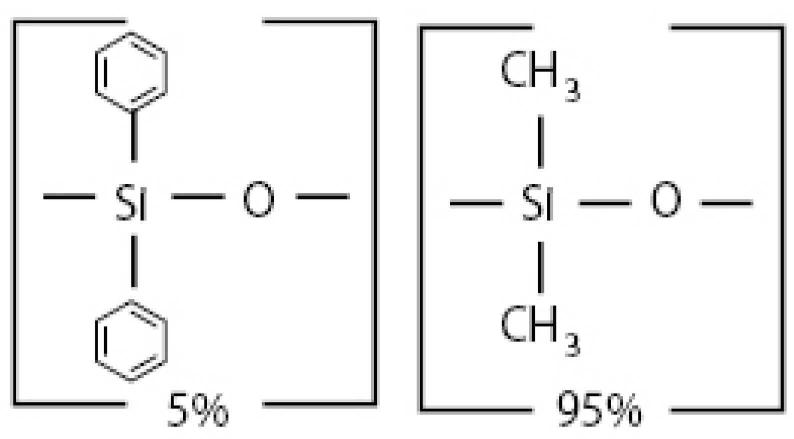


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 400 °C	227-36087-01	227-36087-02
	0.25 µm	-60 to 400 °C	–	227-36088-01
0.32 mm	0.10 µm	-60 to 400 °C	227-36089-01	227-36089-02
	0.25 µm	-60 to 400 °C	–	227-36090-01

SH-I-5HT

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- 40% longer lifetime from specially designed fused silica tubing.
- Columns processed for high-temperature applications, such as mineral oil.
- Similar phases: DB-5HT, VF-5HT

SH-I-5HT Structure

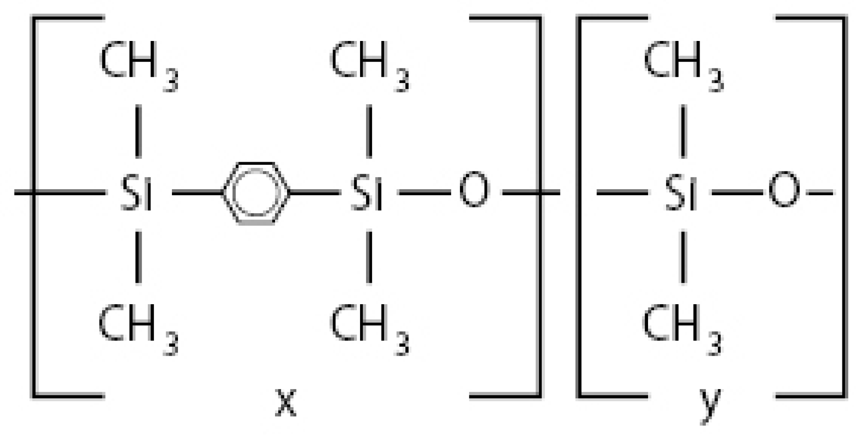


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 400 °C	221-75933-15	227-36091-01
	0.25 µm	-60 to 400 °C	227-36092-01	221-75934-30
0.32 mm	0.10 µm	-60 to 400 °C	227-36093-01	227-36093-02
	0.25 µm	-60 to 400 °C	–	227-36094-01
0.53 mm	0.15 µm	-60 to 380/400 °C	–	227-36095-01

SH-I-5Sil MS

- Low-polarity phase: Crossbond™ silarylene phase 1,4-bis(dimethylsiloxy)phenylene dimethyl polysiloxane
- Engineered to be a low-bleed GCMS column.
- Excellent inertness for active compounds.
- General-purpose columns—ideal for GCMS analysis of semi-volatiles, polycyclic aromatic compounds, chlorinated hydrocarbons, phthalates, phenols, amines, organochlorine pesticides, organophosphorus pesticides, drugs, solvent impurities, and hydrocarbons.
- Similar phases: DB-5ms UI, DB-5ms, VF-5ms, SLB-5ms

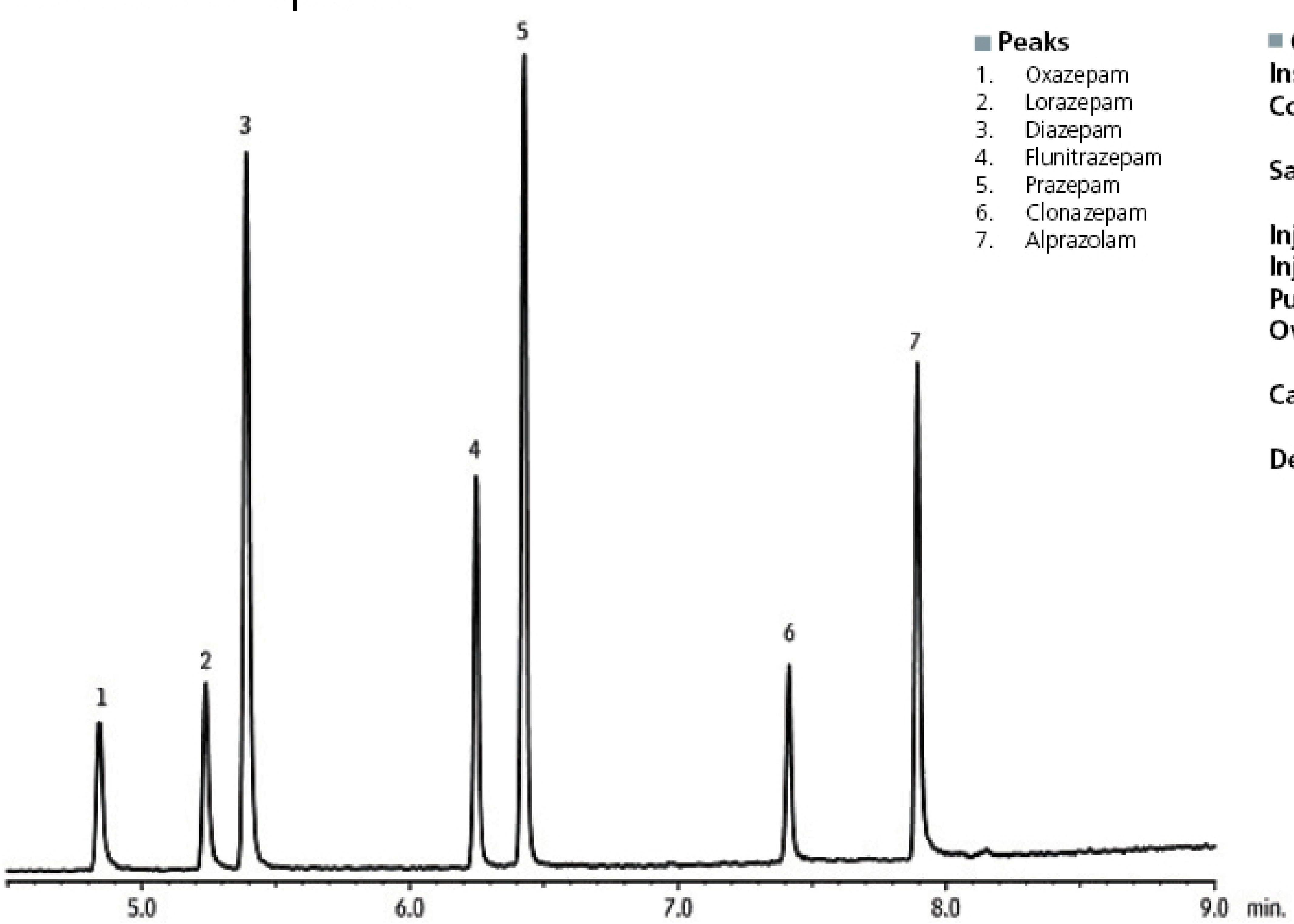
SH-I-5Sil MS Structure



For SH-I-5Sil MS columns with Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	10 m	20 m	40 m	60 m
0.10 mm	0.10 µm	-60 to 320/350 °C	227-36317-01	–	–	–
0.15 mm	0.15 µm	-60 to 320/350 °C	–	227-36030-01	–	–
	2.00 µm	-60 to 320/350 °C	–	227-36031-01	–	–
0.18 mm	0.10 µm	-60 to 320/350 °C	–	–	–	227-36032-01
	0.18 µm	-60 to 320/350 °C	–	227-36033-01	227-36033-02	–
	0.36 µm	-60 to 320/350 °C	–	227-36034-01	–	–
ID	**df**	**Temp. Range**		**15 m**	**30 m**	**60 m**
0.25 mm	0.10 µm	-60 to 320/350 °C	–	227-36035-01	227-36035-02	–
	0.25 µm	-60 to 320/350 °C	–	227-36036-01	221-75954-30	227-36036-02
	0.50 µm	-60 to 320/350 °C	–	227-36037-01	227-36037-02	–
	1.00 µm	-60 to 320/350 °C	–	227-36038-01	221-75956-30	227-36038-02
0.32 mm	0.25 µm	-60 to 320/350 °C	–	227-36039-01	227-36039-02	–
	0.50 µm	-60 to 320/350 °C	–	–	227-36040-01	–
	1.00 µm	-60 to 320/350 °C	–	–	227-36041-01	–
0.53 mm	1.50 µm	-60 to 320/330 °C	–	–	227-36032-02	–

Benzodiazepines



Peaks

1. Oxazepam
2. Lorazepam
3. Diazepam
4. Flunitrazepam
5. Prazepam
6. Clonazepam
7. Alprazolam

Conditions

Instrument	: GCMS-QP2010
Column	: SH-I-5Sil MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75954-30)
Sample	: Diluent: Butyl chloride Conc.: 15 µg/mL
Inj. Vol.	: 1 µL splitless (hold 1 min)
Inj. Temp	: 280 °C
Purge Flow	: 32.2 mL/min (20:1 split)
Oven Temp	: 200 °C to 330 °C at 15 °C/min (hold 3 min)
Carrier Gas	: He, constant linear velocity mode, 50 cm/sec.
Detector	: MS-QP Transfer Line Temp: 280 °C Source Temp: 200 °C Solvent Delay Time: 4 min Tune: PFTBA Ionization: EI Scan Range: 50-350

SH-I-XLB

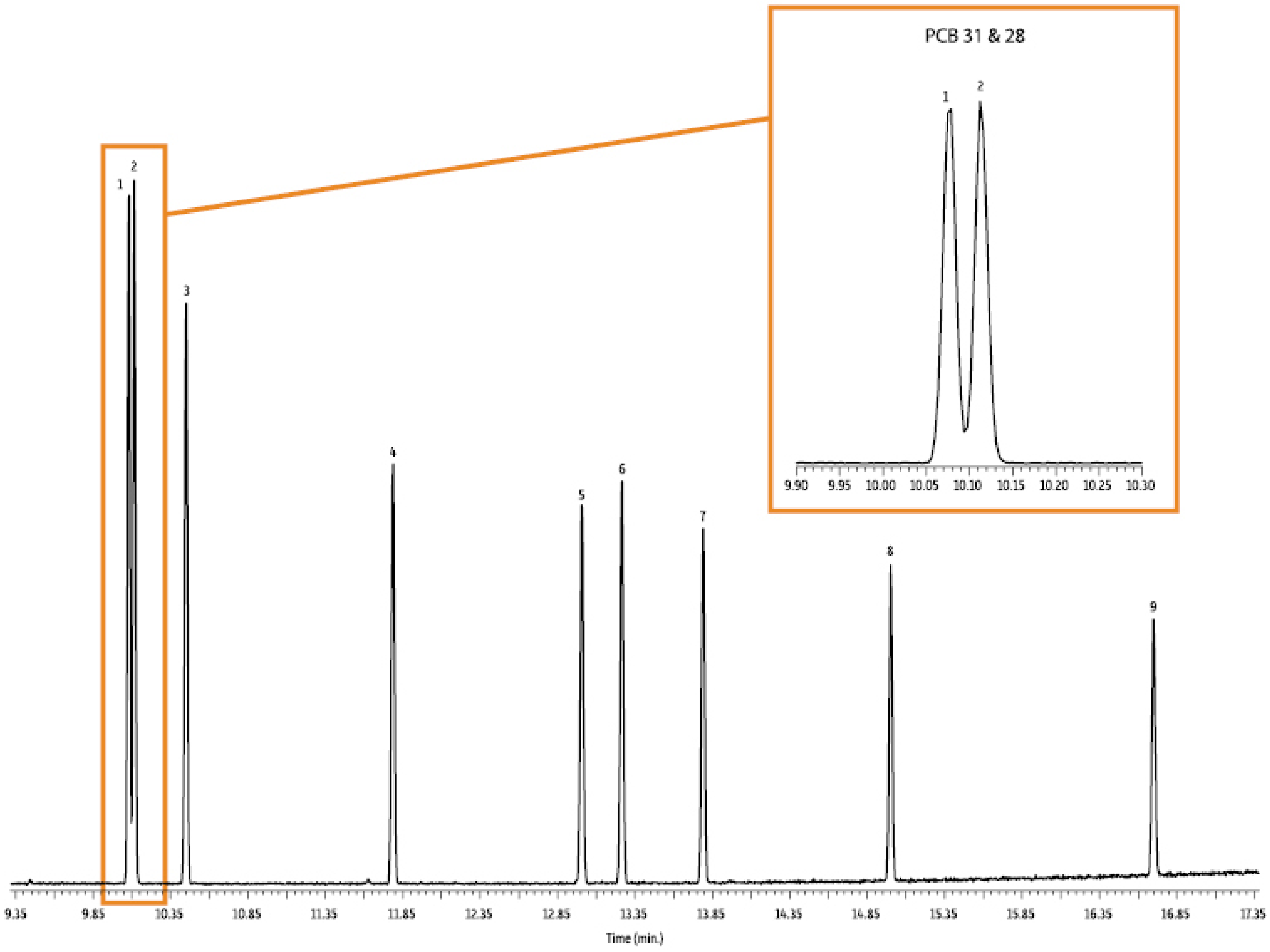
- Low-polarity proprietary phase
- General-purpose columns exhibiting extremely low bleed. Ideal for many GCMS applications, including pesticides, PCB congeners (e.g., Aroclor mixes), PAHs.
- Unique selectivity.
- Similar phases: DB-XLB, VF-Xms

ID	df	Temp. Range	20 m	30 m	60 m
0.18 mm	0.18 µm	30 to 340/360 °C	227-36309-01	–	–
0.25 mm	0.10 µm	30 to 340/360 °C	–	227-36042-01	–
	0.25 µm	30 to 340/360 °C	–	227-36043-01	227-36043-02
	0.50 µm	30 to 340/360 °C	–	227-36044-01	–
	1.00 µm	30 to 340/360 °C	–	227-36045-01	–
0.32 mm	0.25 µm	30 to 340/360 °C	–	227-36046-01	227-36046-02
	0.50 µm	30 to 340/360 °C	–	227-36047-01	–
	1.00 µm	30 to 340/360 °C	–	227-36048-01	–
0.53 mm	0.50 µm	30 to 320/360 °C	–	227-36049-01	–
	1.50 µm	30 to 320/360 °C	–	227-36050-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

EU PCB Congeners

Peaks
1. PCB 31
2. PCB 28
3. PCB 52
4. PCB 101
5. PCB 118
6. PCB 153
7. PCB 138
8. PCB 180
9. PCB 194



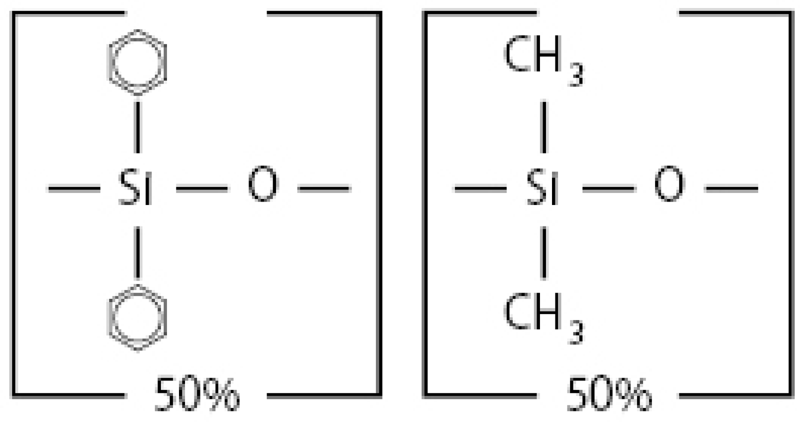
Conditions

Column	: SH-I-XLB, 30 m, 0.25 mm ID, 0.25 µm (P/N: 227-36043-01)	**Oven Temp**	: 40 °C (hold 2 min) to 240 °C at 30 °C/min (hold 2 min) to 340 °C at 10 °C/min (hold 5 min)
Sample	: PCB congener standard Diluent: Dichloromethane Conc.: 3.5 ppm	**Carrier Gas**	: He, constant flow rate 1 mL/min
		Detector	: MS-QP Transfer Line Temp: 300 °C Source Temp: 280 °C Ionization: EI Scan Range: 45-550
Inj. Vol.	: 0.5 µL splitless (hold 1.75 min)		
Inj. Temp	: 300 °C		
Purge Flow	: 50 mL/min		

SH-I-17

- Mid-polarity phase: Crossbond™ 50% diphenyl / 50% dimethyl polysiloxane
- General-purpose columns for pesticides, herbicides, rosin acids, phthalate esters, triglycerides, sterols.
- Similar phases: HP-17, DB-17, DB-17HT, DB-608, SPB-17

SH-I-17 Structure

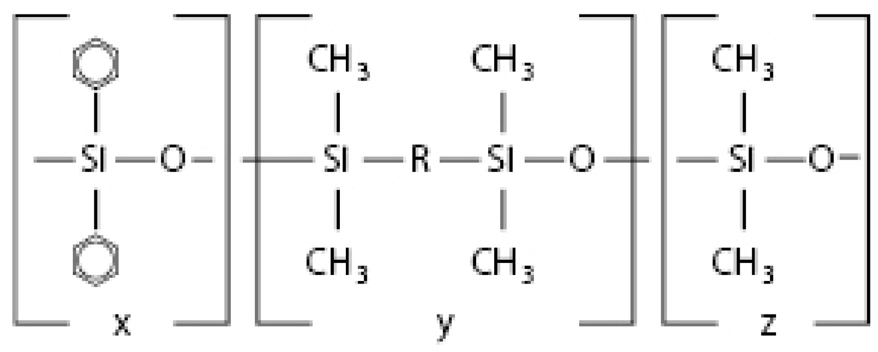


ID	df	Temp. Range	20 m	30 m
0.18 mm	0.18 µm	40 to 280/320 °C	227-36061-01	–
0.25 mm	0.25 µm	40 to 280/320 °C	–	221-75907-30
	0.50 µm	40 to 280/320 °C	–	227-36062-01
	1.00 µm	40 to 280/320 °C	–	227-36063-01
0.32 mm	0.25 µm	40 to 280/320 °C	–	227-36064-01
	0.50 µm	40 to 280/320 °C	–	227-36065-01
	1.00 µm	40 to 280/320 °C	–	227-36066-01
0.53 mm	0.25 µm	40 to 280/320 °C	–	227-36067-01
	0.50 µm	40 to 280/320 °C	–	227-36068-01
	0.83 µm	40 to 280/320 °C	–	227-36069-01
	1.00 µm	40 to 280/320 °C	–	221-76193-30
	1.50 µm	40 to 280/320 °C	–	227-36070-01

SH-I-35Sil MS

- Mid-polarity: Crossbond™ phase (similar to 35% phenyl methyl polysiloxane)
- Very low-bleed phase for GCMS analysis.
- Special selectivity and excellent inertness for substituted polar compounds, such as drugs, pesticides, herbicides, PCBs, phenols, etc.
- Provides superior separation for cannabinoids.
- Similar phases: DB-35ms, DB-35ms UI, VF-35ms

SH-I-35Sil MS Structure

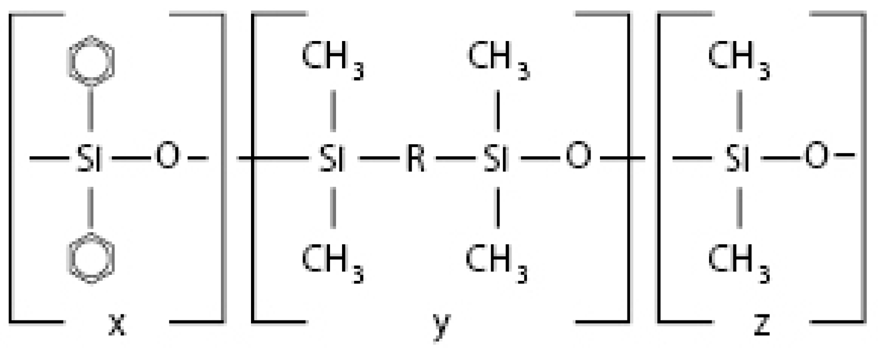


ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	50 to 340/360 °C	227-36051-01	227-36051-02
	0.50 µm	50 to 340/360 °C	227-36052-01	227-36052-02
	1.00 µm	50 to 320/340 °C	227-36053-01	227-36053-02
0.32 mm	0.25 µm	50 to 340/360 °C	227-36054-01	227-36054-02
	0.50 µm	50 to 340/360 °C	227-36055-01	227-36055-02
	1.00 µm	50 to 320/340 °C	227-36056-01	227-36056-02
0.53 mm	0.50 µm	50 to 340/360 °C	227-36057-01	227-36057-02
	1.00 µm	50 to 325/340 °C	227-36058-01	227-36058-02
	1.50 µm	50 to 310/330 °C	227-36059-01	227-36059-02
	3.00 µm	50 to 280/300 °C	227-36060-01	227-36060-02

SH-I-17Sil MS

- Mid-polarity Crossbond™ phase (similar to 50% phenyl methyl polysiloxane)
- Low bleed for use with sensitive detectors, such as MS.
- Excellent inertness and selectivity for active environmental compounds, such as PAHs.
- Equivalent to USP G3 phase.
- Similar phases: DB-17ms, HP-17, DB-17, VF-17ms, CP-Sil 24 CB

SH-I-17Sil MS Structure



ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 340/360 °C	221-75916-30	227-36071-01
0.32 mm	0.25 µm	40 to 340/360 °C	227-36072-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

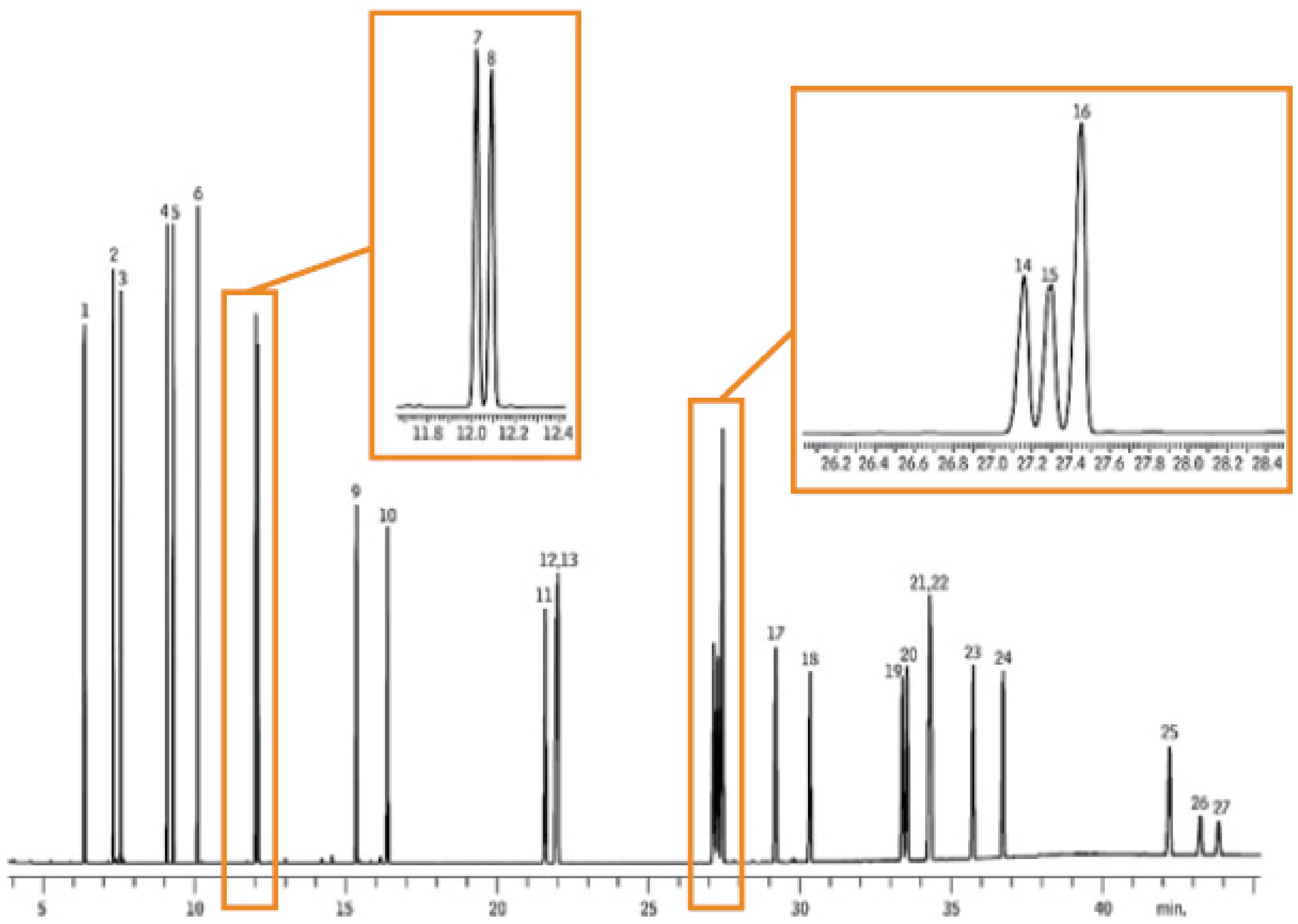
SH-I-PAH

- Mid-polarity proprietary phase
- Ideal for EFSA PAH4 analysis—separates all priority compounds: benz[a]anthracene, chrysene, benzo[b]fluoranthene and benzo[a] pyrene.
- Best resolution of chrysene from interfering PAHs, triphenylene, and cyclopenta[cd]pyrene.
- Complete separation of benzo [b], [k], [j], and [a] fluoranthenes.

ID	df	Temp. Range	30 m	40 m	60 m
0.18 mm	0.07 µm	to 360 °C	–	227-36073-01	–
0.25 mm	0.10 µm	to 360 °C	227-36074-01	–	227-36074-02

Polycyclic Aromatic Hydrocarbons (US EPA Method 8100)

Peaks
1. Naphthalene
2. 2-Methylnaphthalene
3. 1-Methylnaphthalene
4. Acenaphthylene
5. Acenaphthene
6. Fluorene
7. Phenanthrene
8. Anthracene
9. Fluoranthene
10. Pyrene
11. Benz[a]anthracene
12. Chrysene
13. Triphenylene
14. Benzo[b]fl uoranthene
15. Benzo[k]fl uoranthene
16. Benzo(j)fl uoranthene
17. Benzo[a]pyrene
18. 3-Methylcholanthrene
19. Dibenz(a,h)acridine
20. Dibenz[a,j]acridine
21. Indeno[1,2,3-cd]pyrene
22. Dibenz[a,h]anthracene
23. Benzo[ghi]perylene
24. 7H-Dibenzo[c,g]carbazole
25. Dibenzo[a,e]pyrene
26. Dibenzo(a,i)pyrene
27. Dibenzo(a,h)pyrene



Conditions

Column	: SH-I-17Sil MS, 30 m, 0.25 mm ID, 0.25 um (P/N: 221-75916-30)	**Oven Temp**	: 65 °C (hold 0.5 min) to 220 °C at 15 °C/min to 330 °C at 4 °C/min (hold 15 min)
Inj. Vol.	: 0.5 µL splitless (hold 1.75 min)	**Carrier Gas**	: He, constant flow rate 2.0 mL/min
Inj. Temp	: 320 °C	**Detector**	: FID, 320 °C
Purge Flow	: 75 mL/min		

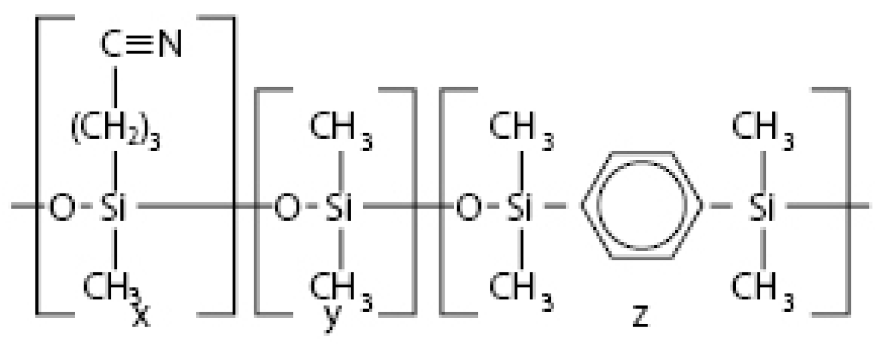
Capillary Columns

High-Performance Columns

SH-I-624Sil MS

- Mid-polarity Crossbond™ silarylene phase (similar to 6% cyanopropylphenyl / 94%dimethyl polysiloxane)
- Low-bleed, high-thermal stability column—maximum temperatures up to 300–320 °C.
- Inert—excellent peak shape for a wide range of compounds.
- Selective—G43 phase highly selective for volatile organics and residual solvents, great choice for USP<467>.
- Manufactured for column-to-column reproducibility—well-suited for validated methods.
- Similar phases: HP-624, DB-624, VF-624ms, CP-Select 624 CB

SH-I-624Sil MS Structure

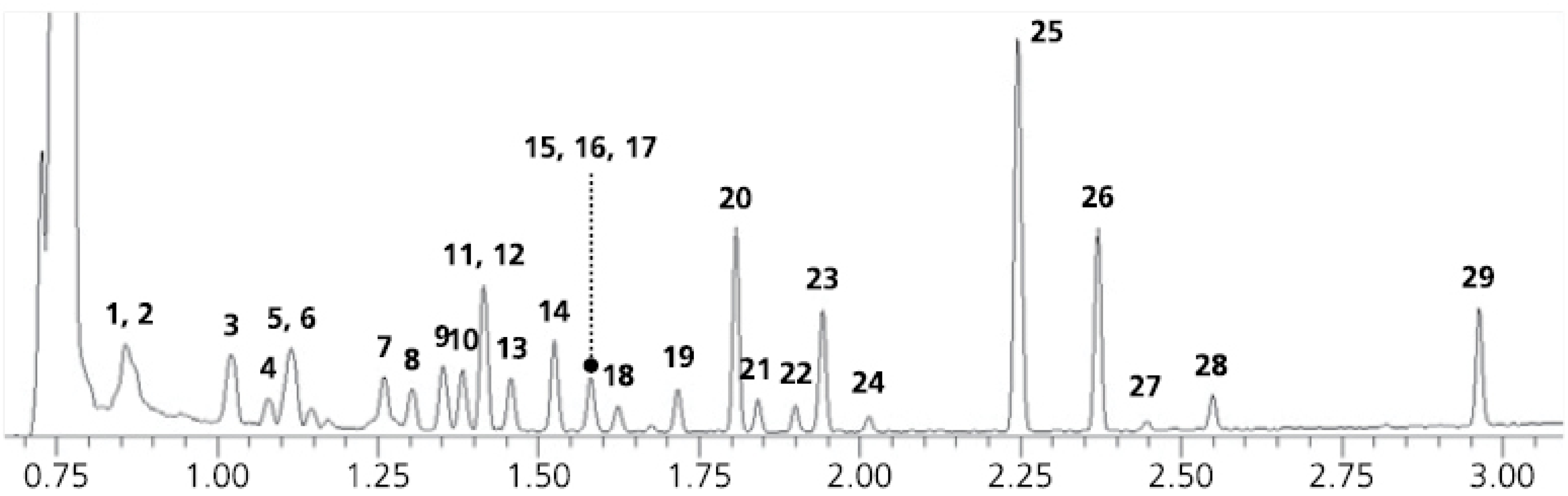


ID	df	Temp. Range	20 m	30 m	60 m	75 m	105 m
0.18 mm	1.00 µm	-20 to 300/320 °C	227-36075-01	–	–	–	–
0.25 mm	1.40 µm	-20 to 300/320 °C	–	221-75962-30	227-36076-01	–	–
0.32 mm	1.80 µm	-20 to 300/320 °C	–	227-36077-01	221-75963-60	–	–
0.53 mm	3.00 µm	-20 to 280/300 °C	–	227-36078-01	227-36078-02	227-36078-03	227-36078-04

Ultra-Fast Analysis of Volatile Organic Compounds in Water

Peaks

1. Vinyl chloride-d3 (ISTD)
2. Vinyl chloride
3. 1,1-dichloroethylene
4. Dichloromethane
5. Methyl-t-butyl ether (MTBE)
6. Trans-1,2-dichloroethylene
7. Cis-1,2-dichloroethylene
8. Trichloromethane
9. 1,1,1-trichloroethane
10. Carbon tetrachloride
11. 1,2-dichloroethane
12. Benzene
13. Fluorobenzene (ISTD)
14. Trichloroethylene
15. 1,4-dioxane-d8 (ISTD)
16. 1,2-dichloropropane
17. 1,4-dioxane
18. Bromodichloromethane
19. Cis-1,3-dichloropropene
20. Toluene
21. Trans-1,3-dichloropropene
22. 1,1,2-trichloroethane
23. Tetrachloroethylene
24. Dibromochloromethane
25. m-,p-xylene
26. o-xylene
27. Bromoform
28. 4-bromofl uorobenzene
29. 1,4-dichlorobenzene



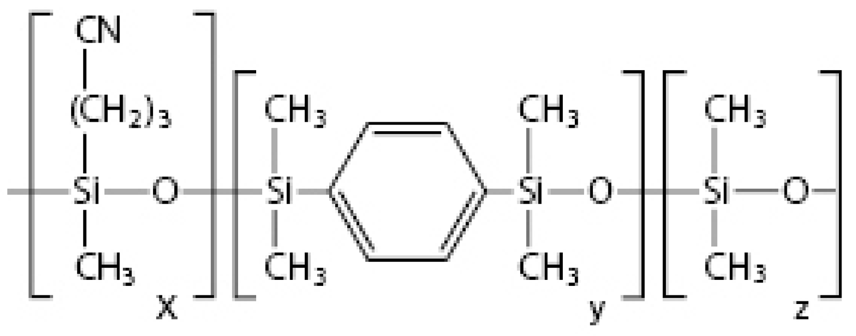
Conditions

Instrument	: GCMS-TQ8030 + HS-20 Loop	**Inj.**	: Split (split ratio 30:1)
Column	: SH-I-624Sil MS, 20 m, 0.18 mm ID, 1.00 µm (P/N: 227-36075-01)	**Oven Temp**	: 70 °C, 40 °C/min to 220 °C (hold 0.5 min)
Headspace-Loop	: Loop volume: 1 mL	**Carrier Gas**	: He, constant linear velocity mode, 50 cm/sec
Sample Equilibration	: 70 °C for 30 min	**Detector**	: MS: SIM MS/MS: MRM Event (loop) time: 0.15 sec Source Temp: 200 °C Interface Temp: 230 °C
Vial pressurization	: 0.5 min, 50 kPa, equilibration 0.05 min		
Needle Flush	: 2 min		
Sample Pathway Temp	: 200 °C		
Transfer Line Temp	: 200 °C		

SH-I-1301Sil MS

- Mid-polarity Crossbond™ silarylene phase (similar to 6% cyanopropylphenyl / 94%dimethyl polysiloxane)
- Highest thermal stability in the industry ensures dependable, accurate MS results and increased uptime.
- Stabilized cyano phase selectivity improves the performance of existing methods. Ideal for solvents, glycols, and other polar compounds.
- Rigorous QC testing ensures inertness and accurate, reliable data for multiple compound classes.
- Similar phase: VF-1301ms

SH-I-1301Sil MS Structure



ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.25 µm	-60 to 320 °C	–	227-36079-01	227-36079-02
	1.00 µm	-60 to 320 °C	–	227-36080-01	227-36080-02
0.32 mm	0.25 µm	-60 to 320 °C	–	227-36081-01	–
	1.00 µm	-60 to 320 °C	–	227-36082-01	227-36082-02
	1.50 µm	-60 to 320 °C	–	227-36083-01	227-36083-02
0.53 mm	1.00 µm	-60 to 320 °C	227-36084-01	227-36084-02	–
	1.50 µm	-60 to 320 °C	–	227-36085-01	–
	3.00 µm	-60 to 320 °C	–	227-36086-01	227-36086-02

Guard columns for SH are also available. Please refer to page C-44.

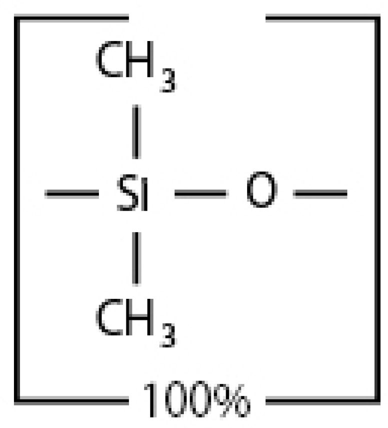
Capillary Columns

General-Purpose Columns

SH-1

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- General-purpose columns for solvent impurities, PCB congeners (e.g., Aroclor mixes), simulated distillation, arson accelerants, gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semi-volatiles, pesticides, oxygenates.
- Equivalent to USP G1, G2, G38 phases.
- Similar phases: HP-1, DB-1, CP-Sil 5 CB, SPB-1

SH-1 Structure



For SH-1 columns with Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	10 m	15 m	25 m	30 m	60 m	105 m
0.25 mm	0.10 µm	-60 to 330/350 °C	–	221-75718-15	–	221-75718-30	227-36096-01	–
	0.25 µm	-60 to 330/350 °C	221-75719-10	–	221-75719-25	221-75719-30	221-75719-60	–
	0.50 µm	-60 to 330/350 °C	–	–	–	227-36097-01	227-36097-02	–
	1.00 µm	-60 to 320/340 °C	–	–	–	227-36098-01	227-36098-02	221-75721-05
0.32 mm	0.10 µm	-60 to 330/350 °C	–	–	–	227-36099-01	227-36099-02	–
	0.25 µm	-60 to 330/350 °C	–	–	–	221-75723-30	221-75723-60	–
	0.50 µm	-60 to 330/350 °C	–	–	–	221-75724-30	227-36100-01	–
	1.00 µm	-60 to 320/340 °C	–	–	–	221-75725-30	221-75725-60	–
	1.50 µm	-60 to 310/330 °C	–	–	–	227-36101-01	227-36101-02	–
	3.00 µm	-60 to 280/300 °C	–	–	–	227-36102-01	227-36102-02	–
	4.00 µm	-60 to 280/300 °C	–	–	–	227-36103-01	–	–
	5.00 µm	-60 to 260/280 °C	–	–	–	221-75728-30	221-75728-60	–
0.53 mm	0.10 µm	-60 to 320/340 °C	–	–	–	227-36104-01	–	–
	0.25 µm	-60 to 320/340 °C	–	–	–	221-75729-30	227-36105-01	–
	0.50 µm	-60 to 310/330 °C	–	221-75730-15	–	221-75730-30	227-36106-01	–
	1.00 µm	-60 to 310/330 °C	–	221-75731-15	–	221-75731-30	221-75731-60	–
	1.50 µm	-60 to 310/330 °C	–	221-75732-15	–	221-75732-30	227-36107-01	–
	3.00 µm	-60 to 270/290 °C	–	–	–	221-75733-30	221-75733-60	–
	5.00 µm	-60 to 270/290 °C	–	–	–	221-75734-30	221-75734-60	–
	7.00 µm	-60 to 240/260 °C	–	–	–	227-36108-01	227-36108-02	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-PONA

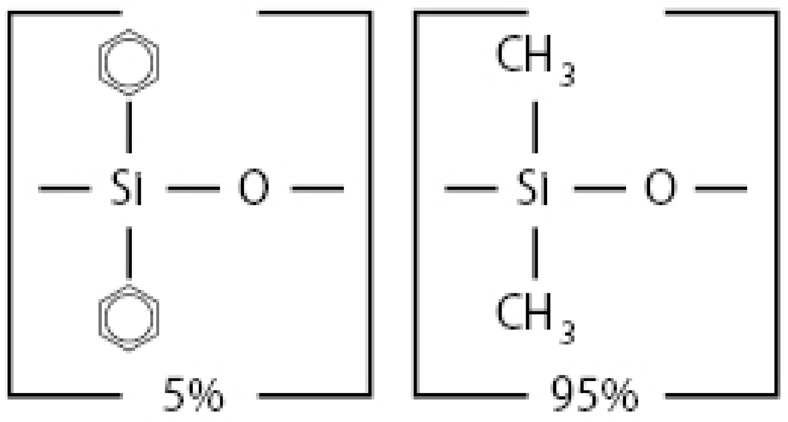
Compatible with ASTM and CGSB for hydrocarbon analysis.

ID	df	Temp. Range	100 m
0.25 mm	0.50 µm	-60 to 300/340 °C	221-76196-00

SH-5

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, semi-volatiles.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5, DB-5, CP-Sil 8 CB, SPB-5

SH-5 Structure



For SH-5 columns with Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	15 m	25 m	30 m	60 m
0.25 mm	0.10 µm	-60 to 330/350 °C	221-75700-15	–	221-75700-30	227-36109-01
	0.25 µm	-60 to 330/350 °C	227-36313-01	–	221-75701-30	227-36110-01
	0.50 µm	-60 to 330/350 °C	–	221-76178-25	221-76178-30	227-36111-01
	1.00 µm	-60 to 320/340 °C	–	–	221-75702-30	227-36112-01
0.32 mm	0.10 µm	-60 to 330/350 °C	227-36312-01	–	227-36113-01	–
	0.25 µm	-60 to 330/350 °C	221-75703-15	–	221-75703-30	221-75703-60
	0.50 µm	-60 to 330/350 °C	–	–	221-75704-30	227-36114-01
	1.00 µm	-60 to 320/340 °C	–	–	221-75705-30	221-75705-60
	1.50 µm	-60 to 310/330 °C	–	–	221-76181-30	227-36115-01
	3.00 µm	-60 to 280/300 °C	–	–	227-36116-01	227-36116-02
0.53 mm	0.10 µm	-60 to 320/340°C	–	–	227-36117-01	–
	0.25 µm	-60 to 320/340 °C	227-36314-01	–	221-75708-30	227-36118-01
	0.50 µm	-60 to 320-330 °C	–	–	221-75709-30	227-36119-01
	1.00 µm	-60 to 320/330 °C	221-75710-15	–	221-75710-30	221-75710-60
	1.50 µm	-60 to 310/330 °C	221-75711-15	–	221-75711-30	227-36120-01
	3.00 µm	-60 to 270/290 °C	–	–	221-75712-30	227-36121-01
	5.00 µm	-60 to 270/290 °C	–	–	221-75713-30	221-75713-60

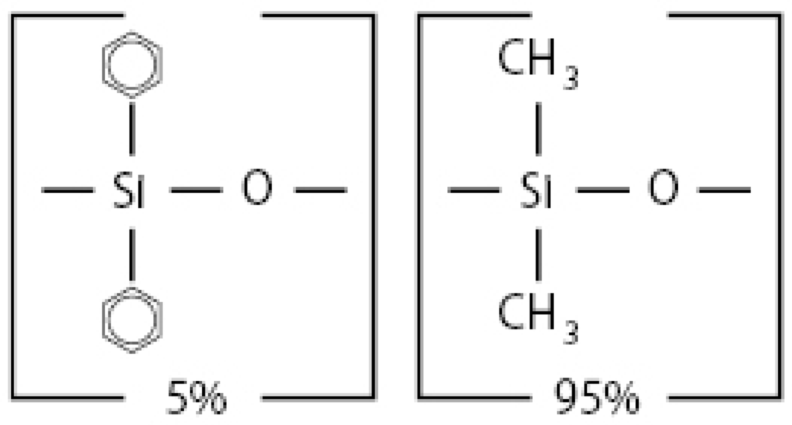
* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Metal columns are also available. Please refer to page C-43.

SH-5MS

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- Column specifically tested for low-bleed performance.
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, semi-volatiles.
- Equivalent to USP G27 and G36 phases.
- Similar phases: HP-5, DB-5, CP-Sil 8 CB, SPB-5

SH-5MS Structure

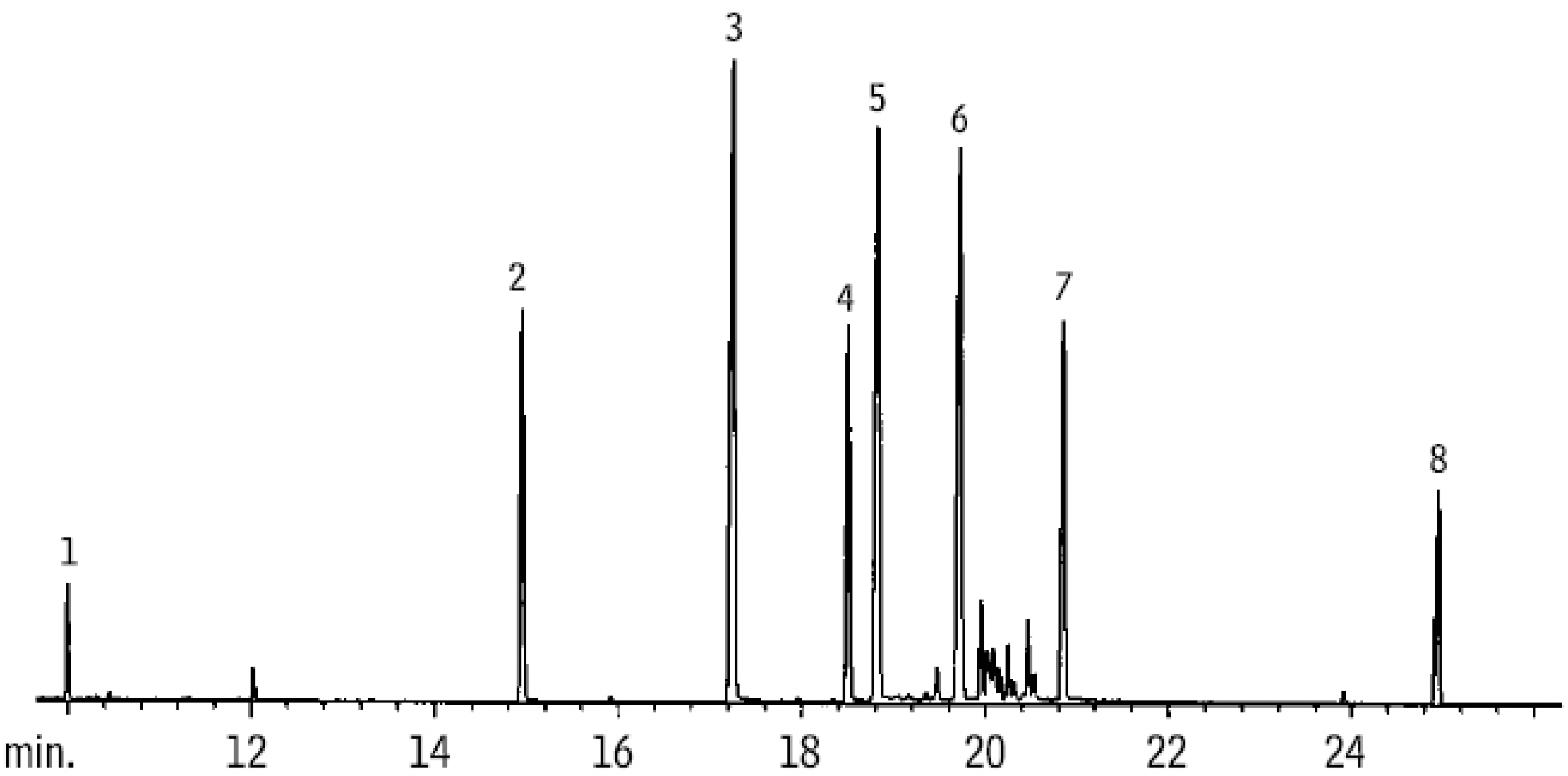


For SH-I-5MS columns with Integra-Guard™ column, please refer to page C-44.

ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.10 µm	-60 to 330/350 °C	221-75854-15	221-75854-30	227-36122-01
	0.25 µm	-60 to 330/350 °C	221-75855-15	221-75855-30	227-36123-01
	0.50 µm	-60 to 330/350 °C	–	227-36124-01	227-36124-02
	1.00 µm	-60 to 325/350 °C	–	221-75857-30	–
0.32 mm	0.10 µm	-60 to 330/350 °C	–	227-36125-01	227-36125-02
	0.25 µm	-60 to 330/350 °C	–	221-75858-30	221-75858-60
	0.50 µm	-60 to 330/350 °C	–	227-36126-01	227-36126-02
	1.00 µm	-60 to 325/350 °C	–	227-36127-01	–
0.53 mm	0.50 µm	-60 to 320/340 °C	–	221-76191-30	–
	1.00 µm	-60 to 320/340 °C	–	227-36128-01	–
	1.50 µm	-60 to 310/330 °C	–	227-36129-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Endocrine Disruptors: Alkyl Phenols



Peaks

1. *tert*-butyl phenol
2. *n*-pentyl phenol
3. *n*-hexyl phenol
4. *n*-heptyl phenol
5. *tert*-octyl phenol
6. *n*-octyl phenol
7. *n*-nonyl phenol
8. bisphenol A

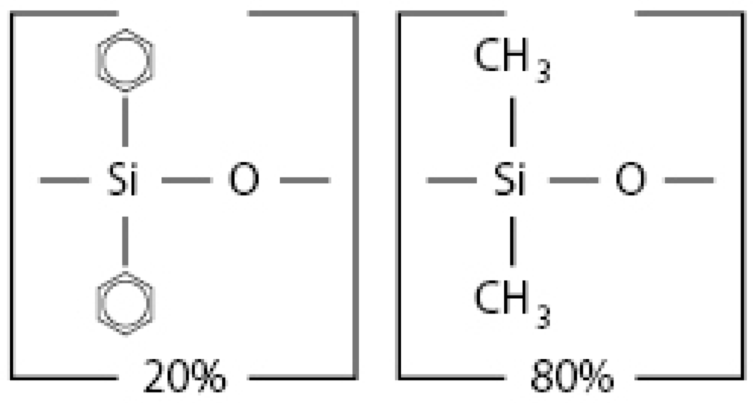
Conditions

Column	: SH-5MS, 30 m, 0.25 mm ID, 0.25 µm (P/N: 221-75855-30).
Conc.	: 5–10 ng on-column
Inj.	: Splitless, purge on at 1 min
Inj. Temp	: 275 °C
Purge Flow	: 32.2 mL/min (20:1 split)
Oven Temp	: 35 °C (hold 1 min) to 300 °C at 10 °C/min (hold 15 min)
Carrier Gas	: He
Det. Temp	: 310 °C

SH-20

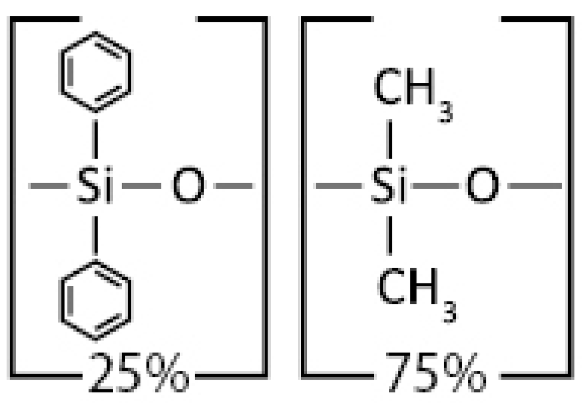
- Mid-polarity phase: Crossbond™ 20% diphenyl / 80% dimethyl polysiloxane
- General-purpose columns for volatile compounds, flavor compounds, alcoholic beverages.
- Equivalent to USP G28 and G32 phases.
- Similar phases: SPB-20, 007-20, AT-20, EC-20.

SH-20 Structure



ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	-20 to 300/320 °C	227-36130-01	227-36130-02
	0.25 µm	-20 to 300/320 °C	227-36131-01	227-36131-02
	0.50 µm	-20 to 290/310 °C	227-36132-01	227-36132-02
	1.00 µm	-20 to 280/300 °C	227-36133-01	227-36133-02
0.32 mm	0.10 µm	-20 to 300/320 °C	227-36134-01	227-36134-02
	0.25 µm	-20 to 300/320 °C	227-36135-01	227-36135-02
	0.50 µm	-20 to 290/310 °C	227-36136-01	227-36136-02
	1.00 µm	-20 to 280/300 °C	227-36137-01	227-36137-02
	1.50 µm	-20 to 270/290 °C	227-36138-01	227-36138-02
	3.00 µm	-20 to 250/270 °C	227-36139-01	227-36139-02
0.53 mm	0.10 µm	-20 to 260/280 °C	227-36140-01	227-36140-02
	0.25 µm	-20 to 260/280 °C	–	227-36141-01
	0.50 µm	-20 to 260/280 °C	227-36142-01	–
	1.00 µm	-20 to 260/280 °C	227-36143-01	227-36143-02
	1.50 µm	-20 to 250/270 °C	227-36144-01	–
	3.00 µm	-20 to 240/260 °C	227-36145-01	227-36145-02

SH-25 Structure

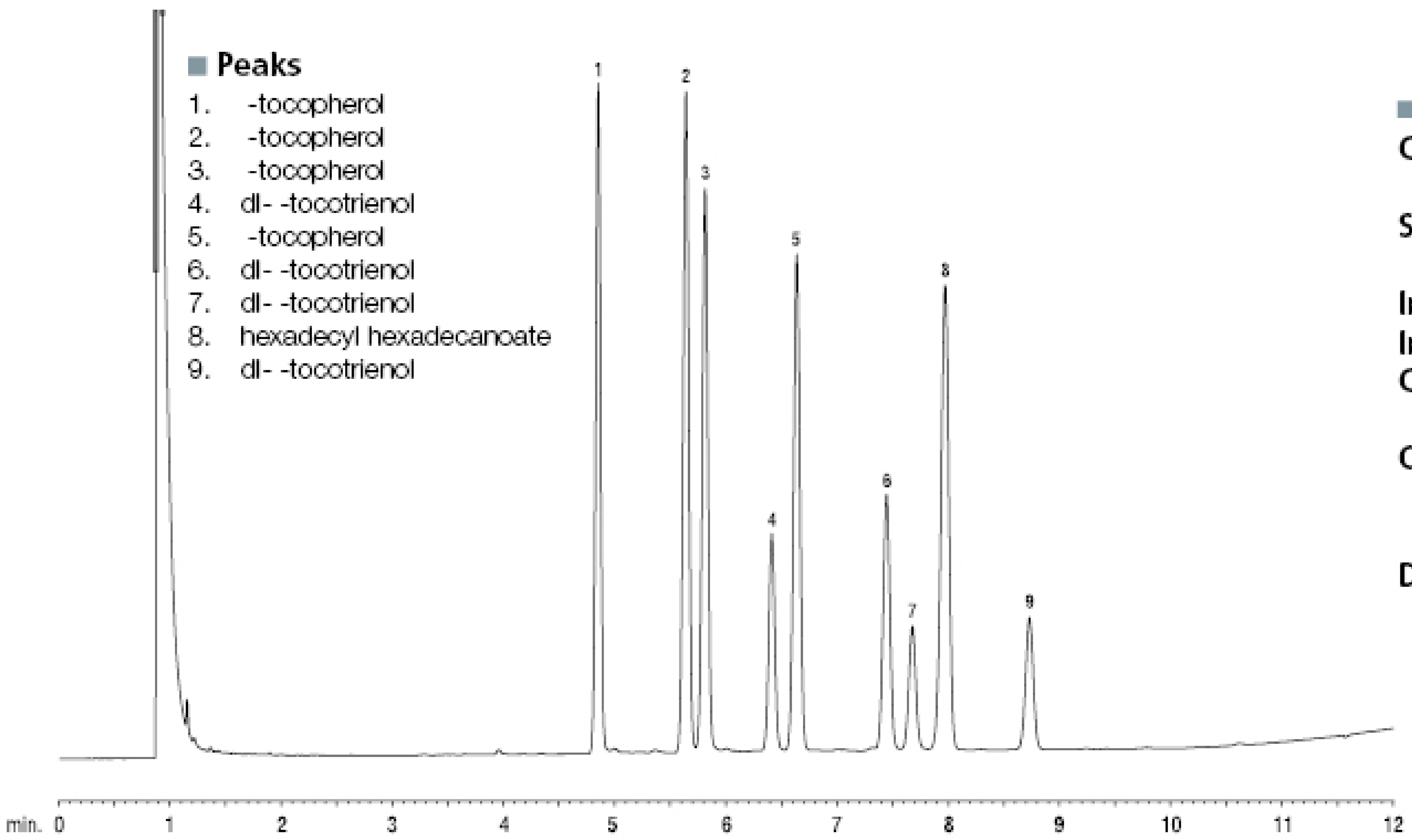


SH-25

- Mid-polarity phase: Crossbond™ 25% diphenyl / 75% dimethyl polysiloxane
- General-purpose columns for volatile compounds, flavor compounds, alcoholic beverages.

ID	df	Temp. Range	60 m
0.32 mm	1.49 µm	-20 to 250/270 °C	227-36329-01

Tocopherols and Tocotrienols



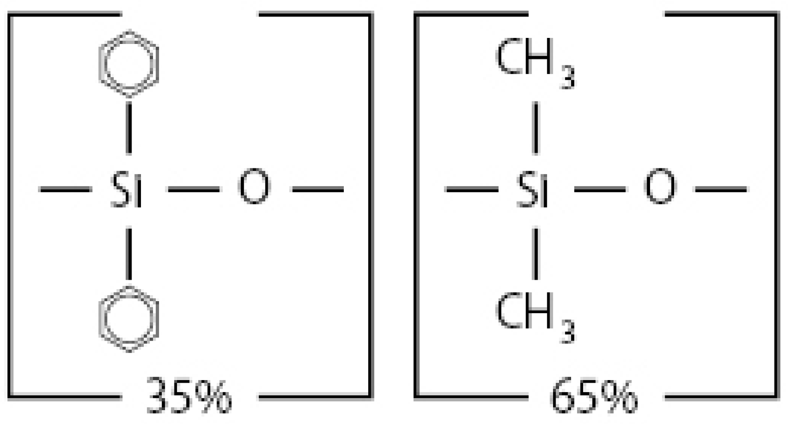
Conditions

Column	: SH-20, 30 m, 0.53 mm ID, 0.50 µm (P/N: 227-36142-01)
Sample	: 1 mg/mL each component in isooctane
Inj. Vol.	: 1 µL split (split ratio 20:1)
Inj. Temp	: 320 °C
Carrier Gas	: Hydrogen, constant flow rate 5.2 mL/min
Oven Temp	: 270 °C to 290 °C at 2 °C/min 290 °C to 320 °C at 10 °C/min (hold 1 min)
Detector	: FID, 320 °C

SH-35/SH-35MS

- Mid-polarity phase: Crossbond™ 35% diphenyl / 65% dimethyl polysiloxane
- General-purpose columns for organochlorine pesticides, PCB congeners (e.g., Aroclor mixes), herbicides, pharmaceuticals, sterols, rosin acids, phthalate esters.
- Equivalent to USP G42 phase.
- Similar phases: HP-35, DB-35, SPB-35, SPB-608

SH-35



SH-35

ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	40 to 320 °C	227-36146-01	227-36146-02
	0.25 µm	40 to 320 °C	227-36147-01	227-36147-02
	0.50 µm	40 to 310 °C	227-36148-01	227-36148-02
	1.00 µm	40 to 290 °C	227-36149-01	227-36149-02
0.32 mm	0.10 µm	40 to 320 °C	227-36150-01	227-36150-02
	0.25 µm	40 to 320 °C	227-36151-01	227-36151-02
	0.50 µm	40 to 310 °C	227-36152-01	227-36152-02
	1.00 µm	40 to 290 °C	227-36153-01	227-36153-02
	1.50 µm	40 to 270/290 °C	227-36154-01	–
	3.00 µm	40 to 250/270 °C	227-36155-01	227-36155-02
0.53 mm	0.10 µm	40 to 260/280 °C	–	227-36156-01
	0.25 µm	40 to 260/280 °C	–	227-36157-01
	0.50 µm	40 to 300 °C	227-36158-01	227-36158-02
	1.00 µm	40 to 290 °C	227-36159-01	227-36159-02
	1.50 µm	40 to 280 °C	227-36160-01	227-36160-02
	3.00 µm	40 to 240/260 °C	227-36161-01	227-36161-02

SH-35MS (Low-bleed for GCMS analysis)

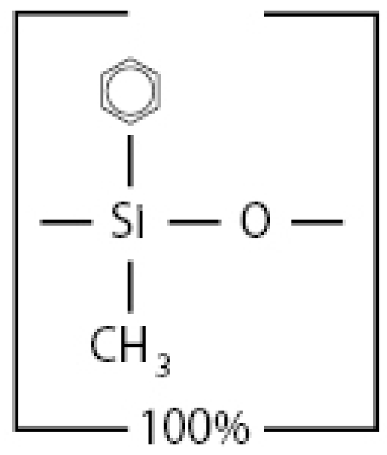
ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 320 °C	221-75835-30

Download the brochure of GC/GCMS consumables from
http://www.shimadzu.com/an/gc/column_consumable/index.html

SH-50

- Mid-polarity phase: Crossbond™ 100% methyl phenyl polysiloxane
- General-purpose columns for pesticides, herbicides, rosin acids, phthalate esters, sterols.
- Equivalent to USP G3 phase.
- Similar phases: HP-50+, CP-Sil 24 CB, SPB-50

SH-50 Structure

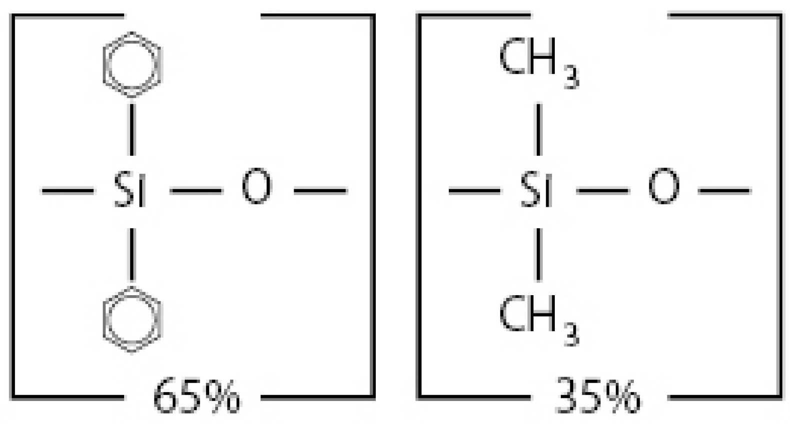


ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 300/320 °C	227-36162-01	227-36162-02
	0.50 µm	40 to 290/310 °C	227-36163-01	227-36163-02
	1.00 µm	40 to 280/300 °C	227-36164-01	227-36164-02
0.32 mm	0.25 µm	40 to 300/320 °C	221-76182-30	227-36165-01
	0.50 µm	40 to 290/310 °C	227-36166-01	227-36166-02
	1.00 µm	40 to 280/300 °C	227-36167-01	227-36167-02
0.53 mm	0.50 µm	40 to 270/290 °C	227-36168-01	227-36168-02
	0.83 µm	40 to 270/290 °C	227-36169-01	–
	1.00 µm	40 to 260/280 °C	227-36170-01	227-36170-02
	1.50 µm	40 to 250/270 °C	227-36171-01	227-36171-02

SH-65

- Mid-polarity phase: Crossbond™ 65% diphenyl / 35% dimethyl polysiloxane
- General-purpose columns for phenols, fatty acids, triglycerides.
- Equivalent to USP G17 phase.

SH-65 / SH-65TG Structure



ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	50 to 300 °C	227-36172-01
	0.50 µm	50 to 280/300 °C	227-36173-01
	1.00 µm	50 to 260/280 °C	227-36174-01
0.32 mm	0.25 µm	50 to 300 °C	227-36175-01
	0.50 µm	50 to 280/300 °C	227-36176-01
	1.00 µm	50 to 260/280 °C	227-36177-01
0.53 mm	1.00 µm	50 to 250/270 °C	227-36178-01

SH-65TG

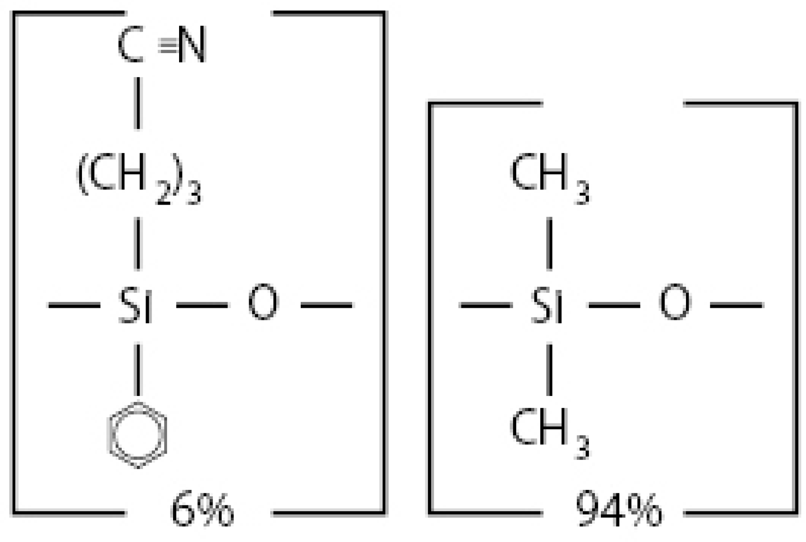
- High-polarity phase; Crossbond diphenyl dimethyl polysiloxane
- Application-specific columns, specially tested for triglycerides.
- Stable to 370 °C.

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	40 to 370 °C	227-36325-01	227-36325-02

SH-1301

- Mid-polarity phase: Crossbond™ 6% cyanopropylphenyl / 94% dimethyl polysiloxane
- General-purpose columns for residual solvents, alcohols, oxygenates, and volatile organic compounds.
- Equivalent to USP G43 phase.
- Similar phases: DB-1301, CP-1301, SPB-1301

SH-1301 Structure



For SH-1301 columns with Integra-Guard™ column, please refer to page C-44.

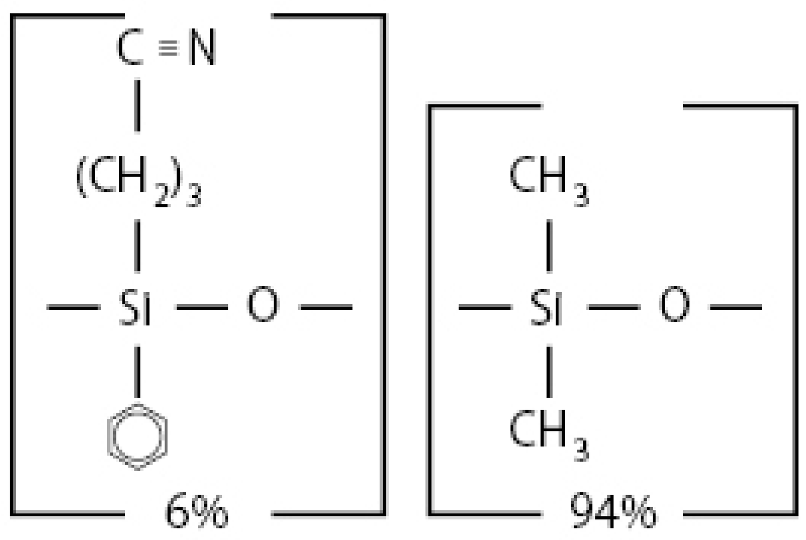
ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	-20 to 280 °C	221-76194-30	221-76194-60
	0.50 µm	-20 to 270 °C	227-36203-01	–
	1.00 µm	-20 to 260 °C	227-36204-01	227-36204-02
	1.40 µm	-20 to 240 °C	–	227-36205-01
0.32 mm	0.25 µm	-20 to 280 °C	227-36206-01	227-36206-02
	0.50 µm	-20 to 270 °C	227-36207-01	227-36207-02
	1.00 µm	-20 to 260 °C	227-36208-01	227-36208-02
	1.50 µm	-20 to 250 °C	227-36209-01	227-36209-02
	1.80 µm	-20 to 240 °C	227-36210-01	227-36210-02
0.53 mm	0.25 µm	-20 to 280 °C	227-36211-01	–
	0.50 µm	-20 to 270 °C	227-36212-01	227-36212-02
	1.00 µm	-20 to 260 °C	227-36213-01	227-36213-02
	1.50 µm	-20 to 250 °C	227-36214-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-624

- Mid-polarity phase: Crossbond™ 6% cyanopropylphenyl / 94% dimethyl polysiloxane
- Application-specific columns for volatile organic pollutants. Recommended in U.S. EPA methods for volatile organic pollutants.
- Equivalent to USP G43 phase.
- Similar phases: HP-624, DB-624, DB-624 UI, VF-624ms, SPB-624

SH-624 Structure



For SH-624 columns with Integra-Guard™ column, please refer to page C-44.

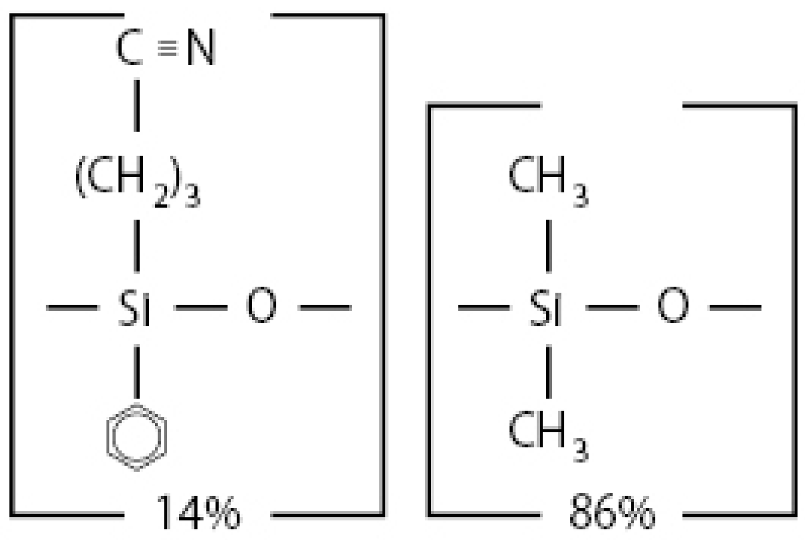
ID	df	Temp. Range	20 m	30 m	60 m	75 m
0.10 mm	0.50 µm	-20 to 240 °C	227-36332-01	–	–	–
0.18 mm	1.00 µm	-20 to 240 °C	227-36259-01	–	–	–
0.25 mm	1.40 µm	-20 to 240 °C	–	221-75863-30	227-36215-01	–
0.32 mm	1.80 µm	-20 to 240 °C	–	221-75864-30	221-75864-60	–
0.53 mm	3.00 µm	-20 to 240 °C	–	221-75865-30	221-75865-60	221-75865-75

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-1701

- Mid-polarity phase: Crossbond™ 14% cyanopropylphenyl / 86% dimethyl polysiloxane
- General-purpose columns for alcohols, oxygenates, PCB congeners (e.g., Aroclor mixes), pesticides, and fragrance compounds.
- Equivalent to USP G46 phase.
- Similar phases: DB-1701P, DB-1701, CP-Sil 19 CB, VF-1701ms, VF-1701 Pesticides, Equity-1701

SH-1701 Structure



For SH-1701 columns with Intega-Guard™ column, please refer to page C-44.

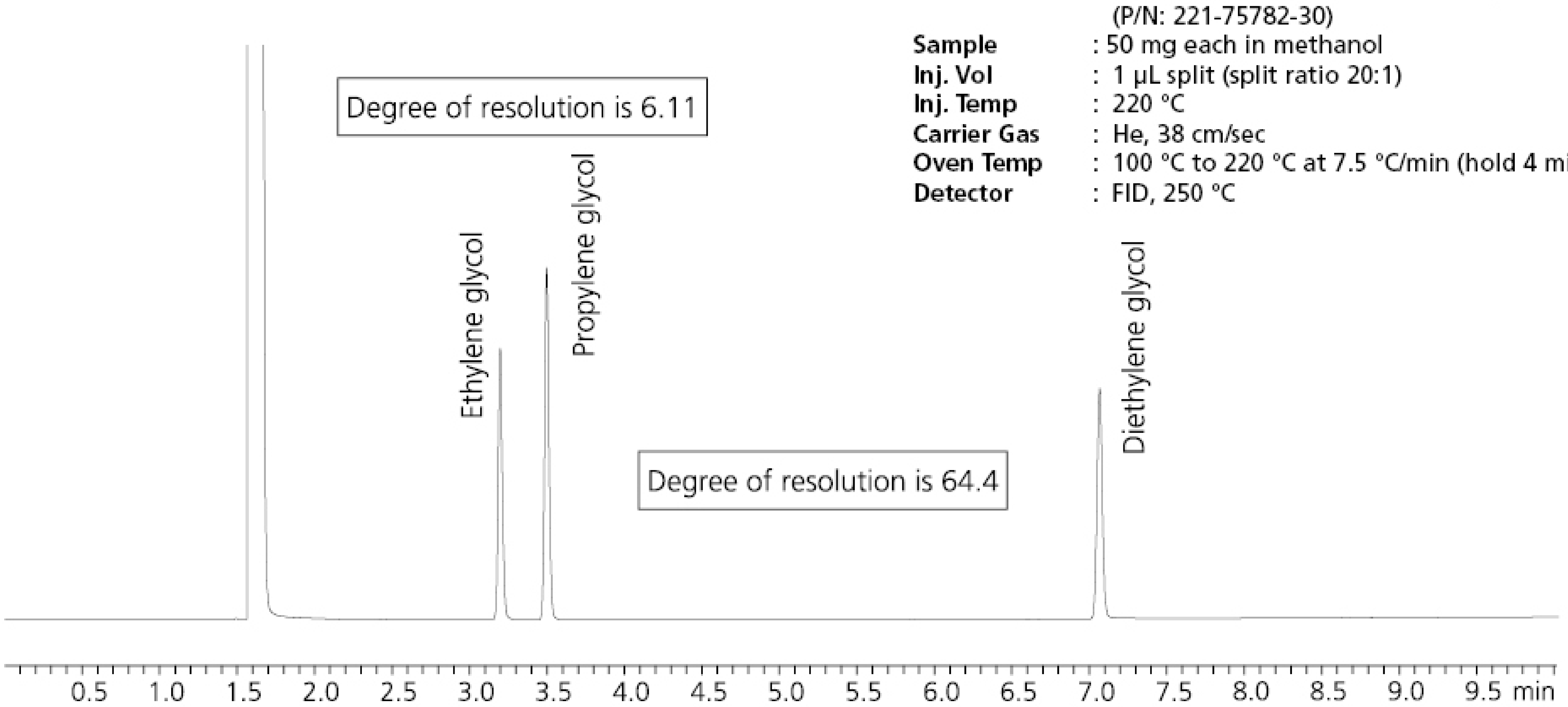
ID	df	Temp. Range	15 m	30 m	60 m
0.25 mm	0.10 µm	-20 to 280 °C	–	227-36216-01	227-36216-02
	0.25 µm	-20 to 280 °C	–	221-75777-30	227-36217-01
	0.50 µm	-20 to 270/280 °C	–	221-75778-30	227-36218-01
	1.00 µm	-20 to 260/280 °C	–	221-75779-30	227-36219-01
0.32 mm	0.10 µm	-20 to 280 °C	–	221-76184-30	227-36220-01
	0.25 µm	-20 to 280 °C	221-75780-15	221-75780-30	221-75780-60
	0.50 µm	-20 to 270/280 °C	–	221-75781-30	227-36221-01
	1.00 µm	-20 to 260/280 °C	–	221-75782-30	221-75782-60
	1.50 µm	-20 to 240/260 °C	–	227-36222-01	227-36222-02
0.53 mm	0.10 µm	-20 to 270/280 °C	–	227-36223-01	227-36223-02
	0.25 µm	-20 to 270/280 °C	–	227-36224-01	–
	0.50 µm	-20 to 260/270 °C	–	227-36225-01	–
	1.00 µm	-20 to 250/270 °C	–	221-75785-30	227-36226-01
	1.50 µm	-20 to 240/260 °C	–	227-36227-01	227-36227-02
	3.00 µm	-20 to 230/250 °C	–	227-36228-01	227-36228-02

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Analysis of Ethylene Glycol and Diethylene Glycol in Propylene Glycol

Conditions

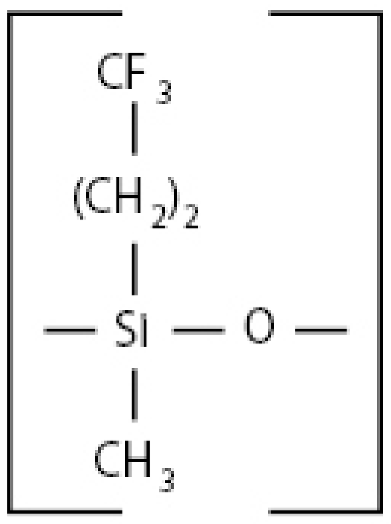
Instrument : GC-2010 Plus AF/AOC-20i
Column : SH-1701, 30 m, 0.32 mm ID, 1.00 µm (P/N: 221-75782-30)
Sample : 50 mg each in methanol
Inj. Vol : 1 µL split (split ratio 20:1)
Inj. Temp : 220 °C
Carrier Gas : He, 38 cm/sec
Oven Temp : 100 °C to 220 °C at 7.5 °C/min (hold 4 min)
Detector : FID, 250 °C



SH-200/SH-200MS

- Mid-polarity phase: Crossbond™ trifluoropropyl methyl polysiloxane
- General-purpose columns for solvents, Freon® fluorocarbons, alcohols, ketones, silanes, glycols, and drugs of abuse.
- Equivalent to USP G6 phase.
- Similar phases: DB-210, DB-200, VF-200ms

SH-200 / SH-200MS Structure



SH-200

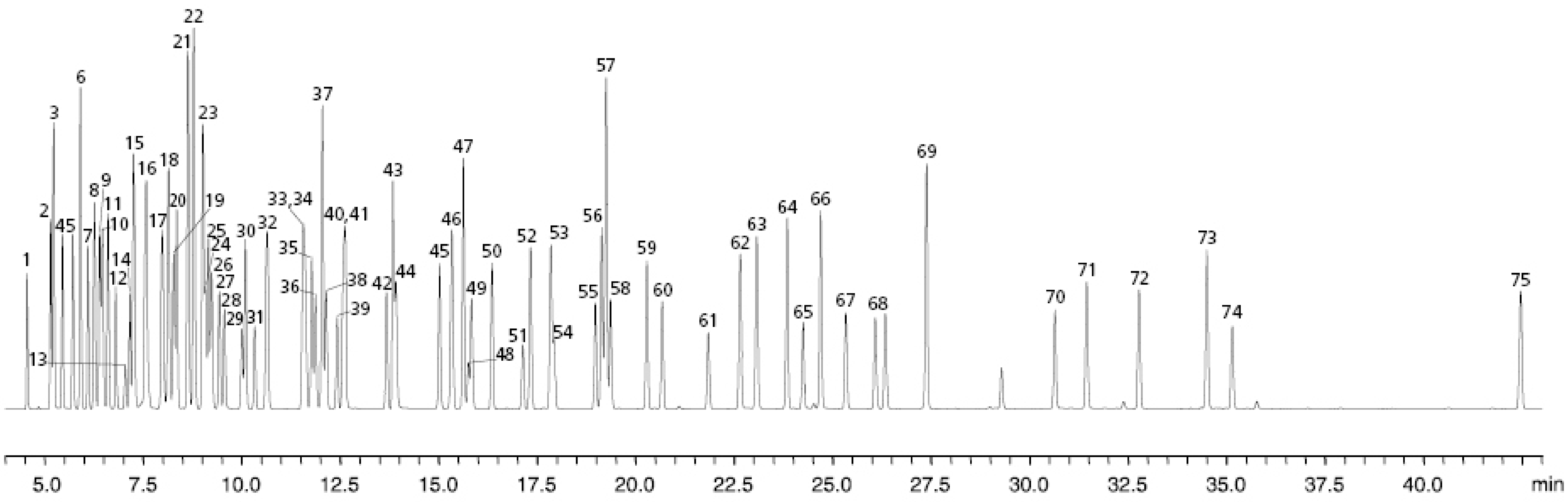
ID	df	Temp. Range	30 m	60 m	105 m
0.25 mm	0.10 µm	-20 to 320/340 °C	227-36179-01	227-36179-02	–
	0.25 µm	-20 to 320/340 °C	227-36180-01	227-36180-02	–
	0.50 µm	-20 to 310/330 °C	227-36181-01	227-36181-02	–
	1.00 µm	-20 to 290/310 °C	221-75800-30	227-36182-01	–
0.32 mm	0.10 µm	-20 to 320/340 °C	227-36183-01	227-36183-02	–
	0.25 µm	-20 to 320/340 °C	227-36184-01	227-36184-02	–
	0.50 µm	-20 to 310/330 °C	227-36185-01	227-36185-02	–
	1.00 µm	-20 to 290/310 °C	227-36186-01	227-36186-02	–
	1.50 µm	-20 to 280/300 °C	227-36187-01	227-36187-02	221-75804-15
0.53 mm	0.10 µm	-20 to 310/330 °C	227-36188-01	227-36188-02	–
	0.25 µm	-20 to 310/330 °C	227-36189-01	227-36189-02	–
	0.50 µm	-20 to 300/320 °C	227-36190-01	227-36190-02	–
	1.00 µm	-20 to 290/310 °C	227-36191-01	227-36191-02	–
	1.50 µm	-20 to 280/300 °C	227-36192-01	227-36192-02	–
	3.00 µm	-20 to 260/380 °C	227-36193-01	227-36193-02	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-200MS (Low-bleed phase for GCMS analysis)

ID	df	Temp. Range	30 m
0.25 mm	0.10 µm	-20 to 320/340 °C	227-36194-01
	0.25 µm	-20 to 320/340 °C	221-75811-30
	0.50 µm	-20 to 310/330 °C	227-36195-01
	1.00 µm	-20 to 290/310 °C	227-36196-01
0.32 mm	0.10 µm	-20 to 320/340 °C	227-36197-01
	0.25 µm	-20 to 320/340 °C	221-75814-30
	0.50 µm	-20 to 310/330 °C	227-36198-01
	1.00 µm	-20 to 290/310 °C	227-36199-01
0.53 mm	0.50 µm	-20 to 300/320 °C	227-36200-01
	1.00 µm	-20 to 290/310 °C	227-36201-01
	1.50 µm	-20 to 280/300 °C	227-36202-01

Analysis of Organic Solvents



■ **Peaks**

1. Methanol
2. Ethanol
3. Acetaldehyde + Ethyl Ether
4. 1,1-Dichloroethylene
5. Isopropanol
6. Dichloromethane + Hexane
7. trans-1,2-Dichloroethylene
8. tert.-Butanol
9. tert.-Butyl Methyl Ether
10. Isopropyl Ether
11. n-Propanol
12. Ethyl Formate
13. Chloroform
14. Methyl Acetate
15. Cyclohexane
16. Tetrachloromethane + sec.-Butanol
17. Isooctane
18. Isobutanol + 1,1,1-Trichloroethane
19. Acetonitrile
20. Acrylonitrile
21. Benzene
22. Tetrahydrofuran + methylcyclohexane
23. Methyl Acrylate + 1,2-Dichloroethane
24. Trichloroethylene
25. n-Butanol
26. Ethyl Acetate
27. 1,2-Dimethoxyethane
28. Ethylene Glycol Monomethyl Ether
29. Ethylenechlorohydrin
30. Methyl Ethyl Ketone
31. Nitromethane
32. Propylene Glycol Monomethyl Ether + Isopropyl Acetate
33. Ethyl Acrylate
34. Isoamyl Alcohol
35. Methyl Methacrylate
36. Ethylene Glycol Monoethyl Ether
37. Toluene
38. 1,4-Dioxane
39. tetrachloroethylene
40. n-Propyl Acetate
41. n-Amyl Alcohol
42. Epichlorohydrin
43. Pyridine
44. Ethylene Glycol Monoisopropyl Ether
45. Isobutyl Acetate
46. Methyl Isobutyl Ketone + Ethylbenzene
47. Chlorobenzene
48. p-Xylene
49. m-Xylene
50. n-Butyl Acetate
51. o-Xylene
52. Methyl Butyl Ketone
53. Cyclohexanol
54. 1,1,2,2-Tetrachloroethane
55. Isoamyl Acetate
56. Butyl Acrylate
57. Ethylene Glycol Monobutyl Ether
58. Anisole + Propylene Glycol Monomethyl Ether Acetate
59. n-Amyl Acetate
60. Ethylene Glycol Monoethyl Ether Acetate
61. N,N-Dimethylformamide
62. Isooctanol
63. Cyclohexanone
64. o-Dichlorobenzene
65. Diethylene Glycol Monoethyl Ether
66. Benzyl Alcohol
67. N,N-Dimethylacetamide
68. Dimethyl Sulfoxide
69. Tetralin
70. Diethylene Glycol Monobutyl Ether
71. 2-Ethylhexyl Acrylate
72. N-Methylpyrrolidone
73. Isophorone
74. 1,3-Dimethyl-2-Imidazolidinone
75. Sulfolane

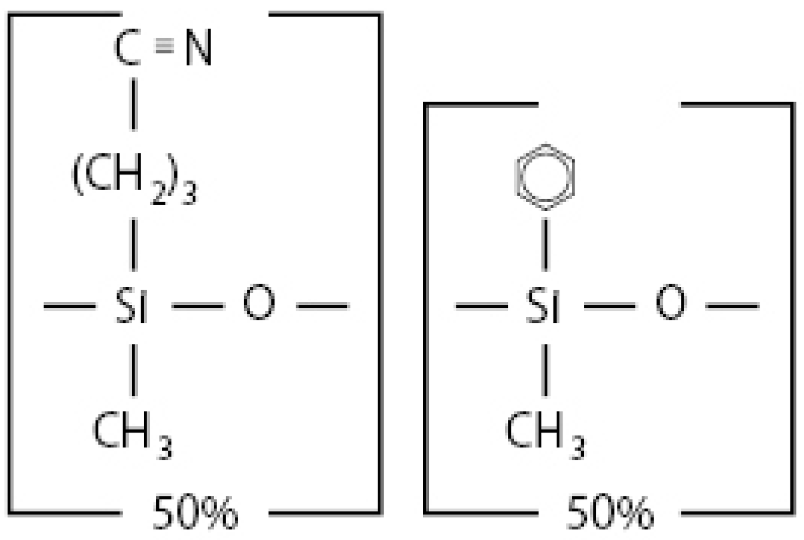
■ **Conditions**

Instrument	: GC-2010
Column	: SH-200, 60 m, 0.32 mm ID, 1.00 µm (P/N: 227-36186-02)
Injection	: Split (split ratio: 50:1)
Inj. Temp	: 250 °C
Carrier Gas	: He, constant linear velocity mode, 25 cm/sec
Oven Temp	: 40 °C (0 min) to 310 °C at 4 °C/min
Detector	: FID, 330 °C

SH-225

- Polar phase: Crossbond™ 50% cyanopropylmethyl / 50% phenylmethyl polysiloxane
- General-purpose columns for FAMEs, carbohydrates, sterols, flavor compounds.
- Equivalent to USP G7 and G19 phases.
- Similar phases: DB-225, DB-225MS, CP-Sil 43 CB, SPB-225

SH-225 Structure



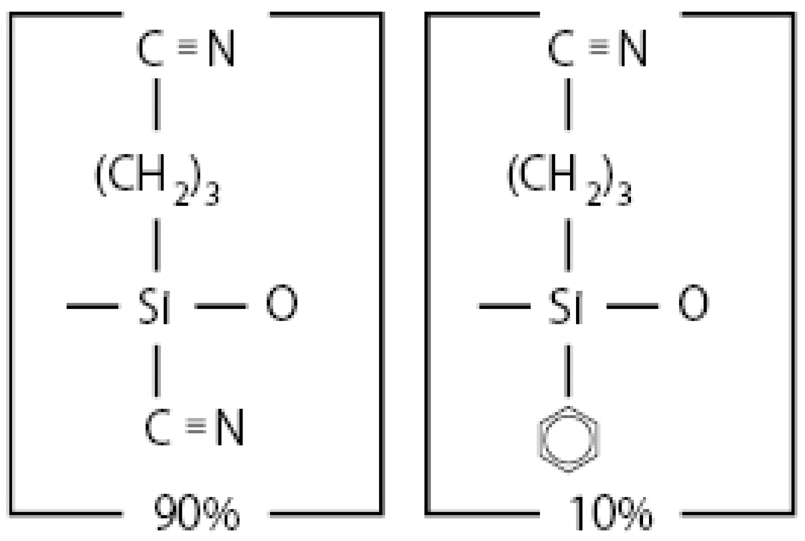
ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 220/240 °C	227-36229-01	227-36229-02
	0.50 µm	40 to 220/240 °C	227-36230-01	–
0.32 mm	0.10 µm	40 to 220/240 °C	227-36231-01	–
	0.25 µm	40 to 220/240 °C	227-36232-01	–
	0.50 µm	40 to 220/240 °C	227-36233-01	–
	1.00 µm	40 to 200/220 °C	227-36234-01	227-36234-02
0.53 mm	0.25 µm	40 to 200/220 °C	227-36235-01	–
	0.50 µm	40 to 200/220 °C	227-36236-01	–
	1.00 µm	40 to 200/220 °C	227-36237-01	–

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-2330

- Highly polar phase: Crossbond™ 90% biscyanopropyl / 10% cyanopropylphenyl polysiloxane (Non-bonded)
- General-purpose columns for cis/trans FAMEs, dioxin isomers.
- Equivalent to USP G8 and G48 phase.
- Similar phases: DB-23, VF-23ms, SP-2330, SP-2331, SP-2380

SH-2330 Structure



ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	0 to 260/275 °C	227-36238-01	227-36238-02
	0.20 µm	0 to 260/275 °C	227-36239-01	227-36239-02
0.32 mm	0.10 µm	0 to 260/275 °C	227-36240-01	227-36240-02
	0.20 µm	0 to 260/275 °C	227-36241-01	227-36241-02
0.53 mm	0.10 µm	0 to 260/275 °C	–	227-36242-01
	0.20 µm	0 to 260/275 °C	227-36243-01	227-36243-02

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Capillary Columns

General-Purpose Columns

SH-2560

- Highly polar phase; biscyanopropyl polysiloxane—not bonded
- Stationary phase selectivity optimized for isomer separation to ensure accurate quantification of critical cis/trans FAMEs.
- Application-specific QC test guarantees consistent, reliable performance for AOAC 996.06 and AOCS Ce 1j-07 methods.
- Excellent sample capacity; no peak distortion means easy, accurate peak integration.
- Similar Phase(s): HP-88, CP-Sil 88, SP-2560, BPX-90, MEGA-10

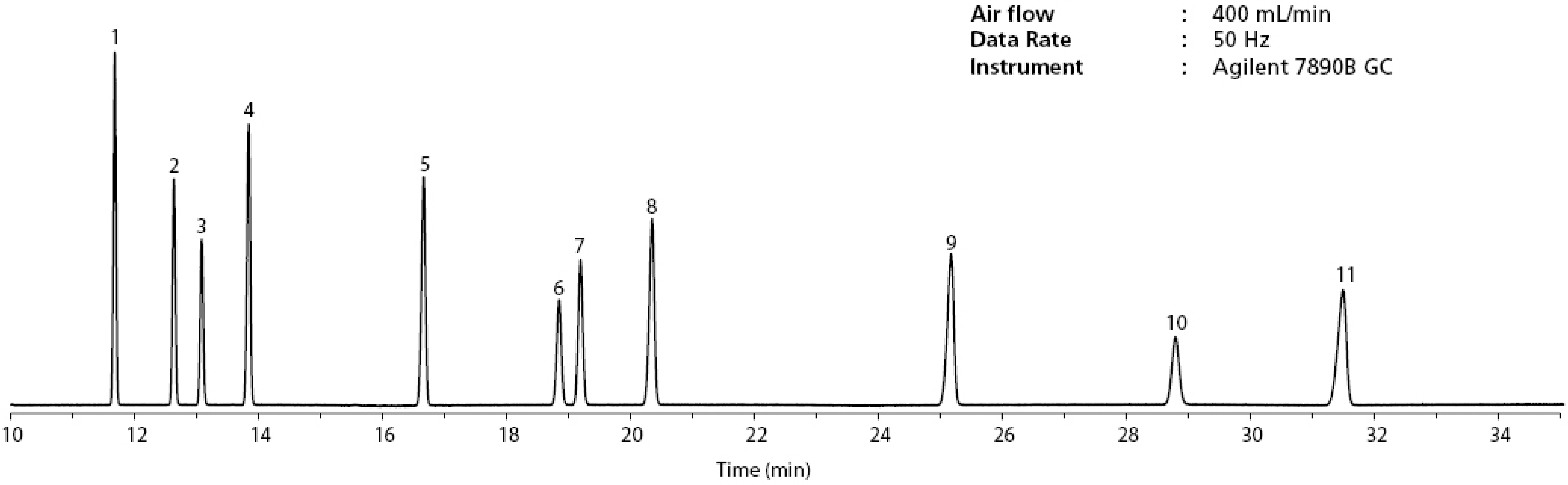
ID	df	Temp. Range	100 m
0.25 mm	0.20 µm	20 to 250 °C	227-36311-01

Unsaturated FAMES QC Test Mix on SH-2560

Peaks	tR (min)	Conc. (µg/mL)	Structural Nomenclature
1. Methyl octadecanoate	11.68	1.1	C18:0
2. Methyl elaidate	12.64	0.8	C18:1 (t9)
3. Methyl oleate	13.09	0.6	C18:1 (c9)
4. Methyl nonadecanoate	13.84	1.1	C19:0
5. Methyl eicosanoate	16.66	1.1	C20:0
6. Methyl eicosenoate	18.85	0.6	C20:1 (c11)
7. Methyl linolenate	19.20	0.8	C18:3 (c9,c12,c15)
8. Methyl heneicosanoate	20.35	1.1	C21:0
9. Methyl docosanoate	25.17	1.1	C22:0
10. Methyl eicosatrienoate	28.79	0.6	C20:3 (c11,c14,c17)
11. Methyl tricosanoate	31.49	1.1	C23:0

Conditions

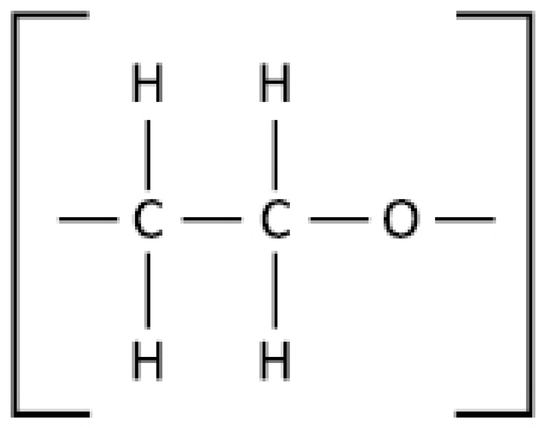
Column	:	SH-2560, 2560, 100 m, 0.25mm ID, 0.20 µm (227-36311-01)
Sample	:	Unsaturated FAMES QC test mix
Diluent	:	Hexane
Injection	:	1 µL split (split ratio 200:1)
Liner	:	Premium 4 mm Precision liner w/wool (cat.# 23305.1)
Inj. Temp	:	250 °C
Oven Temp	:	180 °C (hold 40 min)
Carrier Gas	:	H_2, constant flow
Flow Rate	:	2.5 mL/min
Detector	:	FID, 275 °C
Make-up Gas Type	:	N_2
Hydrogen flow	:	40 mL/min
Air flow	:	400 mL/min
Data Rate	:	50 Hz
Instrument	:	Agilent 7890B GC



SH-Wax

- Polar phase: Crossbond™ polyethylene glycol
- Best polyethylene glycol (PEG) phase for alkenols, glycols, and aldehydes.
- Equivalent to USP G14, G15, G16, G20, G39 phases.
- Similar phases: DB-Wax, CP-Wax 52 CB

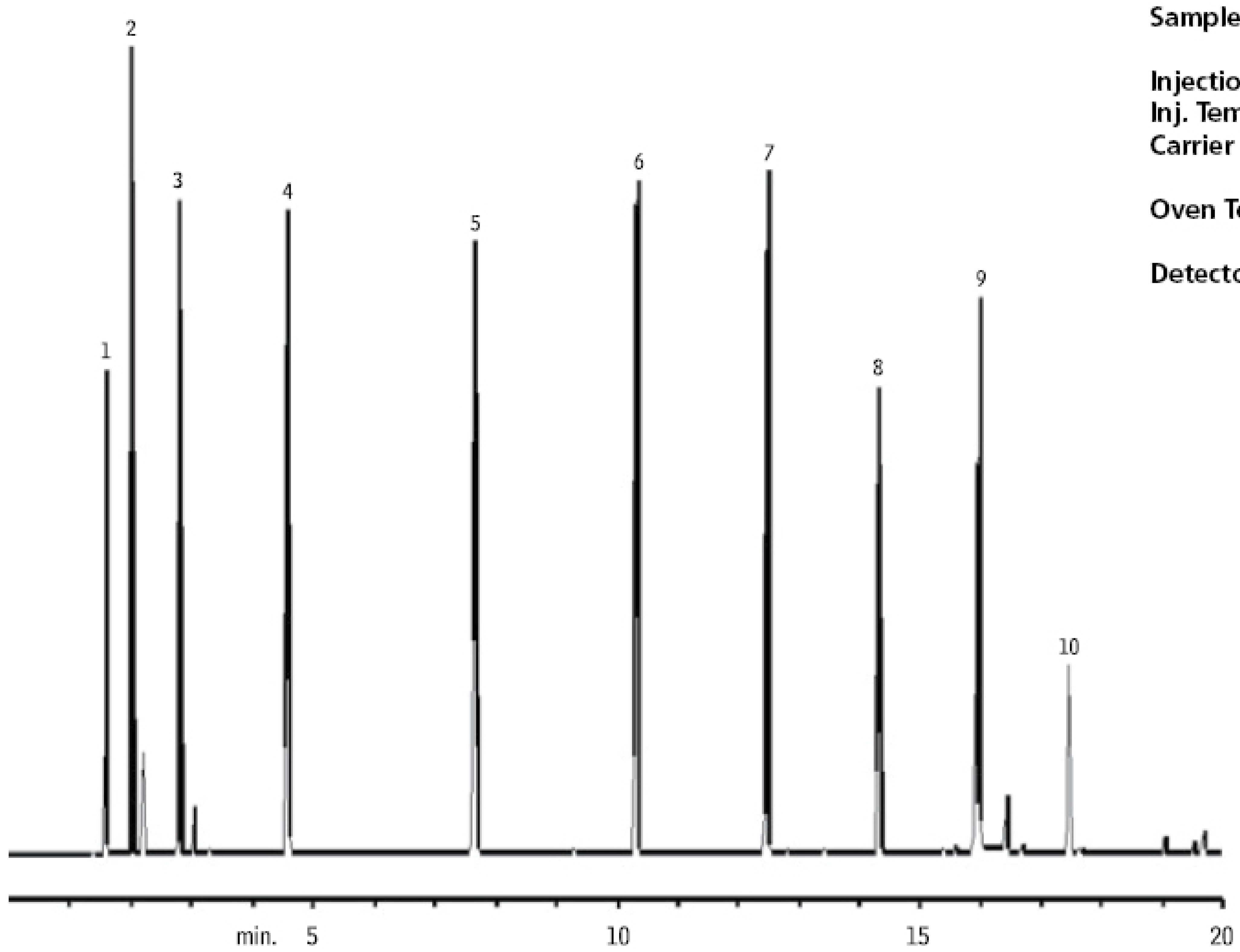
SH-Wax Structure



ID	df	Temp. Range	15 m	20 m	30 m	50 m	60 m
0.25 mm	0.10 µm	20 to 250 °C	–	–	221-76186-30	–	–
	0.25 µm	20 to 250 °C	–	–	221-75893-30	221-75893-50	221-75893-60
	0.50 µm	20 to 250 °C	–	–	221-75894-30	–	221-75894-60
0.32 mm	0.25 µm	20 to 250 °C	–	221-75895-20	221-75895-30	–	221-75895-60
	0.50 µm	20 to 250 °C	–	–	221-75896-30	221-75896-50	221-75896-60
	1.00 µm	20 to 240/250 °C	–	–	221-75897-30	–	221-75897-60
0.53 mm	0.25 µm	20 to 250 °C	–	–	227-36244-01	–	–
	0.50 µm	20 to 250 °C	–	–	221-76188-30	–	227-36245-01
	1.00 µm	20 to 240/250 °C	221-75899-15	–	221-75899-30	–	221-75899-60

* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

Aldehydes



Peaks

1. ethanal
2. propanal
3. butenal
4. pentanal
5. hexanal
6. heptanal
7. octanal
8. nonanal
9. decanal
10. undecanal

Conditions

Column	: SH-Wax, 30 m, 0.25mm ID, 0.50 µm (P/N: 221-75894-30)
Sample	: C2-C11 aldehydes mixture On-column conc.: 250 ng
Injection	: Split (split ratio: 100:1)
Inj. Temp	: 200 °C
Carrier Gas	: Hydrogen, linear velocity 35 cm/sec. set at 40 °C
Oven Temp	: 40 °C (hold 5 min) to 200 °C at 10 °C/min
Detector	: FID, 200 °C

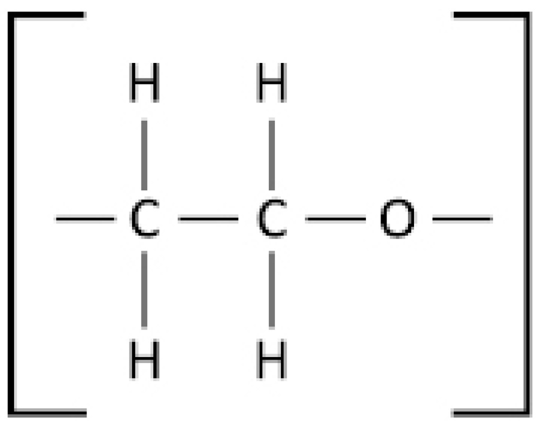
Capillary Columns

General-Purpose Columns

SH-PolarWax / SH-PolarWax MS

- Polar phase: Crossbond™ polyethylene glycol
- Low-bleed PEG column ensures long column lifetimes.
- Rugged enough to withstand repeated water injections.
- Equivalent to USP G14, G15, G16, G20, and G39 phases.
- Similar phases: Innowax, CP-Wax 52 CB, VF-WAX MS, Supelcowax-10

SH-PolarWax / SH-PolarWax MS Structure



SH-PolarWax

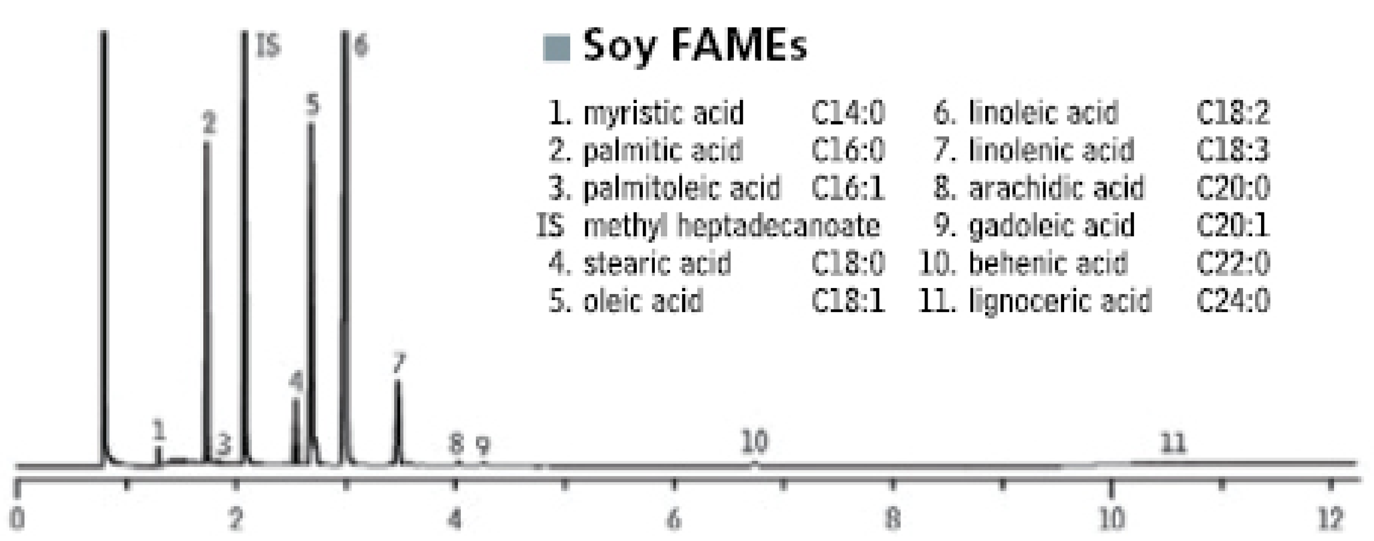
ID	df	Temp. Range	30 m	50 m	60 m
0.25 mm	0.10 µm	40 to 250/260 °C	227-36246-01	–	227-36246-02
	0.25 µm	40 to 250/260 °C	227-36305-02	227-36247-01	227-36247-02
	0.50 µm	40 to 250/260 °C	227-36248-01	–	227-36248-02
0.32 mm	0.10 µm	40 to 250/260 °C	227-36249-01	–	227-36249-02
	0.25 µm	40 to 250/260 °C	221-75972-30	–	227-36250-01
	0.50 µm	40 to 250/260 °C	227-36251-01	–	221-75975-60
	1.00 µm	40 to 240/250 °C	227-36252-01	–	227-36252-02
0.53 mm	0.10 µm	40 to 250/260 °C	227-36253-01	–	–
	0.25 µm	40 to 250/260 °C	227-36254-01	–	227-36254-02
	0.50 µm	40 to 250/260 °C	227-36255-01	–	227-36255-02
	1.00 µm	40 to 240/250 °C	221-75979-30	–	227-36256-01
	1.50 µm	40 to 230/240 °C	227-36257-01	–	227-36257-02
	2.00 µm	40 to 220/230 °C	227-36258-01	–	–

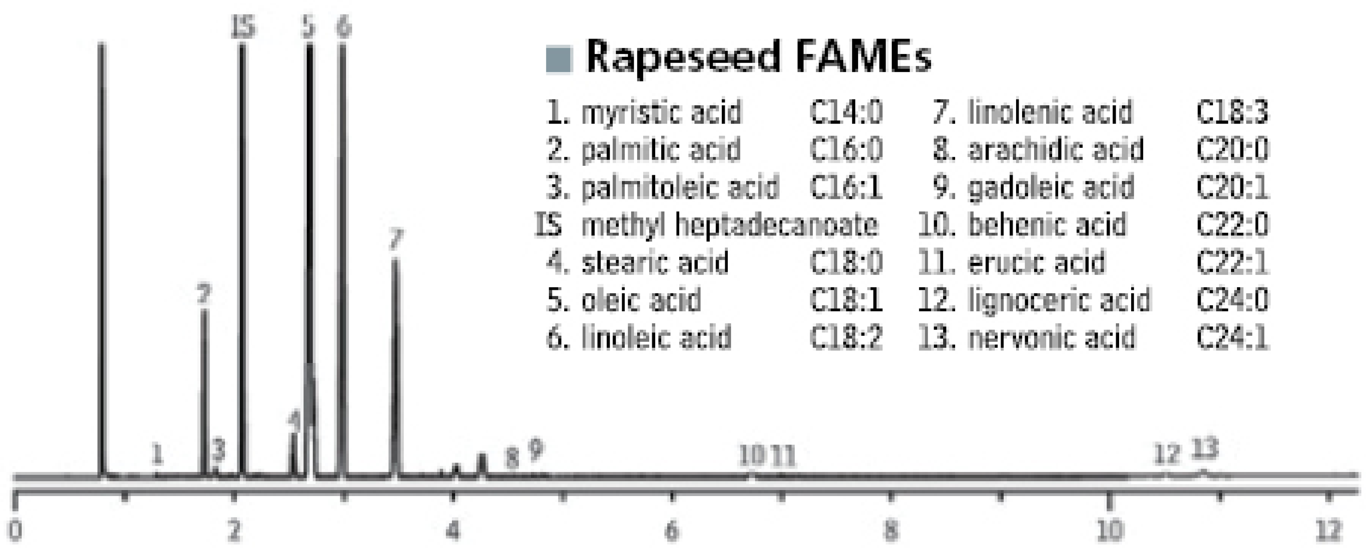
* Maximum temperatures listed are for shorter length columns. Longer columns may have a different maximum temperature.

SH-PolarWax MS

ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	40 to 250/260 °C	227-36322-01
0.32 mm	0.25 µm	40 to 250/260 °C	227-36322-03

FAMEs in Biodiesel Oils





Conditions

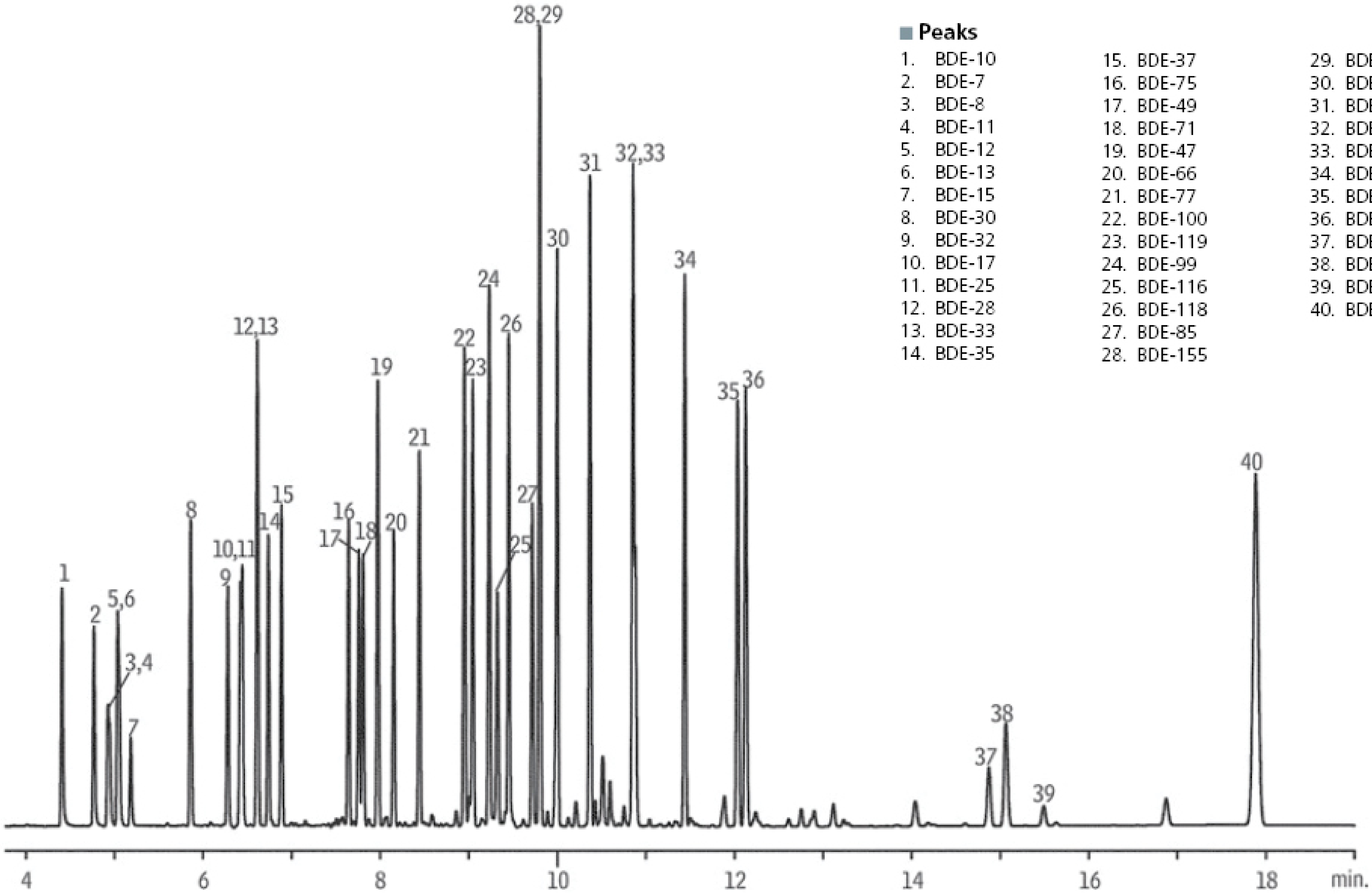
Column : SH-PolarWax, 30 m, 0.32 mm ID, 0.25 µm (P/N: 221-75972-30)
Inj. Vol. : 1 µL split (split ratio 100:1)
Inj. Temp : 250 °C
Carrier Gas : Hydrogen, constant flow rate 3mL/min, linear velocity 60 cm/sec.
Oven Temp : 210 °C (hold 5 min) to 230 °C at 20 °C/min (hold 5 min)
Detector : FID, 250 °C

SH-1614

- 5% diphenyl / 95% dimethyl polysiloxane
- Optimized for PBDE analysis by EPA Method 1614.
- Short column option resolves BDE-209 three times faster, with less thermal breakdown.
- Unique deactivation gives higher BDE-209 response than competitor columns, for greater analytical sensitivity.
- Exceeds EPA Method 1614 resolution criteria for BDE-49 and BDE-71.

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.10 µm	-60 to 330/360 °C	227-36265-01	227-36265-02

Brominated Flame Retardants



Peaks

1. BDE-10
2. BDE-7
3. BDE-8
4. BDE-11
5. BDE-12
6. BDE-13
7. BDE-15
8. BDE-30
9. BDE-32
10. BDE-17
11. BDE-25
12. BDE-28
13. BDE-33
14. BDE-35
15. BDE-37
16. BDE-75
17. BDE-49
18. BDE-71
19. BDE-47
20. BDE-66
21. BDE-77
22. BDE-100
23. BDE-119
24. BDE-99
25. BDE-116
26. BDE-118
27. BDE-85
28. BDE-155
29. BDE-126
30. BDE-154
31. BDE-153
32. BDE-138
33. BDE-166
34. BDE-183
35. BDE-181
36. BDE-190
37. BDE-208
38. BDE-207
39. BDE-206
40. BDE-209

Conditions

Column : SH-1614, 15 m, 0.25 mm ID, 0.10 µm (P/N: 227-36265-01)
Sample : 100-300 ppb PBDE PAR Solution
500 ppb decabromodiphenyl ether
Inj. Vol. : 1 µL splitless (hold 1 min)
Inj. Temp : 340 °C
Carrier Gas : He, constant flow, linear velocity 60 cm/sec., 120 °C
Oven Temp : 120 °C (hold 1 min) to 275 °C at 15 °C/min to 300 °C at 5 °C/min (hold 5 min)
Detector : µ-ECD, 345 °C

Capillary Columns

Dedicated Columns

SH-OPP2

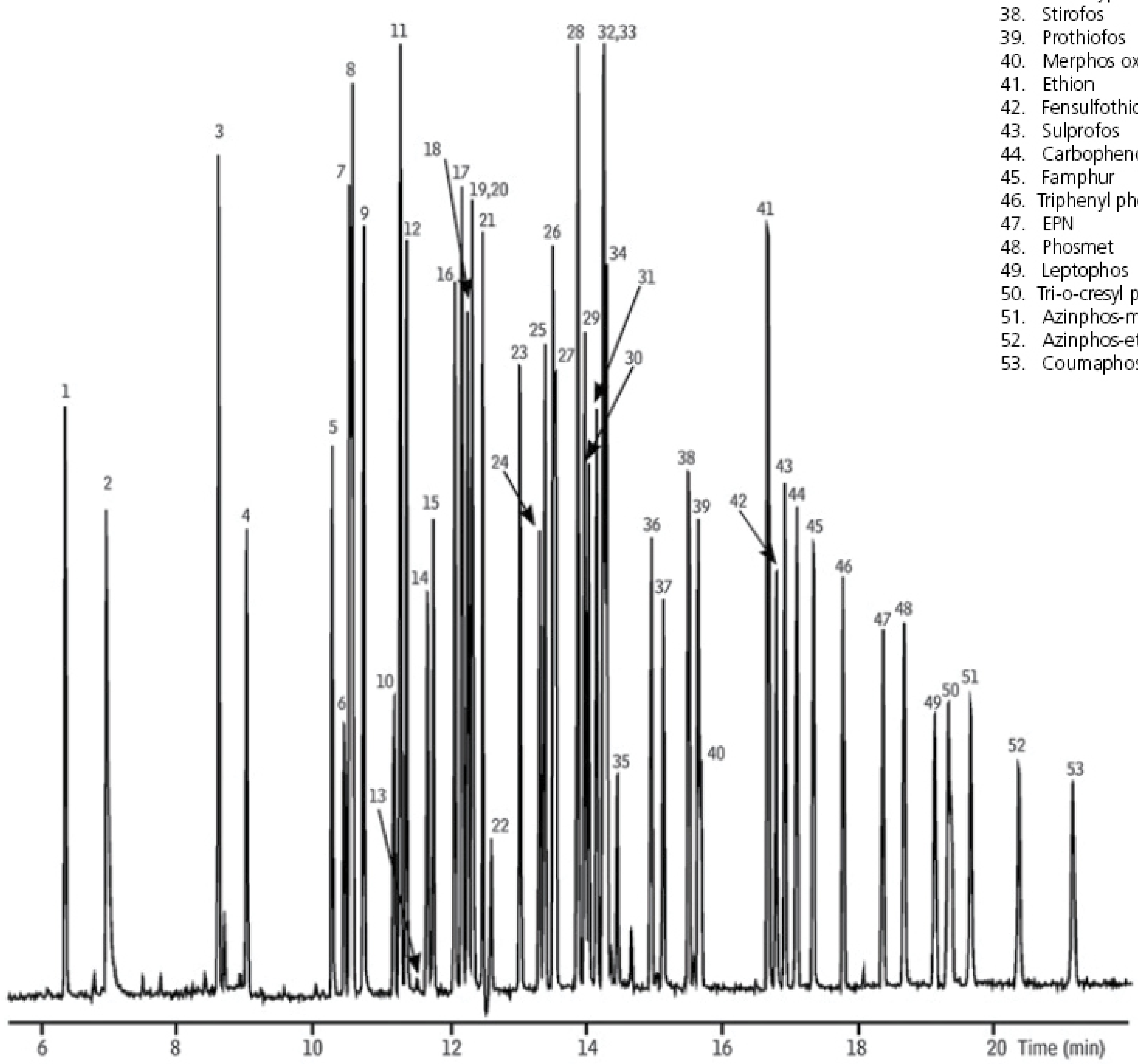
- Dedicated column for organophosphorus pesticides; best column combination for US EPA Method 8141.
- Low bleed - ideal for GC-FPD, GC-NPD, or GCMS analyses.

ID	df	Temp. Range	30 m
0.32 mm	0.32 µm	-20 to 310/330 °C	221-75887-30

Organophosphorus Pesticides (U.S. EPA Method 8141A)

Peaks

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



Conditions

Column	: SH-OPP2, 30 m, 0.32 mm ID, 0.32 µm (P/N: 221-75887-30)
Inj. Vol.	: 1 µL splitless (hold 1 min)
Inj. Temp	: 200 °C
Oven Temp	: 80 °C (hold 0.5 min) to 280 °C at 12 °C/min (hold 10 min)
Carrier Gas	: He
Dead Time	: 1.03 min at 80 °C
Detector	: FPD, 250 °C
Notes	: Constant pressure

SH-CLP / SH-CLP II

- Dedicated columns for organochlorine pesticides and herbicides.
- Low bleed - ideal for high-sensitivity GC-ECD or GCMS analyses.
- Baseline separations in less than 10 minutes.
- Analyze EPA Method 8081B, 8082A, 8151A, 504.1, 515, 508.1, and 552.2 compounds without time-consuming column changes.
- Similar phases: DB-CLP1 / DB-CLP2

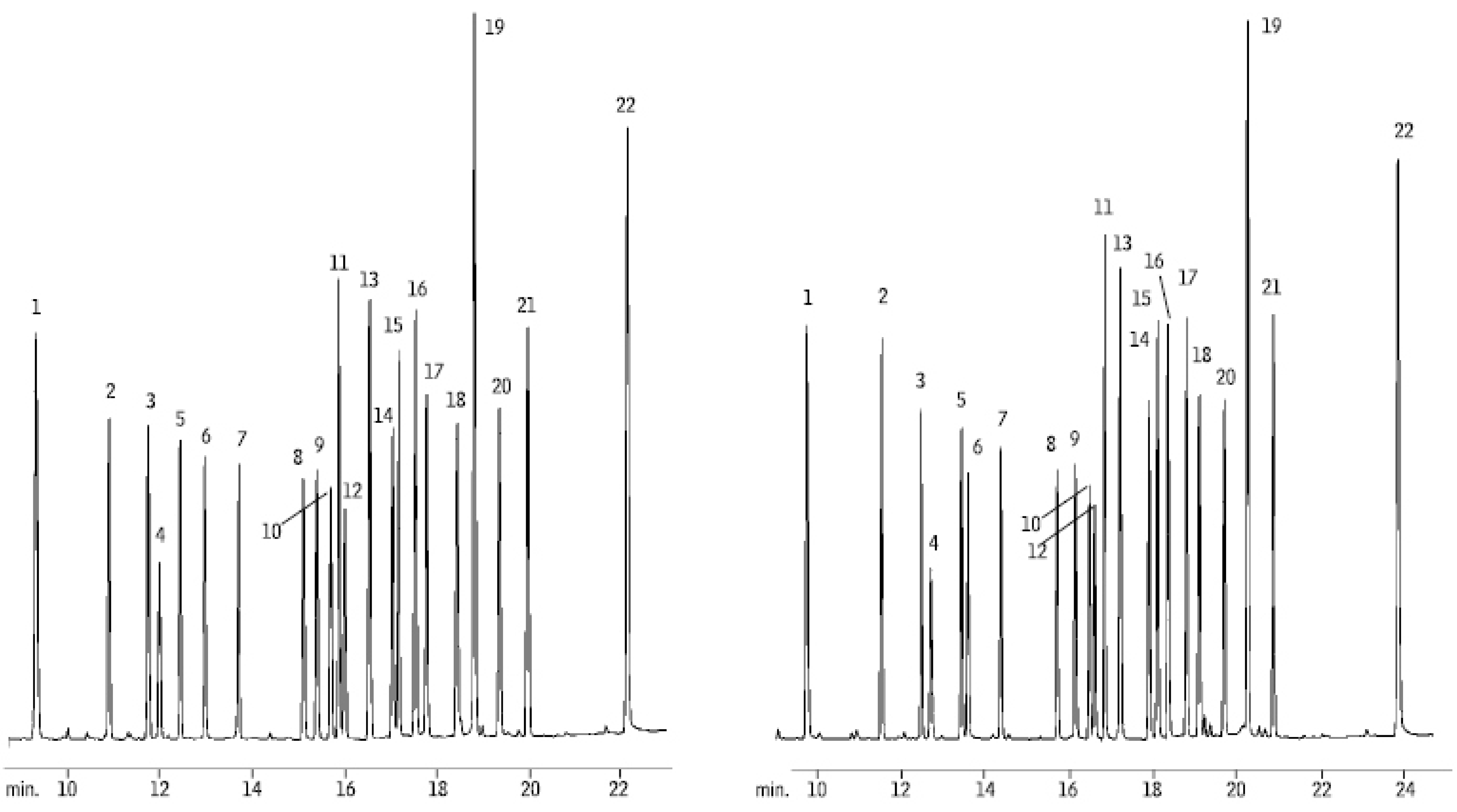
SH-CLP

ID	df	Temp. Range	30 m
0.32 mm	0.32 µm	-20 to 320/340 °C	227-36266-01
	0.50 µm	-20 to 320/340 °C	221-75879-30

SH-CLP II

ID	df	Temp. Range	30 m
0.32 mm	0.25 µm	-20 to 320/340 °C	227-36267-01

Organochlorine Pesticides (US EPA Method 8081)



Peaks

1. 2,4,5,6-tetrachloro-m-xylene
2. α-BHC (α-HCH)
3. γ-BHC (lindane)
4. β-BHC (β-HCH)
5. δ-BHC (δ-HCH)
6. heptachlor
7. aldrin
8. heptachlor epoxide
9. γ-chlordane
10. α-chlordane
11. 4,4'-DDE
12. endosulfan I
13. dieldrin
14. endrin
15. 4,4'-DDD
16. endosulfan II
17. 4,4'-DDT
18. endrin aldehyde
19. methoxychlor
20. endosulfan sulfate
21. endrin ketone
22. decachlorobiphenyl

Conditions

Column : SH-CLP, 30 m, 0.32 mm ID, 0.50 µm (P/N: 221-75879-30)

SH-CLP2, 30 m, 0.32 mm ID, 0.25 µm (P/N: 227-36267-01)

Oven Temp : 120 °C (hold 1 min) to 300 °C (hold 10 min) at 9 °C/min
Inj. : Direct
Inj. Temp : 200 °C
Detector : ECD, 300 °C with anode purge
Dead time : 1.9 min
Head pressure : 8.7 psi (constant)
Flow rate : 1.3 mL/min at 120 °C, He

Capillary Columns

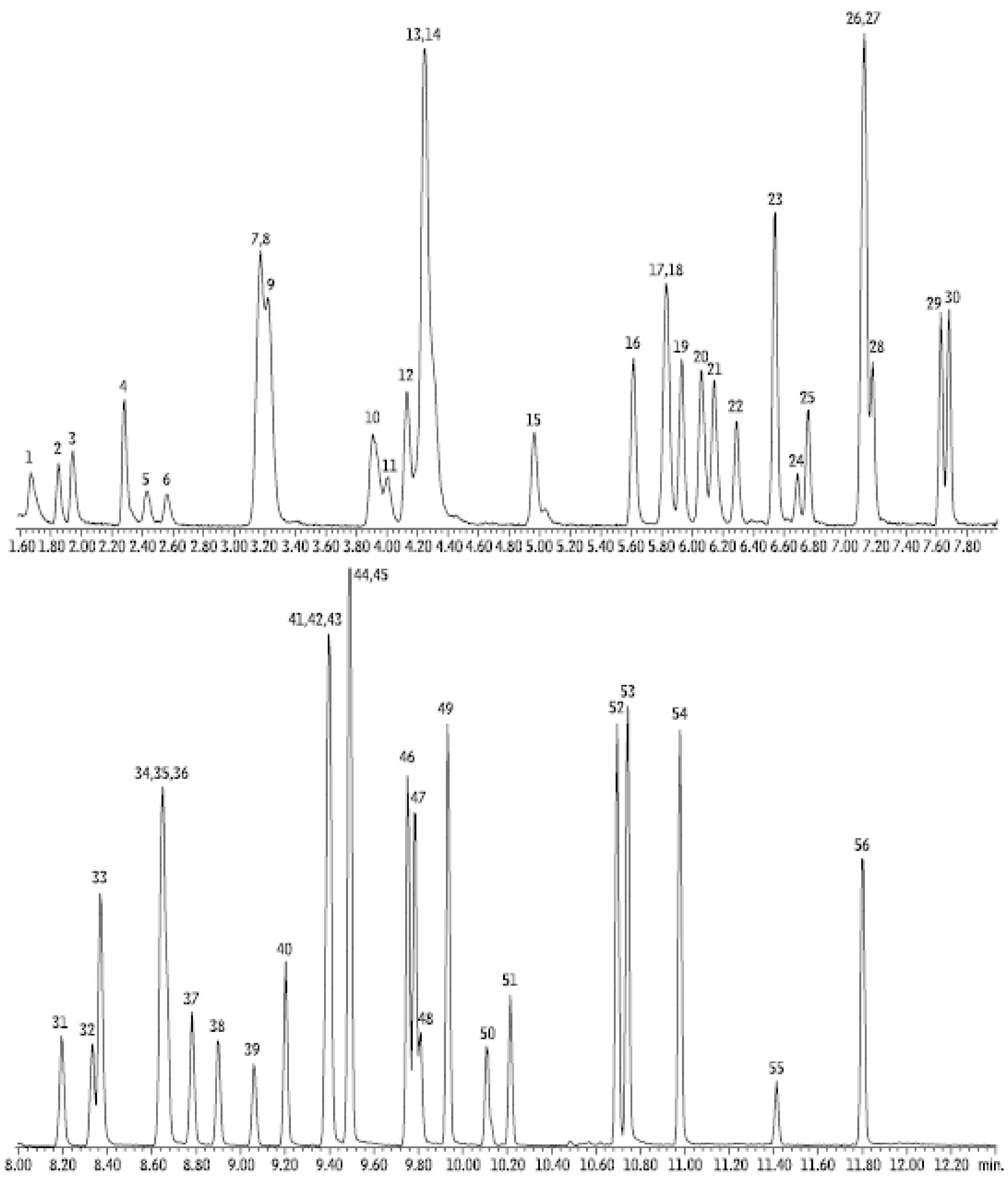
Dedicated Columns

SH-VMS

- Dedicated columns for analyzing volatile organic pollutants by GCMS including methods TO-15, TMS, and EPA 8260.
- Complete separation of U.S. EPA Method 8260 compounds in less than 10 minutes.

ID	df	Temp. Range	20 m	30 m	60 m
0.18 mm	1.00 µm	-40 to 240/260 °C	227-36412-01	–	–
0.25 mm	1.40 µm	-40 to 240/260 °C	–	227-36268-01	227-36268-02
0.32 mm	1.80 µm	-40 to 240/260 °C	–	227-36269-01	227-36269-02

Volatile Organics (US EPA CLP 04.1)



Peaks

1. dichlorodifluoromethane
2. chloromethane
3. vinyl chloride
4. bromomethane
5. chloroethane
6. trichlorofl uoromethane
7. 1,1-dichloroethene
8. carbon disulfi de
9. 1,1,2-trichloro-1,2,2-trifl uoroethane
10. methylene chloride
11. acetone
12. trans -1,2-dichloroethene
13. methyl acetate
14. methyl tert-butyl ether
15. 1,1-dichloroethane
16. cis-1,2-dichoroethane
17. cyclohexane
18. bromochloromethane (IS)
19. chloroform
20. carbon tetrachloride
21. 1,1,1-trichloroethane
22. 2-butanone
23. benzene
24. 1,2-dichloroethane-d4 (SS)
25. 1,2-dichloroethane
26. methylcyclohexane
27. trichloroethene
28. 1,4-difl uorobenzene (IS)
29. 1,2-dichloropropane
30. bromodichloromethane
31. cis -1,3-dichloropropene
32. toluene d8 (SS)
33. toluene
34. tetrachloroethane
35. 4-methyl-2-pentanone
36. trans -1,3-dichloropropane
37. 1,1,2-trichloroethane
38. dibromochloromethane
39. 1,2-dibromoethane
40. 2-hexanone
41. chlorobenzene d5 (IS)
42. chlorobenzene
43. ethylbenzene
44. m -xylene
45. p -xylene
46. o -xylene
47. styrene
48. bromoform
49. isopropylbenzene
50. 4-bromofl uorobenzene (SS)
51. 1,1,2,2-tetrachloroethane
52. 1,3-dichlorobenzene
53. 1,4-dichlorobenzene
54. 1,2-dichlorobenzene
55. 1,2-dibromo-3-chloropropane
56. 1,2,4-trichlorobenzene

Conditions

Column : SH-VMS, 30 m, 0.25 mmID, 1.40 µm
(P/N: 227-36268-01)
Purge and Trap : Trap: #10 ($Tenax_R$/silica gel/carbon molecular sieve)
Sample Temp: ambient
Purge: 11 min at 40 mL/min
Desorb preheat: 185 °C
Desorb: 0.5 min at 190 °C
Desorb flow rate: 35.0 mL/min
Bake: 8 min at 210 °C
Interface: split injector
Transfer Line Temp: 150 °C

Inj. : Split (split ratio: 35:1)
Inj. Temp : 200 °C
Carrier Gas : He, linear velocity 34 cm/sec., 40 °C, constant flow
Oven Temp : 40 °C (hold 4 min) to 90 °C at 16 °C/min to 220 °C at 32 °C/min (hold 5 min)
Detector : MS
Transfer Line Temp: 150 °C
Scan Range: 35-300 amu.
Ionization: EI

SH-VRX

- Proprietary Crossbond phase
- Application-specific columns for volatile organic pollutants.
- Excellent for U.S. EPA Method 8021 compounds.
- Stable to 260 °C.
- Similar Phase(s): DB-VRX

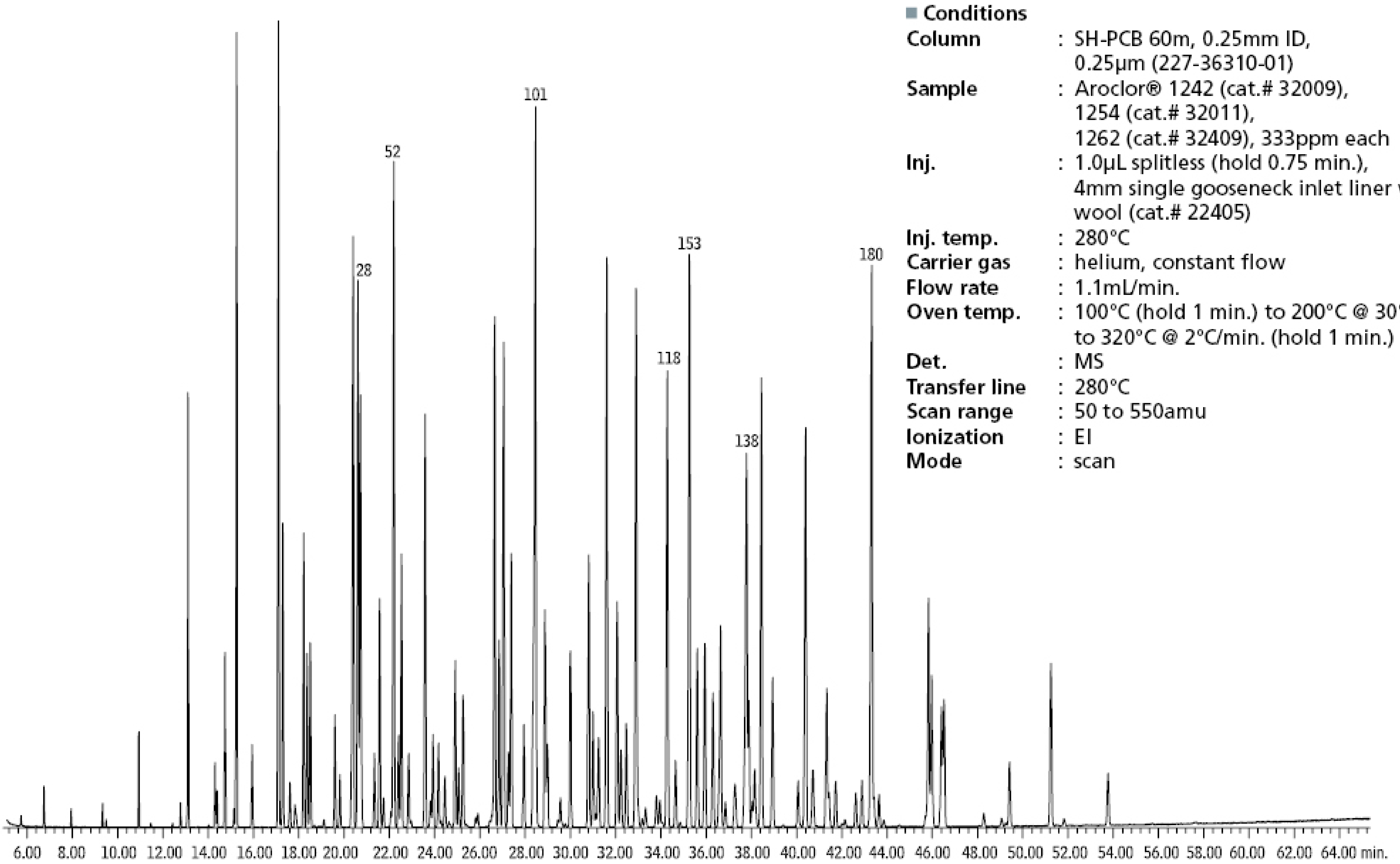
ID	df	Temp. Range	25 m
0.10 mm	0.50 μm	-40 to 240/260 °C	227-36331-01

SH-PCB

- Proprietary Crossbond phase
- Unique polymer for PCBs analysis by GC-ECD or GC-MS.
- Good results for other semi-volatiles.
- Low polarity; inert to active compounds.
- Stable to 340 °C.

ID	df	Temp. Range	60 m
0.25 mm	0.25 μm	30 to 320/340 °C	227-36310-01

Aroclor PCBs



Conditions

Column	: SH-PCB 60m, 0.25mm ID, 0.25μm (227-36310-01)
Sample	: Aroclor® 1242 (cat.# 32009), 1254 (cat.# 32011), 1262 (cat.# 32409), 333ppm each
Inj.	: 1.0μL splitless (hold 0.75 min.), 4mm single gooseneck inlet liner w/ wool (cat.# 22405)
Inj. temp.	: 280°C
Carrier gas	: helium, constant flow
Flow rate	: 1.1mL/min.
Oven temp.	: 100°C (hold 1 min.) to 200°C @ 30°C/min., to 320°C @ 2°C/min. (hold 1 min.)
Det.	: MS
Transfer line	: 280°C
Scan range	: 50 to 550amu
Ionization	: EI
Mode	: scan

Capillary Columns

Dedicated Columns

SH-BAC Plus 1 / SH-BAC Plus 2

- Optimized column selectivities guarantee resolution of ethanol, internal standards, and frequently encountered interferences.
- Robust and reproducible column chemistry ensures longer column lifetime and consistent results.

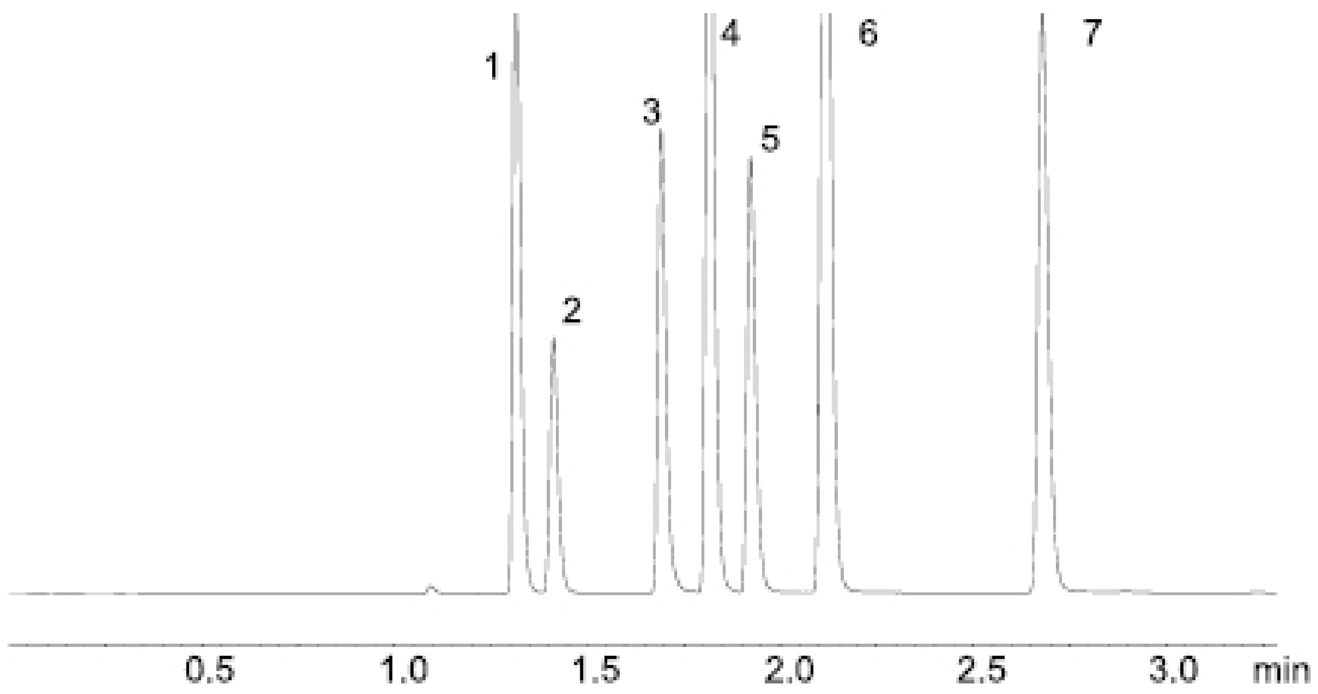
SH-BAC Plus 1

ID	df	Temp. Range	30 m
0.32 mm	1.80 µm	-20 to 240/260 °C	227-36260-01
0.53 mm	3.00 µm	-20 to 240/260 °C	227-36261-01

SH-BAC Plus 2

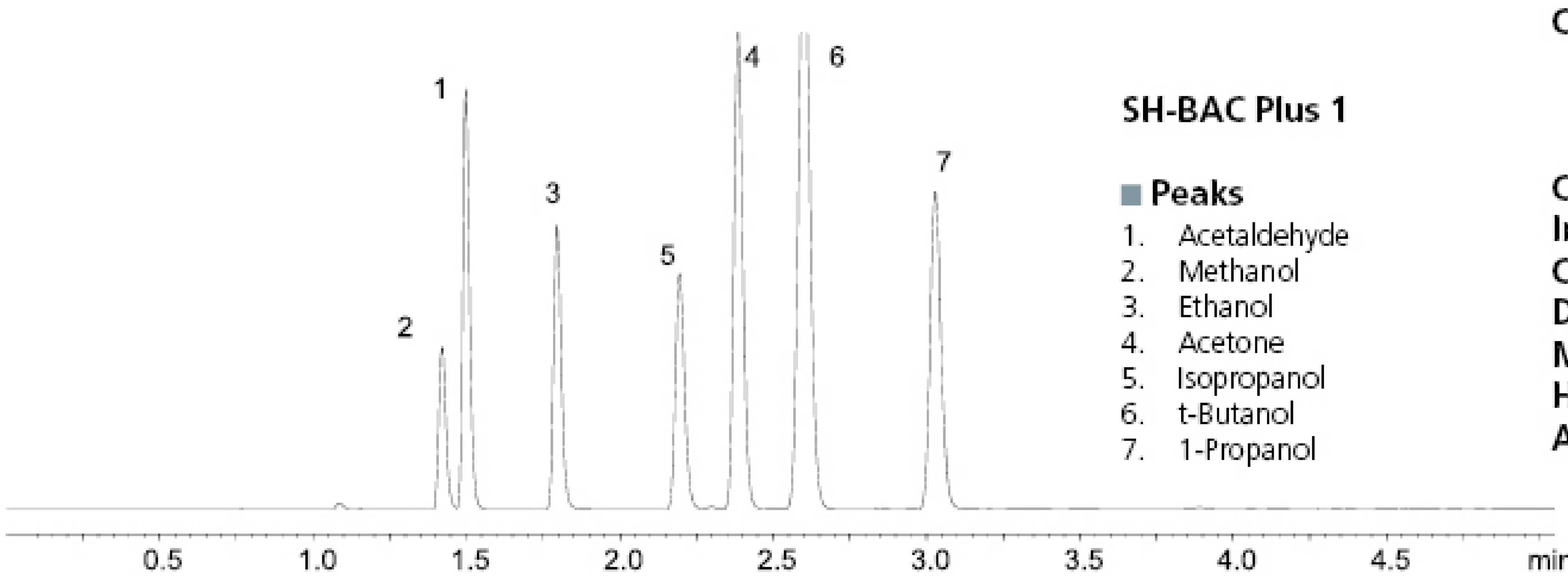
ID	df	Temp. Range	30 m
0.32 mm	0.60 µm	-20 to 240/260 °C	227-36263-01
0.53 mm	1.00 µm	-20 to 240/260 °C	227-36264-01

Analysis of Alcohol Compounds in Blood



SH-BAC Plus 2

Peaks
1. Acetaldehyde
2. Methanol
3. Ethanol
4. Acetone
5. Isopropanol
6. t-Butanol
7. 1-Propanol



SH-BAC Plus 1

Peaks
1. Acetaldehyde
2. Methanol
3. Ethanol
4. Acetone
5. Isopropanol
6. t-Butanol
7. 1-Propanol

Conditions

Instrument	: GC-2010 Plus AF + HS-20
Headspace	: Oven Temp.: 85 °C Vial Warming Time: 15 min Vial Pressurization Time: 1 min Injection Time: 0.5 min Sample Line Temp: 150 °C Vial Volume: 20 mL Vial Agitation: Off Vial Pressurization: 100 kPa Load Time: 0.5 min Needle Flash Time: 0.5 min Transfer Line Temp: 150 °C
Column	: SH-BAC Plus 2, 30 m, 0.32 mm ID, 0.60 µm (P/N: 227-36263-01) SH-BAC Plus 1, 30 m, 0.32 mm ID, 1.80 µm (P/N: 227-36260-01)
Column Temp	: 40 °C
Inj.	: Split (split ratio: 20:1)
Carrier Gas	: He, 100 kPa
Detector	: FID, 250 °C
Makeup Gas	: He, 30 mL/min
Hydrogen	: 40 mL/min
Air	: 400 mL/min

SH-FAME

- Dedicated column for FAMEs, specially tested with a FAME mixture.
- Equivalent to USP G16 phase.
- Similar phases: Select FAME, Omegawax

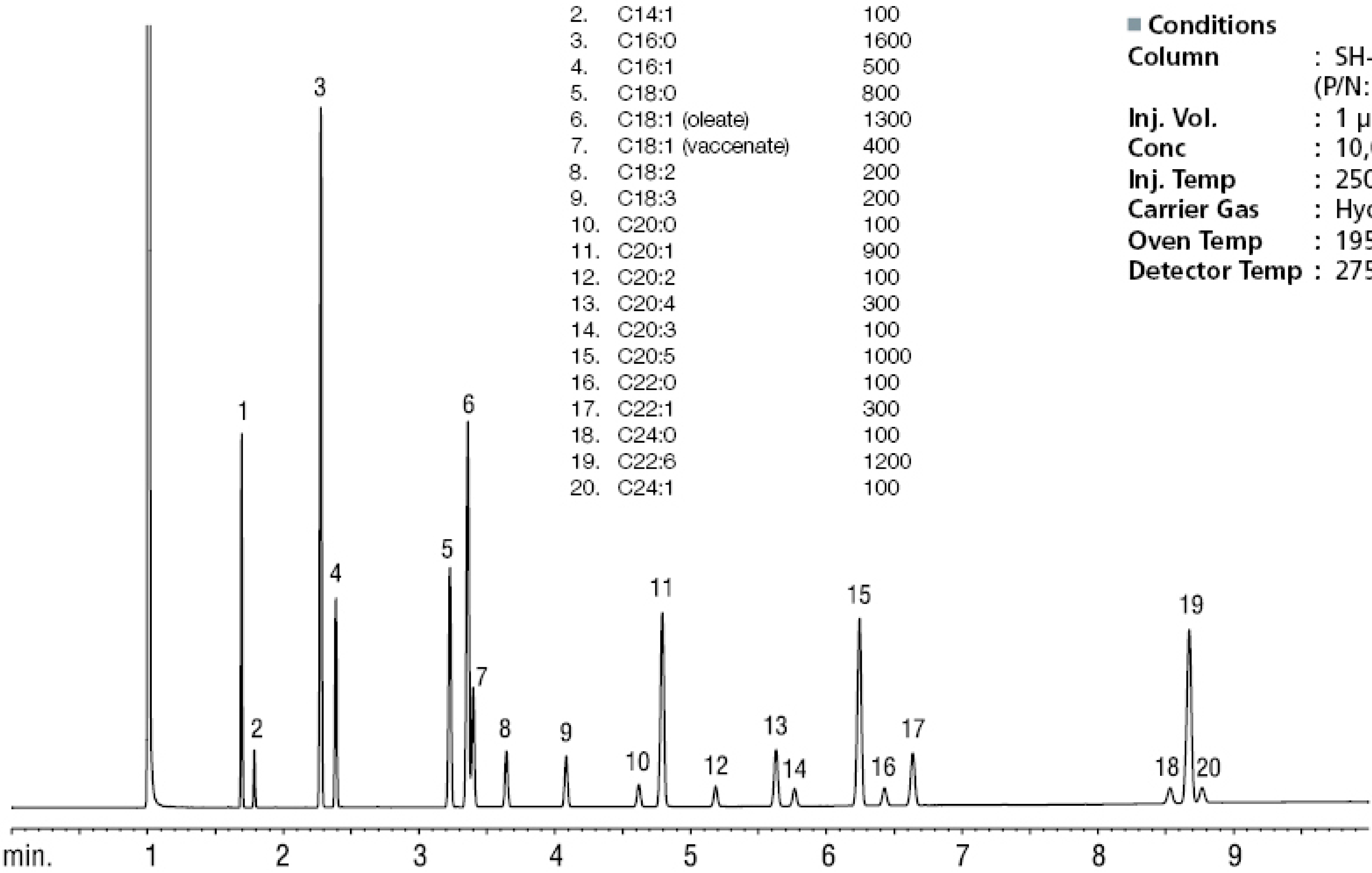
ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	20 to 320/340 °C	227-36324-01
0.32 mm	0.25 µm	20 to 320/340 °C	227-36270-01

FAMEs (Marine Oil Standard)

Peaks		Conc. (µg/mL)
1.	C14:0	600
2.	C14:1	100
3.	C16:0	1600
4.	C16:1	500
5.	C18:0	800
6.	C18:1 (oleate)	1300
7.	C18:1 (vaccenate)	400
8.	C18:2	200
9.	C18:3	200
10.	C20:0	100
11.	C20:1	900
12.	C20:2	100
13.	C20:4	300
14.	C20:3	100
15.	C20:5	1000
16.	C22:0	100
17.	C22:1	300
18.	C24:0	100
19.	C22:6	1200
20.	C24:1	100

Conditions

Column	: SH-FAME, 30 m, 0.32 mm ID, 0.25 µm (P/N: 227-36270-01)
Inj. Vol.	: 1 µL split (split ratio: 100:1)
Conc	: 10,000 µg/mL in isooctane (total FAMEOs)
Inj. Temp	: 250 °C
Carrier Gas	: Hydrogen, constant flow rate 3 mL/min
Oven Temp	: 195 - 240 °C at 5 °C/min (hold 1 min)
Detector Temp	: 275 °C



SH-Volatil Amin

- Unique selectivity for baseline resolution of all volatile amines.
- Excellent inertness assures accuracy and sensitivity for volatile amines, including free ammonia.
- Highly robust phase withstands repeated water injections, resulting in longer column lifetime.
- High temperature stability (290 °C) ensures elution of amines up to C16 and allows contaminants to be removed by "baking out" the column.
- Similar Phase(s): CP-Volamine

ID	Temp. Range	30 m	60 m
0.32 mm	40 to 370 °C	227-36326-01	227-36326-02

SH-5 Amine / SH-35 Amine

- Dedicated columns for amines and other basic compounds, including alkylamines, diamines, triamines, ethanolamines, and nitrogen-containing heterocyclics.

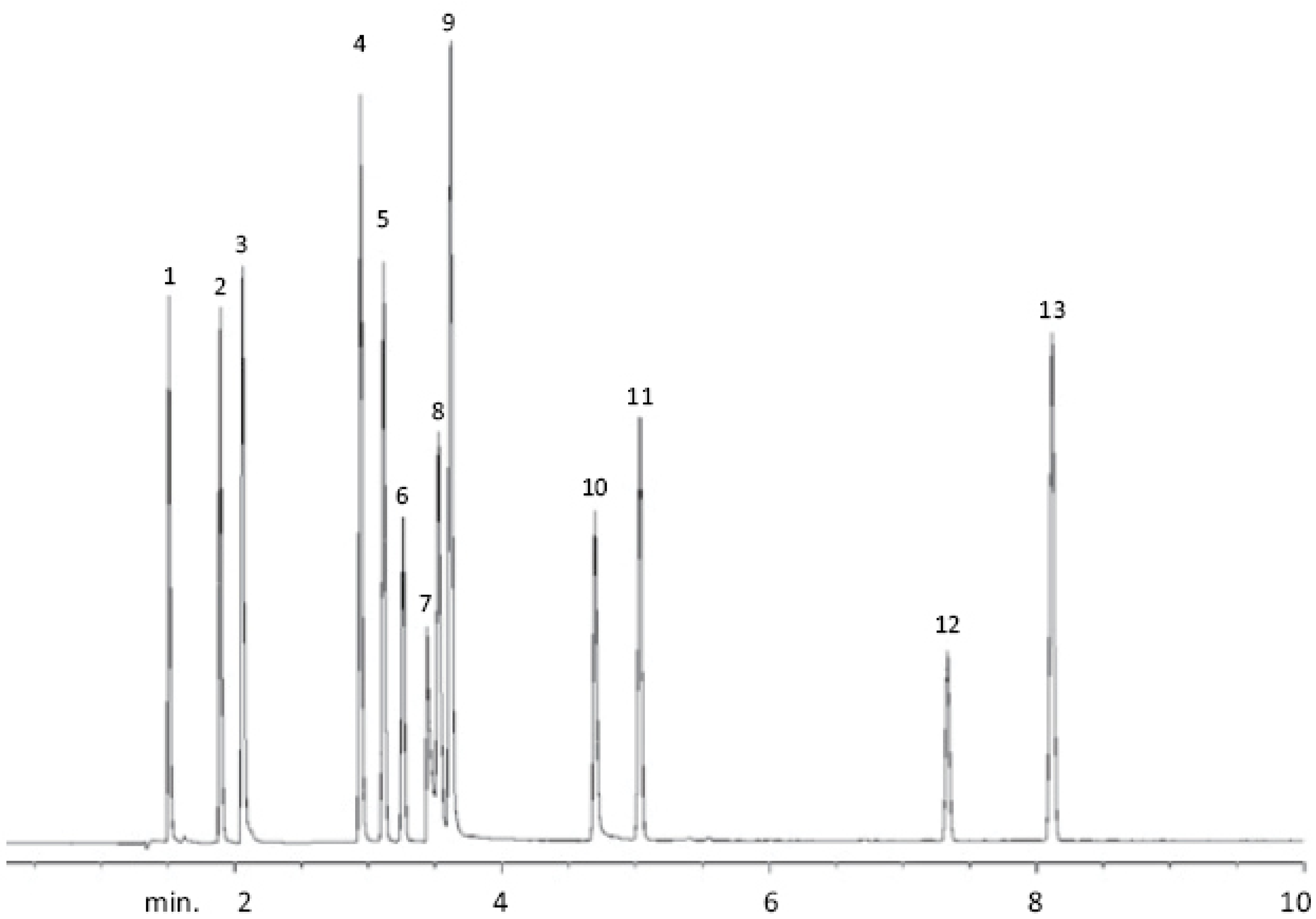
SH-5 Amine (Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane)

ID	df	Temp. Range	15 m	30 m
0.25 mm	0.25 µm	-60 to 300/315 °C	-	227-36282-01
	0.50 µm	-60 to 300/315 °C	227-36323-01	227-36283-01
	1.00 µm	-60 to 300/315 °C	227-36323-02	227-36284-01
0.32 mm	1.00 µm	-60 to 300/315 °C	-	227-36332-02
	1.50 µm	-60 to 290/305 °C	-	227-36285-01
0.53 mm	1.00 µm	-60 to 290/305 °C	-	227-36286-01
	3.00 µm	-60 to 280/295 °C	-	227-36287-01

SH-35 Amine (Mid-polarity phase: Crossbond™ 35% diphenyl / 65% dimethyl polysiloxane)

ID	df	Temp. Range	30 m
0.25 mm	0.50 µm	0 to 220 °C	227-36288-01
	1.00 µm	0 to 220 °C	227-36289-01
0.32 mm	1.00 µm	0 to 220 °C	227-36290-01
	1.50 µm	0 to 220 °C	227-36291-01
0.53 mm	1.00 µm	0 to 220 °C	227-36292-01
	3.00 µm	0 to 220 °C	227-36293-01

Amines & Phenols



Peaks

1. diethylamine
2. pyridine
3. morpholine
4. phenol
5. aniline
6. 2-chlorophenol
7. diethylenetriamine
8. octylamine
9. 1-methyl-2-pyrrolidinone
10. 2-nitrophenol
11. 2,6-dimethylaniline
12. nicotine
13. 2-nitroaniline

Conditions

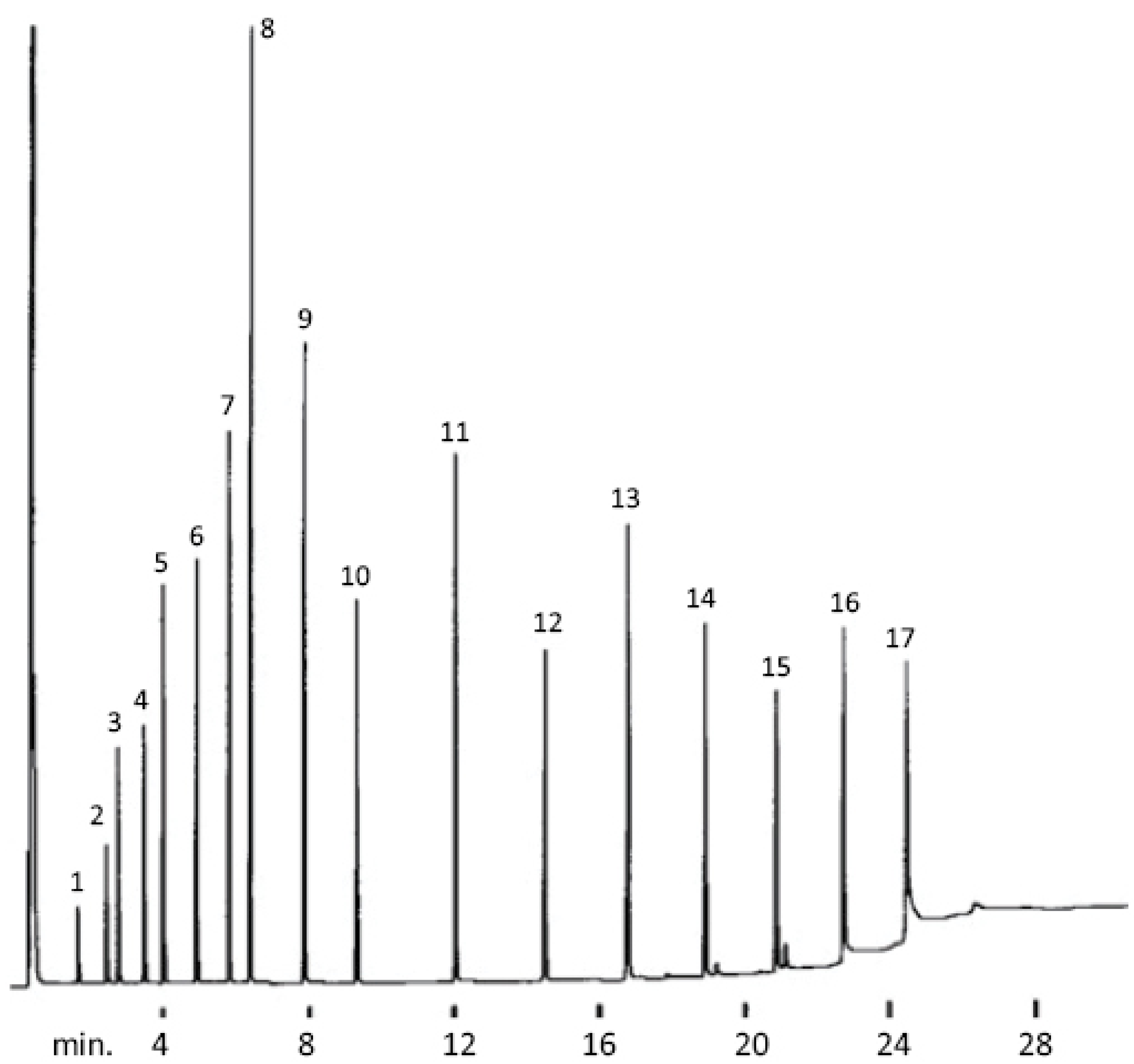
Column	: SH-5 Amine, 30 m, 0.32 mm ID, 1.00 µm (P/N: 227-36290-01)
Inj. Vol.	: 1 µL split injection of miscellaneous amines and phenols in water (split ratio: 25:1)
On-column conc.	: 22 ng
Inj. Temp	: 305 °C
Oven Temp	: 120 °C to 220 °C at 10 °C/min
Carrier Gas	: Hydrogen, linear velocity 38cm/sec. set at 120 °C
Detector Temp	: 305 °C
FID sensitivity	: 6.4×10^{-11} AFS

SH-PolarD

- Polar phase: Crossbond™ acid-deactivated Carbowax™ polyethylene glycol
- Dedicated columns for free (underivatized) acids, some inorganic acids.
- Resistant to oxidative damage.
- Equivalent to USP G25 and G35 phases.
- Similar phases: HP-FFAP, DB-FFAP, VF-DA, CP-Wax 58 CB, CP-FFAP CB, Nukol

ID	df	Temp. Range	30 m	60 m
0.25 mm	0.10 µm	40 to 250/260 °C	227-36271-01	–
	0.25 µm	40 to 250/260 °C	221-75981-30	227-36272-01
	0.50 µm	40 to 250/260 °C	227-36273-01	227-36273-02
0.32 mm	0.10 µm	40 to 250/260 °C	227-36274-01	–
	0.25 µm	40 to 250/260 °C	227-36321-02	227-36275-01
	0.50 µm	40 to 250/260 °C	227-36322-02	227-36276-01
	1.00 µm	40 to 240/250 °C	227-36277-01	227-36277-02
0.53 mm	0.25 µm	40 to 250/260 °C	227-36278-01	227-36278-02
	0.50 µm	40 to 250/260 °C	227-36279-01	227-36279-02
	1.00 µm	40 to 240/250 °C	227-36280-01	227-36280-02
	1.50 µm	40 to 230/240 °C	227-36281-01	227-36281-02

Organic Acids (Free Fatty Acids)



Peaks

1. acetic acid
2. propionic acid
3. isobutyric acid
4. n-butyric acid
5. isovaleric acid
6. n-valeric acid
7. isocaproic acid
8. caproic acid
9. heptanoic acid
10. caprylic acid
11. capric acid
12. lauric acid
13. myristic acid
14. palmitic acid
15. stearic acid
16. arachidic acid
17. behenic acid

Conditions

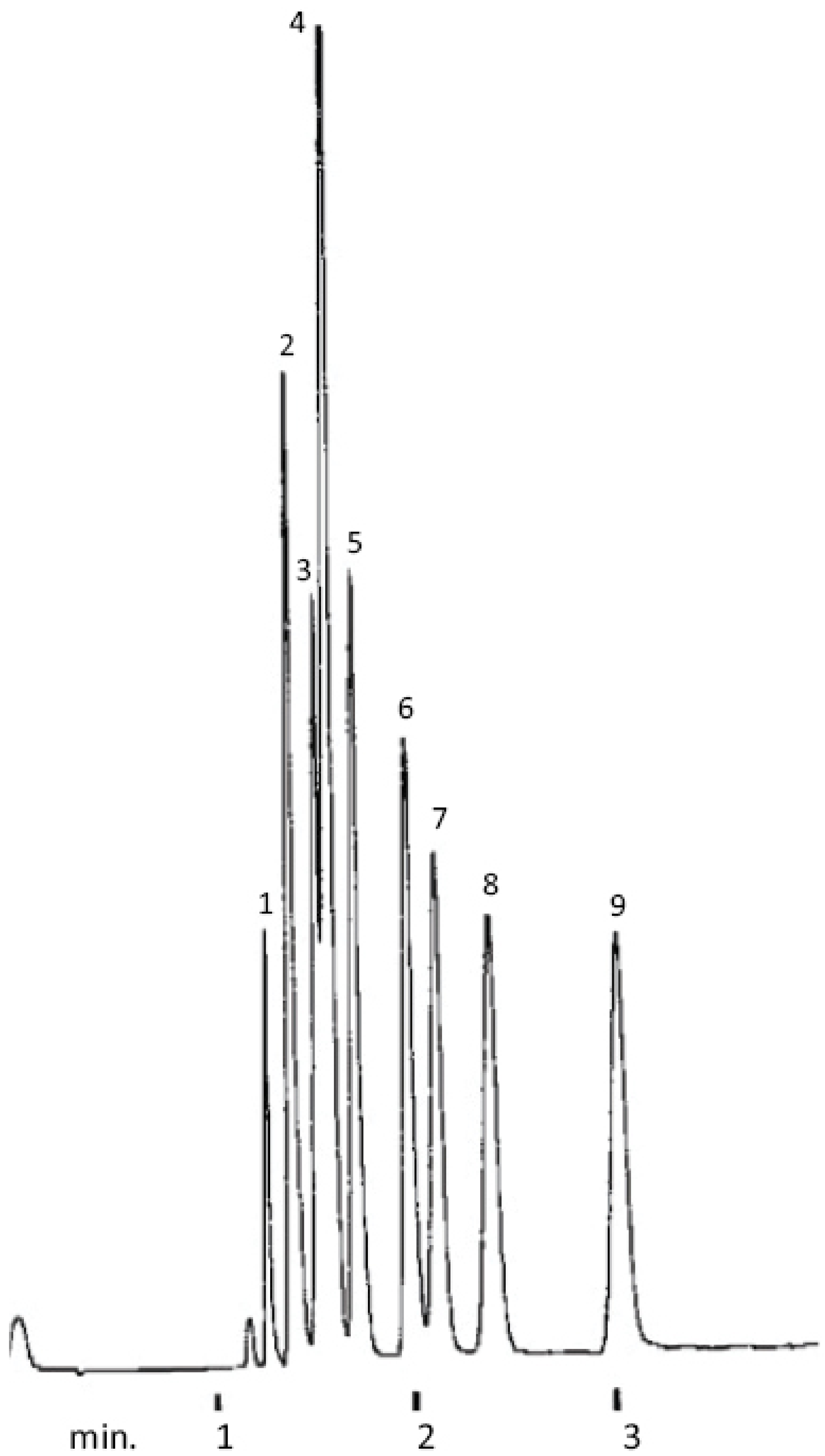
Column : SH-PolarD, 30 m, 0.53 mm ID, 0.25 µm (P/N: 227-36278-01)
Sample : free acid standard Conc.: 25 ng/µL.
Inj. Vol. : 0.3 µL direct
Inj. Temp : 280 °C
Oven Temp : 100 °C (hold 2 min) to 280 °C at 8 °C/min, (hold 10 min)
Carrier Gas : Hydrogen, flow rate 10 cc/min, linear velocity 80 cm/sec.
Detector : FID, 280 °C

SH-PolarX

- Polar phase: Crossbond™ base-deactivated Carbowax™ polyethylene glycol
- Dedicated columns for underivatized amines and other basic compounds, including alkylamines, diamines, triamines, nitrogen-containing heterocyclics. No need for column priming.
- Similar phases: CAM, CP-Wax 51 for Amines, Carbowax Amine

ID	df	Temp. Range	30 m	60 m
0.25 mm	0.25 µm	40 to 210/220 °C	227-36294-01	–
	0.50 µm	40 to 210/220 °C	227-36295-01	–
0.32 mm	0.25 µm	40 to 210/220 °C	227-36296-01	227-36296-02
	0.50 µm	40 to 210/220 °C	227-36297-01	–
	1.00 µm	40 to 210/220 °C	227-36298-01	–
0.53 mm	0.50 µm	40 to 210/220 °C	227-36299-01	–
	1.00 µm	40 to 210/220 °C	227-36300-01	227-36300-02

Amines (low MW)



Peaks

1. trimethylamine
2. dimethylamine
3. ethylamine
4. methylamine
5. isopropylamine
6. n-propylamine
7. tert-butylamine
8. diethylamine
9. sec-butylamine

Conditions

Column : SH-PolarX, 30 m, 0.53 mm ID, 1.00 µm (P/N: 227-36300-01)
Inj. Vol. : 1 µL direct injection of amines in water
Inj. Temp : 250 °C
Carrier Gas : Hydrogen, flow rate 5 cc/min, linear velocity 40 cm/sec.
Oven Temp : 45 °C
Detector : FID, 250 °C

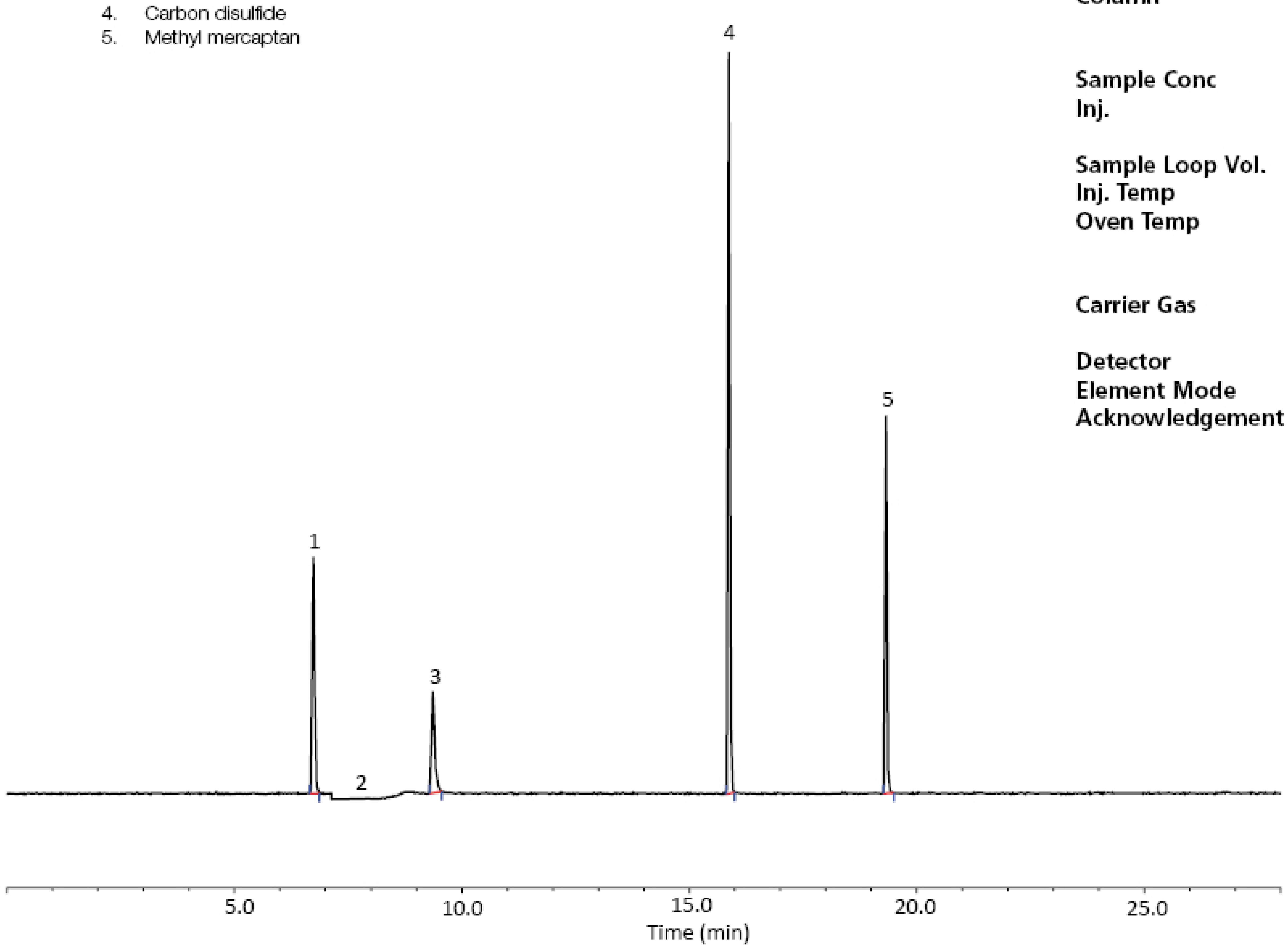
SH-Silica BOND

- Bonded silica stationary phase minimizes impact of water, resulting in reproducible retention times for water-containing samples.
- Versatile column ideal for analysis of light hydrocarbons, sulfur gases, halocarbons, and carbon dioxide.
- Individually QC tested with sensitive C4 probes to ensure consistent selectivity.
- Proprietary manufacturing process practically eliminates particle release, reducing downtime due to obstructed FID jets.
- Similar phases: GS-GASPRO, CP-SilicaPLOT

ID	Temp. Range	30 m
0.32 mm	-80 to 260 °C	227-36620-02

Sulfur Compounds in Propane

Peaks
1. Carbonyl sulfide
2. Propane
3. Hydrogen sulfide
4. Carbon disulfide
5. Methyl mercaptan



Conditions

Column	:	SH-Silica BOND, 30 m, 0.32 mm ID (P/N: 227-36620-02)
Sample Conc	:	6 ppm in 100% propane
Inj.	:	Sample valve, split (split flow: 40 mL/min)
Sample Loop Vol.	:	250 µL
Inj. Temp	:	250 °C
Oven Temp	:	35 °C (hold 8 min) to 200 °C at 10 °C/min (hold 5 min)
Carrier Gas	:	He, constant flow rate 2 mL/min
Detector	:	PFPD, 250 °C
Element Mode	:	sulfur
Acknowledgement	:	Chromatogram courtesy of Brix and Joeri Vercammen (Global Analyser Solutions, Belgium)

Trap columns for adhering dislodged particles from PLOT columns are also available.
Please refer to page C-45.

SH-Alumina BOND

- The reactivity of the aluminum oxide stationary phase is minimized to improve column response for polar unsaturates, such as dienes, and the column's sensitivity (or response) ensures linear and quantitative chromatographic analysis for these compounds.
- Highly selective for C1–C5 hydrocarbons
- Separate all saturated and unsaturated hydrocarbon isomers above ambient temperatures.

SH-Alumina BOND/Na_2SO_4

- Na_2SO_4 deactivation
- Acetylene and propadiene elute after butanes.
- Best separation for butene isomers (impurities in butene streams).
- Methyl acetylene elutes after 1,3-butadiene.
- Cyclopropane (impurity in propylene) elutes well before propylene.
- Similar phases: GS-ALUMINA, CP-Al2O3/Na2SO4, Alumina sulfate PLOT

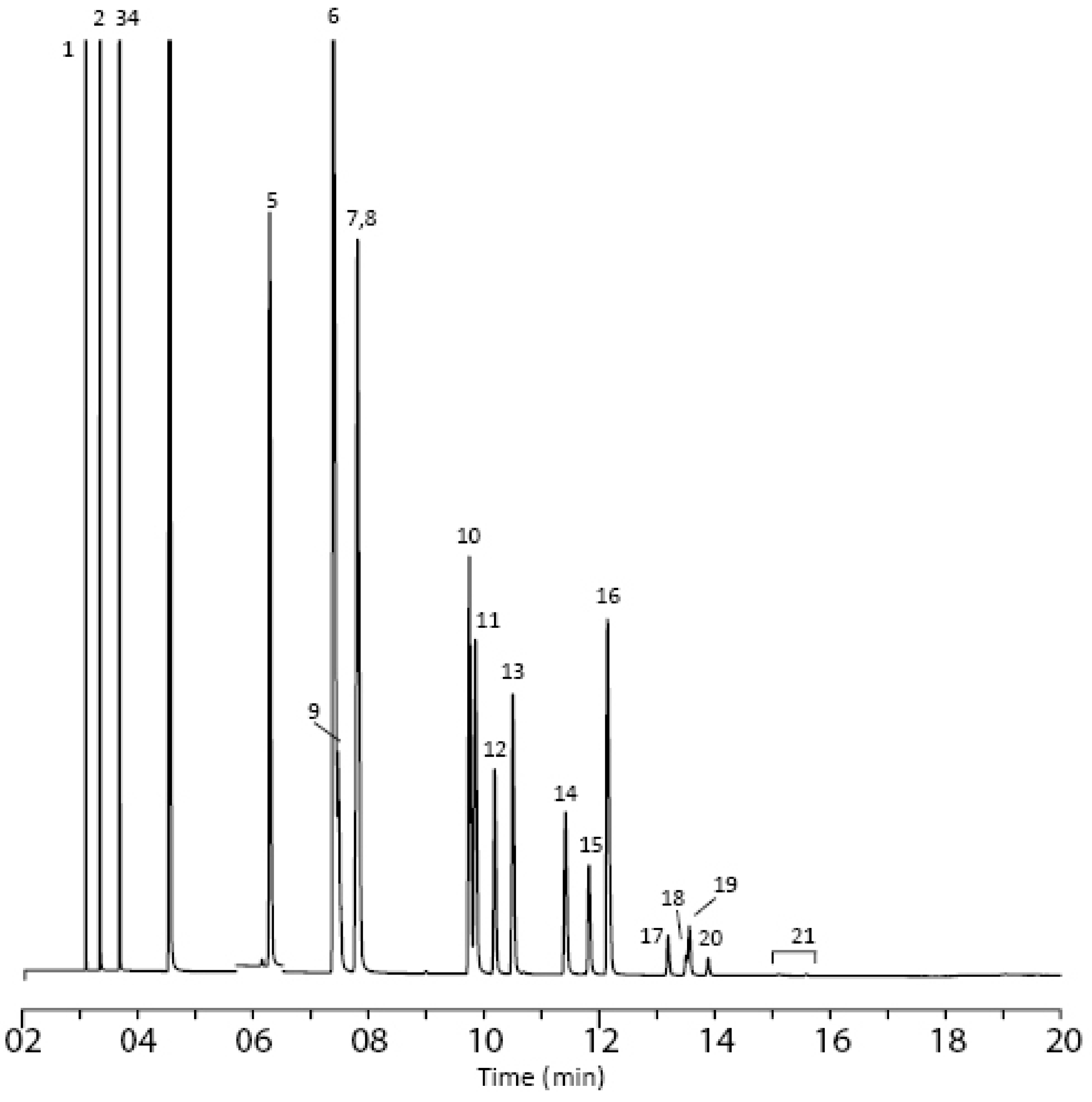
ID	df	Temp. Range	30 m
0.32 mm	5 µm	to 200 °C	227-36328-01
0.53 mm	10 µm	to 200 °C	227-36316-01
ID	df	Temp. Range	50 m
0.53 mm	10 µm	to 200 °C	227-36301-01

SH-Alumina BOND/KCL

- KCl deactivation
- Lowest polarity alumina column in Shimadzu PLOT columns.
- Low moisture sensitivity reduces the need for frequent regeneration.
- Acetylene elutes before n-butane.
- Methyl acetylene (impurity in 1,3-butadiene) elutes before 1,3-butadiene.
- Similar phases: GS-Alumina KCl, HP-PLOT Al2O3 KCl, CP-Al2O3/KCl, Alumina chloride PLOT

ID	df	Temp. Range	50 m
0.53 mm	10 µm	to 200 °C	221-76139-50

Refinery Gas



Peaks

1. methane
2. ethane
3. ethylene
4. propane
5. propylene
6. isobutane
7. n-butane
8. propadiene
9. acetylene
10. trans-2-butene
11. 1-butene
12. isobutylene
13. cis-2-butene
14. isopentane
15. n-pentane
16. 1,3-butadiene
17. trans-2-pentene
18. 2-methyl-2-butene
19. 1-pentene
20. cis-2-pentene
21. hexanes

Conditions

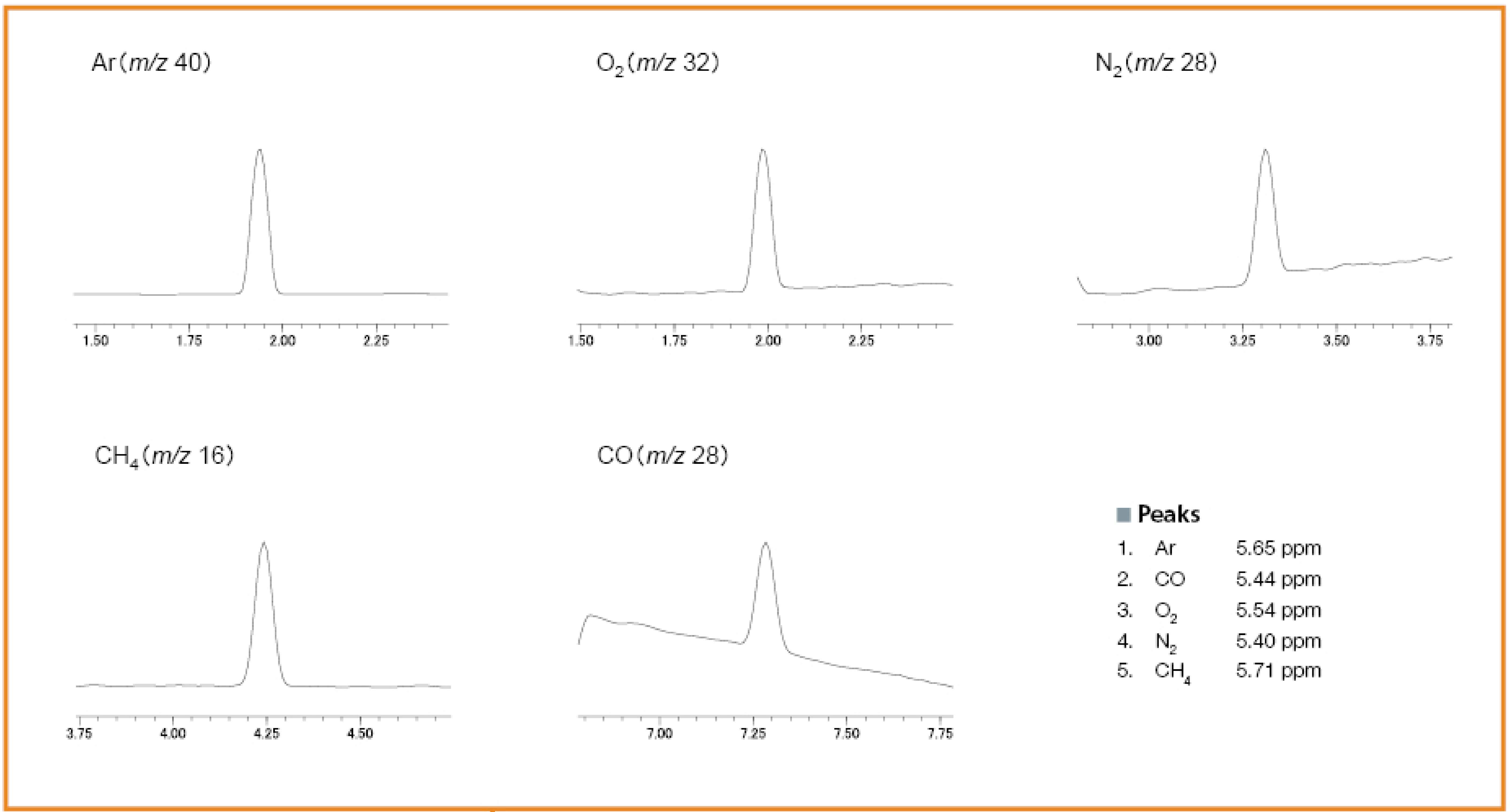
Column	: SH-Alumina BOND/KCL, 50 m, 0.53 mm ID, 10 µm (P/N: 221-76139-50)
Sample	: Refinery gas
Inj. Vol	: 10 µL split (split vent flow 80mL/min)
Inj. Temp	: 200 °C
Oven Temp	: 45 °C (hold 1 min) to 200 °C at 10 °C/min (hold 3.5 min)
Carrier Gas	: Hydrogen, constant pressure, 8.0 psi, linear velocity 74 cm/sec. at 45 °C
Detector	: FID, 200 °C

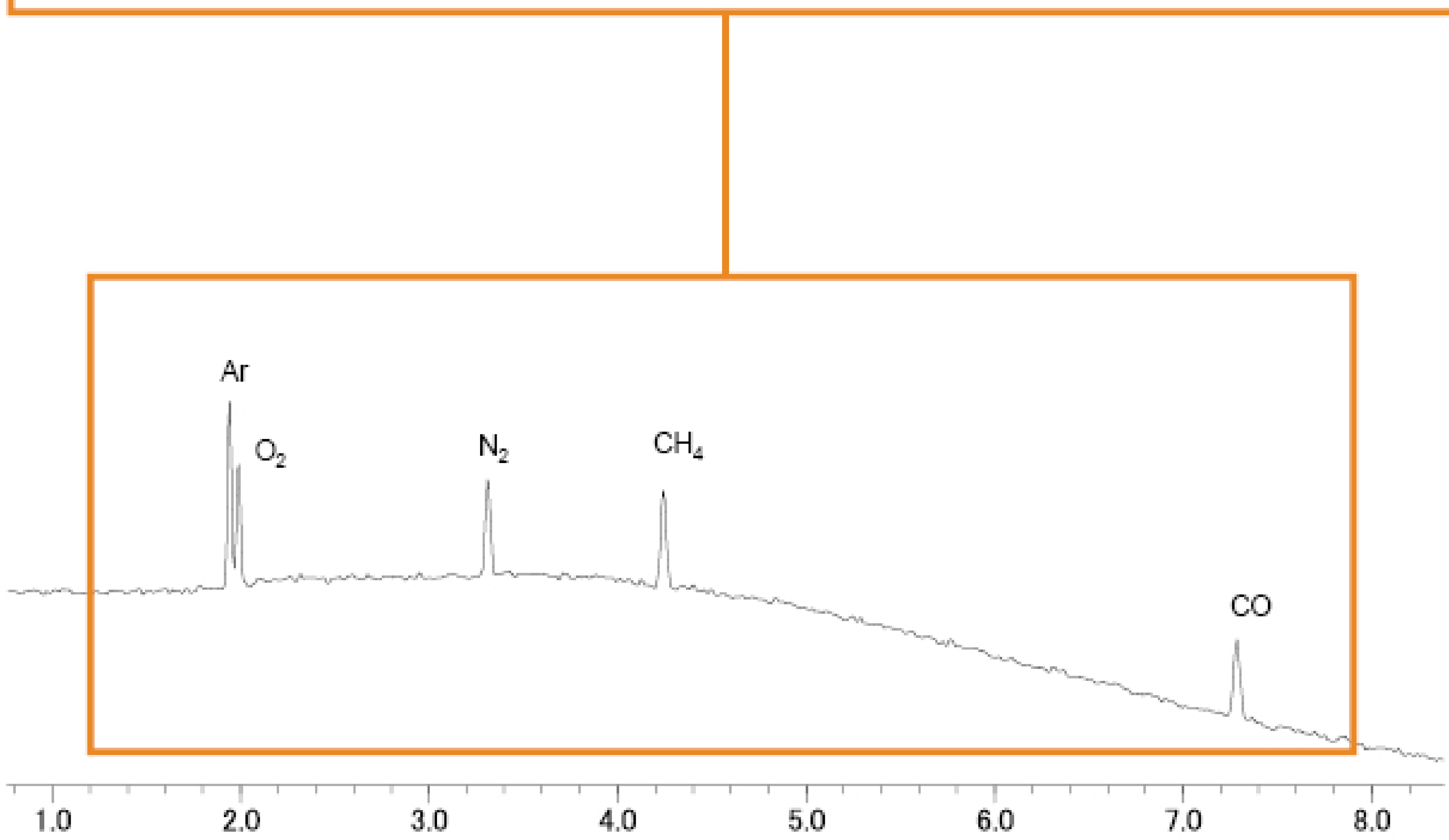
SH-Msieve 5A

- Stationary phase: Molecular sieve 5A
- Easily separate permanent gases at temperatures above ambient.
- Improve accuracy with sharp, symmetrical peaks for argon, oxygen, and carbon monoxide.
- Similar phases: HP-PLOT Molesieve, CP-Molsieve 5A, Molsieve 5A PLOT

ID	df	Temp. Range	30 m
0.32 mm	30 µm	to 300 °C	227-36611-02
0.53 mm	50 µm	to 300 °C	221-75763-30

Analysis of Inorganic Gas





Conditions

Instrument	:	GCMS-QP2010 Ultra
Column	:	SH-Msieve 5A, 30 m, 0.32 mm ID, 30 µm (P/N: 227-36611-02)
Sample injection	:	Gas sampler (1 mL loop volume) (P/N: 223-57653-91)
Inj. Mode	:	Split (split ratio: 50:1)
Inj. Temp	:	200 °C
Control Mode	:	Pressure (100 kPa)
Carrier Gas	:	Helium
Oven Temp	:	35 °C (hold 2 min) to 150°C at 10°C/min (hold 5 min)
Detector	:	MS Interface Temp: 200 °C Ion Source Temp: 200 °C Measurement Mode: Scan (m/z 10 to100) Event Time: 0.5 sec Ionization Method: EI Emission Current:150 µA

SH-Q-BOND PLOT

- Non-polar PLOT column incorporating 100% divinylbenzene
- Excellent for analysis of C1 to C3 hydrocarbons as well as isomers and alkanes up to C12
- High retention for CO2 simplifies gas analysis; CO2 and methane separated from O2/N2/CO. (Note: O2/N2/CO not separated at ambient temperature.)
- Use for analysis of oxygenated compounds and solvents.
- Similar phases: HP-PLOT Q, CP-PoraPLOT Q, CP-PoraBOND Q, Supel-Q PLOT

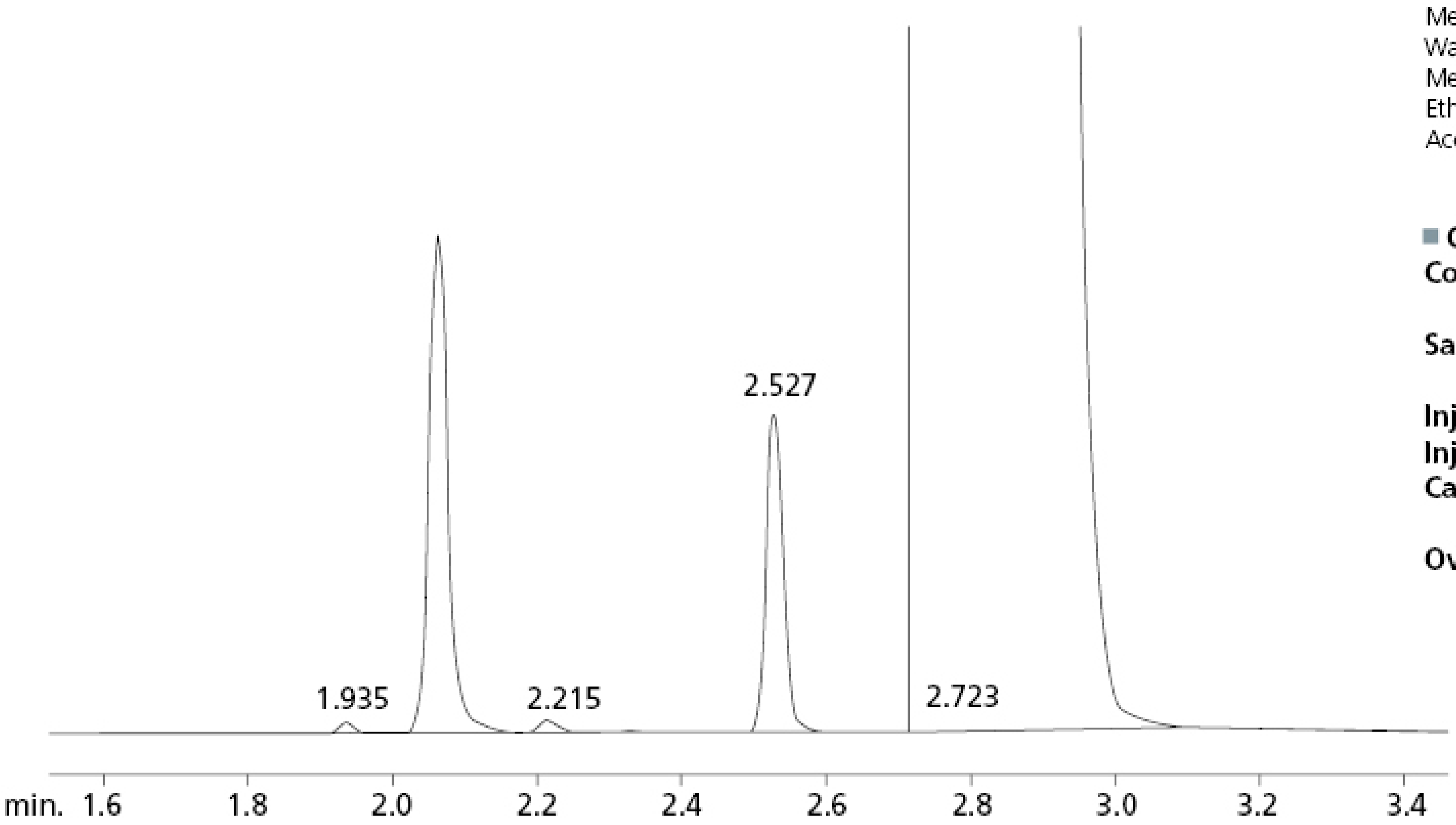
ID	df	Temp. Range	30 m
0.32 mm	10 µm	to 280/300 °C	221-75764-30
0.53 mm	20 µm	to 280/300 °C	221-75765-30

SH-U-BOND PLOT

- Polar PLOT column, incorporating divinylbenzene ethylene glycol / dimethylacrylate.
- Highest polarity porous polymer column in Shimadzu PLOT columns.
- Highly inert for the analysis of polar and nonpolar compounds.
- Ideal for trace H2S, COS, and mercaptans in hydrocarbon streams.
- Similar phases: HP-PLOT U, CP-PoraPLOT U, CP-PoraBOND U

ID	df	Temp. Range	30 m
0.32 mm	10 µm	to 190 °C	227-36327-01
0.53 mm	20 µm	to 190 °C	227-36302-01

Water and Ethanol in Acetone



Peaks	Ret. Time
Methane	1.935
Water	2.063
Methanol	2.215
Ethanol	2.527
Acetone	2.723

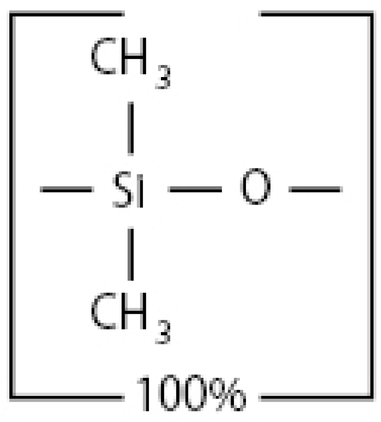
Conditions

Column	: SH-Q-BOND PLOT, 30 m, 0.53 mm ID, 20 µm (P/N: 221-75765-30)
Sample	: 0.5% water and ethanol in acetone
Inj. Vol	: 3 µL split (split ratio 11:1)
Inj. Temp	: 250 °C
Carrier Gas	: He, constant flow, linear velocity 28.7 cm/sec. @ 200 °C
Oven Temp	: 200 °C, isothermal

SH-MetalX-1

- Non-polar phase: Crossbond™ 100% dimethyl polysiloxane
- General-purpose columns for solvent impurities, PCB congeners (e.g., Aroclor mixes), gases, natural gas odorants, sulfur compounds, essential oils, hydrocarbons, semivolatiles, pesticides, and oxygenates.
- Equivalent to USP G1, G2, G38 phases.
- 4.5" standard coil diameter.
- Similar phases: DB-PS1, UAC-1

SH-MetalX-1 Structure

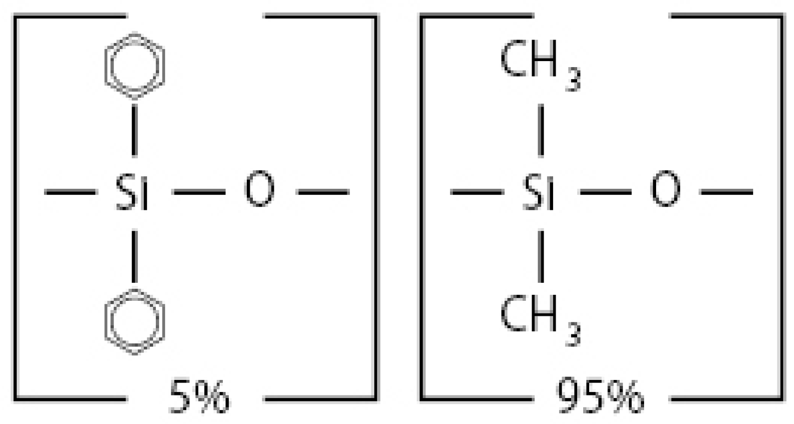


ID	df	Temp. Range	15 m
0.10 mm	0.25 µm	-60 to 430 °C	227-36318-01
0.28 mm	0.10 µm	-60 to 430 °C	221-75734-15

SH-MetalX-5

- Low-polarity phase: Crossbond™ 5% diphenyl / 95% dimethyl polysiloxane
- General-purpose columns for drugs, solvent impurities, pesticides, hydrocarbons, PCB congeners (e.g., Aroclor mixes), essential oils, and semivolatiles.
- Equivalent to USP G27 and G36 phase
- 4.5" standard coil diameter.
- Similar phases: DB-PS5, VF-5ht UltiMeta

SH-MetalX-5 Structure



ID	df	Temp. Range	30 m
0.25 mm	0.25 µm	-60 to 430 °C	221-75743-30

SH-MetalX-1701 (Siltek-treated stainless steel)

- Midpolarity Crossbond phase
- General-purpose columns for alcohols, oxygenates, PCB congeners (e.g., Aroclor mixes), and pesticides.
- Equivalent to USP G46 phase.
- 4.5" standard coil diameter.
- Similar Phase(s): DB-PS1701

ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	-20 to 260 °C	227-36334-01

SH-MetalX-WAX (Siltek-treated stainless steel)

- Polar phase; Crossbond Carbowax polyethylene glycol—provides oxidation resistance
- General-purpose columns for FAMEs, flavor compounds, essential oils, amines, solvents, xylene isomers, and U.S. EPA Method 603 (acrolein/acrylonitrile).
- Equivalent to USP G14, G15, G16, G20, and G39 phases.
- 4.5" standard coil diameter.
- Similar Phase(s): DB-PSWAX, UAC-CW

ID	df	Temp. Range	15 m
0.53 mm	1.00 µm	40 to 240/250 °C	227-36335-01

SH-MetalX Biodiesel TG Column (Siltek-treated stainless steel)

- Fast analysis times and sharp mono-, di-, and triglyceride peaks
- Stable at 430 °C for reliable, consistent performance

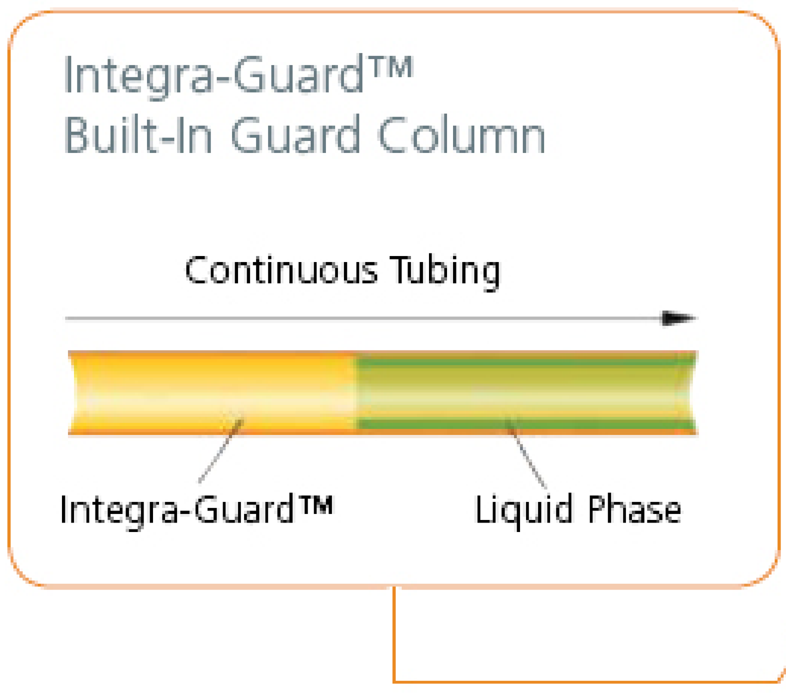
ID	df	Temp. Range	14 m
0.53 mm	0.16 µm	-60 to 430 °C	227-36315-01

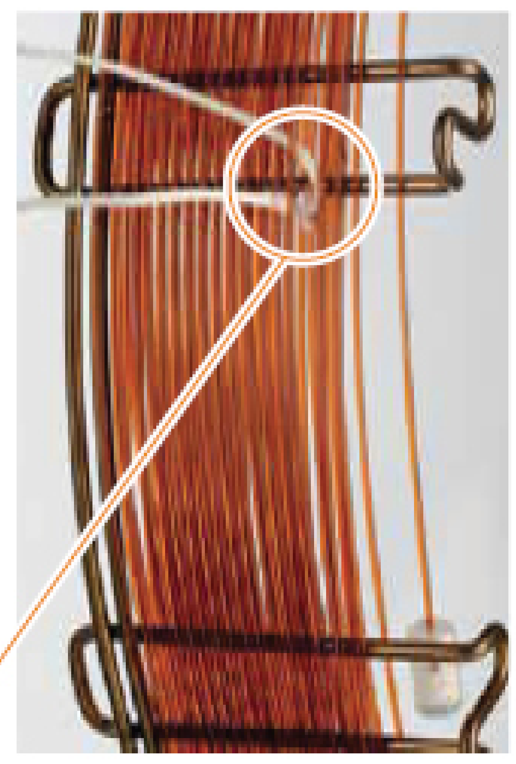
Capillary Columns

Guard Columns

Integra-Guard Columns

- No leaks for a more robust method.
- No column connections for easier, faster maintenance.
- No peak distortions due to connector dead volume and thermal capacity.





String indicates where the analytical column begins

Column	ID	df	Length	With 5 m Integra-Guard™	With 10 m Integra-Guard™
SH-I-5Sil MS	0.25 mm	0.25 µm	30 m	221-76161-30	221-76162-30
SH-1	0.25 mm	0.25 µm	30 m	221-75719-31	–
	0.53 mm	1.00 µm	30 m	221-75731-31	–
	0.53 mm	1.50 µm	30 m	227-36333-01	–
	0.53 mm	5.00 µm	30 m	221-75734-31	–
SH-5	0.25 mm	0.25 µm	30 m	221-76153-05	221-76153-30
	0.25 mm	1.00 µm	30 m	221-76179-30	–
	0.32 mm	0.25 µm	30 m	221-76177-30	–
	0.32 mm	0.25 µm	60 m	221-76177-60	–
	0.32 mm	1.00 µm	30 m	221-76180-30	–
	0.53 mm	5.00 µm	30 m	221-76154-35	–
SH-5MS	0.25 mm	0.10 µm	30 m	221-76189-30	–
	0.25 mm	0.25 µm	15 m	221-75861-15	–
	0.25 mm	0.25 µm	30 m	221-75861-05	221-75861-10
	0.32 mm	0.25 µm	30 m	221-76190-30	–
SH-1301	0.53 mm	3.00 µm	30 m	221-76164-35	–
SH-624	0.25 mm	1.40 µm	30 m	221-76183-30	–
	0.32 mm	1.80 µm	30 m	221-76157-35	–
	0.53 mm	3.00 µm	30 m	221-76158-30	–
SH-1701	0.25 mm	0.25 µm	30 m	221-76185-30	–

SH-I Guard / Retention Gap Columns

- Extend column lifetime.
- Excellent inertness—obtain lower detection limits for active compounds.
- Sharper chromatographic peaks by utilizing retention gap technology.
- Maximum temperature: 360 °C.

ID	5 m	10 m
0.25 mm	227-36303-01	227-36304-01
0.32 mm	227-36305-01	227-36306-01
0.53 mm	227-36307-01	227-36308-01

SH IP Guard Column

- Tested with a comprehensive test mix to ensure high inertness.
- Useful for a wide range of applications.
- Use with most common solvents.
- Maximum temperature: 325 °C.

ID	OD	5 m	10 m
0.25 mm	0.37 mm	227-36320-01	227-36321-03
0.32 mm	0.45 mm	227-36320-02	227-36321-04
0.53 mm	0.69 mm	227-36320-03	227-36321-01

SH-MetalX-Siltek Guard Column

- Useful for a wide range of applications.
- Compatible with most common solvents.
- Specially tested with a Florida TRPH test mix.
- Guard column for most non-polar to intermediate polarity MetalX GC capillary columns.
- Maximum temperature: 325 °C.

ID	10 m
0.53 mm	227-36319-01

SH-Particle Trap (for PLOT columns)

- Includes two Press-Tight® connectors and a 2.5 m column.
- Protects detector and valves; connects between column and detector or valve.
- Eliminates detector spikes and scratches in valve rotors.

Description	P/N
SH-Particle Trap for 0.32 mmID PLOT Columns	227-36800-01
SH-Particle Trap for 0.53 mmID PLOT Columns	227-36800-02

Capillary Columns

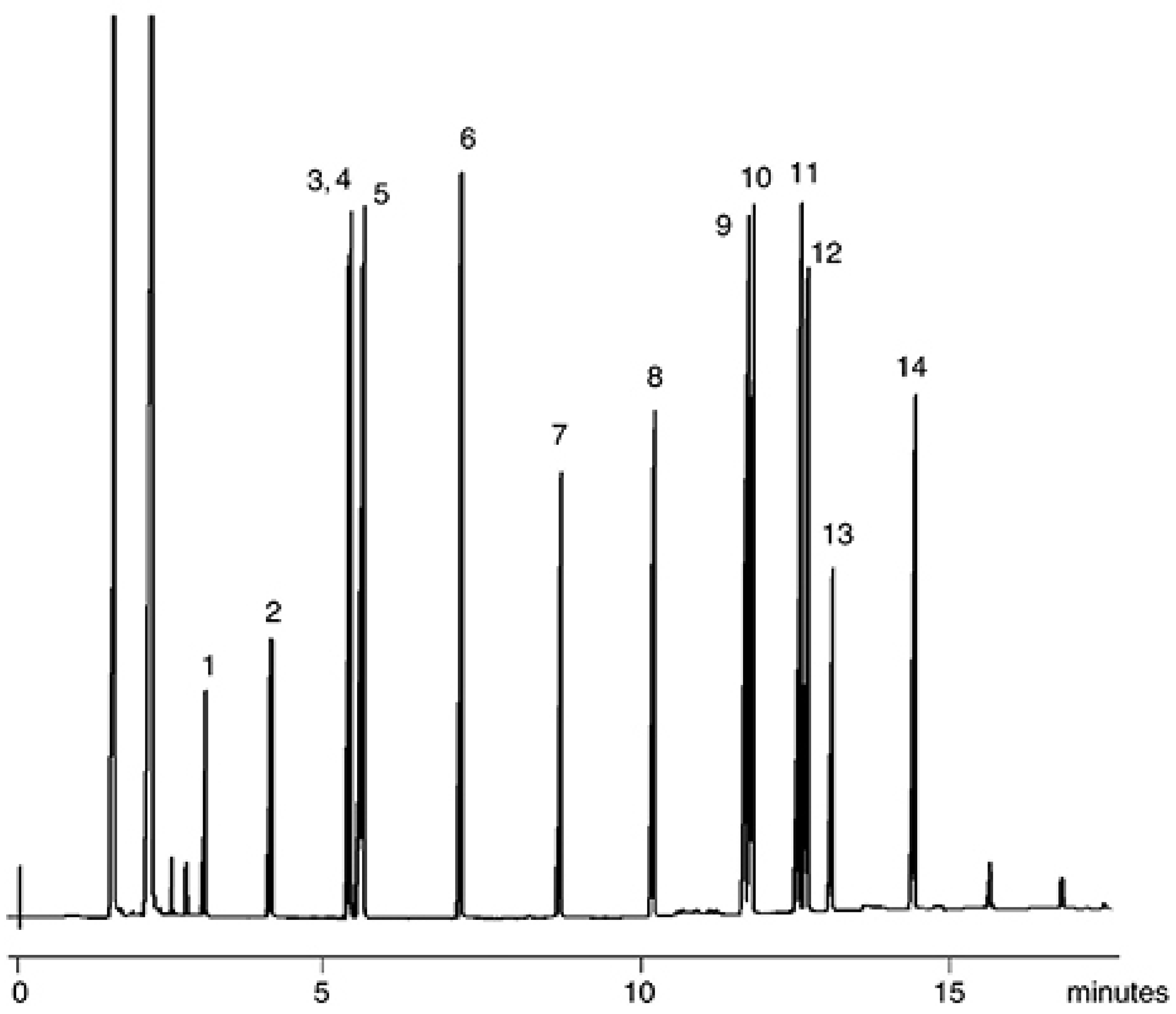
General purpose

CBP-1: 100% Dimethyl Polysiloxane; Classic Crosslinked Dimethyl Polysiloxane Technology

- Excellent general purpose non-polar GC column
- Suitable for all routine analyses
- 320 – 340 °C upper temperature limit – dependent on film thickness

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	-60 to 320/340	221-28635-25
0.22	0.25	50	-60 to 320/340	221-28635-50
0.10	0.1	12	-60 to 320/340	221-28651-12
0.32	0.5	25	-60 to 320/340	221-28639-25
0.32	0.5	50	-60 to 320/340	221-28639-50
0.53	1.0	12	-60 to 320/340	221-28647-12
0.53	1.0	25	-60 to 320/340	221-28647-25
0.53	5.0	12	-60 to 320/340	221-28648-12
0.53	5.0	25	-60 to 320/340	221-28648-25
0.53	5.0	50	-60 to 320/340	221-28648-50

Analysis of Dimethyl Esters of Dicarboxylic Acids on CBP-1



Column : CBP1-M25-025 (M = 0.22 mm ID)
Shimadzu P/N : 221-28635-25

Components

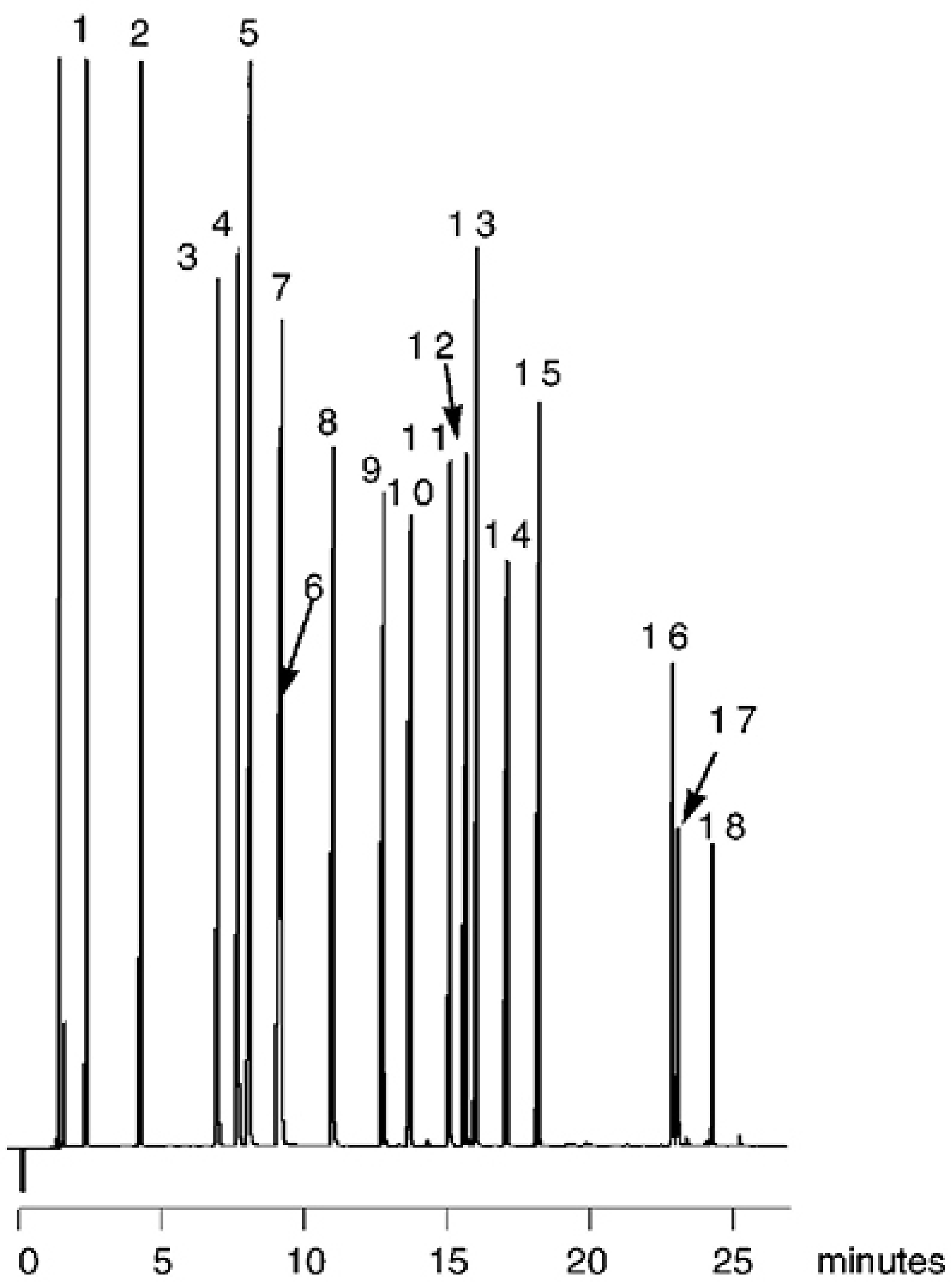
1. Dimethyl Oxalate
2. Dimethyl Malonate
3. Dimethyl Fumarate
4. Dimethyl Succinate
5. Dimethyl Maleate
6. Dimethyl Glutarate
7. Dimethyl Adipate
8. Dimethyl Pimelate
9. Dimethyl Suberate
10. Dimethyl Phthalate
11. Dimethyl Terephthalate
12. Dimethyl iso-Phthalate
13. Dimethyl Azelate
14. Dimethyl Sebacate

CBP-5: 5% phenyl / 95% Dimethyl Polysiloxane

- Ideal general purpose non-polar column
- Excellent inertness
- Good thermal stability

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	-60 to 320/340	221-28636-25
0.22	0.25	50	-60 to 320/340	221-28636-50
0.32	0.5	25	-60 to 320/340	221-28641-25
0.32	0.5	50	-60 to 280/340	221-28641-50

Analysis of Substituted Aromatics on CBP-5



Column : CBP5-M25-025
Shimadzu P/N : 221-28636-25

Components

1. Benzene
2. Toluene
3. Chlorobenzene
4. Ethylbenzene
5. m, p-Xylene
6. o-Xylene
7. Styrene
8. iso Propylbenzene
9. n-Propylbenzene
10. 1,3,5-Trimethylbenzene
11. 1,2,4-Trimethylbenzene
12. m-Dichlorobenzene
13. ec-Butylbenzene, p-Dichlorobenzene
14. o-Dichlorobenzene
15. Butyl-benzene
16. 1,2,4 - Trichlorobenzene
17. Napthalene
18. Hexachlorobutadine

Capillary Columns

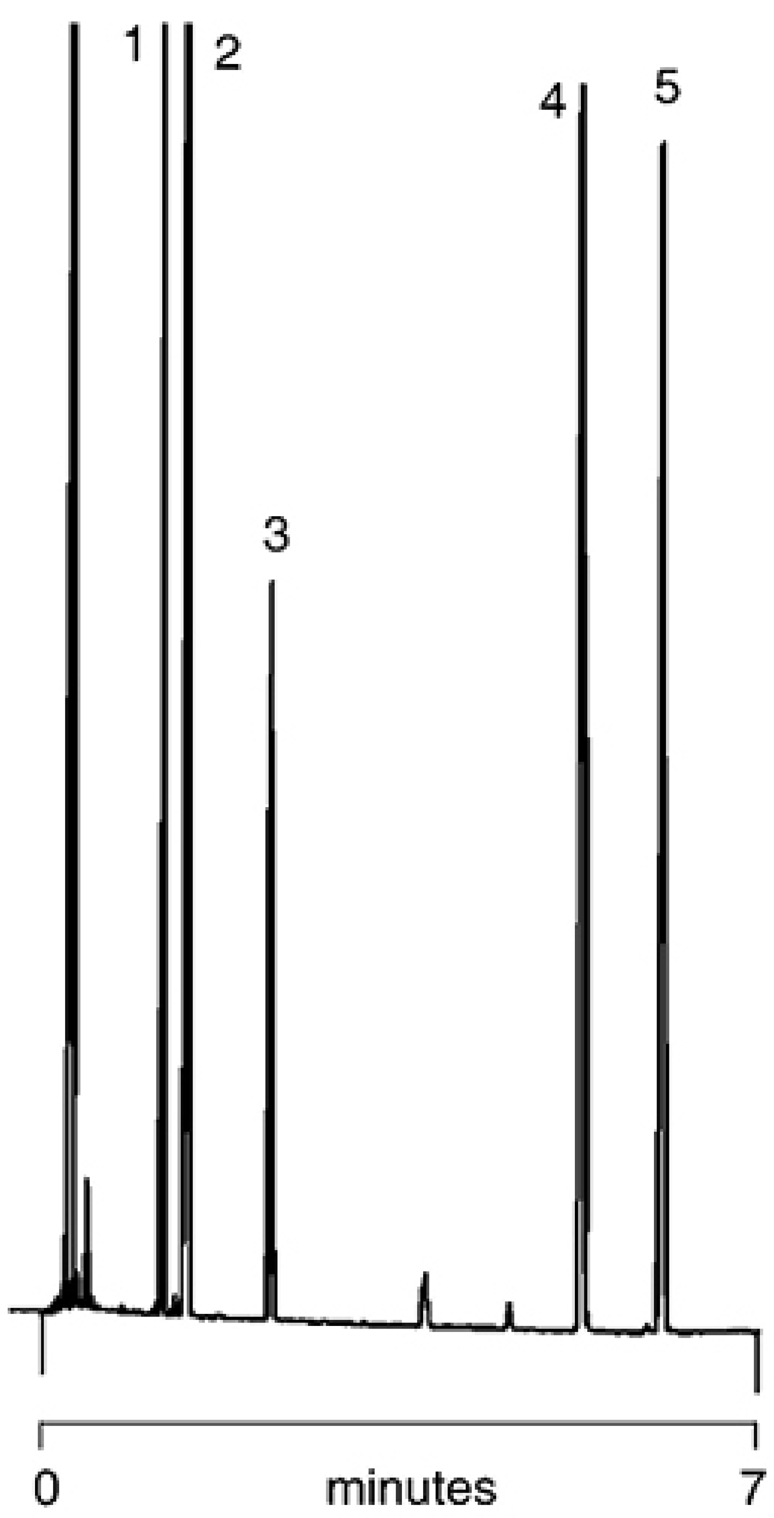
General purpose

CBP-10: 14% Cyanopropylphenyl Polysiloxane

- Used for organochlorine pesticides analysis
- Bonded and crossed-linked
- Able to be solvent rinsed

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.1	0.1	12	-20 to 280/300	221-28652-12
0.22	0.25	25	-20 to 280/300	221-28637-25
0.22	0.25	50	-20 to 280/300	221-28637-50
0.32	0.50	25	-20 to 280/300	221-28643-25
0.32	0.50	50	-20 to 280/300	221-28643-50
0.53	1.0	12	-20 to 260/280	221-28649-12
0.53	1.0	25	-20 to 260/280	221-28649-25

Analysis of Haloethers on CBP-10



Column : CBP10-W12-100
Shimadzu P/N : 221-28649-12

Components

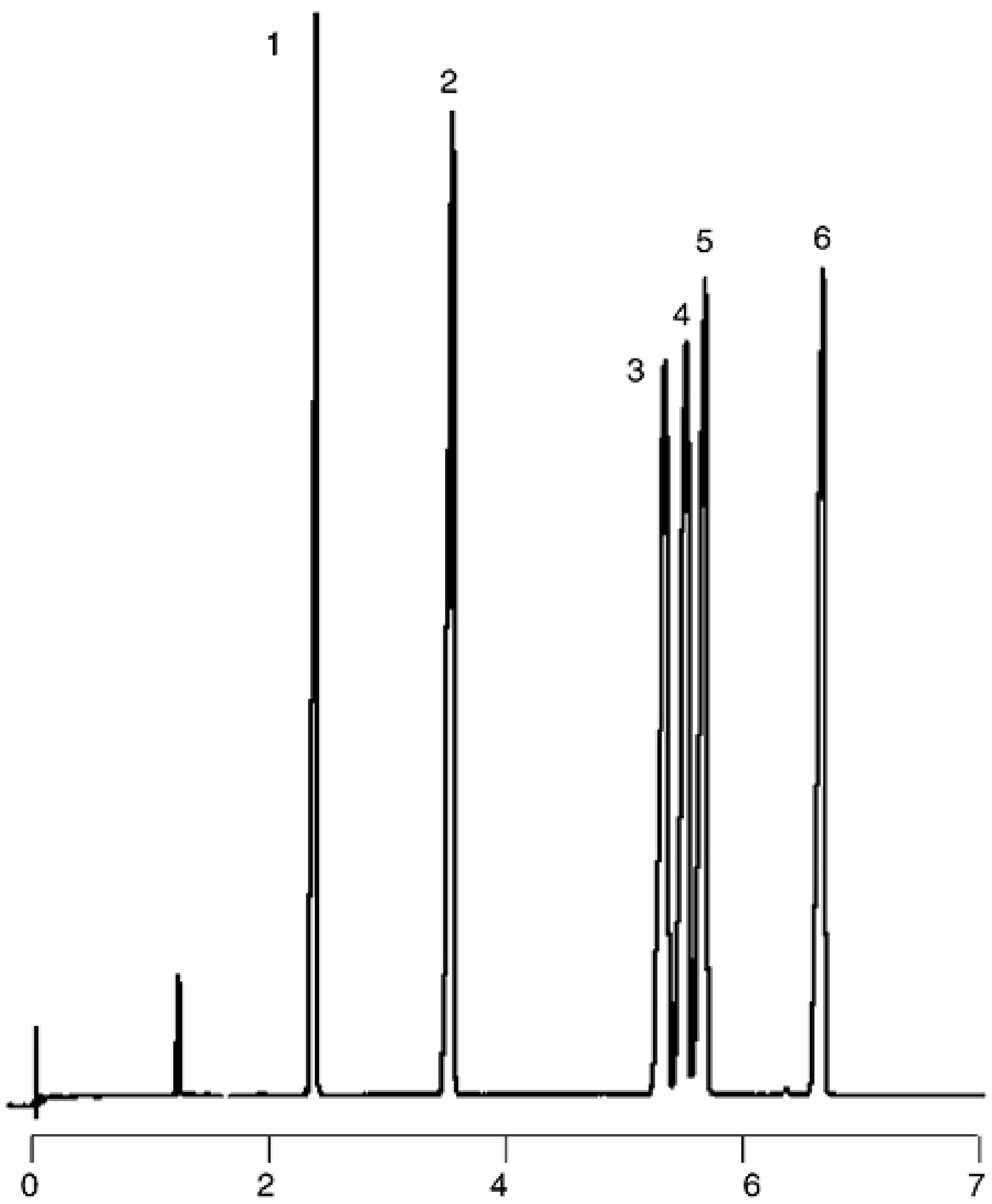
1. Bis (2-chloroethyl) ether
2. Bis (2-chloroisopropyl) ether
3. Bis (2-chloroethoxy) methane
4. 4-Chlorophenyl ether
5. 4-Bromophenyl ether

CBP-20: Bonded Polyethylene Glycol (Wax)

- Industry standard wax column
- Low bleed
- Polar phase suitable for hydrogen bonding analytes

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.22	0.25	25	20 to 260/280	221-28638-25
0.22	0.25	50	20 to 260/280	221-28638-50
0.32	0.5	25	20 to 260/280	221-28645-25
0.32	0.5	50	20 to 260/280	221-28645-50
0.53	1.0	12	20 to 260/280	221-28650-12
0.53	1.0	25	20 to 260/280	221-28650-25

Analysis of Aromatic Pollutants in Water on CBP-20



Column : CBP20-W25-100
Shimadzu P/N : 221-28650-25

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

Capillary Columns

General purpose

CBP1-PONA

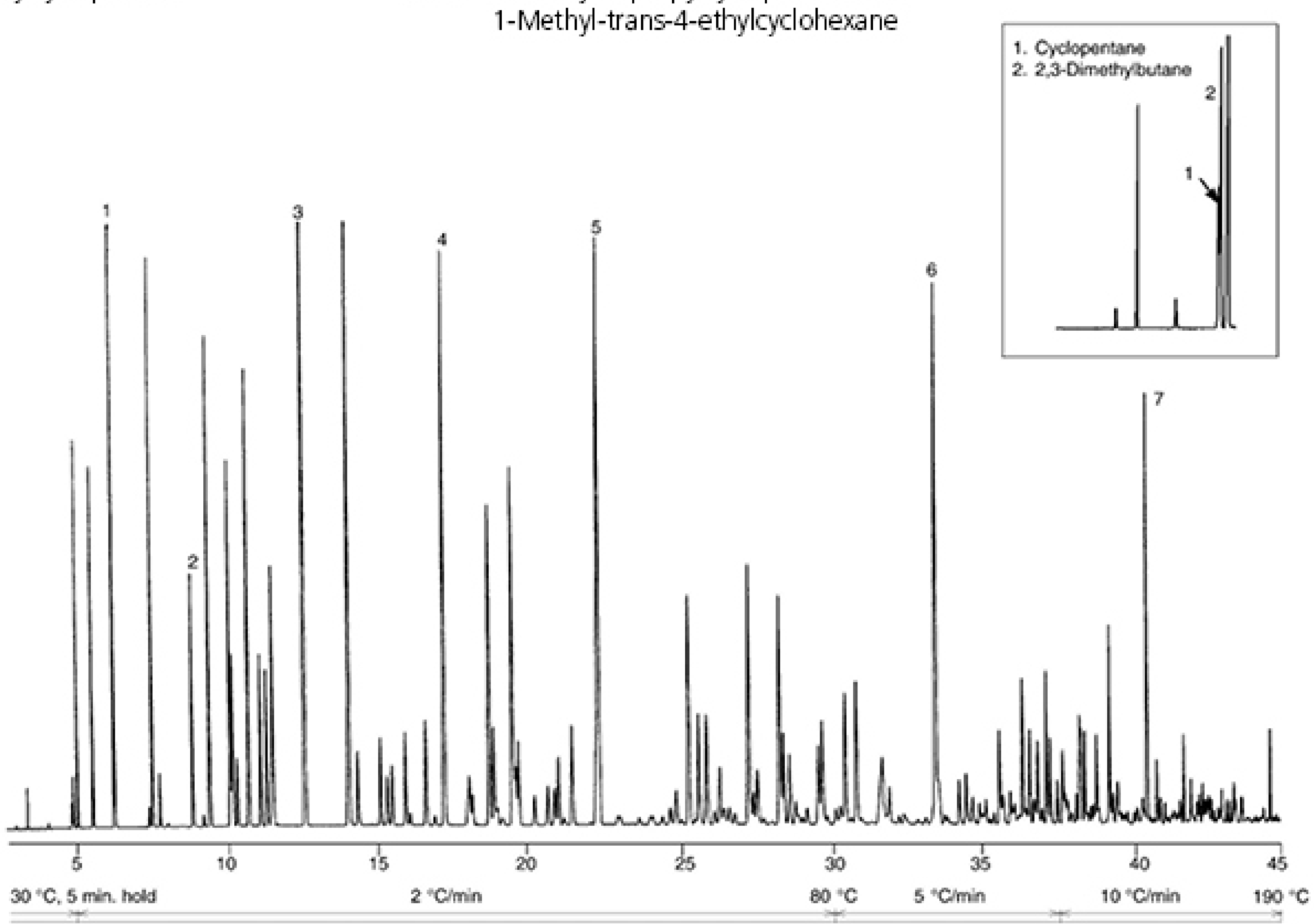
- Designed for the analysis of petroleum products
- Non-polar phase for PONA analysis
- Detailed hydrocarbon analysis according to ASTM (DHA-method)

ID (mm)	Film Thickness (µm)	Length (m)	Temperature Limits (°C)	P/N
0.15	0.50	50	-60 to 320/340	221-44082-50

Analysis of Gasline Range Hydrocarbons on CBP1-PONA

Components

	TIME	COMPOUND
	4.85	Toluene
	5.00	Ethylbenzene
	5.25	p-Xylene
	5.74	m-Xylene
1	6.45	o-Xylene
	7.46	2,2-Dimethylpentane
	7.60	Methylcyclopentane
	7.91	2,4-Dimethylpentane
	8.18	2,2,3-Trimethylbutane
2	8.99	Benzene
	9.35	3,3-Dimethylpentane
	9.55	Cyclohexane
	10.23	2-Methylhexane
	10.32	2,3-Dimethylpentane
	10.47	1,1-Dimethylcyclohexane
	10.83	3-Methylhexane
	11.23	1-trans-3-Dimethylcyclopentane
	11.43	1-cis-3-Dimethylcyclopentane
	11.55	3-Ethylpentane
	11.63	1-trans-2-Dimethylcyclopentane
	11.78	2,2,4-Trimethylpentane
3	12.73	n-Heptane
	14.23	Methylcyclohexane
	14.53	2,2-Dimethylhexane
	15.27	Ethylcyclopentane
	15.49	2,5-Dimethylhexane
	15.65	2,4-Dimethylhexane
	16.09	1-trans-2-cis-4-Trimethylcyclopentane
	16.24	2,3,4-Trimethylpentane
	16.78	1-trans-2-cis-3-Trimethylcyclopentane
	17.05	2,3,3-Trimethylpentane
4	17.39	Toluene
	18.27	2,3-Dimethylhexane
	18.43	2-Methyl-3-ethylpentane
	18.84	2-Methylheptane
	19.69	1-Methyl-2-ethylcyclopentane
	18.98	4-Methylheptane
	19.23	1-cis-2-cis-4-trans-Trimethylcyclopentane
	19.50	3-Methylheptane
	19.77	1-trans-4-Dimethylcyclohexane
	20.73	1-Methyl-cis-2-ethylcyclopentane
	20.86	1-Methyl-trans-3-ethylcyclopentane
	21.08	1-Methyl-cis-3-ethylcyclohexane
	21.27	1-Ethy-1-methycyclopentane
	21.53	1-trans-2-Dimethylcyclohexane
5	22.43	n-Octane
	23.05	iso-Propylcyclopentane
	24.14	2.2.5-Trimethylhexane
	24.19	2,2,4-Trimethylhexane
	24,53	2,4,4-Trimethylhexane
	24.79	2,3,5-Trimethylhexane
	25.16	2,4-Dimethylheptane
	25.41	n-Propylcyclopentane
	25.73	1-cis-2-Dimethylcyclohexane
	26.00	1,1,3-Trimethylcyclohexane
	26.25	2,5-Dimethylheptane
	26.44	3,3-Dimethylheptane
	26.58	3,5-Dimethylheptane
	26.77	4,4-Dimethylheptane
	26.94	2,3,3-Trimethylhexane
	27.43	Ethylbenzene
	27.57	1-cis-3-cis-5-Trimethylpentane
	27.69	1,1,4-Trimethylcyclohexane
	27.88	2,3,4-Trimethylhexane
	28.15	3,3,4-Trimethylhexane
	28.42	m-Xylene
	28.54	p-Xylene
	28.74	2,3-Dimethylheptane
	28.84	1-cis-2-trans-4-trans-Trimethylcyclohexane
	28.95	1-cis-2-trans-4-cis-Trimethylcyclohexane
	29.16	3,4-Dimethylheptane
	29.31	3-Methylethylhexane
	29.68	4-Methyloctane
	29.81	2-Methyloctane
	30.56	3-Methyloctane
	30.93	o-Xylene
	31.75	1-Methyl-2-propylcyclopentane and 1-Methyl-trans-4-ethylcyclohexane
	31.98	1-Methyl-cis-4-ethylcyclohexane
	32.46	3,3-Diethylpentane
	32.89	2,2,6-Trimethylheptane
	33.17	1,1,2-Trimethycyclohexane
6	33.52	n-Nonane
	34.26	iso-Propylbenzene
	34.48	tert-Butylcyclopentane
	34.68	tert-Butylbenzene
	35.57	sec-Butylcyclopentane
	36.33	3-Methylnonane
	36.56	n-Propylbenzene
	36.83	n-Propylcyclohexane
	37.12	m-Ethyltoluene
	37.24	p-Ethyltoluene
	37.64	1,3,5-Trimethylbenzene
	38.20	2-Methylnonane
	38.36	o-Ethyltoluene
	38.75	3,6-Dimethyloctane
	38.75	1,2,4-Trimethylbenzene
7	40.32	n-Decane
	40.63	1,2,3-Trimethylbenzene
	41.57	4-Methyldecane
	41.94	sec-Butylbenzene
	42.45	n-Butylbenzene
	44.54	n-Undecane



Column : CBP1-PONA
Shimadzu P/N : 221-44082-50
Detector : FID

GC Packed Columns

The Shimadzu a wide selection of packed columns that fits in most GC instruments in the market.
Some of the more commonly used columns below:

ShinCarbon ST Columns (packed & micropacked)

- Rapid separations of permanent gas/light hydrocarbon mixtures.
- Separate permanent gases, including carbon monoxide and carbon dioxide, without cryogenic cooling.
- Excellent compatibility with most GC detectors—minimal bleed, minimal baseline rise.
- Preconditioned, less than 30 minutes to stabilize.
- Maximum temperature of 280 °C/300 °C.

Molecular Sieve Columns

- Molecular sieve packed columns easily separate permanent gases at above-ambient temperatures. In addition, our molecular sieves are pre-activated and ready to use.

Micropacked GC Columns

- Higher capacity than PLOT columns.
- Increased efficiency over traditional packed columns.
- Made from inert, flexible SilcoSmooth tubing.
- Wide range of packings available.

Rt-XLSulfur Columns (packed & micropacked)

- Optimized columns for low ppbv sulfur analyses.
- Eliminate the need for PTFE tubing.
- Column and end fittings are Sulfinert treated for maximum inertness.
- Maximum temperature of 290 °C.

Porous Polymer Columns (packed)

- Available in both glass and stainless steel tubing.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

ShinCarbon ST Columns

Analyzing the permanent gases oxygen, nitrogen, methane, carbon monoxide, and carbon dioxide has been virtually impossible for a single gas chromatography (GC) or gas-solid chromatography (GSC) column, without sub-ambient temperatures.

ShinCarbon ST material, a high surface area carbon molecular sieve (~1500 m2/g), is the ideal medium for separating gases and highly volatile compounds by GSC. A 2 m x 1 mm ID micropacked column containing ShinCarbon ST separates the permanent gases in 10 minutes, without cryogenic cooling (Figure 1).

ShinCarbon ST columns can also separate light hydrocarbon / permanent gas mixtures. Figure 2 shows an analysis of permanent gases plus acetylene, ethylene, and ethane, completed in less than 20 minutes. Natural gas components (70% methane) also are cleanly separated (Figure 3). Other potential applications for ShinCarbon ST include analyses of sulfur dioxide and Freon® fluorocarbons (Figure 4).*

** For analysis of other low molecular height sulfur compound, we recommand Rt-X2 Sulfur micropacked and packed columns or SH-Rtx-1 Capillary columns.*

Figure 1 Separate permanent gases in 10 minutes, without cryogenic cooling.

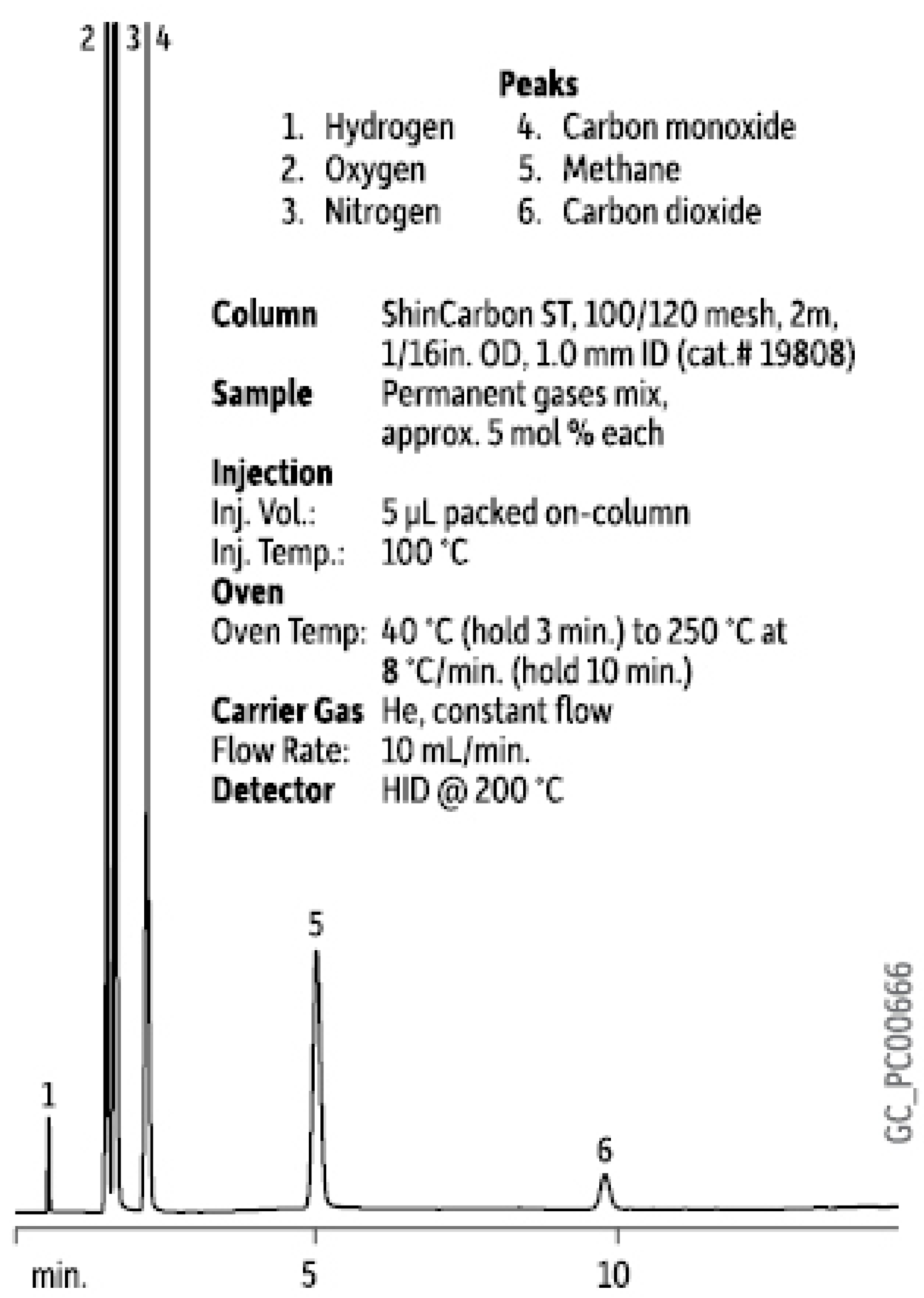


Figure 2 Rapidly analyze light hydrocarbon/permanent gas mixtures.

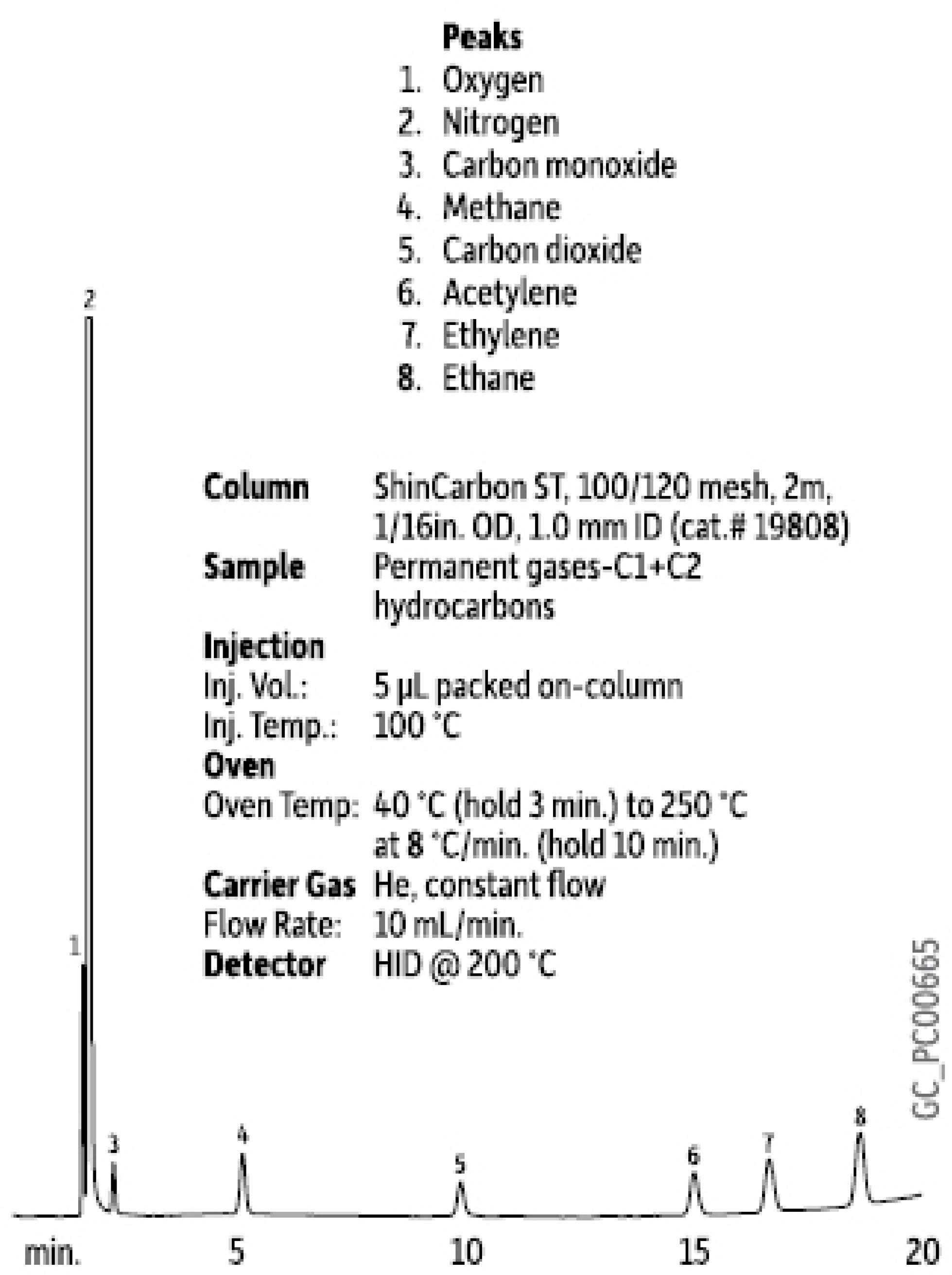
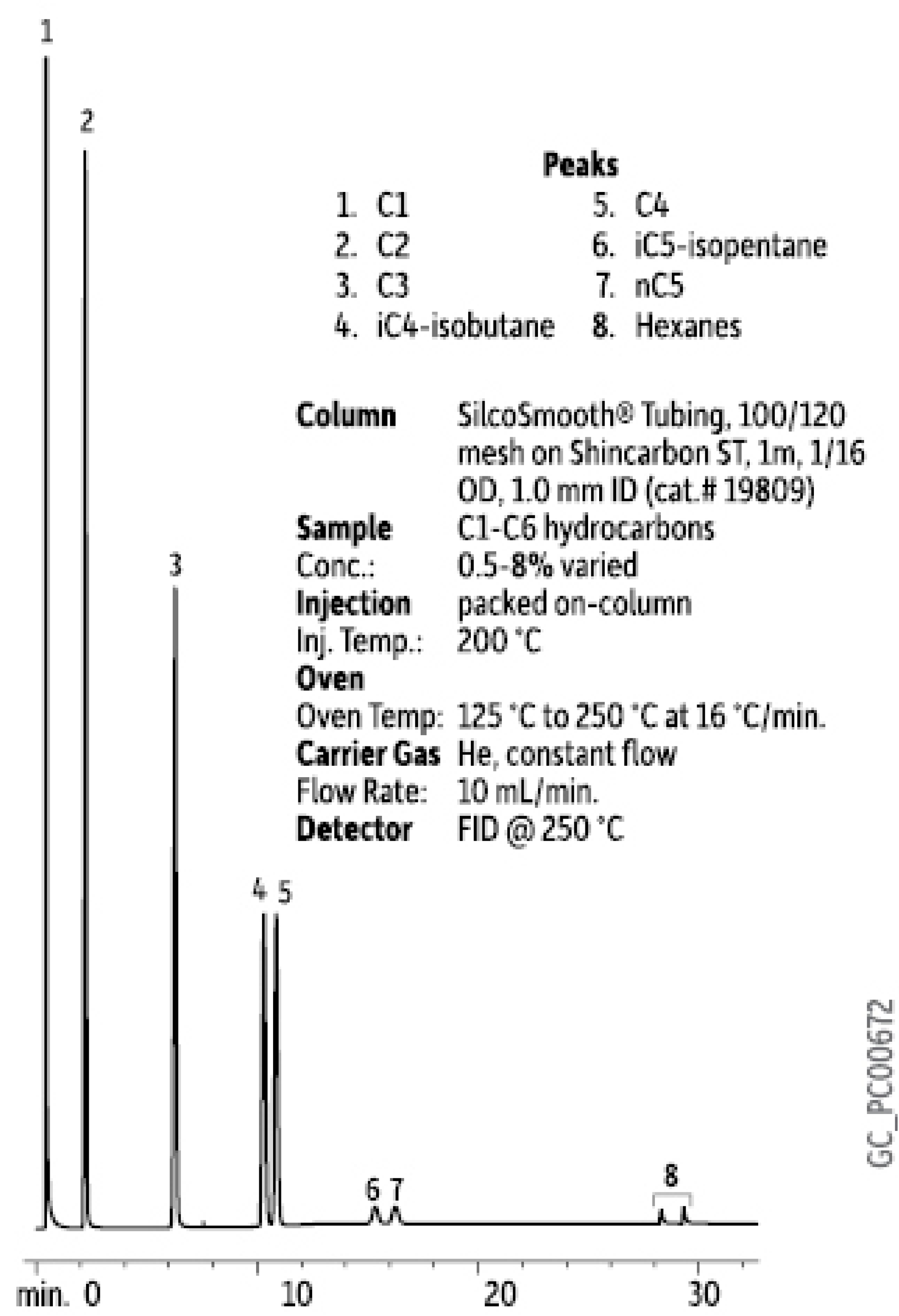


Figure 3 Separate components in natural gas.



ShinCarbon ST Columns (micropacked)

(SilcoSmooth® Stainless Steel)**

OD	ID / mm	Mesh	Length / m
1/16"	1.0	80/100 100/120	1.0
			2.0
			3.0

*** Does not include column nuts and ferrules. Optimal installation kits can be ordered separately.*

ShinCarbon ST Columns (packed)

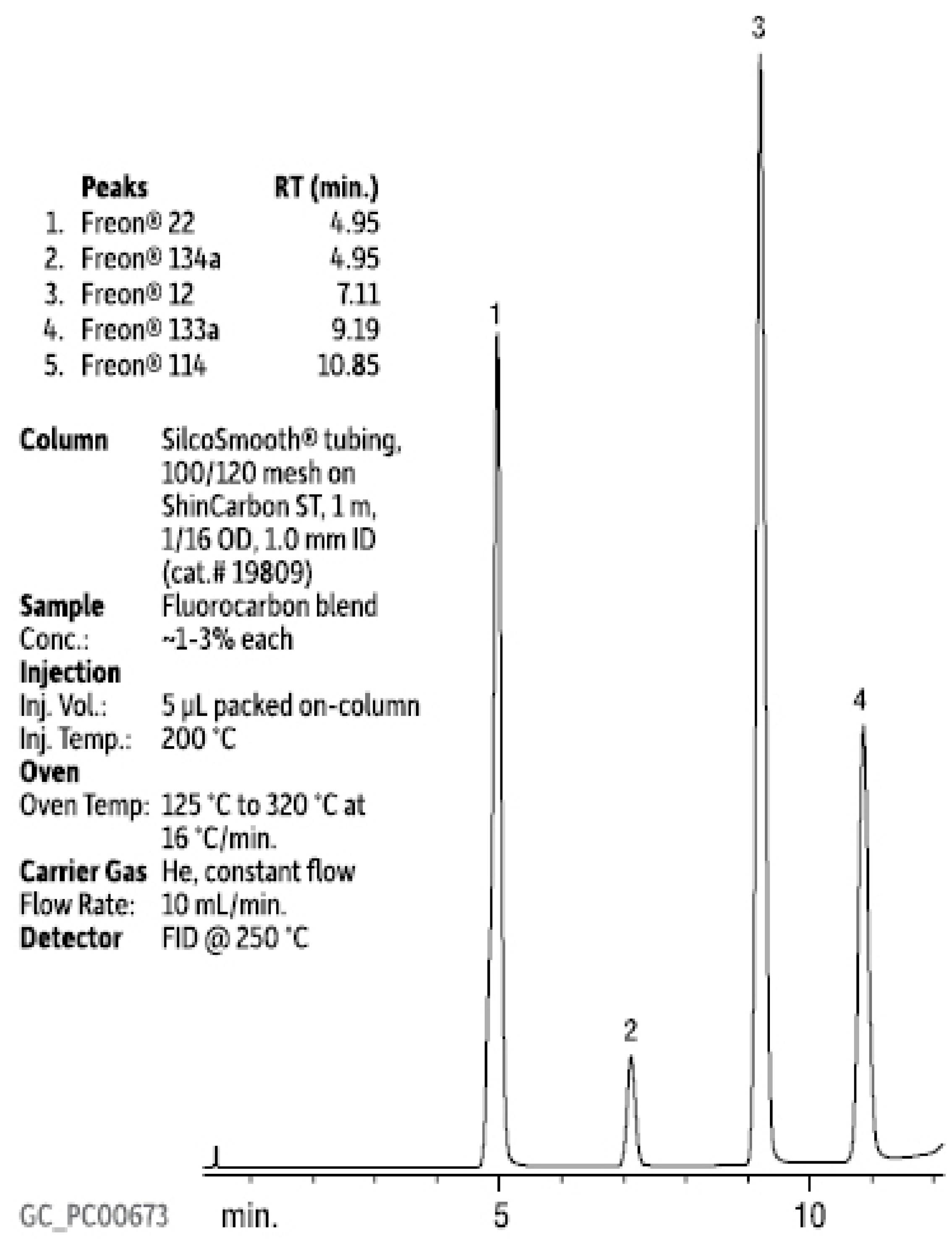
(SilcoSmooth® Stainless Steel)*

OD	ID / mm	Mesh	Length / m
1/8"	2.1	80/100 or 100/120	2.0

** Please indicate instrument configuration when ordering.*

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Figure 4 Fluorocarbon analysis completed in 11 minutes on ShinCarbon ST column.

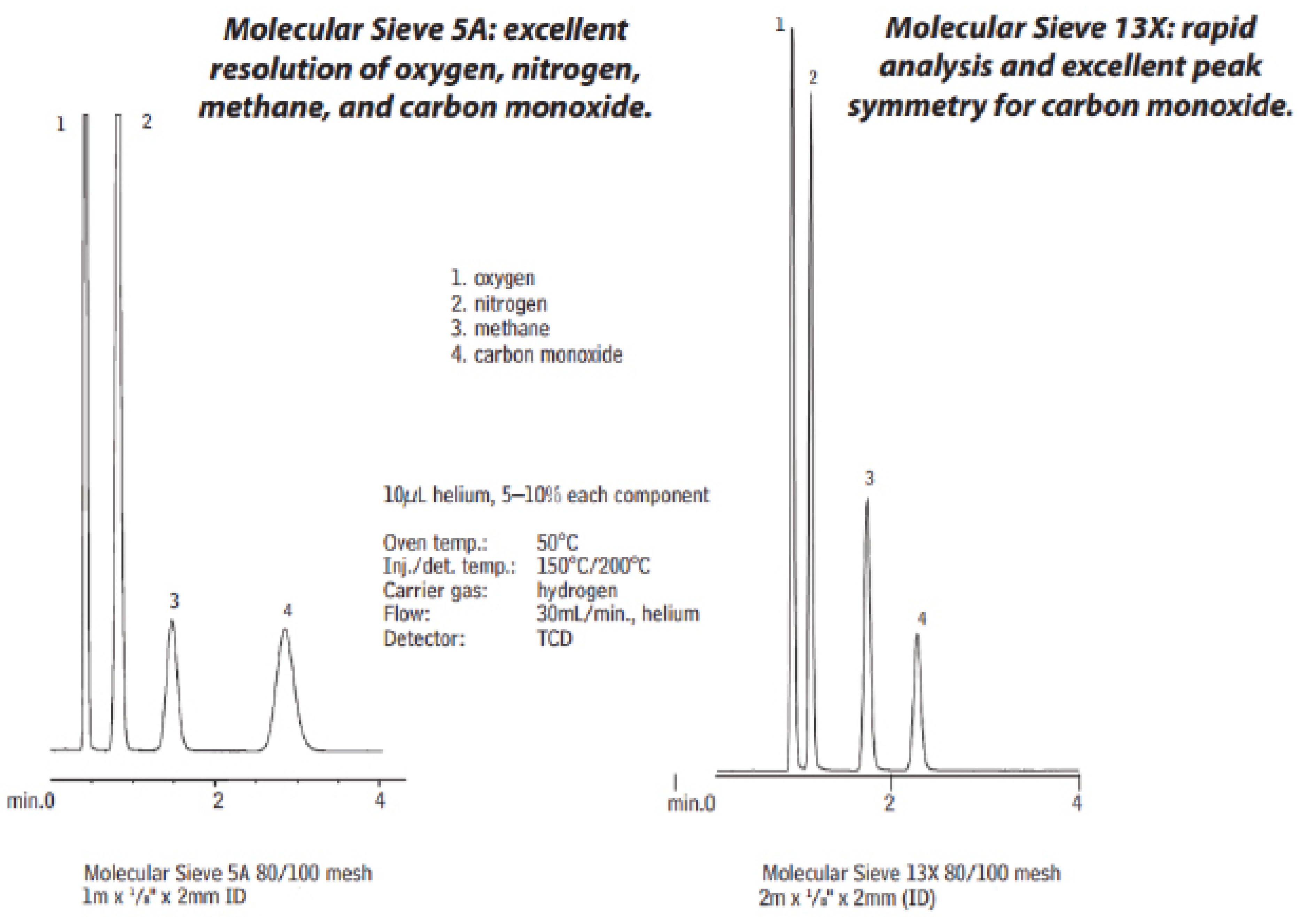


Molecular Sieve 5A / 13X

Molecular sieve packed columns easily separate permanent gases at above-ambient temperatures. The two most common molecular sieves used are 5A and 13X.

Molecular sieve 5A and 13X packings differ in pore size and composition, causing differences in retention and selectivity for many gases. The 5A packing provides greater retention, which improves the separation of argon, oxygen, and nitrogen, and is a better choice for analyzing the trace impurities in inert gases typically used in the semiconductor industry. The 13X packing often is preferred for analysis of carbon monoxide, particularly at trace concentrations, because lower retention results in sharper chromatographic peaks and improved detection limits.

Figure 1 Permanent gases on Molecular Sieve 5A and Molecular Sieve 13X packed columns.



Molecular Sieve Packed Columns

Molesieve	OD	ID / mm	Mesh	Length / m
Molesieve 5A Molesieve 13X	1/8″	2.1	60/80 80/100	1.0
				2.0
				3.0

Molecular Sieve Micropacked Columns

Molesieve	OD	ID / mm	Mesh	Length / m
Molesieve 5A Molesieve 13X	1/16″	1.0	80/100	1.0
				2.0

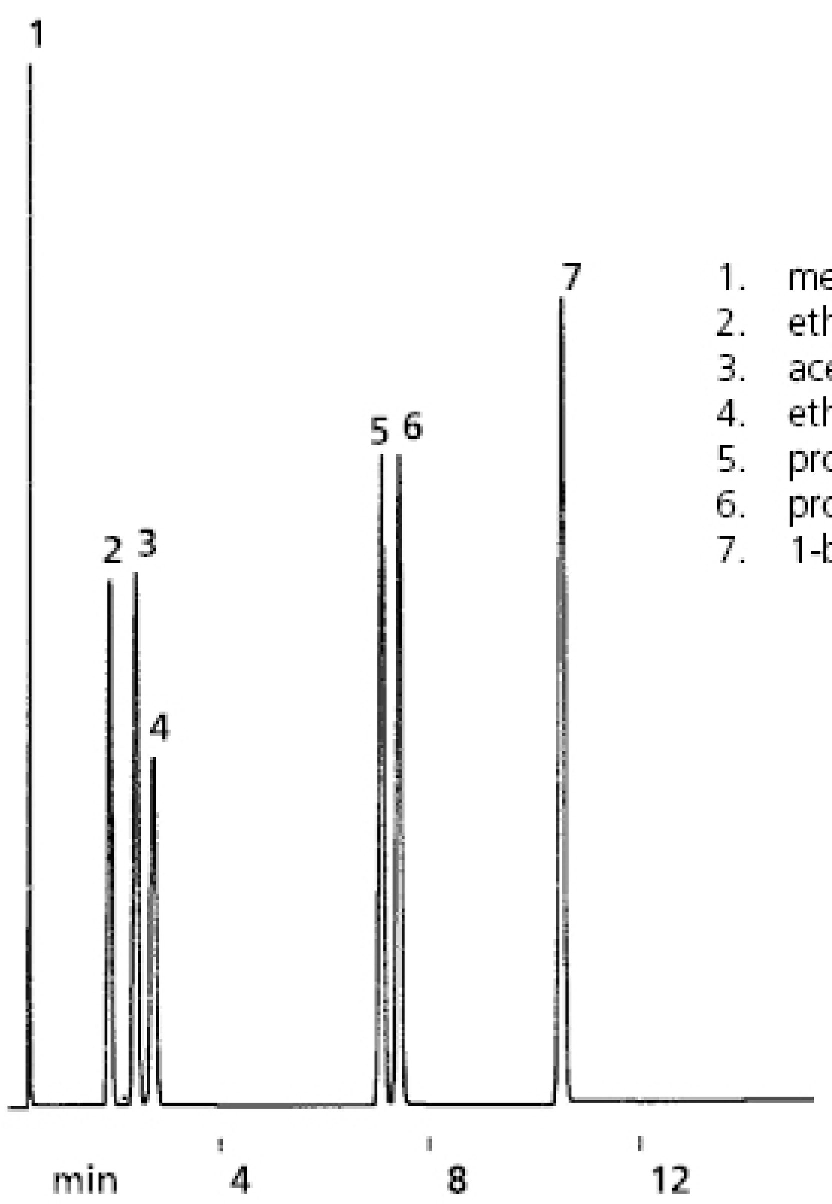
Molecular Sieve 5A and 13X are available in both stainless steel and glass column.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Micropacked GC Columns

Micropacked columns are highly efficient and provide good sample capacity, resulting in a powerful tool for solving many difficult application problems. The unsurpassed inertness of SilcoSmooth tubing is based on Siltek deactivation, which allows the column to be flexed and coiled without any fear of chipping or cracking the inert surface.

Hydrocarbon Gases
HayeSep® S
(micropacked)

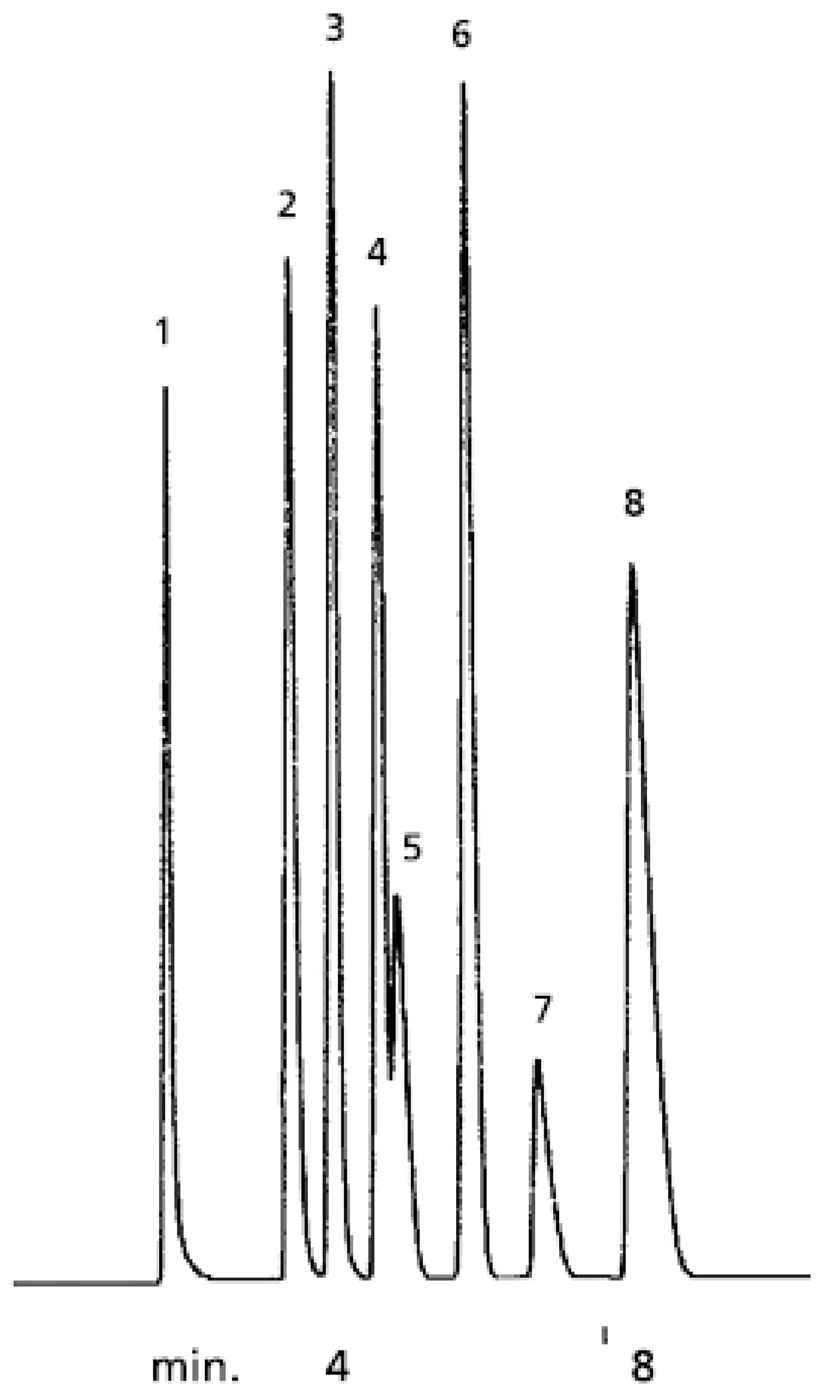


1. methane
2. ethylene
3. acetylene
4. ethane
5. propylene
6. propane
7. 1-butene

2m, 0.75mm ID HayeSep S micropacked column
500µL split injection of a light hydrocarbon gas mixture

Oven temp. : 40°C (hold 3 min.) to 150°C @ 15°C/min. (hold 5 min.)
Inj. & det. temp. : 220 °C
Carrier gas : helium
Flow : 20mL/min. set @ 40 °C
FID sensitivity : 32 x 10-11 AFS
Split ratio: : 10:1

Solvents
HayeSep® Q



1. methanol
2. ethanol
3. acetonitrile
4. acetone
5. methylene chloride
6. n-pentane
7. chloroform
8. n-hexane

2m, 1mm ID HayeSep® Q
1µL direct injection of a neat solvent mixture

Oven temp. : 80°C to 180°C @ 16°C/min. (hold 5 min.)
Inj. & det. temp. : 200 °C
Carrier gas : helium
Flow : 20mL/min. set @ 40 °C
FID sensitivity : 512 x 10-11 AFS

Types of micropacked columns available:

Mesh	Packing material
80/100	HayeSep Q
	Molesieve 5A
	Molesieve 13X
	ShinCarbon ST
100/120	HayeSep Q
	HayeSep R
	HayeSep N
	Rt-XLSulfur Micropacked Column
20% TCEP on 80/100 Chromosorb PAW	

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Rt-XLSulfur Columns (Packed and Micropacked)

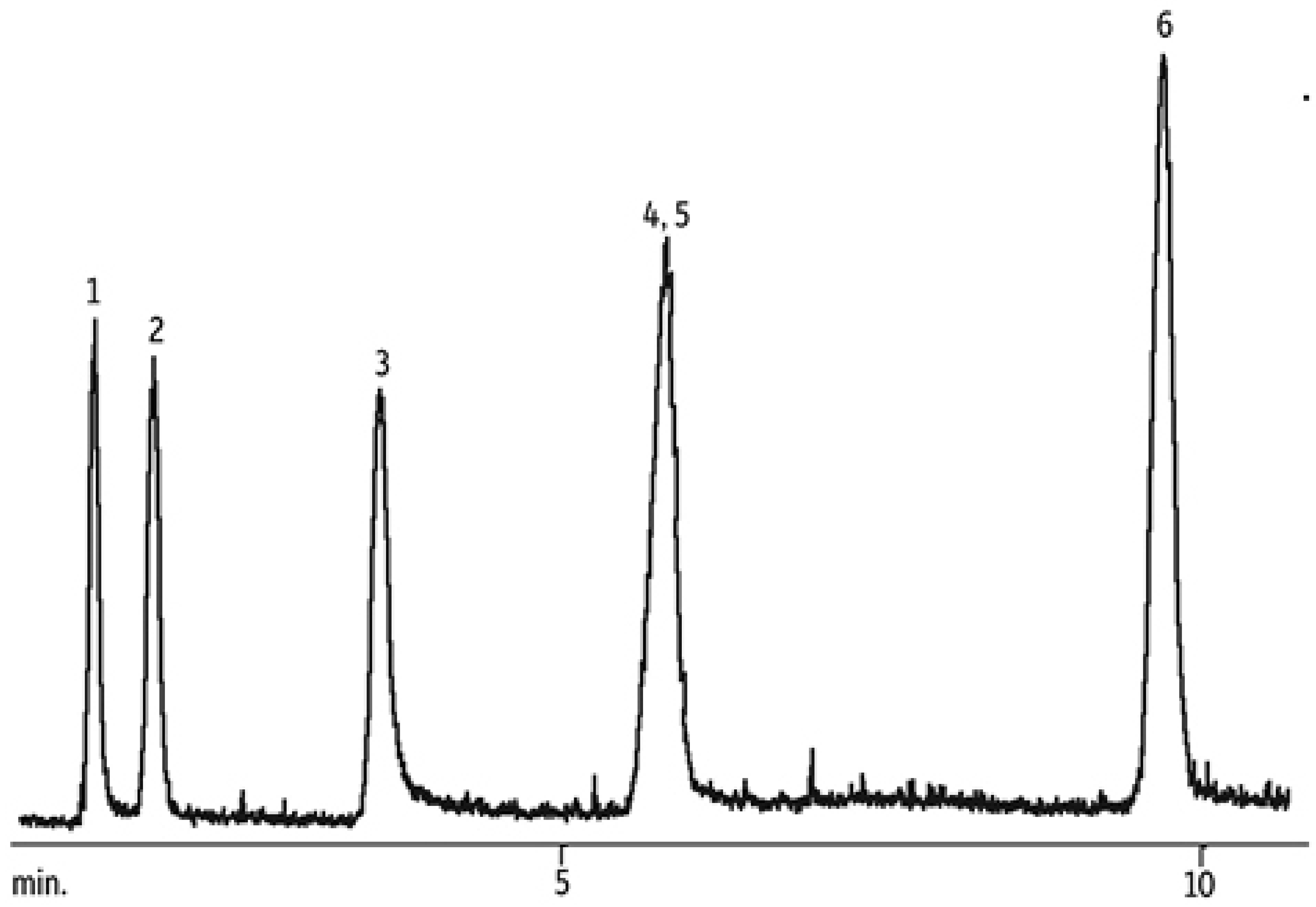
Rt-XLSulfur packed and micropacked columns are designed for ppb-level sulfur analysis. Every component of the sample pathway is treated to provide the highest degree of inertness for reactive, low-level sulfur compounds. The porous polymer phase features a unique surface modification, which results in excellent peak symmetry and thermal stability to 300 °C.

The high performance and reproducibility of the Rt-XLSulfur column enables resolution and quantitation of COS, H_2S, SO^2, CH_3SH, $(CH_3)_2S_2$ at low ppb concentrations. These sulfur compounds typically are found in pulp mill byproducts, natural gas, and petroleum products.

Features:

- Optimized columns for low pbbv sulfur analyses.
- Eliminate the need for PTFE tubing.
- Column and end-fittings are Sulfinert® treated for maximum inertness.

Figure 1 The Rt-XLSulfur column analyzes 50 ppb levels of sulfur compounds, providing low bleed and good symmetry.



Peaks

1. Hydrogen sulfide
2. Carbonyl sulfide
3. Methyl mercaptan
4. Ethyl mercaptan
5. Dimethyl sulfide
6. Dimethyl disulfide

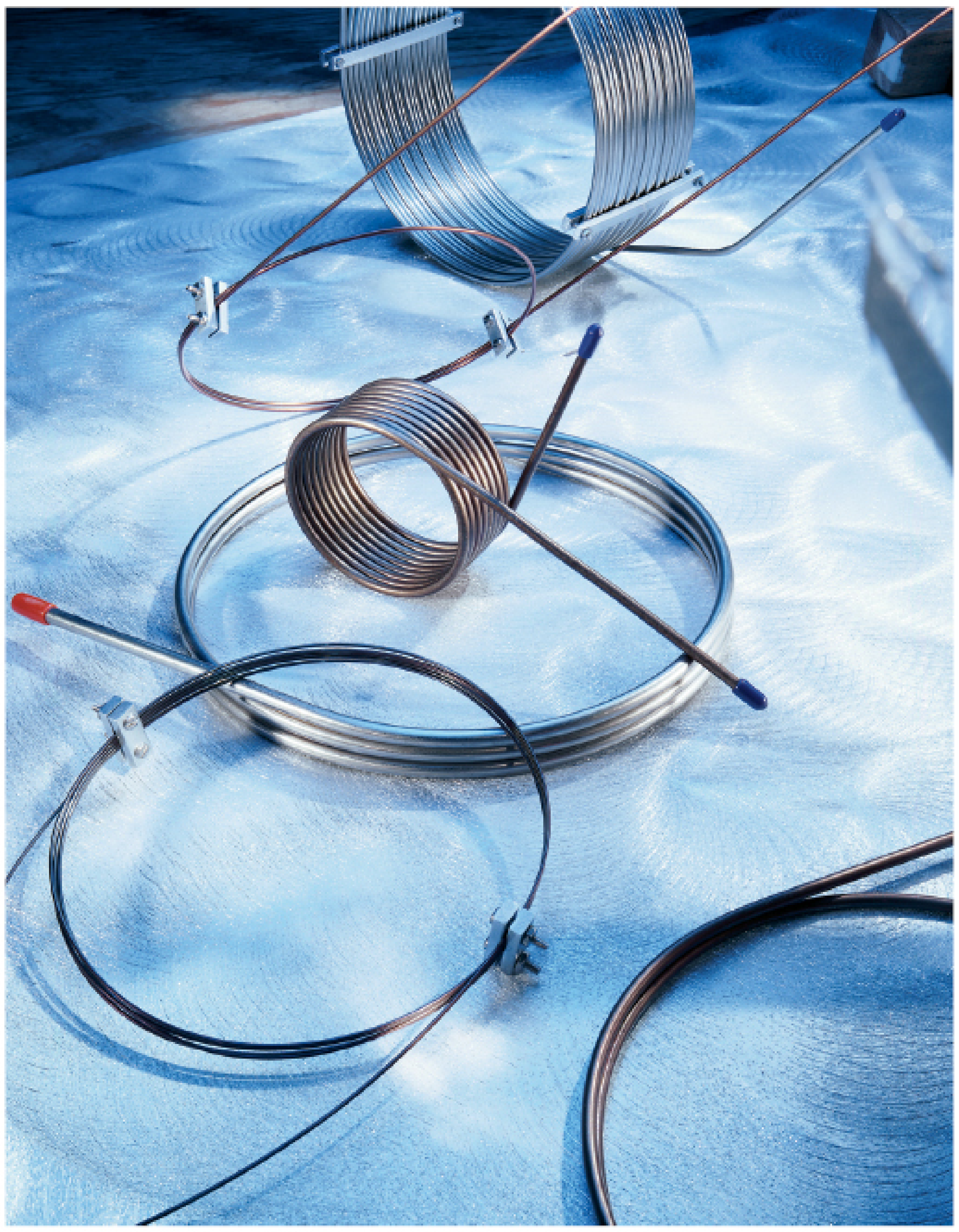
Conditions

Column : Rt-XLSulfur, 1 m, 0.75 mm ID
Sample conc. : 1 mL of 50ppbv each sulfur compound
Injection : sample valve
Oven Temp. : 60 °C to 230 °C at 15 °C/min.
Carrier Gas : He, constant flow
Flow Rate: : 9 mL/min.
Detector : SCD

Column	OD	ID / mm	Length / m
Rt-XLSulfur Columns (packed)	1/8″	2.0	1.0
			2.0
	1/16″	3.2	1.0
			2.0
Rt-XLSulfur Columns (micropacked)	1/16″	1.0	1.0
			2.0
	0.95mm	0.75mm	1.0
			2.0

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

Porous Polymer Columns (Packed)



Types of packing material available:

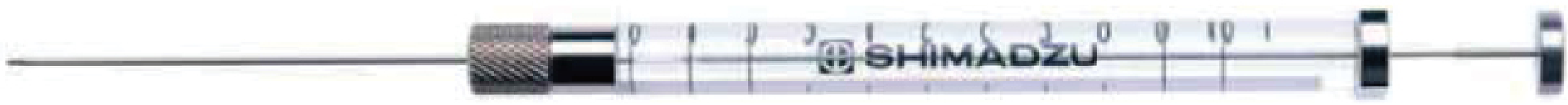
- Activated Charcoal
- HayeSep A
- HayeSep C
- HayeSep D
- HayeSep N
- HayeSep Q
- HayeSep T
- Porapak Q
- Porapak QS
- Porapak R
- Porapak N
- Porapak T
- Shimalite Q
- Silica Gel

Available in both glass and stainless steel tubing.

For availability and ordering information on custom columns, please contact your representative direct sales/distributors.

SAMPLE INTRODUCTION – Syringes

Shimadzu Diamond syringes are the result of technological advancements in materials, design, and engineering. Designed to meet the ever increasing levels of sensitivity required by today's analyses, Shimadzu Diamond syringes give you a new level of accuracy and precision.



LONGER LIFE
Shimadzu Diamond syringes have a longer life. The improved solvent resistance and maximized operational temperature range along with the smoothest available internal glass surface ensure you receive the longest lifetime from your Shimadzu syringe.

SUPERIOR PERFORMANCE AND ROBUSTNESS
Shimadzu Diamond syringes have superior performance and robustness with unsurpassed levels of operational strength and durability. Potential for contamination is significantly reduced by the near-zero syringe dead volume and minimized adhesive in the flow path.

REDUCED CARRYOVER
Engineering enhancements have eliminated areas where fluid can become trapped and potentially cause carryover, improving accuracy, precision and analysis results.

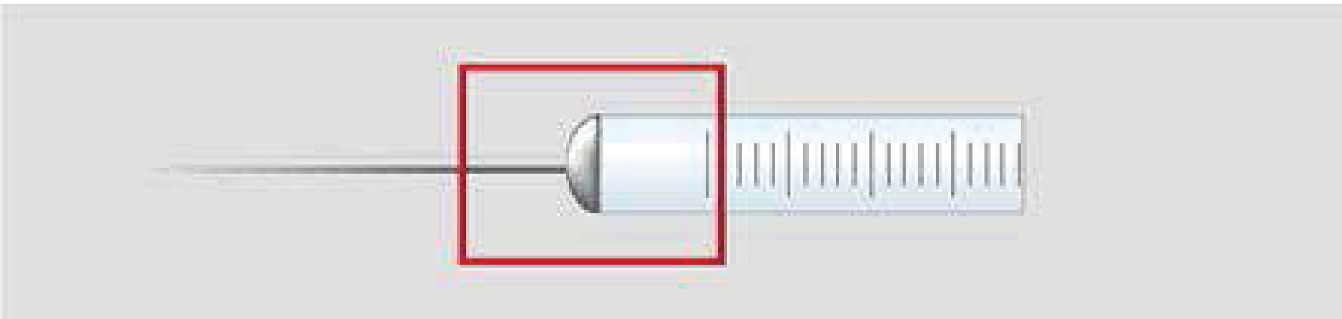
Syringe

Syringe Selection Guide

If a syringe is being used by hand, a manual syringe should be selected. If a syringe is installed in an AOC autosampler, then choose the appropriate syringe and volume to suit your instrument and application.

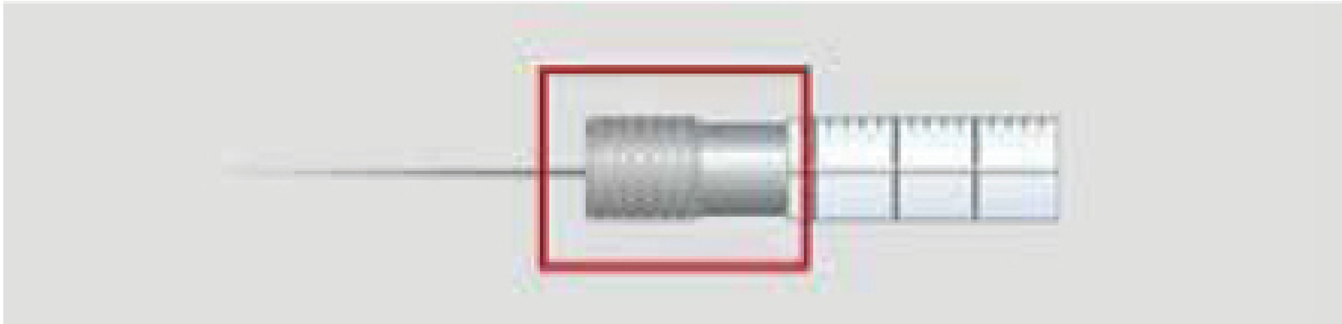
Syringe Style

Fixed Needle



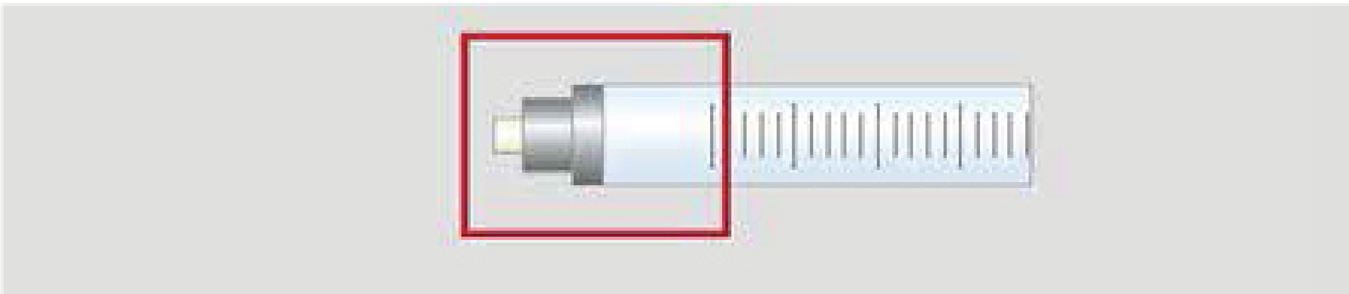
- Better option for experienced users or for applications requiring trace sample levels
- Recommended for use with an autosampler because the probability of needle bending is minimal
- Minimal sample carryover

Removable Needle



- Better option for inexperienced users
- Reduce cost if used in precipitation of salts or in situations in which it may bend easily (such as thick septum) Available for many methods by changing needles

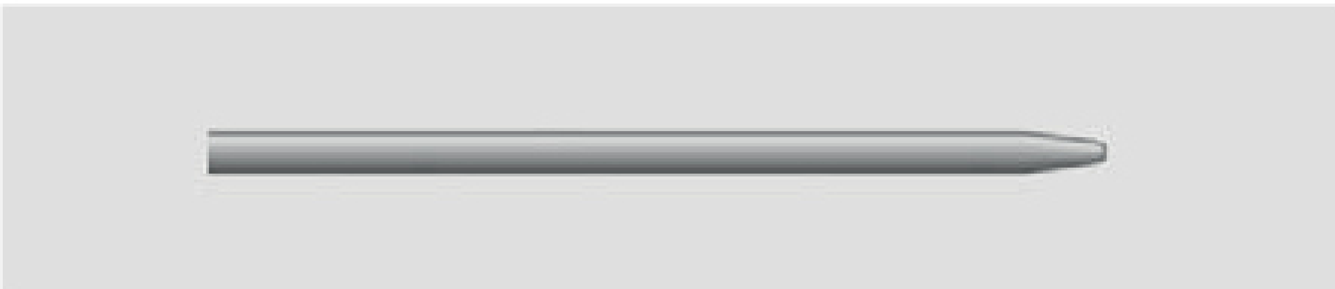
Gas Tight



- For Luer Lock needles and fittings
- Specifically designed to install and secure Luer Lock needles easily

Needle Tip Style

Cone: Autosampler

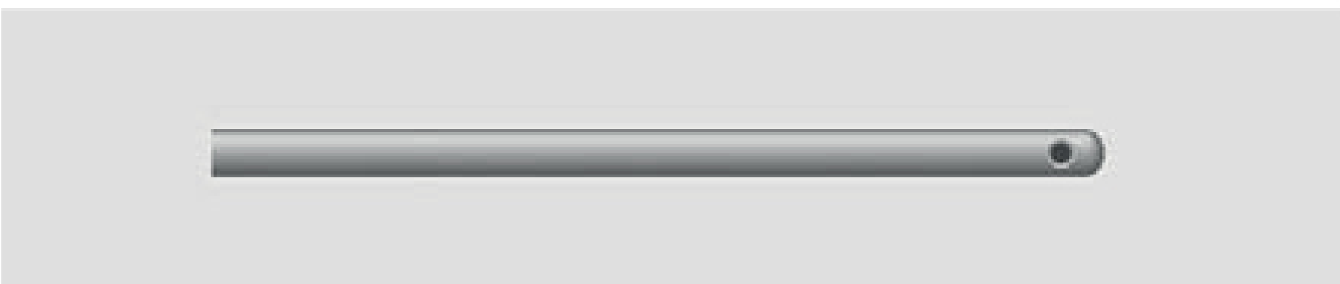


The cone-shaped needle tip is specially developed to withstand multi- injection demands and improve septum lifetime when used with an autosampler. The cone design effectively "parts" the septum during piercing instead of cutting it, as would a bevel needle.

Bevel: Manual Injection

The standard general-purpose needle tip style supplied with many syringes is a 20 ° bevel tip. It is the preferred option for manual injection when piercing the septum in exactly the same place is difficult. The bevel tip is designe d for optimum septum penetration and prevention of septum coring.

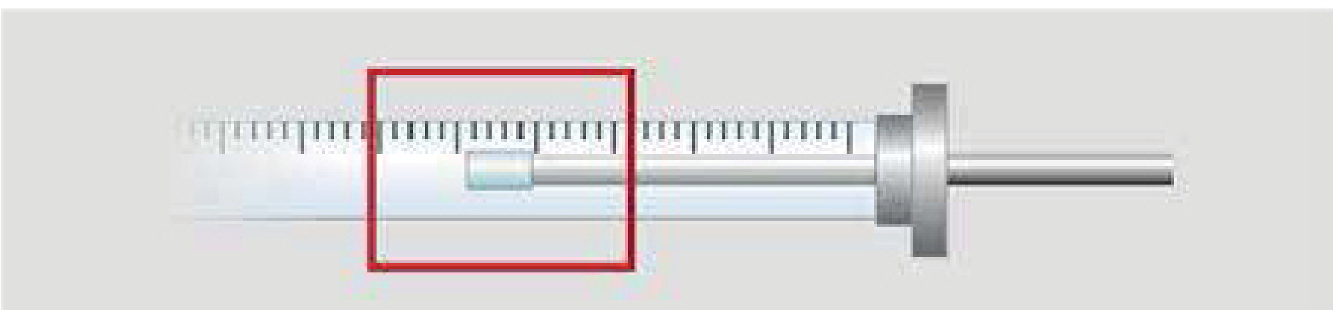
Side Hole Dome



Samples are filled and dispensed through the side hole , eliminating septum plugging of the needle. Ideal for large-volume gas injections. The solid domed tip minimizes septum damage.

Plunger Style

PTFE Tipped Plunger



- PTFE Tip enables gastight analysis
- Suitable for both liquid and gas samples
- Ideal for analysis of highly viscous liquid because it reduces the possibility of the plunger sticking due to micro particles (samples should have no effects with PTFE)
- Plunger is replaceable

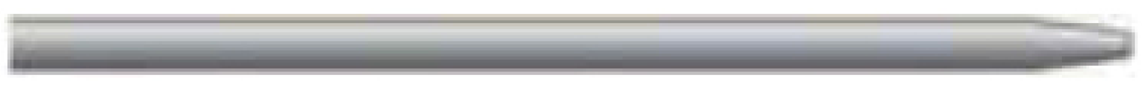
Manual Autosampler or Instrument Syringes

If a syringe is being used by hand, a manual syringe should be selected. If a syringe is installed in an AOC autosampler then choose the appropriate syringe and volume to suit your instrument and application.

Shimadzu autosampler syringes are specifically designed to meet instrument dimensional specifications, have an accuracy of better than ± 1 % and are designed for precise, worry-free overnight sampling.

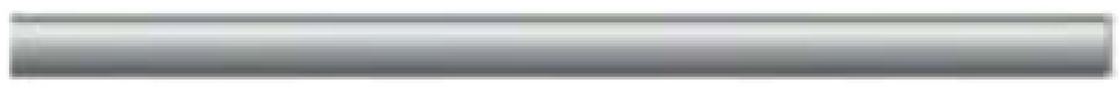
Needle Tip Styles

Cone: GC Autosampler



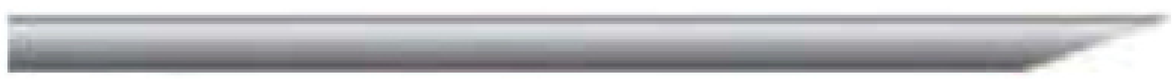
The cone shaped needle tip is specially developed to withstand multi injection demands and improve septum lifetime when used with the AOC autosampler. The cone design effectively "parts" the septum during piercing instead of cutting it, as would a bevel needle.

LC: HPLC



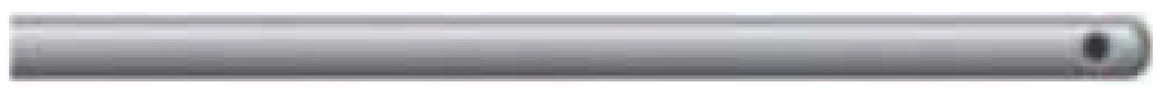
These needles are used for LC and HPLC valve injection and have a 90 ° square tip with rounded and polished edges. This eliminates damage to the valve's rotor seal and stator face. This needle tip style is a good choice for general liquid dispensing.

Bevel: Manual GC



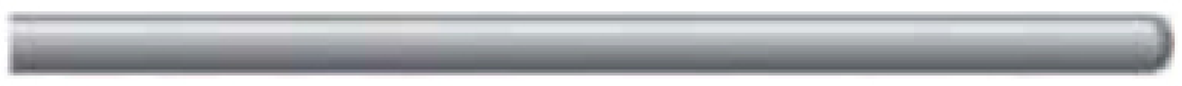
The standard general purpose needle tip style supplied with many Shimadzu syringes is a 20 ° bevel tip. It is the preferred option for manual injection where piercing the septum in exactly the same place is difficult. The bevel tip is designed for optimum septum penetration and prevention of septum coring.

Side Hole Dome:



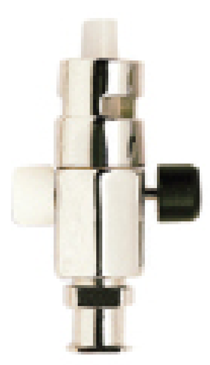
Samples are filled and dispensed through the side hole eliminating septum plugging of the needle. Ideal for large volume gas injection. The solid domed tip minimizes septum damage.

Dome:



This style needle is recommended for use with predrilled septa. The tip is rounded and polished to help septum penetration.

Valves



OPEN ←→ CLOSED

The push-button valve attaches directly to any luer lock 1 mL – 100 mL Shimadzu syringe.

OPEN ←→ CLOSED

The push-button valve attaches to any luer lock 5 mL – 100 mL Shimadzu syringe.

Syringe

Syringe for AOC-20i/20s and AOC-20i Plus / 20s Plus

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	Needle ID (mm)	P/N	Replacement Plunger P/N	Replacement Needle P/N
5 µL	–	42	23	0.63	Cone	0.11	221-75173	–	–
10 µL	√	42	23	0.63	Cone	0.11	221-74469	–	–
10 µL	–	42	23	0.63	Cone	0.11	221-34618	–	–
10 µL	√	42	23	0.63	Cone	0.11	221-75174	221-75174-02	221-75174-01
50 µL	–	42	23	0.63	Cone	0.11	221-45243	–	–
250 µL	√	42	23	0.63	Cone	0.11	221-45244	221-45244-01	–

Description	P/N	Syringe Volume
Syringe for OCI	221-37282-02	10 µL

Syringe for AOC-5000 Plus

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N
10 µL	–	50	26	0.47	0.11	Cone	221-75175
10 µL	–	50	23	0.63	0.11	Cone	221-75175-01
10 µL	–	80	26	0.47	0.11	Cone	221-75176
10 µL	–	80	23	0.63	0.11	Cone	221-75176-01
10 µL	√	50	26	0.47	0.11	Cone	221-75175-02
10 µL	√	50	23	0.63	0.11	Cone	221-75175-03
25 µL	√	50	23	0.63	0.24	Cone	221-75177
1 mL	√	50	26	0.47	0.15	Side Hole Dome	221-75178
1 mL	√	50	23	0.63	0.15	Side Hole Dome	221-75178-01
2.5 mL	√	50	26	0.47	0.15	Side Hole Dome	221-75179
2.5 mL	√	50	23	0.63	0.15	Side Hole Dome	221-75179-01

Xtra Life Micro Syringe for AOC-30i / AOC-20s

Fixed needle syringe with super flexible titanium alloy plunger. They are resistant to bending and sliding friction for extended lifetime, even with water soluble samples. Plunger and barrel are machined for an exact fit, so they are not interchangeable with another syringe if either part is damaged.

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N
5 µL	0.1 µL	43	23	0.64	0.15	Cone	227-35401-01
10 µL	0.2 µL	43	23	0.64	0.15	Cone	227-35400-01

Syringe for AOC-6000

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N
1 µL	-	57	23	0.63	Cone	225-19744-01
5 µL	-	57	26	0.47	Cone	225-19744-02
5 µL	-	57	23	0.63	Cone	227-37166-01
5 µL	-	85	23	0.63	Cone	227-37160-01
10 µL	-	57	26	0.47	Cone	225-19744-03
10 µL	√	57	26	0.47	Cone	225-19744-04
10 µL	-	57	23	0.63	Cone	227-37167-01
10 µL	-	85	23	0.63	Cone	227-37161-01
25 µL	√	57	26	0.47	Cone	225-19744-05
50 µL	√	57	26	0.47	Cone	225-19744-06
100 µL	√	57	26	0.47	Cone	225-19744-07
250 µL	√	57	26	0.47	Cone	225-19744-08
500 µL	√	57	26	0.47	Cone	225-19744-09
1 mL	√	57	23	0.63	Side Hole Dome	225-19744-10
2.5 mL	√	65	23	0.63	Side Hole Dome	225-19744-11

Gastight Syringe for AOC-6000

Syringe Volume	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N
10 µL	85	23	0.63	Cone	227-37162-01
10 µL	57	23	0.63	Cone	227-37168-01
25 µL	85	23	0.63	Cone	227-37163-01
50 µL	85	23	0.63	Cone	227-37164-01
100 µL	57	23	0.63 (ID 0.11)	Cone	227-37169-01
100 µL	85	23	0.63	Cone	227-37165-01
250 µL	57	23	0.63	Cone	227-37170-01

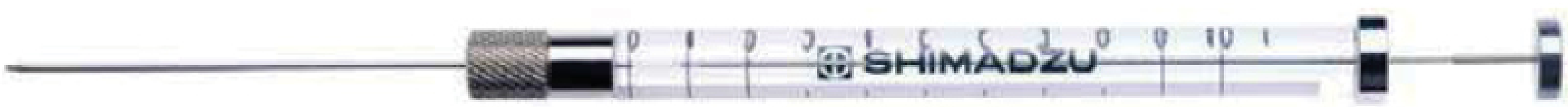
Syringe

Manual Syringe

Shimadzu manual syringes are available from 5µL to 500µL, and can be widely used in your laboratory work.

Fixed Needle Style

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle ID (mm)	Needle Tip	P/N	Replacement Plunger	
								P/N	Qty
5 µL	–	50	26	0.47	0.11	Bevel	221-75170	–	–
10 µL	–	50	26	0.47	0.11	Bevel	670-12552-01	–	–
10 µL	√	80	26	0.47	0.11	Bevel	221-75170-01	221-75170-02	2
25 µL	–	80	25	0.5	0.2	Bevel	670-12510-31	–	–
25 µL	√	50	25	0.5	0.2	Bevel	221-75171	221-75171-01	1
50 µL	–	50	25	0.5	0.2	Bevel	670-12510-36	–	–
50 µL	√	50	25	0.5	0.2	Bevel	221-75172	221-75172-03	1
100 µL	–	50	25	0.5	0.2	Bevel	670-12510-18	–	–
100 µL	√	50	25	0.5	0.2	Bevel	221-75172-01	221-75172-04	1
250 µL	–	50	25	0.5	0.2	Bevel	670-12510-19	–	–
250 µL	√	50	25	0.5	0.2	Bevel	221-75172-02	221-75172-05	1
500 µL	–	50	25	0.5	0.2	Bevel	670-12510-20	–	–
10 µL	–	51	22	0.028"	0.17	LC	670-12554-01	–	–
25 µL	–	51	22	0.028"	0.37	LC	670-12554-02	–	–
50 µL	–	51	22	0.028"	0.37	LC	670-12554-03	–	–
100 µL	–	51	22	0.028"	0.37	LC	670-12554-04	–	–
250 µL	–	51	22	0.028"	0.37	LC	670-12554-05	–	–
500 µL	–	51	22	0.028"	0.37	LC	670-12554-06	–	–



Removable Needle Style

Syringe Volume	PTFE Tipped Plunger	Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	P/N	Replacement Plunger P/N	Replacement Needle P/N
10 µL	√	50	26	0.47	Bevel	670-12553-21	670-12553-33	670-12510-95
25 µL	–	50	25	0.5	Bevel	670-12510-74	–	
50 µL	–	50	25	0.5	Bevel	670-12510-75	–	
100 µL	–	50	25	0.5	Bevel	670-12510-76	–	670-12510-96
250 µL	–	50	25	0.5	Bevel	670-12510-77	–	
500 µL	–	50	25	0.5	Bevel	670-12510-78	–	

Syringe for Gas Analysis

Luer Lock Needle Style

Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger P/N
1 mL	√	221-54778-01	221-54778-11
5 mL	√	221-54778-02	221-54778-12
10 mL	√	221-54778-03	221-54778-13
25 mL	√	221-54778-04	221-54778-14
50 mL	√	221-54778-05	221-54778-15
100 mL	√	221-54778-06	221-54778-16

Luer Lock Needle

Needle Length (mm)	Needle Gauge	Needle OD (mm)	Needle Tip	Qty	P/N
50	23	0.63	Bevel	5	221-54778-51
50	19	1.07	Bevel	5	221-54778-52
50	14	2.1	Bevel	5	221-54778-54

①

OPEN ⟷ CLOSED

Syringe Valve

Diag. #	Syringe Volume	Description	Qty	P/N
①	5 mL to 2 L	Push Button Valve for Luer Lock Needle	1	221-54778-49
②	50 μL to 2 L	Push Button Valve for Luer Lock Needle and Tip Syringe	1	221-54778-50

②

OPEN ⟷ CLOSED

Removable Needle Style

Gastight syringes with a capacity of milliliter quantity level. The needle is 30mm long and is of a screw-in type, which ensures an easy exchange.

Description	Syringe Volume	P/N	Replacement Needle P/N
MS-GAN025	0.25 mL	670-12504-28	670-12504-85 (5 pcs)
MS-GAN050	0.5 mL	670-12504-29	
MS-GAN100	1 mL	670-12504-30	
MS-GAN250	2.5 mL	670-12504-31	
MS-GAN500	5 mL	670-12504-32	
MS-GANX00	10 mL	670-12504-33	

PIN Style Microsyringe

Plunger-in-needle style. The plunger goes into the needle tip to eliminate dead volume. Ideal for highly precise analysis of micro-volume samples.

Description	P/N	Syringe Volume
0.5BR-7	670-12510-71	0.5 μL
1BR-7	670-12510-72	1 μL
5BR-7	670-12510-73	5 μL

Syringe

Microsyringe with Plunger Guide

This type of microsyringe has an extended barrel (120 mm long) to prevent the plunger from bending.

Description	P/N	Syringe Volume	Replacement Needle P/N	Qty
10R-GP	670-12510-80	10 μL	670-12510-95	5
5R-GPS	670-12510-86	5 μL	670-12510-94	5

Elastic Plunger Style Microsyringe

These syringes use a titanium alloy plunger, which is highly flexible and corrosion resistant. The high flexibility of the plunger ensures stable injection of samples as small as 5 μL. The needle is 0.41 mm in tip diameter, which is suitable for on-column injection into a capillary column.

Description	P/N	Syringe Volume	Replacement Needle P/N
MS-E05-CS	670-12580-21	5 μL	Fixed Needle
MS-E10-CS	670-12580-22	10 μL	
MS-NE05-CS	670-12580-25	5 μL	670-12580-31 (5 pcs)
MS-NE10-CS	670-12580-26	10 μL	

Microsyringe with Guide Bar

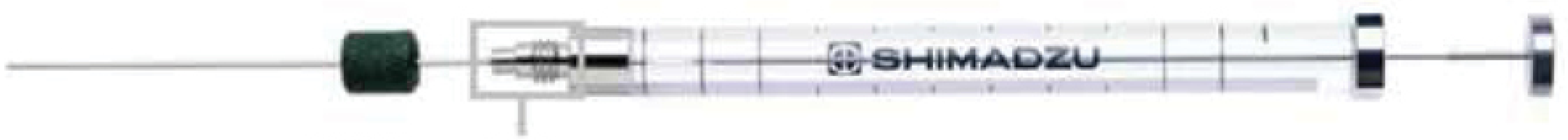
A guide bar is installed parallel to the plunger, which prevents the plunger from bending. A stopper is also provided to allow a preset amount of sample to be injected accurately without reading the scale in each run.

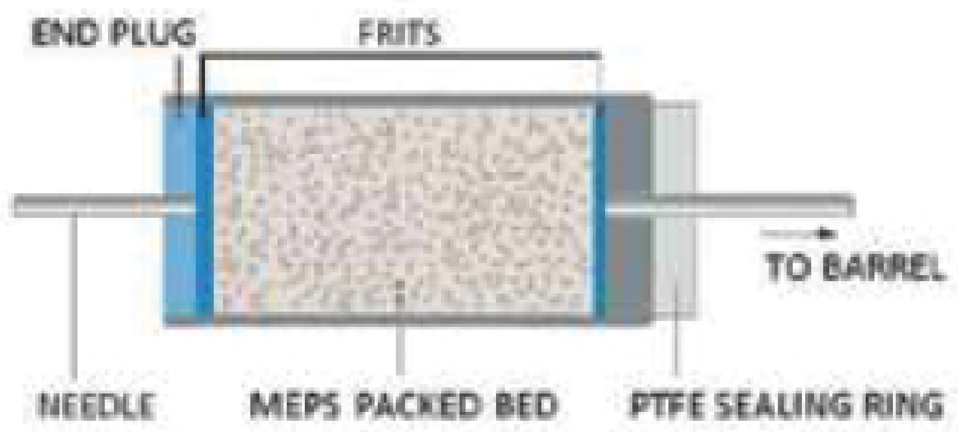
Description	P/N	Syringe Volume	Replacement Needle P/N
MS-G10	670-12504-25	10 μL	Fixed Needle
MS-NG10	670-12504-22	10 μL	670-12504-86 (5 pcs)

Micro Solid Phase Extraction Syringe MEPS™

MEPS™ is Micro Extraction by Packed Sorbent and is used for sample preparation and handling. MEPS is the miniaturization of conventional SPE packed bed devices from milliliter bed volumes to microliter volumes. The MEPS approach to sample preparation is suitable for reversed phases, normal phases, mixed mode or ion exchange chemistries. MEPS is available in a variety of common SPE phases.

Meps Barrel Insert And Needle





The MEPS Barrel Insert and Needle (BIN) assembly contains the stationary phase, and is built into the syringe needle.

SAMPLE SIZE AND SENSITIVITY

Sample volumes may be as little as 10 µL, or by taking multiple aliquots of 100 µL or 250 µL, samples of 1 mL or larger may be concentrated.

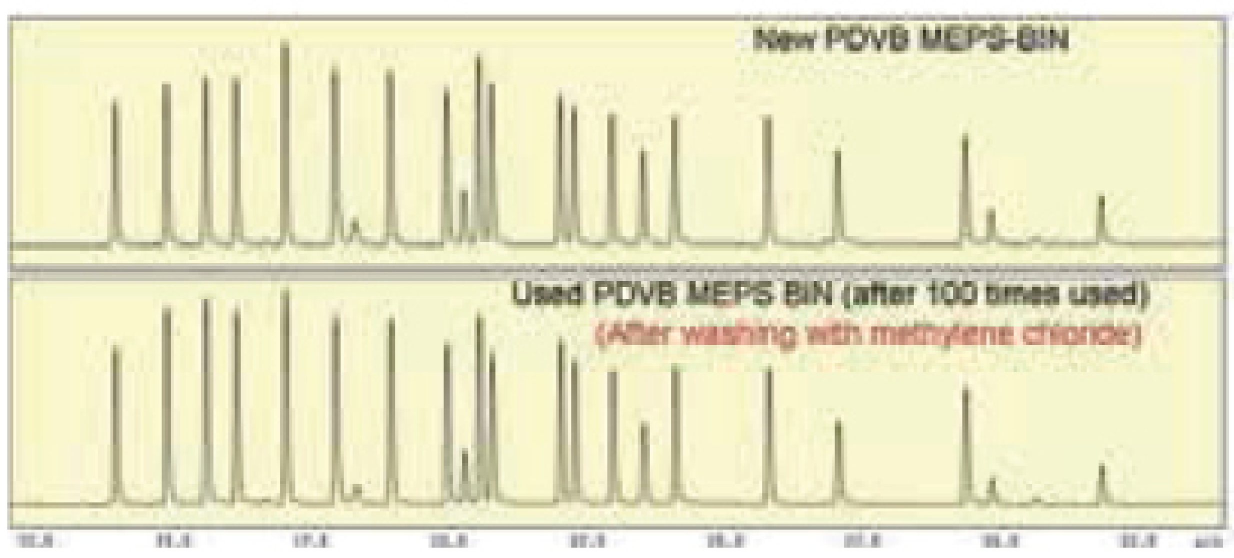
AUTOMATION

Extract samples and make injections on-line using a single device, reducing sample processing times and the need for operator intervention.

SORBENT LIFE

BIN life is dependent on the specific matrix being analyzed. For example, C18 analysis of whole plasma samples is conservatively 25-100 samples before the BIN needs to be changed. BIN life of cleaner samples is significantly longer.

Chromatogram of 22 pesticides standard solution (40 ng/mL)



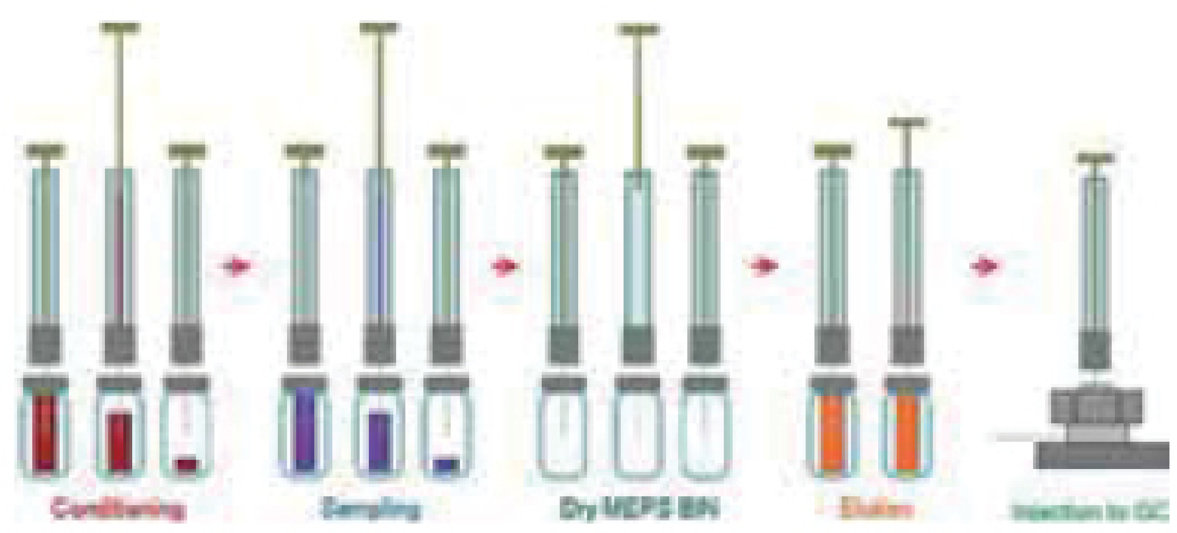
CARRYOVER

The small quantity of phase in the MEPS BIN is easily and effectively washed between samples to reduce the possibility of carryover. This washing process is not practical with off-line SPE devices. With automated MEPS, washing occurs while the previous sample is running.

FLEXIBLE AND EASY TO USE

The dimensions of the sorbent bed ensure performance remains identical to conventional SPE devices when used for extraction of similar samples. The AOC-MEPS system was developed to incorporate MEPS into a process automation workflow, combining sample preparation and analysis in a single platform.

AOC-MEPS System



When automated by an AOC-MEPS system, the injection volume is much larger compared to the commonly used GC injection volumes of 1 - 2 µL. With AOC-MEPS, the typical injections are 50 to 200 µL of elution solvent.

A large volume injection technique that removes the solvent volume from inside the injector unit while condensing the target compounds should be employed.

MEPS™ Syringe for AOC-20i/20s and AOC-20i Plus/ AOC-20s Plus

Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger	
			P/N	Qty
100 µL	√	221-74830-01	221-74830-10	1

Base	P/N	Qty
C18	221-74830-03	5
Silica	221-74830-04	5
C8 + SCX	221-74830-05	5
C2	221-74830-06	5
C8	221-74830-07	5
PDVB	221-74830-02	5
SDVB	221-74830-11	5
HDVB	221-74830-12	5
Development Kit	221-74830-08	1 each of C18, C8, Silica, C8+SCX, C2

MEPS™ Syringes for AOC-5000 Plus

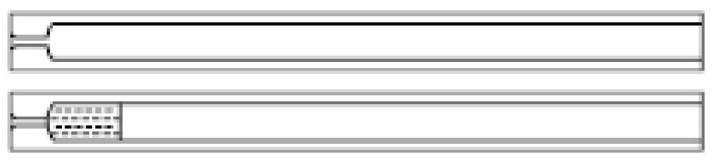
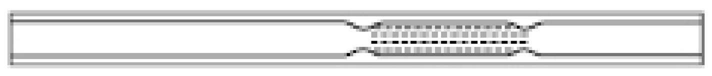
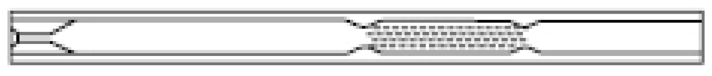
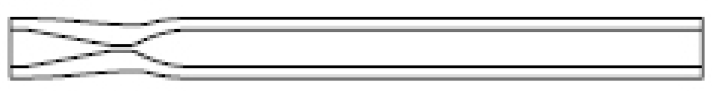
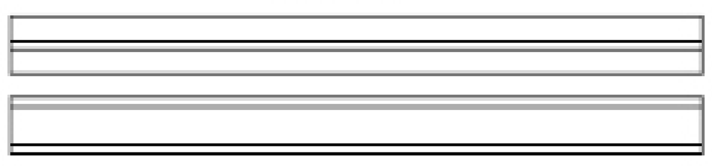
Syringe Volume	PTFE Tipped Plunger	P/N	Replacement Plunger	
			P/N	Qty
100 µL	√	221-75202-01	221-75202-03	1
250 µL	√	221-75202-02	221-75202-04	1

Phase	Qty	P/N for 100 µL syringe	P/N for 250 µL syringe
C18	5	221-75198-01	221-75199-01
Silica	5	221-75198-02	221-75199-02
C8 + SCX	5	221-75198-03	221-75199-03
C2	5	221-75198-04	221-75199-04
C8	5	221-75198-05	221-75199-05
Development Kit	1 each of C18, C8, Silica, C8+SCX, C2	221-75198-06	221-75199-06

GC Glass Insert

The GC inlet functions as the interface between the syringe and the GC capillary column, where the sample is introduced, vaporized, mixed with carrier gas and transferred to the column. Shimadzu instruments offer several types of inlets - split, splitless, programmable temperature vaporization (PTV) and on-column.

The glass insert prevents the sample contacting the metal walls of the injector block. Glass insert geometry and packing materials enable the glass insert to achieve greater heated surface area; this additional surface area can often improve sample vaporization. Conversely, choosing the wrong glass insert geometry can significantly decrease the reproducibility and quality of analysis.

Injection Technique	Sample Types	Glass insert Geometry	Function
Splitless	Trace Level Analyses/ Active Compounds	Taper 	A bottom taper focuses sample onto the head of the column and minimizes sample contact with metal parts of the inlet. The addition of quartz wool to your glass insert promotes mixing of analytes, aids the vaporization of liquid samples, and works as a trap to collect non-volatile residue in the sample (i.e. protects capillary column from 'dirty' samples).
Split	General Purpose/ Concentrated Samples/ Dirty Samples	FocusLiner™ 	Ensures quartz wool remains in the correct position in the liner. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation. Minimizes high molecular weight discrimination.
Splitless	Trace Level Analyses/ Dirty Samples/ Wide Boiling Point Range	Taper FocusLiner™ 	Bottom taper focuses sample onto the head of the column and minimizes contact with metal parts of the inlet. Excellent reproducibility results from the wiping of the sample from the syringe needle and the prevention of droplet formation. Minimizes high molecular weight discrimination.
Direct	Trace Level Analyses/ Active Compounds	Direct Taper 	Direct glass inserts facilitate maximum transfer of sample by connecting directly to the GC column and inhibiting sample degradation due to hot metal components inside inlet.
Split/Splitless	General Purpose/ Concentrated Samples/ Dirty Samples (only if quartz wool is present)/ Gaseous Samples (also purge & trap, headspace)	Straight 	Straight glass inserts facilitate higher split flows. Narrow bore straight glass inserts facilitate fast GC work. Small injection volumes of less than 0.5 µL are best used with a narrow bore. Narrow bore straight glass inserts improve focussing of gaseous samples (purge, trap & headspace).

Glass Insert Deactivation

Every batch of glass inserts are tested for inertness using the EPA 8081B method. This standard method ensures that each batch of glass inserts has less than 3 % Endrin breakdown from a 1 ppm injection.

Glass Insert for Capillary Column Analysis

Glass insert is very important to prevent the column from being contaminated by sample components. Please choose an appropriate insert according to your system model, injection port and injection method, and exchange it regularly to avoid poor reproducibility and peak shape caused by the crossover of residual samples, etc.

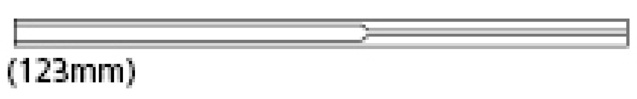
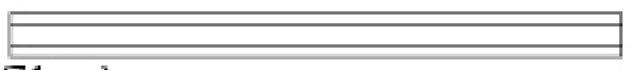
S: Standard; O: Option

Injection Port Side		P/N	Specification	Nexis GC-2030	GC-2010 Plus GC-2010 GC-2025	GC-2014	GC-17A ver. 1-3 GC-1700 GC-18A	GC-14A GC-14B	GC-8A
			Injection Unit →	SPL-2030	SPL-2010 Plus SPL-2010 SPL-2025	SPL-2014	SPL-17	SPL-14	SPL-G9
Split/Splitless Injection Method	For Split	221-41444	(ID 3.5mm; OD 5mm; Length 95mm)	O	O	S	S		
Split/Splitless Injection Method	For Split	221-41444-01	(ID 3.5mm; OD 5mm; Length 95mm)	O	S		O		
Split/Splitless Injection Method	For Split	221-37574-01	(99mm)					S	
Split/Splitless Injection Method	For Split	221-25822-03	(87mm)						S
Split/Splitless Injection Method	For Split	227-35007-01	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	S	O	O	O		
Split/Splitless Injection Method	For Splitless	221-48335-01	(ID 3.5mm; OD 5mm; Length 95mm)		S	S	O		
Split/Splitless Injection Method	For Splitless	221-41544	(95mm)		O	O	S		
Split/Splitless Injection Method	For Splitless	221-75192	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)		O	O			
Split/Splitless Injection Method	For Splitless	221-32544	(99mm)					S	
Split/Splitless Injection Method	For Splitless	221-25944-03	(87mm)						S
Split/Splitless Injection Method	For Splitless	227-35008-01	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool*2, 5pcs)	S	O	O	O		
Split/Splitless Injection Method	For Split and Splitless	221-75187	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	O	O	O			
Split/Splitless Injection Method	For Split and Splitless	221-75188	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle onto wool, 5pcs)	O	O	O			
Split/Splitless Injection Method	For Split and Splitless	221-75189	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle into wool, 5pcs)	O	O	O			
Split/Splitless Injection Method	For Split and Splitless	221-75190	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, Straight Through, 5pcs)	O	O	O			
Split/Splitless Injection Method	For Split and Splitless	221-75191	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, needle into wool, 5pcs)	O	O	O			
Split/Splitless Injection Method	For Split and Splitless	221-75193	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)	O	O				
Split/Splitless Injection Method	For Split and Splitless	221-75194	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)	O	O				
Split/Splitless Injection Method	For Split and Splitless	221-41444-05	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, 5pcs)			O			
Split/Splitless Injection Method	For Split and Splitless	221-41544-05	(ID 2.6mm; OD 5mm; Length 95mm, Deactivated, 5pcs)			O			
Split/Splitless Injection Method	For Split and Splitless	221-75195	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool, 5pcs)			O			
			Injection Unit →	WBI-2030	WBI-2010 Plus WBI-2010	WBI-2014	WBI-17		
Direct Injection Method (WBI)		221-41599	(95mm)	O	O	O	S		
Direct Injection Method (WBI)		221-48335-01	(ID 3.5mm; OD 5mm; Length 95mm)	S	S (WBI-2010)	S	O		
Direct Injection Method (WBI)		221-75197	(ID 3.4mm; OD 5mm; Length 95mm, Deactivated, with wool*2, 5pcs)		O	O			
Direct Injection Method (WBI)		221-41599-05	(ID 2.6mm; OD 5mm; Length 95mm, Deactivated, for 0.53mmID column, 5pcs)			O			
		P/N	Specification	Nexis GC-2030	GC-2010 Plus GC-2010 GC-2025	GC-2014	GC-17A ver. 1-3 GC-1700 GC-18A	GC-14A GC-14B	GC-8A
			Injection Unit →	SPL-2030	SPL-2010 Plus	SPL-2014	SPL-17	SPL-14	SPL-G9
For SPME		221-75196*	(ID 0.75mm; OD 5mm; Length 95mm, Deactivated, 5pcs)	O	O	O			
For HS 10		221-76863-73	(ID 1.2mm; OD 5mm, Length 95mm, Deactivated, 5pcs)	S	S	S			
WBC Attach-ment		221-38107 *1	(139mm)			S		S	
WBC Attach-ment		221-39148	(86 mm)						S

*1 Required if the WBC Attachment is used for a packed column injection in GC-2014, Insert for GC-14 septum purge unit is P/N: 221-38151-04
*2 Wool is 25mm from the top of insert.
* Can be used for AOC-6000 SPME

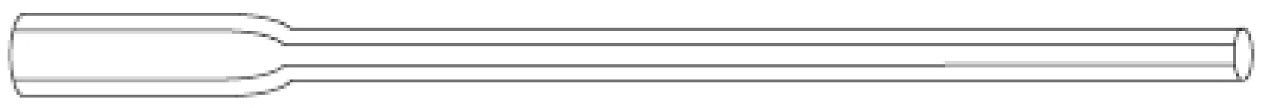
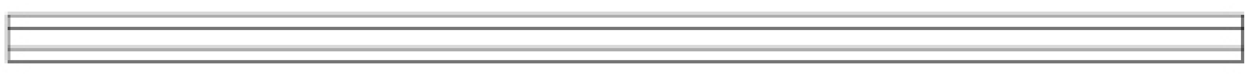
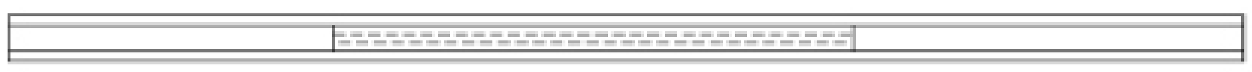
Glass Insert for Capillary Column Analysis

S: Standard; O: Option

			Injection Unit →	WBI-2030	WBI-2010 Plus WBI-2010	WBI-2014	WBI-17	SPL-14	SPL-G9
For CLH-14	Injection Port Side	221-32998-01	 (123mm)					S	
	Detector Side	221-33000	 (71mm)					S	
For CLH-800	Injection Port Side	221-18384-04	 (78mm, for split injection method)						S
	Detector Side	221-18756-02	 (78mm)						S

Glass Insert for OCI / PTV

S: Standard; O: Option

	P/N	Injection Unit →	Nexis GC-2030	GC-2010 / GC-2010 Plus	GC-17
			OCI-2030	OCI/PTV-2010 *1	OCI/PTV-17 *2
Simple On-column Injection Method	221-49381-01		O	O	
	221-49381-02	 (deactivated)	O	O	
	P/N	Specification / Injection Unit →	PTV-2030	OCI/PTV-2010*1	OCI/PTV-17*2
PTV Injection Method	221-42223				S
	221-49300	 (ID 1.5mm; OD 3.5mm; Length 95mm, quartz)	S	S	
	221-74830-09	 (for AOC-MEPS™ system, deactivated, with wool, 5 pcs)	O	O	

*1 GC-2010 OCI requires an additional adapter (P/N: 221-49298-91).
*2 GC-17 OCI requires an additional adapter (P/N: 221-42222-91).

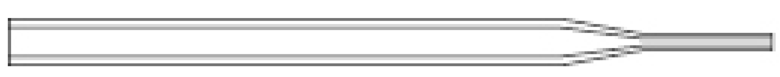
Glass Insert for Packed Column Analysis

When using a glass column, one may add a glass insert to prevent the column from accumulating non-volatile components. Please choose a proper insert according to the inter diameter of the glass column.

When using a stainless column, it is necessary to connect a glass insert to a 3.0 mmID column at the side of the injection unit. Please exchange it regularly to avoid poor reproducibility and peak shape caused by the crossover of residual sample, etc.

Note: Glass insert cannot be used in a GC-8A Series instrument when using glass columns.

S: Standard; O: Option

	P/N	Specification	GC-2014	GC-17A ver. 1-3	GC-14A/B
Injection Port Side	221-41484			O	
	221-14093	 (for 3.0 mmID column)	S		S
	221-14093-84	 (for 3.0 mmID column, 5 pcs)	O		O
	221-14094	 (for 2.6 mmID column)	S		S
	221-14094-84	 (for 2.6 mmID column, 5 pcs)	O		O

* GC for packed column analysis includes one insert for a 3.0 mmID column and one insert for a 2.6 mmID column as standard accessories.

Ferrules

Ferrules are available in a variety of different materials, shapes and sizes depending on their use, the instrument and the size of the capillary column being used. Probably the most important but difficult aspect of choosing a ferrule is the selection of the material type. The table below will help you choose the appropriate ferrule material for your application.

When choosing ferrules ensure you consider the following:

1) The material that best suits your application.

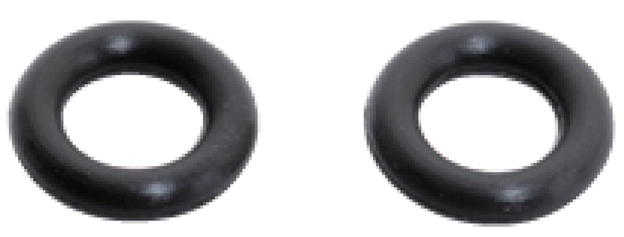
2) The connection type you want.

The following selection table will assist with your decision.

Ferrule Material Type	Graphite	Graphite Vespel®	SilTite™ Metal	ClickTek Ferrule
				
Features	• Easy to use. • Forms a stable seal. • Soft material. • Porous to oxygen. • Can be reused. • Forms a soft grip with capillary column. • Low emissions.	• A composite of graphite and Vespel®. • Mechanically robust. • Hard material, long lifetime. • Forms a strong grip with capillary column. • Cannot be reused with another capillary column. • Requires re-tightening.	• Specifically developed to overcome the problems associated with the use of 100% graphite and composite ferrules. • Strong seal on capillary columns. • Leak free - The ferrule and nut expand and contract at the same rate eliminating any chance of leaks with temperature cycling. • Nut does not need re-tightening after initial temperature cycles.	• Easy to use • Leak free • Specially designed to use with ClickTek Connector on Nexis GC-2030 • Cannot be reused with another capillary column • Not suitable for stainless steel column
Suitable Uses	• Column to injector connection. • Non-mass spectrometer detectors (FID, TCD, FTD, FPD, ECD, BID).	MS interfaces, although even with a good seal will leak air compared to SilTite™ ferrules.	Ideal for MS interfaces and advanced flow technology due to leak-free	• Column to injector connection • Non-mass spectrometer detectors (FID, TCD, FTD, FPD, ECD, BID).
Not Suitable For	Connecting columns to mass spectrometers, as porous to oxygen.	High temperature applications.	–	–
Risks	• Can leave residue inside your column. • Can extrude into the injector or detector if it is over-tightened.	If not re-tightened after installation and temperature cycles of the GC, air may enter the column or detector decreasing sensitivity of the analysis and possibly degrading the column as well as components of the system.	Over-tightening of the seal can introduce leaks into the system. Follow the recommended installation instructions to avoid this problem.	–
Operating Temperature	Upper limit of 450 °C	Upper limit of 325 °C	No temperature limit in GC use.	–

Description	Specification	P/N
Graphite Ferrule (10 pcs)	For 5 mmOD packed columns	221-75182
Graphite Ferrule (10 pcs)	For 0.25 - 0.32 mmID columns	227-35006-01
Graphite Ferrule (10 pcs)	For 0.53 mmID columns	227-35009-01
Graphite Vespel® Ferrule (10 pcs)	No hole	670-15003-01
Graphite Vespel® Ferrule (10 pcs)	For 0.32 mmID columns	670-15003-04
Graphite Vespel® Ferrule (10 pcs)	For 0.53 mmID columns	670-15003-07
Graphite Vespel® Ferrule (10 pcs)	For 0.05 - 0.25 mmID columns	670-15003-03
SilTite™ Metal Ferrule (10 pcs)	For 0.05 - 0.25 mmID columns	221-72563-04
SilTite™ Metal Ferrule (10 pcs)	For 0.32 mmID columns	221-72563-05
SilTite™ Metal Ferrule (10 pcs)	For 0.53 mmID columns	221-72563-08
SilTite™ Metal Ferrule (10 pcs)	For 1/32” ID columns	221-75200-04
SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.05 - 0.25 mmID columns	221-75200
SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.32 mmID columns	221-75200-01
SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 0.53 mmID columns	221-75200-02
SilTite™ Kit (10 pcs ferrules, 2 pcs nuts)	For 1/32” ID columns	221-75200-03
SilTite™ Nut 10/32" 0.8 mm ID Column (5 pc)	–	221-75186
ClickTek Ferrule Kit	Narrow bore 0.43, includes 6 ferrules and prefixing tool (for 0.05 - 0.25 mmID columns)	221-81162-01
ClickTek Ferrule Kit	Middle bore 0.50, includes 6 ferrules and prefixing tool (for 0.32 mmID columns)	221-81162-02
ClickTek Ferrule Kit	Wide bore 0.73, includes 6 ferrules and prefixing tool (for 0.53 mmID columns)	221-81162-03
ClickTek Ferrule	No Hole (for blinding)	221-81162-00

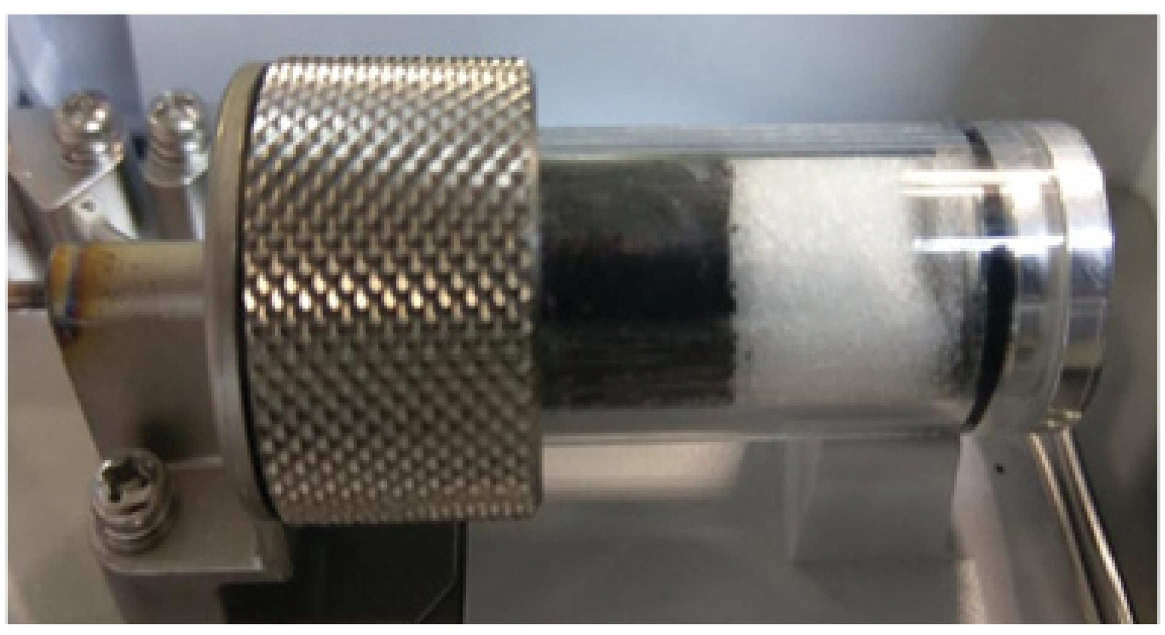
Other Accessories	
Description	P/N
Capillary Ceramic Tube Cutter (3 pc)	221-75181
Stainless Steel Nut/ SSNE-16-012S (Pk 5)	670-11009
O-ring for insert, Max. Temp. 350 °C (10pcs)	227-35005-01
Filter for split, for Nexis GC-2030	221-77580-42



O-ring for insert

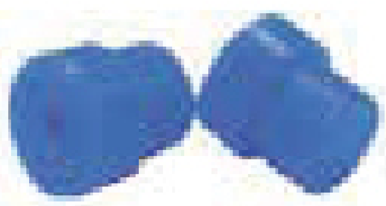
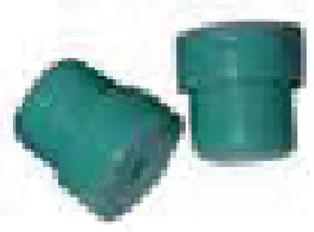
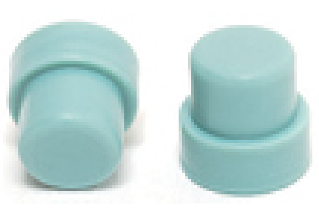
Capillary Ceramic tube cutter

Stainless Steel Nut



Filter for split, for Nexis GC-2030

Injection Port Septum

Description	P/N	Color	Description
Standard type (20 pcs) 	201-35584	White	• General-purpose septum • Maximum temperature (INJ setting temperature): 250 °C
LL Septum (long life type, 20 pcs) 	221-48972-91	Blue	Provides significant durability improvements compared to a conventional low-bleed septum, offering both low bleed and long life. The problem of sticking to the vaporizing chamber during continuous use at high temperatures experienced with a conventional septum has also been eliminated. • Suitable for high-sensitivity analysis • Maximum temperature (INJ setting temperature): 450°C
HT Septum (high temp type, 20 pcs) 	221-48398-91	Brown	Using this septum alleviates the problem of reduced durability when the vaporizing chamber is used continuously at 450°C. Compared to the LL septum, the increase in bleed when used at high temperatures is kept at a lower level. The problem of sticking to the vaporizing chamber during continuous use at high temperatures experienced with a conventional septum has also been eliminated. • Suitable for high-sensitivity analysis at high temperatures • Maximum temperature (INJ setting temperature): 450°C
Low-bleed Septum (25 pcs) 	221-76650-01	Green	This septum is least influenced by a plasticizer. Better prevents septum coring & • Low-bleed, suitable for high-sensitivity analysis • Maximum temperature (INJ setting temperature): 340°C
Enduro Blue Septum (50 pcs) 	221-75180	Light Blue	• Low-bleed, suitable for high-sensitivity analysis at high temperatures • Maximum temperature (INJ setting temperature): 350°C
Premium Green Septa (50 pcs) 	227-35004-01	Light green	• Low bleed, highly robust (max. usable temp. 350°C) • High durability, proper sealing and good resistance to most chemical solvents. • Useful for trace analysis and other applications where high sensitivity is critical
Perforated septum for HS-10 	221-76863-96	White	• For HS-10 only • To ensure cleanliness and inertness • Maximum temperature (INJ setting temperature): 250 °C

Low-bleed septum is not completely free of bleeding. The type of bleeding that occurs varies with the septum, and results in different patterns on chromatograms. In the case of high-sensitivity analysis, it is necessary to select a septum whose bleeding will not occur at a point that interferes with the peak of the target compound. Conditioning for several hours between 200°C and 250°C after extraction with hexane may help to reduce bleeding.

In the case of using a syringe for AOC, it is recommended to exchange the septum after about 100 injections. If the outside diameter of a needle of a gastight syringe is thick, it is recommended to exchange after about 50 injections.

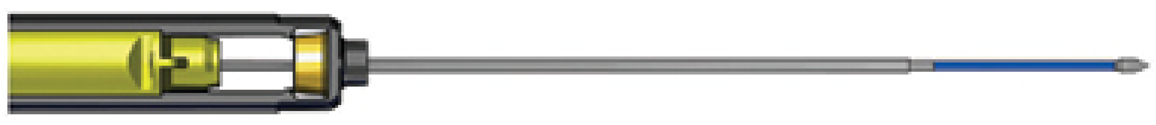
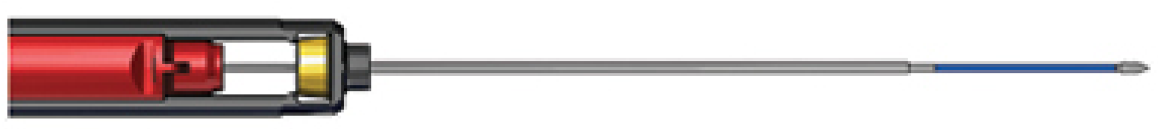
Shimadzu SPME Arrow

Ferrules are available in a variety of different materials, shapes and sizes depending on their use, the instrument and the size of the capillary column being used. Probably the most important but difficult aspect of choosing a ferrule is the selection of the material type. The table below will help you choose the appropriate ferrule material for your application.

Features:

- Each SPME Arrow is equipped with its unique Smart chip containing parameters, ranges and usage history.
- Automatic application of the correct parameters for the individual Smart Arrow.
- Color Code for easy optical identification of coating type and thickness
- Rugged stainless-steel construction ensures longer lifetimes.
- Faster extraction means higher sample throughput.
- Better sensitivity allows lower LODs.

The table below shows the dimension of a Shimadzu SPME Arrow 1.5 mm (a), 1.1 mm (b) and a SPME Fiber (c) in comparison:

		Sorption Phase Surface	Sorption Phase Volume
a		62.8 m²	11.8 µL
b		44.0 m²	3.8 µL
c		9.4 m²	0.6 µL

Stationary Phase	Color Code	Thickness (µm)	O.D. (mm)	Analytes	Set of 1 Part Number	Set of 3 Part Number	Set of 5 Part Number
Acrylate (Polyacrylate)	Grey	100	1.1	Polar, semivolatile, 80–300 g/mol	227-35301-01*^	227-35301-03	227-35301-05
Carbon WR/PDMS (Carbon Wide Range)	Light Blue	120	1.1	Highly volatile, 30–225 g/mol	227-35302-01*^	227-35302-03	227-35302-05
			1.5		227-35306-01	227-35306-03	227-35306-05
PDMS (Polydimethylsiloxane)	Red	100	1.1	Volatile, 60–275 g/mol	227-35305-01*^	227-35305-03	227-35305-05
			1.5		227-35309-01	227-35309-03	227-35309-05
	Black	250	1.5	Volatile, 60–275 g/mol (high capacity)	227-35310-01*	227-35310-03	227-35310-05
DVB/PDMS (Divinylbenzene)	Violet	120	1.1	Amines and polar compounds, 60–300 g/mol	227-35303-01*^	227-35303-03	227-35303-05
			1.5	Aromatic semi-volatile, 60–300 g/mol	227-35308-01	227-35308-03	227-35308-05
DVB/Carbon WR/PDMS (Divinylbenzene)	Dark Grey	120	1.1	Volatile and semi-volatile, 40–275 g/mol	227-35304-01^	227-35304-03	227-35304-05
			1.5		227-35307-01	227-35307-03	227-35307-05
Shimadzu SPME Arrow Selection5-Set1 Set of 5; includes 1pc of each type listed above with a *							227-35311-01
Shimadzu SPME Arrow Selection5-Set2 Set of 5; includes 1pc of each type listed above with a ^							227-35312-01

All Shimadzu SPME Arrows have a phase length of 20mm bonded onto stainless steel.
Recommended maximum GC inlet pressure is 50 psi or less.

Shimadzu SPME Arrow glass insert

Part number	Inner diameter (mm)	Injection method	GC Model	Pack size
227-35327-03	1.3	Split/Splitless	2010	3
227-35328-03	1.7	Split/Splitless	2010	3

Shimadzu SPME Fiber

SPME is a very effective way of automated sample preparation. It is used for extracting organics from a matrix (solid, liquid or gaseous) into a stationary phase immobilized on a fiber. The analytes are thermally desorbed directly in the injector of a gas chromatograph.

Shimadzu SPME fibers are suitable for a wide range of analyte chemistries and sample matrices. Choose the best SPME fiber for your application based on the properties of your target compounds.

Typical Applications:

- Trace analysis in food
- Drugs and pharmaceuticals
- Herbicides/pesticides
- Medical diagnostics
- Organics in water
- Trace impurities in polymers and solid samples
- Solvent residues in raw materials

Stationary Phase	Color Code	Thickness (µm)	Analytes	Set of 1 Part Number	Set of 3 Part Number	Set of 5 Part Number
PDMS (Polydimethylsiloxane)	Green	7	Non-polar, 125 - 600 g/mol	227-35313-01*	227-35313-03	227-35313-05
	Gold	30	Non-polar semi-volatiles, 80 – 500 g/mol	227-35314-01*	227-35314-03	227-35314-05
	Red	100	Volatiles, 60 – 275 g/mol	227-35315-01*^	227-35315-03	227-35315-05
DVB/Carbon WR/PDMS (Divinylbenzene)	Dark grey	80	Volatile and semi-volatile, 40-275 g/mol	227-35316-01^	227-35316-03	227-35316-05
DVB/PDMS (Divinylbenzene)	Violet	65	Aromatic, semi-volatile, 50-300 g/mol	227-35317-01^	227-35317-03	227-35317-05
Carbon WR/PDMS (Carbon Wide Range)	Dark Blue	95	Gases and low molecular weight compounds, 30 – 225 g/mol	227-35318-01*^	227-35318-03	227-35318-05
Acrylate (Polyacrylate)	Grey	85	Polar semi-volatiles, 80 -300 g/mol	227-35319-01*^	227-35319-03	227-35319-05
Shimadzu SPME Fiber Selection5-Set1 Set of 5; includes 1pc of each type listed above with a *						227-35320-01
Shimadzu SPME Fiber Selection5-Set1 Set of 5; includes 1pc of each type listed above with a ^						227-35321-01

All Shimadzu SPME fibers have a phase length length of 10 mm, gauge 23 and the core material is fused silica.
They can be used for a wide range of GC injector models. Recommended maximum GC inlet pressure is 50 psi or less.

Shimadzu SPME Fiber Glass Insert

Part number	Inner diameter (mm)	Injection method	GC Model	Pack size
227-35322-01	0.8	Split/Splitless	2010	1
227-35322-03		Split/Splitless	2010	3

CoreFocus
SHIMADZU

Gas Filtration

Gas Filtration

Ensuring a Super-Clean Analytical Journey

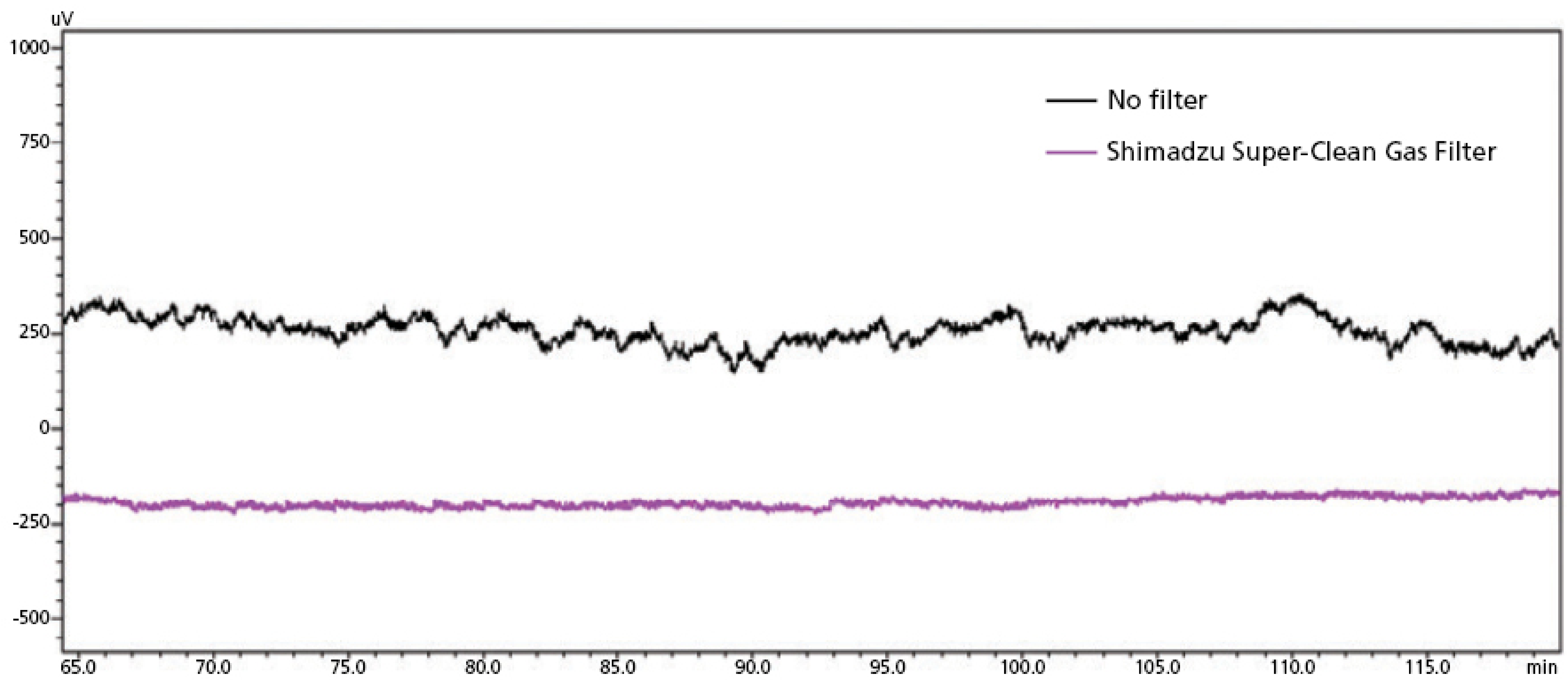
Impurities in gases, such as hydrocarbons, moisture and oxygen, can contaminate the gas line and instrument, cause column degradation and affect the accuracy of your analysis results, which may lead to instrument downtime. Even though high-purity gases are used, contaminants may result from pressure regulators or other parts of the gas line. Therefore, an additional gas filter is essential.

Introducing the *Shimadzu Super-Clean Gas Filter!*

Example of Shimadzu Gas Filter Kit for GC-FID

Ensure High-purity Gas

The Shimadzu Super-Clean Gas Filter can remove the impurities (hydrocarbons, moisture and oxygen) and outlet 99.9999% pure gas. The use of high-purity and contaminant-free gases reduces column degradation, prevents ghost peaks and baseline fluctuations, eliminates excessive detector noise, and keeps your instrument in good working performance.



Using the Shimadzu Super-Clean Gas Filter results in significantly lower detector noise.

Easy and Leak-tight Replacement

As long as there is no filter cartridge connected, the spring-loaded check valves block the gas stream automatically.

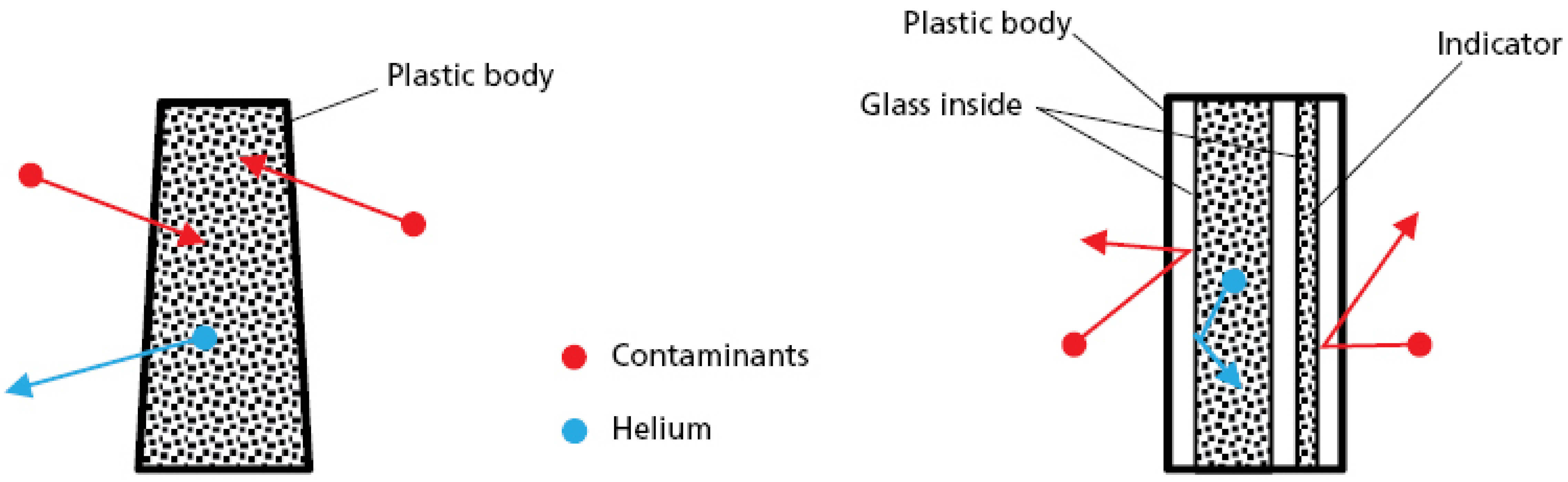
Installing the filter

The design of the Shimadzu Super-Clean Gas Filter makes it possible to replace filter cartridges quickly and easily without any tools. Spring-loaded check valves seal when a cartridge is removed and open only when a new cartridge has been locked in place, which prevents contamination of the system during the replacement process.

Swagelok connector can be connected directly to the Shimadzu gas supply pipe, ensuring a leak free and completely clean gas line

Unique Body Design

A plastic body helps with checking the indicators and replacing the filter cartridges. However, it also allows contaminants to diffuse into the instrument and cause helium to leak. To address this issue, the Shimadzu Super-Clean Gas Filter has been designed to pack the absorbents in glass inside the plastic body, thereby preventing diffusion.



Other filter with plastic body

Shimadzu Super-Clean Gas Filter

Easy-to-read Indicator

The Shimadzu Super-Clean Gas Filter is designed with an easy-to-read indicator. It changes color when the absorbent is saturated, indicating when filter cartridges should be replaced.

Before using

If absorbent is saturated, the indicator changes color

Gas Filtration

Connection Diagrams

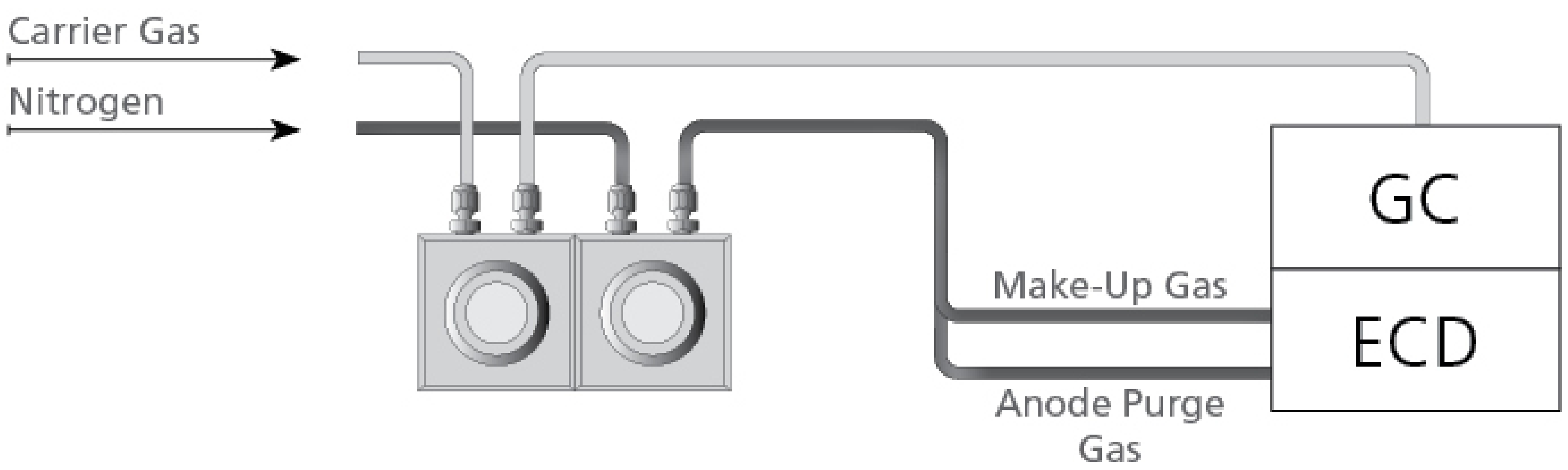
GC / MS (ITD/MSD)

Product	Part No.	Qty
Triple Filter	226-50751-00	1
1 Position Base plate	226-50771-00	1
Kit Part Number	226-50710-00	

TOC Analyzer

Product	Part No.	Qty
CO_2 / Moisture Filter	226-50759-00	1
1 Position Base plate	226-50771-00	1
Kit Part Number	226-50779-00	

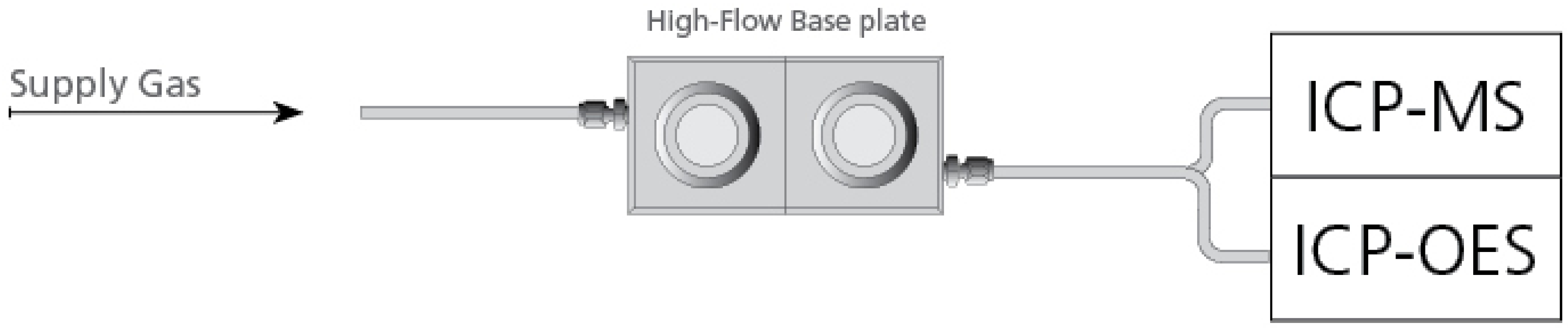
GC / ECD



Product	Part No.	Qty
Triple Helium Filter	226-50752-00	1
Oxygen/Moisture Filter	226-50758-00	1
2 Position Base plate	226-50772-00	1
Kit Part Number	226-50780-00	

ICP-OES / ICP-MS

Plasma Gas = Nebulizer Gas

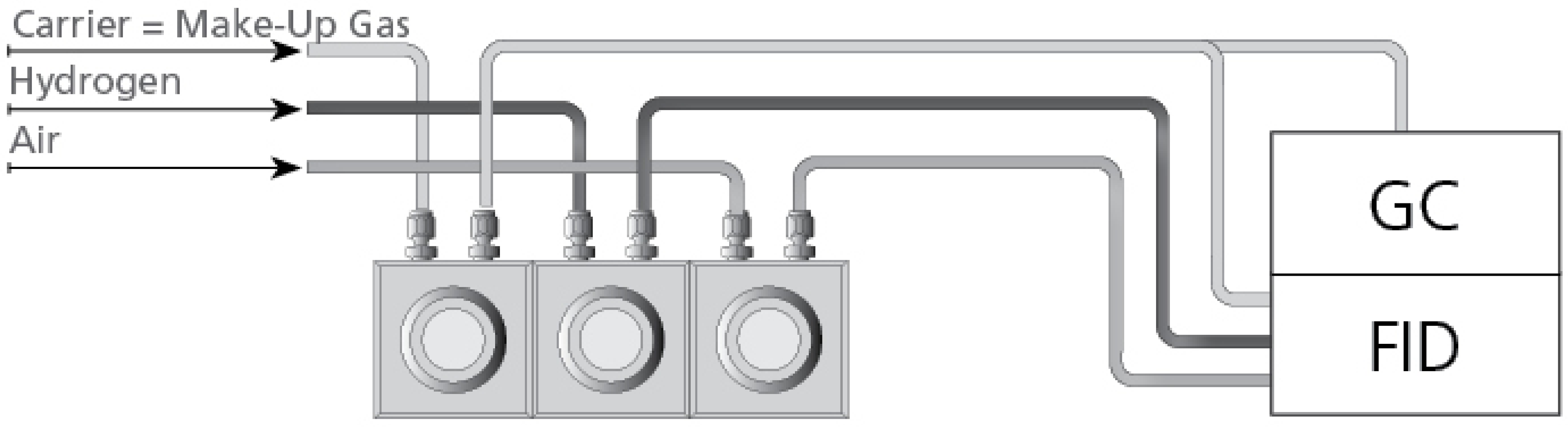


Product	Part No.	Qty
High Flow Oxygen/Moisture Filter Bundle	226-50766-00	1
ICP-MS Base plate	226-50776-00	1
Kit Part Number	226-50767-00	

Connection Diagrams

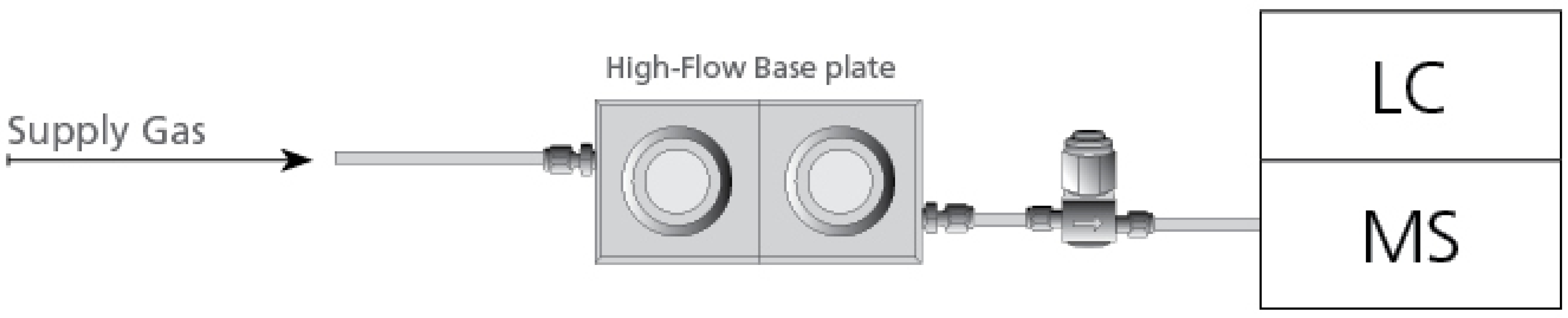
GC / FID

GC/FID Solution 2 (Carrier Gas = Make-Up Gas)

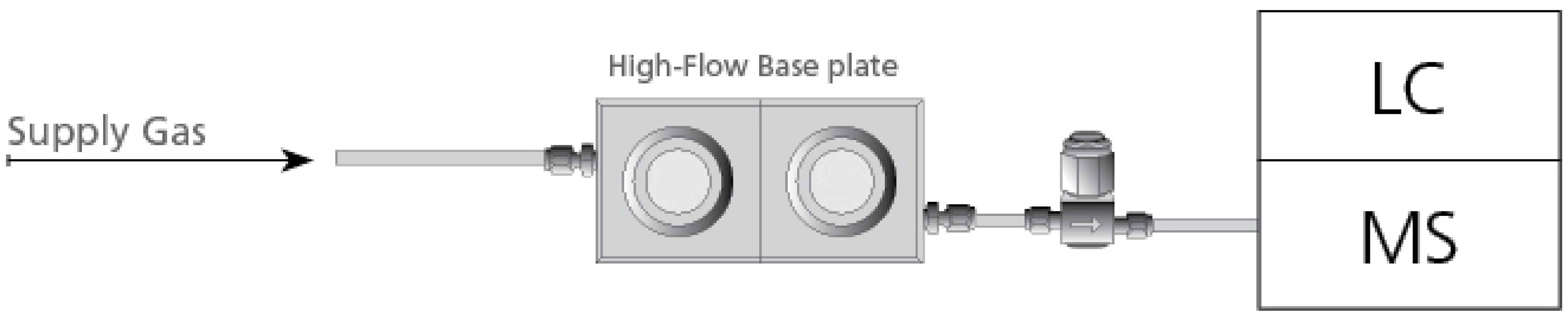


Product	Part No.	Qty
Triple Filter	226-50751-00	1
Hydrocarbon/ Moisture Filter	226-50750-00	2
3 Position Base plate	226-50773-00	1
Kit Part Number	226-50730-00	

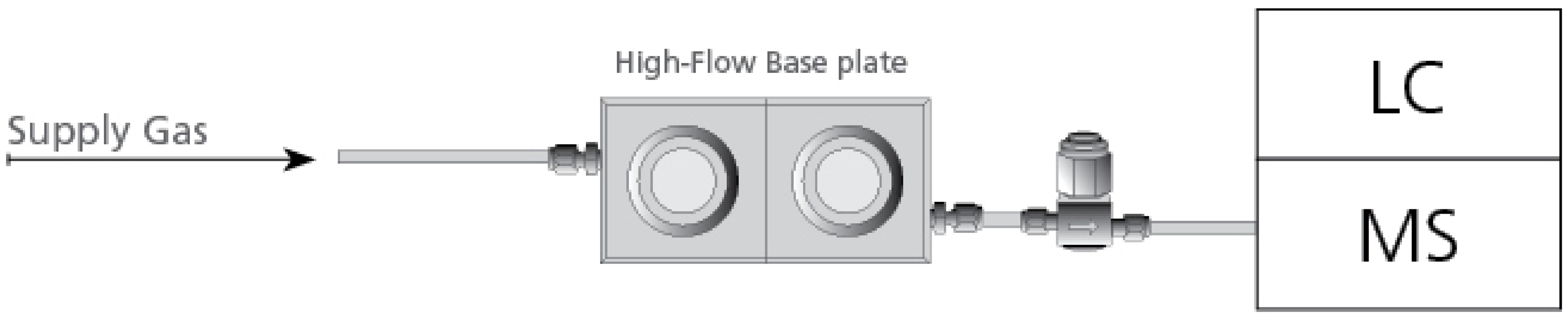
LC/MS



Product	Part No.	Qty
High Flow Hydrocarbon Filter Bundle	226-50760-00	1
Particle Filter	226-50794-01	1
High Flow Base plate	226-50775-01	1
Kit Part Number	226-50720-00	



Product	Part No.	Qty
High Flow Moisture Filter Bundle	226-50762-00	1
Particle Filter	226-50794-01	1
High Flow Base plate	226-50775-01	1
Kit Part Number	226-50722-00	



Product	Part No.	Qty
High Flow Hydrocarbon/ Moisture Filter Bundle	226-50764-00	1
Particle Filter	226-50794-01	1
High Flow Base plate	226-50775-01	1
Kit Part Number	226-50724-00	

Gas Filtration

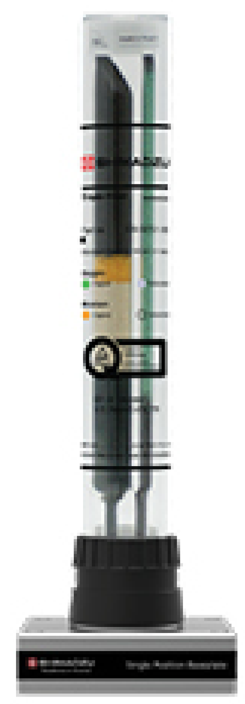
Installation Kits

GC/MS
TRIPLE FILTER KIT

The triple combination filter kit is ideal for purifying GC/MS carrier gases. It contains oxygen, moisture and hydrocarbon scrubbers in one easy to change economical cartridge

Catalog No. 226-50710-00
226-50712-00 (Helium)

Usable for	Benefit
GC/MS	Higher data accuracy and less maintenance
GC/TCD	Greater sensitivity and less maintenance



TOC
CO2/MOISTURE FILTER KIT

The carbon dioxide/moisture combination filter kit is ideal for TOC analysers and Zero-Air generators. It removes both carbon dioxide and moisture from gas streams.

Catalog No. 226-50779-00

Usable for	Benefit
TOC Analyzer	Greater sensitivity
Zero-Air generator	Cleaner gas

GC/ECD FILTER KIT

Removes oxygen, moisture and hydrocarbons from the carrier gas and removes moisture and oxygen from the make-up and purge gas.

Catalog No. 226-50780-00

Usable for	Benefit
GC/ECD	Greater sensitivity

ICP-MS
MOISTURE/OXYGEN FILTER KIT

Removes Oxygen and Moisture from gas streams.

Catalog No. 226-50767-00

Usable for	Benefit
ICP-MS	Greater sensitivity
ICP-OES	Greater sensitivity

Installation Kits

Catalog No.	226-50730-00
Usable for	**Benefit**
GC/FID	Greater sensitivity

FID
3 POSITION KIT

The FID Filter kit is the perfect all-in-one solution for purifying flame ionization detector (FID) fuel gases together with the carrier gas.
This kit removes hydrocarbons, moisture and oxygen from the carrier gas and removes both moisture and hydrocarbons from the Hydrogen and Air fuel gases.

Catalog No.	226-50720-00
Usable for	**Benefit**
LC/MS	Greater sensitivity

LC/MS
HYDROCARBON KIT

Up to 20 L/min. of hydrocarbon-free nitrogen per minute with this LC/MS High Flow Kit

Catalog No.	226-50722-00
Usable for	**Benefit**
LC/MS	Greater sensitivity

LC/MS
MOISTURE KIT

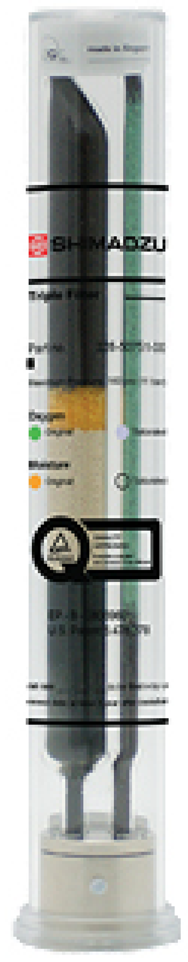
Up to 20 L/min. of moisture-free nitrogen per minute with this LC/MS High Flow Kit

Catalog No.	226-50724-00
Usable for	**Benefit**
LC/MS	Greater sensitivity

LC/MS COMBI (HYDROCARBON/MOISTURE) KIT

Removes Moisture and Hydrocarbons from high flow gas streams.

Replacement Filters

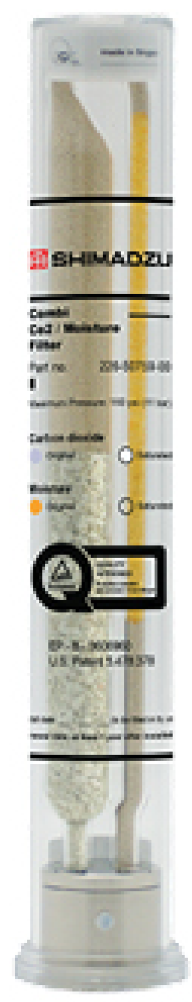


GC/MS TRIPLE (OXYGEN/MOISTURE/ HYDROCARBON) FILTER

The Triple trap is ideal for purifying carrier gas. It contains oxygen, moisture and hydrocarbon scrubbers in one easy to change economical cartridge

Capacity	
H_2O	1.8 g
O_2	75 mL
HC	4 g (as n-butane)

Replacement Filter for	GC/MS Triple Filter Kit (226-50710-00)
Catalog No.	226-50751-00 226-50752-00 (Helium) 226-50752-10 (Hydrogen)

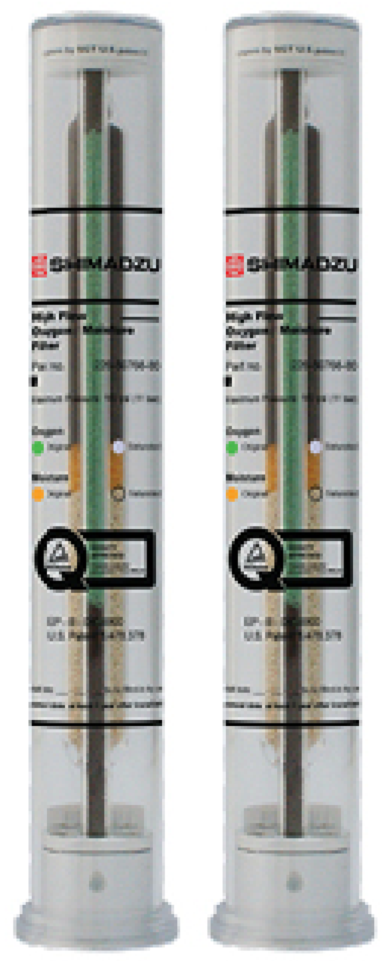


TOC COMBI (CARBON DIOXIDE/ MOISTURE) FILTER

Removes carbon dioxide and moisture from gas streams.

Capacity	
H_2O	3.5 g
CO_2	6 g

Replacement Filter for	TOC CO_2/Moisture Filter Kit (226-50779-00)
Catalog No.	226-50759-00

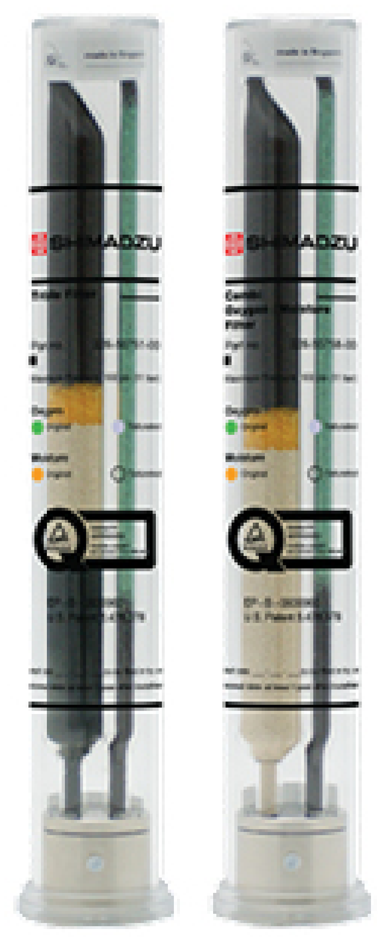


ICP-MS COMBI (OXYGEN/MOISTURE) FILTER BUNDLE

Removes Oxygen and Moisture from the ICP-MS supply gas stream. To be used in combination with a high flow ICP-MS base plate.

Capacity	
H_2O	7.2 g
O_2	150 mL

Replacement Filters for	ICP-MS Moisture/Oxygen Filter Kit (226-50767-00)
Catalog No.	226-50766-00



GC/ECD FILTER BUNDLE

Removes oxygen, moisture and hydrocarbons from the carrier gas and removes moisture and oxygen from the make-up and purge gas.

Capacity	
H_2O	1.8 g / 3.5
O_2	75 mL / 75 mL
HC	4 g (as n-butane)

Replacement Filters for	GC/ECD Filter Kit (226-50780-00)
Catalog No.	226-50781-00 includes: (1) 226-50752-00 and (1) 226-50758-00

Replacement Filters

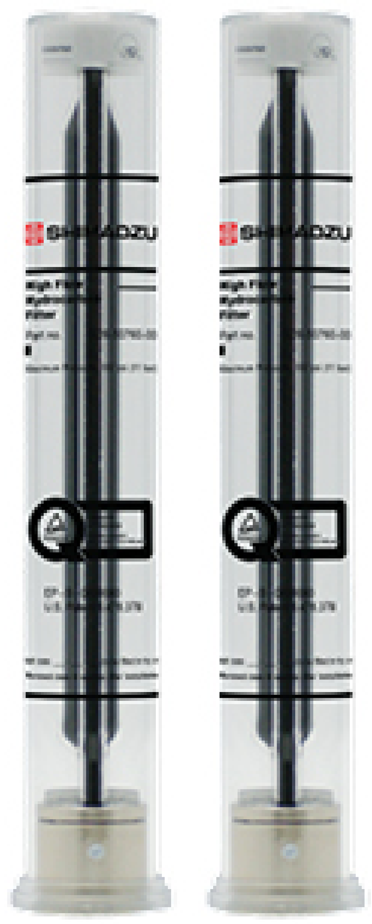
Replacement Filter for	FID 3 Position Filter Kit (226-50730-00)
Catalog No.	226-50761-00 includes: (1) 226-50751-00 and (2) 226-50750-00

FID
FILTER BUNDLE OF 3

Removes Oxygen and Moisture from high flow gas streams. To be used in combination with a high flow base plate.

Capacity	
H_2O	7.2 g
O_2	150 mL

Replacement Filter for	LC/MS Hydrocarbon Filter Kit (226-50720-00)
Catalog No.	226-50760-00



LC/MS
HIGH FLOW HYDROCARBON FILTER BUNDLE

Up to 20 L/min. of hydrocarbon-free nitrogen per minute. To be used in combination with a high flow base plate.

Capacity	
HC	24 g (as n-butane)

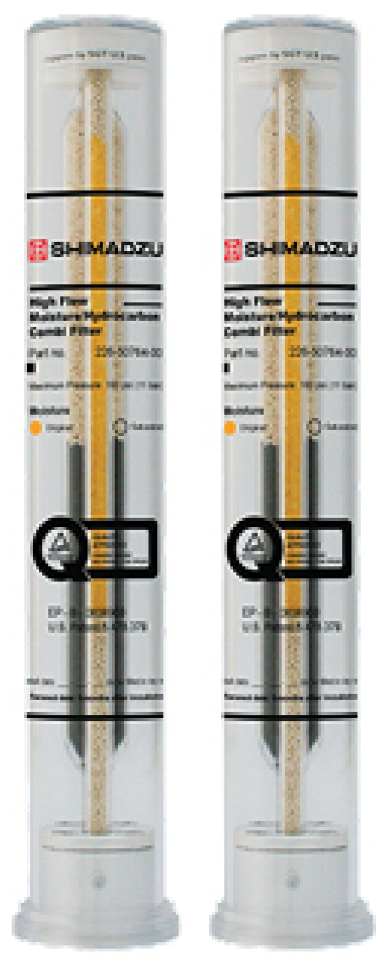
Replacement Filters for	LC/MS Moisture Filter Kit (226-50722-00)
Catalog No.	226-50762-00

LC/MS
HIGH FLOW MOISTURE FILTER BUNDLE

Removes moisture from high flow gas streams. To be used in combination with a high flow base plate.

Capacity	
H_2O	14.4 g

Replacement Filters for	LC/MS Combi (hydrocarbon/moisture) Filter Kit (226-50724-00)
Catalog No.	226-50764-00



LC/MS
HIGH FLOW COMBI (HYDROCARBON/ MOISTURE) FILTER BUNDLE

Removes Moisture and Hydrocarbons from high flow gas streams. To be used in combination with a high flow base plate.

Capacity	
HC	12 g (as n-butane)
H_2O	7.2 g

Gas Filtration

Single Filters

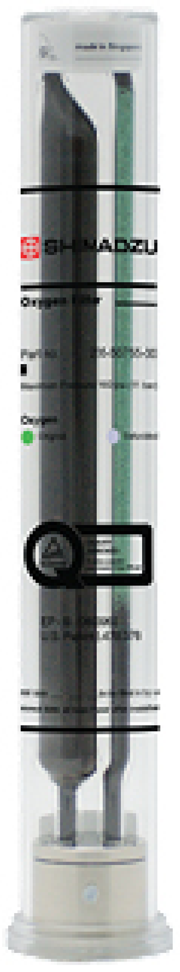
Catalog No.	226-50754-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR, Air
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

MOISTURE FILTER

Moisture in carrier gas lines will prematurely degrade oxygen and hydrocarbon traps and increase detector noise. As a precaution, we higly recommend installing a moisture trap before the hydrocarbon and oxygen traps on all carrier gas lines.

Capacity	
H_2O	7.2 g

Catalog No.	226-50755-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

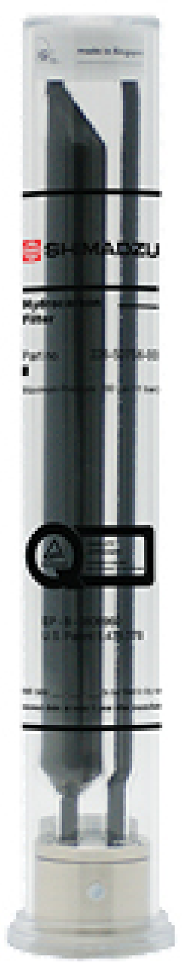


OXYGEN FILTER

Oxygen is a column killer. It is present even in UHP gases, as minutes leaks at fittings allow oxygen to influx against the concentration gradient. Because oxygen can enter a gas line at any fitting or during gas bottle exchange, the oxygen trap should be the last connection before the gas line enters the chromatograph.

Capacity	
O2	150 mL

Catalog No.	226-50756-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR, Air
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years



HYDROCARBON FILTER

Use a hydrocarbon trap if your gas has a potential source of hydrocarbon contaminants or if you suspect you are observing carrier gas ghost peaks. Install the hydrocarbon trap after the moisture trap, to prevent moisture from degrading the hydrocarbon-trapping ability of the activated carbon in the hydrocarbon trap.

Capacity	
HC	12 g (as n-butane)

Catalog No.	226-50757-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR, Air
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

CARBON DIOXIDE FILTER

Removes carbon dioxide from gas streams. To be used in combination with a Moisture Filter

Capacity	
CO2	12 g

COMBI Filters

Catalog No.	226-50750-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR, Air
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

COMBI (HYDROCARBON/MOISTURE) FILTER

The Fuel Gas Filter is perfect for purifying flame ionization detector (FID) fuel gases, removing both moisture and hydrocarbons. Using the Fuel Gas Filter for FID Hydrogen and air will produce a stable baseline, improving overall reproducability and sensitivity.

Capacity	
H_2O	3.5 g
HC	6 g (as n-butane)

Catalog No.	226-50758-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

COMBI (OXYGEN/MOISTURE) FILTER

This Combi trap is ideal for purifying carrier gas. It contains oxygen and moisture scrubbers in one easy to change economical cartridge

Capacity	
H_2O	3.5 g
HC	75 mL

Catalog No.	226-50759-00
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR, Air
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26 Kg
Estimated Lifetime	> 2 years

COMBI (CARBON DIOXIDE/ MOISTURE) FILTER

Removes carbon dioxide and moisture from gas streams.

Capacity	
H_2O	3.5 g
HC	6 g

Catalog No.	226-50751-00 226-50752-00 (Helium Specfic) 226-50752-10 (Hydrogen Specific)
Specifications	
Outlet Gas Quality (%)	> 99.9999
Maximum Pressure	11 bar (160 psi)
Maximum Flow	7 L/min.
Usable For	Inert carrier gas, He, H2, N2, AR
Dimensions	24 cm x Ø 4.4 cm
Weight	0.26kg
Estimated Lifetime	> 2 years

TRIPLE (OXYGEN/MOISTURE/ HYDROCARBON) FILTER

The Triple trap is ideal for purifying carrier gas. It contains oxygen, moisture and hydrocarbon scrubbers in one easy to change economical cartridge

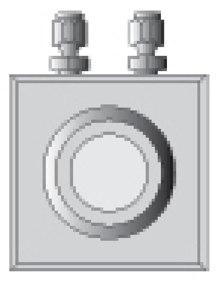
Capacity	
H_2O	1.8 g
O2	75 mL
HC	4 g (as n-butane)

Base Plates

1 POSITION BASE PLATE

Single position base plate

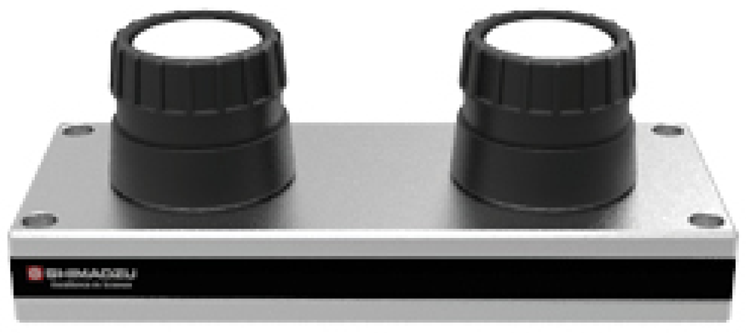
Catalog No.	Fitting Type
226-50771-00	1/8″ SS

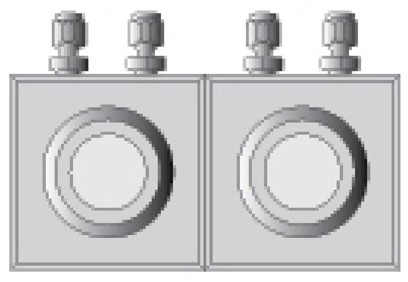


2 POSITION BASE PLATE

Double position base plate

Catalog No.	Fitting Type
226-50772-00	1/8″ SS

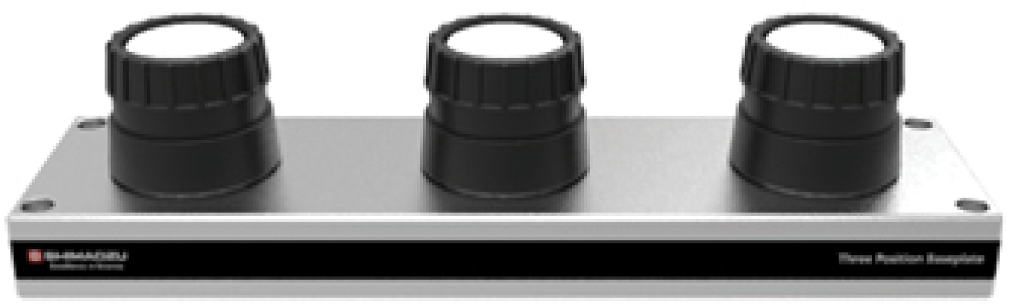


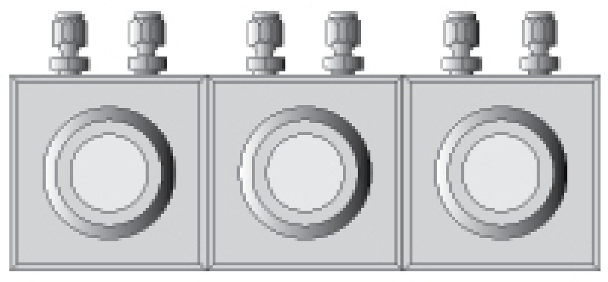


3 POSITION BASE PLATE

Three position base plate

Catalog No.	Fitting Type
226-50773-00	1/8″ SS

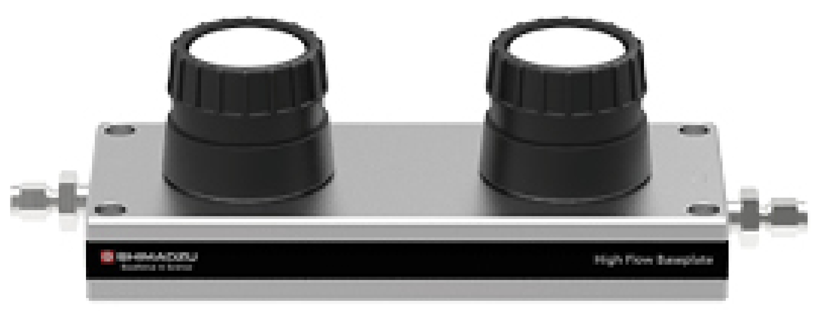


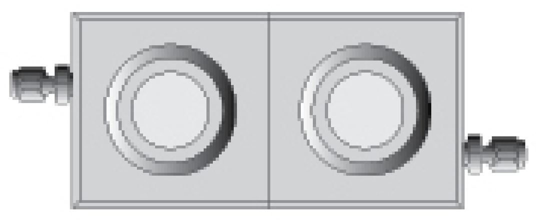


ICP-MS
HIGH FLOW BASE PLATE

High Flow Base plate for ICP-MS (in parallel)

Catalog No.	Fitting Type
226-50776-00	1/8″ SS

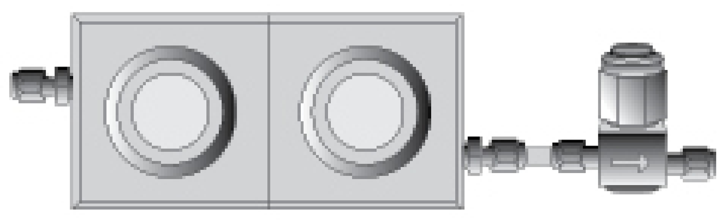




LC/MS
HIGH FLOW BASE PLATE

High Flow double position base plate (in parallel)

Catalog No.	Fitting Type
226-50775-01	1/4″ Brass
226-50775-00	1/4″ SS



Base Plate Accesories

Catalog No.	Clip Type
226-50798-00	Filter Cartridge
226-50797-00	Universal Ring Nut

Usable for

All base plates with Universal Ring Nut

ELECTRONIC INDICATOR

Electronic Maintenance Indicator device warns when scheduled filter replacement or base plate maintenance is due.

Catalog No.	226-50799-00

Usable for

All base plates

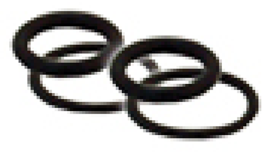
UNIVERSAL RING NUT

Universal Ring Nut to mount a filter or flush-cap on a base plate.

Catalog No.	226-50770-00

Usable for

All base plates



O-RING REPLACEMENT SET

O-ring replacement set for replacing the O-rings on the in- and outlet valves on a base plate.

Catalog No.	226-50790-00

Usable for

All base plates

WALL-MOUNT BRACKET SET

Wall mounting brackets to mount a Base plate on a wall.

Catalog No.	226-50796-00

Usable for

All base plates

UNIVERSAL FLUSH-CAP SET

Flush-cap that mounts on a base plate , and allows the gas to pass through the base plate without a filter attached.

Catalog No.	Connection Type
226-50792-01	1/4" Brass
226-50791-01	1/8" Brass
226-50792-00	1/4" SS
226-50791-00	1/8" SS

Usable for

1, 2, 3 and 4 position base plates

STANDARD BASE PLATE CONNECTOR SET

Replacement connectors for standard base plates.

Catalog No.	Connection Type
226-50793-01	1/4" Brass
226-50793-00	1/4" SS

Usable for

High flow base plates

HIGH FLOW BASE PLATE CONNECTOR SET

Replacement connector for high flow base plates.

Catalog No.	Description
226-50794-01	0.5 Micron Particle Filter (1/4" Brass)
226-50795-00	0.5 Micron Particle Filter Cup Replacement Pack

PARTICULATE FILTER

Particulate filter for high flow base plates.

Capillary Column Cutters

SHORTIX™ GC

In Gas chromatography, the Glass Quick-Fit connection is often used (e.g. for Retention Gaps, Guard Columns). This connection will only be leak-tight when the column is cut extremely straight and without any damage to the fused-silica column wall.

Catalog No.	226-50700-00
Specifications	
Usable For	Fused Silica Capillary Column Ø 0.5 Use with 0.25mm ID to 0.53mm ID tubing (0.78mm OD maximum).
Dimensions	9.2 cm x 1.7 cm x 1.7 cm
Weight	94 g

SHORTIX™ CE-CEC

For CE/CEC analyses, a clean and straight cut of the capillary column is needed to assure symetrical Field-Strength over the inlet of the column. When there is no symetrical Field-Strength, the analytical results will be non-reproducible.

Catalog No.	226-50700-01
Specifications	
Usable For	Fused Silica Capillary Column Ø 0.25micron
Dimensions	9.7 cm x 1.7 cm x 1.7 cm
Weight	94 g

MAINTENANCE KIT FOR SHORTIX TM GC

Includes diamond cutting wheel, O-rings and a tool to open the column cutter.

Catalog No.	226-50700-10
Specifications	
Usable For	Shortix™ GC

MAINTENANCE KIT FOR SHORTIX™ CE-CEC

Includes diamond cutting wheel, O-rings and a tool to open the column cutter.

Catalog No.	226-50700-11
Specifications	
Usable For	Shortix™ CE-CEC

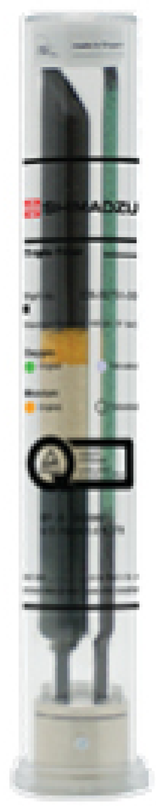
Gas Filter System Components

Base Plate

Connecting unit with in- and outlet connectors for the gas line and two spring-loaded check valves that automatically start the flow of gas once a filter is installed.

Filter Cartridge

The filter cartridges are made of glass to prevent diffusion, and protected by a plastic housing for safety. The PTFE seals at the base of the Filter will only be punctured during installation on the base plate.



Universal Ring Nut

The Universal Ring Nut is used for mounting a filter cartridge or flush-cap to a base plate. It can also serve as a mounting point for the Electronic Maintenance Indicator device.

Electronic Indicator

Optional Electronic Maintenance Indicator device warns when scheduled replacement or maintenance is due.

Wall Mount Bracket Set

Optional wall mounting brackets to mount a base plate to a wall.

CoreFocus SHIMADZU

Spectrum Consumables

UV Cells

The following table shows the wavelength range and tolerance for different window materials:

Window Material	Path lengths	Wavelength Range	Tolerance
Quartz	0.5 to 30mm	200 nm – 2500 nm	± 0.01mm
	40 to 100mm		± 0.02mm
Glass	up to 20mm	320 nm – 2500 nm	± 0.01mm
	30 to 100mm		± 0.02mm

Standard cell with PTFE Lid

- Open top, comes with either non-sealing PTFE cover or a stopper providing a liquid-tight seal.
- Two polished windows.
- Walls polished internally, fine ground externally.
- Suitable for use with all standard cell holders.

Cell with PTFE Lid

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell		Glass cell
			Single Cell	Matched Pair	Single cell
1	400	3.5 x 12.5 x 45	226-85101-01	226-85102-01	226-85111-01
2	700	4.5 x 12.5 x 45	226-85101-02	226-85102-02	226-85111-02
5	1700	7.5 x 12.5 x 45	226-85101-05	226-85102-05	226-85111-05
10	3500	12.5 x 12.5 x 45	226-85101-10	226-85102-10	226-85111-10
20	7000	22.5 x 12.5 x 45	226-85101-20	226-85102-20	226-85111-20
40	14000	42.5 x 12.5 x 45	226-85101-40	226-85102-40	226-85111-40
50	17500	52.5 x 12.5 x 45	226-85101-50	226-85102-50	226-85111-50
100	35000	102.5 x 12.5 x 45	226-85101-00	226-85102-00	226-85111-00

10mm Quartz Cell, 226-85101-10

Cell with stopper

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell	Glass cell
1	400	3.5 x 12.5 x 55	226-85201-01	226-85211-01
2	700	4.5 x 12.5 x 55	226-85201-02	226-85211-02
5	1700	7.5 x 12.5 x 48	226-85201-05	226-85211-05
10	3500	12.5 x 12.5 x 48	226-85201-10	226-85211-10
20	7000	22.5 x 12.5 x 48	226-85201-20	226-85211-20
40	14000	42.5 x 12.5 x 48	226-85201-40	226-85211-40
50	17500	52.5 x 12.5 x 48	226-85201-50	226-85211-50
100	35000	102.5 x 12.5 x 48	226-85201-00	226-85211-00

10mm Quartz Cell with stopper, 226-85201-10

Semi-Micro cell with PTFE Lid, Single cell

- Reduced nominal volume to <50% of Standard rectangular.
- Open top, comes with non-sealing PTFE cover.
- Two polished windows.
- Walls polished internally, fine ground externally.
- Suitable for use with all standard cell holders.
- Self-masking solid black walls enhance sensitivity and improve linearity at higher absorbances.

10mm Semi-Micro Quartz cell, 226-85301-10

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell	Glass cell	Black Quartz cell
5	700	7.5 x 12.5 x 45	226-85301-05	226-85311-05	226-85401-05
10	1400	12.5 x 12.5 x 45	226-85301-10	226-85311-10	226-85401-10
20	2800	22.5 x 12.5 x 45	226-85301-20	226-85311-25	226-85401-20
40	5600	42.5 x 12.5 x 45	226-85301-40	226-85311-40	226-85401-40
50	7000	52.5 x 12.5 x 45	226-85301-50	226-85311-50	226-85401-50

10mm Semi-Micro Quartz Black cell, 226-85401-10

Semi-Micro cell with PTFE Lid Black, Single cell – Lower sample volume

*9mm thick base, not suitable for an instrument with an 8.5mm 'Z' dimension

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell
10	1160	12.5 x 12.5 x 45	226-85401-99

10mm Semi-micro Quartz Black cell, 226-85401-99

Semi-Micro cell with PTFE Lid, Single cell – Lower sample volume

*9mm thick base, not suitable for an instrument with an 8.5mm 'Z' dimension

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell
10	1160	12.5 x 12.5 x 45	226-85501-10

10mm Semi-micro Quartz cell, 226-85501-10

Micro cells

- Reduced nominal volume to <20% of Standard rectangular.
- Open top, comes with non-sealing PTFE cover or a stopper providing a liquid-tight seal.
- Two polished windows.
- Walls polished internally, fine ground externally.
- Suitable for use with all standard cell holders.

Cell with PTFE Lid

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell	Glass cell
5	350	7.5 x 12.5 x 45	226-85601-05	226-85611-05
10	700	12.5 x 12.5 x 45	226-85601-10	226-85611-10
20	1400	22.5 x 12.5 x 45	226-85601-20	226-85611-20
40	2800	42.5 x 12.5 x 45	226-85601-40	226-85611-40
50	3500	52.5 x 12.5 x 45	226-85601-50	226-85611-50

10mm Micro Quartz cell, 226-85601-10

UV Cells

Micro cells

Cell with stopper

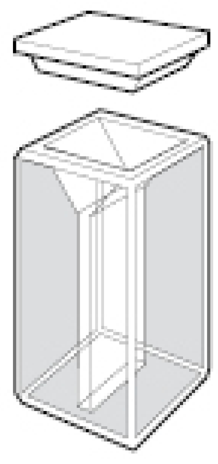
Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell	Glass cell	Black Quartz cell
5	350	7.5 x 15.5 x 48	226-86301-05	226-86311-05	226-85001-05
10	700	12.5 x 12.5 x 48	226-86301-10	226-86311-10	226-85001-10
20	1400	22.5 x 12.5 x 48	226-86301-20	226-86311-20	226-85001-20
40	2800	42.5 x 12.5 x 48	226-86301-40	226-86311-40	226-85001-40
50	3500	52.5 x 12.5 x 48	226-86301-50	226-86311-50	226-85001-50

10mm Micro Quartz Cell with stopper, 226-85001-10

Micro short cell

- Two polished windows.
- Open top, comes with non-sealing PTFE cover.
- Walls polished internally, fine ground externally.

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Type	Quartz cell
5	200	7.5 x 12.5 x 25	Clear	226-86101-05
10	400	12.5 x 12.5 x 25	Clear	226-86101-10
5	200	7.5 x 12.5 x 25	Black	226-89029-05
10	400	12.5 x 12.5 x 25	Black	226-89002-10



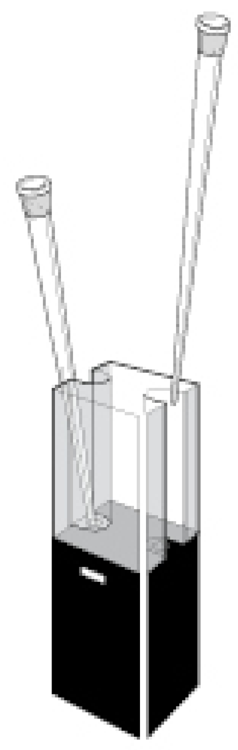
10mm Micro short Quartz Cell 226-86101-10

Ultra-micro lens cell

- Ultra-micro volume ranges from 0.5µl to 10µl.
- Two polished windows.
- Sample inserted and retrieved with micro pipette tip.
- Two micro pipette tips provided with each cell.

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / cm	*Z* Height	Quartz cell
0.1	0.5	12.5 x 12.5 x 45	15	226-89031-01
1	5	12.5 x 12.5 x 45	15	226-86201-01
5	2.5	12.5 x 12.5 x 45	15	226-86201-05
5	5	12.5 x 12.5 x 45	15	226-89001-05*
10	5	12.5 x 12.5 x 45	15	226-86201-10

*Has integral focusing lens which increases the energy entering the sample



0.1mm Ultra-micro Lens Quartz Cell, 226-89031-01

Cylindrical Cell, single cell

- Two polished windows.
- Closed by PTFE stopper, providing a liquid-tight seal.
- 10 & 20 mm cell closed by a single PTFE stopper
- 50 & 100 mm cell closed by two PTFE stoppers
- Internal diameter = 19mm

Light path /mm	Maximum Vol/µL	External Dimension (Dia. x L) / mm	Quartz cell	Glass cell
10	2800	22 x 12.5	226-85701-10	226-85711-10
20	5600	22 x 22.5	226-85701-20	226-85711-20
50	14100	22 x 52.5	226-85701-50	226-85711-50
100	28200	22 x 102.5	226-85701-00	226-85711-00


10mm Cylindrical Quartz Cell, 226-85701-10

Standard Fluorescence Cell with PTFE Lid, Single cell

- Open top, with non-sealing PTFE cover.
- Four windows and base polished.

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell	Glass cell
5	1700	7.5 x 12.5 x 45	226-85801-05	226-85811-05
10	3500	12.5 x 12.5 x 45	226-85801-10	226-85811-10
20	7000	22.5 x 12.5 x 45	226-85801-20	226-85811-20
40	14000	42.5 x 12.5 x 45	226-85801-40	226-85811-40


10mm Fluorescence Cell, 226-85801-10

Micro Fluorescence Cell with PTFE Lid, Single cell

- Four windows and base polished.
- Comes with non-sealing PTFE cover.
- Base thickness - 3mm
- Suitable for use with all standard cell holders.

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	Quartz cell
10	700	12.5 x 12.5 x 45	226-85901-10


Micro Fluorescence Cell, 226-85901-10

Flow cells

- Two polished windows, long aperture.
- Path lengths of 0.5mm or less incorporate by-pass tubes to avoid back pressure and assist laminar flow through the sample compartment.
- M6 Screw-in connections.
- Profiled sample compartment to optimize flow characteristics, reduces carry over and bubble retention.

Light path /mm	Maximum Vol/µL	External Dimension (L x W x H) / mm	*Z* Height	Quartz cell
0.1	41	12.5 x 12.5 x 45	15	226-89021-01
0.2	47	12.5 x 12.5 x 45	15	226-89022-02
0.5	95	12.5 x 12.5 x 45	15	226-89023-05
1	120	12.5 x 12.5 x 45	15	226-89024-10


0.5mm Flow Cell, 226-89023-05

Certified Glass Filter

Shimadzu Glass Filters are accepted by the following bodies:

- United States Pharmacopeia
- American Society for Testing and Materials
- Therapeutic Goods Administration (Australia)
- British Pharmacopoeia

Characteristics:

- Each glass filter is individually certified.
- Certificate of Calibration and Traceability are provided

Material	Part number	Wavelength range	Usage
Didymium	226-85009-01	430 nm to 890 nm	For wavelength analysis
Holmium Oxide	226-85009-02	240 nm to 640 nm	
Didymium Oxide/Neutral Density	226-85009-21	430 nm to 890 nm	For wavelength and absorbance analysis
Holmium Oxide/Neutral Density	226-85009-22	360 nm to 640 nm	

Accessories

Part Number	Description
226-80001-00	KBr Agate Mortar and Pestle, 5cm
226-89001-00	UV 10mm matched pair cell GSKit

Nano Stick - S

The optimized nano cuvette for concentration and purity measurements of DNA, RNA, oligonucleotides and proteins

Features:

- Dedicated cell for micro volume of sample
- Compatible with any kind of UV-Vis. Spectrophotometer
- No need for any special cell holder.
- Easy to use and clean

Specifications:

Pathlength	0.5 mm
Physical Dimensions	12.5 x 12.5 x 60 mm (WDH)
Beam Height (Z-Dimension)	15 or 8.5mm types
Minimum Sample Volume	2 uL
Recommended Sample Volume	2.5 – 3 uL
DNA Detection Limit	1.1 ng/uL
DNA Maximum Concentration	3000 ng/uL
DNA Reproducibility at 100 ng/uL	±1.0 ng/uL
DNA Reproducibility at 1000 ng/uL	±3.0 ng/uL
Protein Detection Limit	0.06 mg/ml
Protein Maximum Concentration	100 mg/ml
Protein Reproducibility at 2 mg/ml	±0.02 mg/ml
Protein Reproducibility at 10 mg/uL	±0.05 mg/ml

Application:

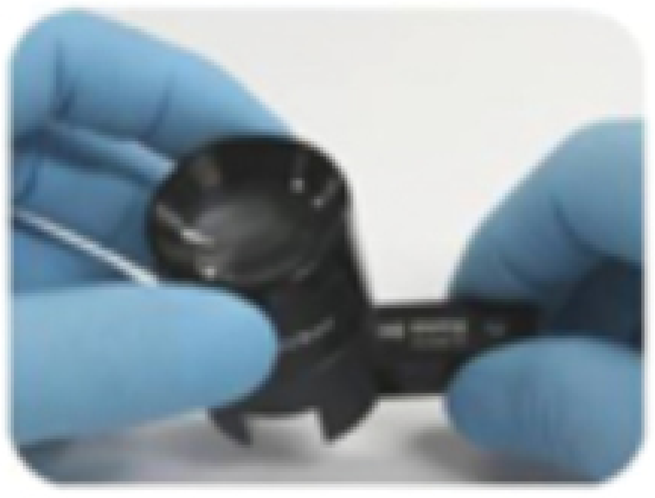
- Nucleic Acid concentration measurement
- Nucleic Acid purity measurement
- Protein concentration measurement (Direct UV method)
- Bio / Life Science
- Medical
- Environmental / Agriculture
- Food / Beverage

Nano Stick – S Components (Red) :

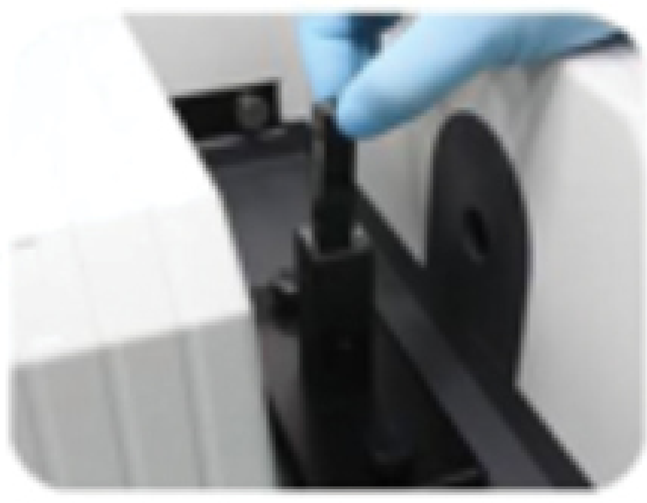
How to use:

1. Pipette the blank

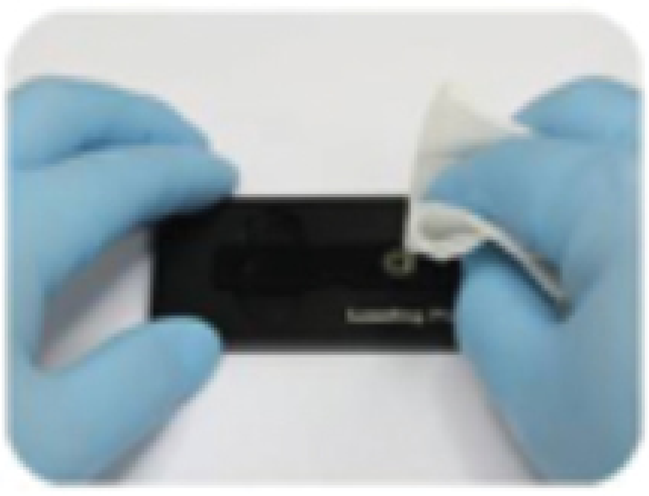
2. Close the cover



3. Look for bubbles

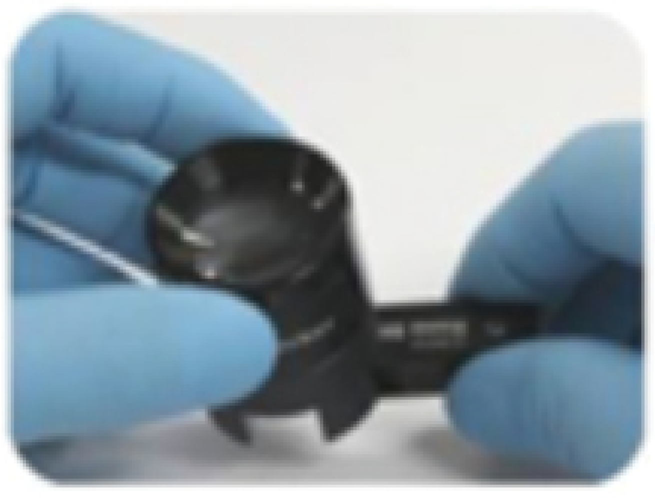


4. Measure the blank

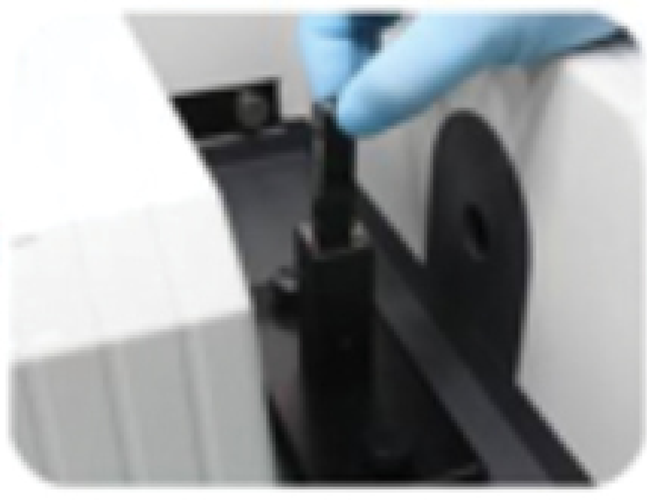


5. Clean the sampling port

6. Pipette the sample



7. Look for bubbles



8. Measure the sample

- For next sample measurement, repeat the procedures 5~8.

Part number	Path Length	Description
226-80002-03	0.5 mm	NanoStick-S, Single Port, Z-height 15 mm, Black, one cell
226-80002-02	0.5 mm	NanoStick-S, Single Port, Z-height 15 mm, Red, one cell

Autosampler vials for AAS, ICPE, ICPMS

Features:

- Easy to use, pre-calibrated for make-up volume
- Made of polypropylene to avoid contamination
- Cost-effective
- Suitable for sample storage (comes with lid)

Autosamplers:

- ASC-6880/7000 for Flame AAS
- AS-10/ ASX-280/560 for ICP/ICPMS
- Available in economy pack of 500 vials

15mL vial

50mL vial

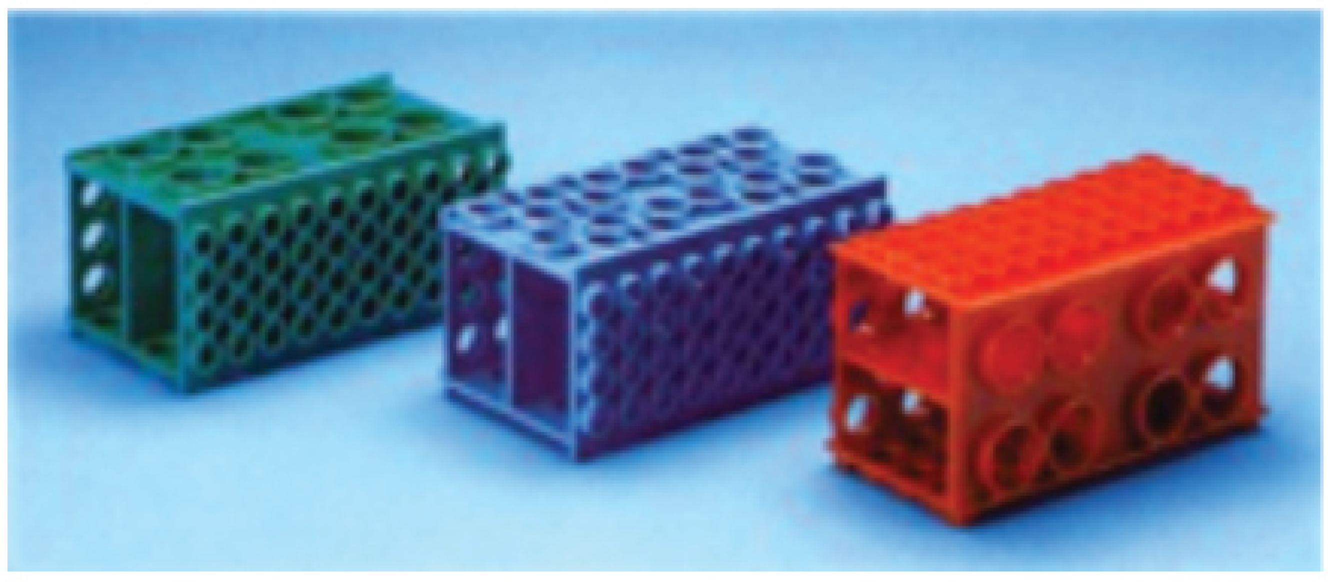
Part number	Description	Pack Size
226-89902-01	15ml Autosampler vials for AAS, ICPE, ICPMS	500 pcs
226-89902-02	50ml Autosampler vials for AAS, ICPE, ICPMS	500 pcs

PP Test Tube Rack for Autosampler vials

Features:

- PP Stand for 15 ml and 50 ml autosampler vials
- 4-way rack for to suit different size vials
- Suitable for sample make-up and storage
- Facilitates manual mode analysis

Part number	Description	Pack Size
226-89903-01	4 way PP Test Tube Rack, Natural	4 pcs



Appendix I

Septa

Septa Selection Guide

Septum Material	Description	Temperature (°C)
PTFE/Red Rubber	Most popular and economical choice for general GC and HPLC applications. Used for routine analysis in GC with FID, TCD and FPD detectors or HPLC with UV/Vis and RI detectors. They offer moderate resealability and excellent chemical inertness prior puncture. Low durometer of rubber allows ease of needle penetration. PTFE/Red Rubber septa are not recommended for multiple injections or storage of samples.	-40 to 110
PTFE/Silicone	Ideal for use in GC and HPLC applications for its high resealability even after repeated punctures. Good for sensitive analysis (lower background) and storage of samples. PTFE/Silicone septa are soft and more easily punctured, and protects the needle in autosampler.	-60 to 200
PTFE/Silicone, pre-slit	Share the same chromatographic characteristics, physical and chemical property as non-slit PTFE/Silicone septa. The cross-slit aid in needle penetration for low coring, and prevent formation of vacuum when multiple injection or large volume of sample is withdrawal from vial. However, the pre-slit septa are not recommended for storage of samples due to evaporation of volatile organic solvents through the slit.	-60 to 200
PTFE/Silicone/PTFE	Recommended for ultra trace analysis, or where there is a longer time between injections. PTFE liners on both sides of Silicone resist coring during penetration, and protects Silicone from chemical attacks.	-60 to 200
Butyl/PTFE	The PTFE barrier provides excellent chemical resistance to most solvents. Butyl/PTFE septa has good resealability and suitable for gas sampling due to low permeability.	-40 to 120

Physical Characteristic and Solvent Compatibility of Materials used for Caps and Septa.

The chart below displayed the physical characteristic and solvent compatibility of materials used for caps and septa. You might want to test your product under actual conditions of use as there are many factors that can affect chemical resistance.

Physical Characteristic of Caps and Septa

Code	Description	Appearance	Temp. MAX °C	Temp. MIN °C	Autoclavable	Dry Heat	Gamma	Microwavable	Ethylene Oxide	Analytical Purity	Fragmentation*	Hardness†	Resealability‡
PP	Polypropylene	Translucent	135	-20	Yes	No	No	Yes	Yes	Method Dependent	Low	Medium hard	No resealability
PTFE	Polytetra-fluorethylene	White	260	-200	Yes	Yes	Yes	Yes	Yes	Very high	Low	Very hard (Very thin)	No resealability
RR	Synthetic Red Rubber/PTFE	Red/beige	110	-30	No	No	No	No	No	Medium	Medium	Medium hard	Medium
Butyl	Grey Butyl	Opaque grey	125	-20	Yes	No	Yes	Yes	Yes	Method Dependent	Low to Medium	Soft to medium	Highly resealable
T/S	Silicone/PTFE	White/Red	200	-60	Yes	Yes	Yes	Yes	Yes	High	Low to Medium	Soft	Highly resealable
T/S/T	PTFE/Silicone/PTFE	Red/White/Red	200	-60	Yes	Yes	Yes	Yes	Yes	High	Very low	Soft	Good

* Due to hardness and molecular structure (coring)
† Needle penetration
‡ In case of multiple injection

Chemical Resistance of Vials and Caps

Chemical	Glass	PP	Chemical	Glass	PP	Chemical	Glass	PP
1,2-Dichloroethane	EE	NN	Diacetone	EE	GF	n-Amyl Acetate	EE	GF
1,2,4-Trichlorobenzene	EE	NN	Diacetone Alcohol	EE	EF	n-Butanol	EE	EE
1,4-Dioxane	EE	GF	Dibutylphthalate	EE	NN	n-Butyl Acetate	EE	GF
2,2,4-Trimethylpentane	EE	FN	Diethyl Benzene	EE	NN	n-Decane	EE	FN
2,4 Dichlorophenol	EE	NN	Diethyl Ether	EE	NN	n-Heptane	EE	FF
2-Butanol	EE	EE	Diethyl Ketone	EE	GG	Nitric Acid, 10%	EE	EE
2-Methoxyethanol	EE	EE	Diethyl Malonate	EE	EE	Nitric Acid, 20%	EE	FF
2-Propanol	EE	EE	Diethylamine	EE	GN	Nitric Acid, 50%	EE	FN
Acetaldehyde	EE	GN	Diethylene Dioxide	EE	GF	Nitric Acid, 70%	EE	NN

Acetamide, Sat.	EE	EE	Diethylene Glycol	EE	EE	Nitrobenzene	EE	NN
Acetic Acid, 5%	EE	EE	Dimethyl Acetamide	EE	EE	Nitromethane	EE	FN
Acetic Acid, 50%	EE	EE	Dimethyl Formamide	EE	EE	n-Octane	EE	EE
Acetic Acid, Glacial	EE	EG	Dimethylsulphoxide (DMSO)	EE	EE	o-Dichlorobenzene	EE	FN
Acetic Anhydride	EE	GF	Dioxane	EE	GF	Oil, Mineral	EE	EE
Acetone	EE	EG	Dipropylene Glycol	EE	EE	Oxalic Acid, 10%	EE	EE
Acetonitrile	EE	FN	Ether	EE	NN	Ozone	EE	EG
Acetophenone	EE	FN	Ethyl acetate	EE	EG	p-Chloroacetophenone	EE	EE
Acrylonitrile	EE	EE	Ethyl Alcohol (Absolute)	EE	EG	p-Dichlorobenzene	EE	GF
Adipic Acid	EE	EE	Ethyl Alcohol, 40%	EE	EG	Perchloric Acid	EE	GN
Allyl Alcohol	EE	EE	Ethyl Alcohol, 96%	EE	EE	Perchloric Acid, 70%	EE	GN
Aluminum Hydroxide	SS	EG	Ethyl Benzene	EE	NN	Perchloroethylene	EE	NN
Amino Acids	EE	EE	Ethyl Benzoate	EE	GF	Phenol, 100%	EE	NN
Ammonia	SS	EE	Ethyl Butyrate	EE	GN	Phenol, 50%	EE	NN
Ammonia, 25%	SS	EE	Ethyl Chloride	EE	FN	Phenol, Crystals	EE	GN
Ammonium Glycolate	EE	EG	Ethyl Chloride, Liquid	EE	FN	Phenol, Liquid	EE	NN
Ammonium Hydroxide, 30%	SS	EG	Ethyl Cyanoacetate	EE	EE	Phosphoric Acid, 5%	EE	EE
Ammonium Hydroxide, 5%	SS	EE	Ethyl Lactate	EE	EE	Phosphoric Acid, 85%	EE	EG
Ammonium Oxalate	EE	EG	Ethylene Chloride	EE	FN	Picric Acid	EE	NN
Ammonium Salts	EE	EE	Ethylene Glycol	EE	EE	Potassium Hydroxide, 1%	SS	EE
Amyl Alcohol	EE	EE	Ethylene Oxide Gas	EE	FF	Potassium Hydroxide, 30%	SS	EE
Amyl Chloride	EE	NN	Ethylene Oxide, 100%	EE	FF	Potassium Permanganate	EE	EE
Aniline	EE	GF	Fatty Acids	EE	EG	Propane Gas	EE	NN
Aqua Regia	SS	NN	Fluorine	EE	FN	Proprionic Acid	EE	EG
Arsenic Acid	EE	EE	Formaldehyde, 10%	EE	EE	Propylene Glycol	EE	EE
Benzaldehyde	EE	EG	Formaldehyde, 40%	EE	EG	Propylene Oxide	EE	EG
Benzenamine	EE	GF	Formalin, 10%	EE	EE	Pyridine	EE	NN
Benzene	EE	NN	Formalin, 40%	EE	EG	Resorcinol, 5%	EE	EE
Benzoic Acid, Sat.	EE	EG	Formic Acid	EE	EG	Resorcinol, Sat.	EE	EE
Benzyl Acetate	EE	EG	Formic Acid, 100%	EE	EG	Salicylaldehyde	EE	EG
Benzyl Alcohol	EE	NN	Formic Acid, 3%	EE	EG	Salicylic Acid, Sat.	EE	EE
Boric Acid	EE	EE	Formic Acid, 50%	EE	EG	Salt Solutions, Metallic	SS	EE
Bromine	EE	NN	Formic Acid, 85%	EE	EG	Silicone Oil	EE	EE
Bromobenzene	EE	NN	Freon TF	EE	EG	Silver Nitrate	EE	EG
Bromoform	EE	NN	Glutaraldehyde	EE	EE	Sodium Dichromate	EE	EE
Butadiene	EE	NN	Glycerine (Glycerol)	EE	EE	Sodium Hydroxide, 50%	SS	EE
Butyl Acetate	EE	FF	Hexane	EE	GF	Sodium Hydroxide, 1%	SS	EE
Butyl Chloride	EE	NN	Hydrazine	EE	NN	Sodium Hydroxide, 10%	SS	EE
Butyric Acid	EE	NN	Hydrobromic Acid, 4%	EE	EG	Sodium Hypochlorite, 15%	EE	GF
Calcium Hydroxide	SS	EE	Hydrobromic Acid, 48%	EE	EE	Stearic Acid	EE	EE
Calcium Hypochlorite	EE	EE	Hydrobromic Acid, 69%	EE	EG	Sulfur dioxide	EE	NN
Carbazole	EE	EE	Hydrochloric Acid, 20%	EE	EE	Sulfur Dioxide, wet or dry	EE	EE
Carbon Disulphide	EE	NN	Hydrochloric Acid, 35%	EE	EG	Sulfur Salts	FE	FN
Carbon Tetrachloride	EE	GF	Hydrochloric Acid, 5%	EE	EE	Sulfuric Acid, (96%)	EE	FN
Cellosolve Acetate	EE	EG	Hydrogen Peroxide, 3%	EE	EE	Sulfuric Acid, 20%	EE	EG
Chlorine Water	EE	FN	Hydrogen Peroxide, 30%	EE	EG	Sulfuric Acid, 30%	EE	EG
Chlorine, 10% (Moist)	EE	FN	Hydrogen Peroxide, 90%	EE	EG	Sulfuric Acid, 6%	EE	EE
Chlorine, 10% in air	EE	FN	Isobutanol	EE	EE	Sulfuric Acid, 60%	EE	EG
Chlorine, wet gas	EE	FN	Isopropanol, 100%	EE	EE	Sulfuric Acid, 98%	EE	FN
Chloroacetic Acid	EE	EG	Isopropyl Acetate	EE	GF	Tartaric Acid	EE	EE
Chlorobenzene	EE	NN	Isopropyl Benzene	EE	FN	Tetrahydrofuran	EE	GF
Chloroform	EE	NN	Isopropyl Ether	EE	NN	Thionyl Chloride	EE	NN
Chromic Acid, 10%	EE	EE	Lactic Acid, 3%	EE	EG	Tincture of Iodine	EE	GG
Chromic Acid, 20%	EE	GG	Lactic Acid, 85%	EE	EG	Toluene	EE	FN
Chromic Acid, 50%	EE	GF	Mercury	EE	EE	Tributyl Citrate	EE	GF
Chromic:Surfuric Acid Mixture,96%	EE	NN	Methanol, 100%	EE	EE	Trichloroacetic Acid (TCA)	EE	FN
			Methoxyethyl Oleate	EE	EG	Trichloroethane	EE	NN
Citric Acid, 10%	EE	EE	Methyl Acetate	EE	GF	Trichloroethylene	EE	NN
Cresol	EE	GF	Methyl Ethyl Ketone	EE	EG	Triethylene Glycol	EE	EE
Cyclohexane	EE	FN	Methyl Isobutyl Ketone	EE	GF	Tripropylene Glycol	EE	EE
Cyclohexanone	EE	FN	Methyl Propyl Ketone	EE	GF	Tris Buffer, Solution	EE	EG
Cyclopentane	EE	FN	Methylene Chloride	EE	FN	Urea	EE	EE
Decahydronaphtalene	EE	GF	Methyl-t-Butyl Ether	EE	FN	Xylene	EE	FN

The first character indicates the characteristics of vials and cap at low temperature; the second character indicates the characteristics at high temperature conditions.

Appendix I

E = No damage after 30 days of constant exposure; G = Little of no damage after 30 days of constant exposure; F = Some effect after 7 days of constant exposure; N = Immediate damage may occur. Not recommended for continuous use; S = Surface.

Solvent Compatibility of Materials Used for Septa

Solvent	PTFE/Red Rubber	PTFE/Silicone	PTFE/Silicone/PTFE	PTFE/Butyl
Acetic Acid Aqueous	A(A)	A(A)	A(A)	A(A)
Acetone	A(A)	A(A)	A(B)	A(A)
Acetonitrile	A(A)	A(A)	A(–)	A(A)
Alcohols (Aromatic)	A(B)	A(A)	A(–)	A(B)
Alcohols (Aliphatic)	A(A)	A(A)	A(–)	A(A)
Amyl Acetate	A(A)	A(C)	A(D)	A(A)
Aqueous Solution Dilute	A(A)	A(A)	A(–)	A(A)
Benzene	A(D)	A(C)	A(D)	A(D)
Butyl Alcohol	A(B)	A(B)	A(B)	A(B)
Carbon Disulphide	A(D)	A(A)	A(–)	A(D)
Carbon Tetrachloride	A(D)	A(C)	A(D)	A(D)
Chloroform	A(D)	A(C)	A(D)	A(D)
Cyclohexane	A(D)	A(C)	A(D)	A(D)
Cyclohexanol	A(D)	A(B)	A(–)	A(D)
Diethyl Ether	A(D)	A(B)	A(–)	A(D)
Dimethyl Sulphoxide	A(C)	A(A)	A(–)	A(C)
Dioxane	A(B)	A(C)	A(D)	A(B)
Esters	A(B)	A(B)	A(–)	A(B)
Ethyl Acetate	A(B)	A(B)	A(B)	A(B)
Ethyl Alcohol	A(A)	A(A)	A(B)	A(A)
Ethylene Chloride	A(D)	A(C)	A(D)	A(D)
Ethylene Glycol	A(A)	A(A)	A(A)	A(A)
Formaldehyde	A(B)	A(A)	A(B)	A(B)
Glycol	A(A)	A(A)	A(A)	A(A)
Halogenated Hydrocarbons	A(D)	A(A)	A(–)	A(D)
Hexane	A(D)	A(C)	A(D)	A(D)
Hydrochloric Acid Dilute	A(A)	A(A)	A(–)	A(A)
Iso-Octane	A(D)	A(C)	A(D)	A(D)
Ketones	A(A)	A(B)	A(–)	A(A)
MeOH/H_2O/Acetonitrile	A(A)	A(B)	A(–)	A(A)
Methanol	A(A)	A(A)	A(A)	A(A)
Methyl Chloride	A(C)	A(A)	A(D)	A(C)
Methyl Acetate	A(B)	A(B)	A(D)	A(B)
Methyl Ethyl Ketone	A(A)	A(A)	A(D)	A(A)
Methyl Chloride	A(D)	A(B)	A(–)	A(D)
Nitric Acid Dilute	A(A)	A(B)	A(B)	A(A)
Pentane	A(D)	A(C)	A(–)	A(D)
Petroleum Ether	A(D)	A(C)	A(–)	A(D)
Sodium Hydroxide	A(A)	A(A)	A(B)	A(A)
Sulphuric Acid Dilute	A(D)	A(B)	A(D)	A(D)
Surfactants	A(A)	A(A)	A(–)	A(A)
Toluene	A(D)	A(C)	A(D)	A(D)
Trichloroethylene	A(D)	A(C)	A(D)	A(D)
Water	A(A)	A(A)	A(A)	A(A)

The first character indicates the characteristics of septa prior puncture. The second character indicates the characteristics of septa after puncture.
A = Recommended; B = Suitable for most purposes; C = Use with care; D = Not advisable; - = Not tested.

Appendix I

Product Description

1) **Seal**
A seal is an already assembled closure consisting of a cap and septum.

2) **Rubber**
Red Rubber/PTFE is a synthetic rubber which is softer and show less fragmentation than Natural Rubber/PTFE. It has better cleanliness and purity then Natural Rubber/PTFE but inferior than Silicone. Nevertheless, it does not have the outstanding resealability property like Natural Rubber for multiple injections.

3) **Pre-slit septa**
The septa are cross-slit to aid in the needle penetration. The Septa are only cut through the Silicone layer, but not the PTFE layer to avoid the risk of concentration changes due to solvent loss or contamination from the environment.

4) **Ultrabond**
The Ultrabond seal is that the septa and screw cap form an inseparable unit. The molecular structure of the contact areas of the PP screw cap and the septa are modified such that it requires no glue or adhesive between the two to form a firm unit. The Ultrabond products is recommended over a general cap/septa assembly:
- To avoid pushing the septa into the vial when use with very thick and dull needles
- For screw caps with a wide diameter, where a septum cannot achieve any press-fit in the cap

5) **Micro-insert**
A Micro-insert is different from a Micro-vial where it cannot be sealed on its own. The diameter of the Micro-insert is depending on the size of vial opening. A Micro-insert reduces the volume of sample needed and allow the needle to pick up even the smallest sample quantities.

Appendix I

Syringe filter order guideline

Choosing the right membrane is important. The wrong membrane could cause loss of valuable samples, time and money. Please use below guideline and chemical compatibility table as reference.

Hydrophilic Nylon	pH 6-13	• Naturally hydrophilic, high protein binding, high dirt-loading, surfactant-free and offer the lowest extractables. • Filtering of general samples and organic solvents. • Not recommended for use with acids.
Hydrophilic PVDF (polyvinylidene fluoride)	pH 3-12	• Extremely low protein binding. • Good chemical compatibility. • For filtration of non-aggressive aqueous and mild organic solutions, or when maximizing protein recovery is important.
Hydrophilic RC (regenerated cellulose)	pH 3-12	• Hydrophilic membrane with good solvent resistance. • Low protein binding and extractables. • Good chemical compatibility with nearly all common HPLC solvents and stable against DMSO. • Good for general filtration, tissue culture media filtration or life science applications.
Hydrophilic PES (polyethersulfone)	pH 3-12	• Low protein binding and extractables. • Good for life science applications.
PTFE	pH 1-14	• High chemical compatibility. • High temperature resistance. • Good for filtration of gases, aggressive chemicals, and strong acid.
Cellulose Acetate (CA)	pH 4-8	• Low protein binding • For filtration of aqueous solutions • Good for applications involving culture media
Mixed Cellulose Ester (MCE)	pH 4-8	• High protein binding • Good for general filtration of aqueous solutions.

Solvent Compatibility:

Solvent	MCE	CA	PES	Nylon	PVDF	PTFE	RC
Acetic Acid (glacial)	X	X	O	X	O	O	LR
Acetone	X	X	X	O	X	O	O
Acetonitrile (ACN)	X	X	X	O	LR	O	O
Benzene	O	O	X	O	O	O	O
Butyl Alcohol	O	O	O	O	O	O	O
Chloroform	O	X	X	X	O	O	O
Cyclohexanone	X	X	X	O	X	O	O
Dimethyl Sulfoxide (DMSO)	X	X	X	O	X	O	O
Ethyl Acetate	X	X	X	O	O	O	O
Ethyl Alcohol	X	O	O	O	LR	O	O
Formaldehyde	X	X	NI	O	O	O	LR
Hexane	O	O	O	O	O	O	O
Hydochloric Acid, 1N (HCl)	LR	LR	O	LR	O	O	X
Hydochloric Acid, 6N (HCl)	LR	X	LR	X	LR	O	X
Hydochloric Acid, 12N (HCl)	X	X	LR	X	X	O	X
Hydrogen Peroxide, 3%	X	O	NI	O	O	O	X
Isopropyl Alcohol	X	O	O	LR	O	O	O
Methanol	X	O	O	LR	O	O	O
Nitric Acid, 6N (HNO3)	X	O	O	X	O	O	X
Nitric Acid, 12N (HNO3)	X	X	NI	X	X	LR	X
Sodium Carbonate (aqueous)	O	NI	NI	LR	O	O	NI
Sodium Hydroxide, 3N (NaOH)	X	X	O	O	O	O	X
Sulfuric Acid, 6N (H2SO4)	LR	X	LR	X	LR	O	LR
Sulfuric Acid, 32N (H2SO4)	X	X	X	X	LR	LR	X
Tetrahydrofuran (THF)	X	X	NI	O	X	O	O
Toluene	O	O	O	O	O	O	O

O: Recommended	LR: Limited recommendation	X: Not recommended	NI: No info

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