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

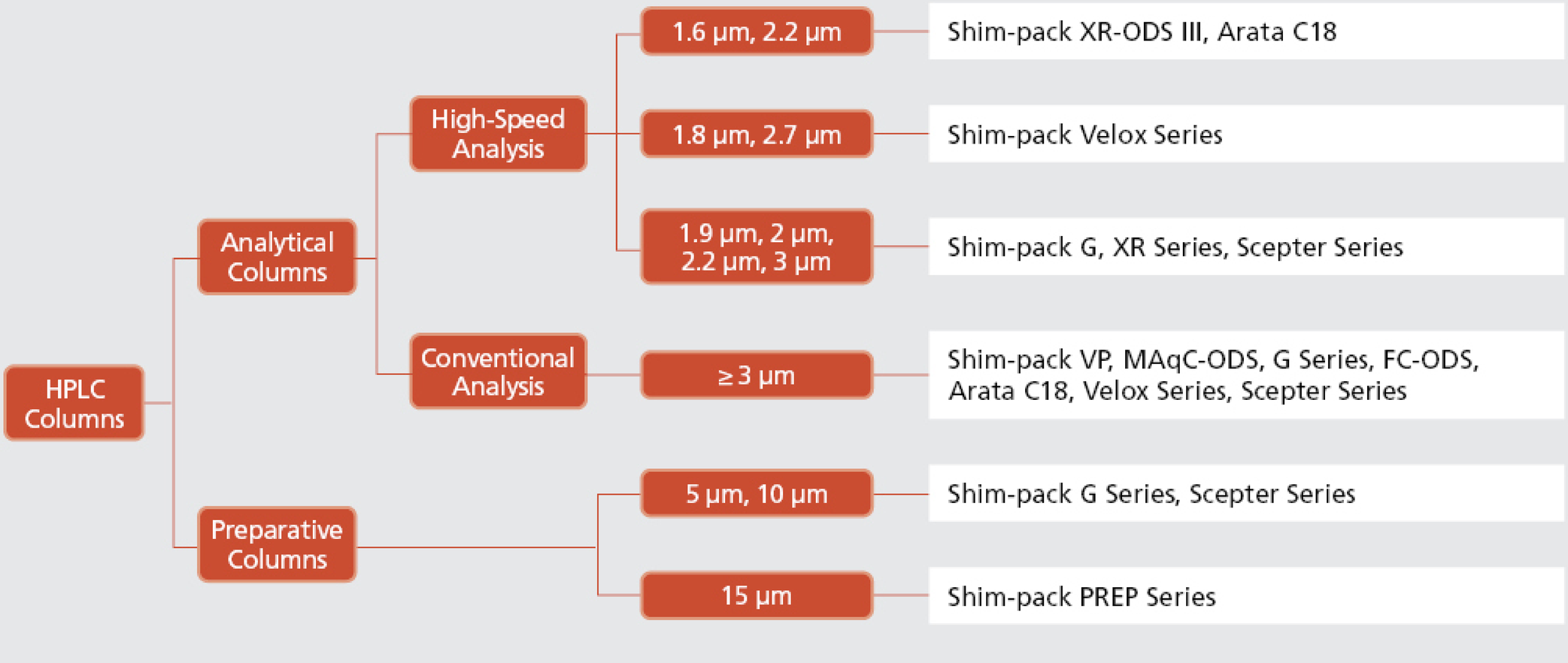
- **Reversed Phase**
  - ODS/C18 (Shim-pack XR, VP, MAqC, G, FC Series, Velox, Scepter)
  - Shim-pack GIST C18-AQ
  - Shim-pack GIS C18-P
  - Shim-pack GIS RP-Shield
  - C8 (Shim-pack XR, VP, G Series)
  - Phenyl (Shim-pack XR, VP, G Series)
  - Shim-pack GIST Phenyl-Hexyl
  - Shim-pack Velox Biphenyl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

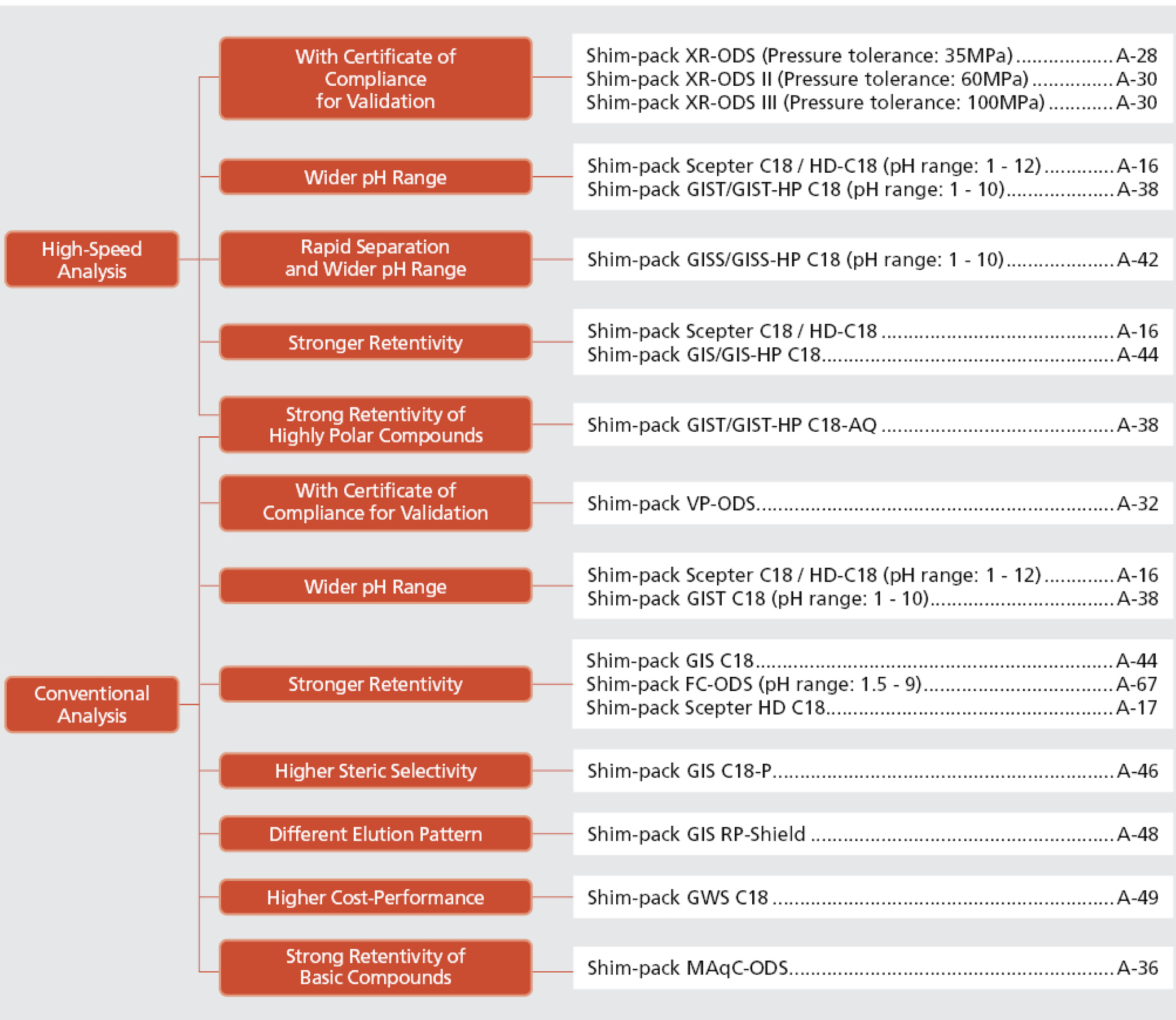
Polymer Type

- **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

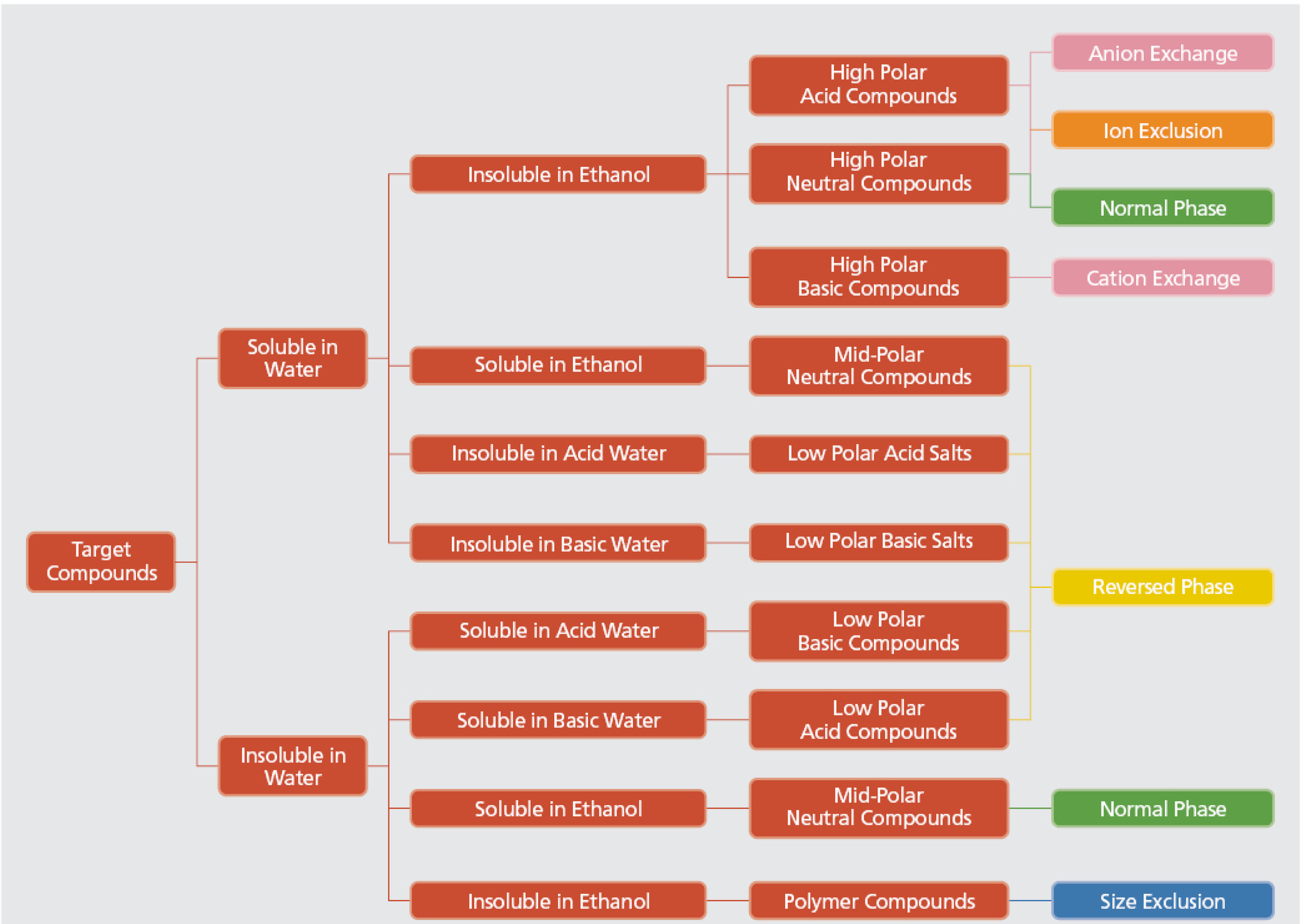


Selection of ODS columns

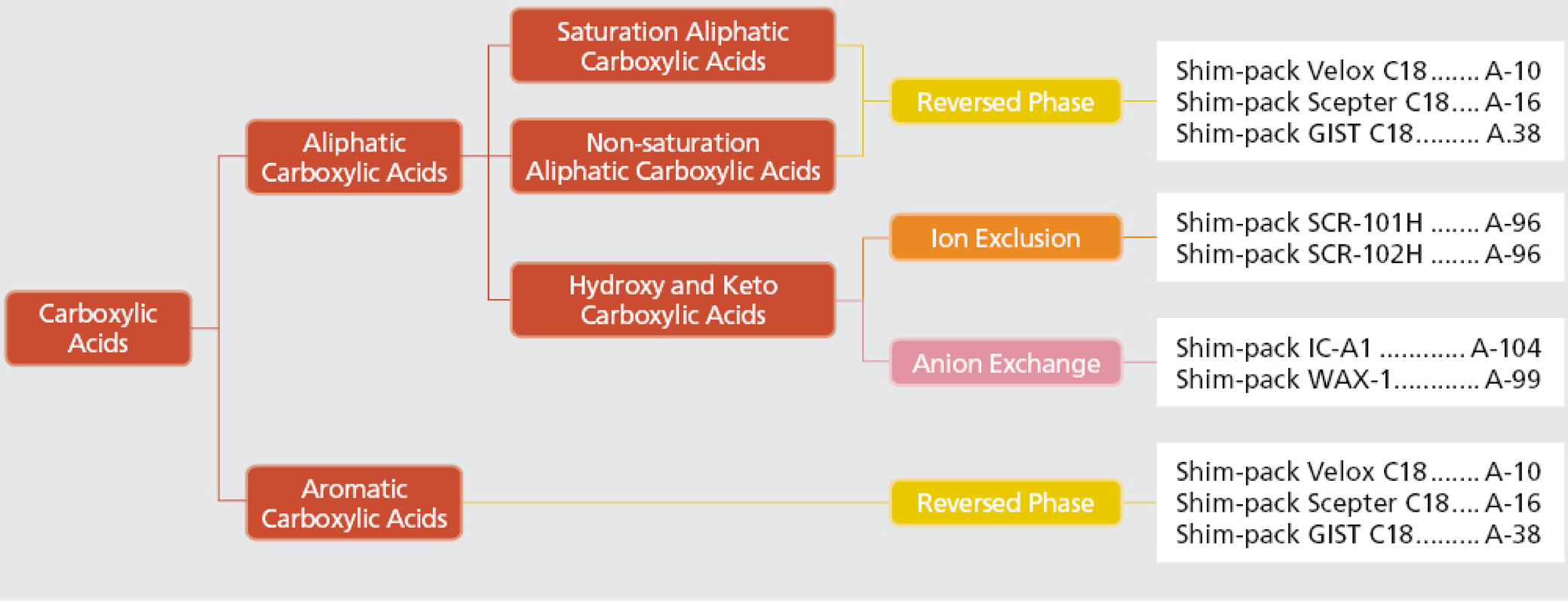


Column Selection Guide

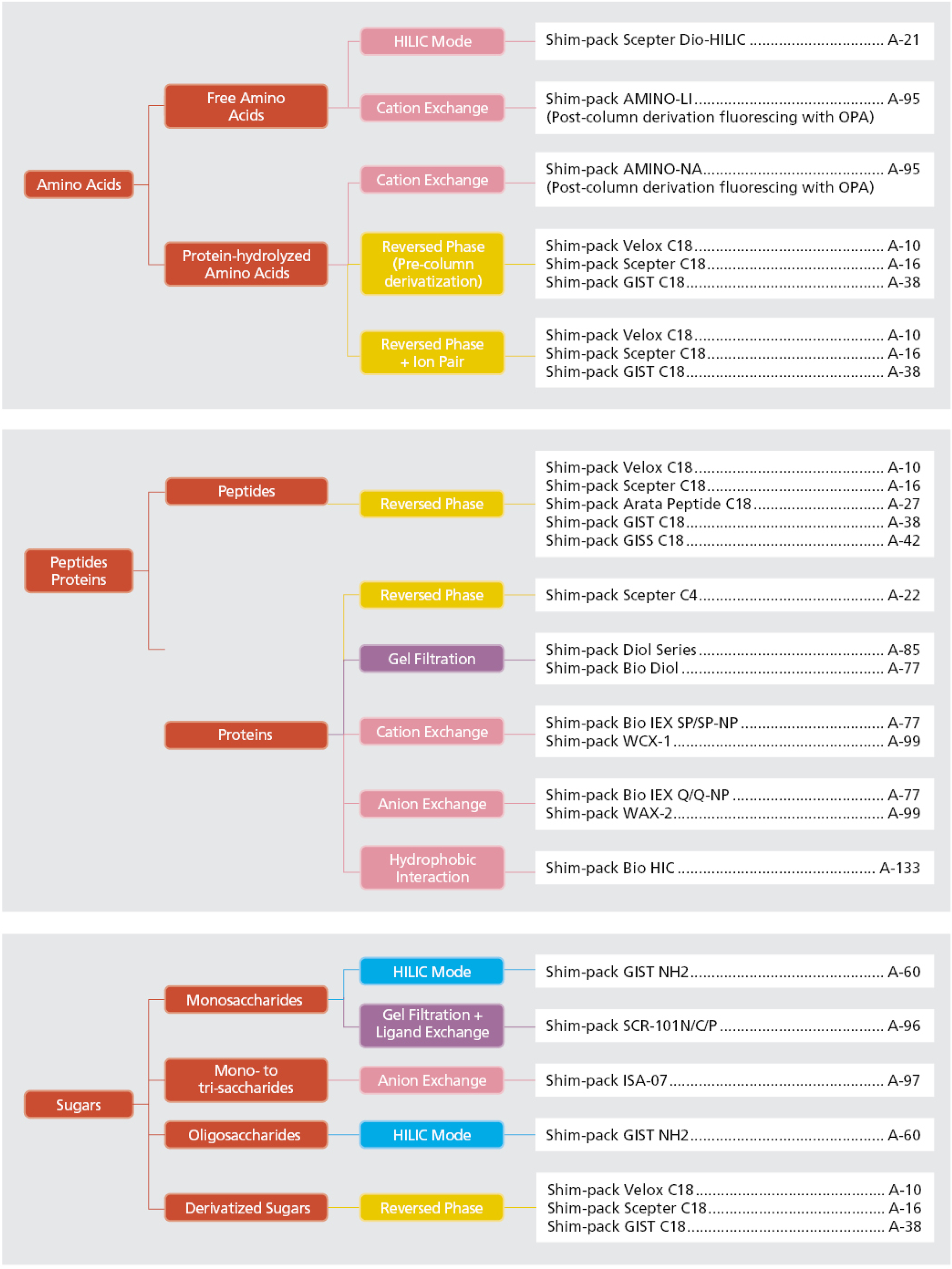
Column Selection by Target Compounds



Column Selection by Target Compounds

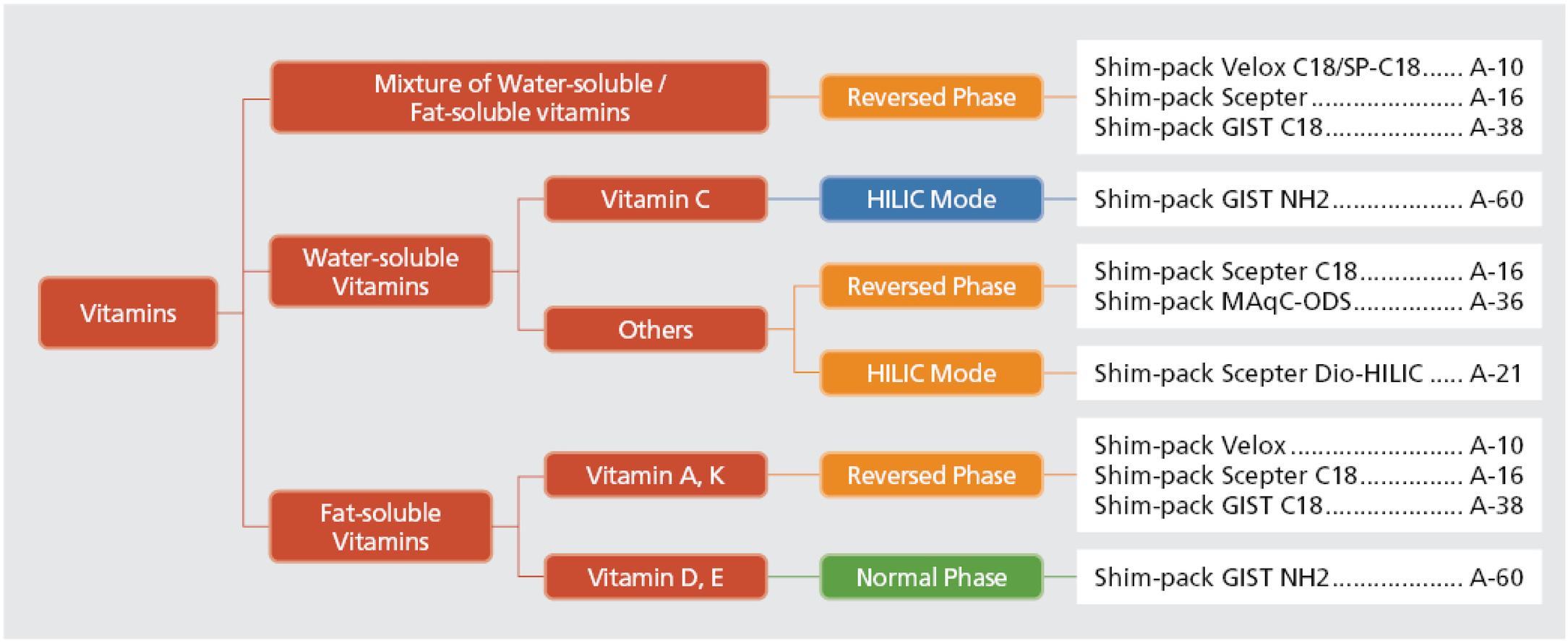


Column Selection by Target Compounds



Column Selection Guide

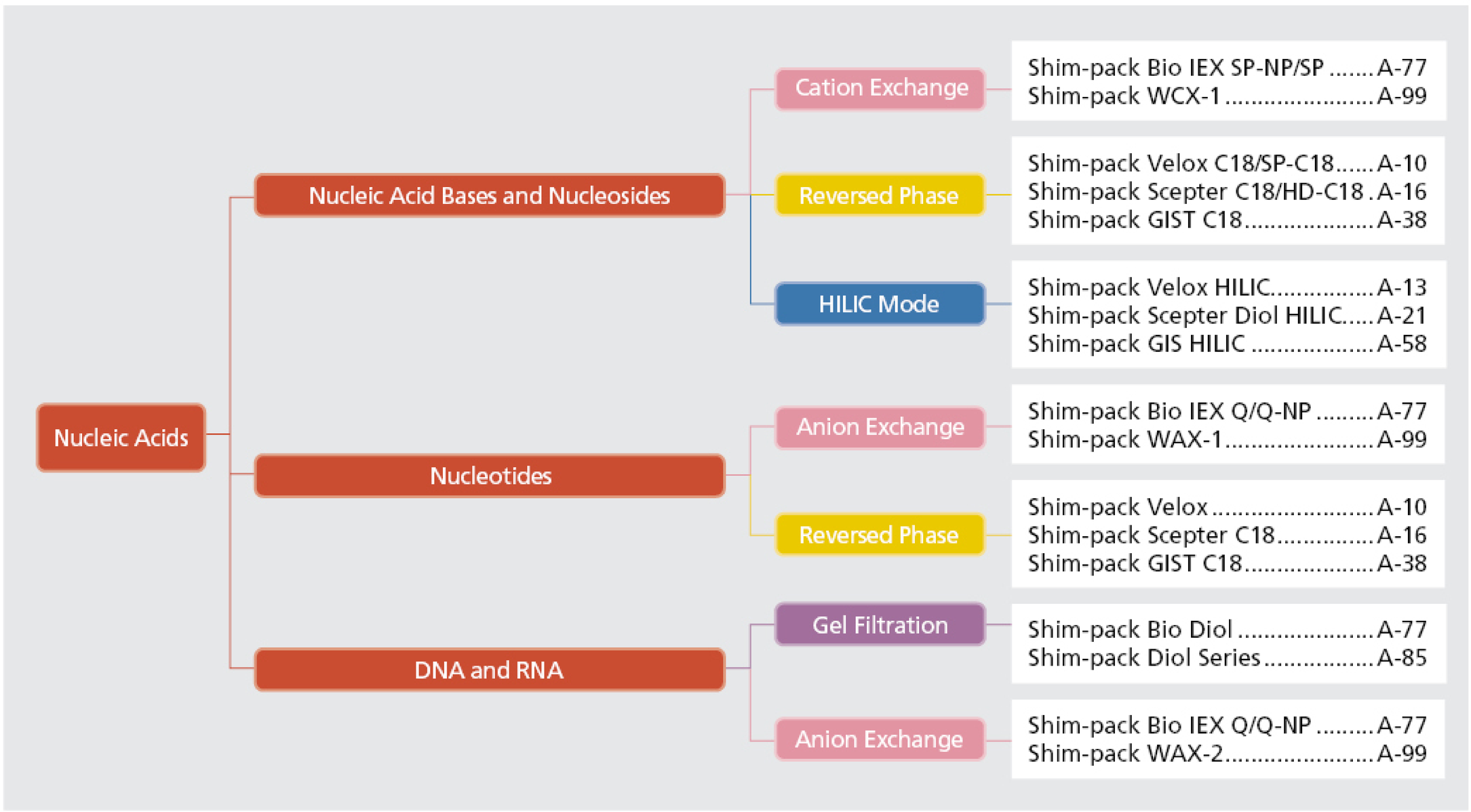
Column Selection by Target Compounds



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.



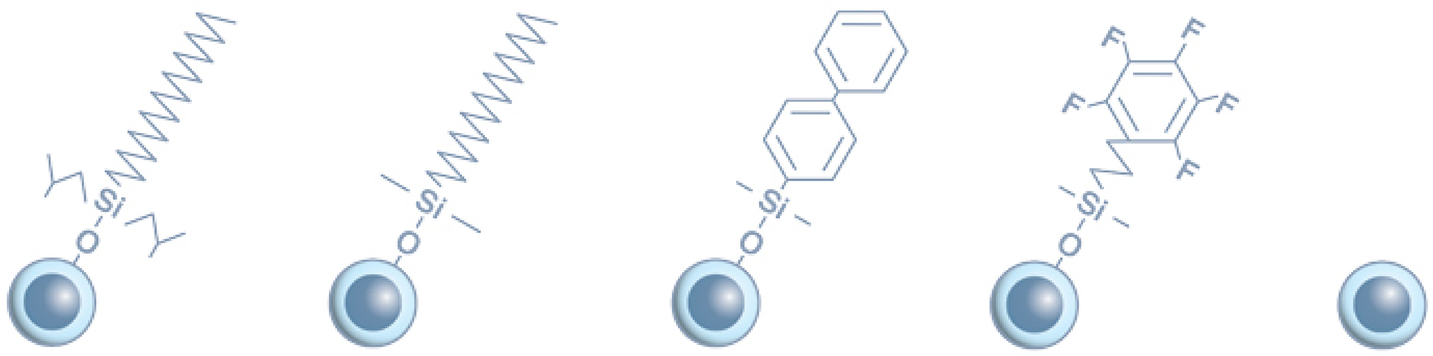




	Prominence	Prominence-i plus	Nexera XR	Nexera-i plus	Nexera X2
LC System	HPLC		UHPLC-like	UHPLC	
Particle size	2.7 µm & 5 µm		2.7 µm	1.8 µm & 2.7 µm	
Column I.D.	4.6 mm (3.0 mm)		3.0 mm (2.1 mm)	2.1 mm	
Column Length	100-250 mm		50-100 mm	150 mm	

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.

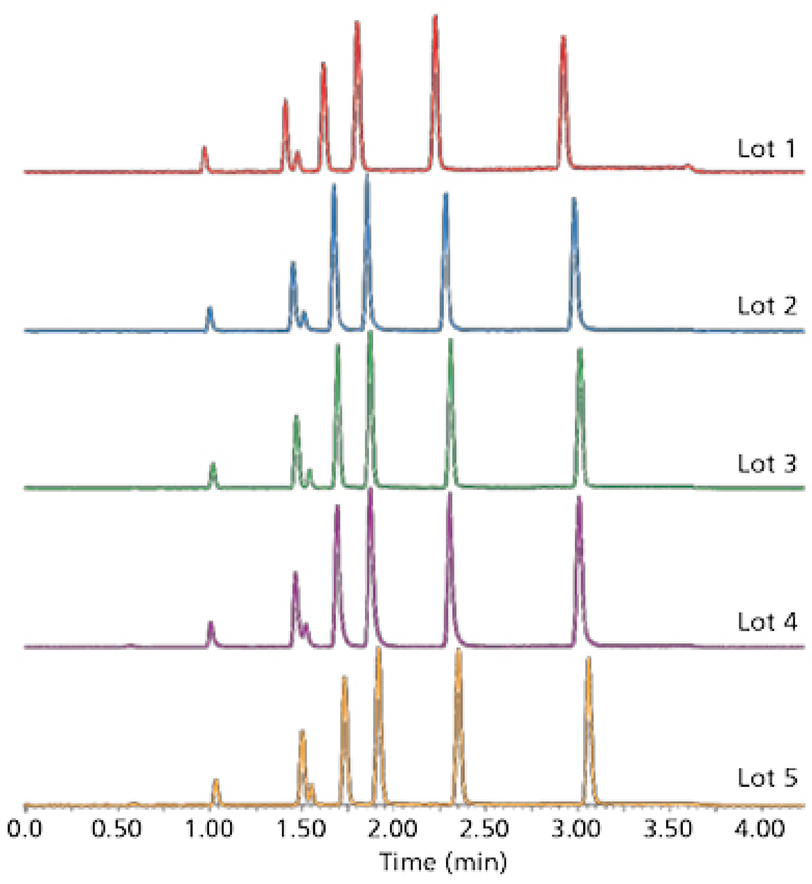


		SP-C18	C18	Biphenyl	PFPP	HILIC
USP Classification		L1	L1	L11	L43	L3
Ligand type		Sterically protected C18	C18	Biphenyl	Pentafluorophenyl propyl	None
Particle Size (µm)		1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	1.8, 2.7, 5	2.7
Pore size (Å)		90	90	90	90	90
Suraface Area	1.8 µm	125 m^2/g	125 m^2/g	125 m^2/g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

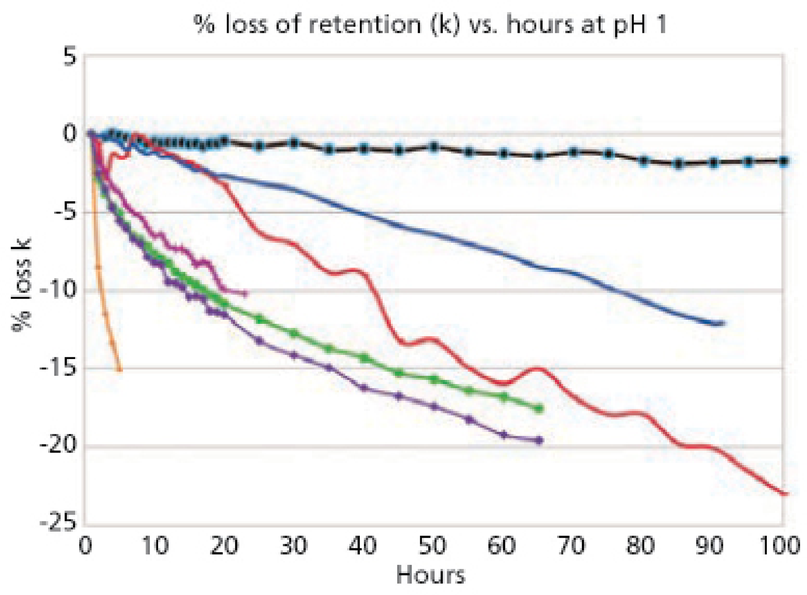
Designed and intended specifically for use under low pH condition, Shim-pack Velox SP (Sterically Protected)-C18 offers a well balanced retention profile with a long life time even under harsh, acidic condition needed for LC/MS(/MS) analysis.

- 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) .



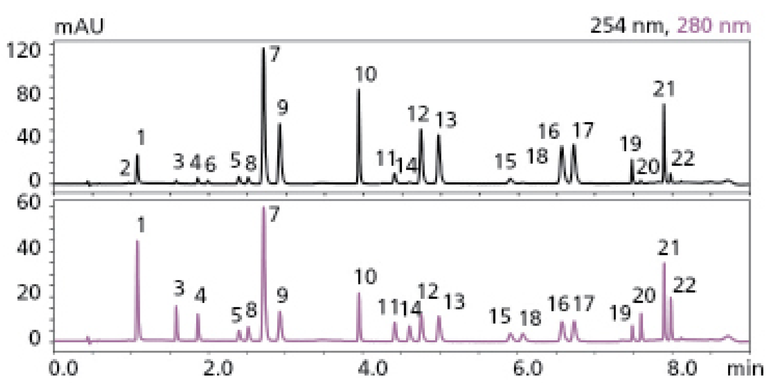
Conditions

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)

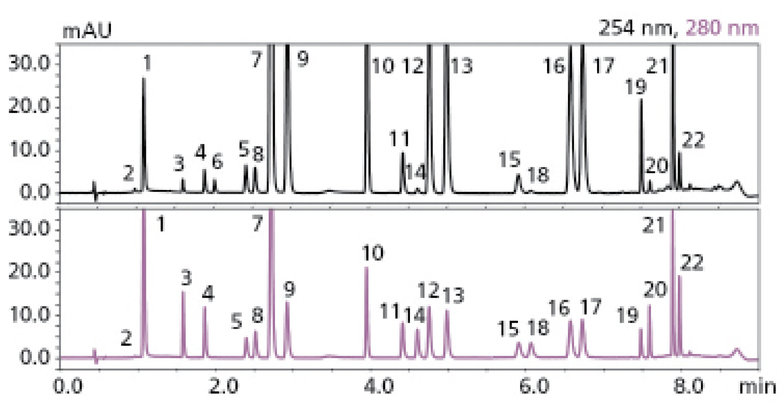
- Shim-pack Velox SP-C18 Brand A FPP C18
- Brand B FPP C18
- Brand C FPP C18
- Brand D Core-shell C18
- Brand E Core-shell C18
- Brand F Core-shell C18

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

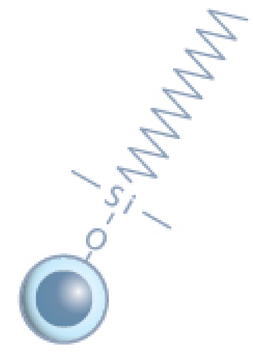
1. 2-methyl-4-Isothiazolin-3-one
2. 2-Bromo-2-Nitro-1,3-propanediol
3. Salicylic Acid
4. Isothiazolinones
5. Benzoic Acid
6. Benzyl Alcohol
7. Sorbic Acid
8. 2-Phenoxyethanol
9. Methyl Paraben
10. Ethyl Paraben
11. Methyl Benzoate
12. Isopropyl Paraben
13. Propyl Paraben
14. 4-Chloro-3-Methylphenol
15.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

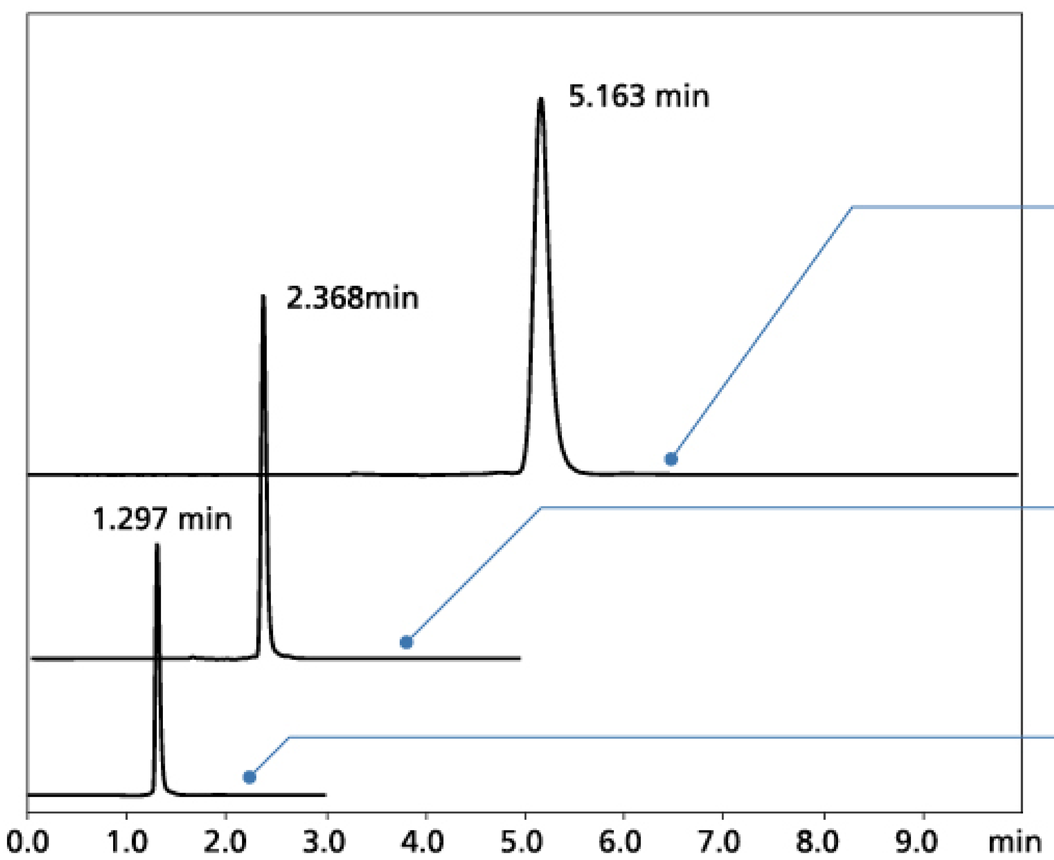
USP requirement of Chromatography <621>

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

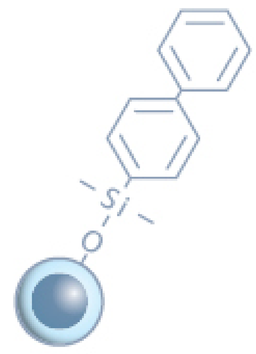
Faster Method
Column : Shim-pack Velox C18 (2.7 µm, 4.6×100 mm)
Flow rate : 0.50 mL/min
Injection Volume : 67 µL
Column temp. : 25 °C
Detection : UV 361 nm

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

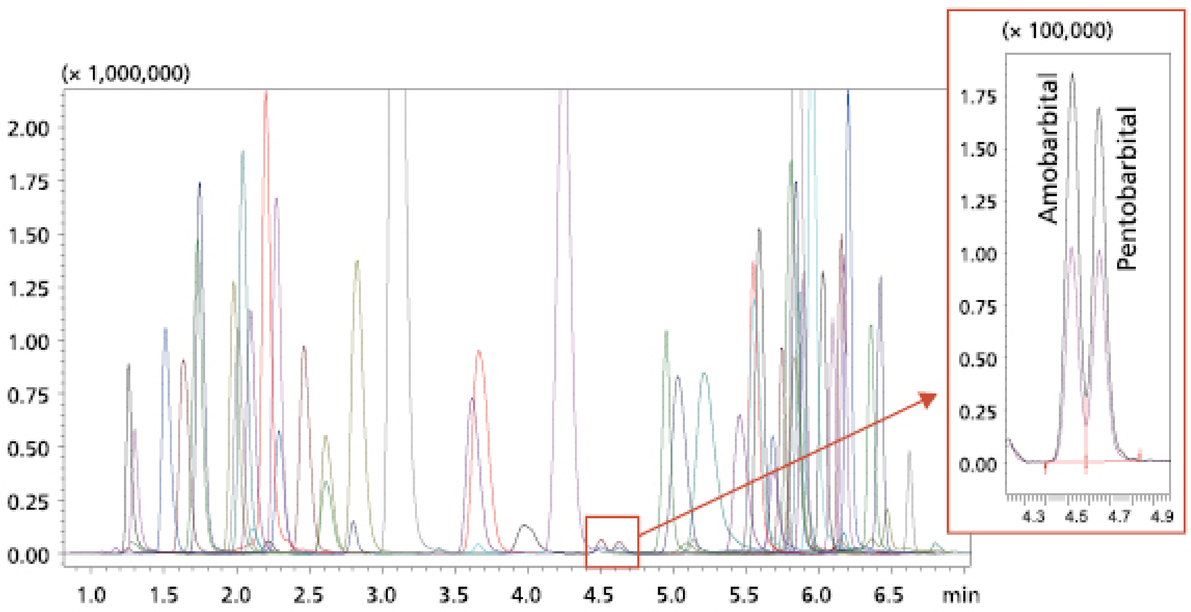
Shim-pack Velox Biphenyl provides enhanced retention of aromatic compounds. It is useful for fast separations in bioanalytical applications due to the increased retention of early eluting analytes such as dipolar, unsaturated and conjugated analytes.



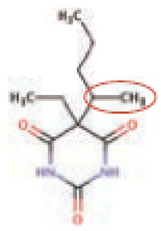
- Complementary selectivity to alkyl phases
- Enhanced separation of aromatic compounds
- Ideal for increasing sensitivity and selectivity in LC/MS(/MS) analysis

Separating the Structural Isomers

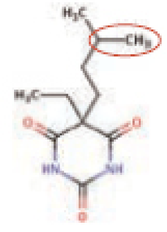
Even under the condition where 56 drugs of abuse and metabolites in human urine are quantitated within 10 minutes, two structural isomers, amobarmital and pentobarbital, which have been historically difficult to separate due to their similarity in chemical structures, could be relatively well resolved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



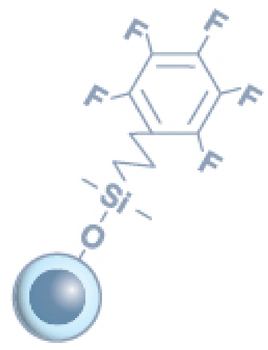
Pentobarbital
5-ethyl-5-pentan-2-yl-1,3-diazinane-2,4,6-trione

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

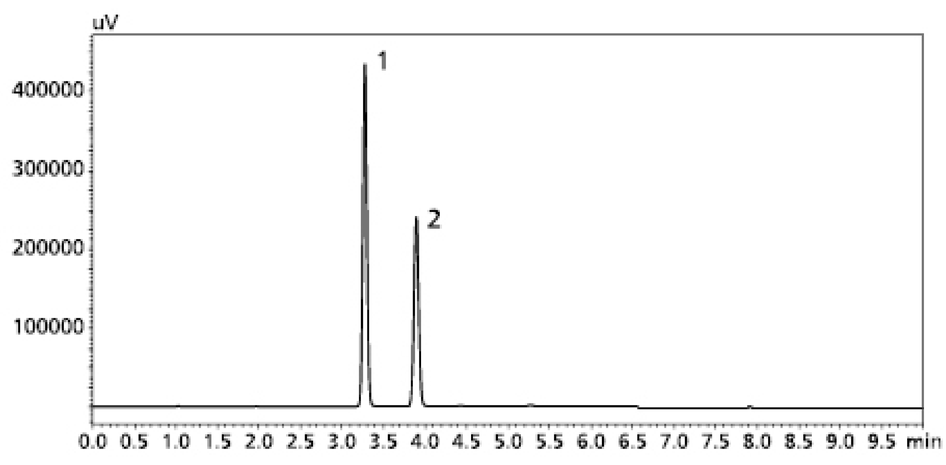
Shim-pack Velox PFPP (Pentafluorophenylpropyl) provides an alternative selectivity to C18 columns and is suitable for the analysis of halogenated compounds, positional isomers and charged bases.



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

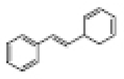
Good Separation of Cis / Trans Stilbene

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

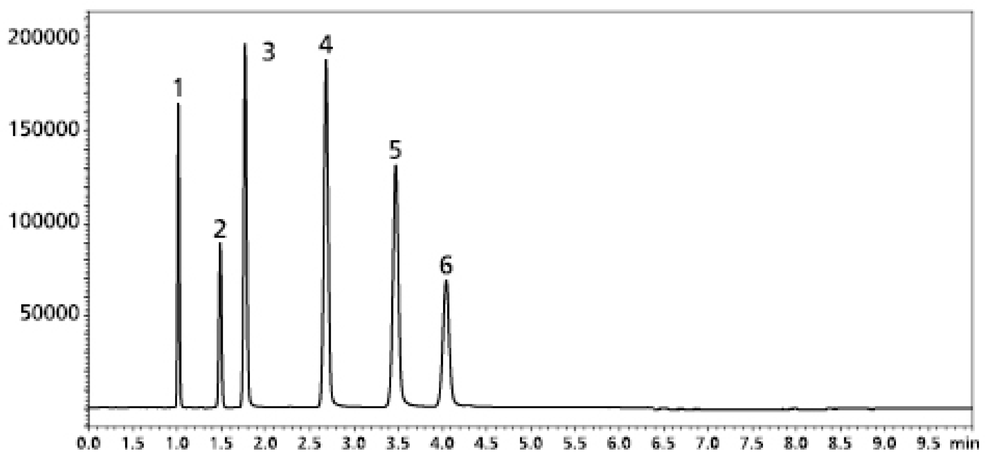
Shim-pack Velox HILIC

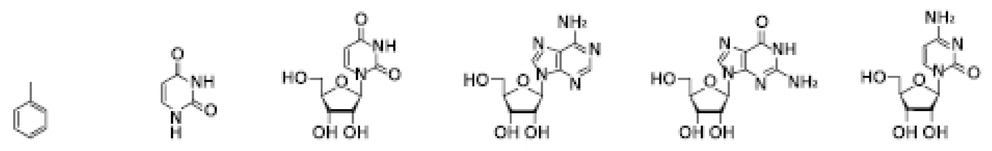
Hydrophilic interaction chromatography (HILIC) is an increasingly popular separation mode that can be used to improve the retention of challenging polar analytes. Shim-pack Velox HILIC using unbonded core shell particles is specifically designed for this application.

- 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



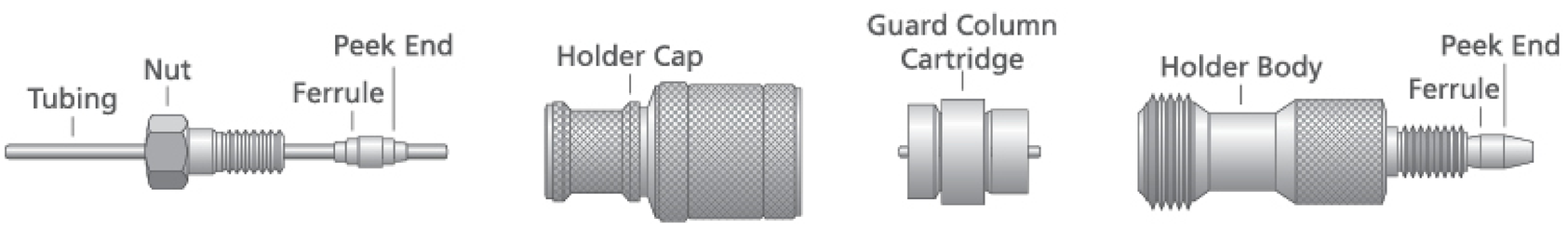
Shim-pack Velox UHPLC Pre-column (0.2 µm)

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

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

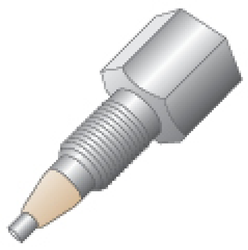
Shim-pack Velox EXP Guard Column

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.

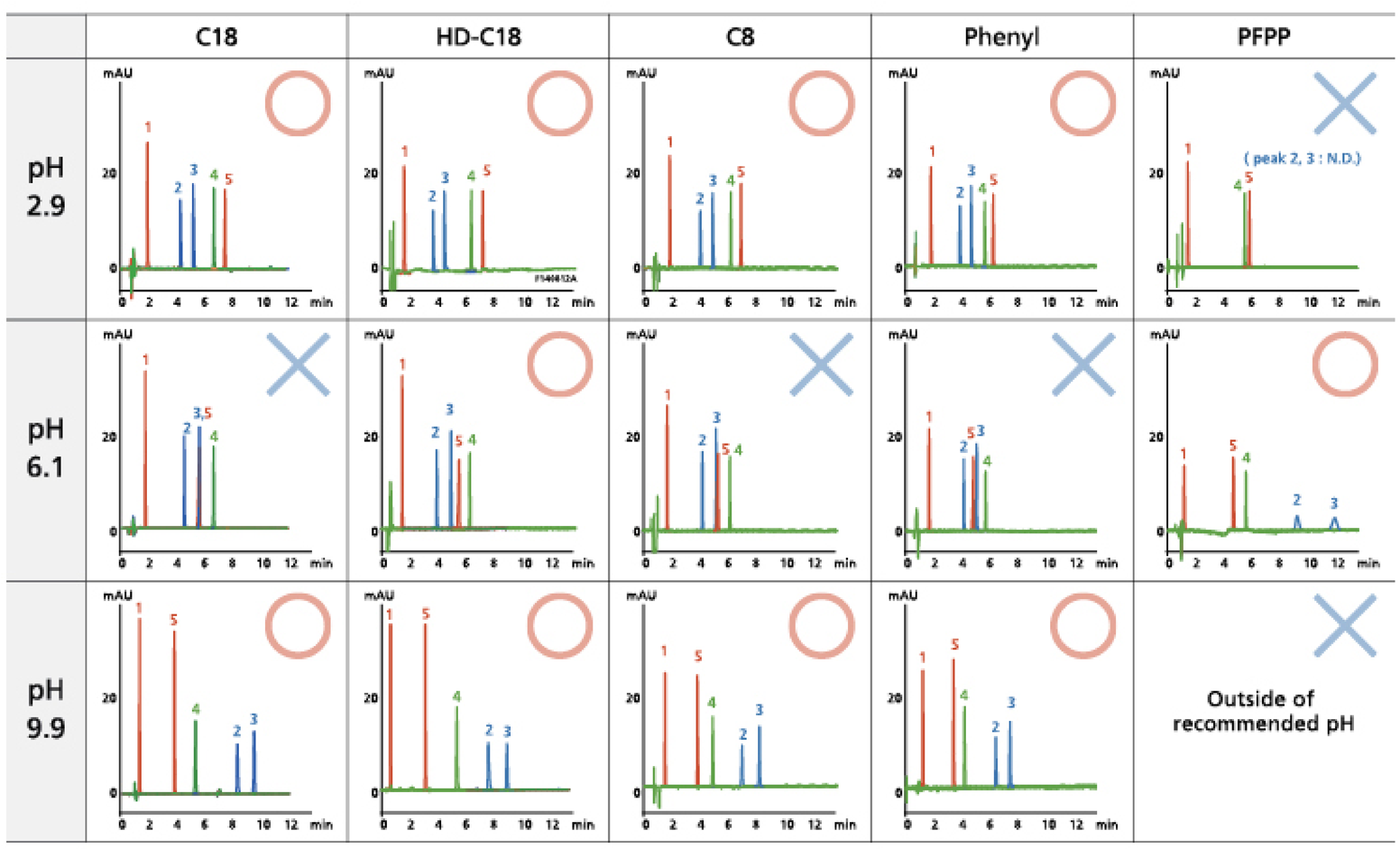
Shim-pack Scepter Chemistries

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

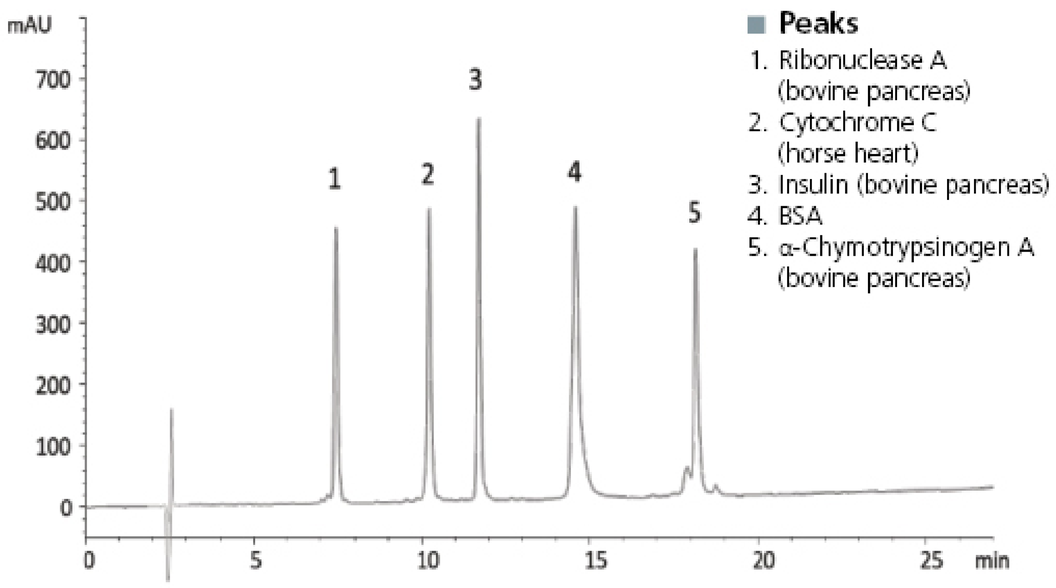
Design for biomolecules separations

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

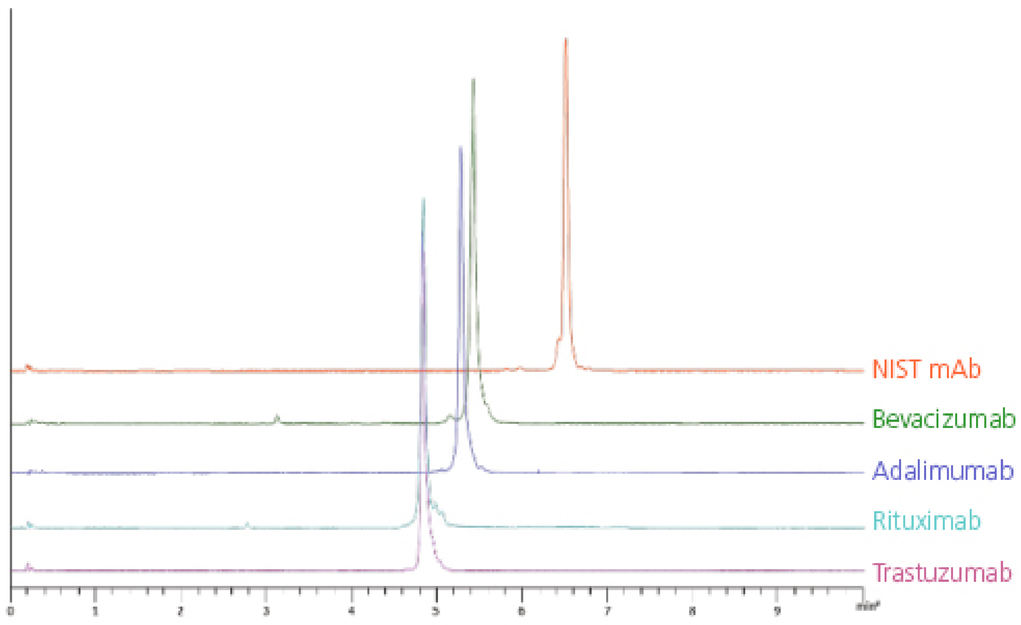
Analysis of Proteins



■ 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

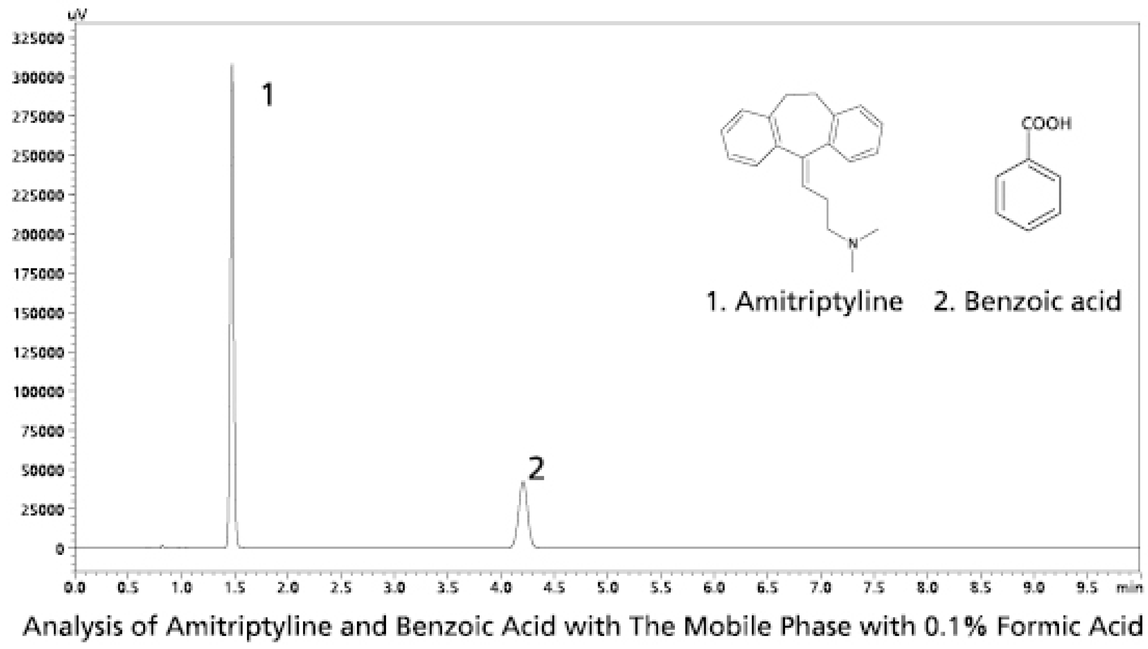
Unprecedented Resolution and Peak Shape of Basic Compounds

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

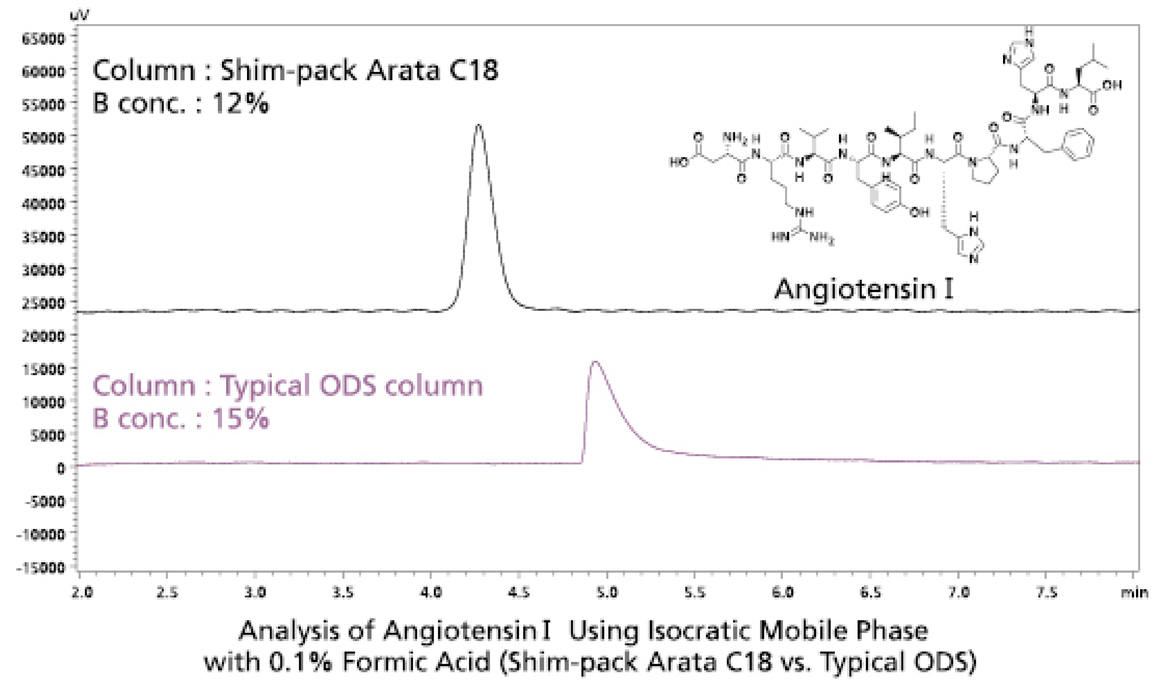
Analytical Conditions

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

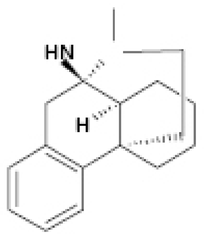
Column	Asymmetry
Shim-pack Arata C18	1.26
Typical ODS column	6.94

* 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.

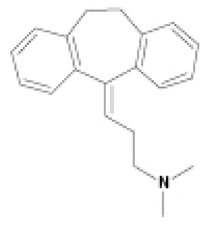
** Acetonitrile concentration was adjusted in order that the retention time of peptide on each column become similar.

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

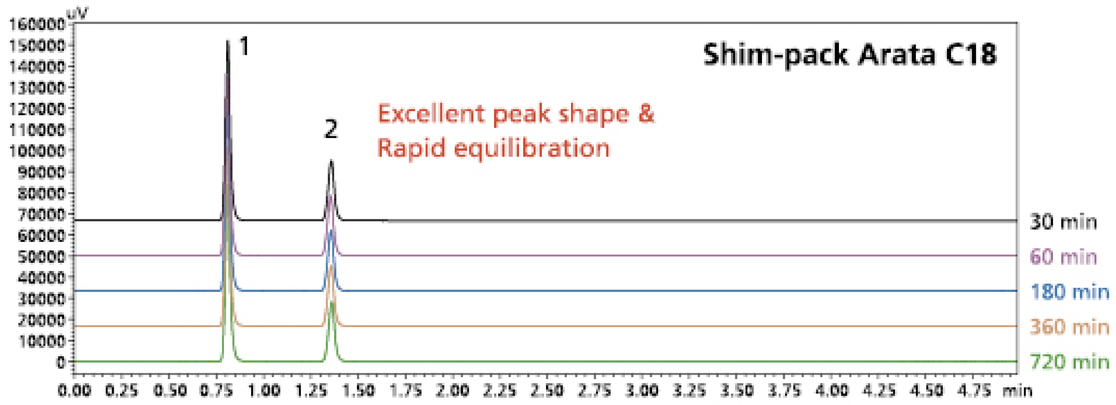
When analyzing basic compounds on a typical ODS column with low ionic strength acidic mobile phase, peak shape and long equilibration times are common problems. Shim-pack Arata LC columns can be rapidly equilibrated in low ionic strength acidic mobile phases yielding excellent peak shape and stable retention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



1. Dextromethorphan



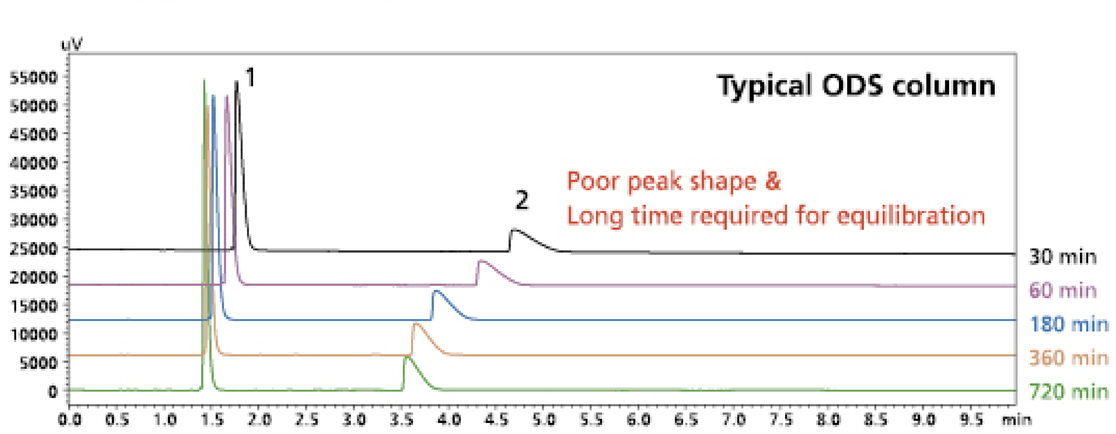
2. Amitriptyline



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

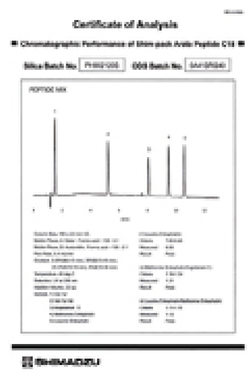
Shim-pack Arata Peptide Columns

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.

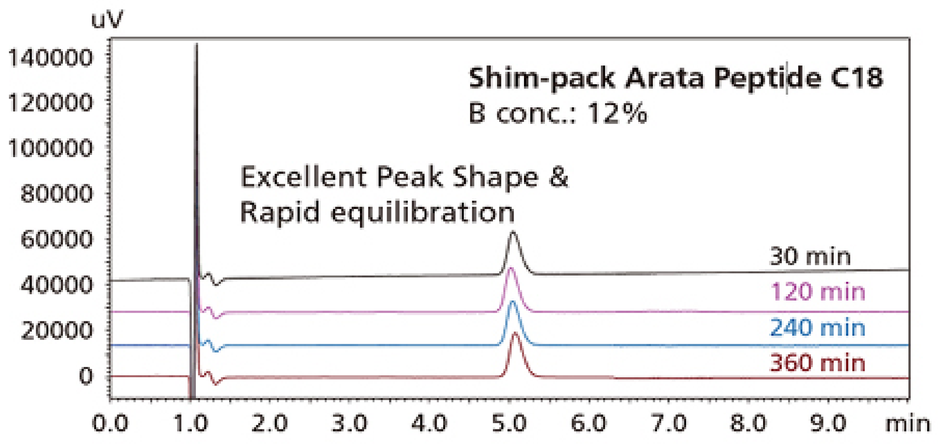
Increased Assurance of Peptide Analysis ~ Shim-pack Arata Peptide C 18 column ~

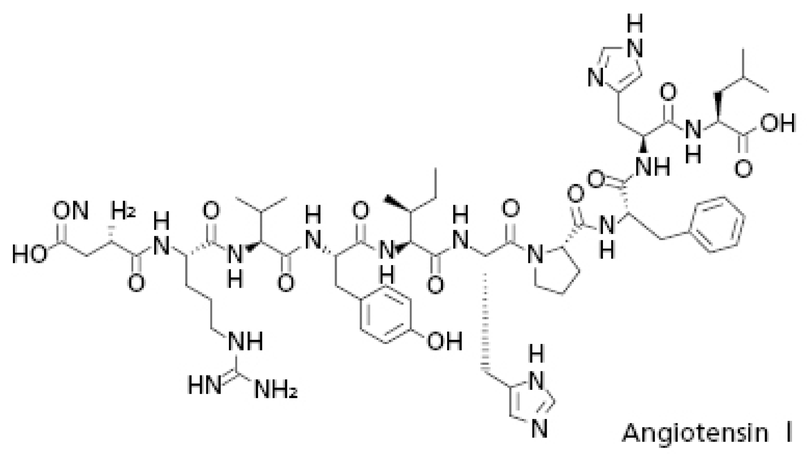
In order to ensure lot-to-lot reproducibility in peptide analysis, each lot of Shim-pack Arata Peptide C18material is tested using a mixture of peptide standards in addition to the standard Shim-pack Arata C18 lot QCtest. This test is carried out under severe condition using 0.1 % formic acid mobile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


Certificate of Analysis

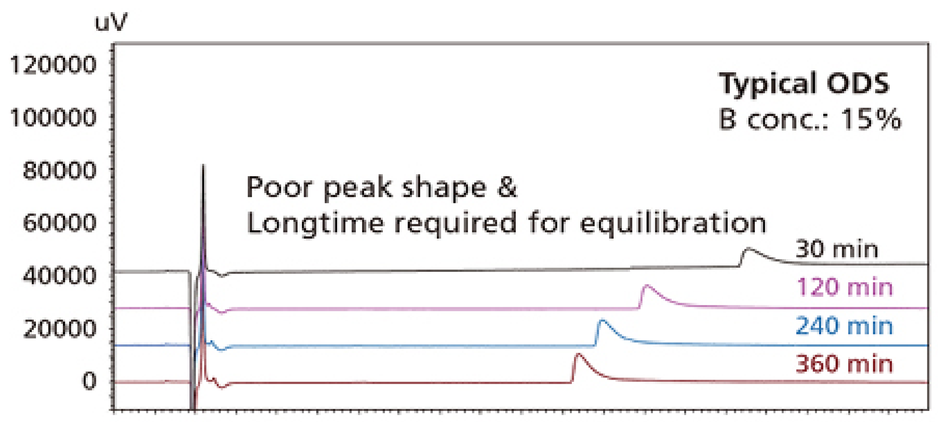
Excellent Seperation Performance of Peptides

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

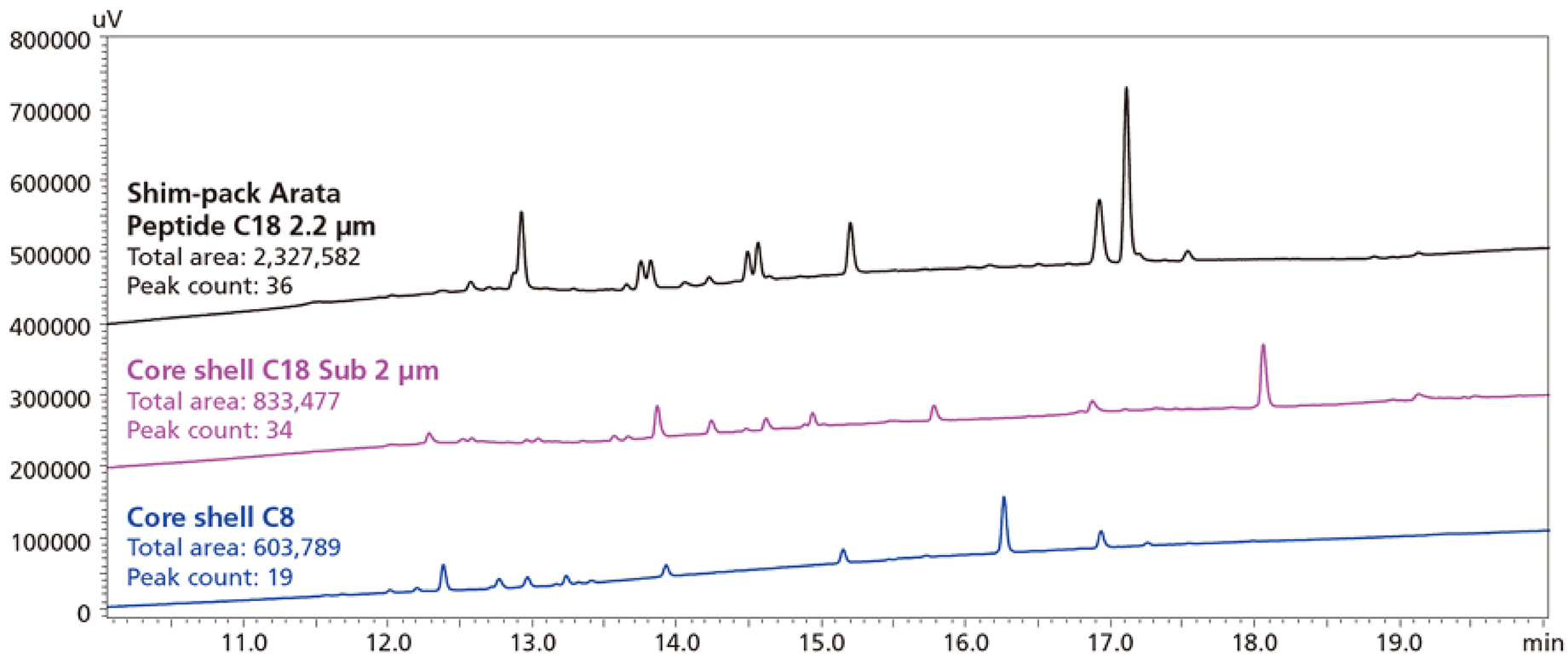
Both columns were new columns (shipping solvent: acetonitrile) and equilibrated with mobile phase without any conditioning. Angiotensin I was analyzed after a certain period of equilibration and retention time, symmetry factor and area of Angiotensin I were compared. The typical ODS showed poor peak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

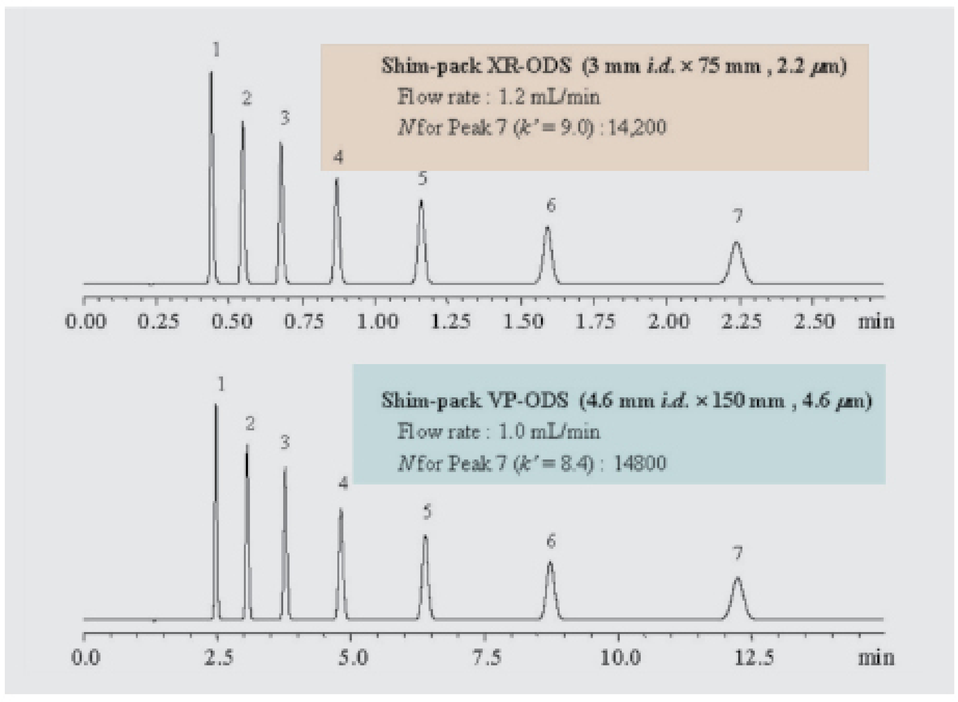
Shim-pack XR Series Columns Offer Versatility and Fast Analysis

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

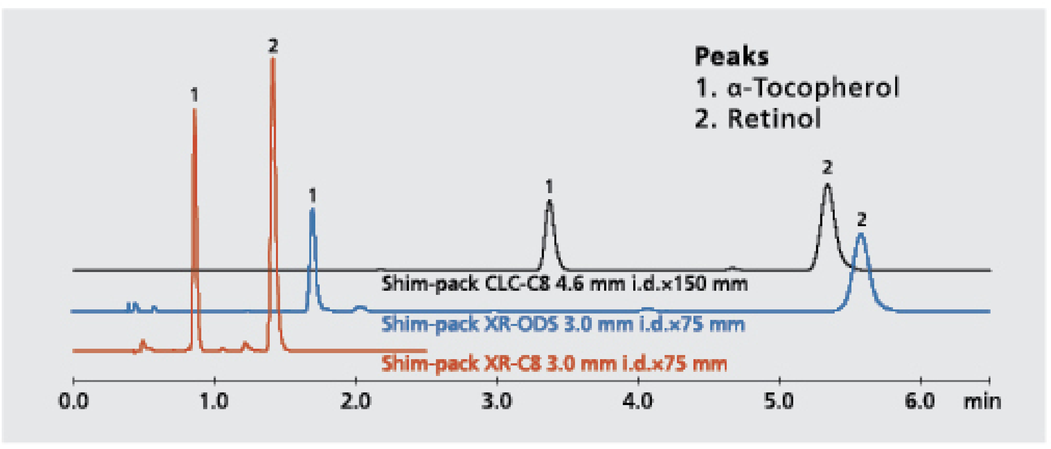
Shim-pack XR Series Comprehensive Product Range

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.

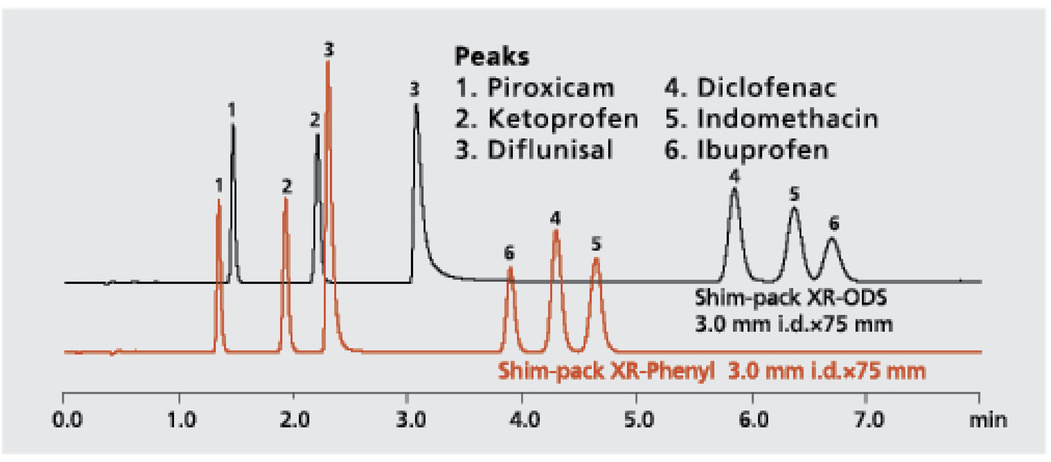


■ **Conditions**

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.

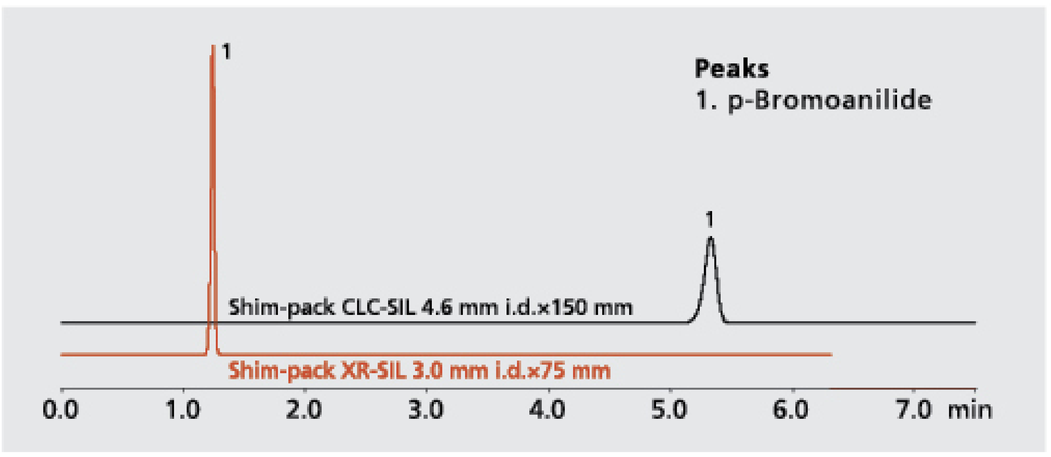


■ **Conditions**

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

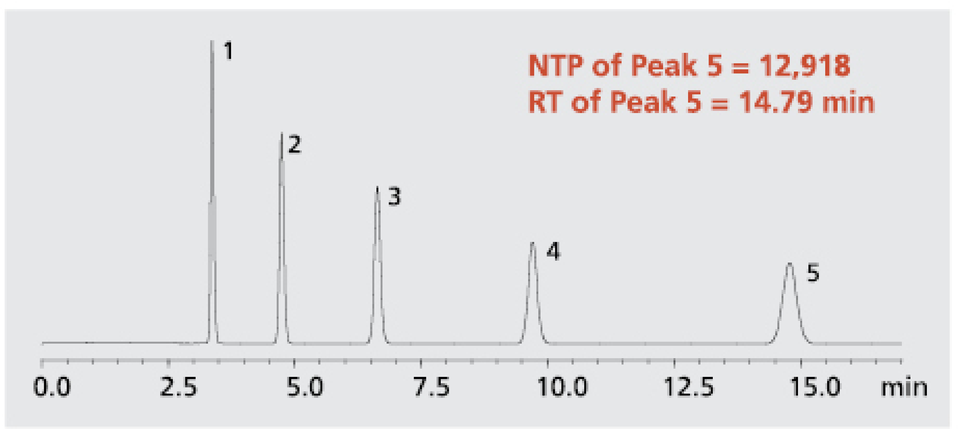
The Shim-pack XR-ODS II range includes a 1.5 mmI.D. model in addition to normal 2 mm and 3 mmI.D. columns. With an optimal flow rate of 0.2 to 0.3 mL/min, the 1.5 mmI.D. column offers the optimal flow rate for LC/MS and reduces mobile phase consumption.

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.

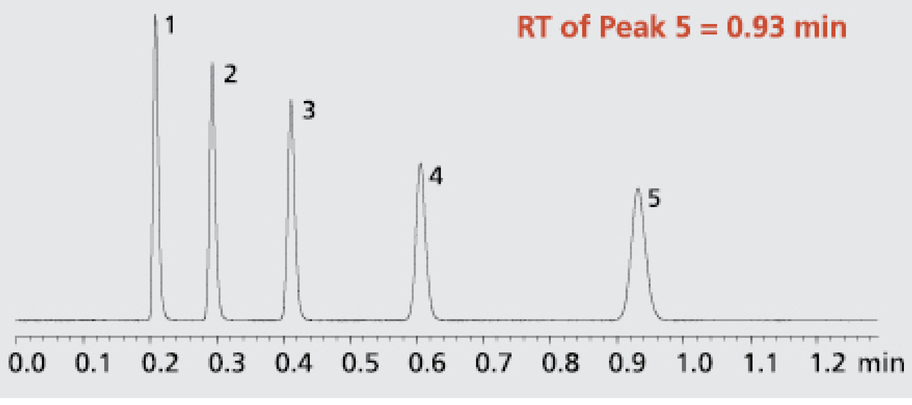
Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 5 µm, P/N: 228-34937-91)

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



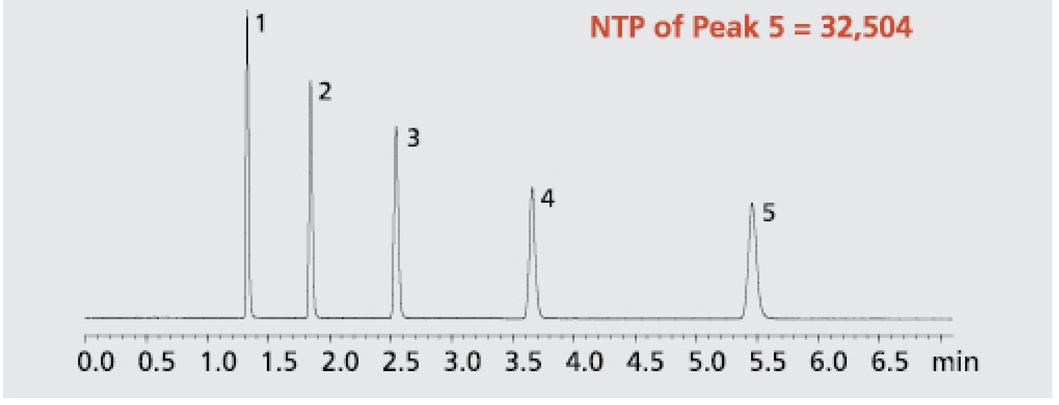
■ Conditions
Mobile Phase : 55 % Aqueous Acetonitrile Solution
Flow Rate : 1.0 mL/min
Col. Temp. : 40 °C
Injection Vol. : 5 µL

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



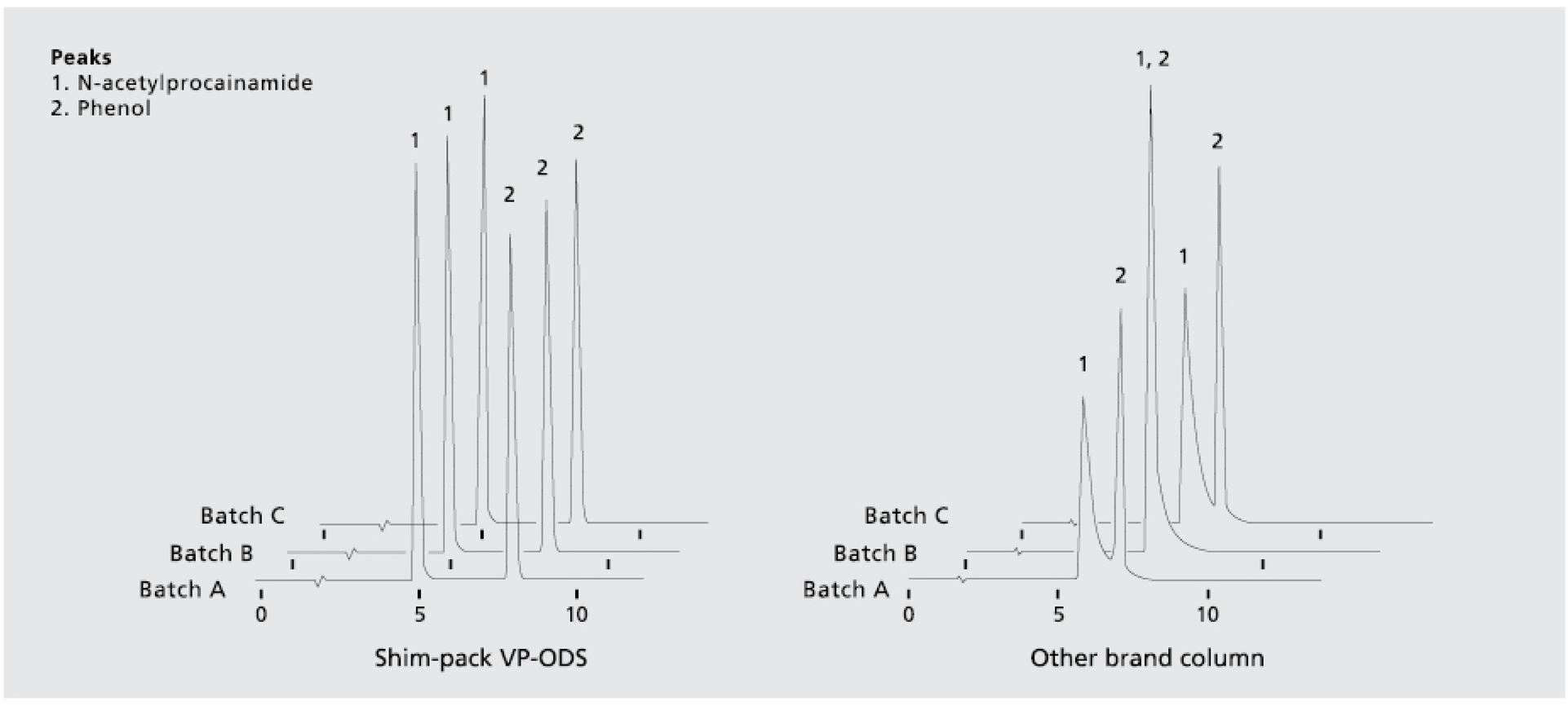
Shim-pack VP Series

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

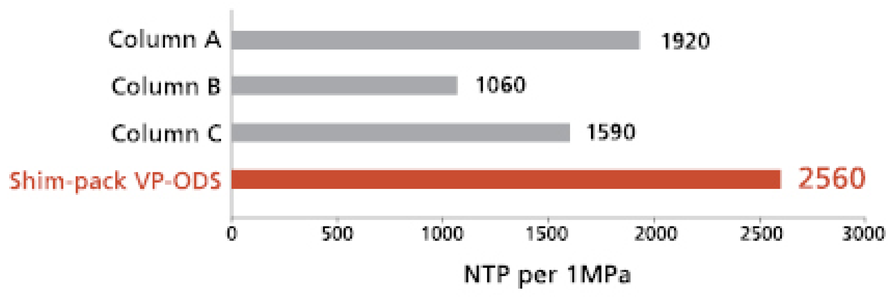
Shim-pack VP series ensures high column-to-column performance reproducibility, which is ideal for method development and validation. Silica-bases, surface treatment and packing procedures are subjected to a strict array of quality criteria tests and controlled respectively. Each column is delivered together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



Comparison of reproducibility between three batches of silica-based materials

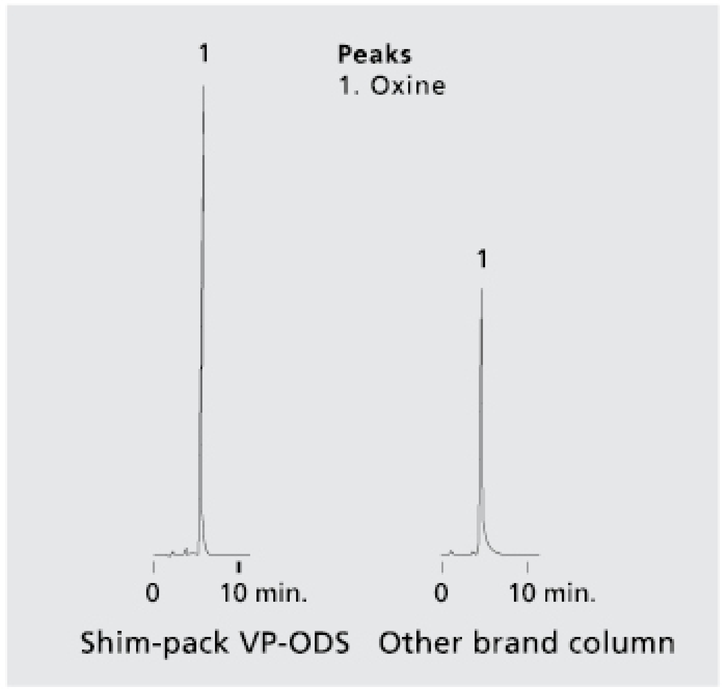
Balance of Column Efficiency and Column Backpressure

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.

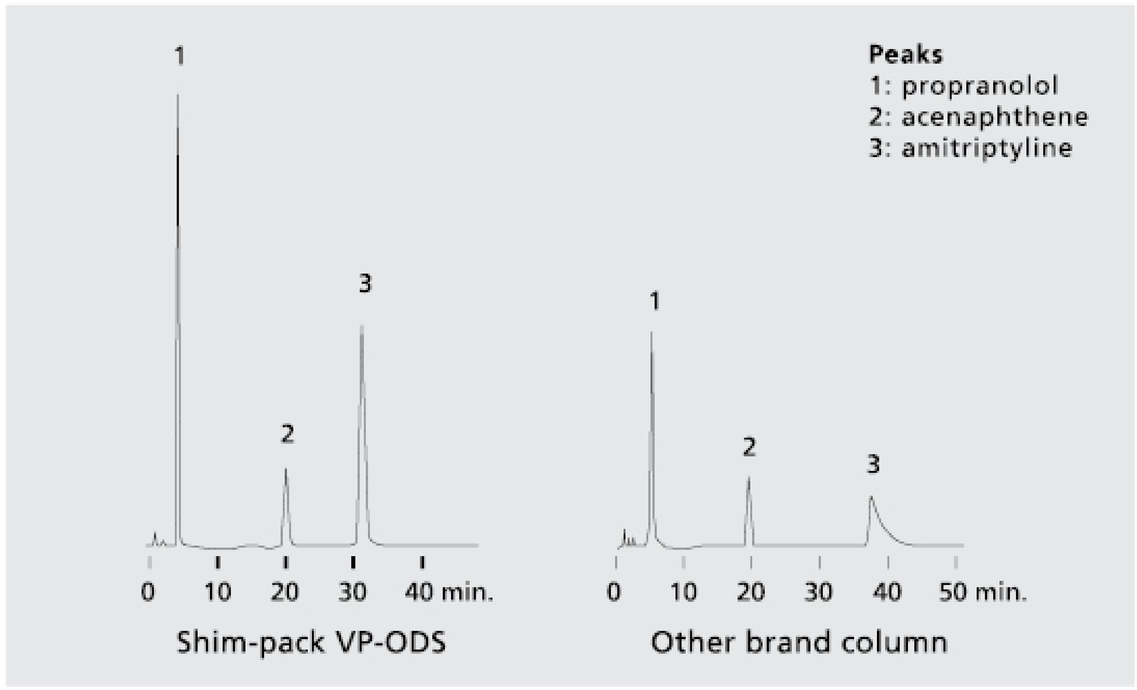


Column Size: 4.6 x 150 mm, Mobile Phase: Methanol/Water=70/30,
Flow Rate: 1.0 mL/min., Sample: Naphthalene

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

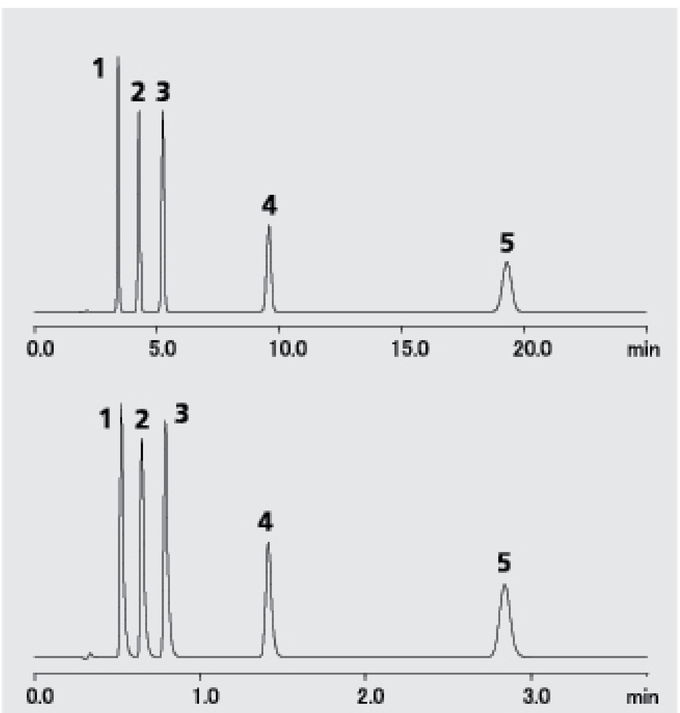
Smooth Transfer of Methods from High-Speed Analysis to Conventional Analysis

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)

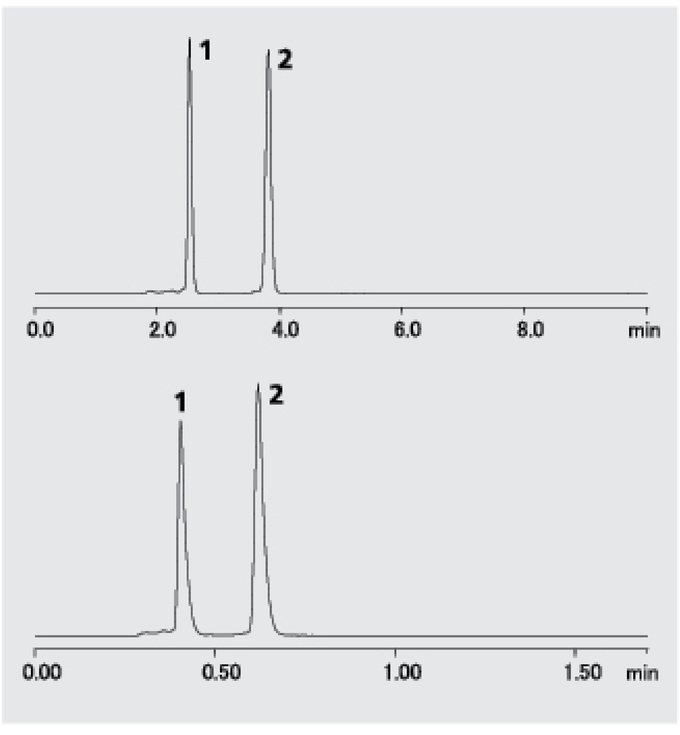
Mobile Phase : A) 0.1 % formic acid
B) Acetonitrile
A/B = 8/2 (v/v)

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)

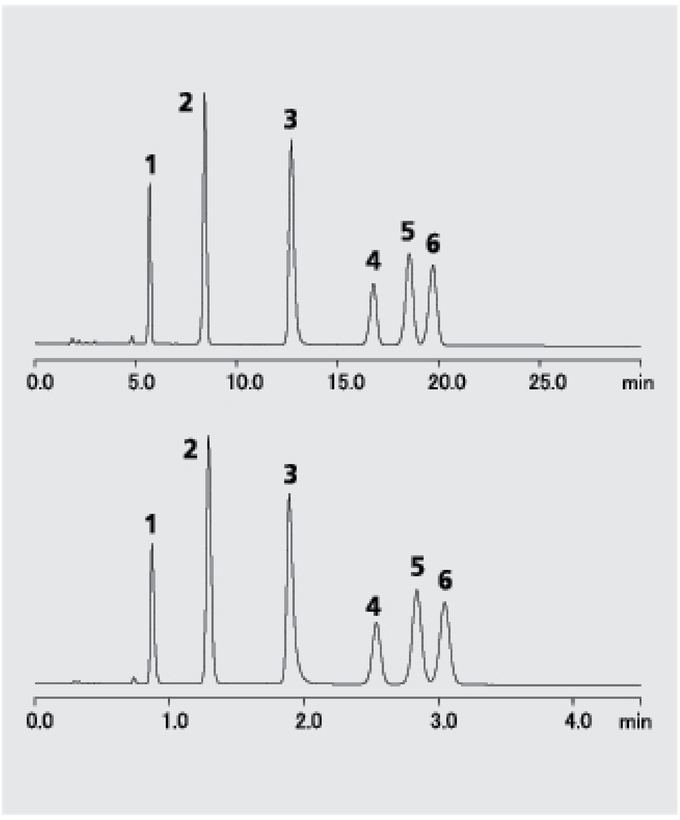
Mobile Phase : Methanol

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)

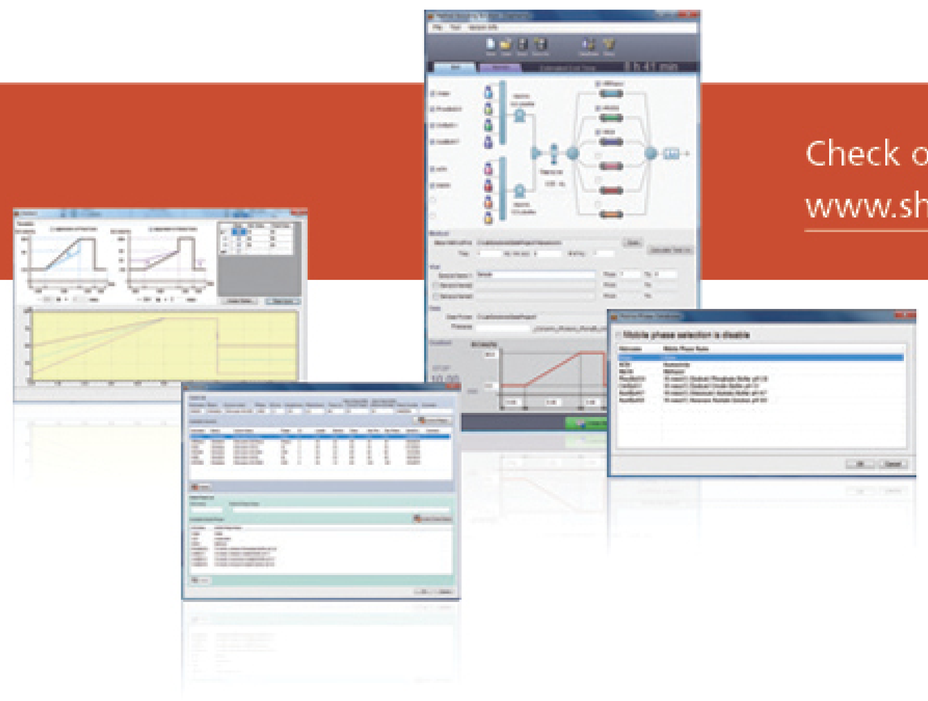
Mobile Phase : A) 20 mmol/L Phosphoric acid (Na) buffer (pH 2.5)
B) Acetonitrile
A/B = 3/7 (v/v)

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

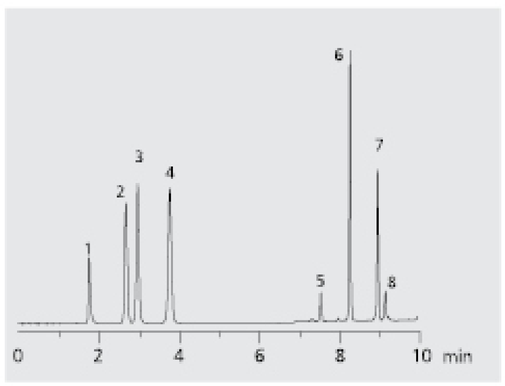
Shim-pack MAqC-ODS

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

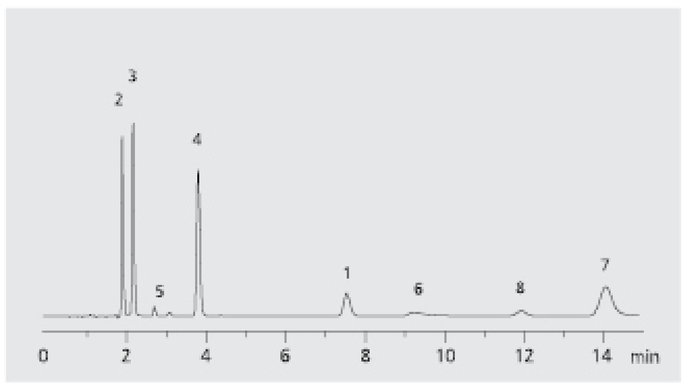


■ Peaks
1. Thiamine
2. Niacin
3. Nicotinamide
4. Pyridoxine
5. Ca Pantothenate
6. Folic acid
7. Riboflavin
8. Biotin

■ **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



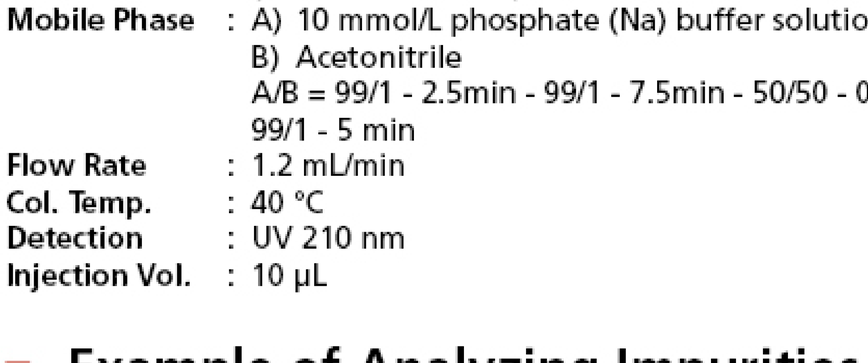
■ **Conditions**

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.

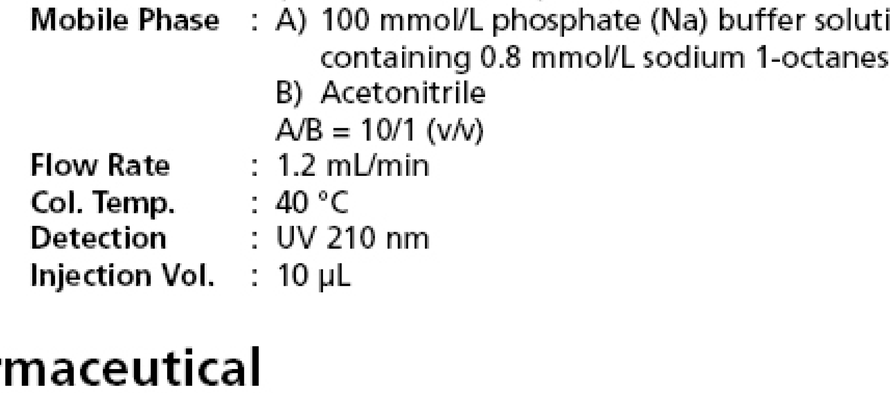
Shim-pack MAqC-ODS I



■ **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

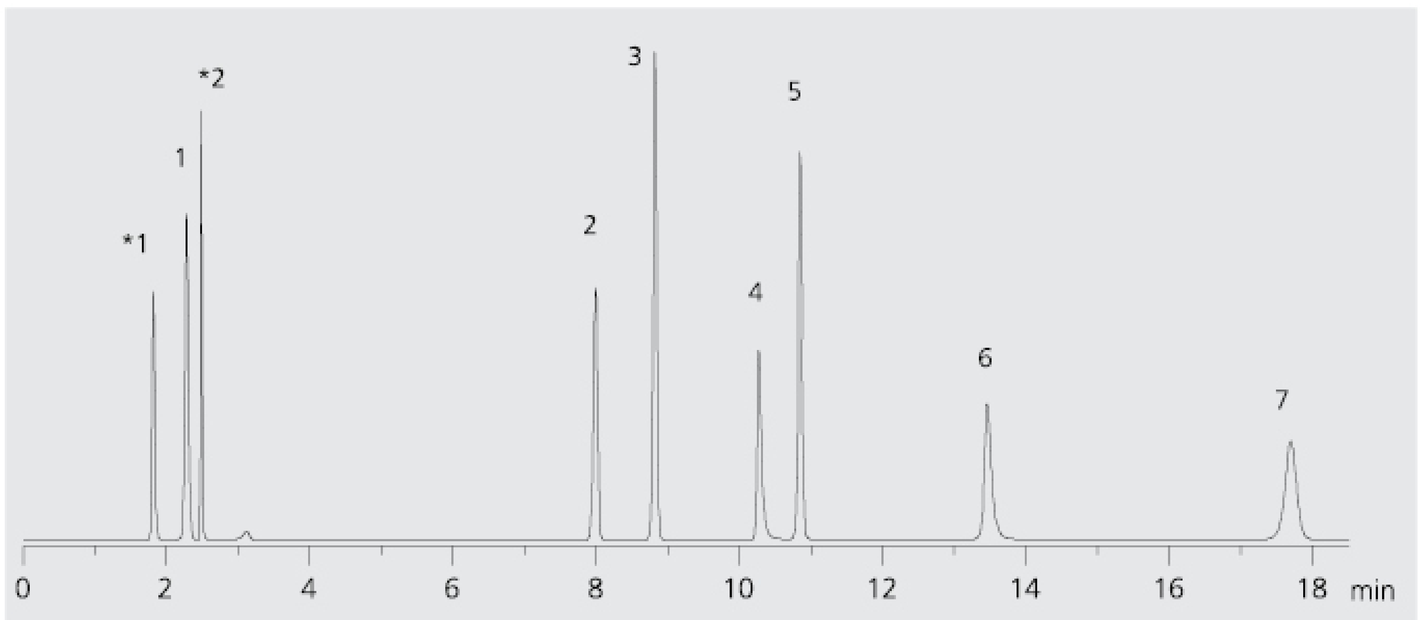


■ **Conditions**

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

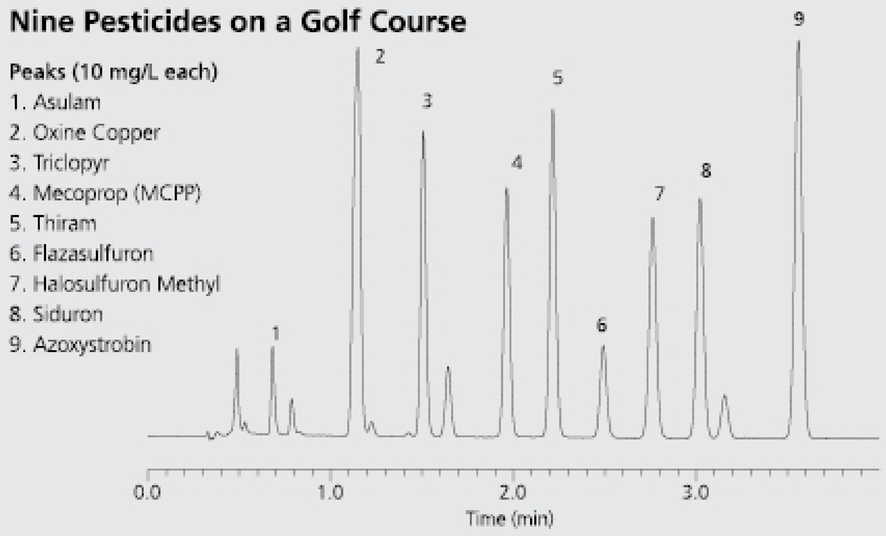
Shim-pack GIST C18 has superior inertness, which improves analysis precision and increases column durability. In addition, it can be used to analyze strong ionic compounds and difficult to absorb samples, which helps to obtain symmetrical peaks and high reproducibility.

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

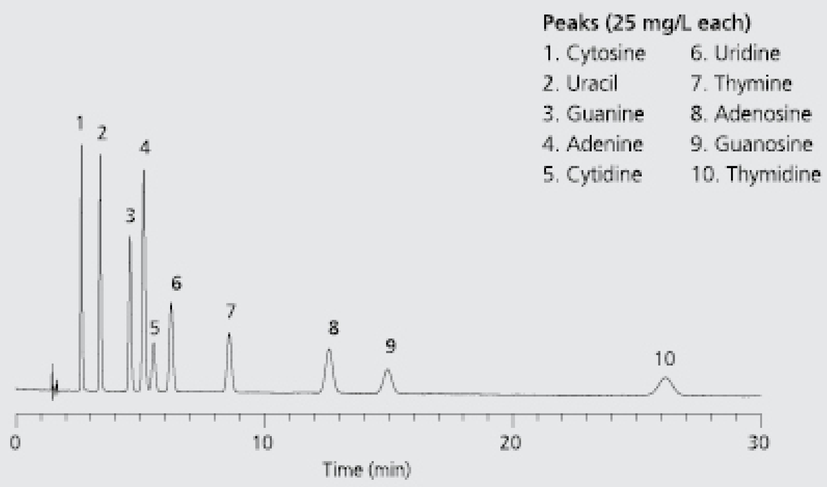
Nine Pesticides on a Golf Course



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

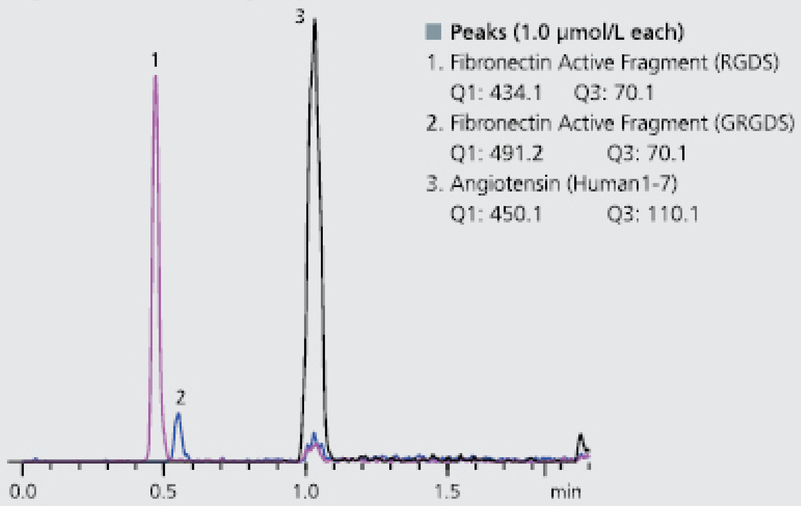
Shim-pack GIST C18-AQ achieves strong retention of hydrophilic highly polar compounds compared to general C18 columns, while maintaining high inertness and durability in highly or 100% aqueous mobile phases.

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

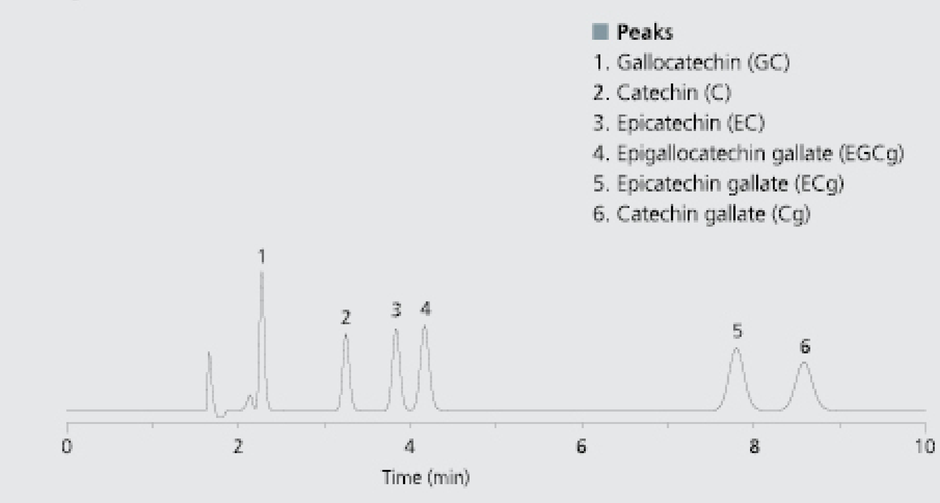
Analysis Examples

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

Cartridge Guard Columns

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

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

Analytical Columns (High-Pressure Series)

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

Cartridge Guard Columns (High-Pressure Series)

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

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

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

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

Shim-pack GISS C18

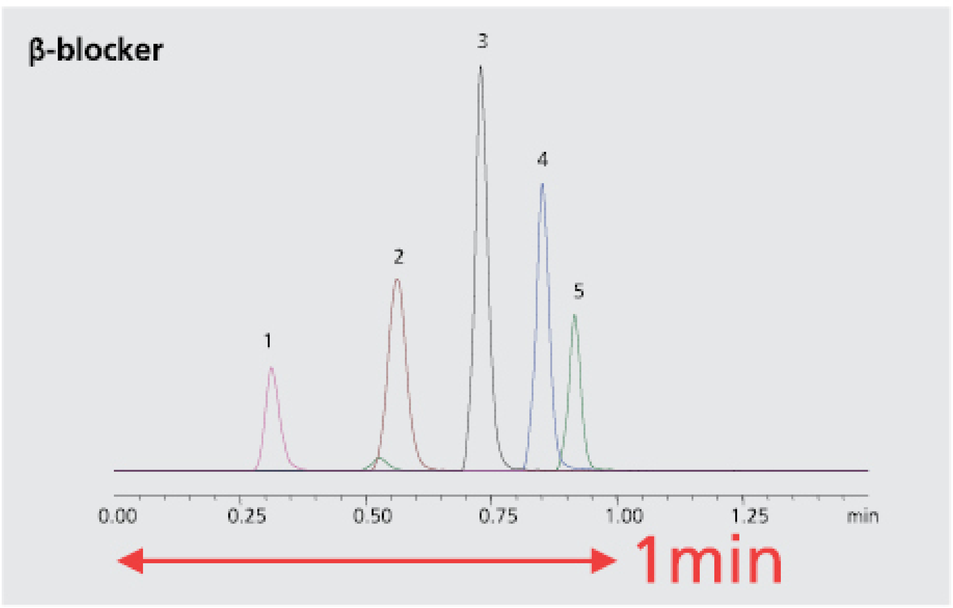
Ideal for Rapid Analysis

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

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

Bonded Phase	Octadecyl Groups
Particle Size	1.9 µm, 3 µm, 5 µm
Pore Size	20 nm
Surface Area	200 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

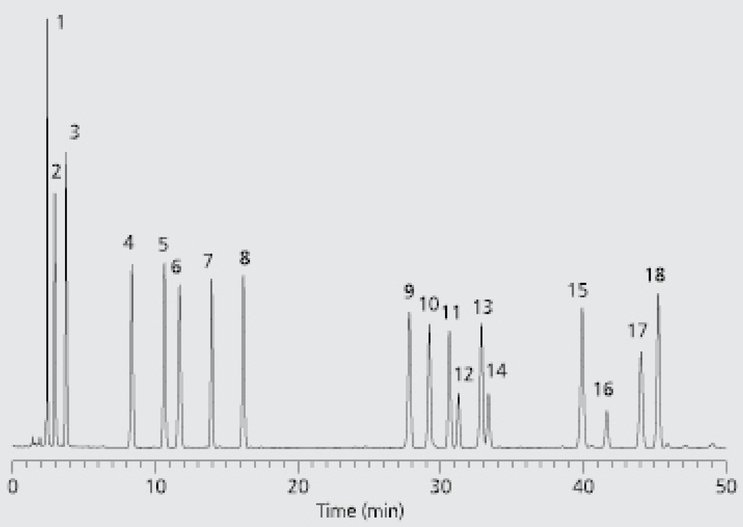
Widely used octadecyl bonded silica gel enables the Shim-pack GIS C18 to have strong hydrophobic interaction and low absorption of ionic compounds. In addition, highly uniform particles ensure stable mobile phase delivery and outstanding low pressure.

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.

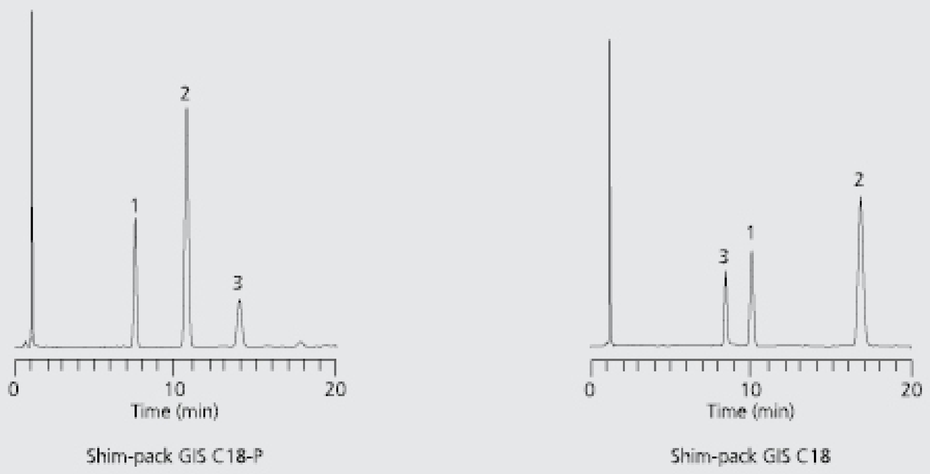
Shim-pack GIS C18-P is also ideal for the HPLC analysis of 16 PAH compounds listed as target pollutants by the U.S. EPA.

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

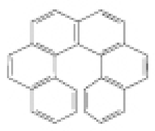
Due to increased retention of planar structural compounds, Shim-pack GIS C18-P shows different selectivity compared to Shim-pack GIS C18.

Analysis of Planar and Non-planar Compounds

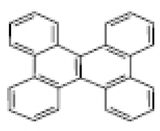


Peaks

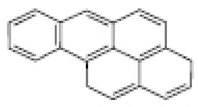
1. Phenanthro[3,4-c]phenanthrene (PhPh)



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

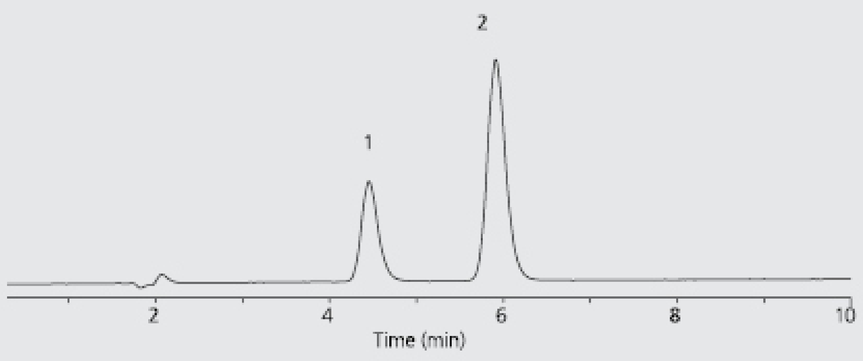
Shim-pack GIS RP-Shield contains a polar functional group embedded between silica surface and an octadecyl group, making it stable in 100% aqueous mobile phases without phase collapse. The embedded polar functional group is also extremely base deactivated, which enables the column to provide superior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

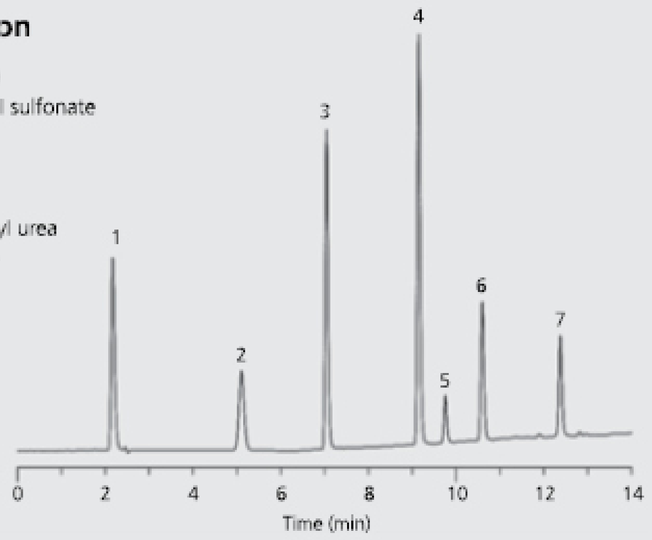
Shim-pack GWS series is an ideal choice for cost control.

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

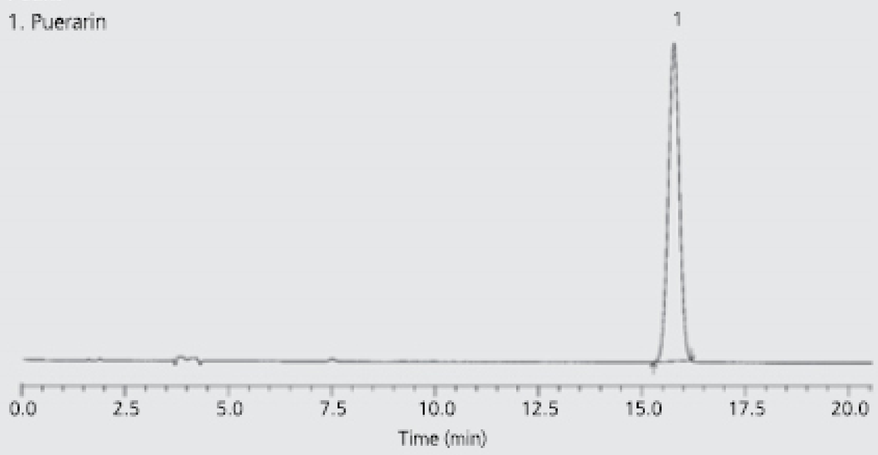


Conditions

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

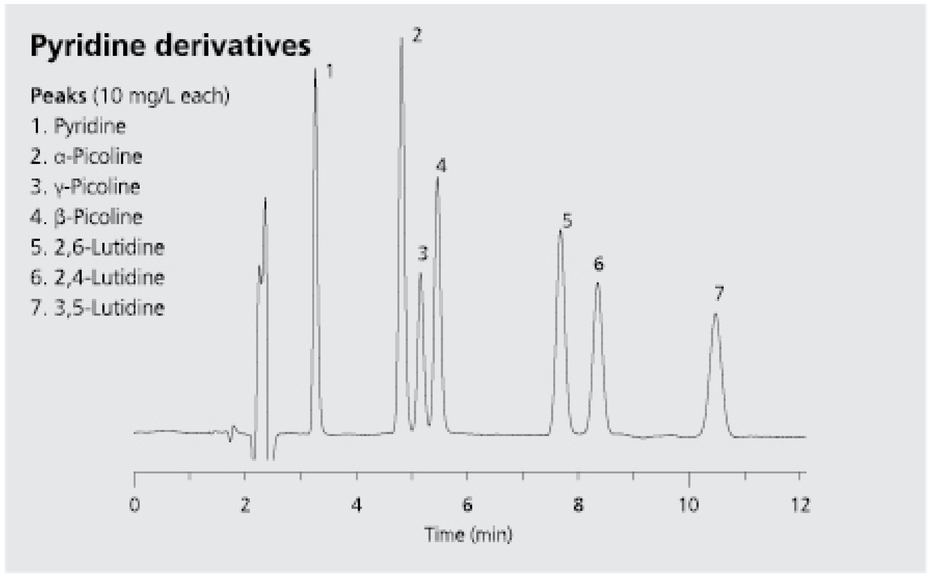
Shim-pack GIST C8 is packed with high-purity porous spherical silica for delivering the same extreme inertness to elute either basic or acidic compounds without undesired adsorption. Low retentivity and no sample adsorption enable analysis of natural samples.

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

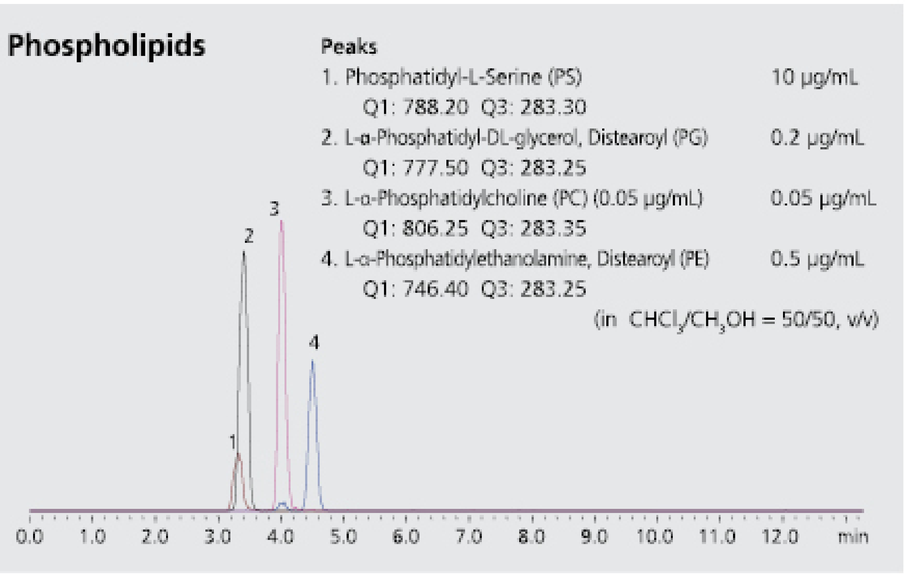
Pyridine derivatives



■ **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

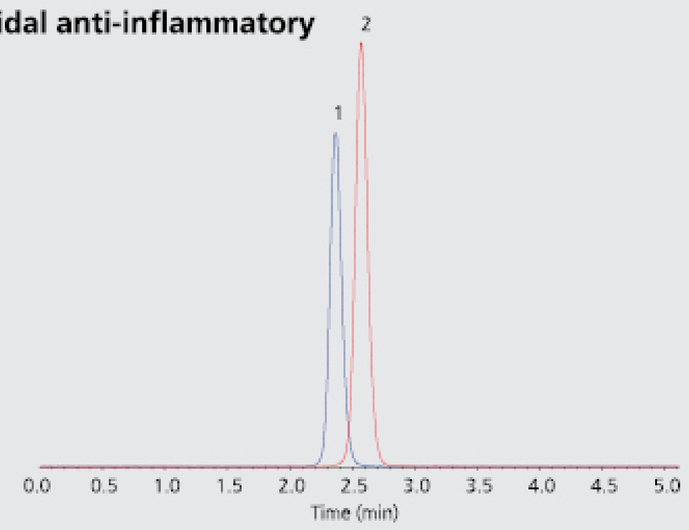
The extremely unique phase characteristics of Shim-pack GIST Phenyl are critical to resolving compounds that could not be separated with a C18 or C8 phase column.

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.

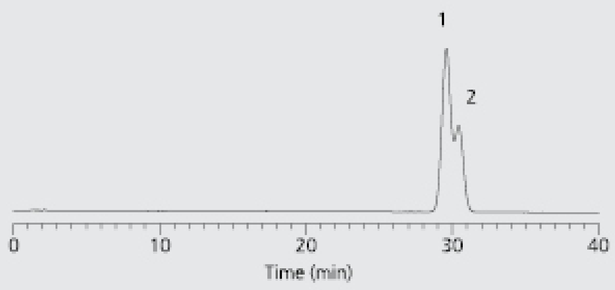
Bonded Phase	Phenylhexyl Groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m²/g
Carbon Loading	9 %
End-capping	Yes
pH Range	1 to 10
USP Code	L11

Analysis Examples

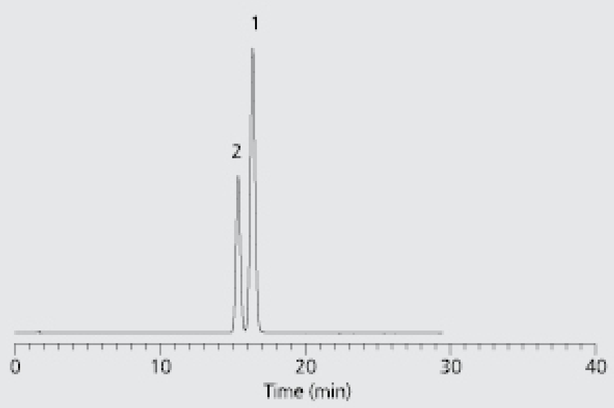
Different Selectivity to Shim-pack GIST C18

Analysis of Analgesic Drugs

■ Peaks
1. Indomethacin
2. Ibuprofen



Shim-pack GIST C18



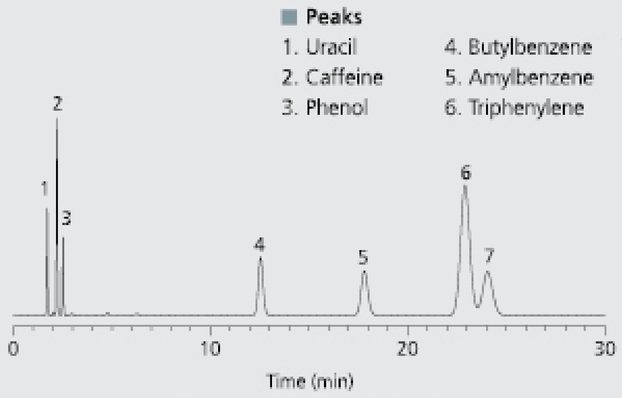
Shim-pack GIST Phenyl-Hexyl

■ 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

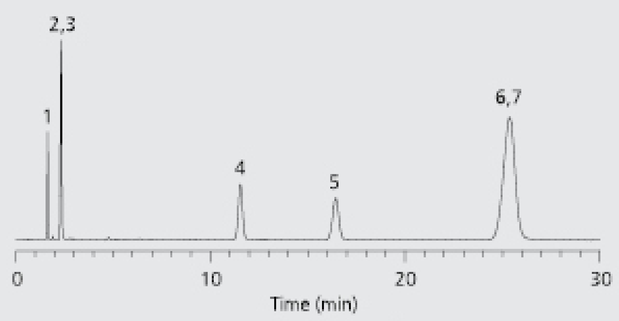
Stronger Retentivity Than Other Phenyl Phase

Analysis of Samples for Column Selectivity

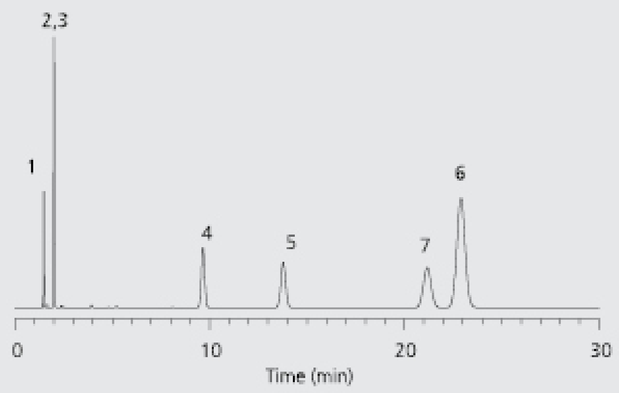
■ Peaks
1. Uracil
2. Caffeine
3. Phenol
4. Butylbenzene
5. Amylbenzene
6. Triphenylene
7. o-Terphenyl



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

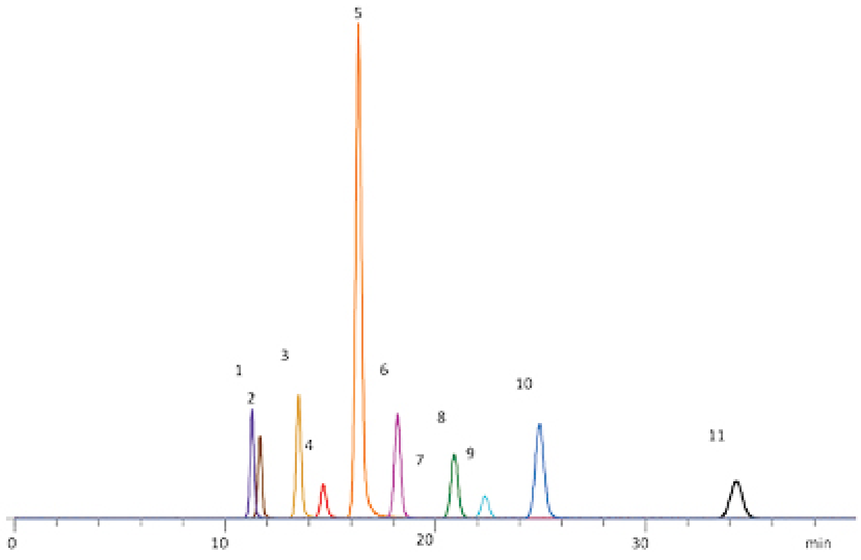
Different from other Shim-pack Series PFPP (pentafluorophenylpropyl) columns, this PFPP column is end-capped so it provides a different selectivity. Durability is a challenge for PFPP columns. However, Shim-pack GIST PFPP provides both high durability, which is a characteristic of the Shim-pack GIST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

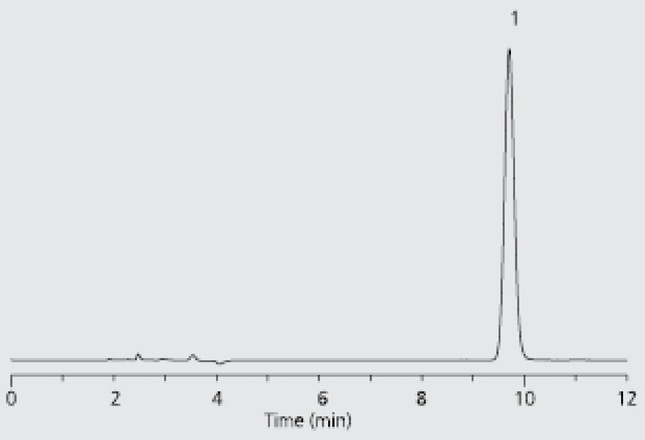
Shim-pack GIS HILIC is designed for Hydrophilic Interaction Liquid Chromatography (HILIC). It is chemically bonded with a diol group, which provides excellent peak shape for basic and neutral polar compounds.

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

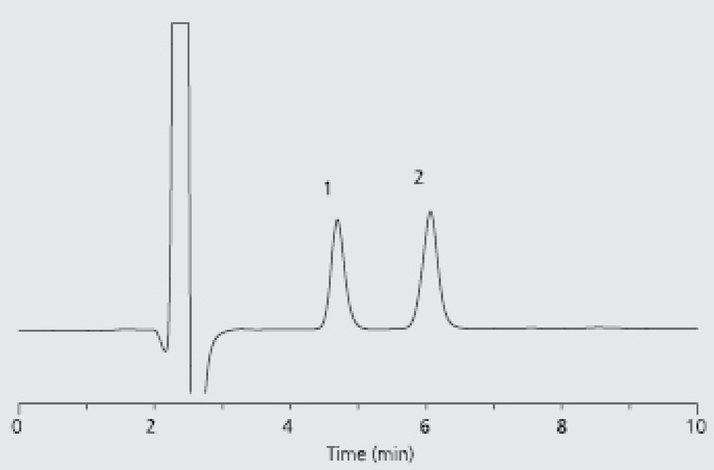


Peaks
1. Allantoin

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

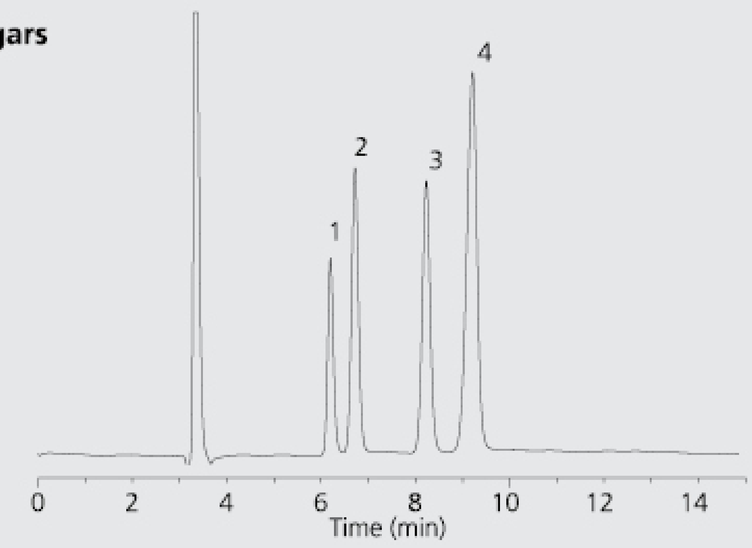
Ideal for Sugar Analysis

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

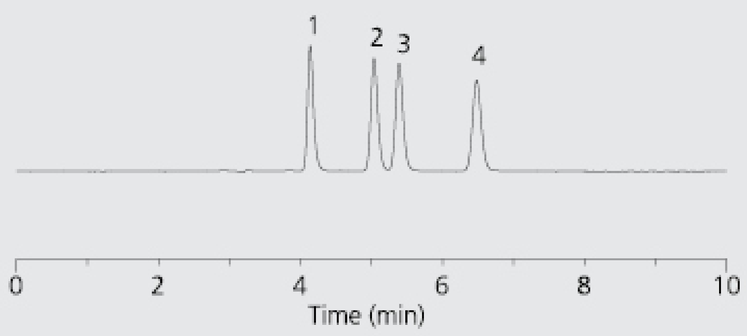


Peaks
1. Fructose
2. Glucose
3. Sucrose
4. Maltose

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

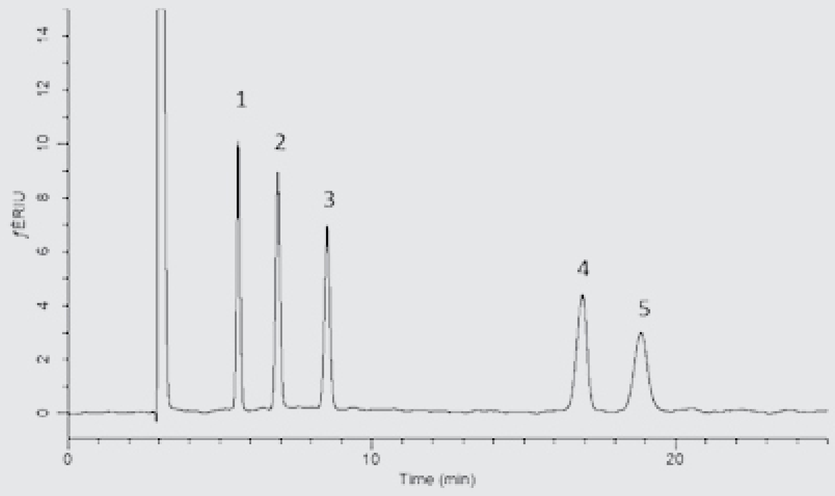
This is the amide type HILIC column in the Shim-pack Series. It shows stronger retention of polar compounds than other HILIC columns such as unmodified silica and Diol type and it provides a different selectivity. It is also highly durable, which is a characteristic of the Shim-pack GIST Series.

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

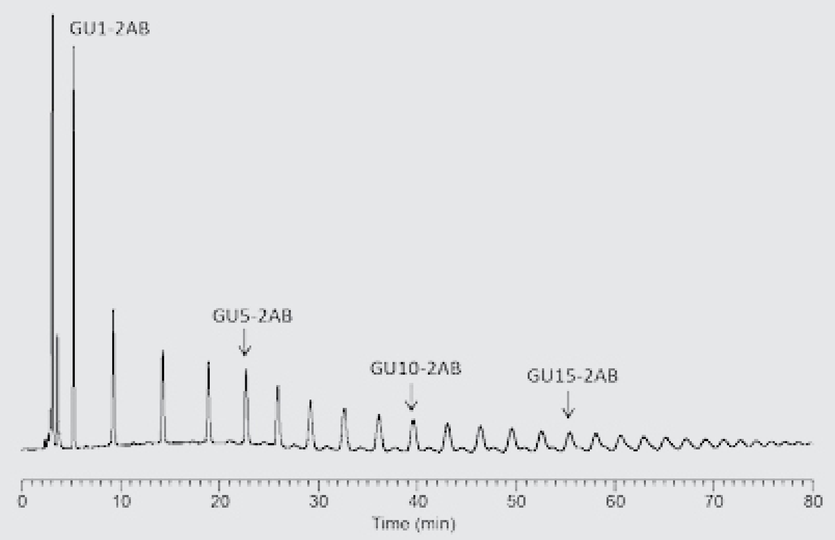
Analysis of Sugar Alcohol



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

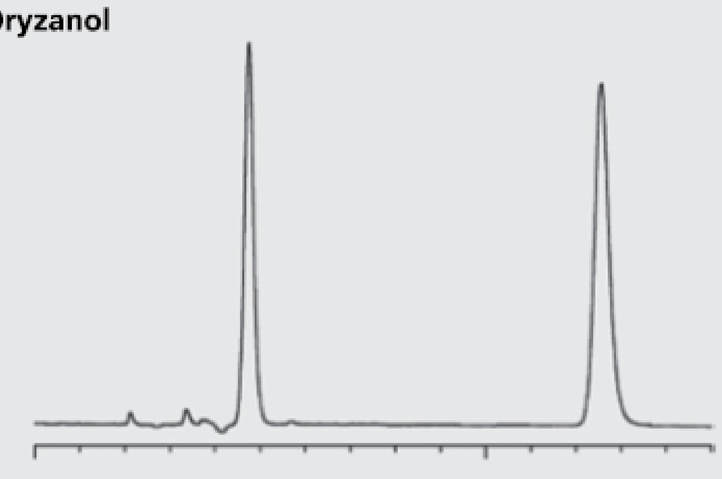
Shim-pack GIS CN is capable of either normal phase or reversed phase analysis. Cyanopropryl groups bonded to silica gel with high density increases the difference recognition of hydrophilicity and the stability. Due to no end-capping, it is capable of analysis utilizing cyano group characteristics.

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

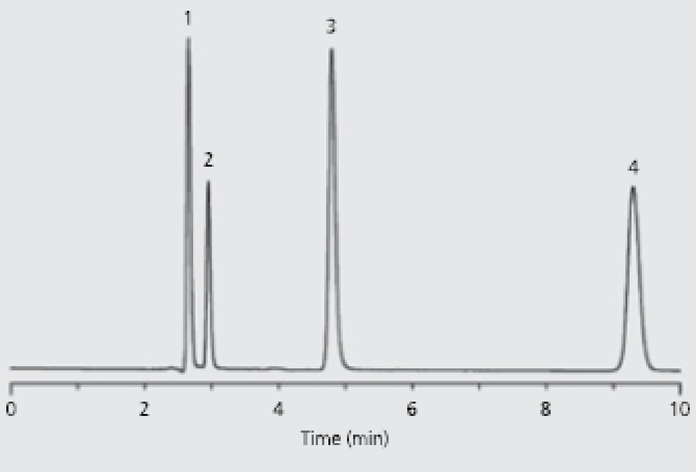


Peaks
1. gamma-oryzanol
2. vanillin

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.

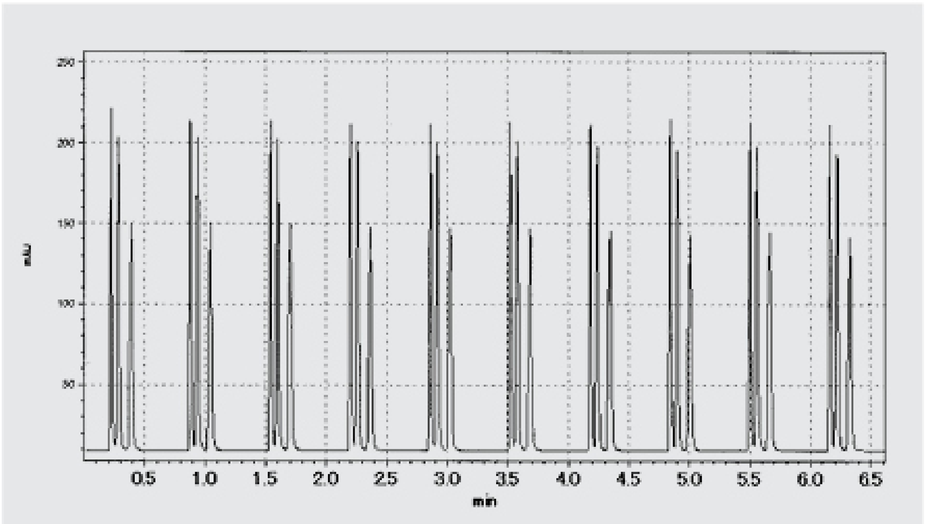
Particle Size	3 µm
Pore Size	12 nm
Surface Area	315 m²/g
Carbon Loading	18%
Pressure Tolerance	20 MPa
Pore Volume	1 mL/g
End-capping	Yes
Bonding Type	Monomeric
pH Range	1.5 - 9
USP Code	L1

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

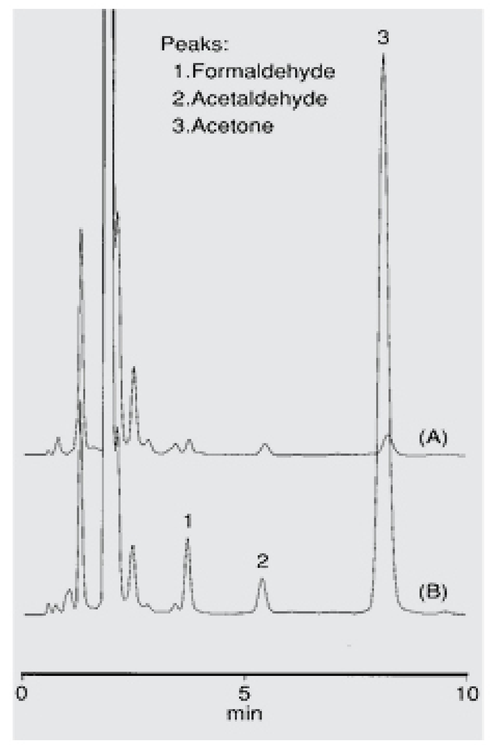
High-speed analysis of 2,4-DNPH derivatized aldehydes / ketones



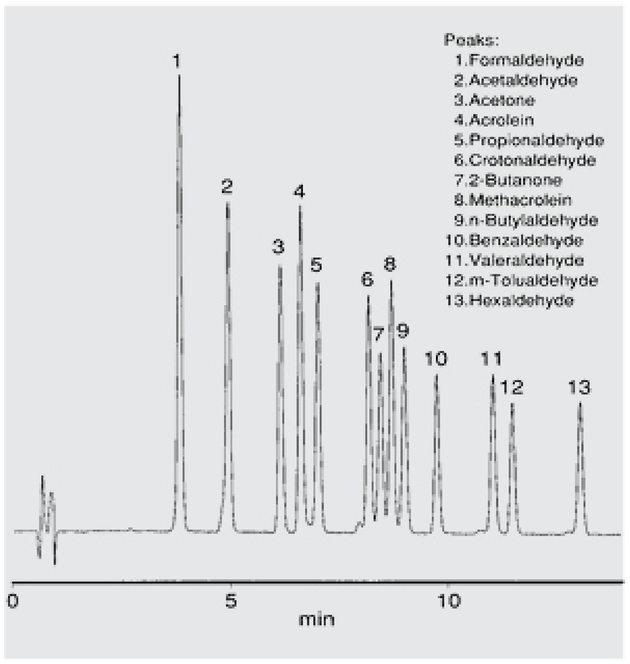
Chromatogram of Standard Sample
(formaldehyde 0.35µg/mL, acetaldehyde 0.55µg/mL, 10µL injected)

■ **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



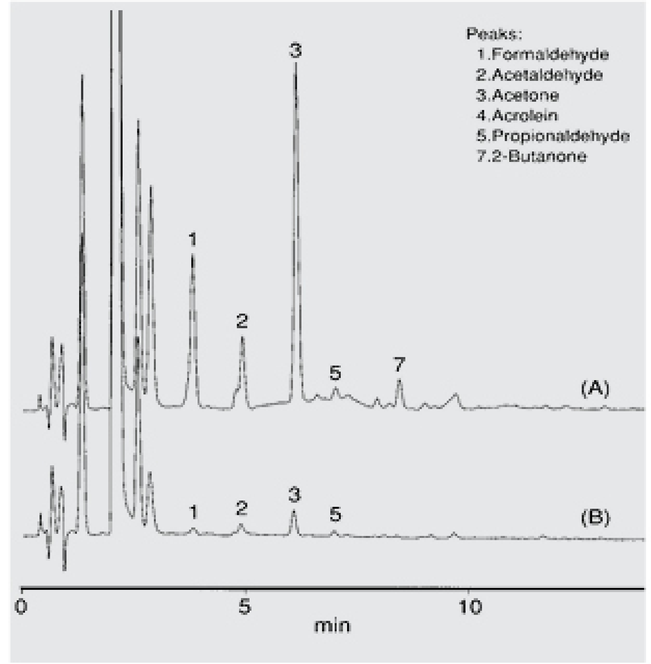
Chromatograms of Environmental Air (A) and Indoor Air at Laboratory (B)



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

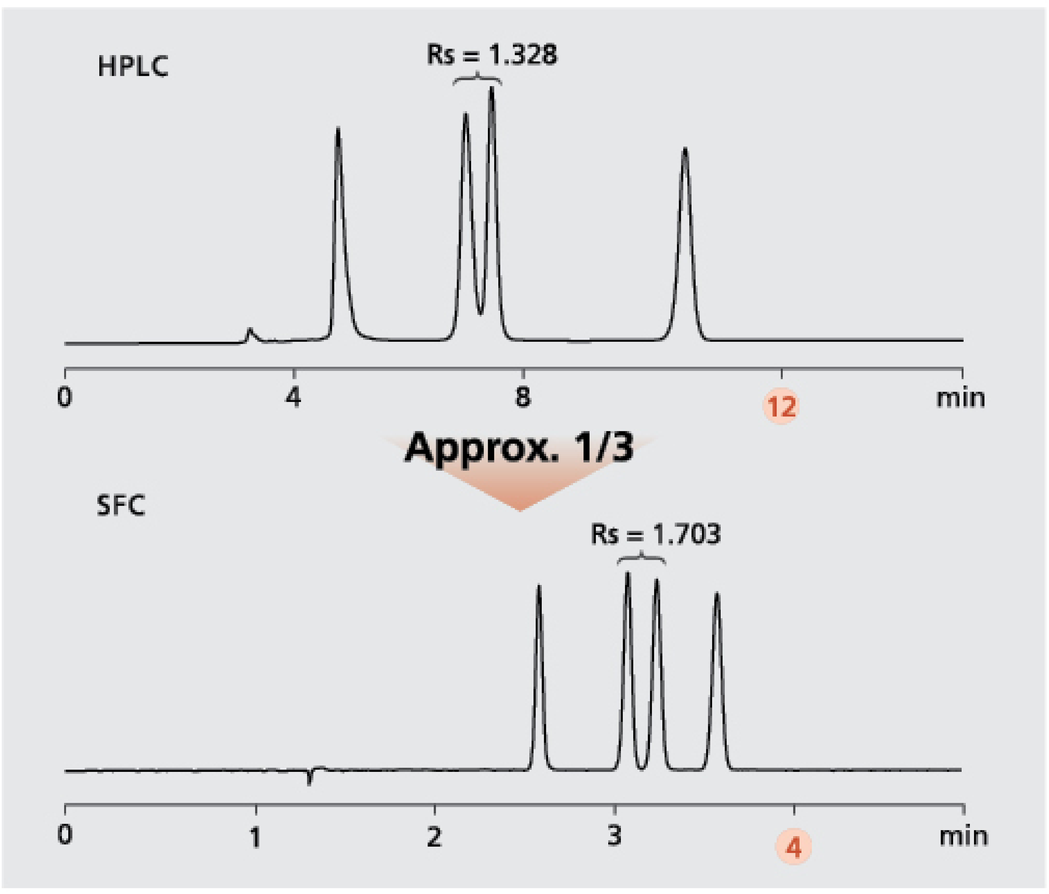
Column	Particle Size (µm)	I.D. (mm) / Length (mm)	30	50
Shim-pack GIS C18	5	50	227-30110-01	-
		100	227-30110-02	-
		150	227-30110-03	-
		250	227-30110-04	227-30110-05
	10	50	227-30116-01	-
		100	227-30116-02	-
		150	227-30116-03	-
		250	227-30116-04	227-30116-05
└ Guard Column	5	50*	227-30142-01	227-30143-01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

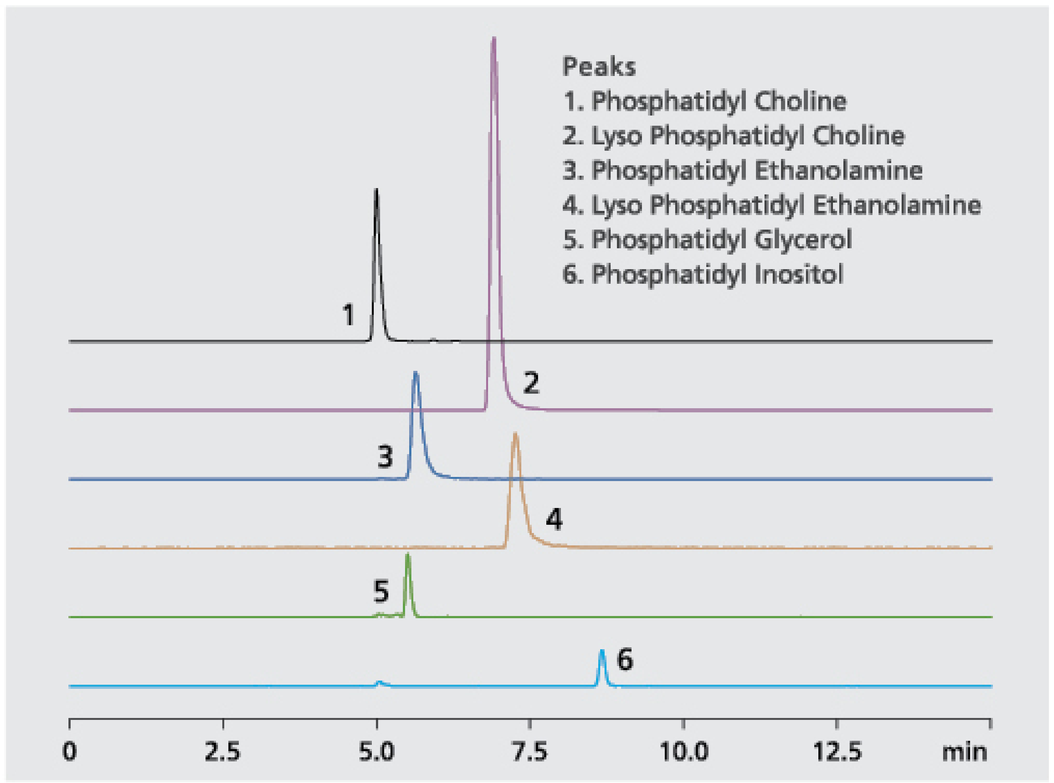
Tocopherol Isomers

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

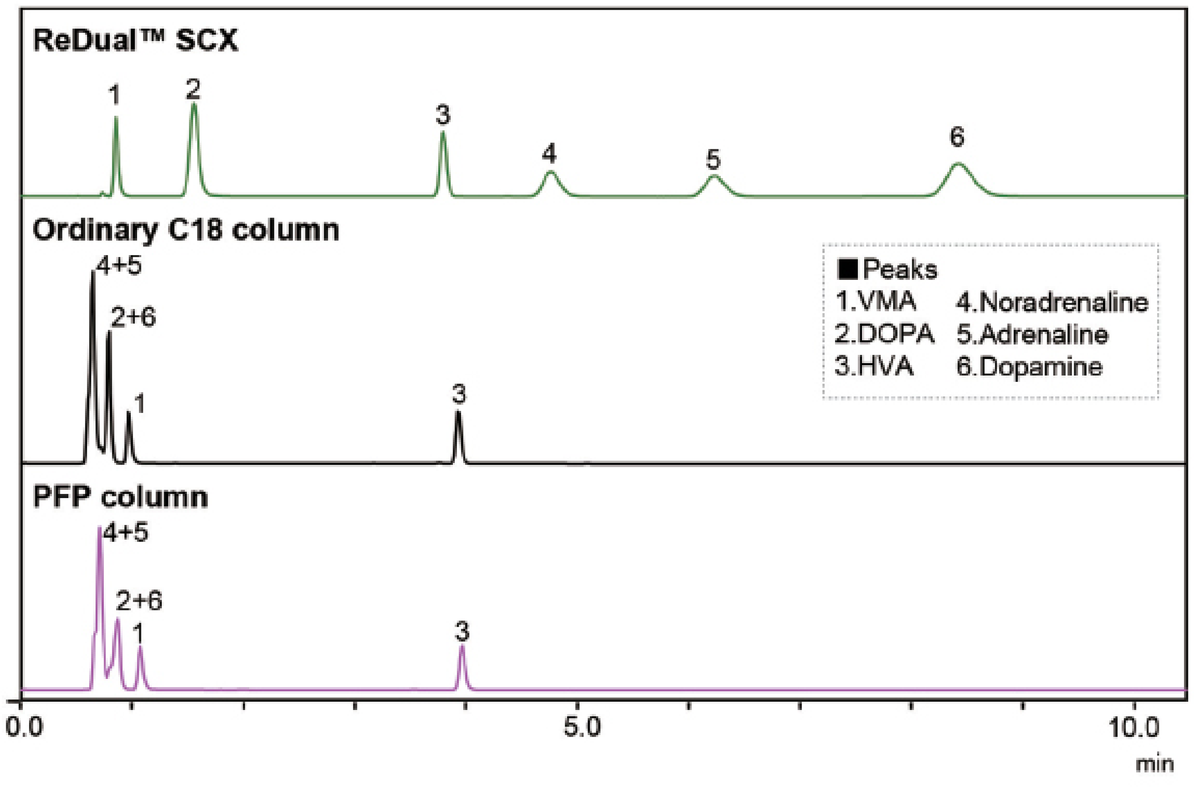
Column	Particle Size (µm)	I.D (mm)	Length (mm)	Guard Column
			250	
STR ODS-II	5	20.0	226-80087-01	226-80088-91 (50 x 20.0 mm)

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

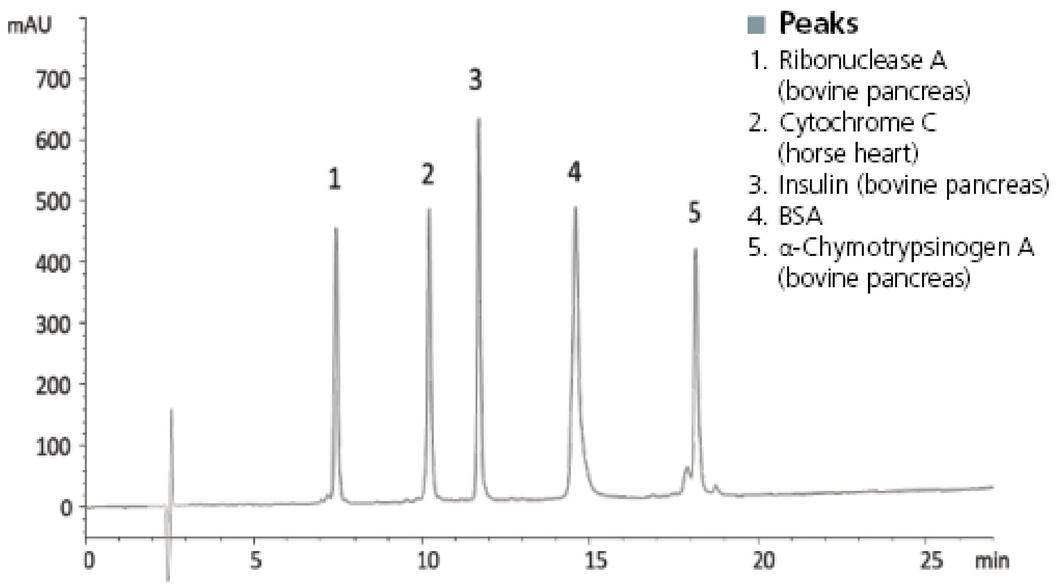
Design for biomolecules separations

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

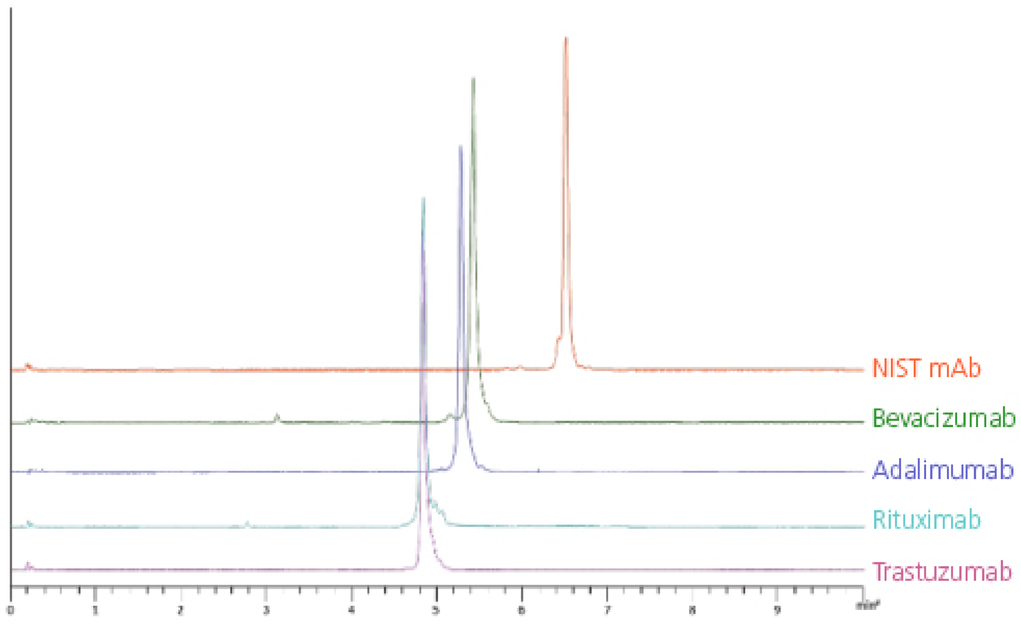
Analysis of Proteins



■ 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