SHIMADZU
Excellence in Science

S-COS-B18B
#2021 Issue

Shimadzu Consumables Catalogue

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S-COS-B18B #2021 Issue

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”.

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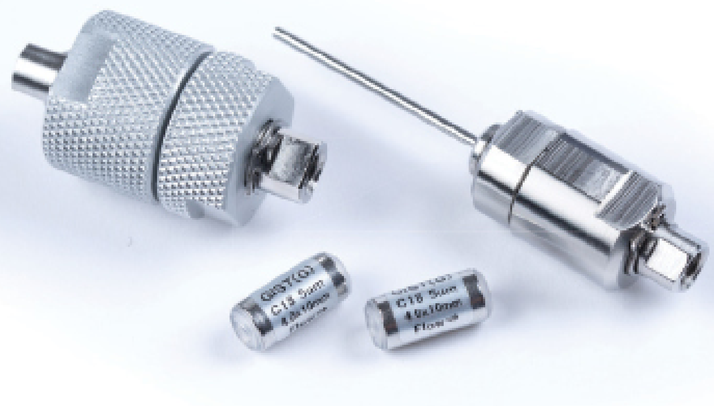
UHPLC/HPLC Columns and LC Accessories



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

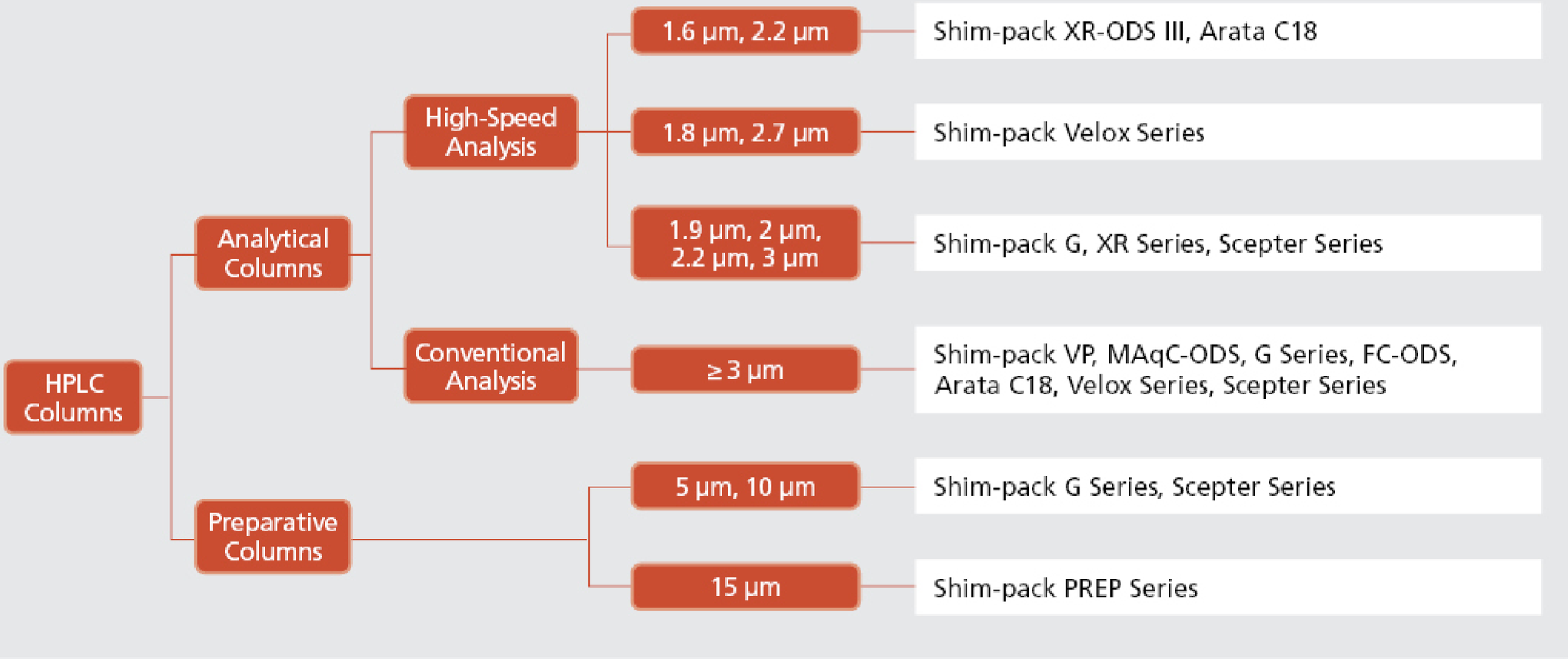
- **Reversed Phase**
  - ODS/C18 (Shim-pack XR, VP, MAqC, G, FC Series, Velox, Scepter)
  - Shim-pack GIST C18-AQ
  - Shim-pack GIS C18-P
  - Shim-pack GIS RP-Shield
  - C8 (Shim-pack XR, VP, G Series)
  - Phenyl (Shim-pack XR, VP, G Series)
  - Shim-pack GIST Phenyl-Hexyl
  - Shim-pack Velox Biphenyl
  - Shim-pack Velox PFPP, Shim-pack Scepter PFPP

  → Low molecular-weight compounds
- **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

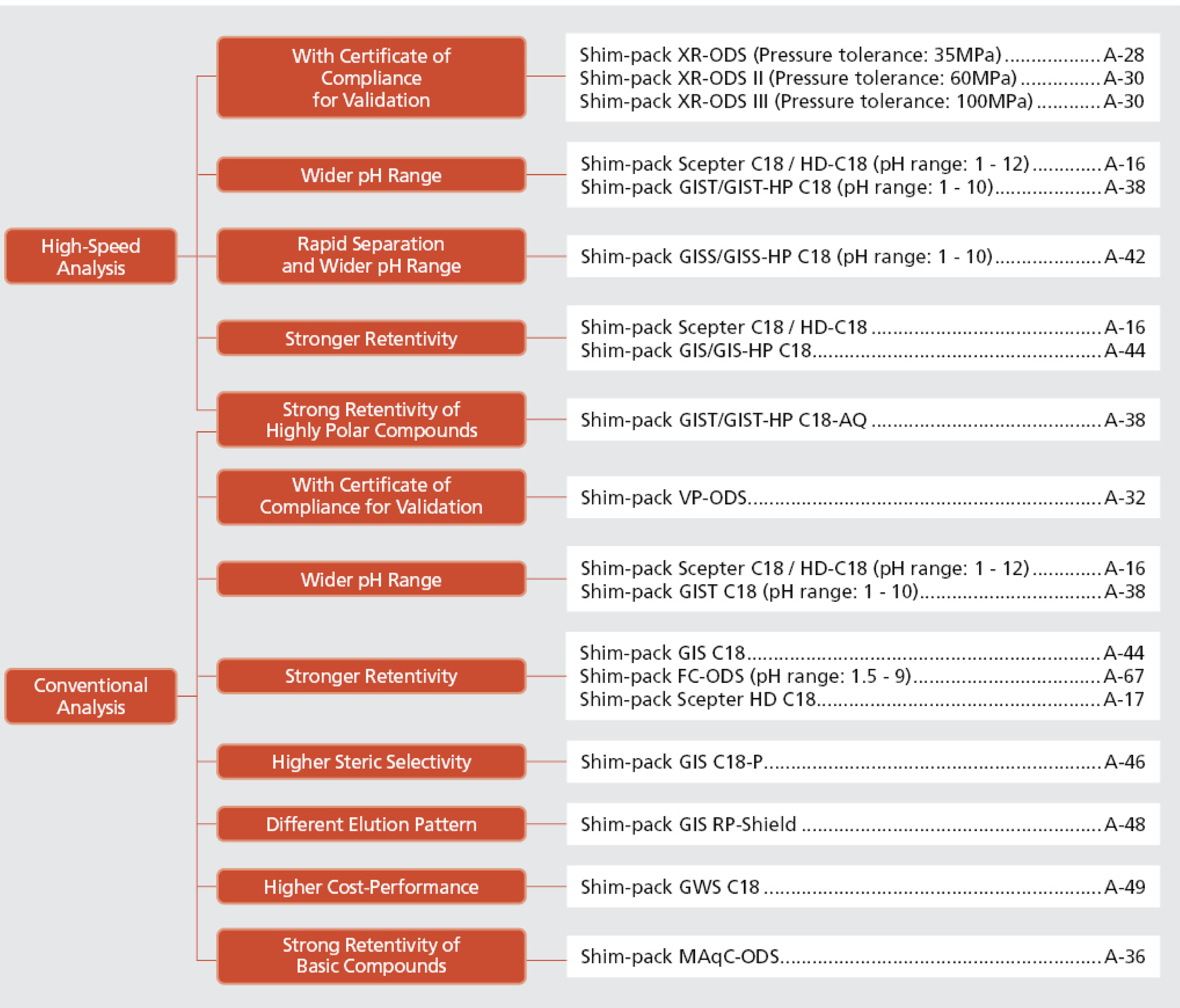
Polymer Type

- **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

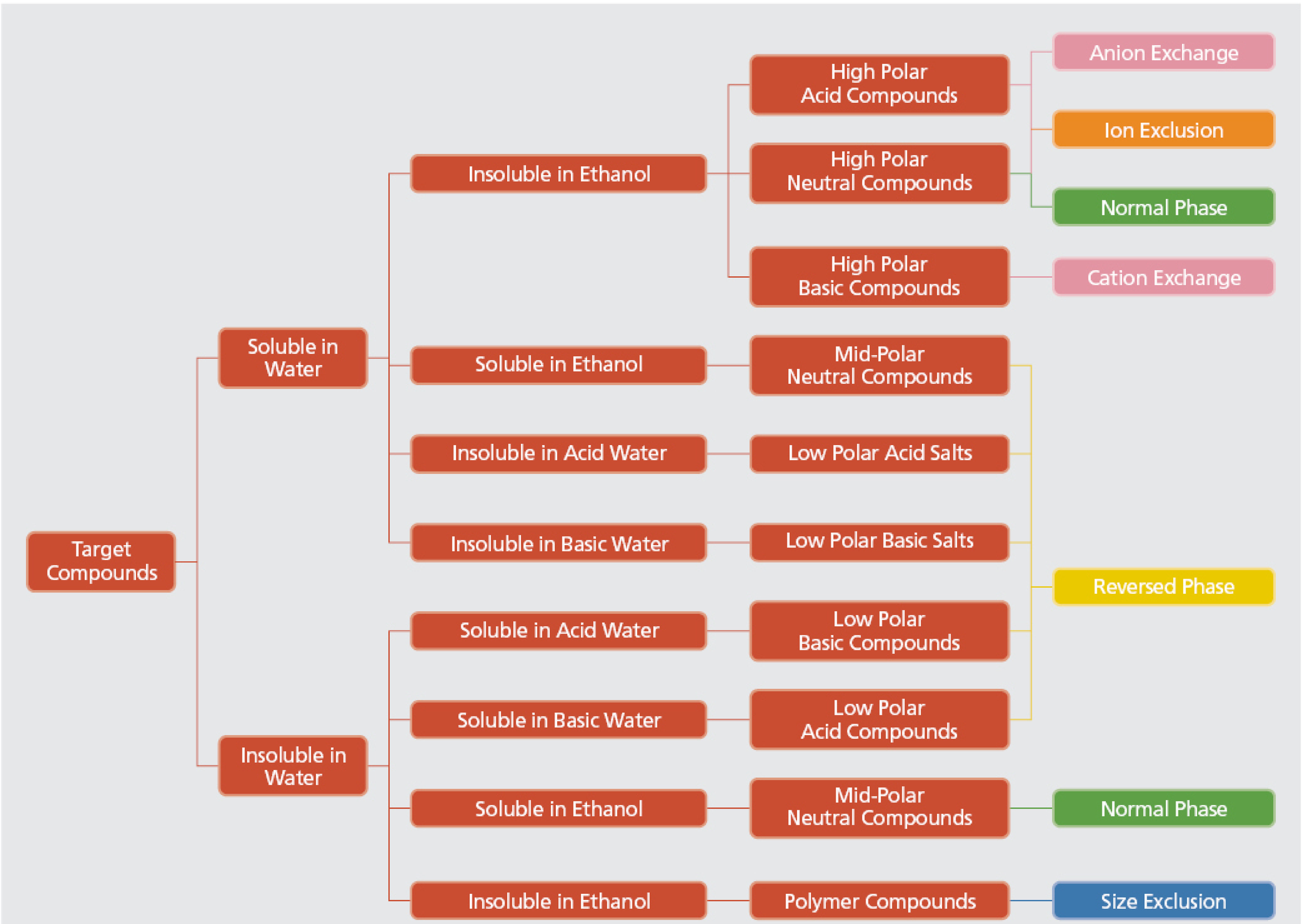


Selection of ODS columns

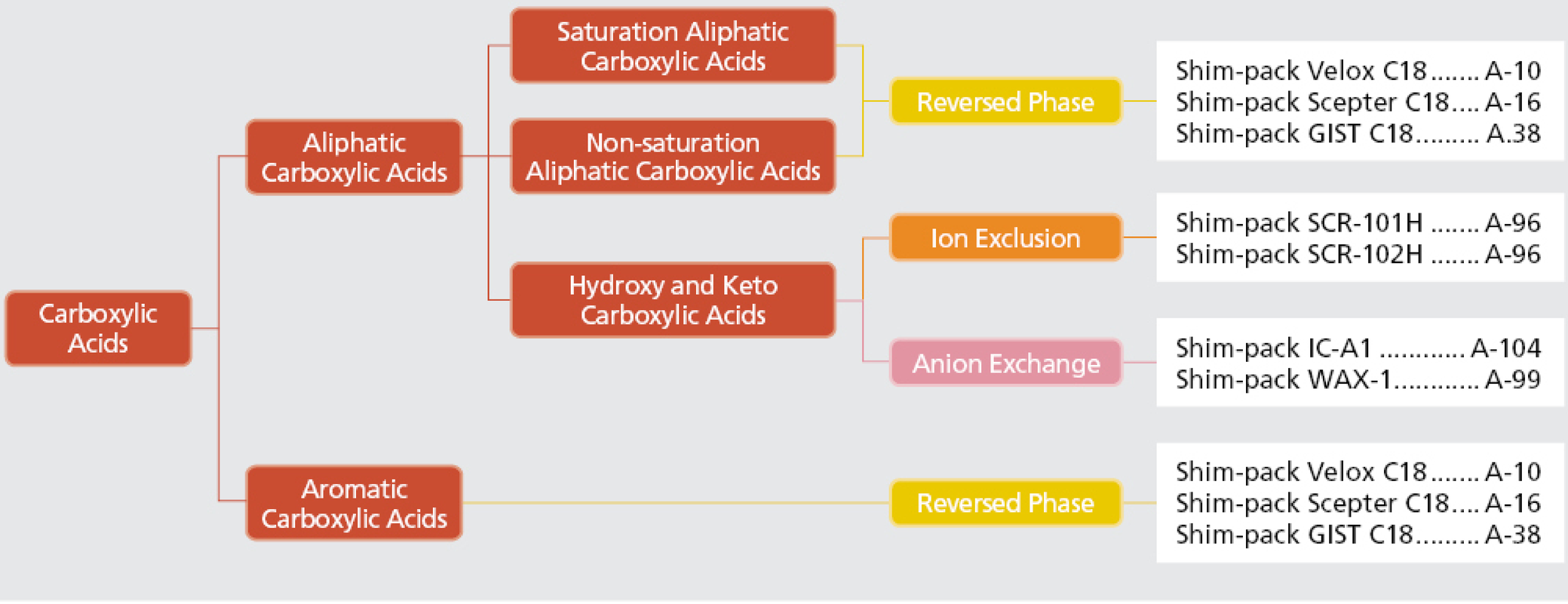


Column Selection Guide

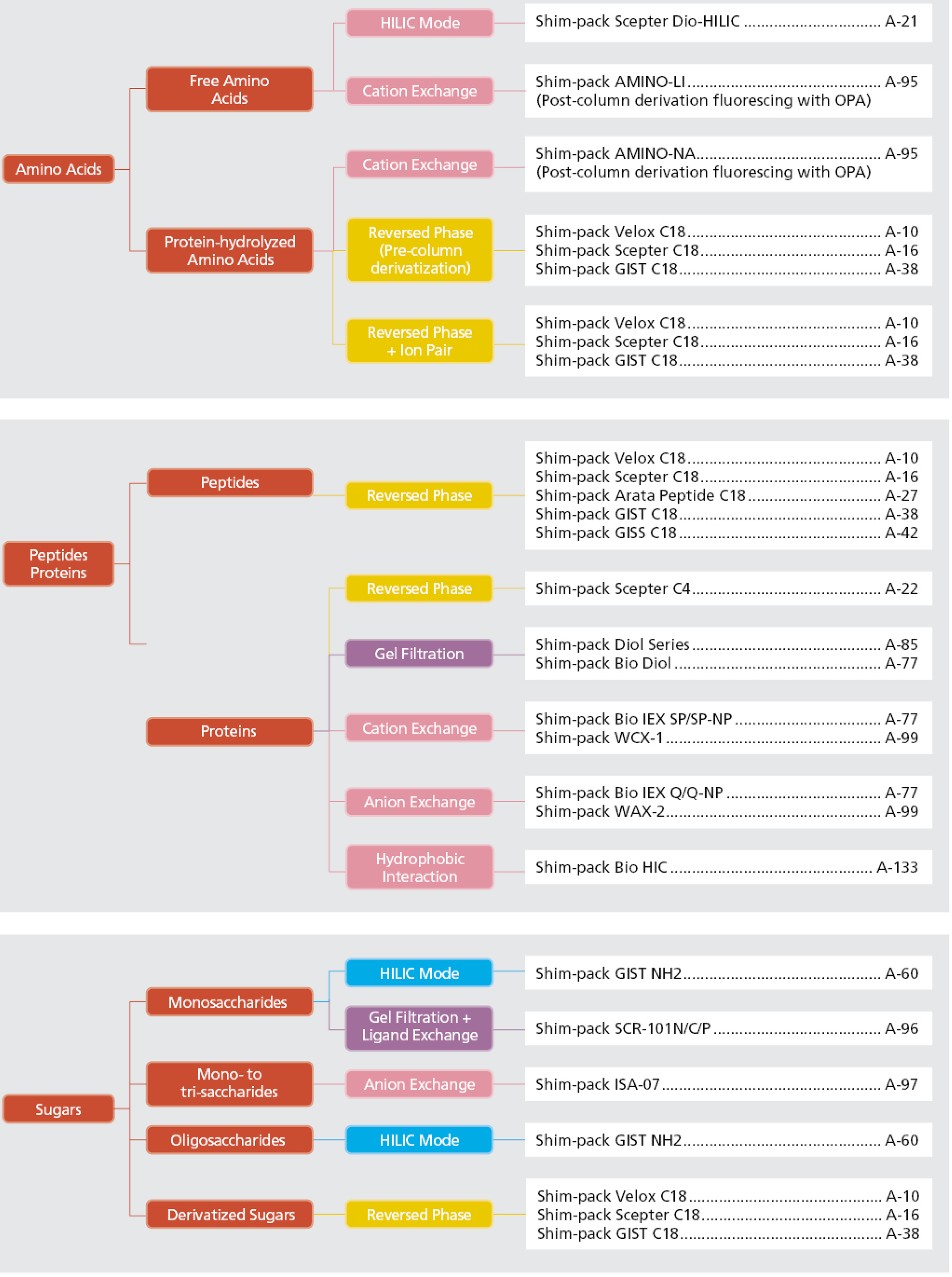
Column Selection by Target Compounds



Column Selection by Target Compounds

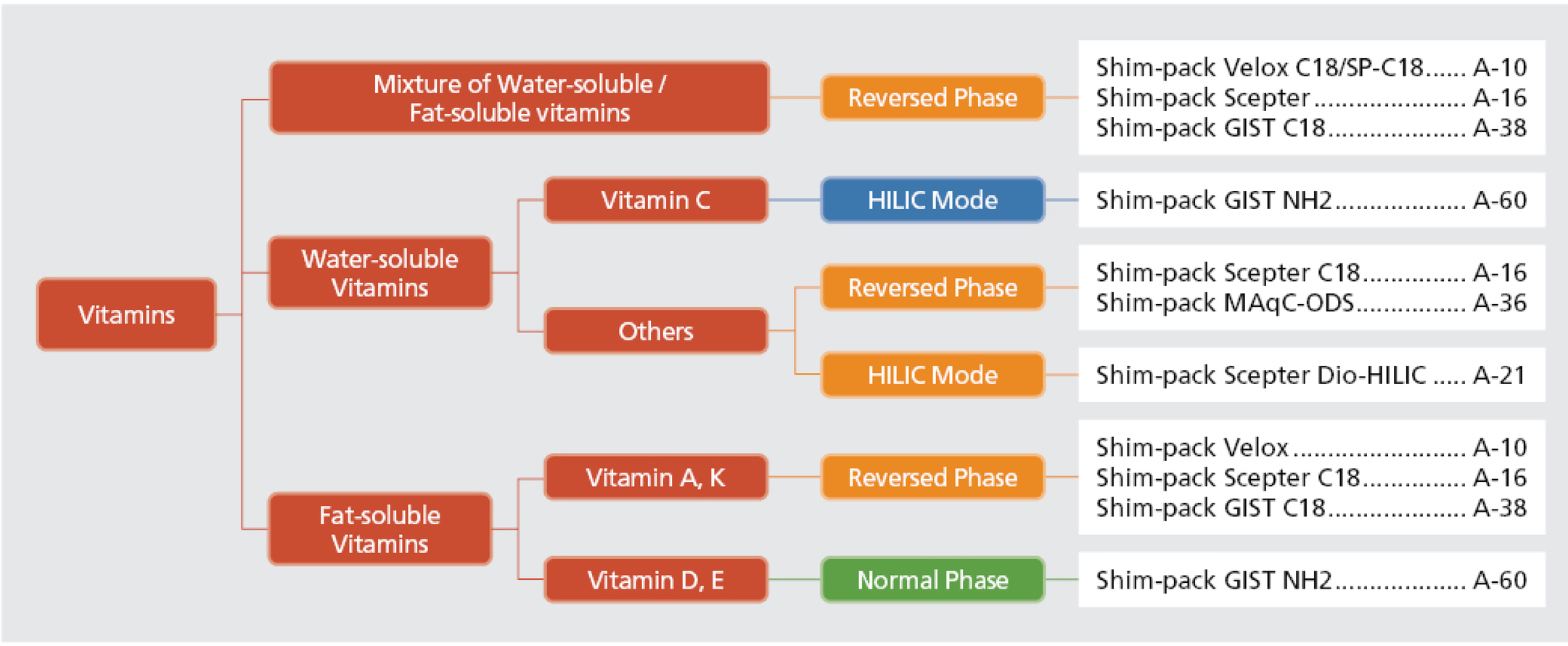


Column Selection by Target Compounds



Column Selection Guide

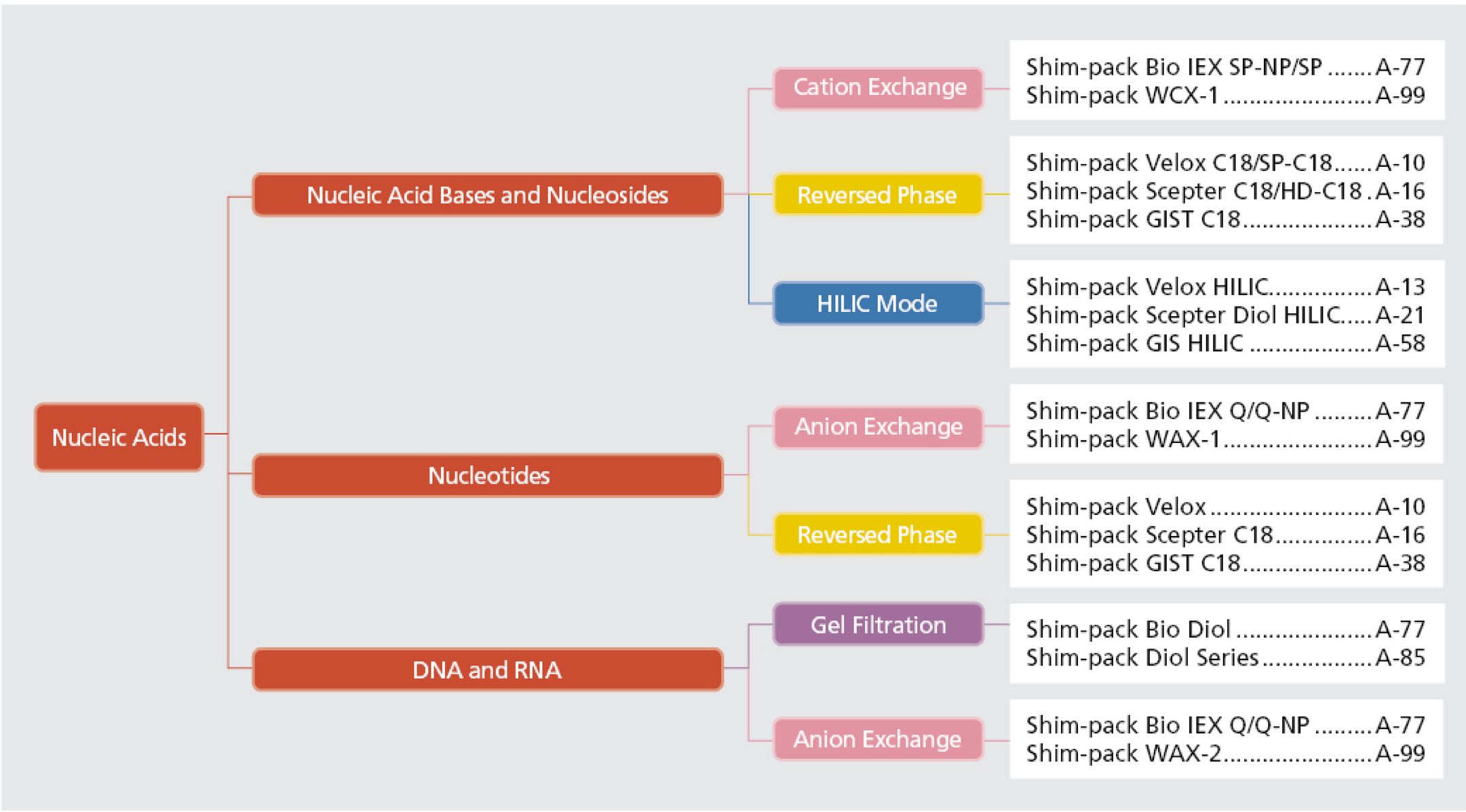
Column Selection by Target Compounds



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

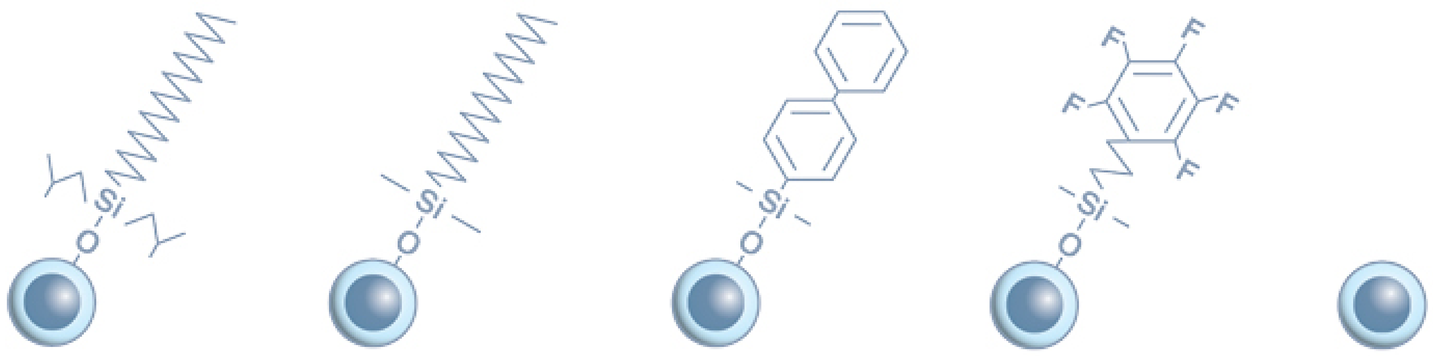
Column particle sizes and column volumes affect chromatography results significantly if the column configuration does not match the LC system. As column particle size is reduced, or the column volume (ID and/or the length of the columns) decreases, the necessity for a lower dispersion system is increased.

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.

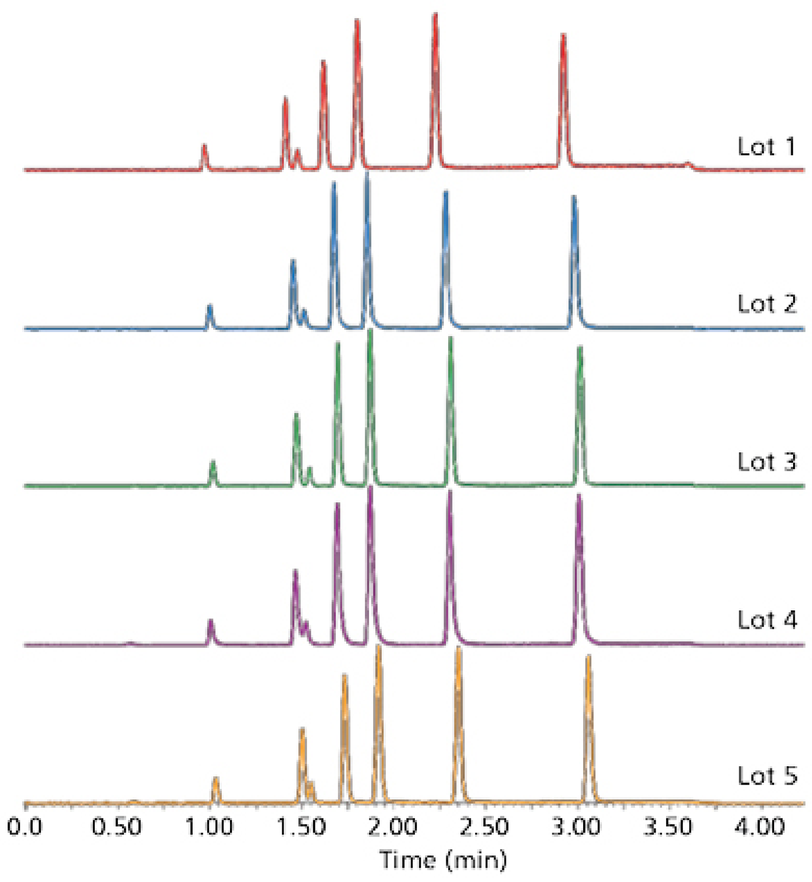


		SP-C18	C18	Biphenyl	PFPP	HILIC
USP Classification		L1	L1	L11	L43	L3
Ligand type		Sterically protected C18	C18	Biphenyl	Pentafluorophenyl propyl	None
Particle Size (µm)		1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	2.7
Pore size (Å)		90	90	90	90	90
Suraface Area	1.8 µm	125 m^2/g	125 m^2/g	125 m^2/g	125 m^2/g	-
	2.7 µm	130 m^2/g	130 m^2/g	130 m^2/g	130 m^2/g	130 m^2/g
	5 µm	100 m^2/g	100 m^2/g	100 m^2/g	100 m^2/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)

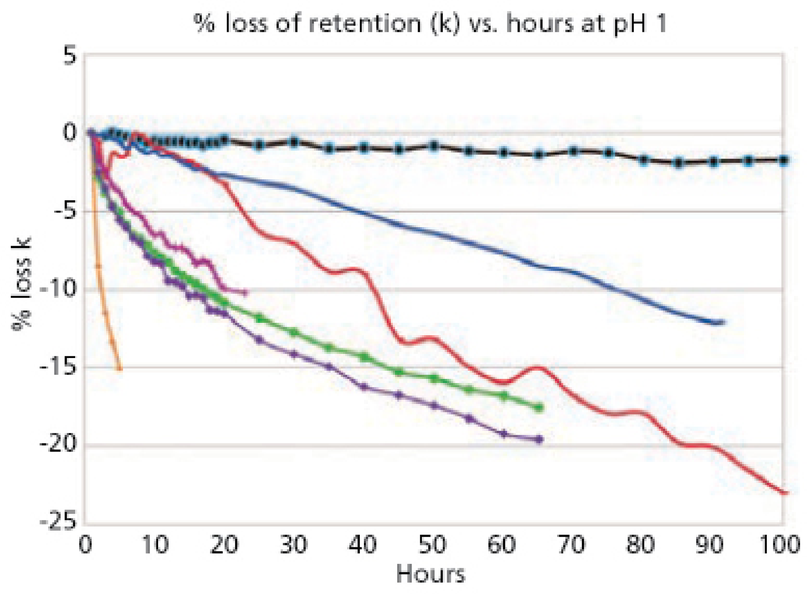
Shim-pack Velox SP-C18

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) .



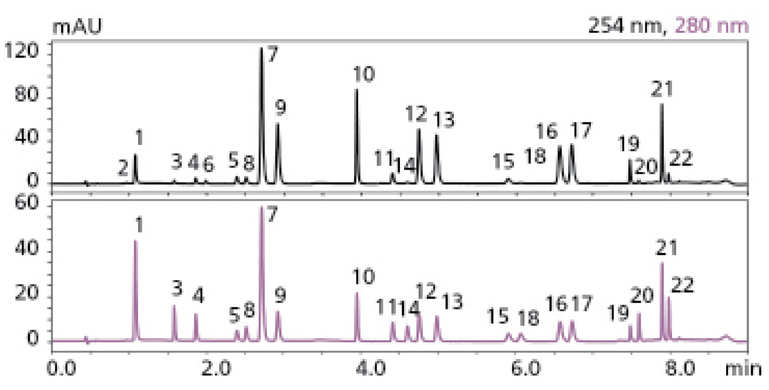
Conditions

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)

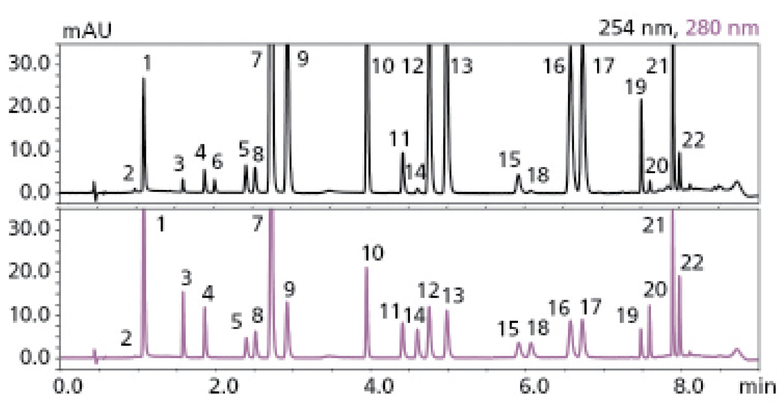
- Shim-pack Velox SP-C18 Brand A FPP C18
- Brand B FPP C18
- Brand C FPP C18
- Brand D Core-shell C18
- Brand E Core-shell C18
- Brand F Core-shell C18

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.



Magnified Baseline



Preservative agents

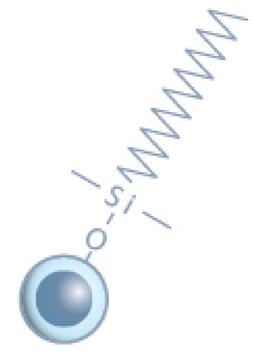
1. 2-methyl-4-Isothiazolin-3-one
2. 2-Bromo-2-Nitro-1,3-propanediol
3. Salicylic Acid
4. Isothiazolinones
5. Benzoic Acid
6. Benzyl Alcohol
7. Sorbic Acid
8. 2-Phenoxyethanol
9. Methyl Paraben
10. Ethyl Paraben
11. Methyl Benzoate
12. Isopropyl Paraben
13. Propyl Paraben
14. 4-Chloro-3-Methylphenol
15. 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.

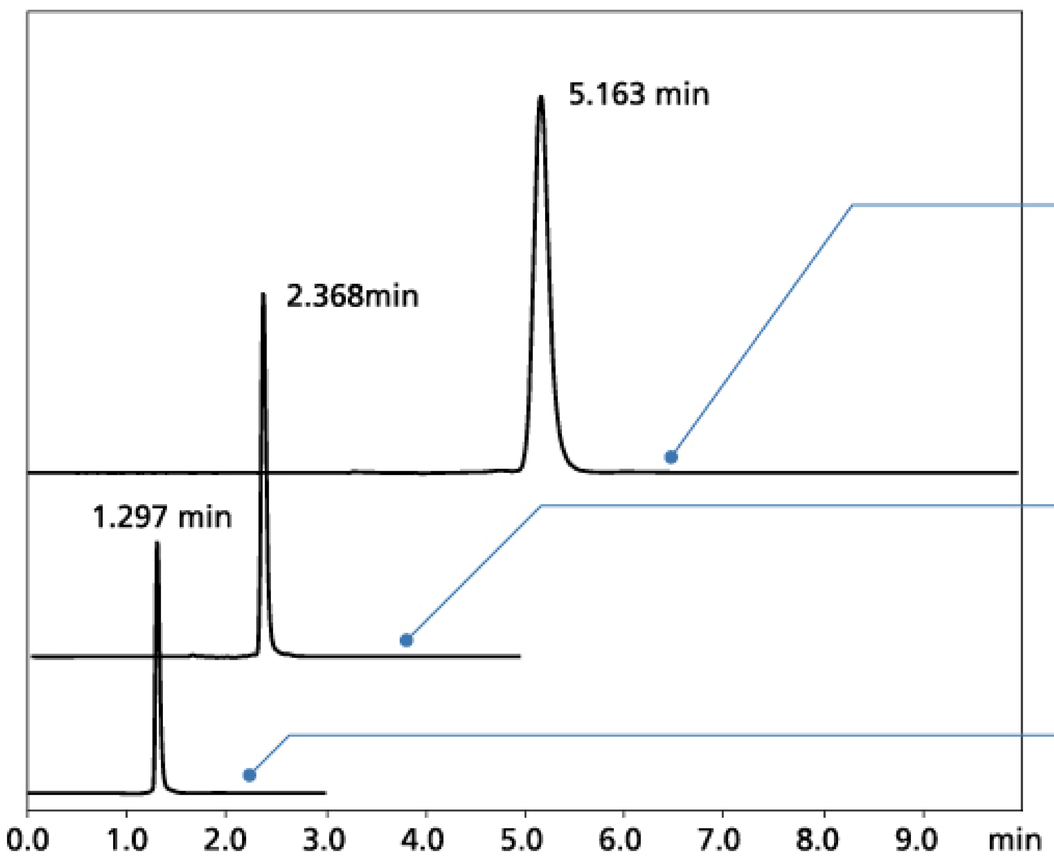
USP requirement of Chromatography <621>

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

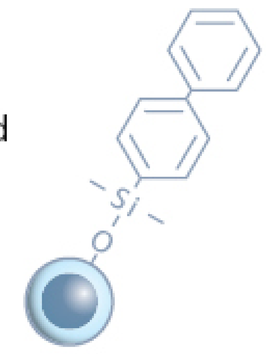
Faster Method
Column : Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate : 0.50 mL/min
Injection Volume : 67 µL
Column temp. : 25 °C
Detection : UV 361 nm

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

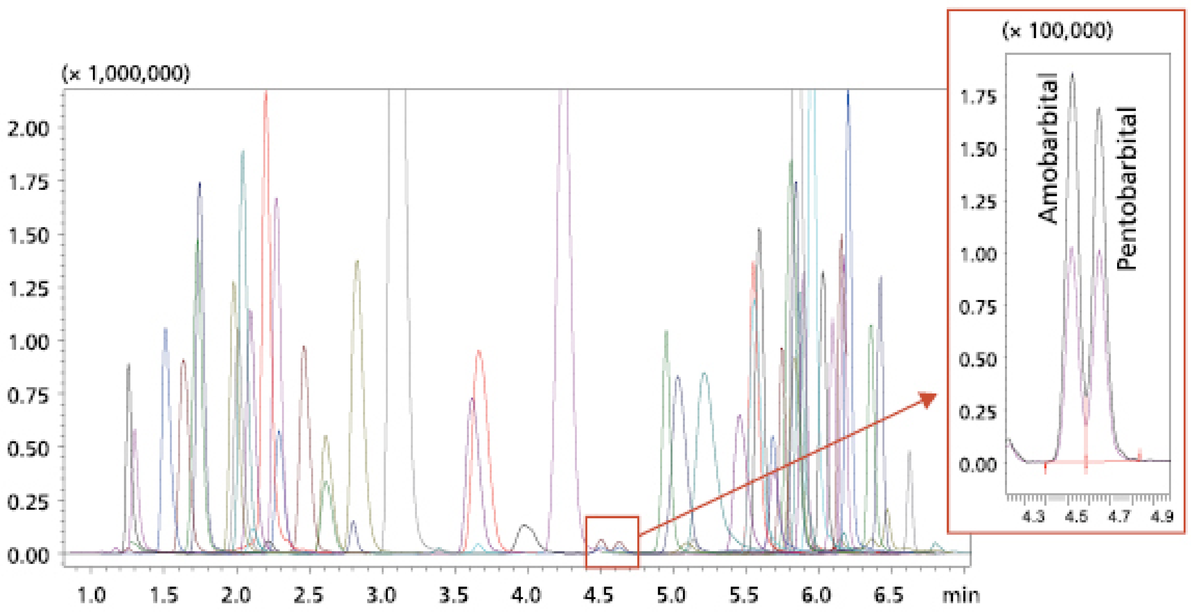
Shim-pack Velox Biphenyl provides enhanced retention of aromatic compounds. It is useful for fast separations in bioanalytical applications due to the increased retention of early eluting analytes such as dipolar, unsaturated and conjugated analytes.



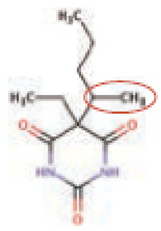
- Complementary selectivity to alkyl phases
- Enhanced separation of aromatic compounds
- Ideal for increasing sensitivity and selectivity in LC/MS(/MS) analysis

Separating the Structural Isomers

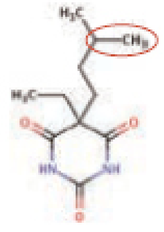
Even under the condition where 56 drugs of abuse and metabolites in human urine are quantitated within 10 minutes, two structural isomers, amobarmital and pentobarbital, which have been historically difficult to separate due to their similarity in chemical structures, could be relatively well resolved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



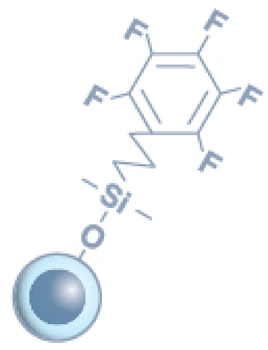
Pentobarbital
5-ethyl-5-pentan-2-yl-1,3-diazinane-2,4,6-trione

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

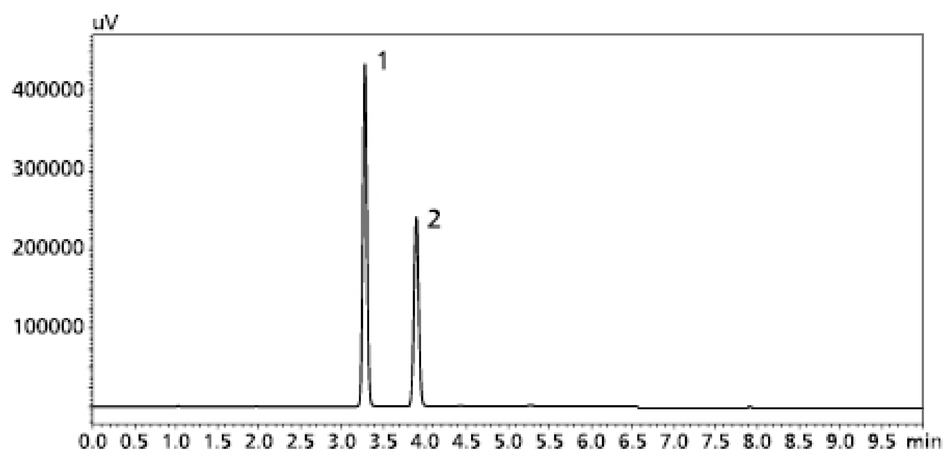
Shim-pack Velox PFPP (Pentafluorophenylpropyl) provides an alternative selectivity to C18 columns and is suitable for the analysis of halogenated compounds, positional isomers and charged bases.



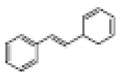
- Alternative selectivity to C18 columns
- Suitable for positional isomers and halogenated compounds
- Offers increased retention for charged bases

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

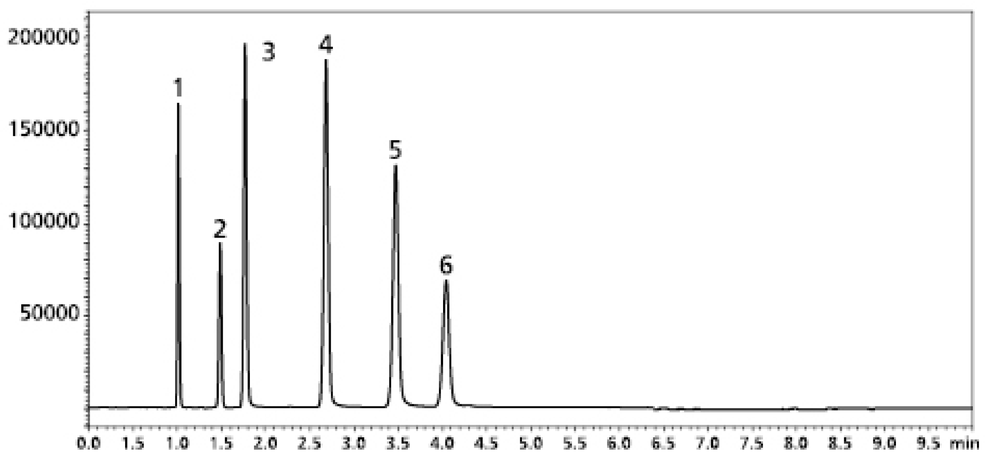
Shim-pack Velox HILIC

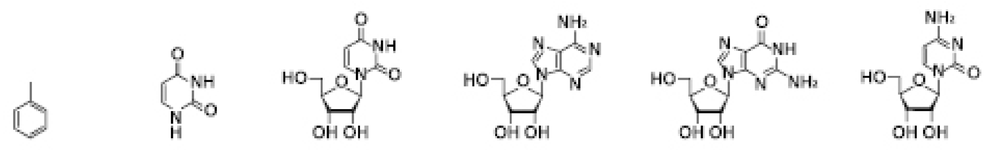
Hydrophilic interaction chromatography (HILIC) is an increasingly popular separation mode that can be used to improve the retention of challenging polar analytes. Shim-pack Velox HILIC using unbonded core shell particles is specifically designed for this application.

- 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

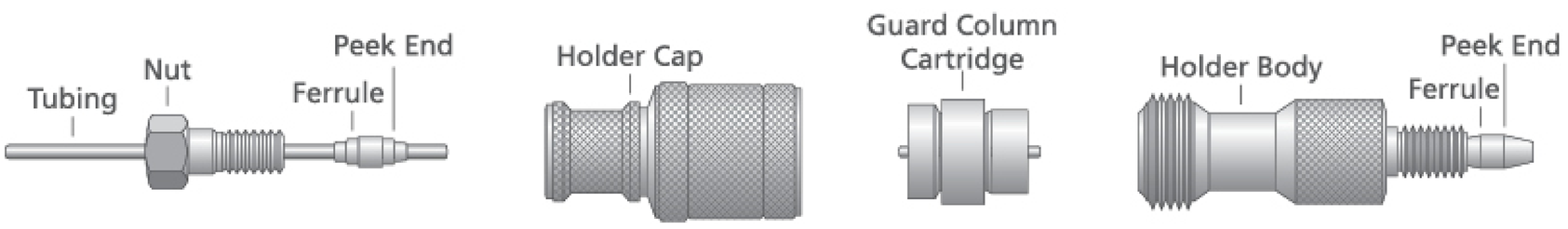
Shim-pack Velox UHPLC Pre-column (0.2 µm)

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

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

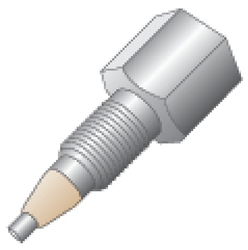
Shim-pack Velox EXP Guard Column

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.

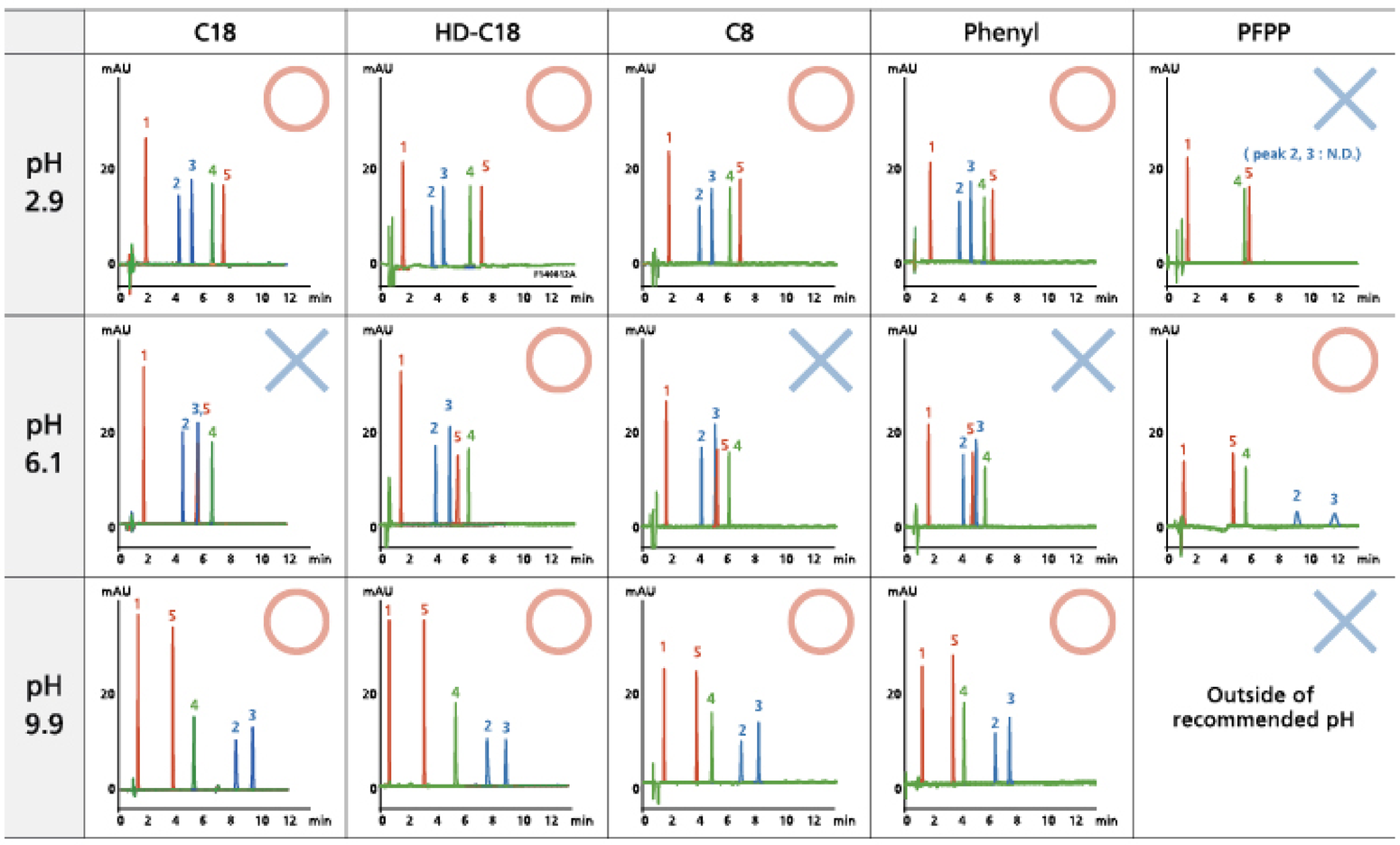
Shim-pack Scepter Chemistries

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

Shim-pack Scepter

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

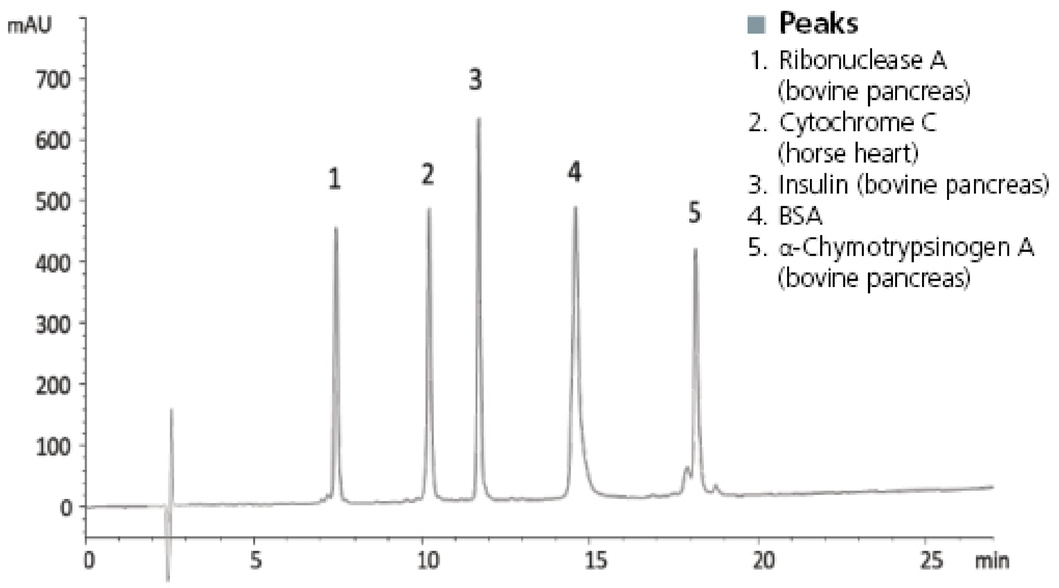
Design for biomolecules separations

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.

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

Analysis Examples

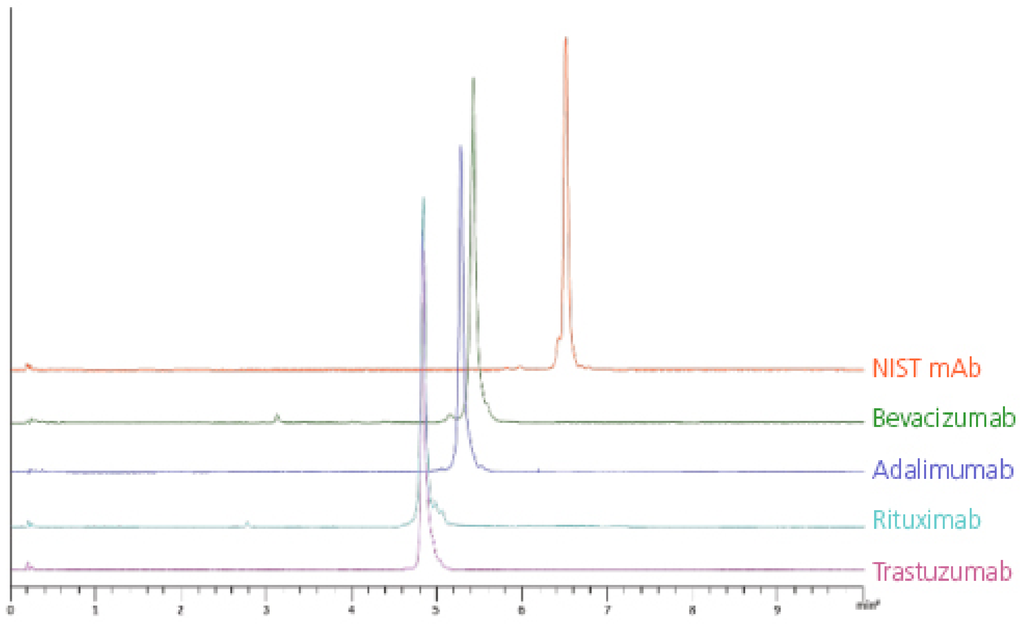
Analysis of Proteins



■ 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

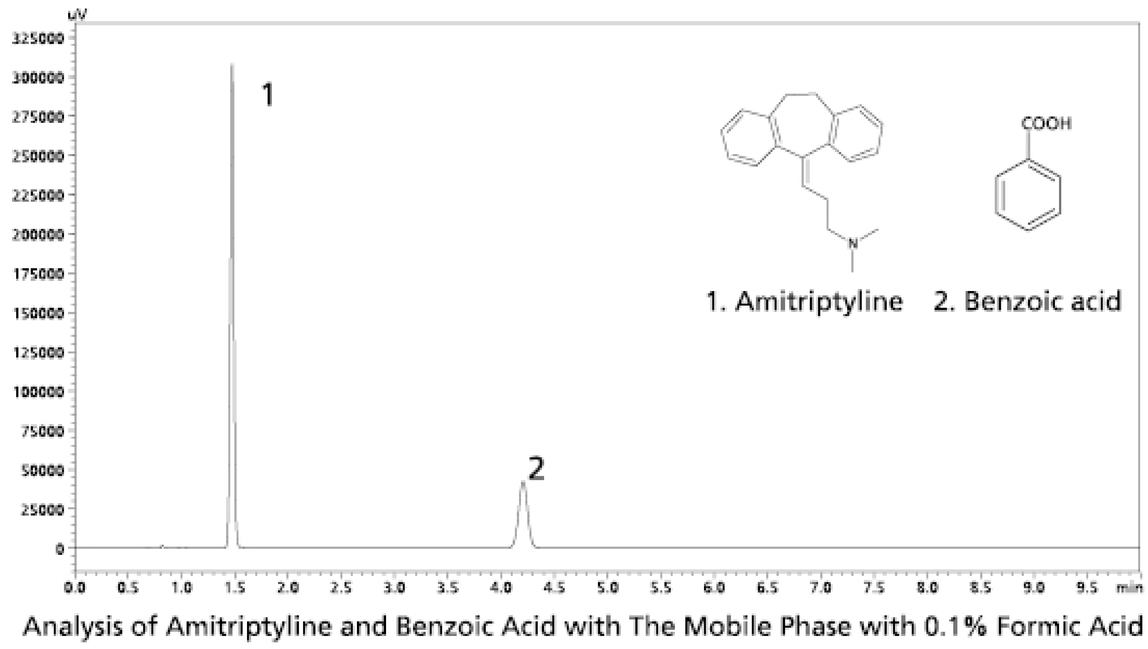
Unprecedented Resolution and Peak Shape of Basic Compounds

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

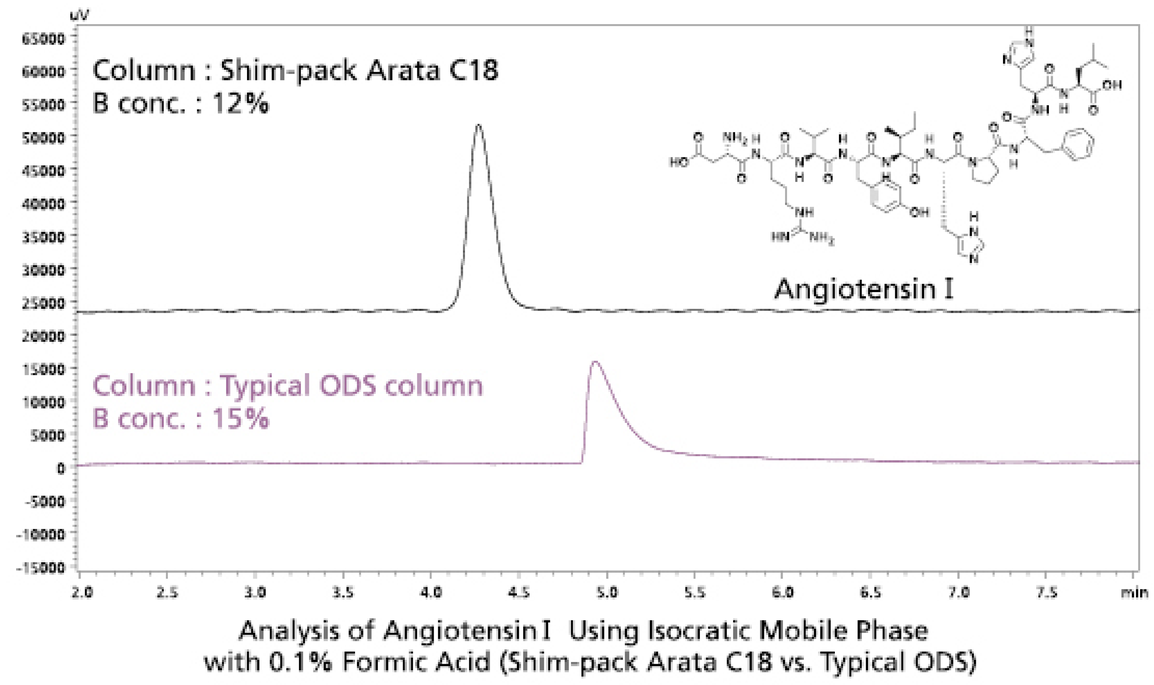
Analytical Conditions

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

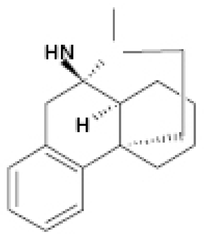
Column	Asymmetry
Shim-pack Arata C18	1.26
Typical ODS column	6.94

* 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.

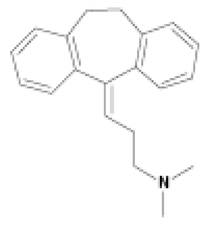
** Acetonitrile concentration was adjusted in order that the retention time of peptide on each column become similar.

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

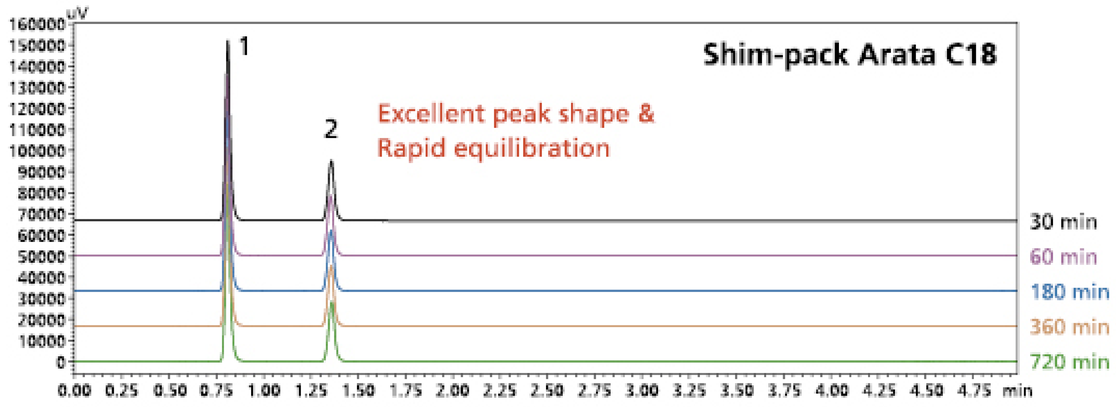
When analyzing basic compounds on a typical ODS column with low ionic strength acidic mobile phase, peak shape and long equilibration times are common problems. Shim-pack Arata LC columns can be rapidly equilibrated in low ionic strength acidic mobile phases yielding excellent peak shape and stable retention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



1. Dextromethorphan



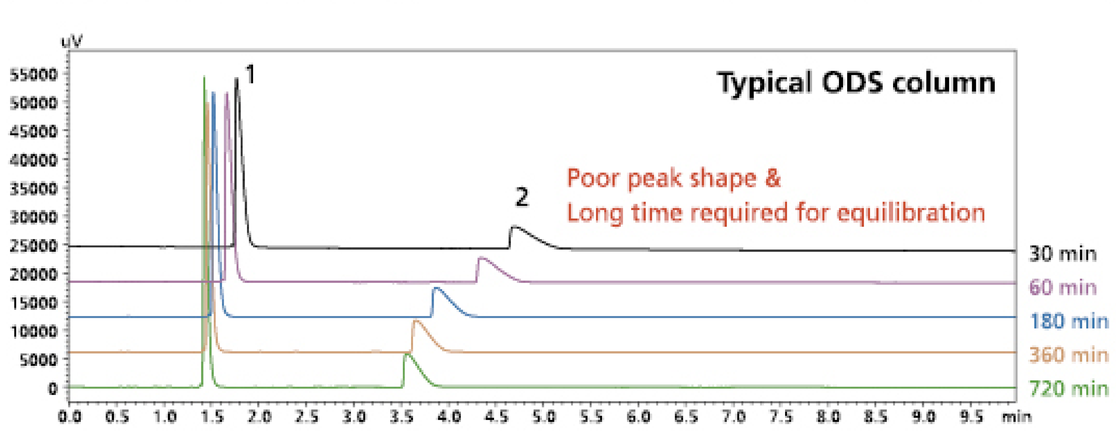
2. Amitriptyline



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

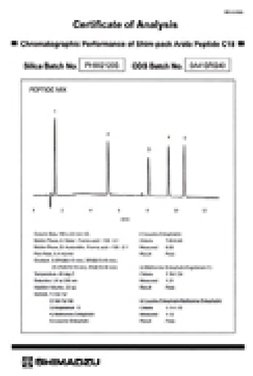
Shim-pack Arata Peptide Columns

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.

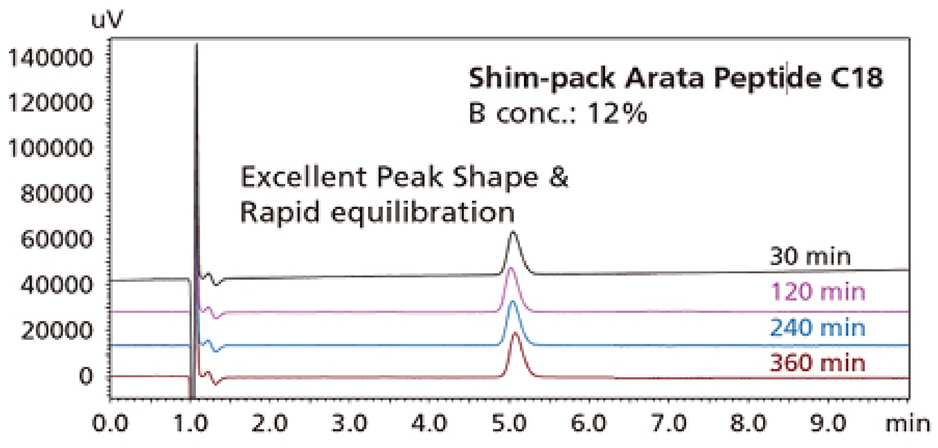
Increased Assurance of Peptide Analysis ~ Shim-pack Arata Peptide C 18 column ~

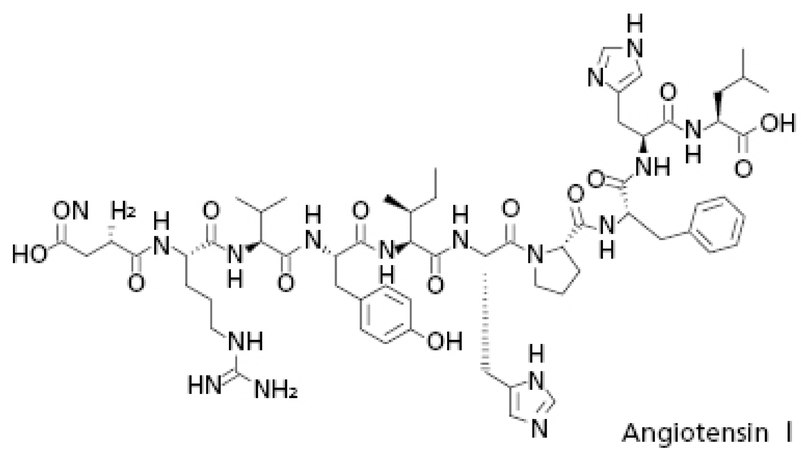
In order to ensure lot-to-lot reproducibility in peptide analysis, each lot of Shim-pack Arata Peptide C18material is tested using a mixture of peptide standards in addition to the standard Shim-pack Arata C18 lot QCtest. This test is carried out under severe condition using 0.1 % formic acid mobile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


Certificate of Analysis

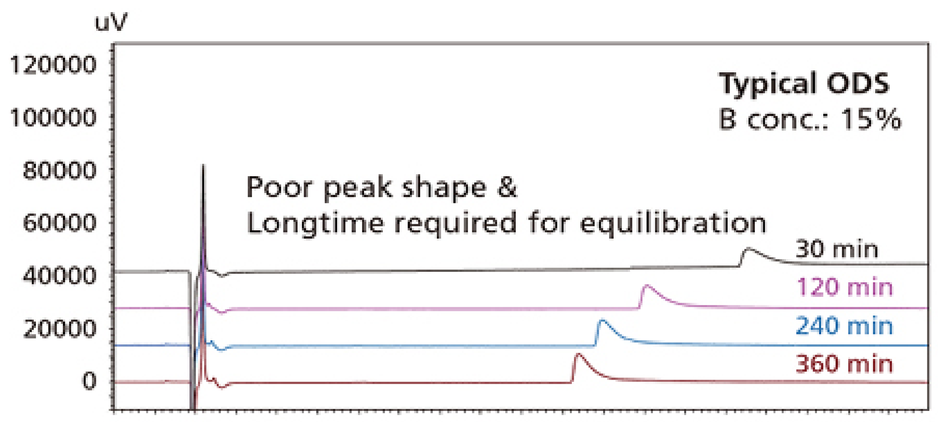
Excellent Seperation Performance of Peptides

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.





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	2.17×10^5	2.13×10^5	2.26×10^5	2.25×10^5	2.23×10^5	2.24×10^5	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	1.65×10^5	1.58×10^5	1.76×10^5	1.78×10^5	1.83×10^5	1.84×10^5	5.3

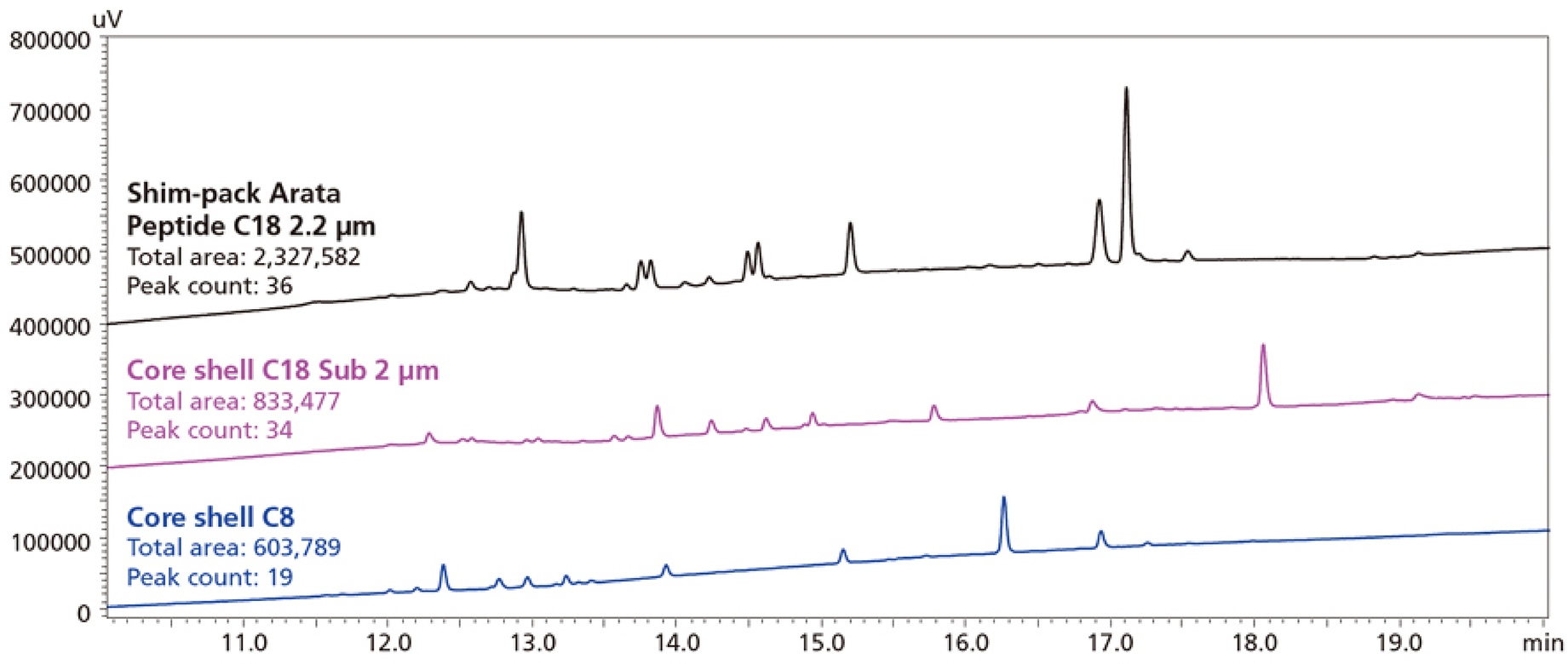
Both columns were new columns (shipping solvent: acetonitrile) and equilibrated with mobile phase without any conditioning. Angiotensin I was analyzed after a certain period of equilibration and retention time, symmetry factor and area of Angiotensin I were compared. The typical ODS showed poor peak 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

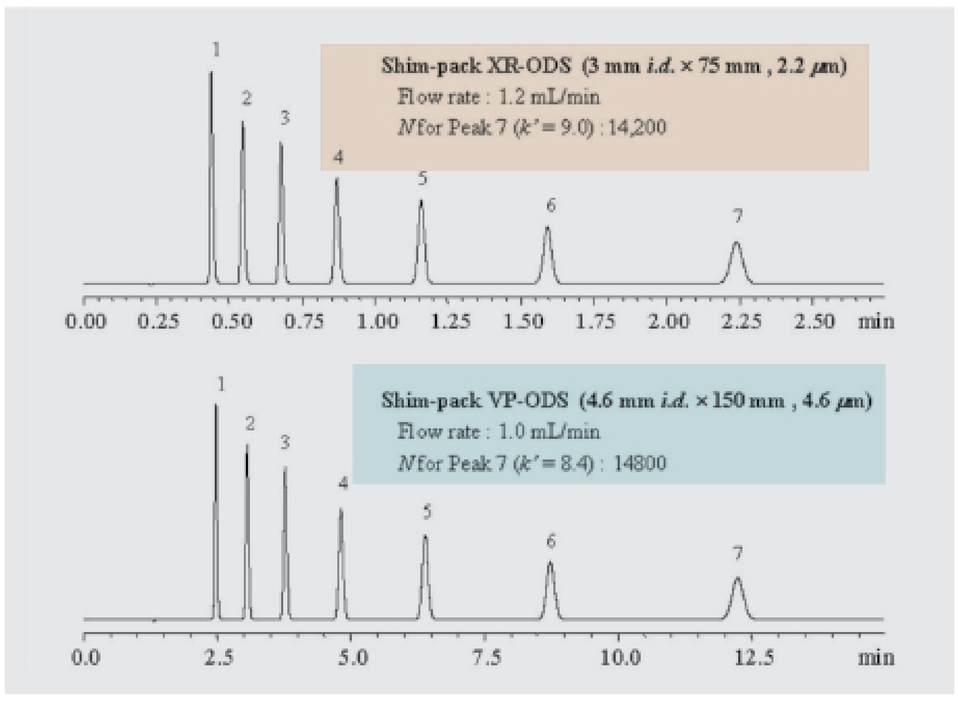
Shim-pack XR Series Columns Offer Versatility and Fast Analysis

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

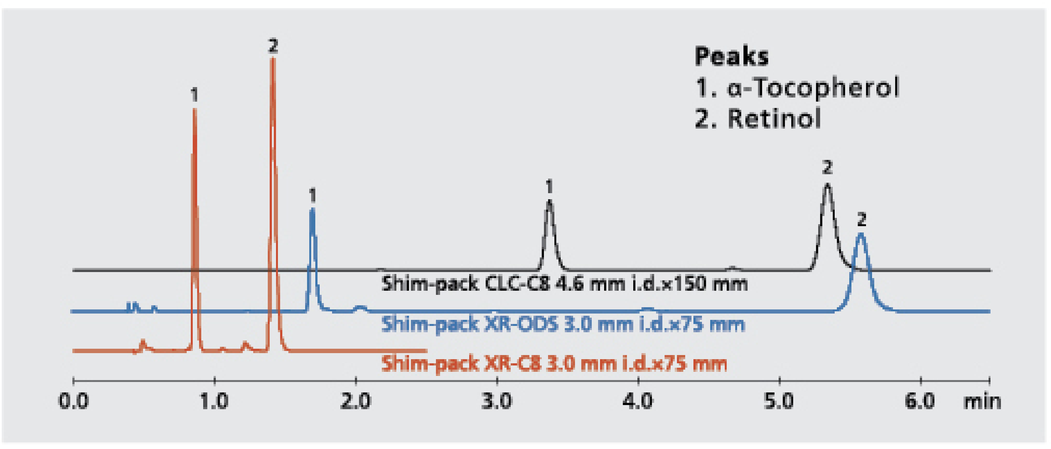
Shim-pack XR Series Comprehensive Product Range

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.

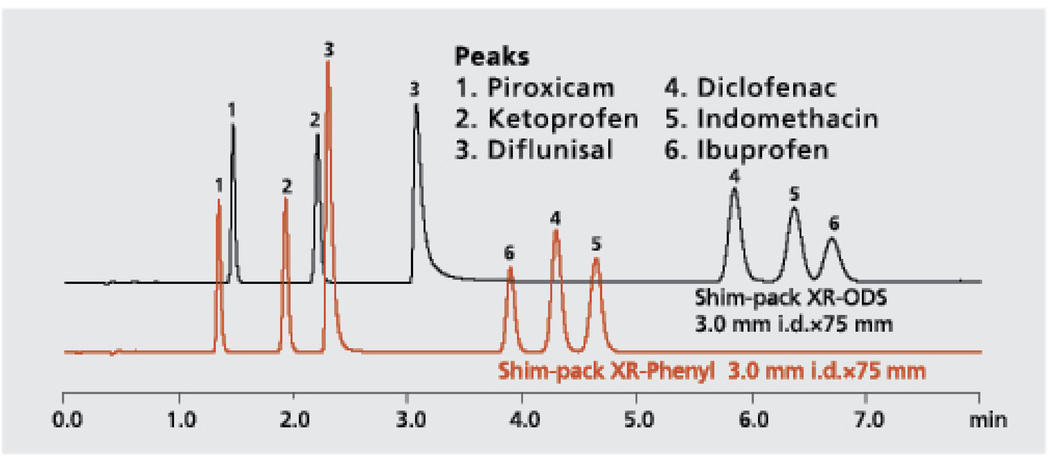


■ **Conditions**

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.

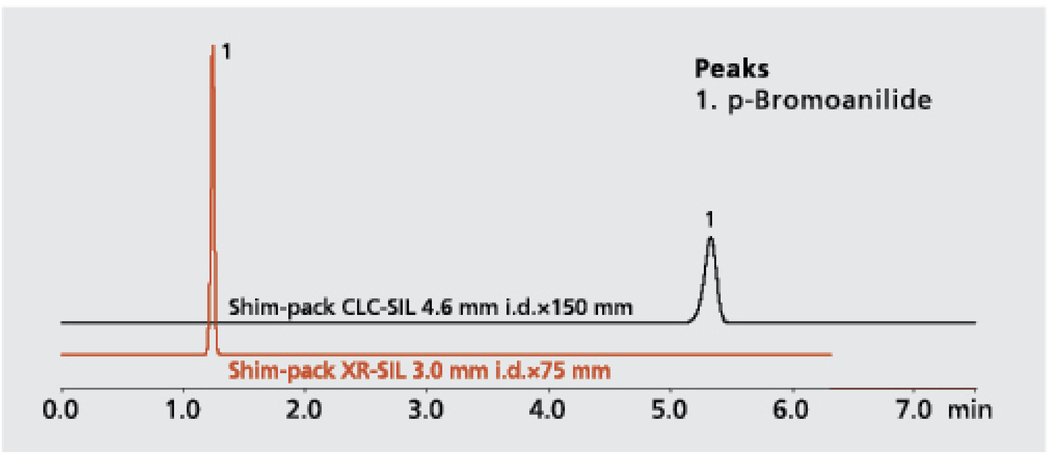


■ **Conditions**

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

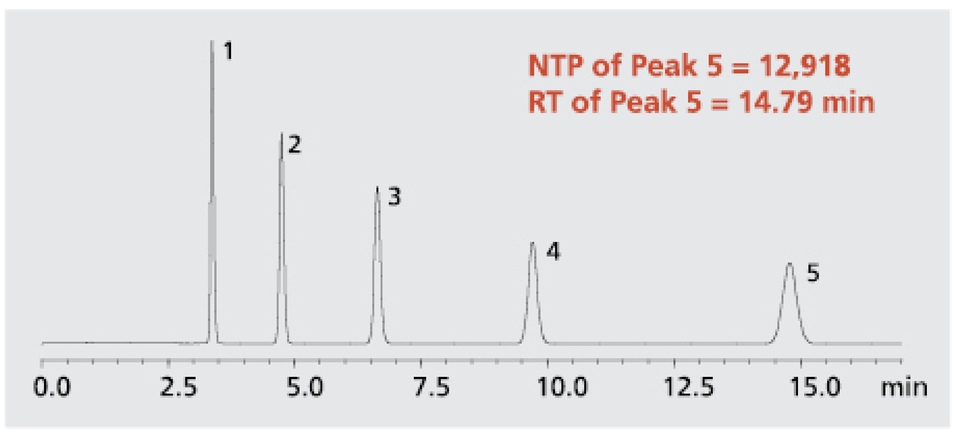
The Shim-pack XR-ODS II range includes a 1.5 mmI.D. model in addition to normal 2 mm and 3 mmI.D. columns. With an optimal flow rate of 0.2 to 0.3 mL/min, the 1.5 mmI.D. column offers the optimal flow rate for LC/MS and reduces mobile phase consumption.

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.

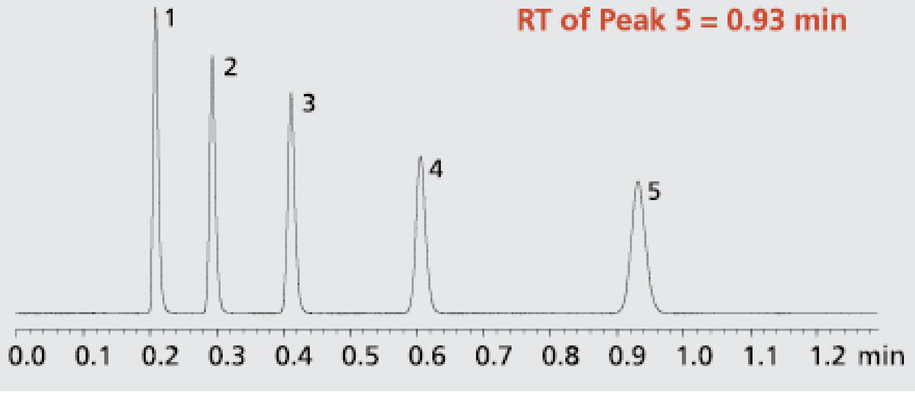
Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm, P/N: 228-34937-91)

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



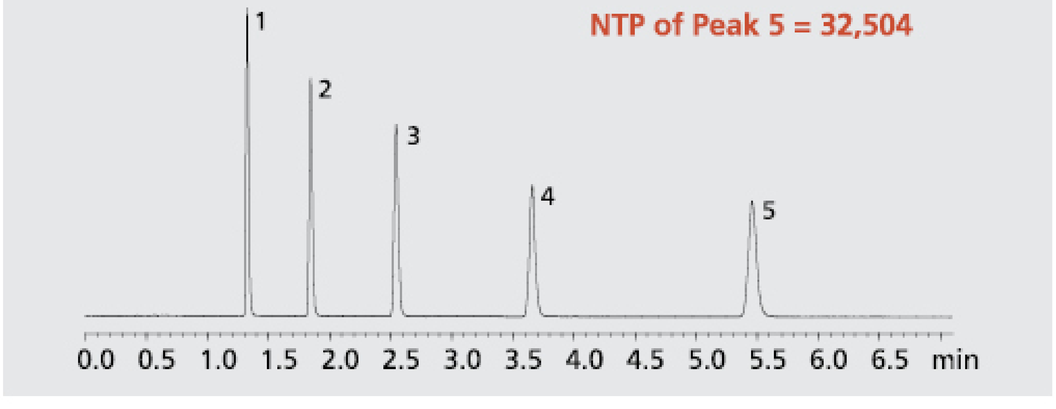
Conditions
Mobile Phase : 55 % Aqueous Acetonitrile Solution
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Injection Vol. : 5 µL

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

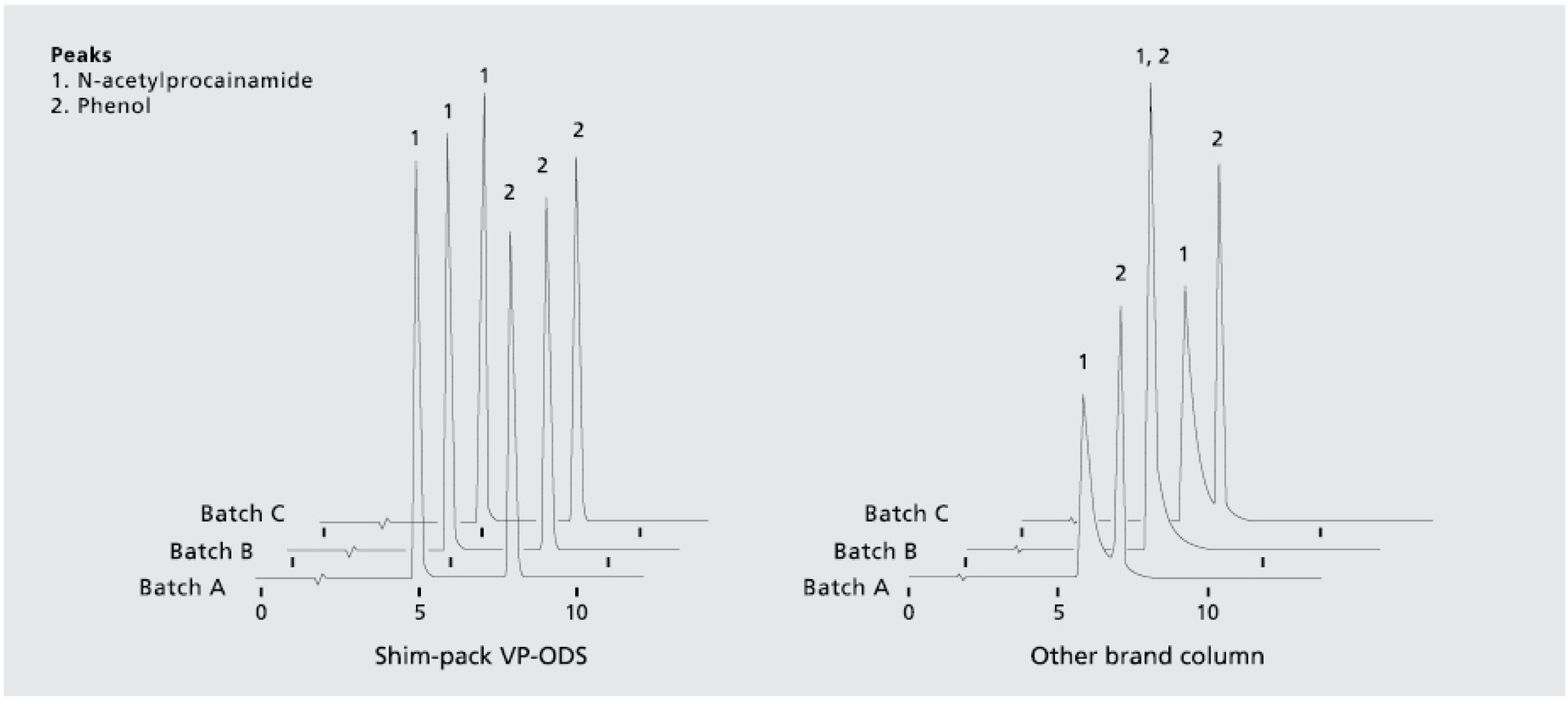
Shim-pack VP Series

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

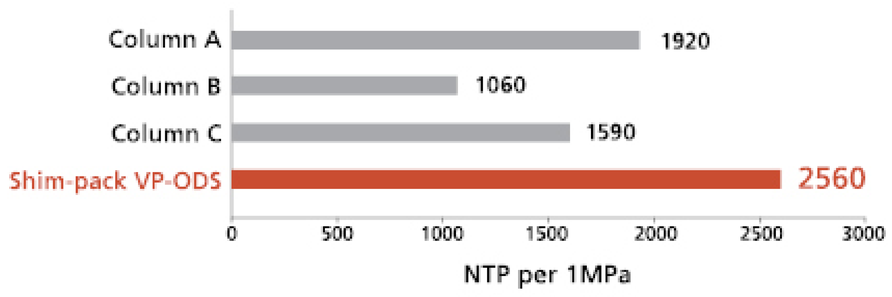
Shim-pack VP series ensures high column-to-column performance reproducibility, which is ideal for method development and validation. Silica-bases, surface treatment and packing procedures are subjected to a strict array of quality criteria tests and controlled respectively. Each column is delivered together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



Comparison of reproducibility between three batches of silica-based materials

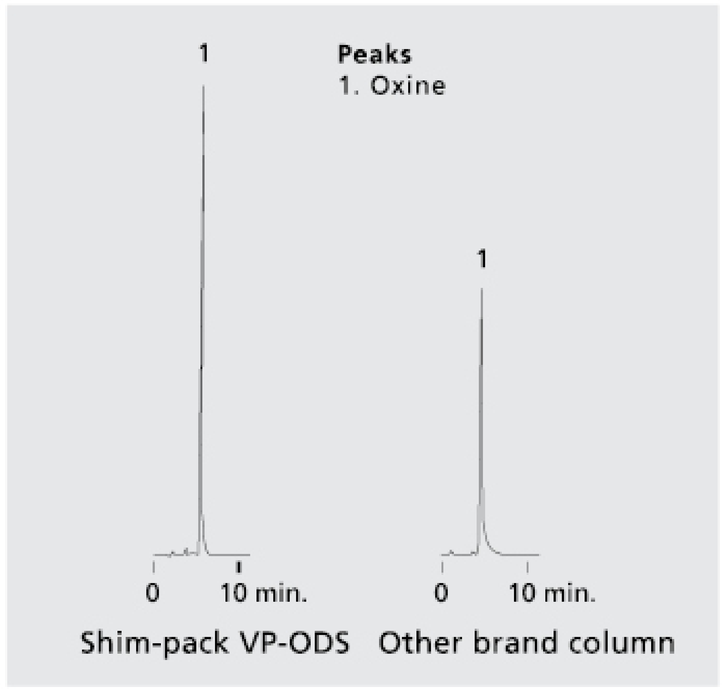
Balance of Column Efficiency and Column Backpressure

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.

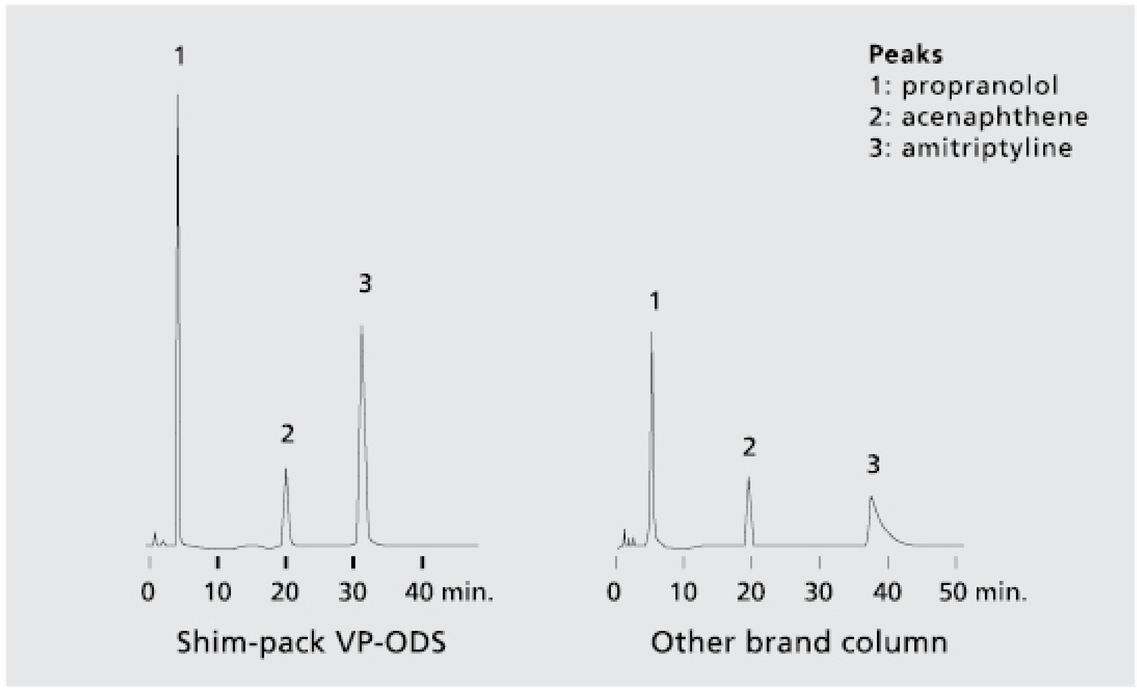


Column Size: 4.6 x 150 mm, Mobile Phase: Methanol/Water=70/30,
Flow Rate: 1.0 mL/min., Sample: Naphthalene

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

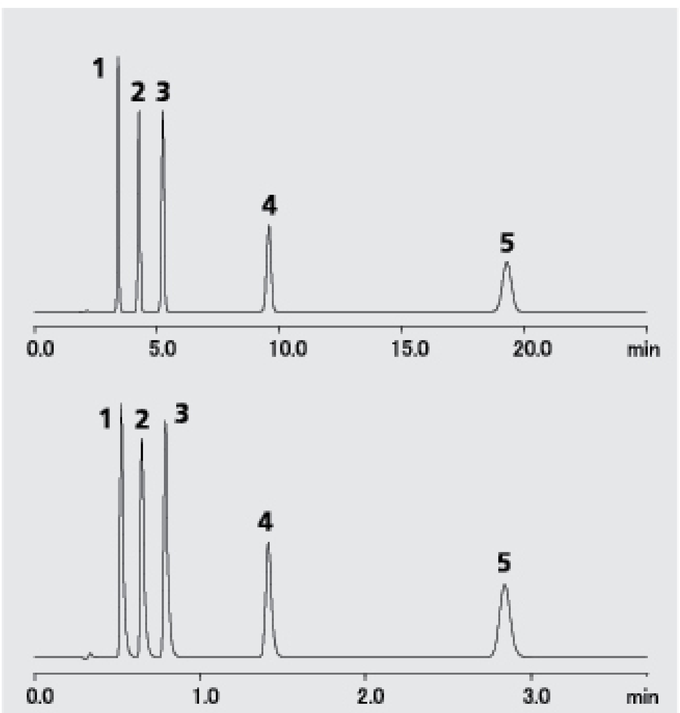
Smooth Transfer of Methods from High-Speed Analysis to Conventional Analysis

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)

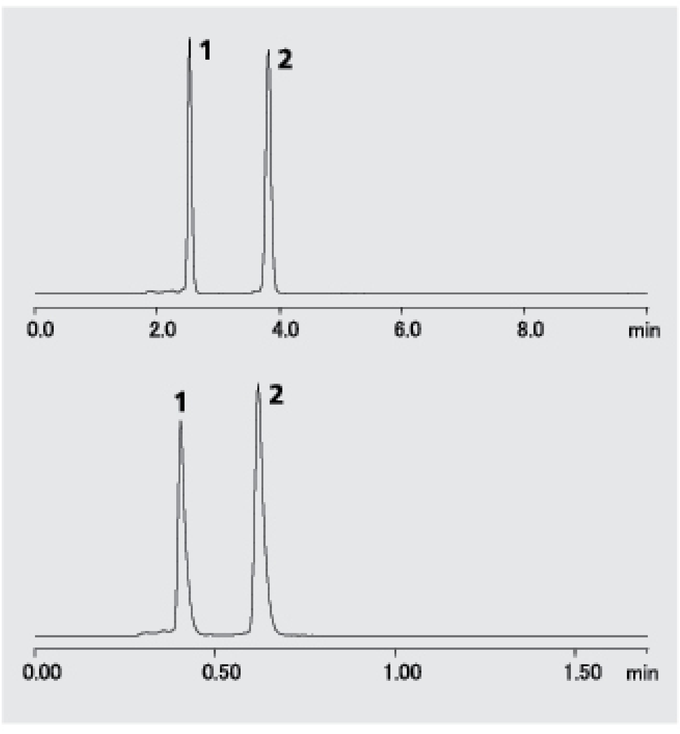
Mobile Phase : A) 0.1 % formic acid
B) Acetonitrile
A/B = 8/2 (v/v)

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)

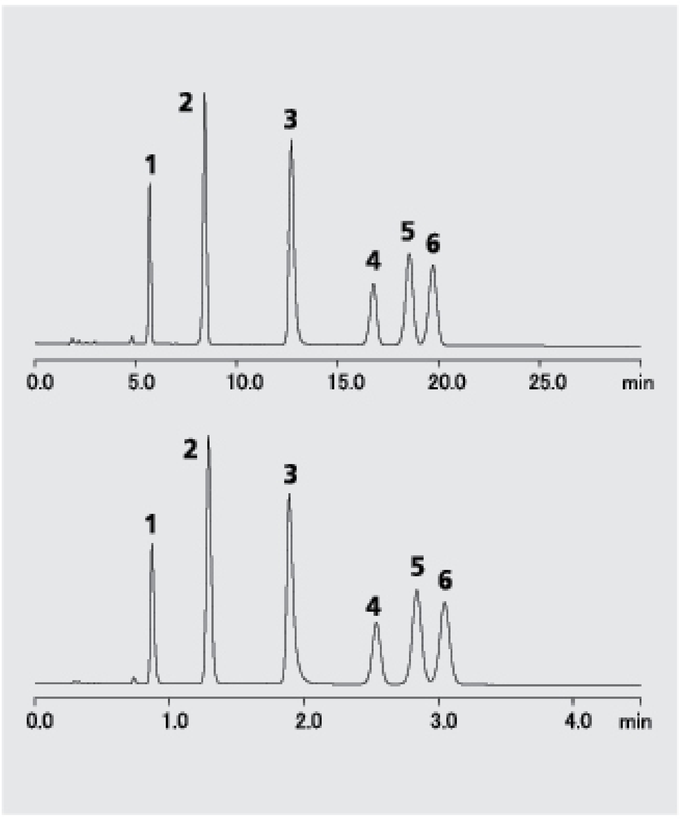
Mobile Phase : Methanol

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)

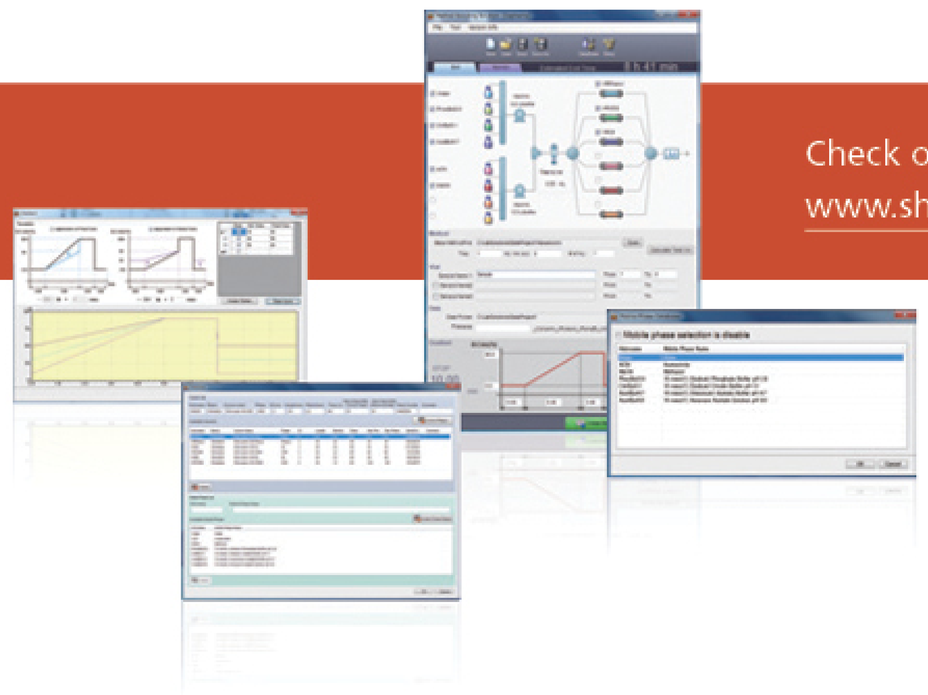
Mobile Phase : A) 20 mmol/L Phosphoric acid (Na) buffer (pH 2.5)
B) Acetonitrile
A/B = 3/7 (v/v)

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

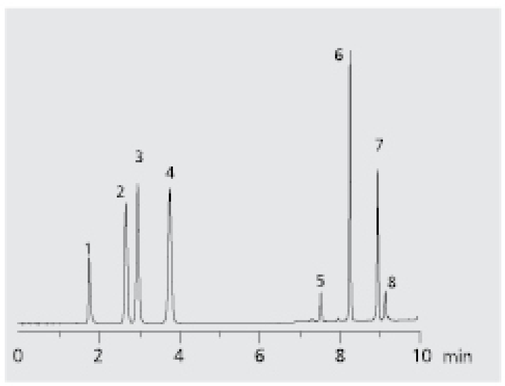
Shim-pack MAqC-ODS

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

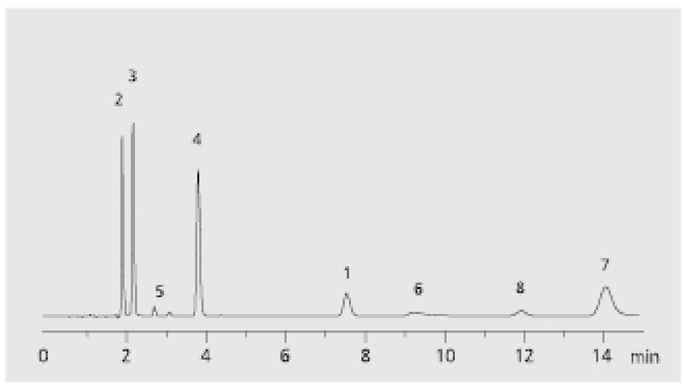


■ Peaks
1. Thiamine
2. Niacin
3. Nicotinamide
4. Pyridoxine
5. Ca Pantothenate
6. Folic acid
7. Riboflavin
8. Biotin

■ **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



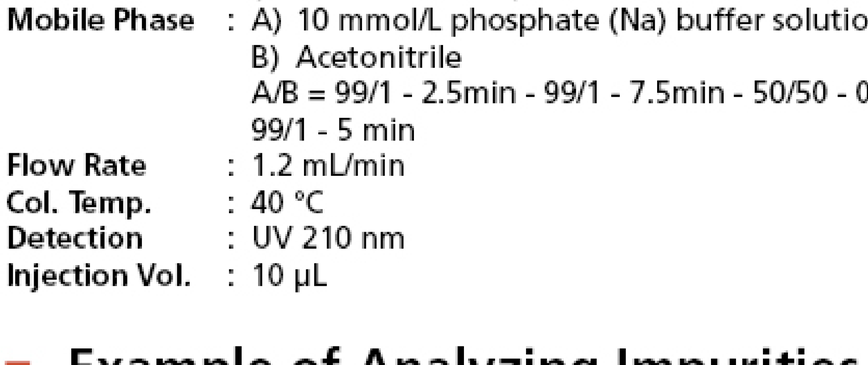
■ **Conditions**

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.

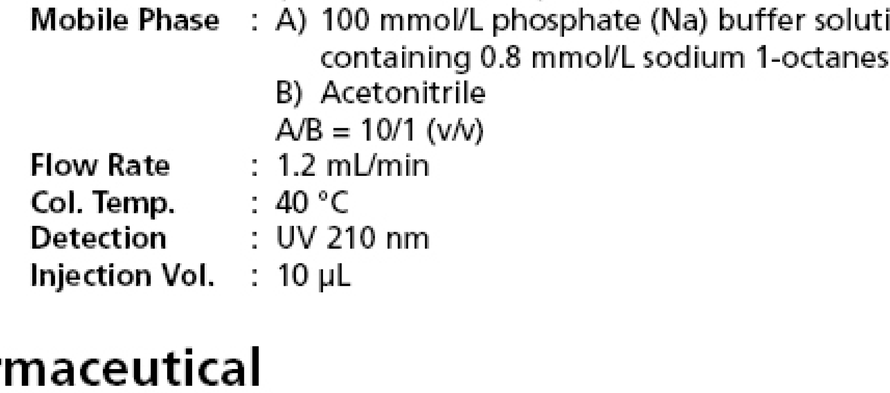
Shim-pack MAqC-ODS I



■ **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

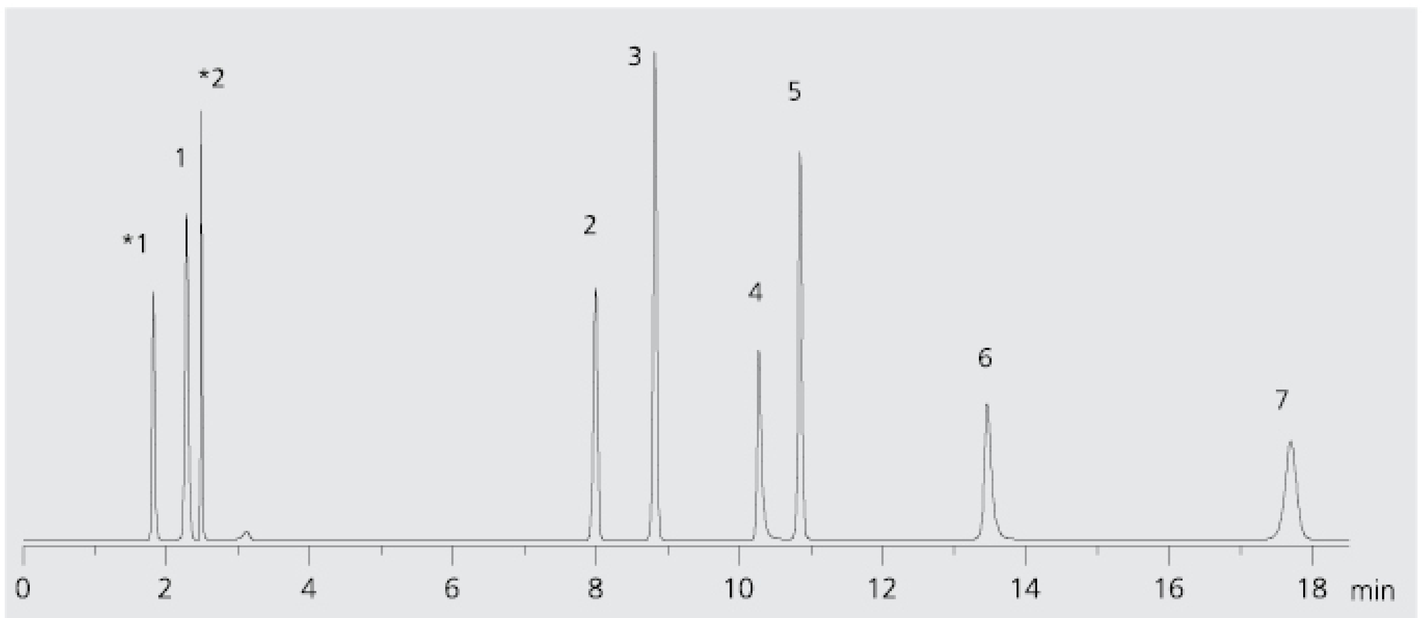


■ **Conditions**

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

More Free Literature at www.shimadzu.com/an

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

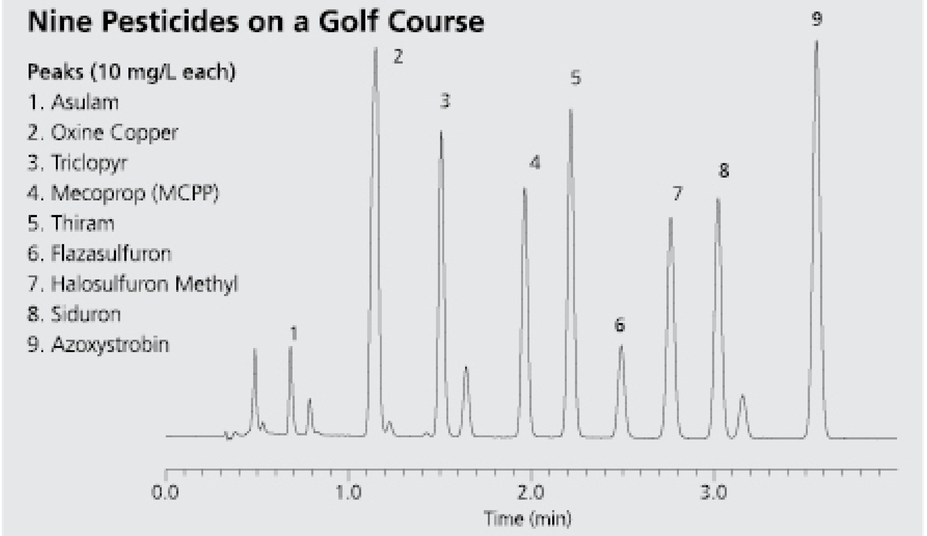
Shim-pack GIST C18 has superior inertness, which improves analysis precision and increases column durability. In addition, it can be used to analyze strong ionic compounds and difficult to absorb samples, which helps to obtain symmetrical peaks and high reproducibility.

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

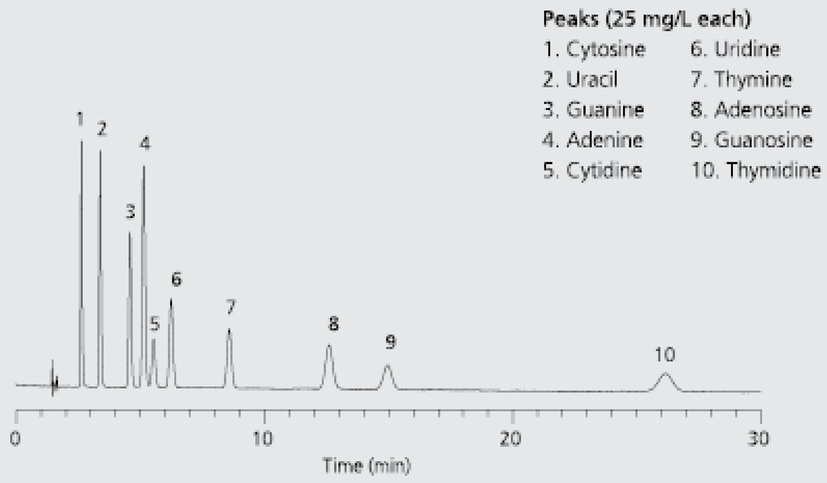
Nine Pesticides on a Golf Course



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

Nucleoside and Nucleic acid base



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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
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)	I.D. (mm) / Length (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

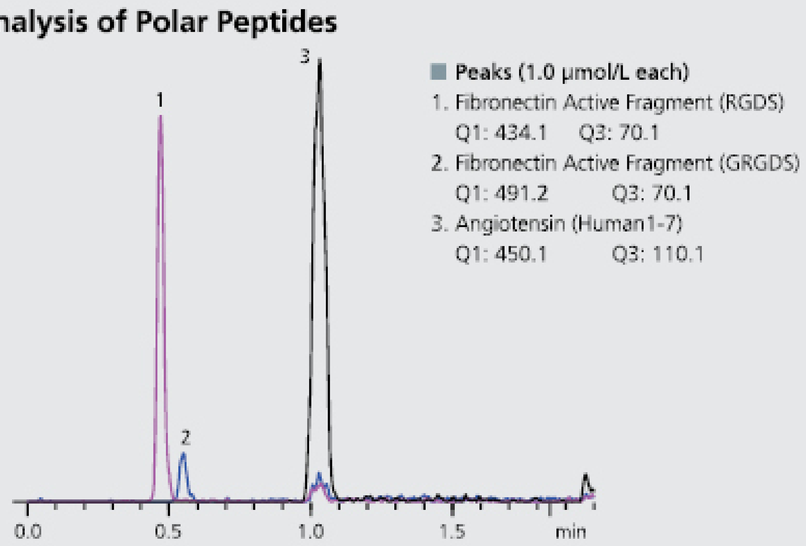
Shim-pack GIST C18-AQ achieves strong retention of hydrophilic highly polar compounds compared to general C18 columns, while maintaining high inertness and durability in highly or 100% aqueous mobile phases.

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 m²/g
Carbon Loading	13 %
End-capping	Yes
pH Range	1 to 10
USP Code	L1, L96

Analysis Examples

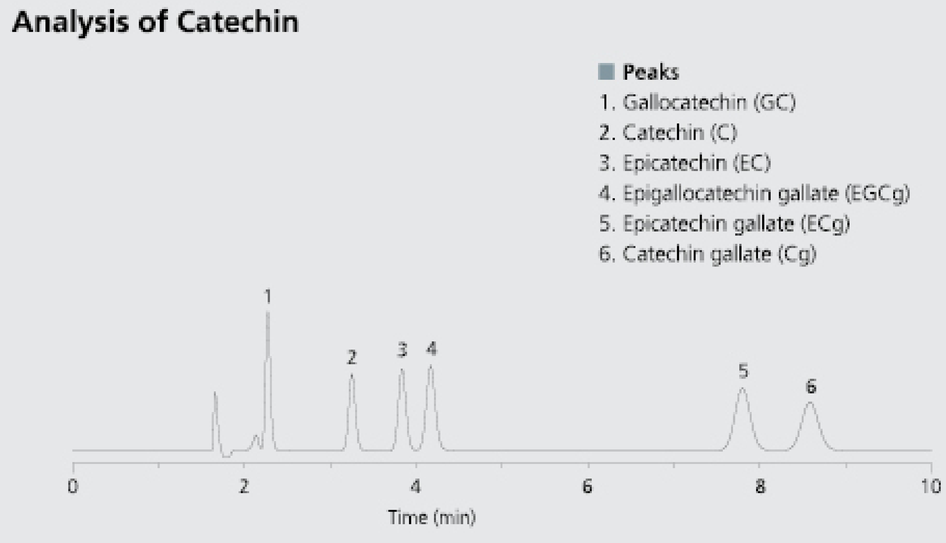
Analysis of Polar Peptides



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)	Length (mm) \ I.D. (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

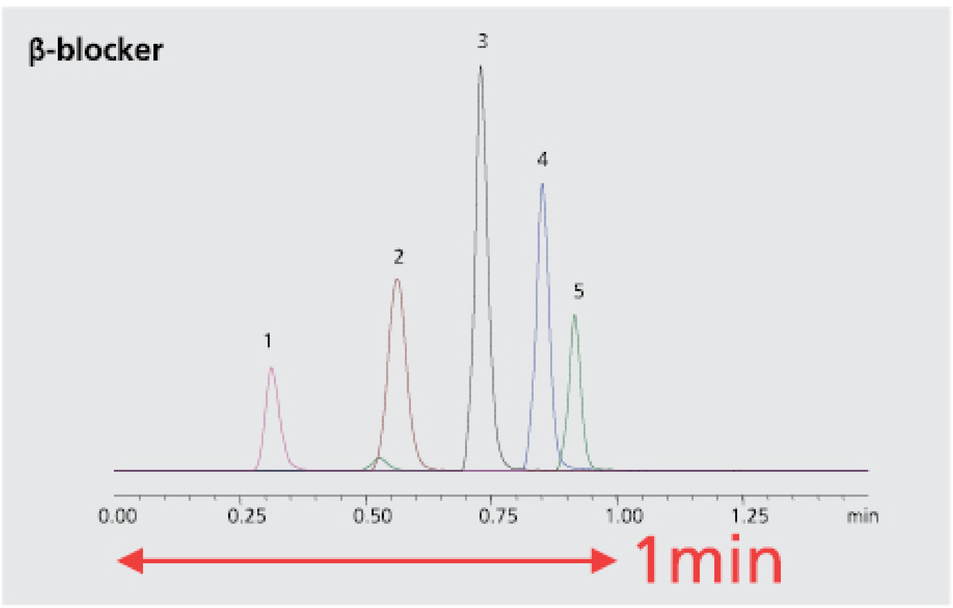
Ideal for Rapid Analysis

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 m^2/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

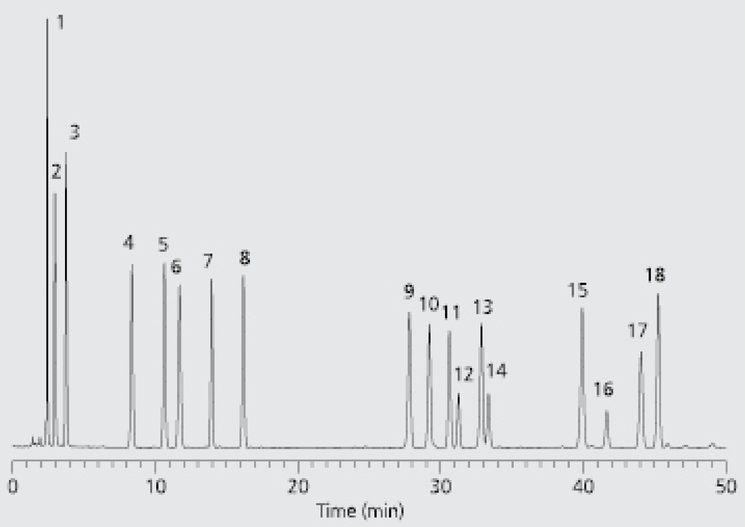
Widely used octadecyl bonded silica gel enables the Shim-pack GIS C18 to have strong hydrophobic interaction and low absorption of ionic compounds. In addition, highly uniform particles ensure stable mobile phase delivery and outstanding low pressure.

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

Food Dyes



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.

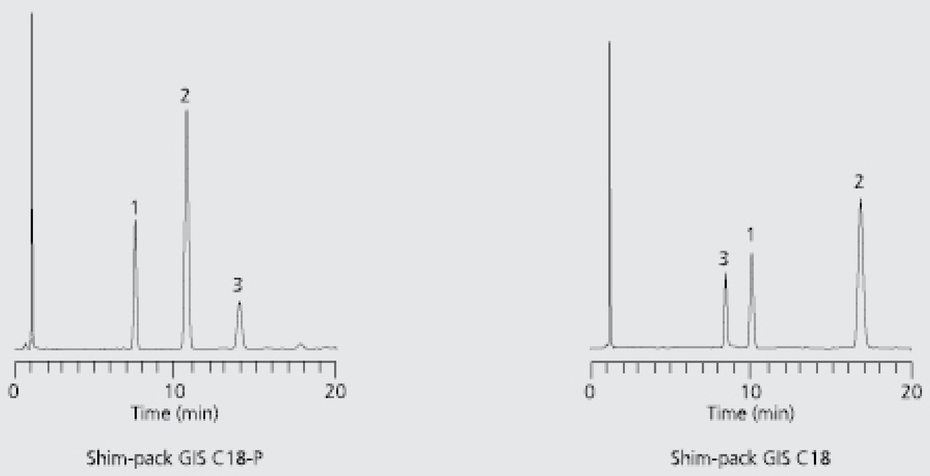
Shim-pack GIS C18-P is also ideal for the HPLC analysis of 16 PAH compounds listed as target pollutants by the U.S. EPA.

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

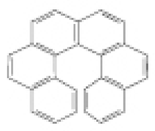
Due to increased retention of planar structural compounds, Shim-pack GIS C18-P shows different selectivity compared to Shim-pack GIS C18.

Analysis of Planar and Non-planar Compounds

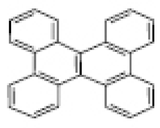


Peaks

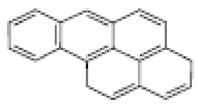
1. Phenanthro[3,4-c]phenanthrene (PhPh)



2. Tetrabenzonaphthalene (TBN)



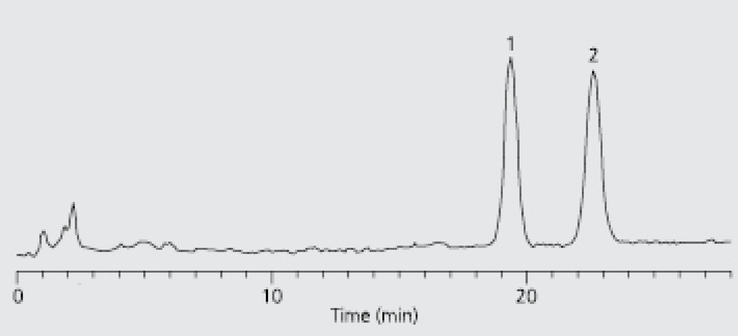
3. Benzo[a]pyrene (BaP)



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

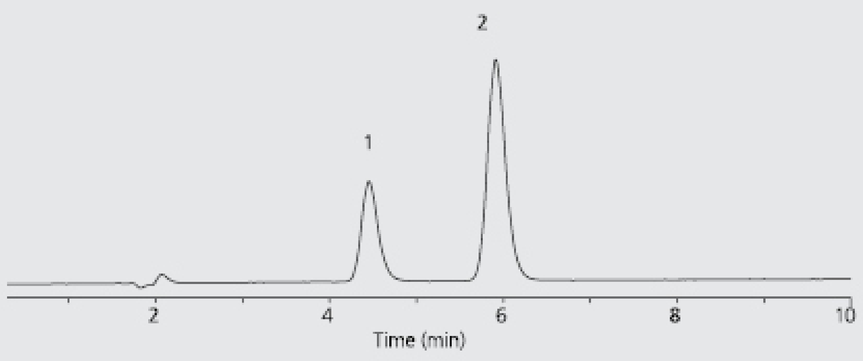
Shim-pack GIS RP-Shield contains a polar functional group embedded between silica surface and an octadecyl group, making it stable in 100% aqueous mobile phases without phase collapse. The embedded polar functional group is also extremely base deactivated, which enables the column to provide superior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

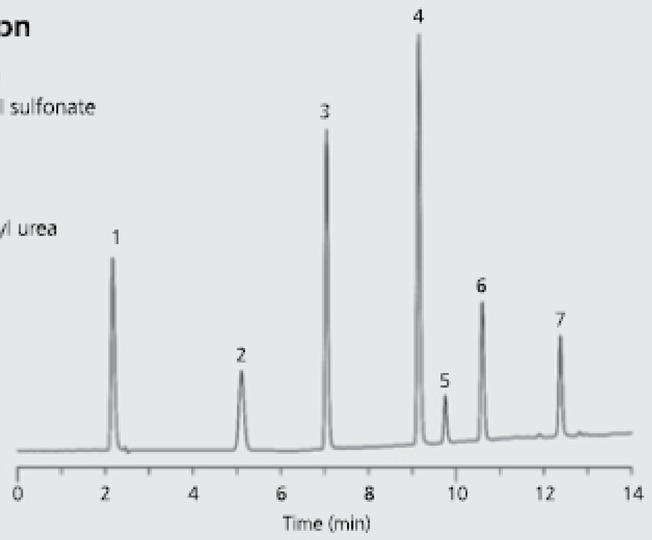
Shim-pack GWS series is an ideal choice for cost control.

Bonded Phase	Octadecyl Groups
Particle Size	5 µm
Pore Size	10 nm
Surface Area	450 m²/g
Carbon Loading	9.5 %
End-capping	Yes
pH Range	2 to 7.5
USP Code	L1

Analysis Examples

Cold medication

Peaks (10 mg/L each)
1. Potassium Guaiacol sulfonate
2. Acetaminophen
3. Caffeine
4. Ethenzamide
5. Allyl isopropyl acetyl urea
6. Isopropylantipyrine
7. Ibuprofen

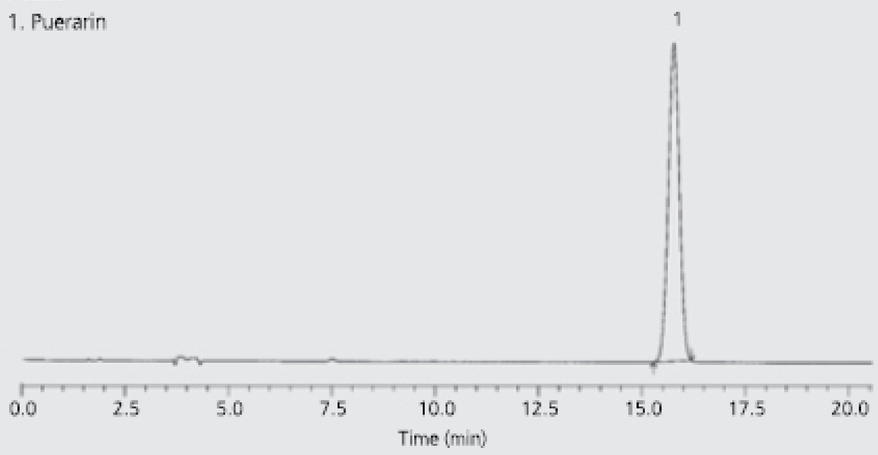


Conditions

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

Puerariae radix

Peaks
1. Puerarin



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

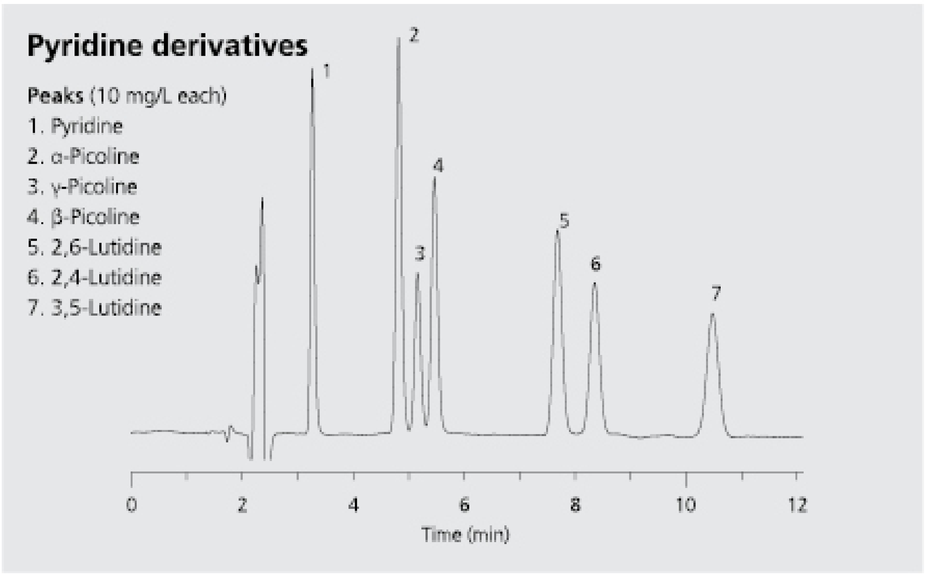
Shim-pack GIST C8 is packed with high-purity porous spherical silica for delivering the same extreme inertness to elute either basic or acidic compounds without undesired adsorption. Low retentivity and no sample adsorption enable analysis of natural samples.

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

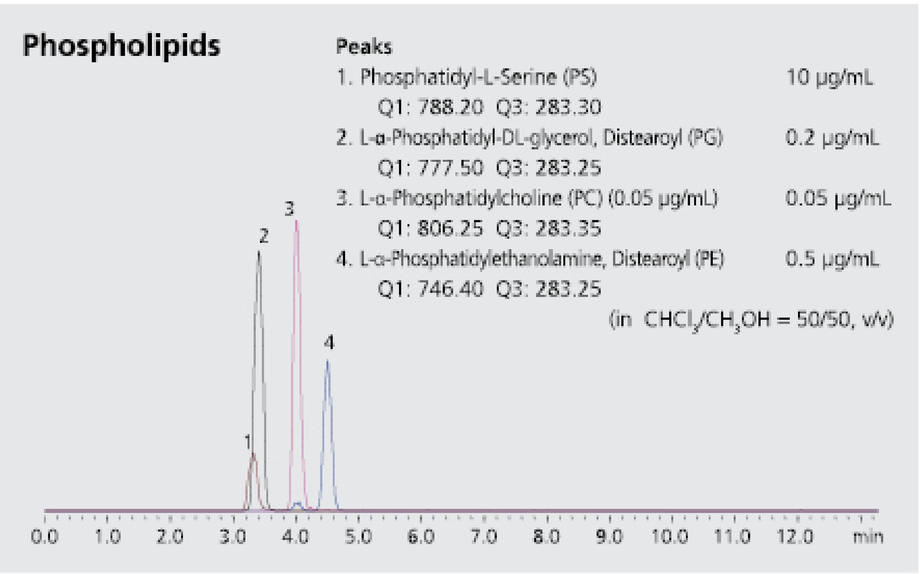
Pyridine derivatives



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

Phospholipids



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)				Holder
		1.0	1.5	3.0	4.0	
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)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
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			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
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

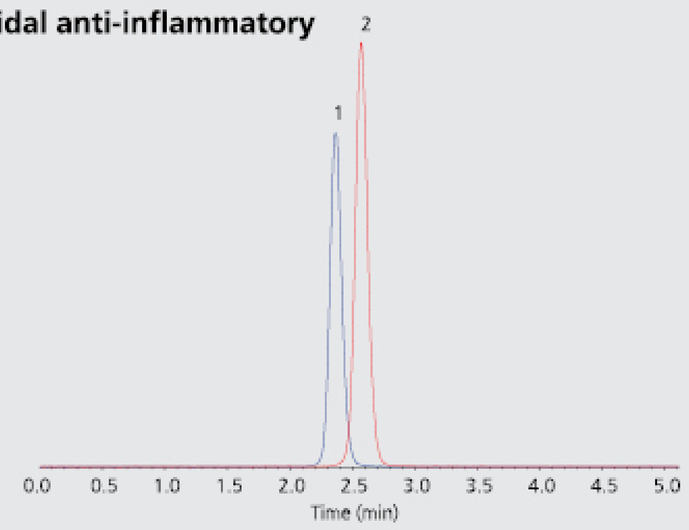
The extremely unique phase characteristics of Shim-pack GIST Phenyl are critical to resolving compounds that could not be separated with a C18 or C8 phase column.

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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)				Holder
		1.0	1.5	3.0	4.0	
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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
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)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
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)	I.D. (mm) / Length (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.

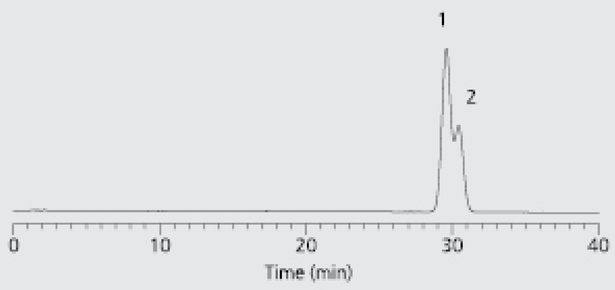
Bonded Phase	Phenylhexyl Groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	9 %
End-capping	Yes
pH Range	1 to 10
USP Code	L11

Analysis Examples

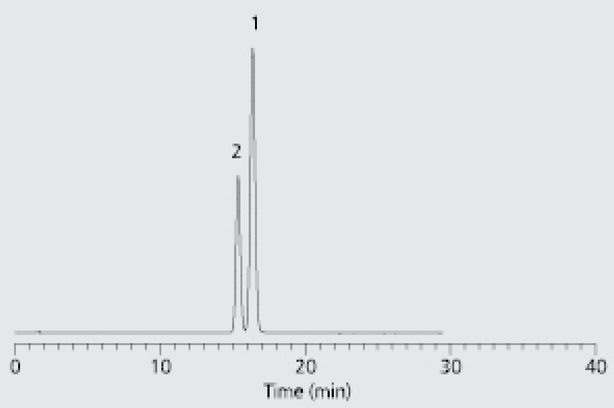
Different Selectivity to Shim-pack GIST C18

Analysis of Analgesic Drugs

■ Peaks
1. Indomethacin
2. Ibuprofen



Shim-pack GIST C18



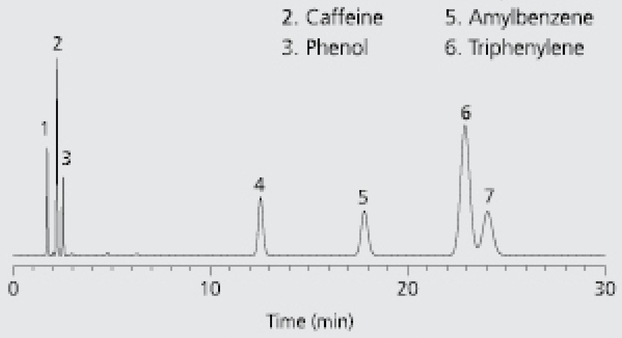
Shim-pack GIST Phenyl-Hexyl

■ 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

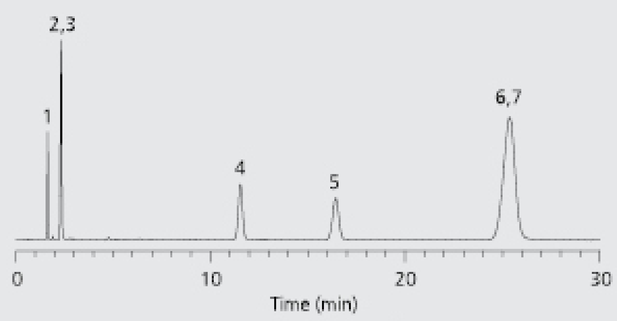
Stronger Retentivity Than Other Phenyl Phase

Analysis of Samples for Column Selectivity

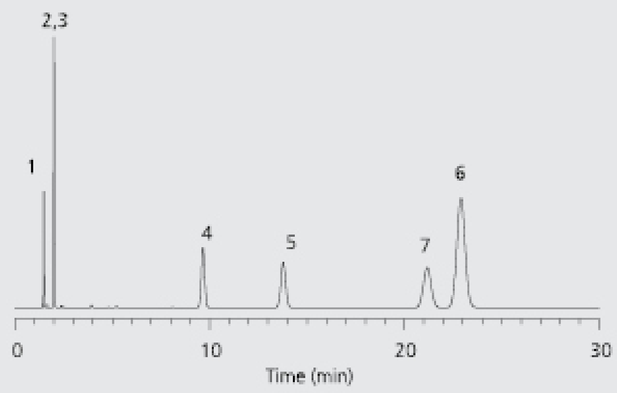
■ Peaks
1. Uracil
2. Caffeine
3. Phenol
4. Butylbenzene
5. Amylbenzene
6. Triphenylene
7. o-Terphenyl



Shim-pack GIST Phenyl-Hexyl



Luna Phenyl-Hexyl



Zorbax Edipse Plus Phenyl-Hexyl

■ 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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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

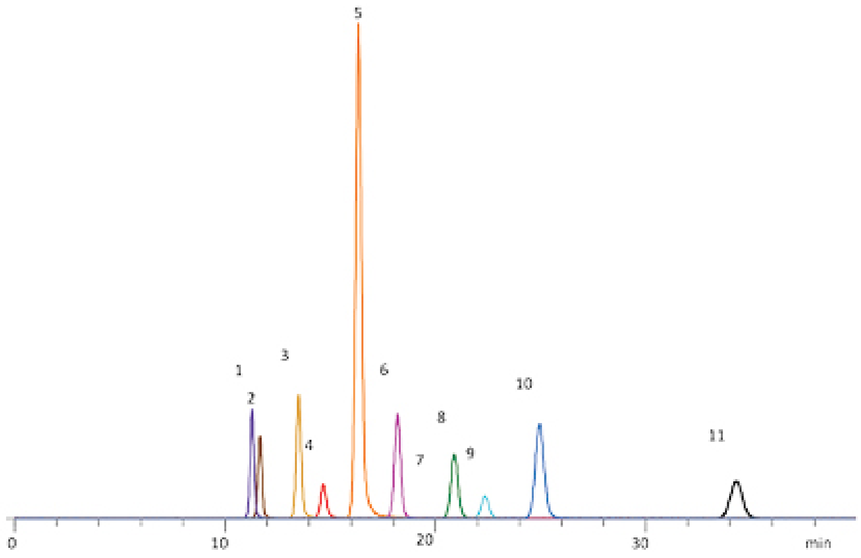
Different from other Shim-pack Series PFPP (pentafluorophenylpropyl) columns, this PFPP column is end-capped so it provides a different selectivity. Durability is a challenge for PFPP columns. However, Shim-pack GIST PFPP provides both high durability, which is a characteristic of the Shim-pack GIST 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 m²/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

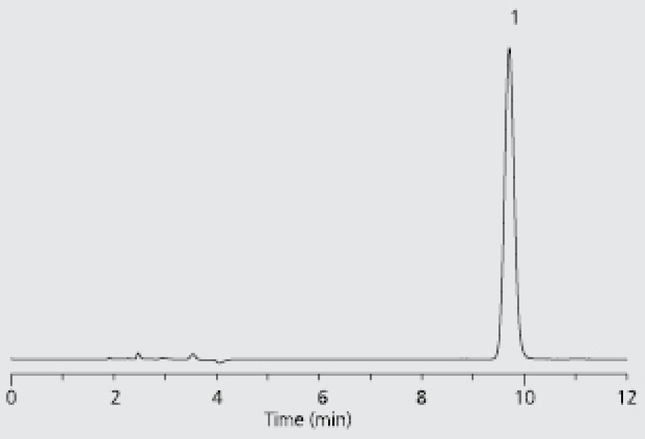
Shim-pack GIS HILIC is designed for Hydrophilic Interaction Liquid Chromatography (HILIC). It is chemically bonded with a diol group, which provides excellent peak shape for basic and neutral polar compounds.

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

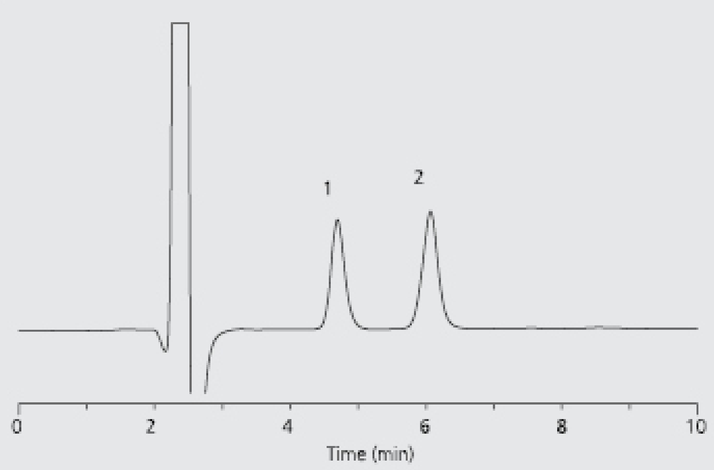
Analysis of Allantoin



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

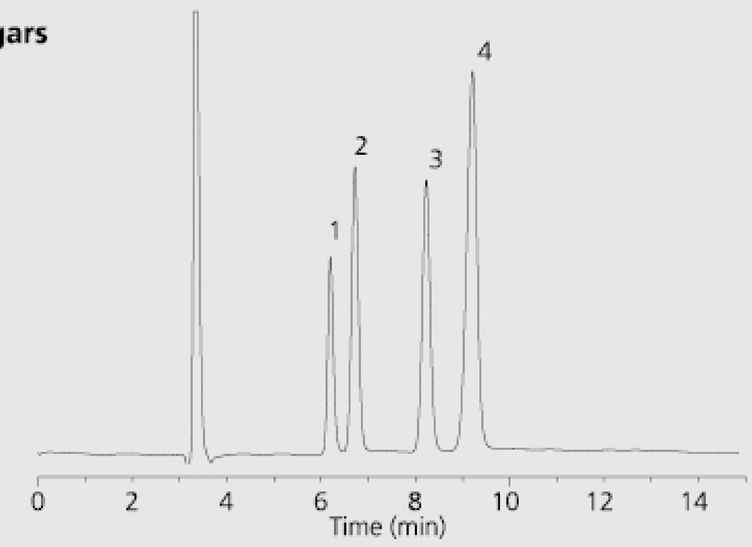
Ideal for Sugar Analysis

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

Sugars

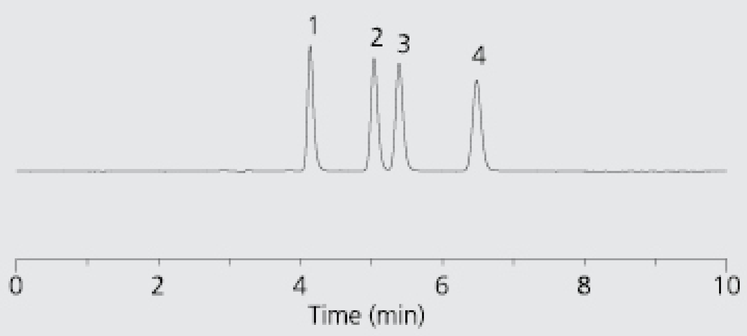


Peaks
1. Fructose
2. Glucose
3. Sucrose
4. Maltose

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

Vitamin E



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

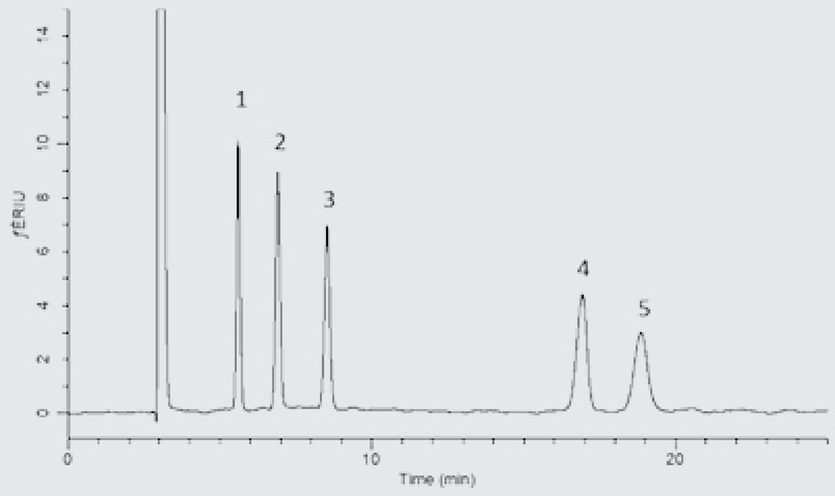
This is the amide type HILIC column in the Shim-pack Series. It shows stronger retention of polar compounds than other HILIC columns such as unmodified silica and Diol type and it provides a different selectivity. It is also highly durable, which is a characteristic of the Shim-pack GIST Series.

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

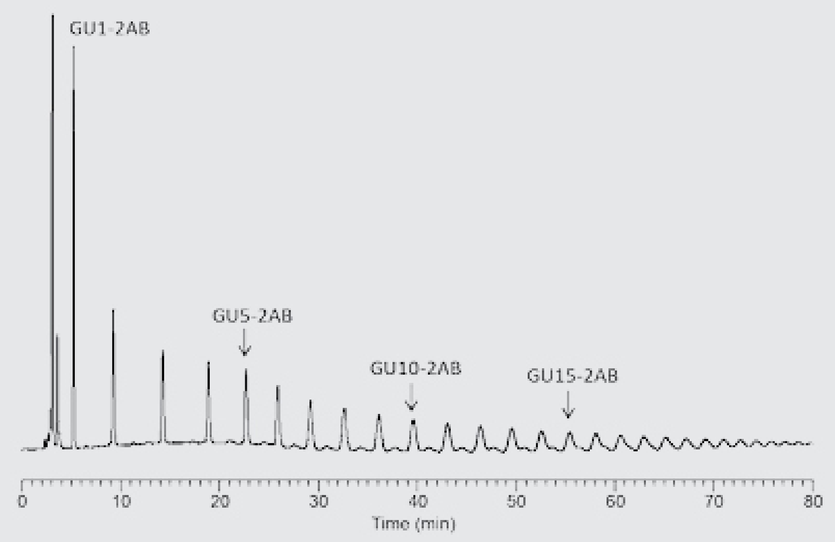
Analysis of Sugar Alcohol



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

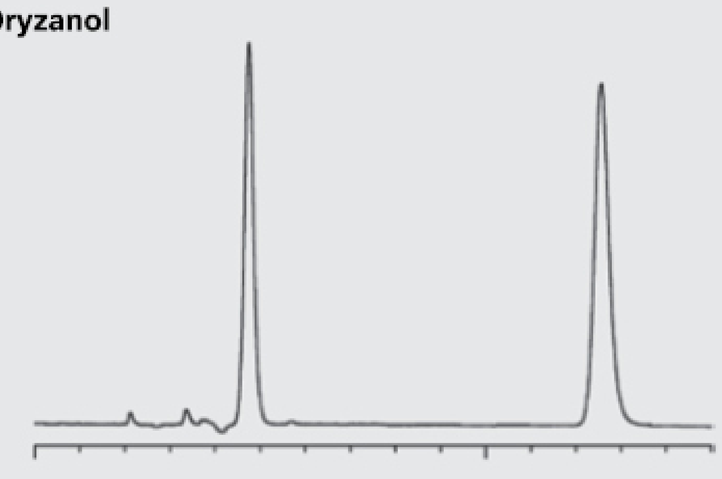
Shim-pack GIS CN is capable of either normal phase or reversed phase analysis. Cyanopropryl groups bonded to silica gel with high density increases the difference recognition of hydrophilicity and the stability. Due to no end-capping, it is capable of analysis utilizing cyano group characteristics.

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	Cyanopropryl 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

☒-Oryzanol

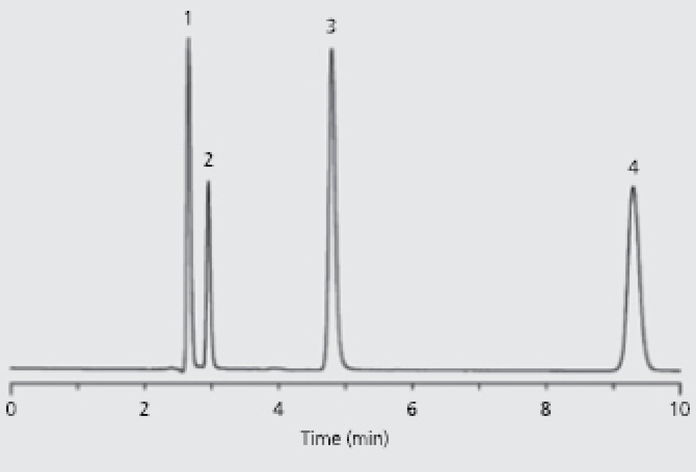


Peaks
1. gamma-oryzanol
2. vanillin

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

Pg A-66

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.

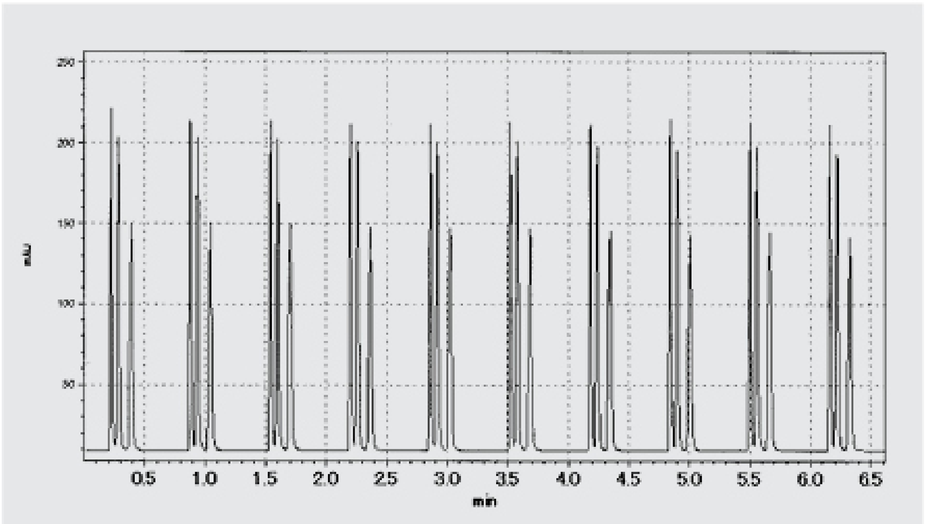
Particle Size	3 µm
Pore Size	12 nm
Surface Area	315 m²/g
Carbon Loading	18%
Pressure Tolerance	20 MPa
Pore Volume	1 mL/g
End-capping	Yes
Bonding Type	Monomeric
pH Range	1.5 - 9
USP Code	L1

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



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

10 times repeated analysis in 6.5 minutes is possible.

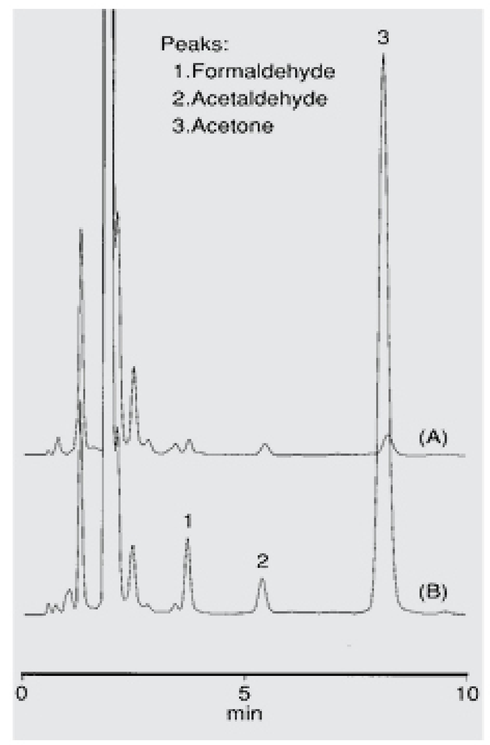
Shim-pack FC-ODS

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

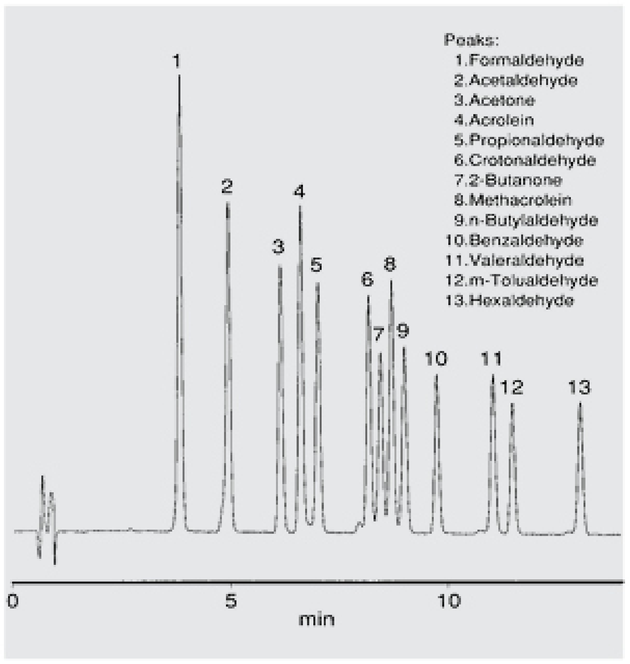
Chromatogram of Standard Sample
(formaldehyde 0.35µg/mL, acetaldehyde 0.55µg/mL, 10µL injected)

■ **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



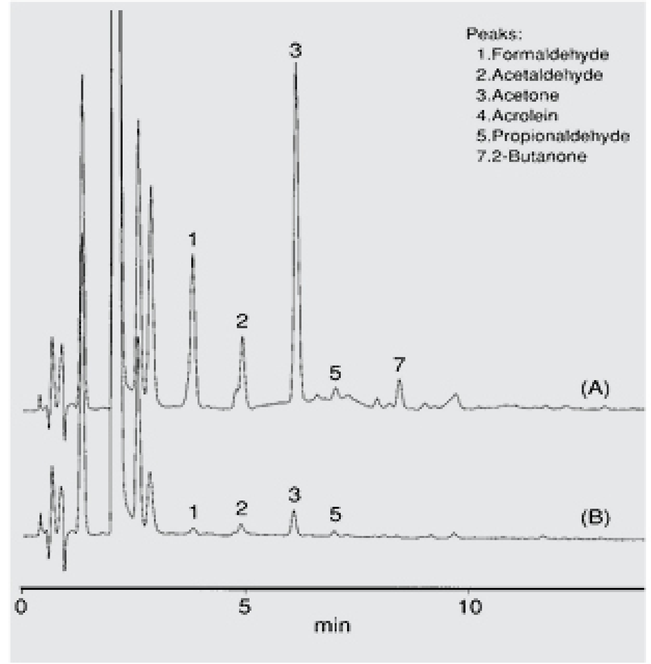
Chromatograms of Environmental Air (A) and Indoor Air at Laboratory (B)



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)	I.D. (mm) / Length (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)	I.D. (mm) / Length (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

Preparative Columns

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

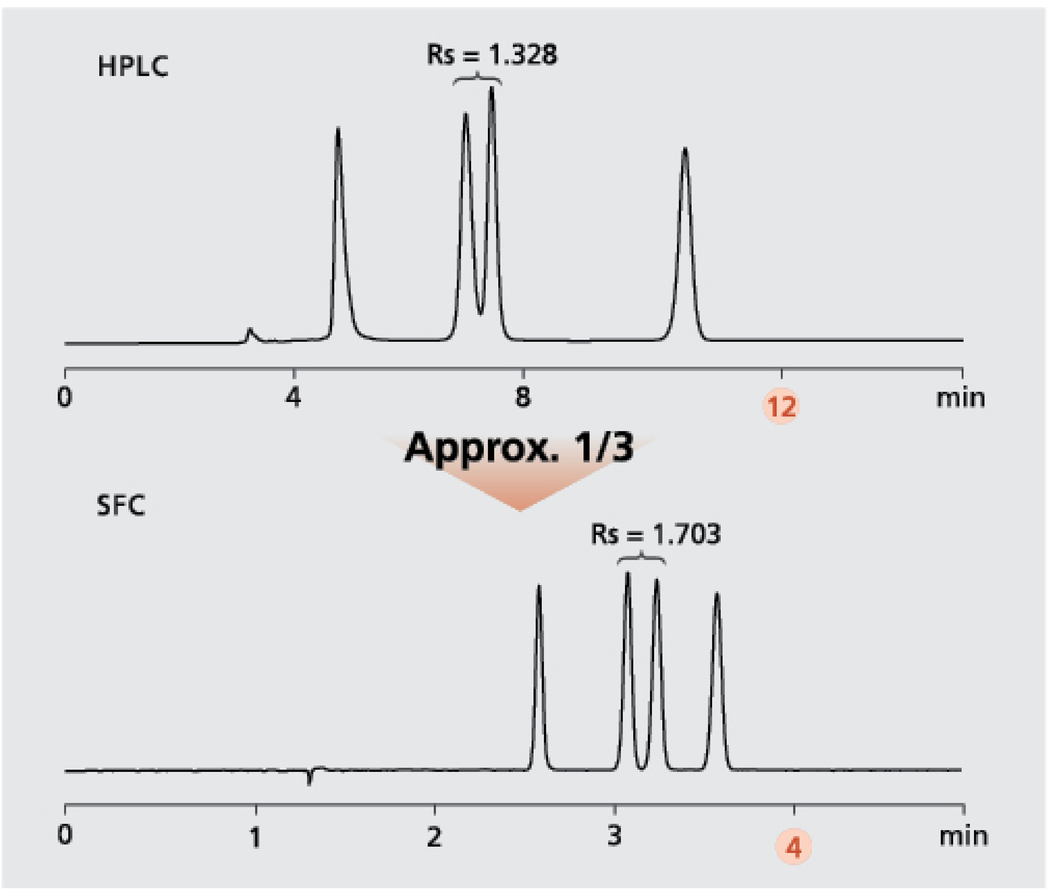
Column	Particle Size (µm)	I.D. (mm) / Length (mm)	30	50
Shim-pack GIS C18	5	50	227-30110-01	-
		100	227-30110-02	-
		150	227-30110-03	-
		250	227-30110-04	227-30110-05
	10	50	227-30116-01	-
		100	227-30116-02	-
		150	227-30116-03	-
		250	227-30116-04	227-30116-05
└ Guard Column	5	50*	227-30142-01	227-30143-01
	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

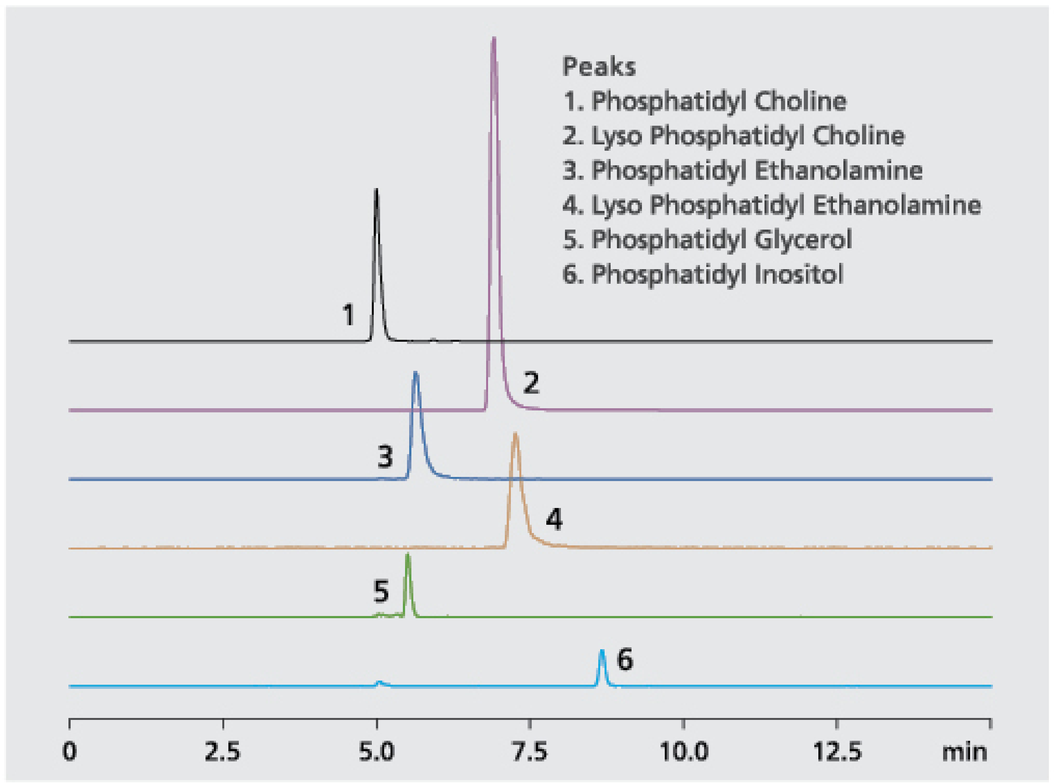
Tocopherol Isomers

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)	Guard Column
			250	
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)
	10	30.0	226-80025-01	
	10	50.0	226-80026-01	226-80034-01 (15 x 8.0 mm)
	15	4.6	226-80027-01	226-80035-01 (10 x 4.0 mm)
	15	20.0	226-80028-01	
	15	30.0	226-80029-01	226-80036-01 (5 x 8.0 mm)
	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)
		20.0	226-80056-01	
		30.0	226-80057-01	226-80064-01 (15 x 8.0 mm)
		50.0	226-80058-01	

Shim-pack STR-ODS Series

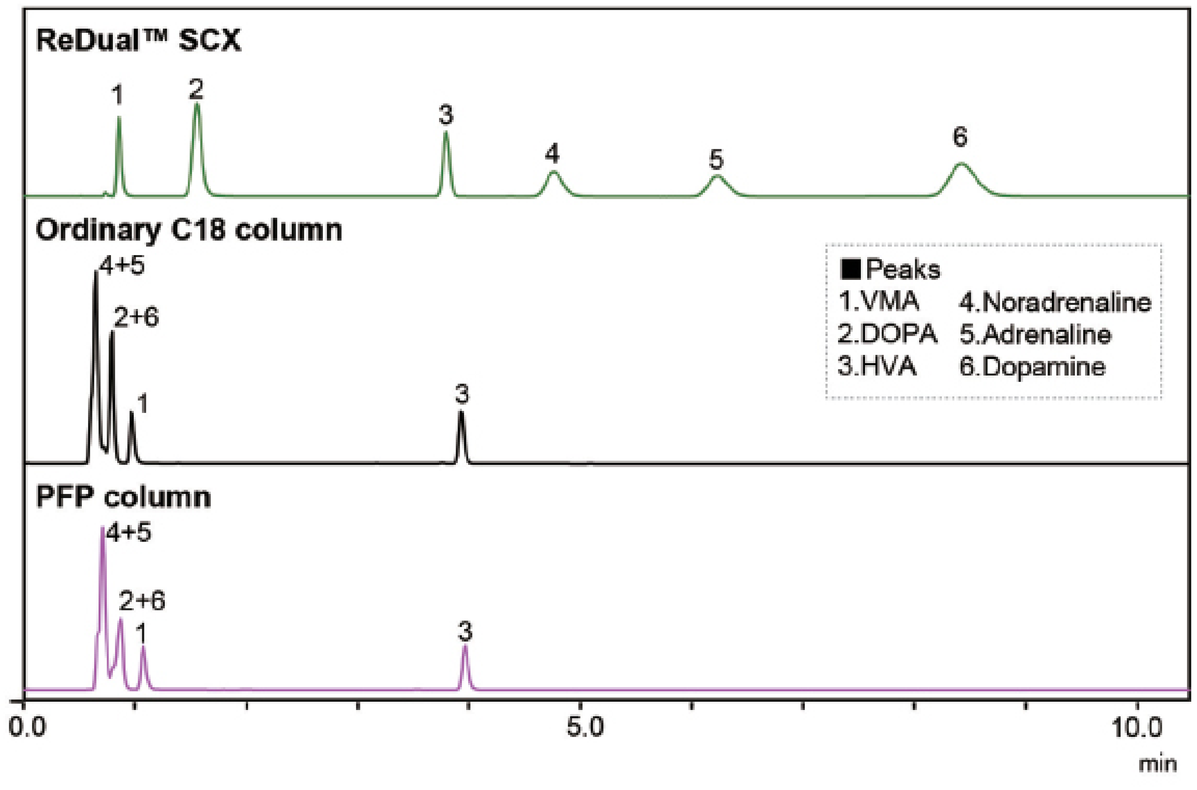
Column	Particle Size (µm)	I.D (mm)	Length (mm)	Guard Column
			250	
STR ODS-II	5	20.0	226-80087-01	226-80088-91 (50 x 20.0 mm)

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

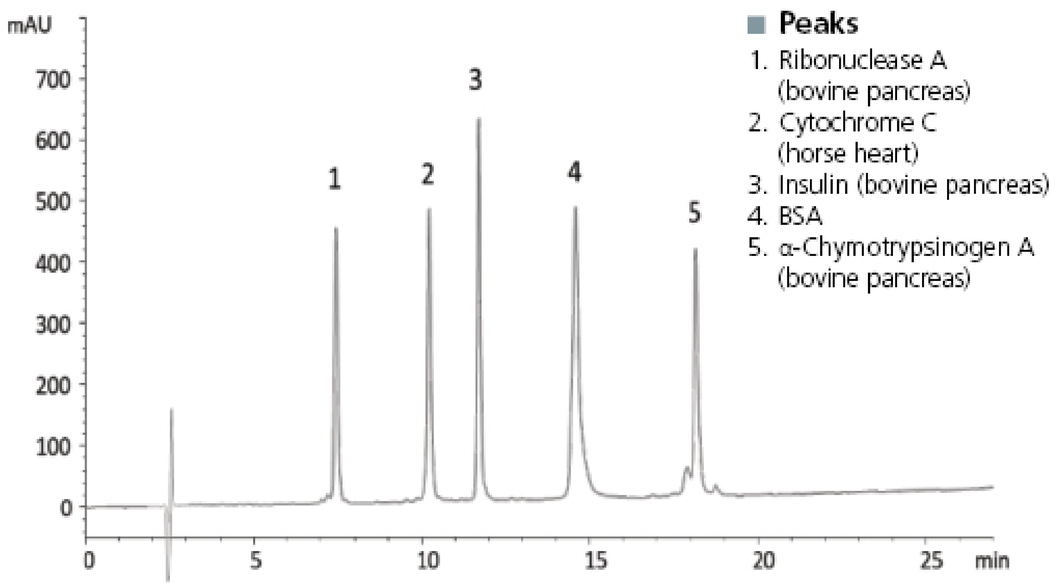
Design for biomolecules separations

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.

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

Analysis Examples

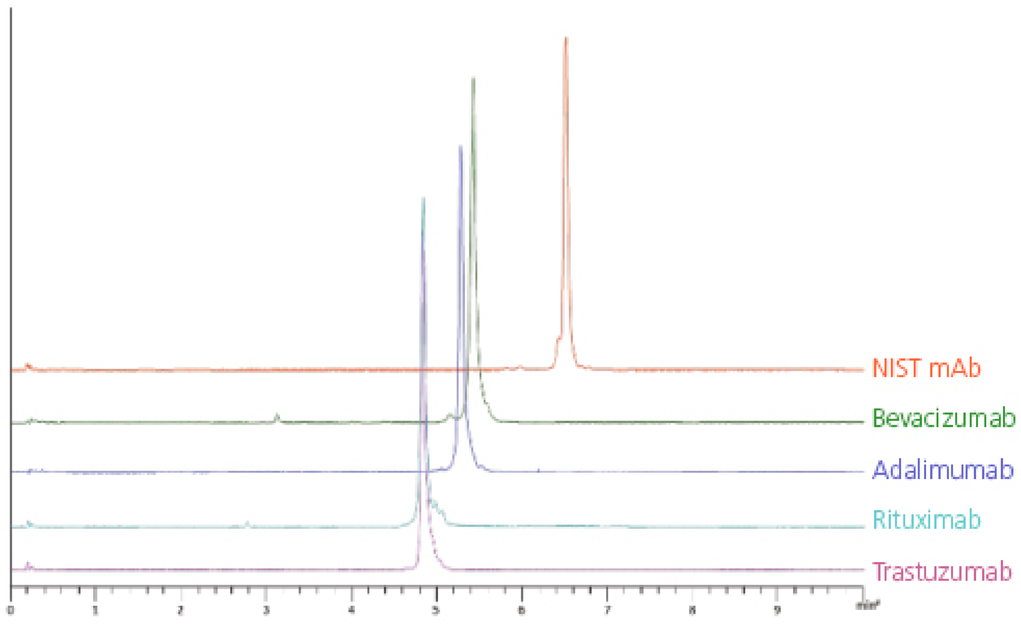
Analysis of Proteins



■ 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 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

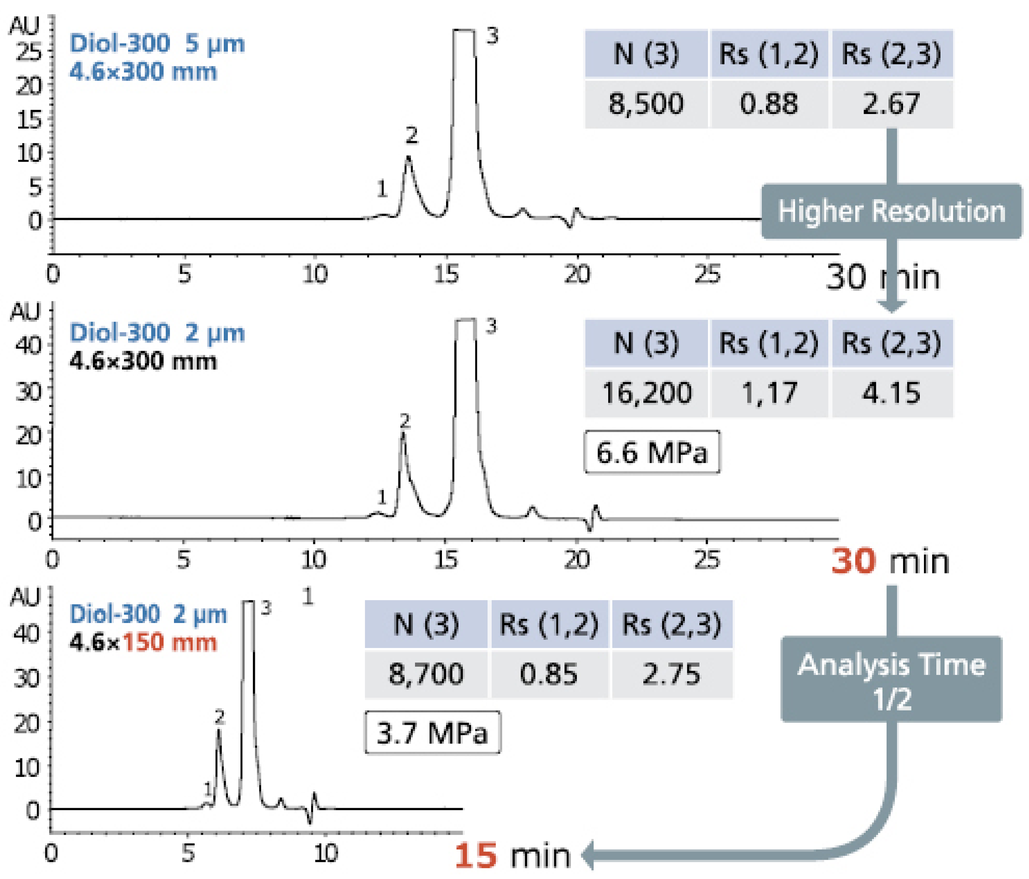
Solution for Analysis of Peptides, Oligonucleotides and Biopharmaceuticals

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.

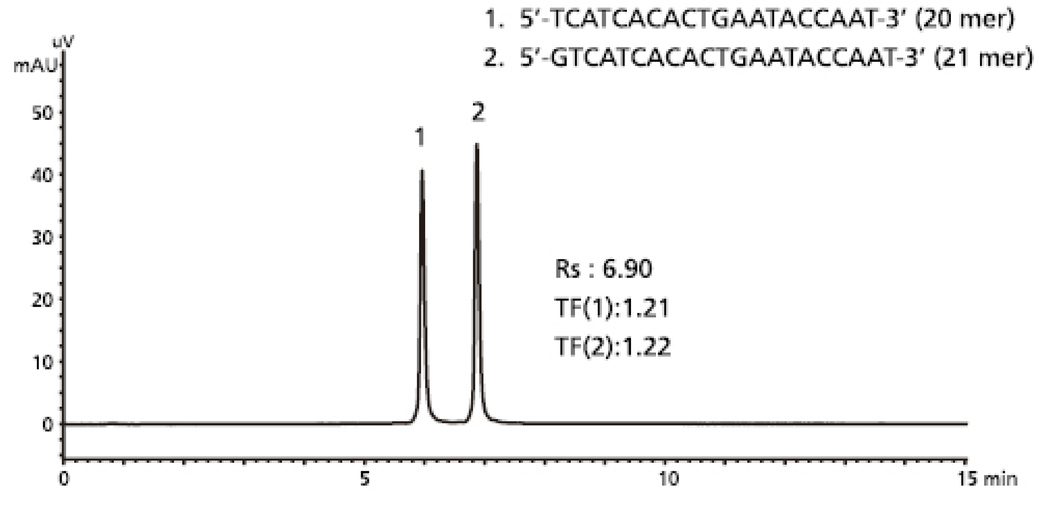
Conditions

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			
Chemistry / Column Dimension	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			
Chemistry / Column Dimension	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	
Chemistry / Column Dimension	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

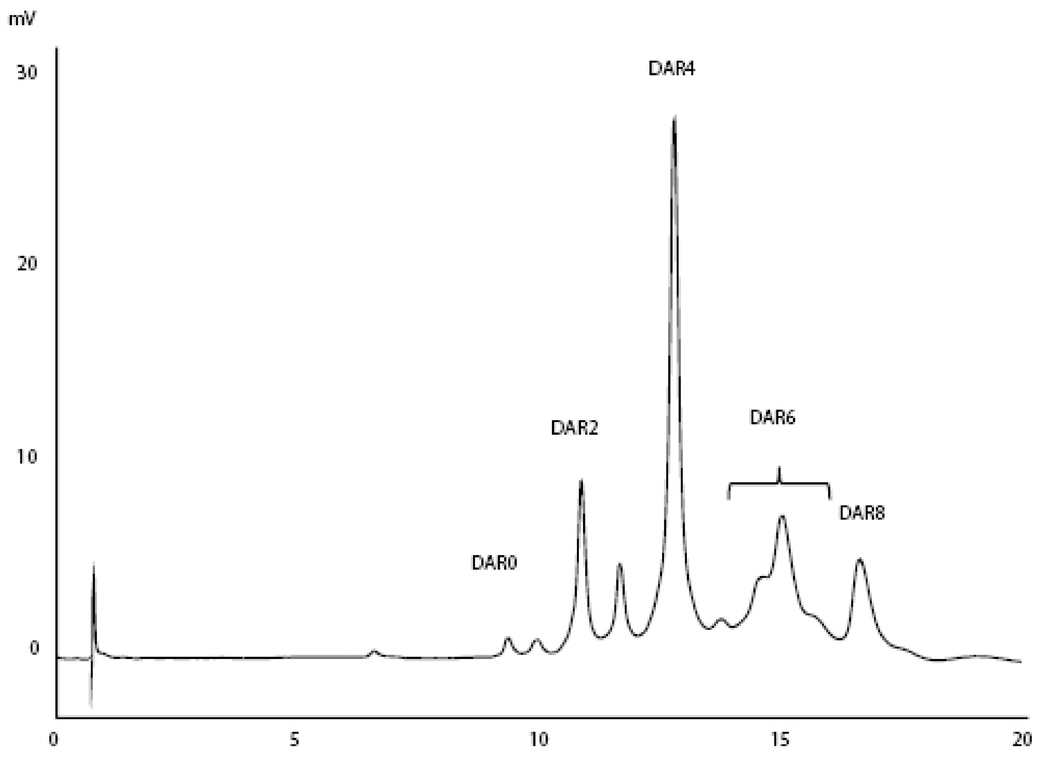
Shim-pack Arata Peptide C18

Particle Size (µm)	I.D. (mm) / Length (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



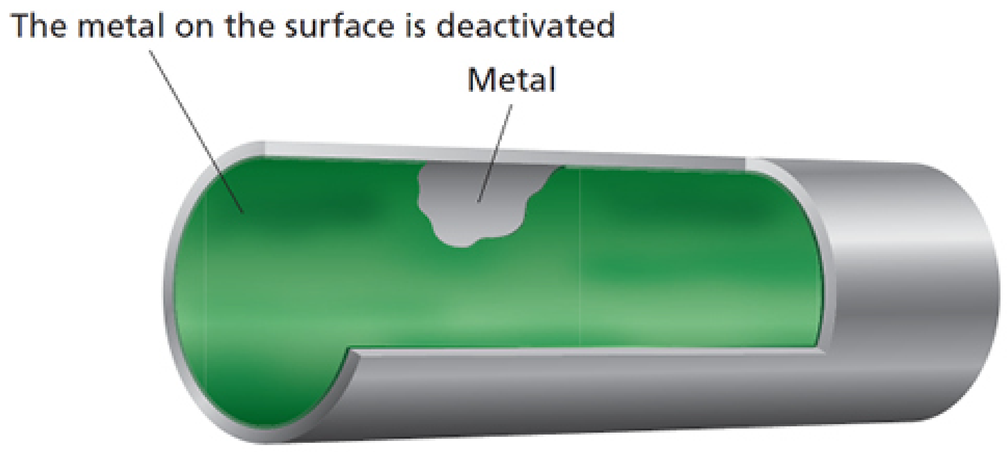
Conditions

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

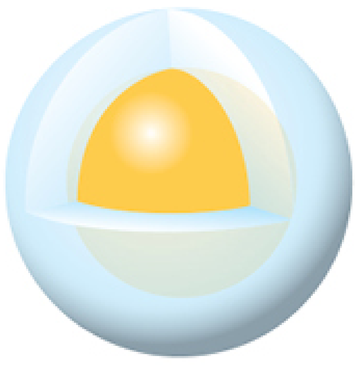
Shim-pack ™ MC C18



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	

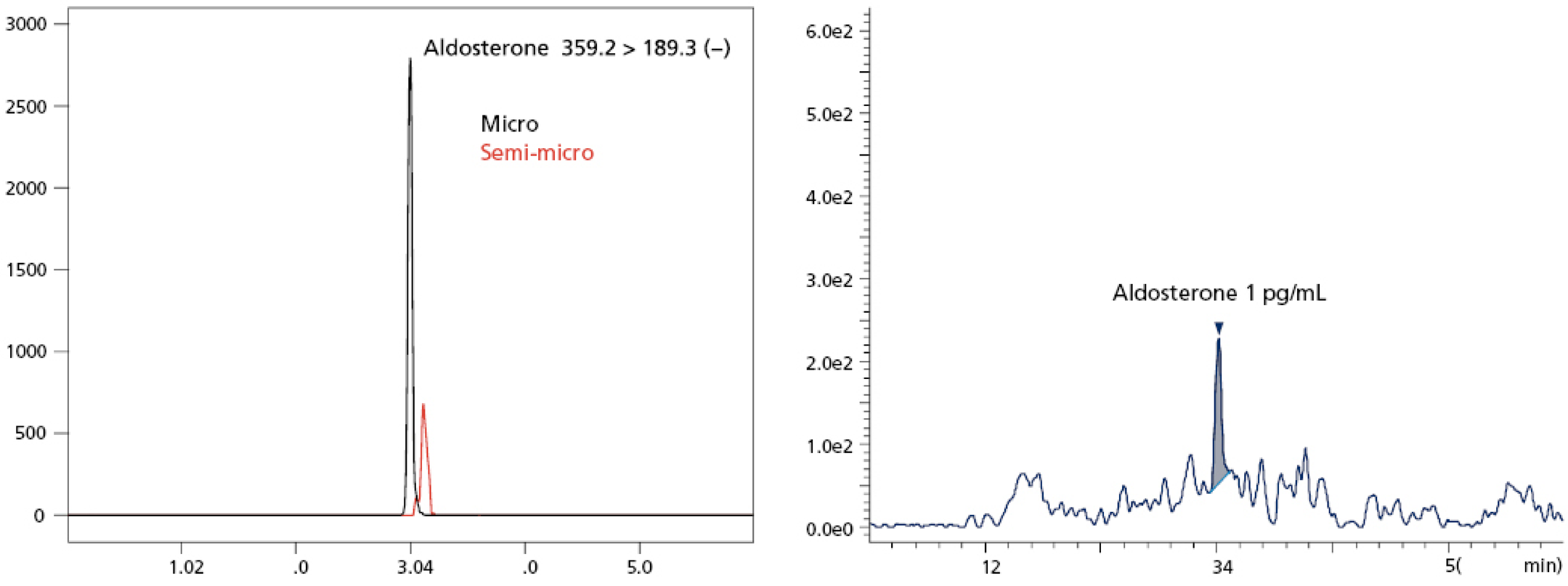
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
227-32104-01	Biphenyl	0.2	50
227-32104-11		0.3	
227-32104-02		0.2	100
227-32104-12		0.3	
227-32104-03		0.2	150
227-32104-13		0.3	
227-32103-01	PFPP	0.2	50
227-32103-11		0.3	
227-32103-02		0.2	100
227-32103-12		0.3	
227-32103-03		0.2	150
227-32103-13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

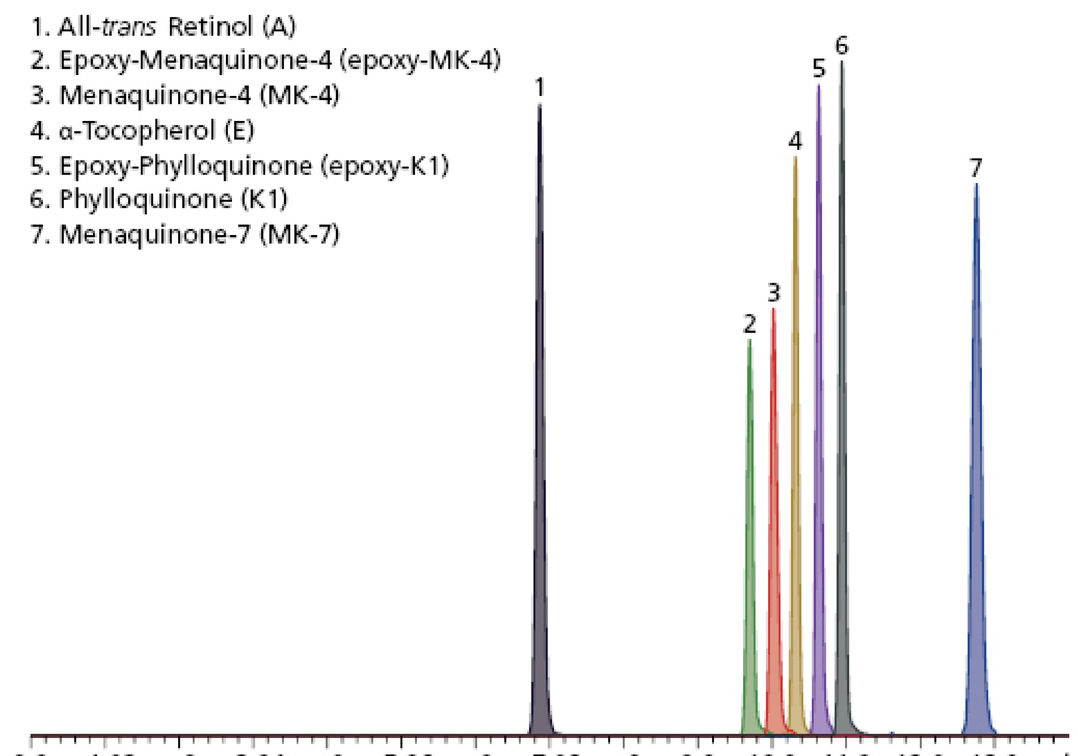
Various molecules give an increase in the peak intensity on Nexera Mikros™ LC-MS/MS platform with an MC PLONAS column.

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

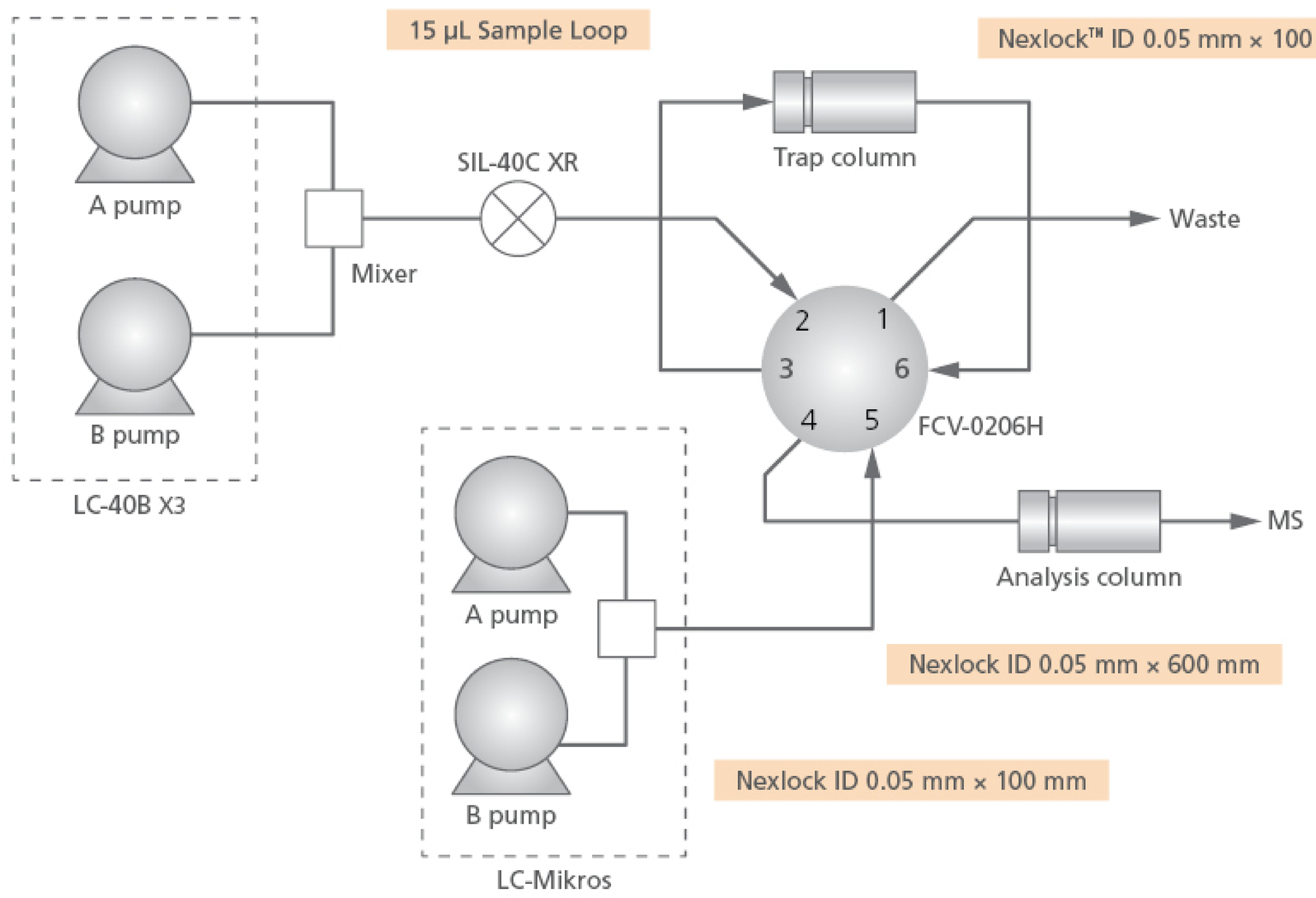
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
228-59938-91	C18	0.3	35
228-59938-92		0.5	
228-59939-91	C8	0.3	35
228-59939-92		0.5	

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

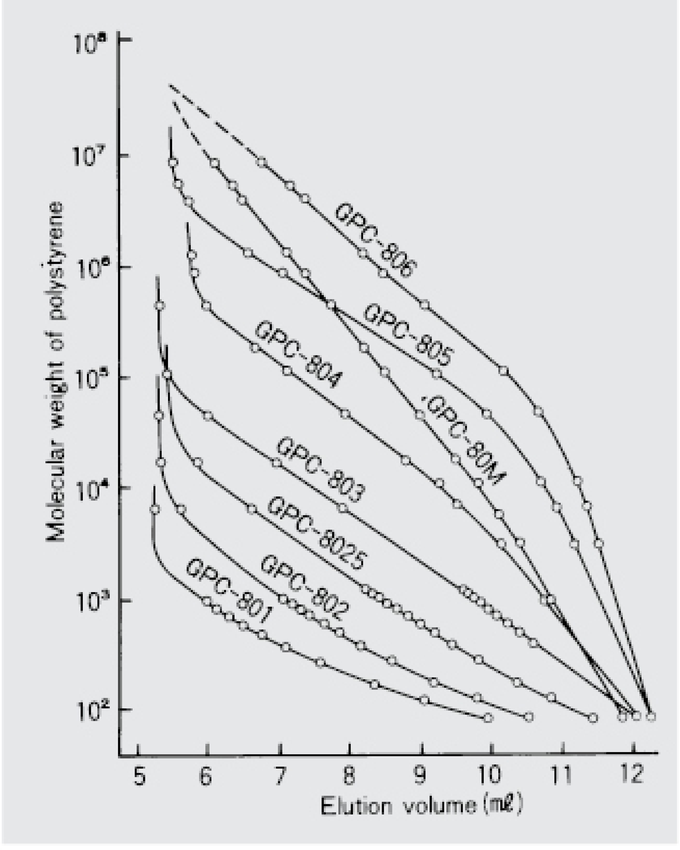
Column	Exclusion Limit (polystyrene)	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801D	1.5×10^3	300 × 8.0	228-20803-93
Shim-pack GPC-802D	5×10^3	300 × 8.0	228-20804-93
Shim-pack GPC-8025D	2×10^4	300 × 8.0	228-20805-93
Shim-pack GPC-803D	7×10^4	300 × 8.0	228-20806-93
Shim-pack GPC-804D	4×10^5	300 × 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

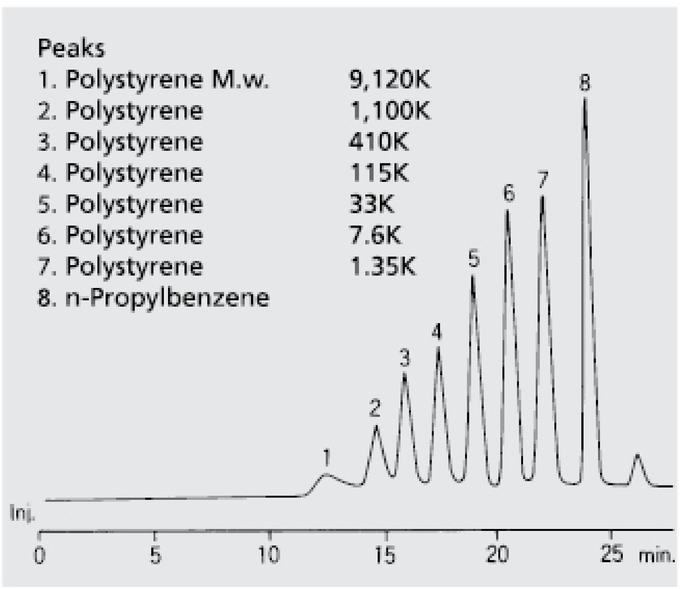
Analysis Examples

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).

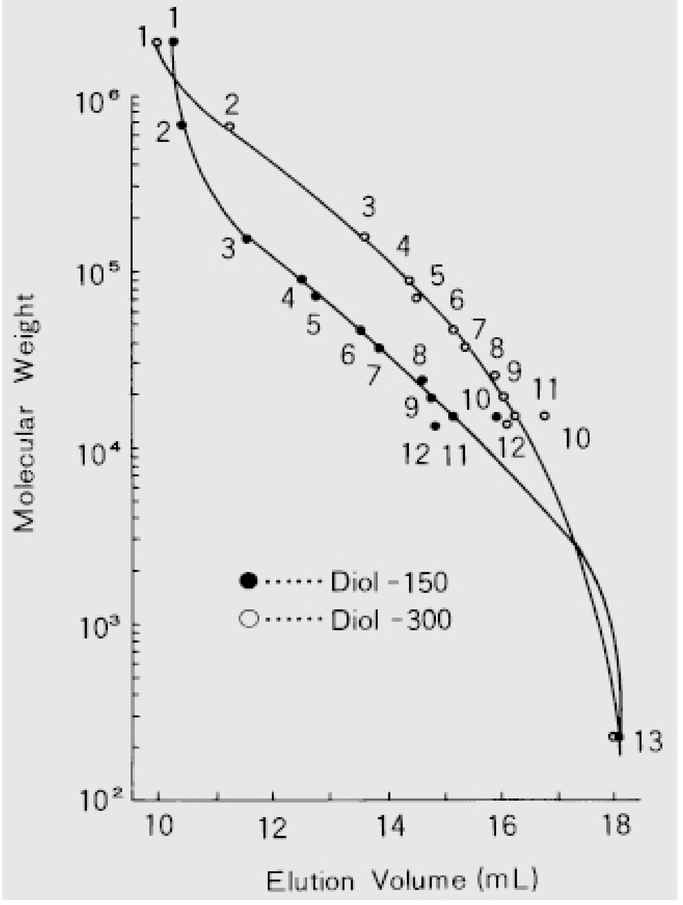
Product Information

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



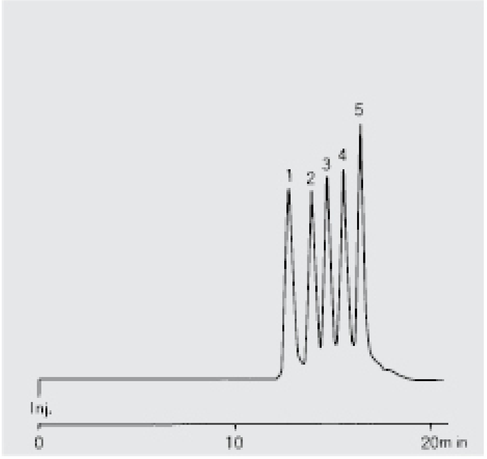
Peaks

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

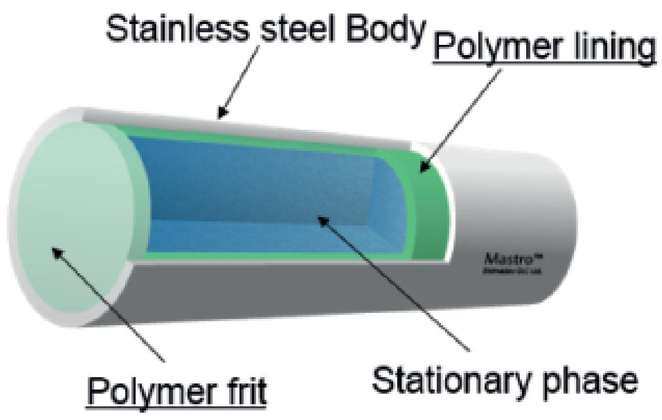
High pressure tolerance metal free column, best solution for chelating compound

	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.

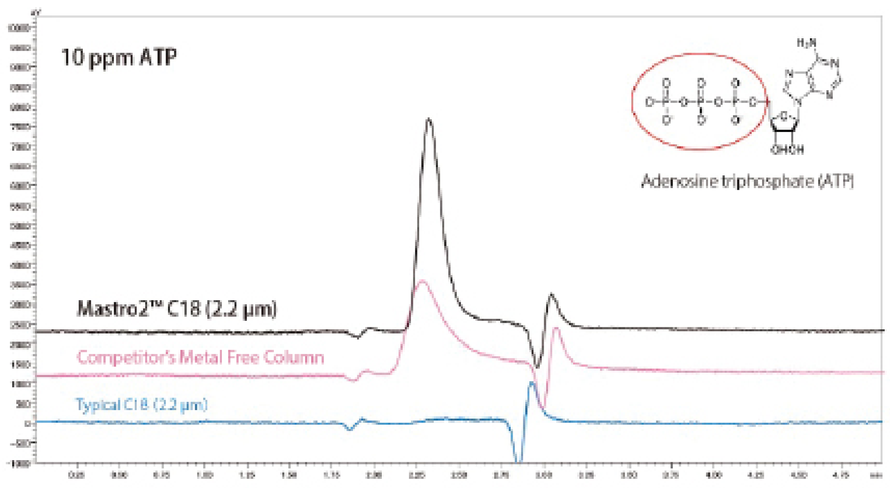
Features

- 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

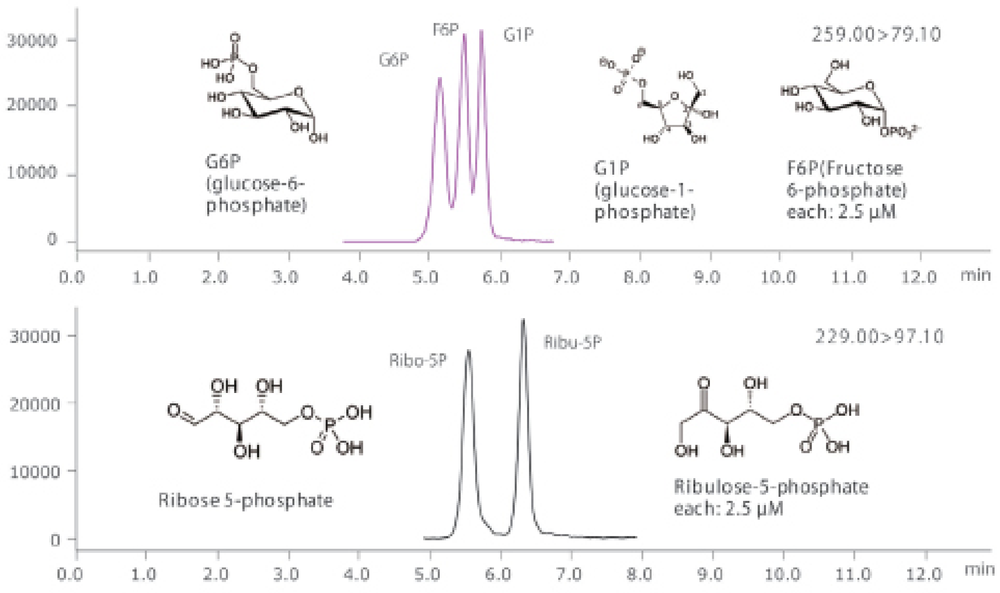
Unlike other products, Mastro2 ™ has a structure that does not generate metal chelates because all liquid contact parts are PEEK resin. In addition, a line-up of 2.2 µm microparticles is introduced as the PEEK resin parts are designed to be resistant to deformation even under high pressure.

	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**

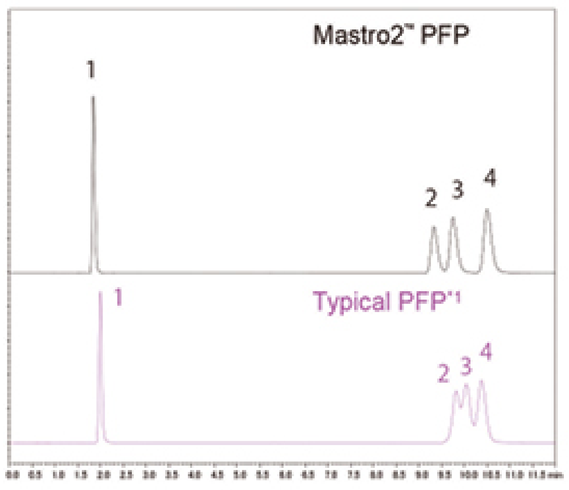
Instruments	:	Shimadzu Nexera/LCMS-8050
Column	:	Mastro™ SP (2.1 mmI.D × 100 mmL., 5 µm)
Mobile phase	:	A) 10 mM Ammonium acetate/ACN=90/10
Mobile phase	:	B) 50 mM Ammonium acetate/ACN=80/20 0% B (0-4.0 min) ⇒ 60% B (9.0 min) ⇒ 00% B (11.0-20.0 min) ⇒ 0% B (20.1-25.0 min)
T. Flow	:	0.5 mL/min
Nebulizing 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



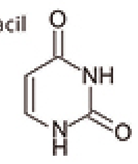
■ **Analytical conditions**

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

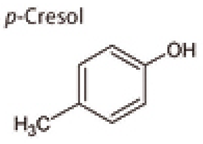
**1 Metal free column*

	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

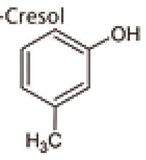
1. Uracil



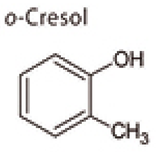
2. *p*-Cresol



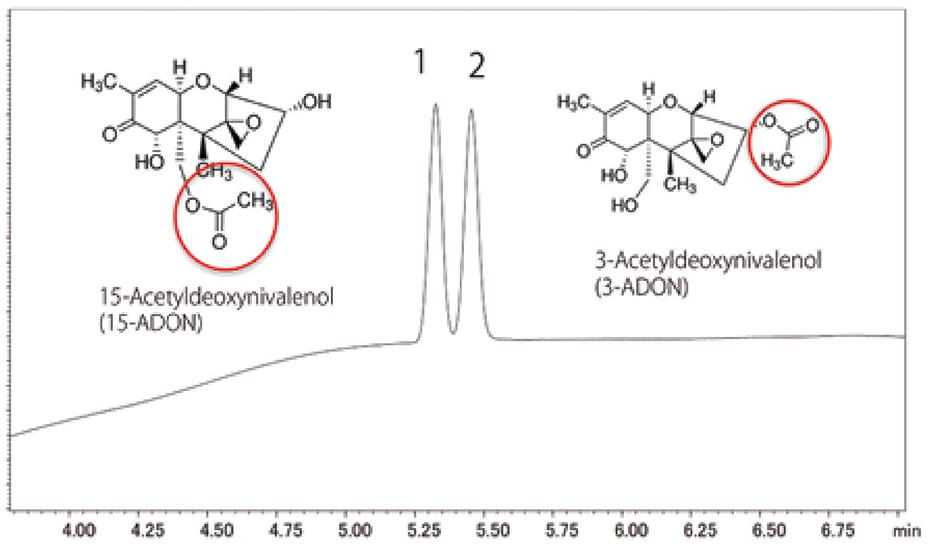
3. *m*-Cresol



4. *o*-Cresol



■ 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	Cyanopropryl 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

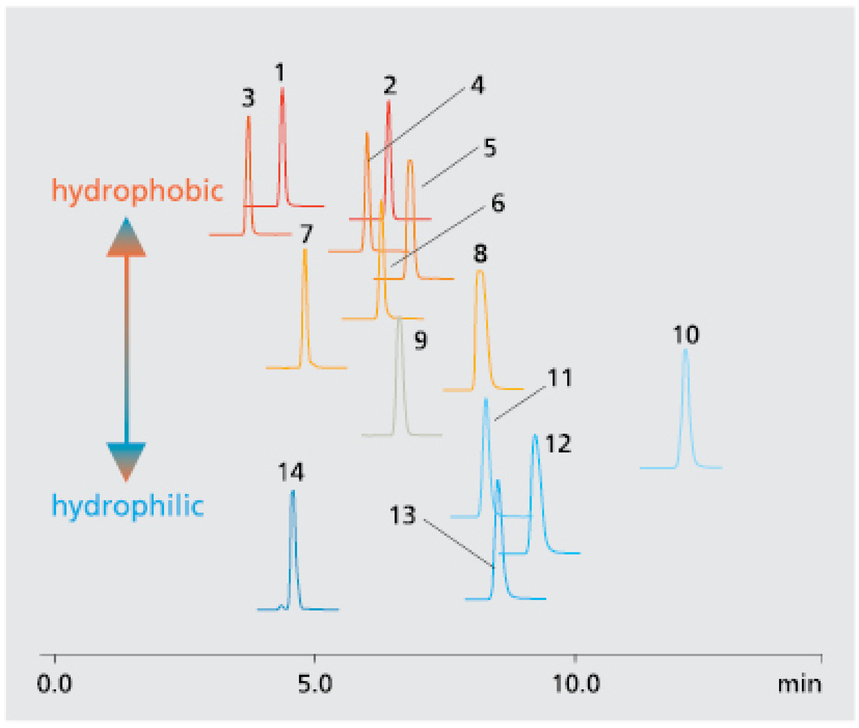
Analysis Examples

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

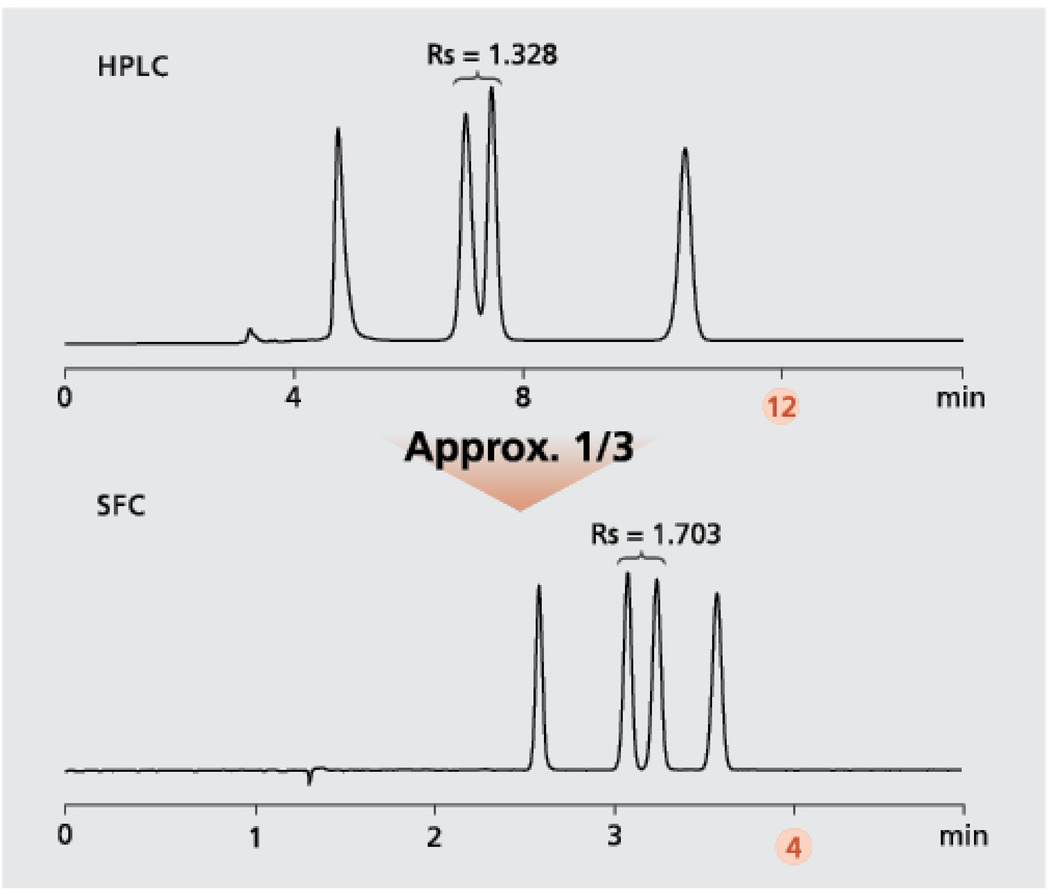
Column	Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	4.6
Shim-pack UC RP	3	150	227-30400-03	227-30401-03
		250	227-30400-04	227-30401-04
	5	150	227-30402-03	227-30403-03
		250	227-30402-04	227-30403-04
Shim-pack UC GIS II	3	150	227-30404-03	227-30405-03
		250	227-30404-04	227-30405-04
	5	150	227-30406-03	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

Pg A-92

Analysis Examples

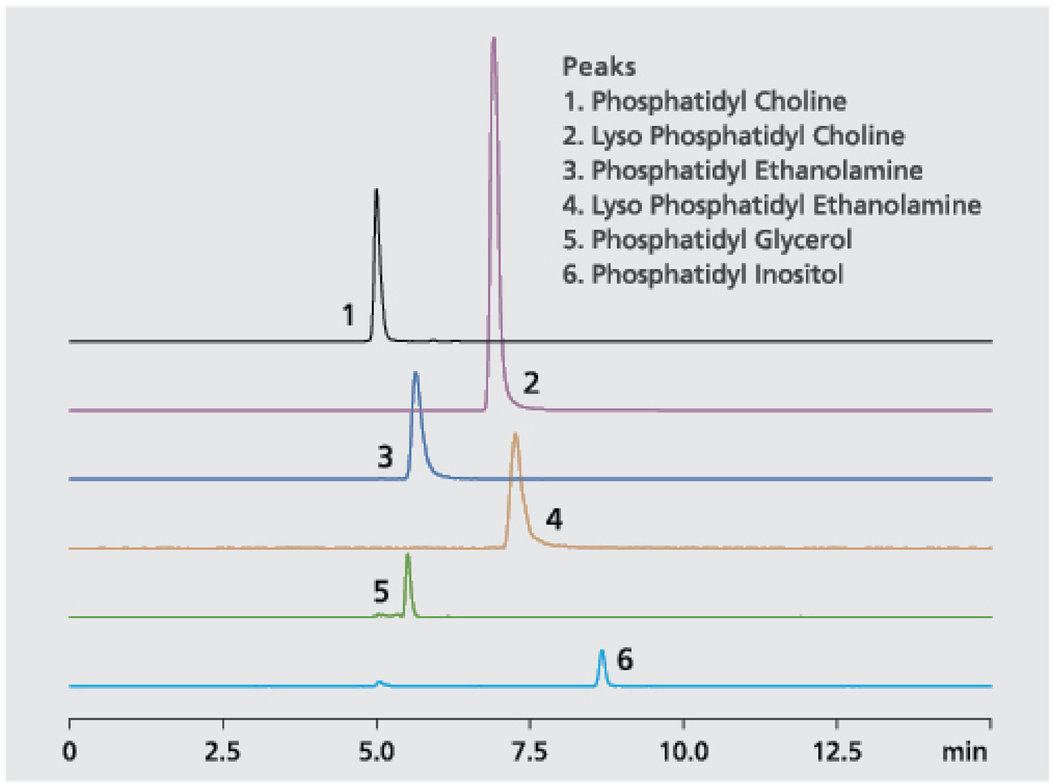
Tocopherol Isomers

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

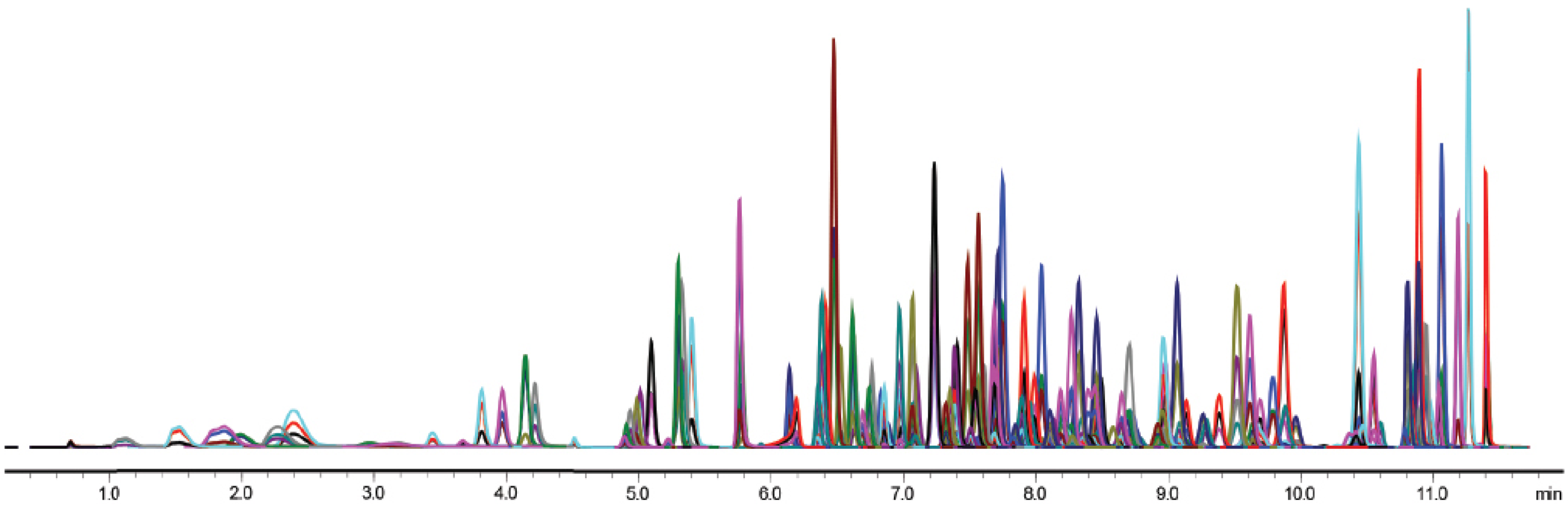
NexLeaf® Columns

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

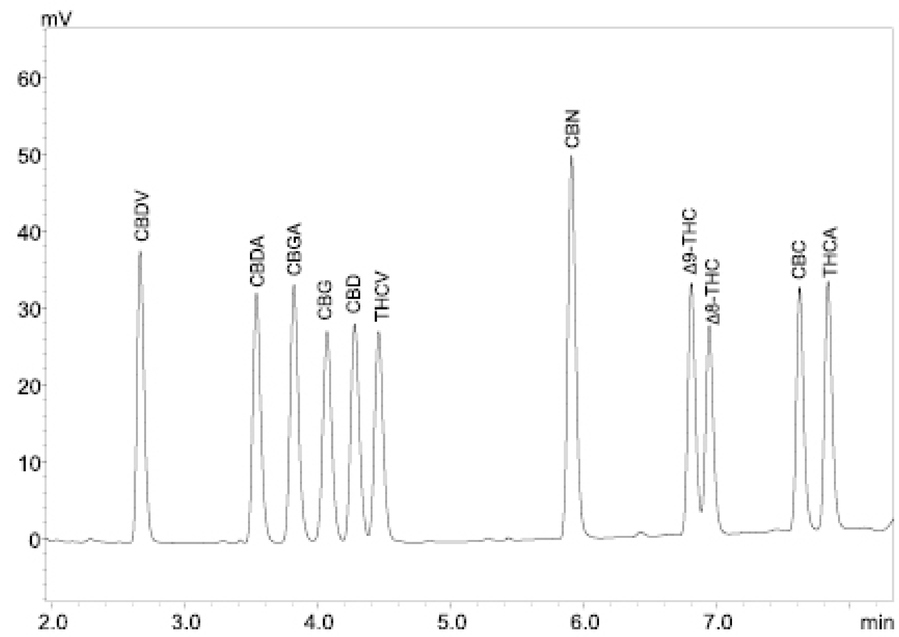
Provides the Ultimate separation for all your multi-residue pesticide analysis needs.



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

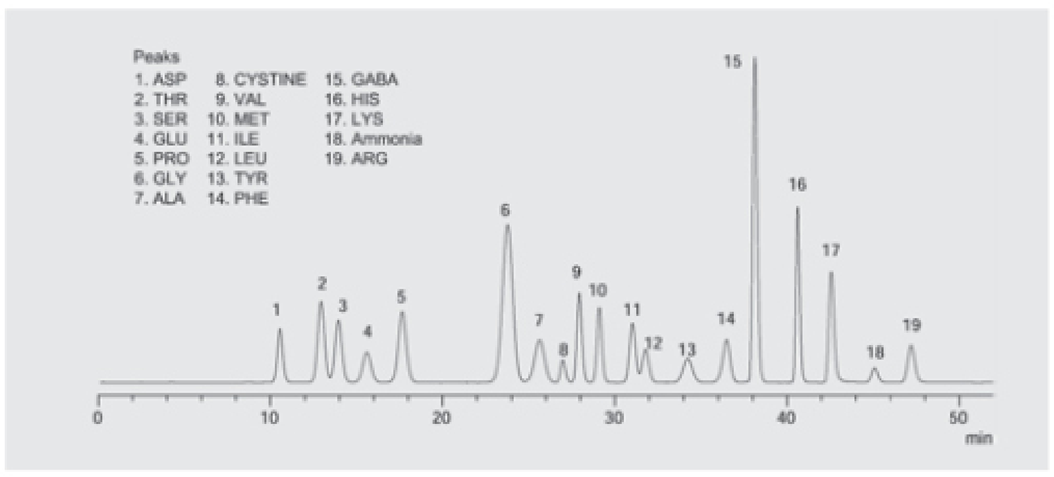


Analysis of Amino Acids

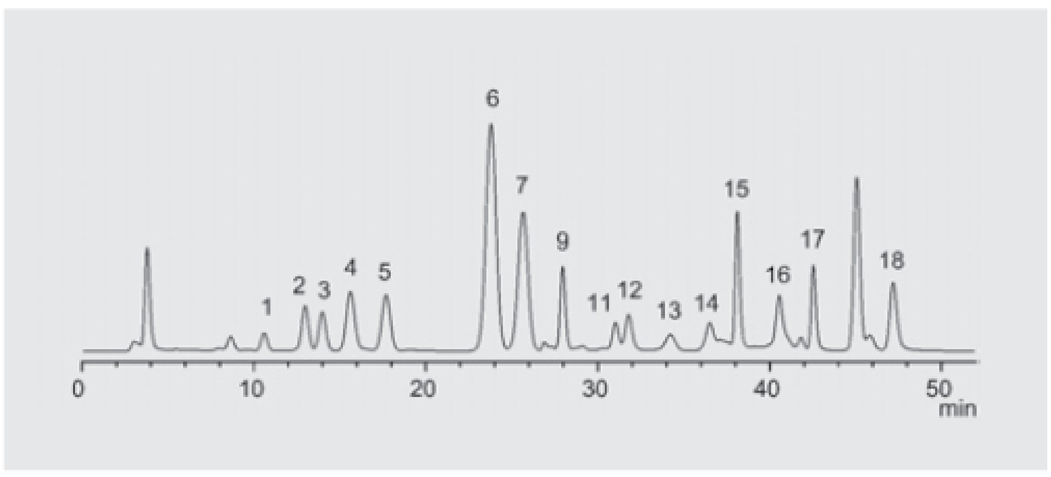
Shim-pack Amino Series

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



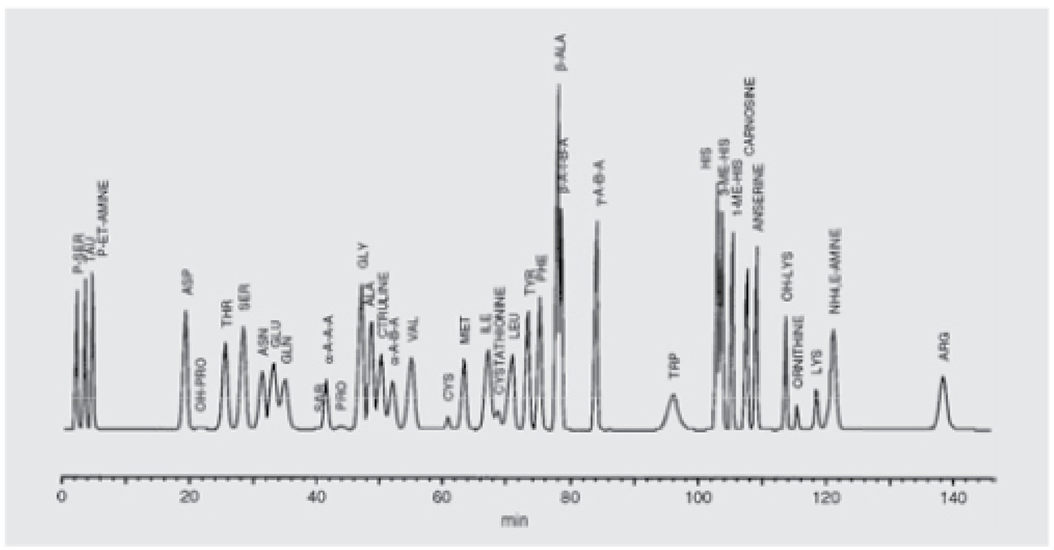
Analysis of Vinegar

Conditions

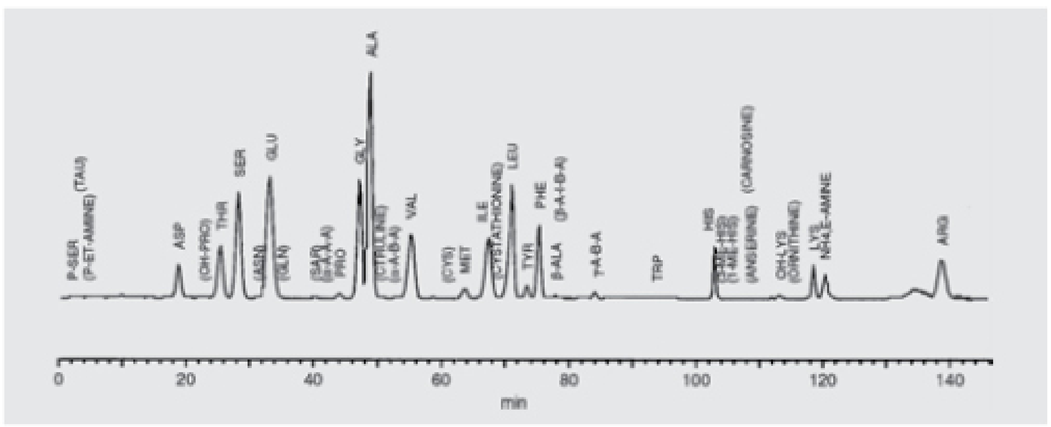
Column	:	Shim-pack Amino-Na (100 mmL × 6.0 mmI.D., 5 µm) (P/N: 228-18837-91)
Mobile Phase	:	Mobile phase kit for amino acid analysis (Na Type) (P/N: 228-21195-94)
Flow Rate	:	0.4 mL/min
Col. Temp.	:	60 °C
Detection	:	RF (Post-column derivation)

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.

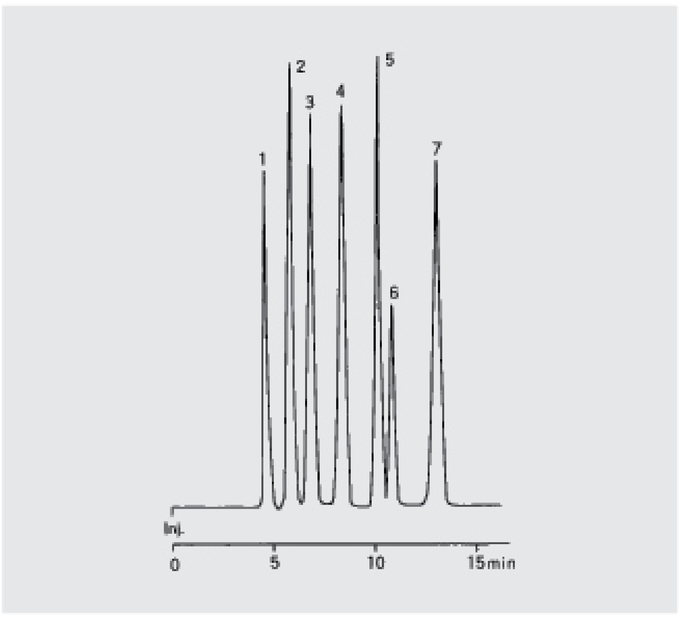
Description	Dimensions (Length × I.D., mm)	P/N
ISC-30/S 0504 NA (For trapping Na type ammonia)	50 × 4.0	228-14206-91
ISC-30/S 0504 LI (For trapping Li type ammonia)	50 × 4.0	228-00821-91

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.



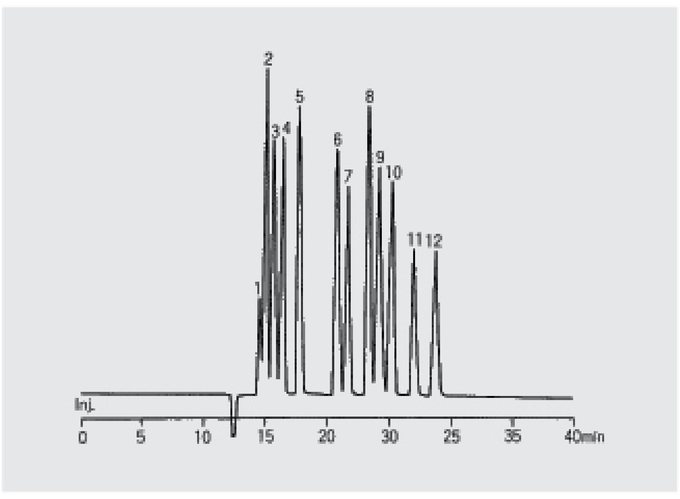
Analysis of Saccharide Standard

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

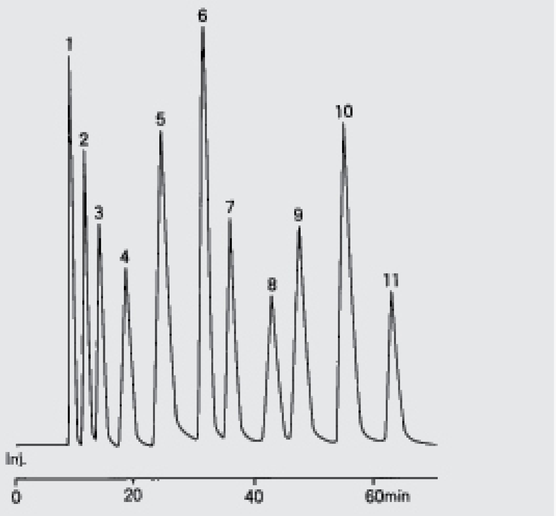
Column : Shim-pack SCR-102H (2 columns in series) (P/N: 228-17893-91)
Mobile Phase : 5 mM p-Toluene sulfonic acids aqueous solution
Flow Rate : 0.8 mL/min
Col. Temp. : 40 °C
Detection : CDD (pH buffer organic acids analysis system)

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

Check out more Application Systems at
www.shimadzu.com/an/hplc

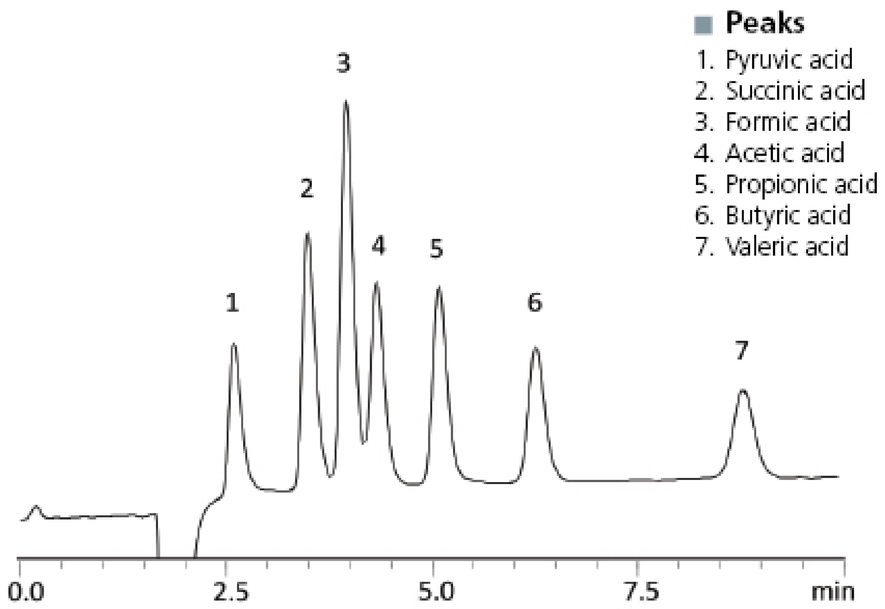
Shim-pack Fast-OA

High-speed analysis of organic acids

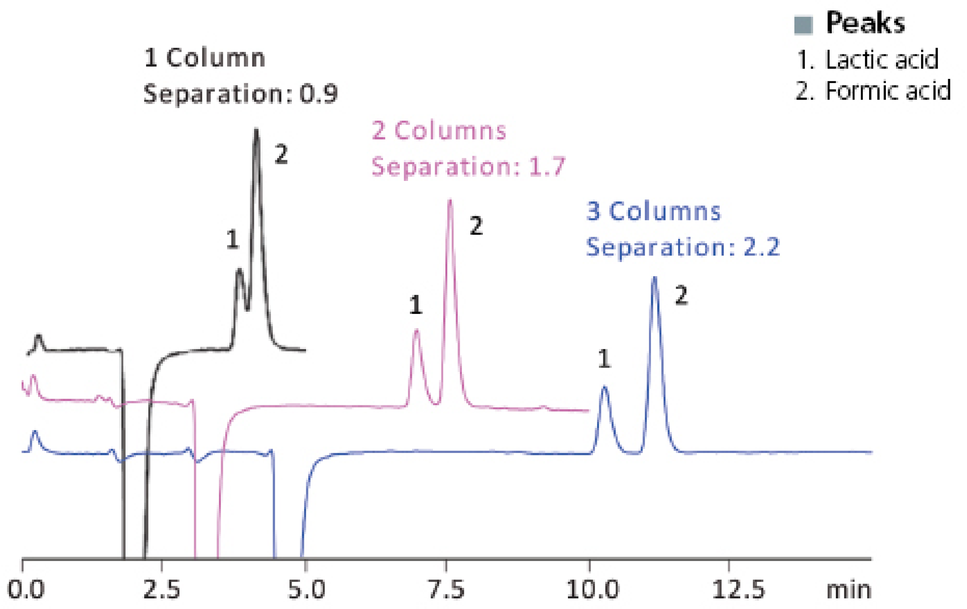
Shim-pack Fast-OA columns are packed with an ion-exclusion polymer, and utilizing an acidic mobile phase, can separate mixture solutions based on the pKa value of each sample component. The Shim-pack Fast-OA is a column for the high speed analysis of organic acids. It can separate multiple organic acids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

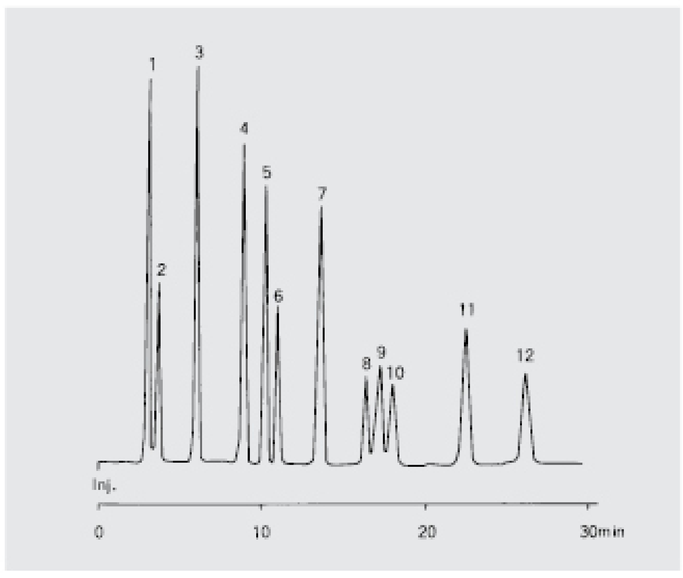
Product Information

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.



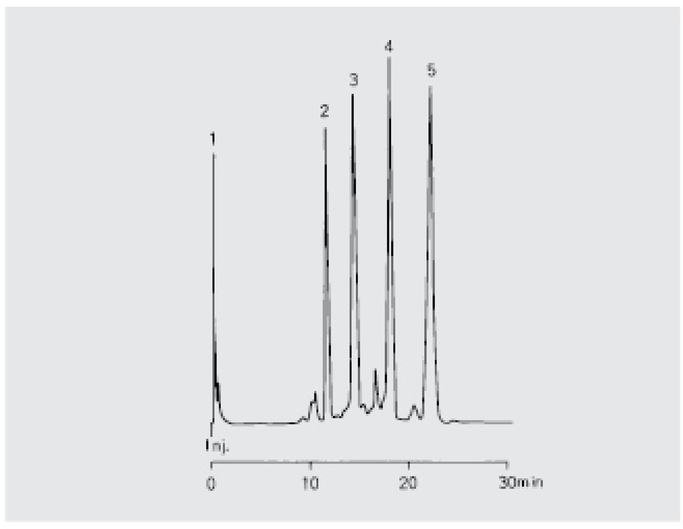
Analysis of Mononucleotides

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

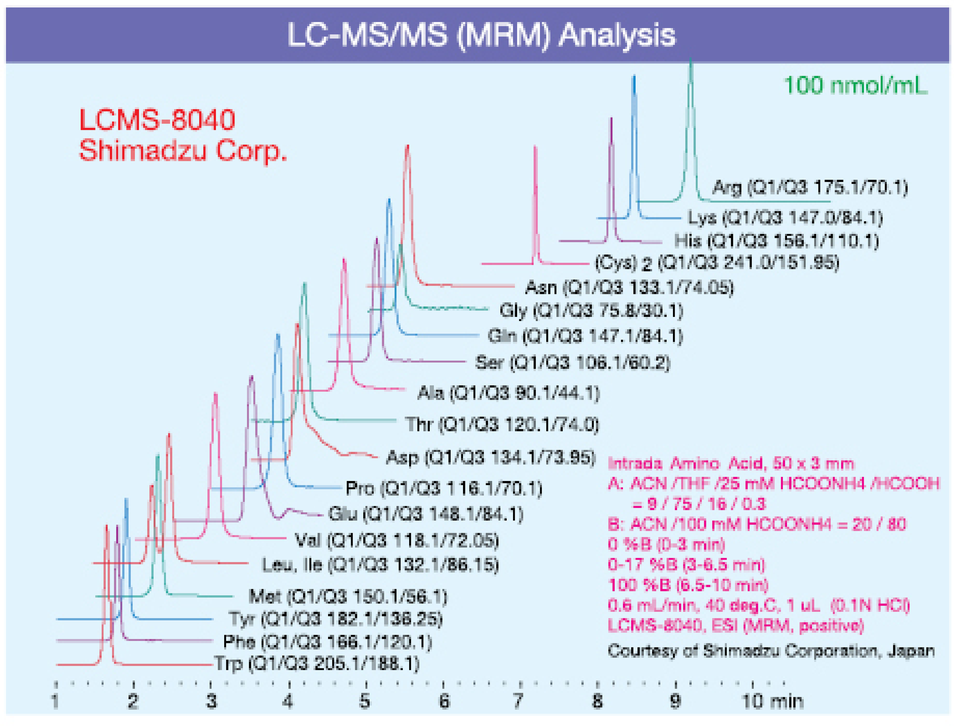
* Installed between the liquid pump and the sample injector to protect the column.

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

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.

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

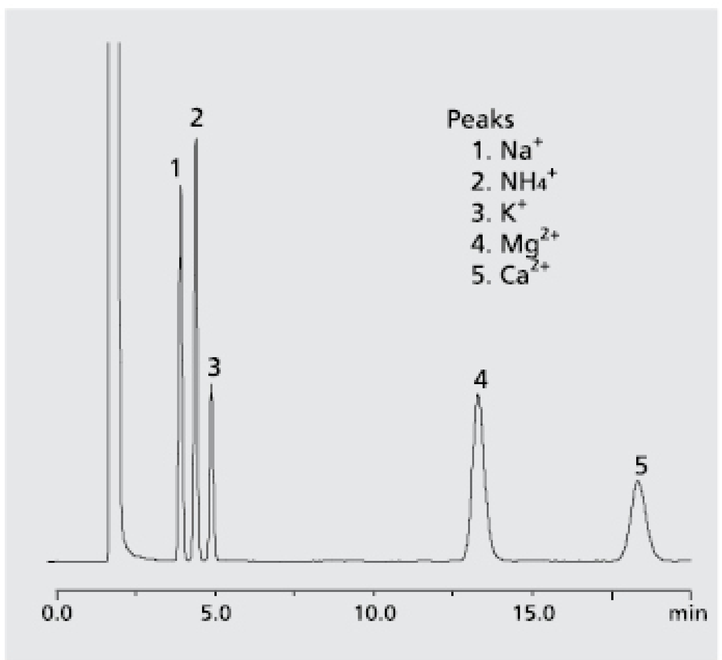
Analysis Examples

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.



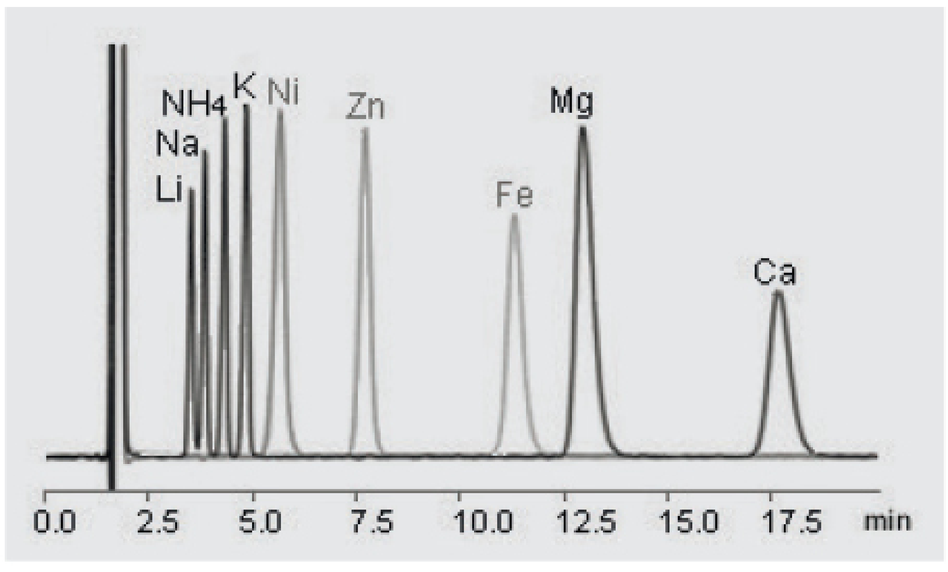
Analyses of a Standard Mixture of 5 Cations

■ **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.



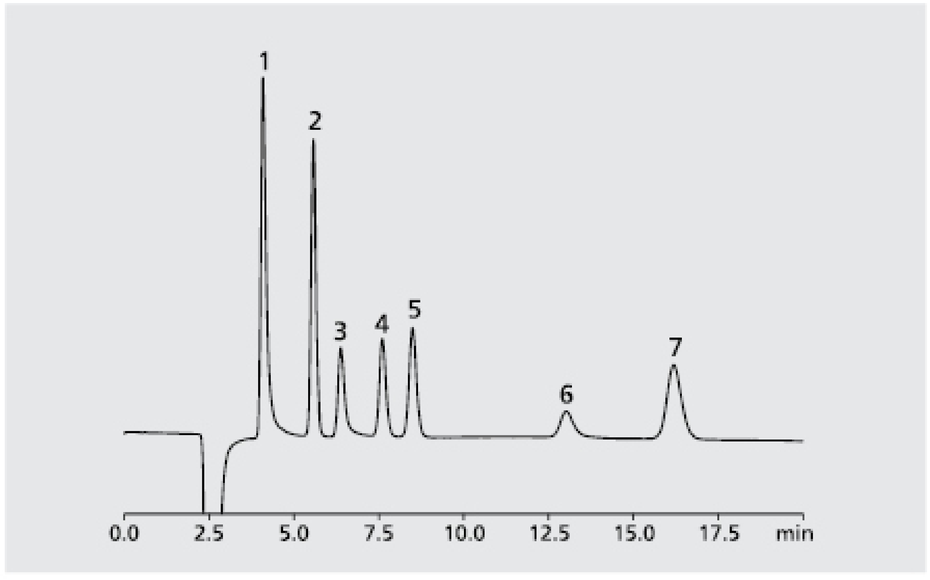
■ **Conditions**

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

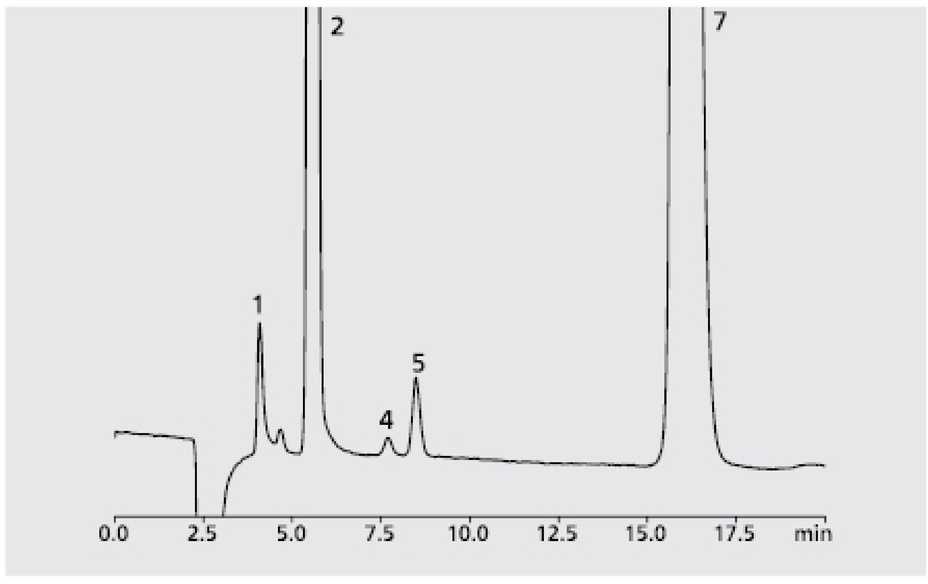
Analysis of Anions in Water

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

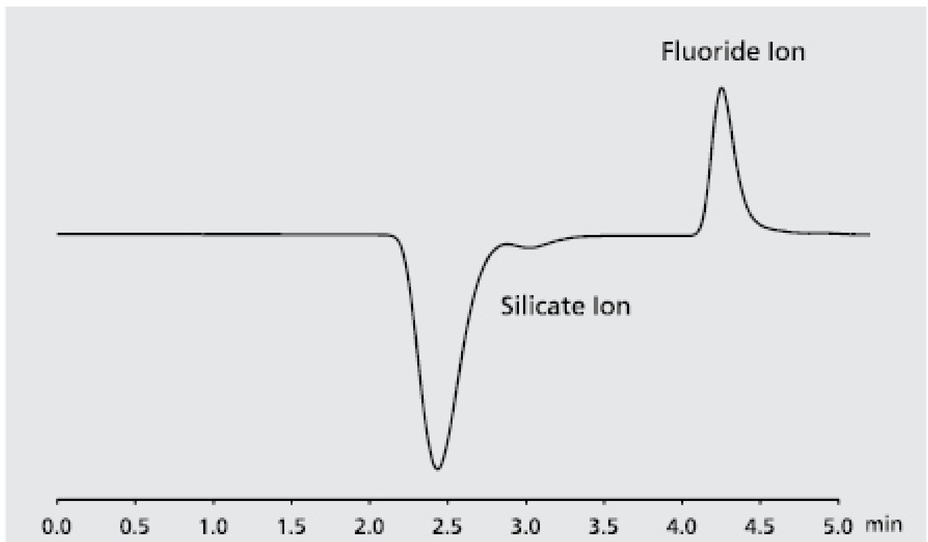
Column	:	Shim-pack IC-SA2 (250 mmL. × 4.0 mmI.D.) (P/N: 228-38983-91)
Mobile Phase	:	A) 12 mmol/L sodium hydrogen carbonate B) 0.6 mmol/L sodium carbonate A/B = 60/40 (v/v)
Flow Rate	:	1.0 mL/min
Col. Temp.	:	30 °C
Detection	:	CDD
Injection Vol.	:	50 µL

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).



Ion Chromatography Columns

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.

More Free Literature at www.shimadzu.com/an

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.

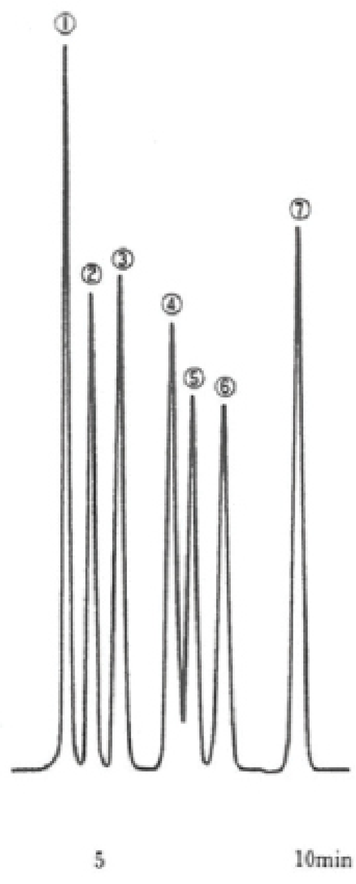
- Utilize electrostatic repulsion interactions.
- Display excellent retention reproducibility.
- Durable due to the use of a mechanically strong polymer gel.
- ph range pH 2-6
- USP L17

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

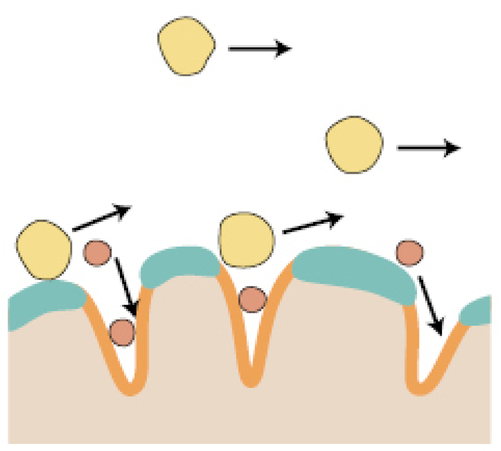
Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column (50 x 8.0)
			250	300	500	
PS-80H	10	8.0	-	226-80001-01	-	226-80003-91
		2.0	226-80002-01	-	-	-

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.

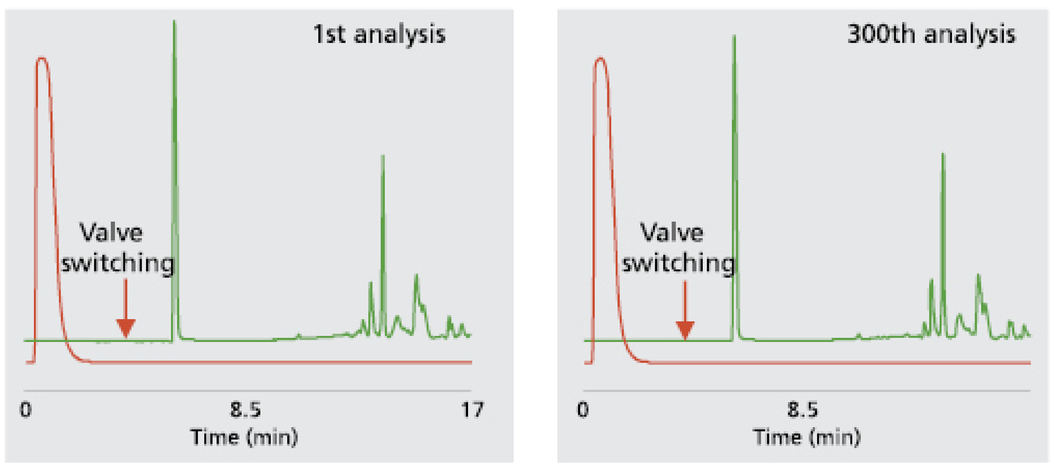


Quick and Reliable Protein Removal

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

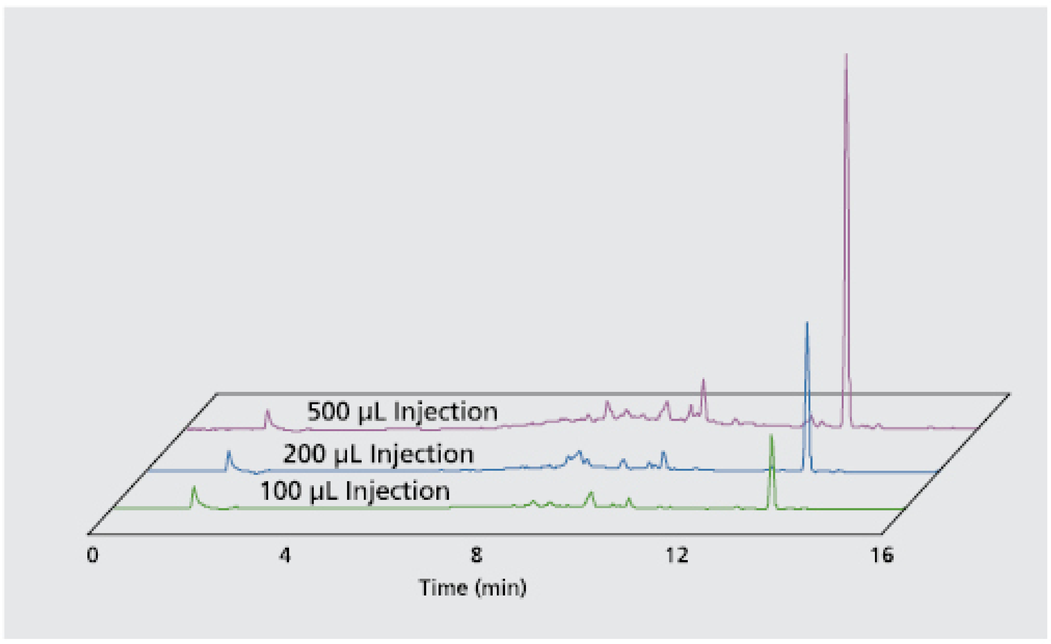
Stable Trap Even for Large Injection Volumes

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

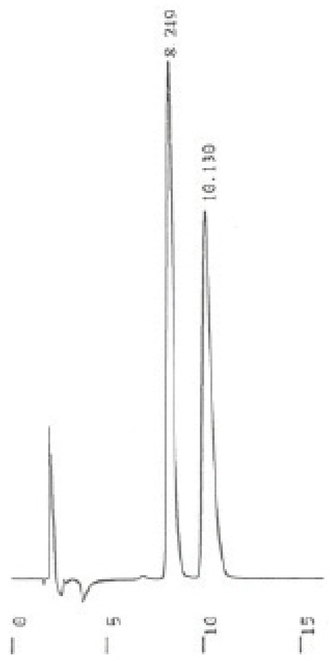
- A chiral separation column immobilized with ovomucoid which is a strong protein for denaturation
- Display a wide range of chiral recognition.
- No sample pretreatment required for chiral separations.
- Can be used for reversed-phase analyses.
- Trace analyses possible (several nanograms).
- [ULTRON 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

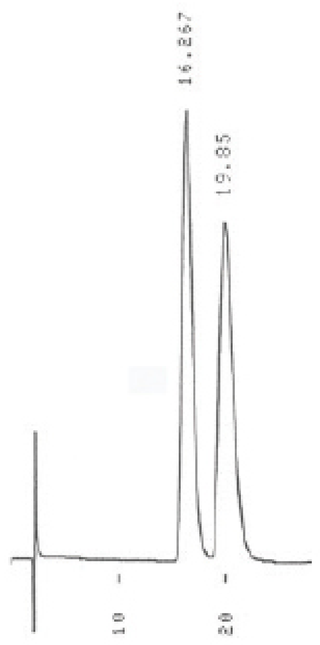
- Maximum operating pressure of 30 MPa.
- Can be used in LC/MS systems as well.
- Employs a 3 µm packing material for higher peak resolution and theoretical plate numbers.
- Enables significant reductions in analysis times while maintaining high theoretical plate numbers.
- Enables further improvements 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 KH_2PO_4 (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 KH_2PO_4 (pH 4.6) / C_2H_5OH = 100 / 20
Flow Rate	:	1.0 mL/min
Col. Temp.	:	25 °C
Detection	:	UV-220 nm

ULTRON ES-PEPSIN

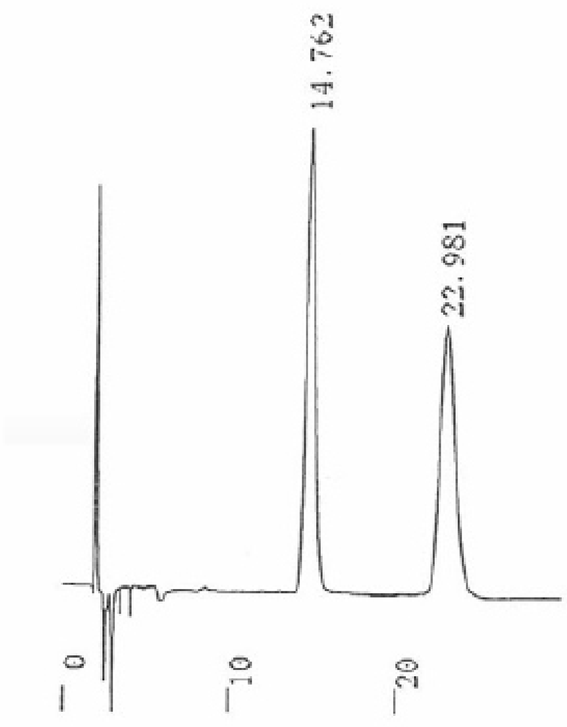
- An enantiomer separation column immobilized with pepsin which is the polypeptide dialytic enzyme of the pig stomach mucous membrane origin.
- Displays superior performance with respect to chiral separations of aminoalcohol pharmaceuticals such as beta blockers.
- No sample pretreatment required for 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 KH2PO4 (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

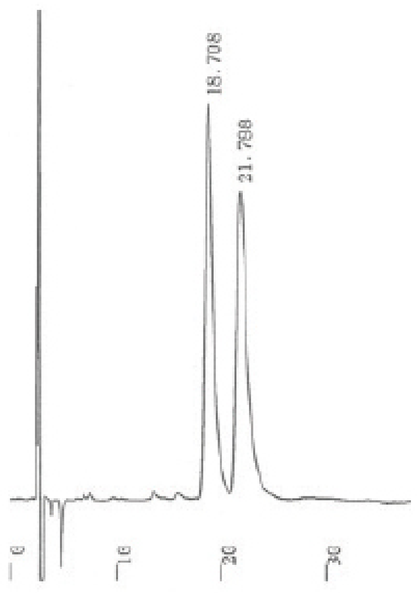
Chiral Separation Columns

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⊠-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



■ ⊠-Blockers: Arotinolol

Column : ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase : 20 mM KH2PO4 (pH 4.6) / CH3CN = 75 / 25
Flow Rate : 1.2 mL/min
Col. Temp. : 25 °C
Detection : UV-220 nm

■ ⊠-Blockers: Alprenolol

Column : ULTRON ES-PhCD 150 mm x 6.0 mm I.D.
Mobile Phase : 20 mM KH2PO4 (pH 4.6) / CH3CN = 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

Pg A-112

Shim-pack Ultron PS-Series

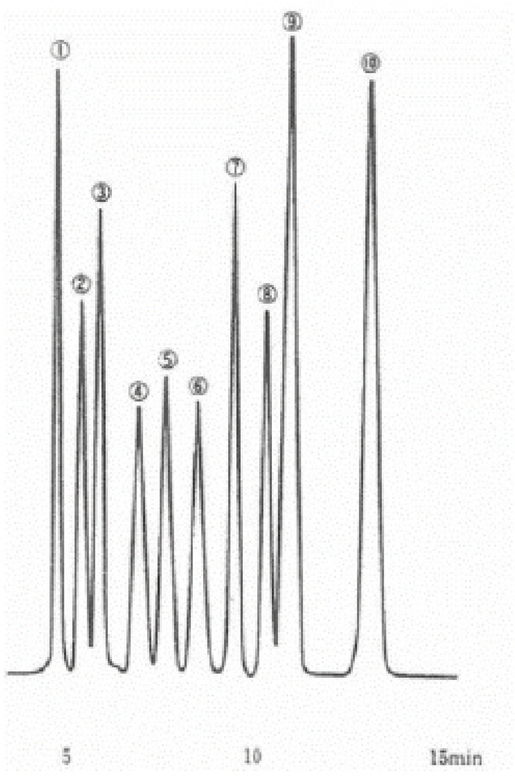
Shim-pack ULTRON PS-80N, ULTRON PS-80C, ULTRON PS-80P

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

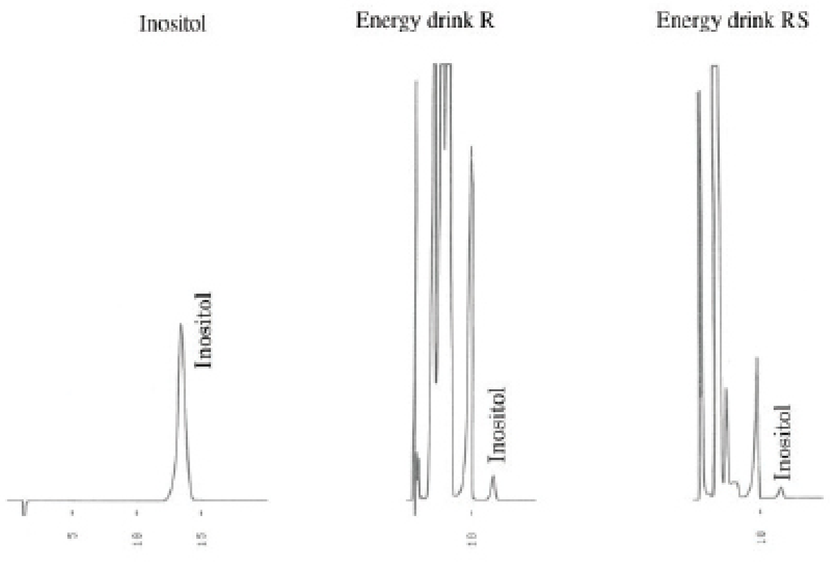
1. Dextran T-10
2. Raffinose
3. Sucrose
4. Glucose
5. Galactose
6. Fructose
7. Adonitol
8. Glycerol
9. Ethanol + Mannitol
10. Xylitol +Sorbitol

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.



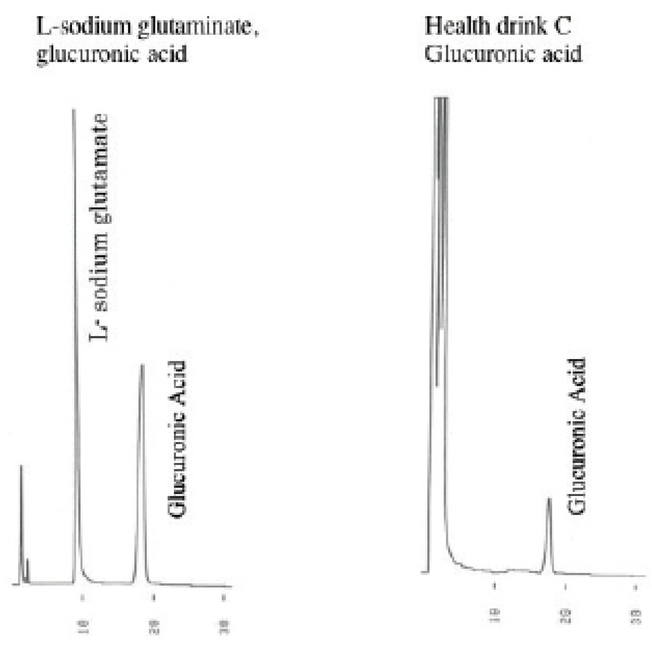
Inositol in Health Drink

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 (SiO2 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)
	10	30.0	-	226-80025-01	
	10	50.0	-	226-80026-01	226-80034-01 (15 x 8.0 mm)
	15	4.6	-	226-80027-01	226-80035-01 (10 x 4.0 mm)
	15	20.0	-	226-80028-01	
	15	30.0	-	226-80029-01	226-80036-01 (15 x 8.0 mm)
	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)
		20.0	-	226-80056-01	
		30.0	-	226-80057-01	226-80064-01 (15 x 8.0 mm)
		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)

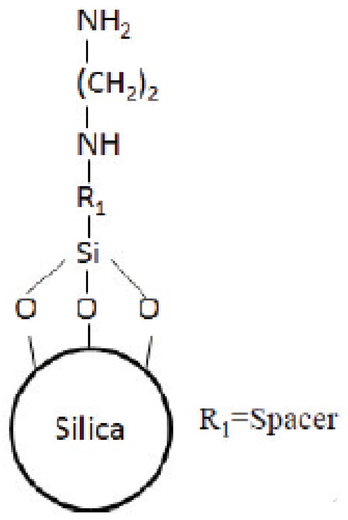
HILIC Mode Columns

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 m²/g
End-Cap	Yes
Carbon content	17 %
USP Code	L1

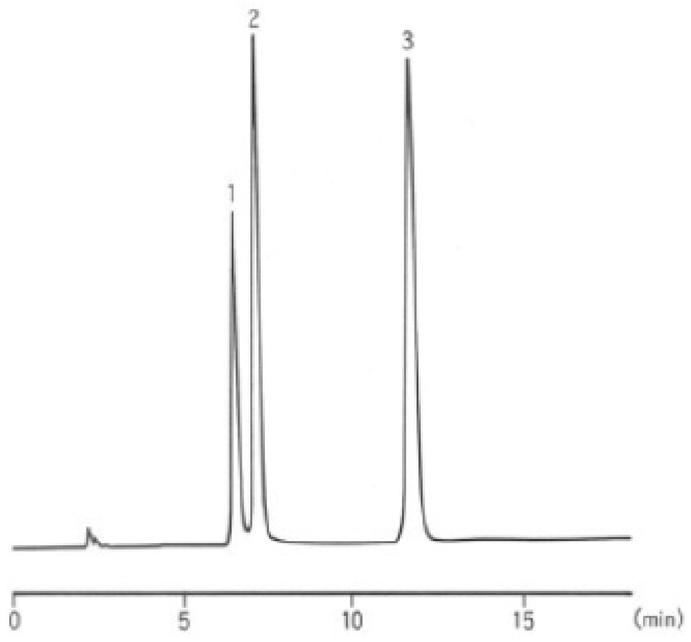
Column	Particle Size (µm)	I.D (mm)	Length (mm)			Guard column
			100	150	250	
STR ODS-II (Narrow Bore)	5	2.0	-	226-80074-01	226-80075-01	-
STR ODS-II (for Analytical)	5	3.0	-	226-80076-01	226-80077-01	-
		4.0	226-80078-01	226-80079-01	226-80080-01	226-80084-91 (10 x 4.0 mm)
		4.6	-	226-80081-01	226-80082-01	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

Reversed-phase Columns

Shim-pack STR ODS-M

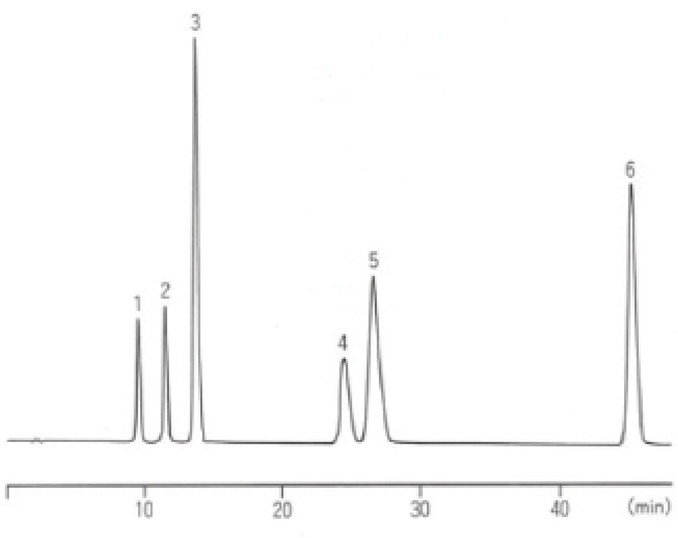
Bonded Phase	Octadecyl Group
Particle Size	5 µm
Particle Shape	Perfectly spherical porous silica gel
Pore Size	10 nm
Specific Surface	350 m²/g
End-Cap	Yes
Carbon content	15 %
USP Code	L1



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	-

Mobile Phase Cleaner for UHPLC/HPLC

Ghost Trap DS/DS-HP

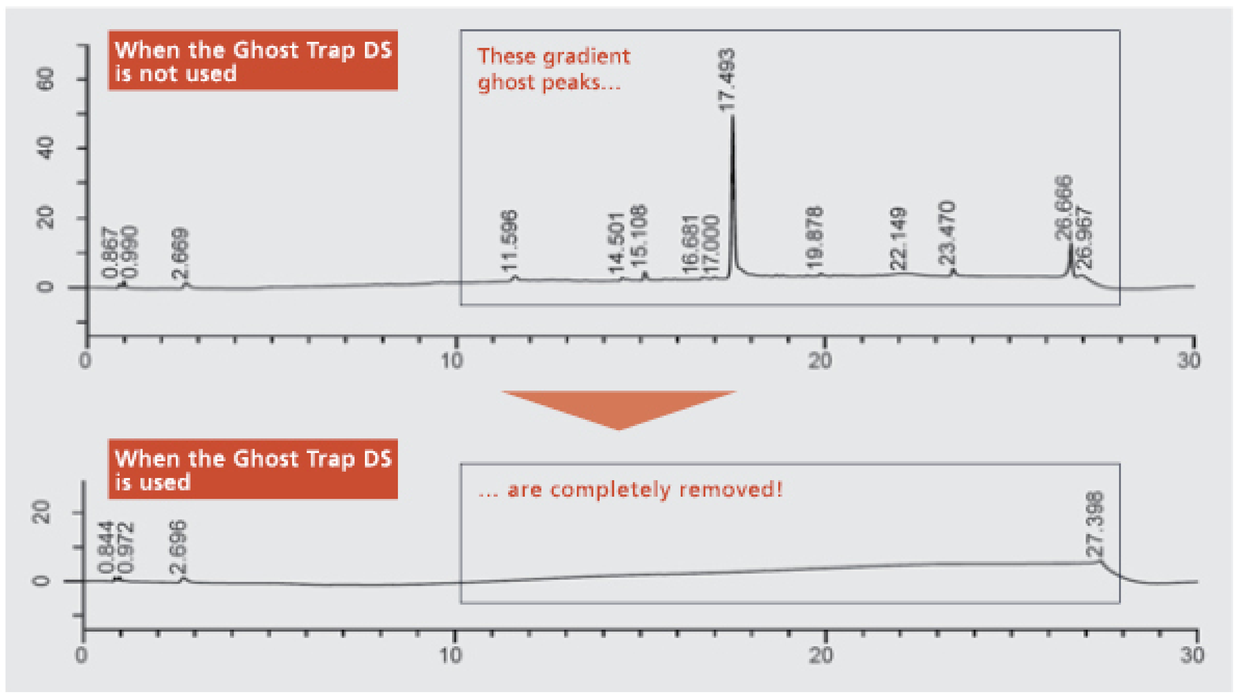
A new high-pressure model for the elimination of impurities from organic solvents has been added to the Ghost Trap DS* lineup. The Ghost Trap DS was co-developed with Daiichi Sankyo Co., Ltd. It has been designed to effectively adsorb impurities in the mobile phase in order to reduce the time required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

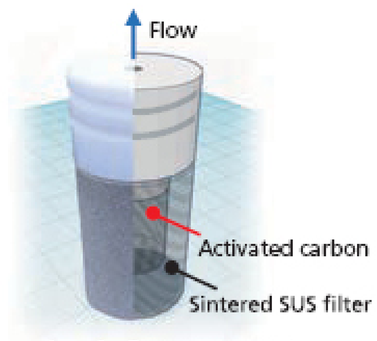
Features

- 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

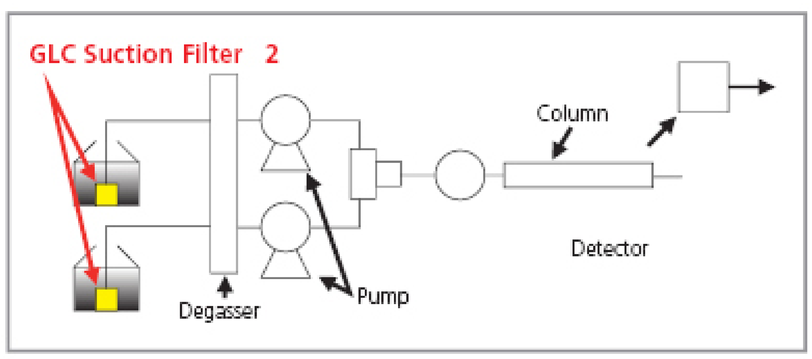
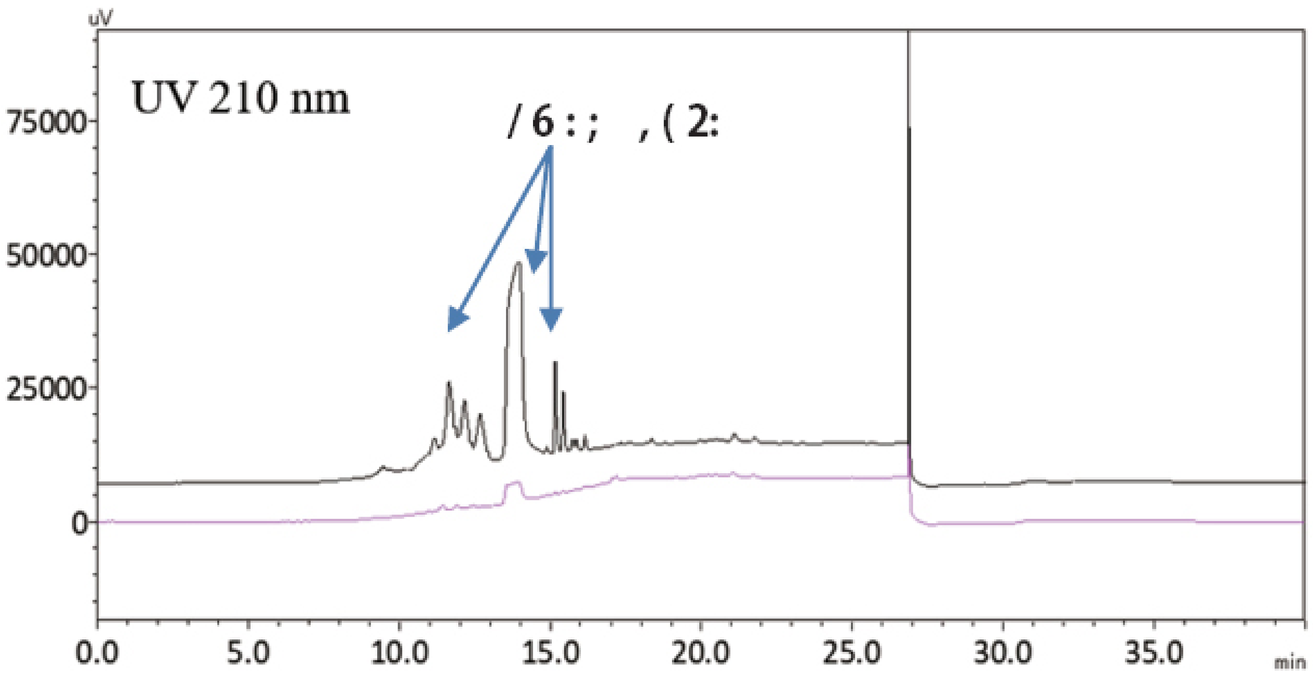


Fig. 2. Attachment position

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

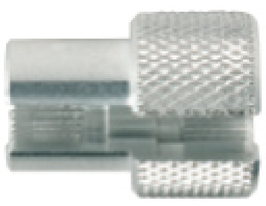
226-50001-05
Pre-Column replacement frit

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.

Vials

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

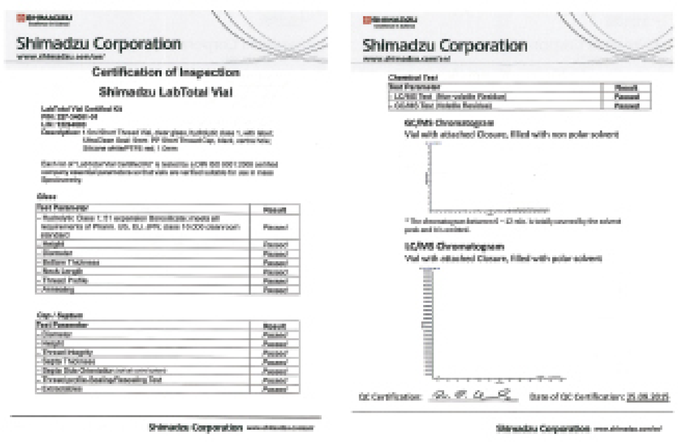
Shimadzu LabTotal Vial MS Certified Kit

- 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

Kit part number	Vial	Vial part number	Septa material	Cap/Septa part number	Kit Type
226-54307-31	0.9mL Recovery vial	226-54307-01	Silicone beige/PTFE white*	226-84131-01	-
226-55001-71					Deactivated
226-55001-81					HPLC/GC certified
226-55001-91					MS certified
226-54308-31			Silicone beige/PTFE white pre-slit*	226-54113-02	-
226-55002-71					Deactivated
226-55002-81					HPLC/GC certified
226-55002-91					MS certified

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

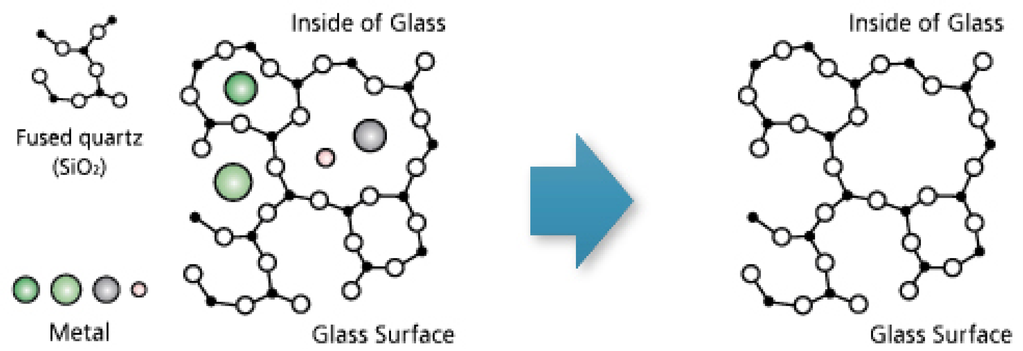
TORAST-H Glass Vial

Features

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

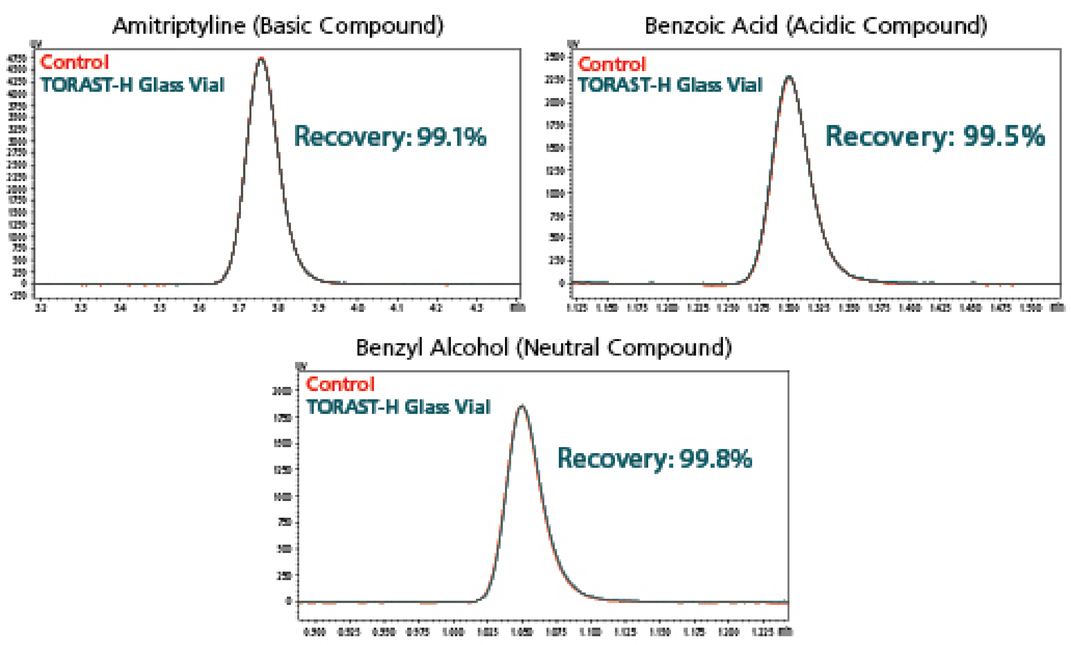
TORAST -H Glass Technology eliminates the risk of adsorption to the glass surface of the vials

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.



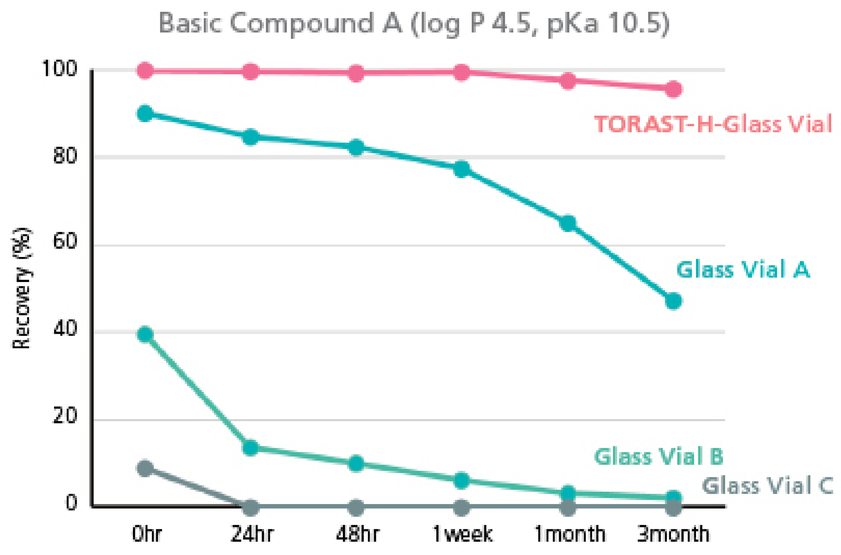
Minimized adsorption of bases, acids & neutrals

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

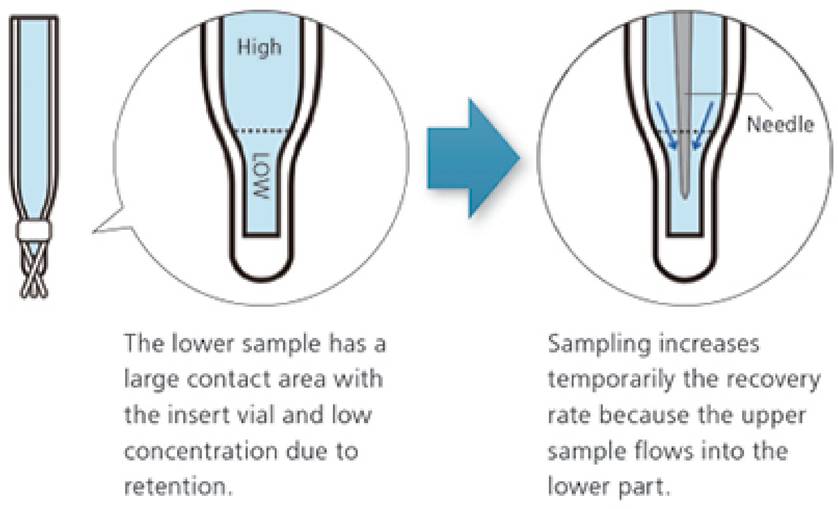
When a sample is stored in a general vial for a long time, the sample may adsorb into the surface of the vial, causing the reproducibility to be poor. The TORAST-H Glass Vial contains low adsorption characteristics that makes it excellent for long term sample storage.



Adsorption test for long-term storage

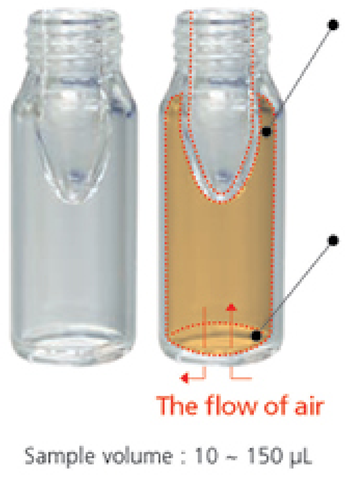
Small-Volume Vials

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.



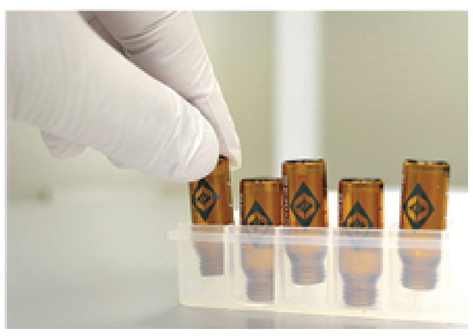
- This design ensures that the sample solution contact area is minimized.
- The bottom of the vial is concave to improve thermal conductivity.

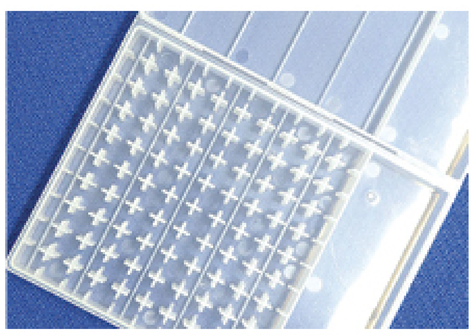
Sample volume : 10 ~ 150 µL

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

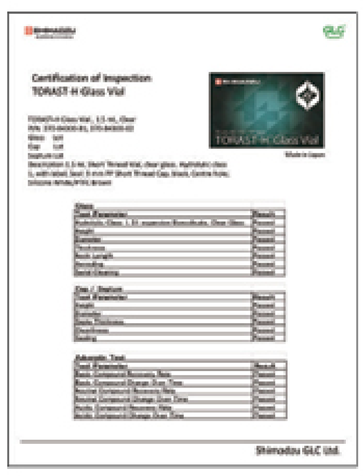
Reduce the adhesion of organic substances from the packaging and the formation of organic layers.

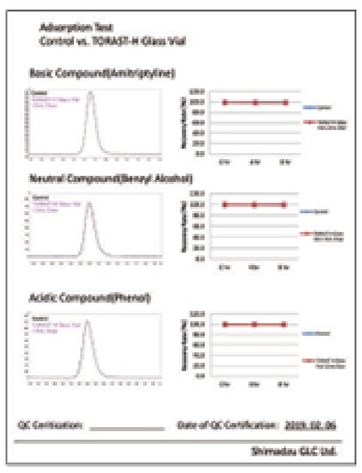




Superior Quality Control

- 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

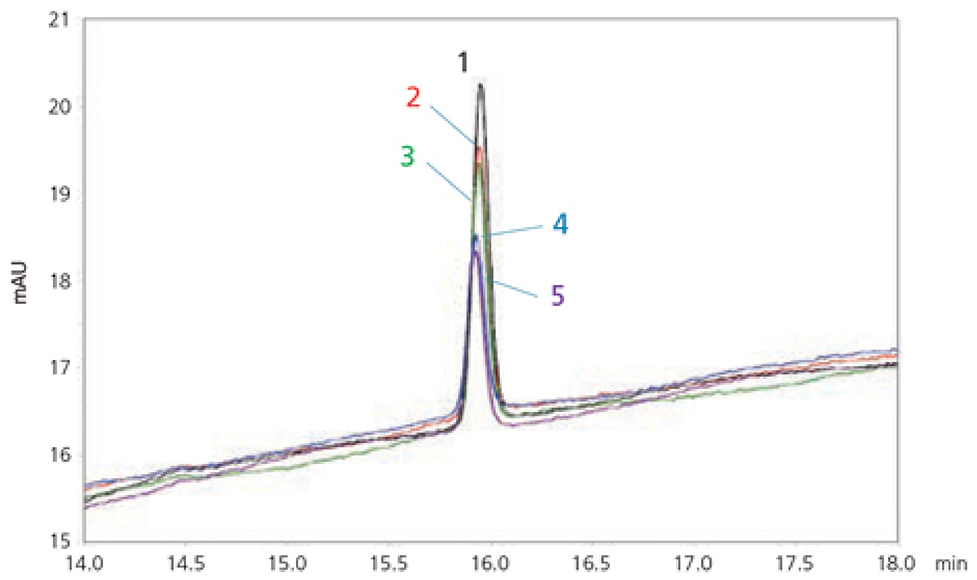
Features

- 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

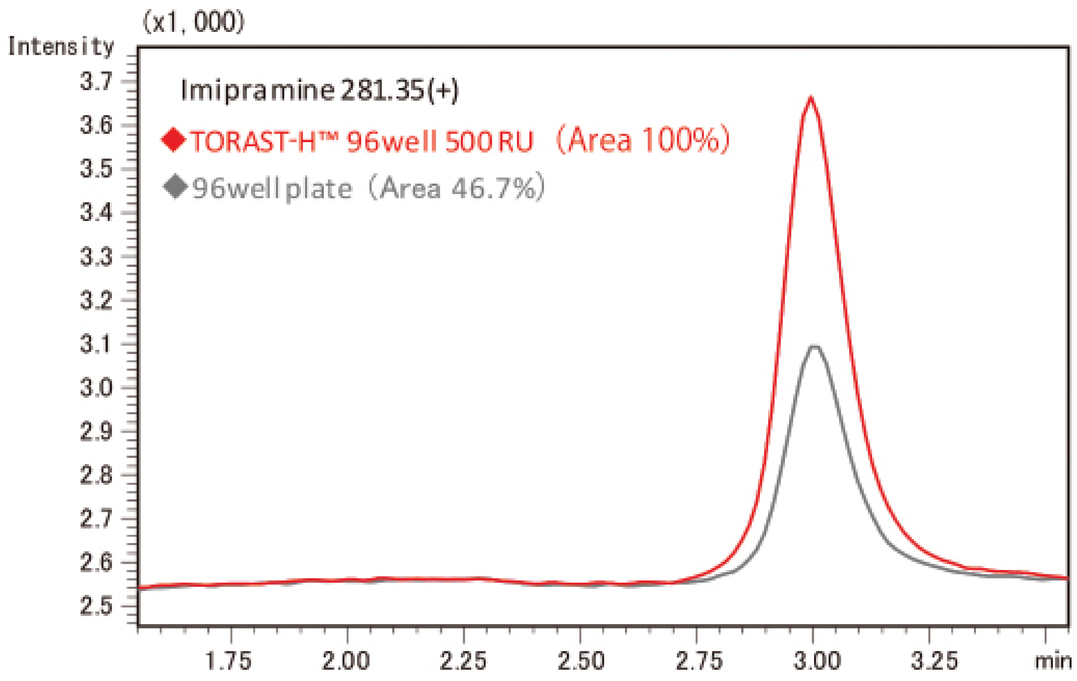
Adsorption Test of Imipramine

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

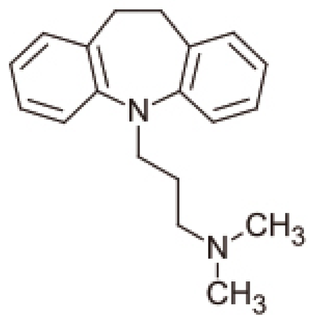
The chromatogram below shows a comparison of the Imipramine peak area with non-coated polypropylene 96-well plate compared to TORAST-H™ 96- well plates.

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 Ammoniom Acetate in Water : MeCN =40:60_Isocratic flow
Flow Rate : 0.2 mL/min

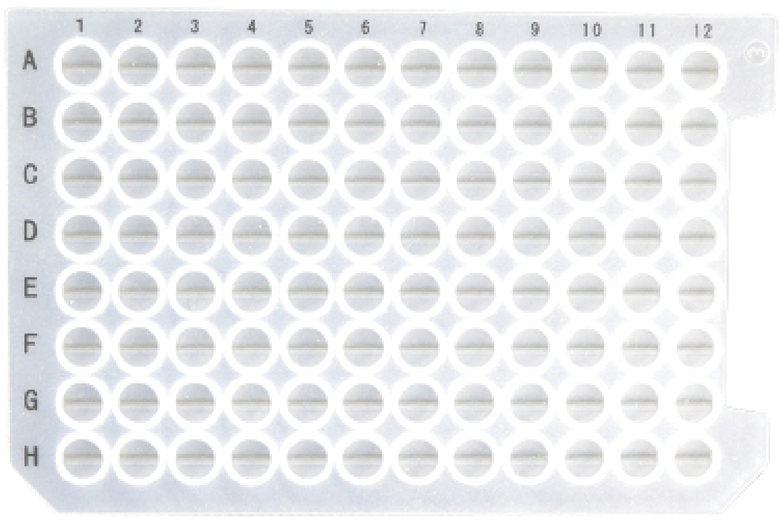


Imipramine Molecular Weight : 280.4

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

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

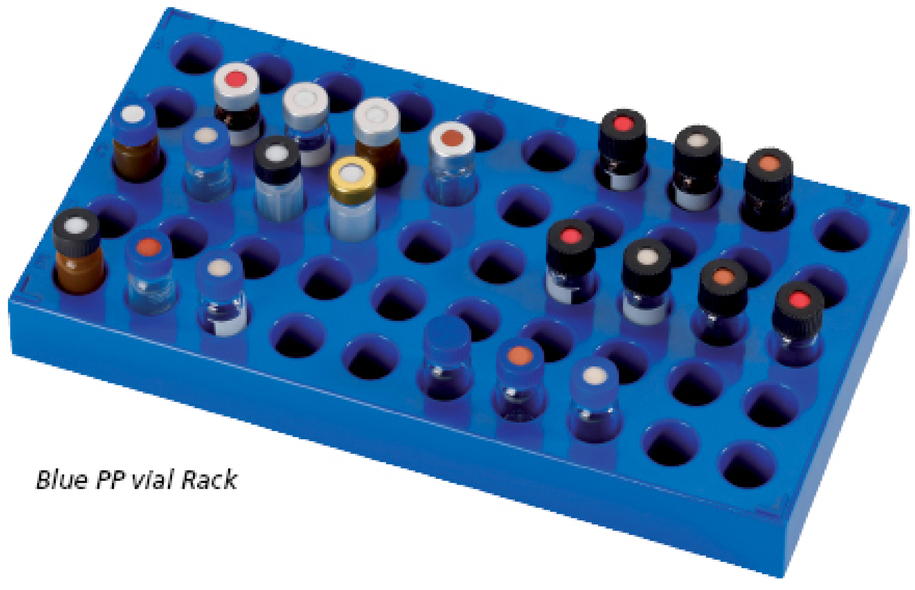
Vial racks for 1.5mL vials

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

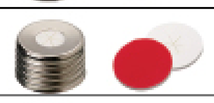
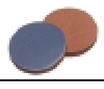
10mL and 20mL Headspace screw vials, 100/pack

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

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

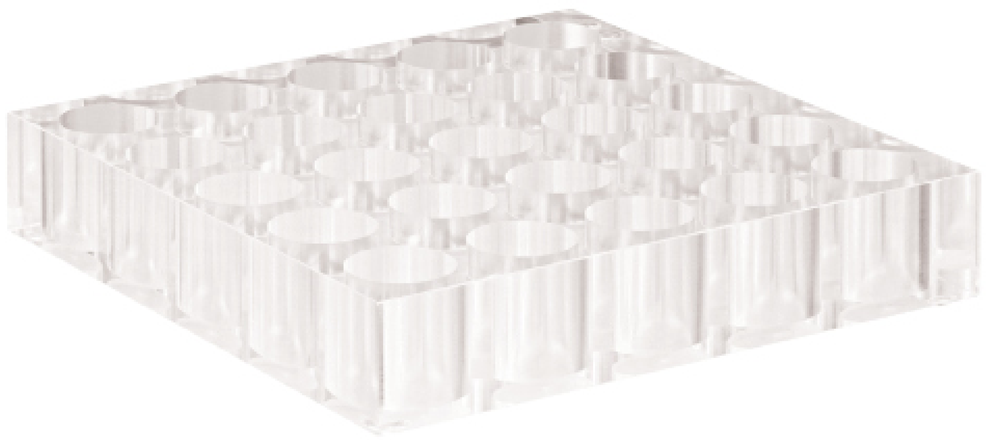
Part number	Vial type	Cap Type	Septa Material	Pack size
226-84600-00	10mL crimp vial	PE Snap Cap	Silicone/PTFE, Y-slitted	25

Vial rack for 10mL and 20mL vials

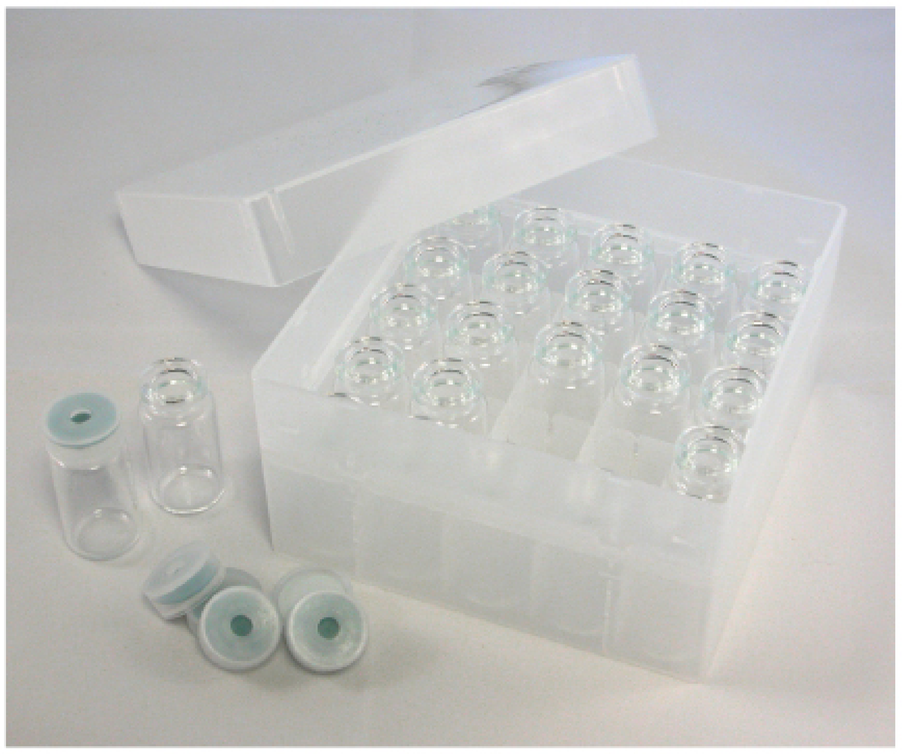
Part number	Type	Dimension	Cavities
226-84901-10	Acrylic	160 x 160 x 30mm	25

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

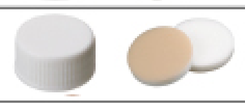
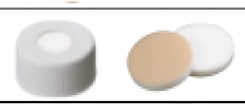
EPA vials

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

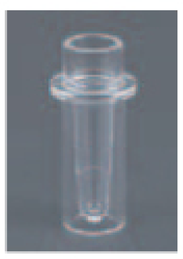
CLAM-2000 is compatible with dedicated disposable pretreatment vials from Shimadzu. Filtration and Collection vials are used as a pair.

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

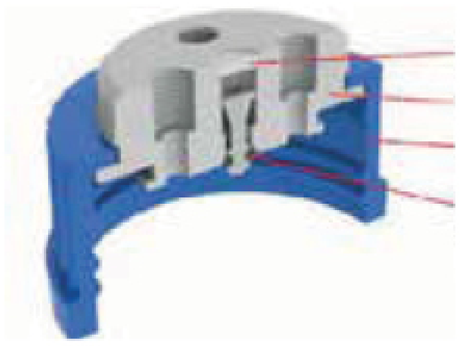
Specifications of Applicable Sample and Reagent Vials

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 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

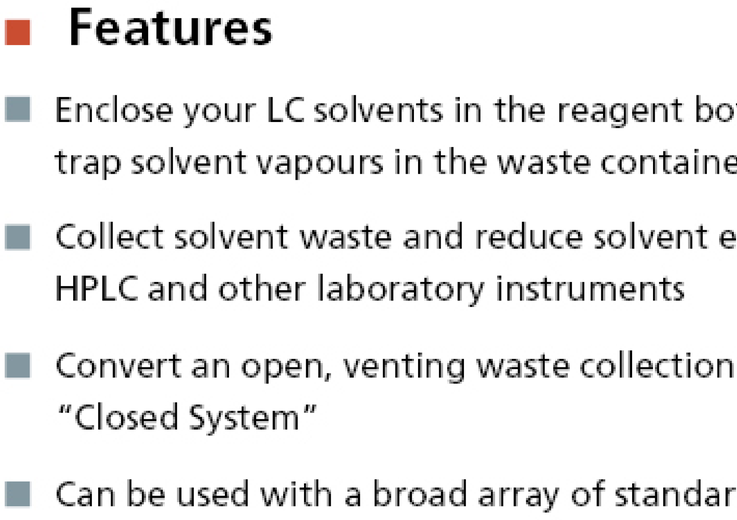


Part number		Description	Consists of	
①	226-50318-00	4 Ports bottle cap, 1 pc	-	
②	226-50319-00	2 Ports Bottle Cap, 1 pc	-	
③	226-50315-01	Plug, ¼-28, Virgin PTFE, 1pc	-	
④	226-50316-01	Tubing Connection, 1/8" OD tubing, Blue Polypropylene fitting, Yellow Tefzel ferrule, 1pc	-	
⑤	226-50318-01	4 Ports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

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



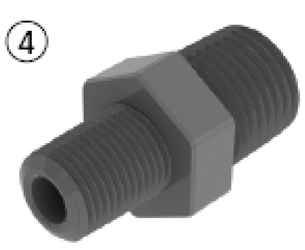
A colour marker label at the top of the indicator tube, marked "EXPOSED," shows the colour at which the indicator has been fully exposed. When the colour approximates this label, the filter should be changed. If the indicator changes to a light yellow colour, it designates a prolonged exposure to solvent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

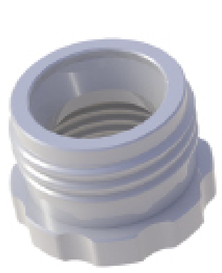
③

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

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

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 cm^2
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

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