C190-E206F

SHIMADZU
Excellence in Science

High Performance Liquid Chromatography Columns

Shim-pack HPLC Column Guidebook

CoreFocus

Shimadzu Liquid Chromatographs

Nexera X3 model

Nexera X3 is Shimadzu's new flagship UHPLC model. Nexera X3 excels in high throughput environments requiring fast separations. The system easily handles small ID UHPLC columns with sub-2 micron particles for high efficiency chromatography. Five minute run times are the norm.

Utilizing Analytical Intelligence (AI) technologies, and featuring the most advanced performance features available, the Nexera X3 will transform your workflows for maximum reliability, uptime, and efficiency.

Nexera XS model

Nexera XS excels at fast separations, easily handling small ID UHPLC columns with sub-2 micron particles or the popular SPP phases for high efficiency and lower back pressure. A common XS configuration may have a 4-channel solvent selection valve on each pump providing versatility for method development. Five to ten minute run times are the norm.

Nexera XR model

Nexera XR is perfect for fast separations using the popular SPP column phases for high efficiency and lower back pressure. This system offers a rugged and forgiving UHPLC workflow. Five to ten minute separations are the norm.

Common Features:

- Automated support functions utilizing digital technology, such as M2M, IoT, and Artificial Intelligence (AI), that enable higher productivity and maximum reliability.
- Allows a system to monitor and diagnose itself, handle any issues during data acquisition without user input, and automatically behave as if it were operated by an expert.
- Supports the acquisition of high quality, reproducible data regardless of an operator's skill level for both routine and demanding applications.

ANALYTICAL INTELLIGENCE

Liquid Chromatograph Mass Spectrometer

LCMS-2050

LCMS-2050

The LCMS-2050 provides both high speed and high sensitivity analysis even in a small design. We have achieved the utmost in both miniaturization and high performance with Shimadzu's technology cultivated over many years of MS development. A single platform, a single solution for LC detection, the LCMS-2050 has the power to deliver better results with incredible simplicity and unparalleled robustness. It may be small but the design and capability of the new single quadrupole LC/MS will change the productivity of any analytical laboratory.

3-10 µm > 3-4.6 mm i.d. 2.7-5 µm 3-4.6 mm i.d.	1.9-3 µm 2.1-3 mm i.d. 2.7 µm 2.1-3 mm i.d.	< 2 µm 2.1 mm i.d. < 2 µm 2.1 mm i.d.
Nexera XS Ultra High Performance Liquid Chromatograph Nexera X3 Ultra High Performance Liquid Chromatograph	It is compatible with a wide range of analysis conditions from conventional HPLC analysis to ultra-high separation analysis.	
Nexera XR Ultra High Performance Liquid Chromatograph	This UHPLC-like model is the new standard for the Shimadzu LC series.	
Nexera lite High Performance Liquid Chromatograph	A conventional HPLC model	

Fully porous particles (FPP)

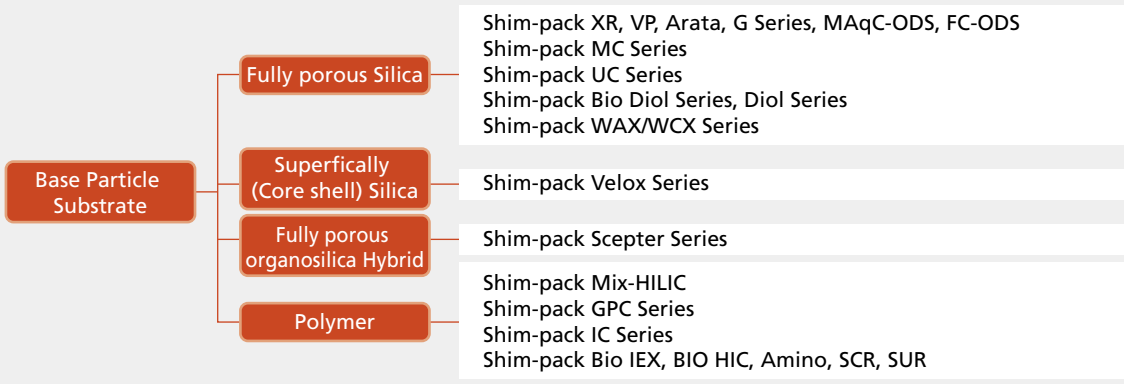
Superficially porous particles (SPP)

Table of Contents

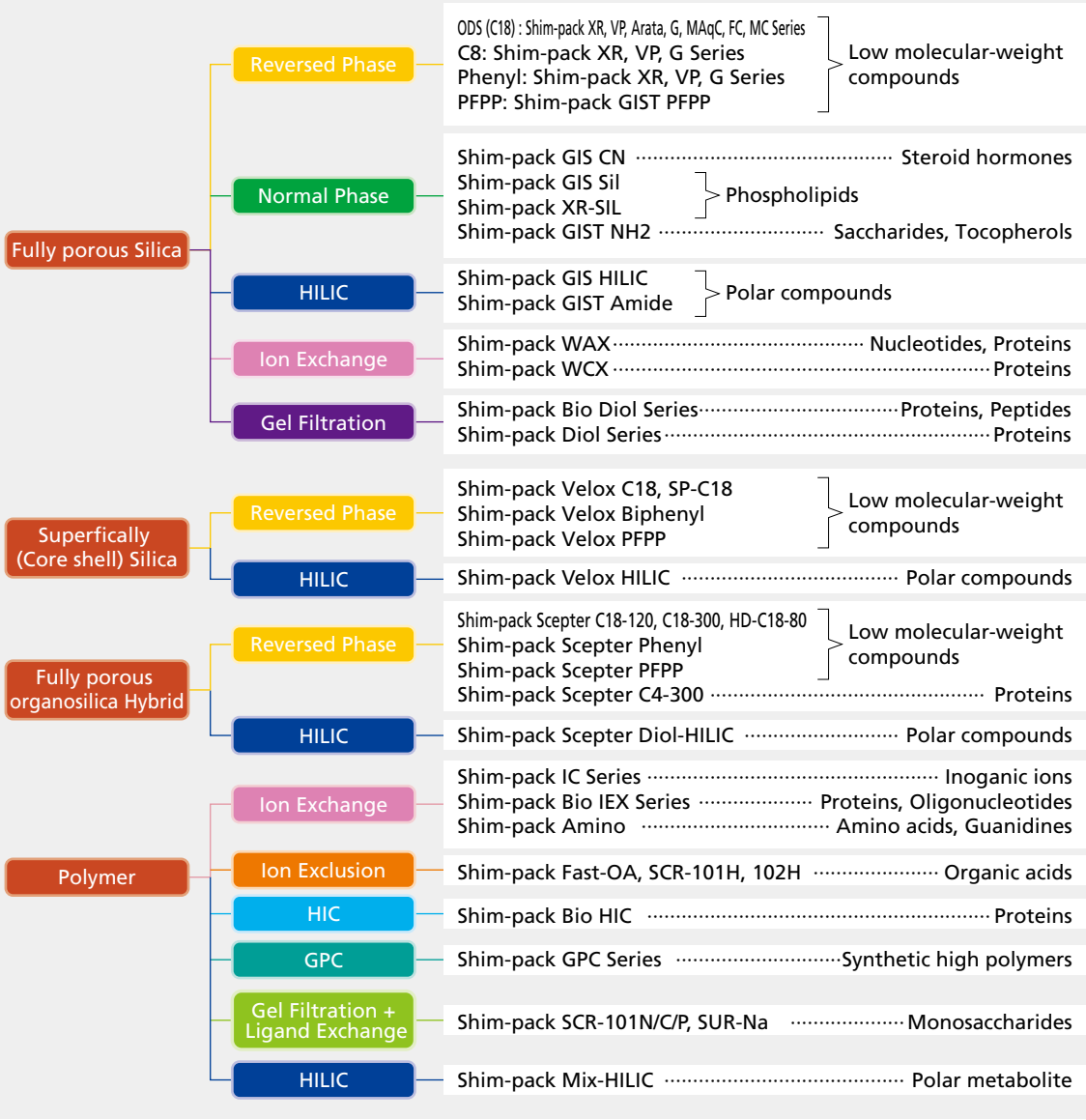
Column Features

Column Type	Column Series	Feature
UHPLC/HPLC Columns	Shim-pack Arata	Unprecedented resolution and peak shape of basic compounds & peptides
	Shim-pack Scepter	Excellent stability & performance could be achieved under a wide range of LC conditions
	Shim-pack Velox	Maximize LC separation performance with core shell technology
	Shim-pack G	Wide range of chemistries
	Shim-pack XR	Offer versatility and fast analysis
	Shim-pack VP	Strict manufacturing uniformity
	Shim-pack MAqC-ODS	Strong retention of basic compounds
	Shim-pack FC-ODS	Shortens the analysis time using a conventional system
	Shim-pack Mix-HILIC	HILIC column suitable for polar metabolite analysis
	Mastro2	Metal free column for stable and reliable data
Preparative Columns	Shim-pack Scepter	Seamless scaleup from UHPLC/analyticala HPLC to preparative separation
	Shim-pack G	Wide range of chemistries
	Shim-pack PREP	Prep columns packed with 15 µm particles
Microscale Columns	Shim-pack MC	Excellent durability & versatilily
	Shim-pack MCT	Trap column with suppressed metal coordinative adsorption
	Shim-pack MCT L	Low volumne trap column to minimize gradient delay
SFC Columns	Shim-pack UC	Wide range of stationary phases meets diverse needs
Size Exclusion Columns	Shim-pack GPC	Organic SEC (GPC) columns for the measurement of molecular weight distribution of high polymers and oligomers
	Shim-pack Bio Diol	Aqueous SEC (GFC) columns for aggregates and fragments analysis of peptides, oligonucleotides and biopharmaceuticals
	Shim-pack Diol	Aqueous SEC (GFC) columns
Ion Exchange Columns	Shim-pack Bio IEX	Polymer based IEX columns for analysis of peptides, oligonucleotides and biopharmaceuticals
	Shim-pack WAX/WCX	Chemically-bonded hydrophilic silica gel based ion exchange columns
Ion Chromatography Columns	Shim-pack IC	IC columns for the analysis of inorganic and organic ions
Hydrophobic Interaction Chromatography Columns	Shim-pack Bio HIC	HIC Column suitable for the analysis of DAR of ADC
Dedicated Columns	Shim-pack Amino	Ion exchange columns for post-column derivatization amino acid analysis
	Shim-pack Fast-OA	High-speed organic acid analysis column, quick and easy monitoring of culture or fermentation processes
	Shim-pack SCR	For the analysis of monosaccharides and organic acids by ligand exchange + size exclusion and ion exclusion mode
	Shim-pack SUR	For the analysis of monosaccharides by ligand exchange + size exclusion and ion exclusion mode
Pretreatment Columns	Shim-pack MAYI	Biological sample pretreatment column
Mobile Phase Cleaner for UHPLC/HPLC	Ghost Trap DS/DS-HP	Consistently traps impurities, even in organic solvents

Selection by Base Particle Substrates



Selection by Separation Modes



Selection of ODS columns

Physical characteristics of HPLC/UHPLC/SFC Packing Materials

Brand	Chemistry	Particle Size	Pore Size [nm]	Surface Area [m^2/g]	% Carbon Load	Endcapped	USP Code	Page
Shim-pack Arata	C18	2.2, 5	12	340	17	Yes	L1	12
	Peptide C18	2.2	12	340	17	Yes	L1	14
Shim-pack GIST	C18	2, 3, 5	10	350	14	Yes	L1	26
	C18-AQ	1.9, 3, 5	10	350	13	Yes	L1	28
	C8	2, 3, 5	10	350	8	Yes	L7	37
	Phenyl	2, 3, 5	10	350	10	No	L11	39
	Phenyl-Hexyl	3, 5	10	350	9	Yes	L11	41
	PFPP	3, 5	10	350	10	Yes	L43	43
	Amide	1.9, 3, 5	10	350	8.5	No	L68	45
	NH2	3, 5	10	350	7	No	L8	49
Shim-pack GISS	C18	1.9, 3, 5	20	200	9	Yes	L1	30
	C8	1.9, 3, 5	20	200	6	Yes	L7	-
Shim-pack GIS	C18	2, 3, 4, 5, 10	10	450	15	Yes	L1	32
	C18-P	3, 5	10	450	29	Yes	L1	34
	RP-Shield	5	10	450	9	No	L1	36
	CN	3, 5	10	450	14	No	L10	51
	Sil	3, 5	10	450	-	No	L3	53
	HILIC (Diol)	3, 5	10	450	20	No	L20	47
Shim-pack GWS	C18	5	10	450	9.5	Yes	L1	55
Shim-pack Velox	C18	1.8 2.7 5	9	125 130 100	9 7 5	Yes	L1	21
	SP-C18	1.8 2.7 5	9	125 130 100	7 7 5	No	L1	21
	Biphenyl	1.8 2.7 5	9	125 130 100	7 7 5	Yes	L11	21
	PFPP	1.8 2.7 5	9	125 130 100	4 4 3	No	L43	21
	HILIC (Unbonded Silica)	2.7	9	130	-	-	L3	21
Shim-pack Scepter	C18-120	1.9, 3, 5	12	360	20	Yes	L1	16
	C18-300	1.9, 3, 5	12	ND	ND	Yes	L1	16
	HD-C18-80	1.9, 3, 5	8	430	25	Yes	L1	16
	C8-120	1.9, 3, 5	12	360	17	Yes	L7	16
	Phenyl-120	1.9, 3, 5	12	360	17	Yes	L11	16
	PFPP-120	1.9, 3, 5	12	360	15	No	L43	16
	C4-300	1.9, 3, 5	30	ND	ND	Yes	L26	16
	Diol-HILIC-120	1.9, 3, 5	12	360	12	No	L20	16
Shim-pack VP	ODS	5	12	410	20	Yes	L1	56
	C8	5	12	410	12.5	Yes	L7	56
	Phenyl	5	12	410	12.3	Yes	L11	56
Shim-pack XR	ODS	2.2	12	340	18	Yes	L1	56
	ODS Ⅱ	2.2	8	470	20	Yes	L1	56
	ODS Ⅲ (50/75 mm)	1.6	7.5	500	22	Yes	L1	56
	ODS Ⅲ (150/200 mm)	2.2	8	470	20	Yes	L1	56
	C8	2.2	12	340	11	Yes	L7	56
	Phenyl	2.2	12	340	11	Yes	L11	56
	Sil	2.2	12	340	-	-	L3	56

Brand	Chemistry	Particle Size	Pore Size [nm]	Surface Area [m^2/g]	% Carbon Load	Endcapped	USP Code	Page
Mastro2	C18	2.2, 3, 5	12	340	13	Yes	L1	65
	PFP	2.2, 3, 5	12	340	12	Yes	L43	65
Shim-pack MAqC	ODS Ⅰ	5	12	ND	13	Yes	L1	60
Shim-pack FC	ODS	3	12	315	18	Yes	L1	62
Shim-pack UC	RP	3, 5	10	450	9	No	L1	77
	ODS	3, 5	12	3 µm: 340, 5 µm: 300	16	Yes	L1	77
	GIS Ⅱ	3, 5	10	450	11	Yes	L1	77
	Phenyl	3, 5	10	450	9.5	No	L11	77
	CN	3, 5	10	450	14	No	L10	77
	Diol	3, 5	10	450	20	No	L20	77
	Diol Ⅱ	3, 5	12	3 µm: 340, 5 µm: 300	ND	No	L20	77
	Sil	3, 5	10	450	-	-	L3	77
	Sil Ⅱ	3, 5	12	3 µm: 340, 5 µm: 300	-	-	L3	77
	Amide	3, 5	10	450	18	No	L68	77
	NH^2	3, 5	10	450	8	No	L8	77
	Choles	3, 5	12	3 µm: 340, 5 µm: 300	20	Yes	L101	77
	PBr	3, 5	12	3 µm: 340, 5 µm: 300	8	Yes	-	77
	PyE	3, 5	12	3 µm: 340, 5 µm: 300	18	Yes	-	77
	HyP	3, 5	12	3 µm: 340, 5 µm: 300	ND	Yes	-	77
	Py	3, 5	12	3 µm: 340, 5 µm: 300	ND	Yes	-	77
	Triazole	3, 5	12	3 µm: 340, 5 µm: 300	ND	No	L104	77
	NaE	3, 5	12	3 µm: 340, 5 µm: 300	16	Yes	-	77
	PolyVP	3, 5	ND	ND	ND	Proprietary	-	77
	PolyBT	3, 5	ND	ND	ND	Proprietary	-	77

ND: Not Disclosed

Selection by USP

USP Code	Description	Shim-pack HPLC Column	Page
L1	Octadecylsilane chemically bonded to porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.	Shim-pack Arata C18	12
		Shim-pack Arata Peptide C18	14
		Shim-pack GIST C18	26
		Shim-pack GIST C18-AQ	28
		Shim-pack GISS C18	30
		Shim-pack GIS C18	32
		Shim-pack GIS C18-P	34
		Shim-pack GWS C18	55
		Shim-pack Scepter C18-120	16
		Shim-pack Scepter C18-300	16
		Shim-pack Scepter HD-C18-80	16
		Shim-pack Velox C18	21
		Shim-pack Velox SP-C18	21
		Shim-pack XR-ODS	56
		Shim-pack XR-ODSⅡ	56
		Shim-pack XR-ODSⅢ	56
		Shim-pack VP-ODS	56
		Shim-pack FC-ODS	62
		Mastro2 C18	65
		UC ODS	77
		Shim-pack UC-RP	77
		Shim-pack UC-GISⅡ	77
		Shim-pack GIS RP-Shield	36
		Shim-pack MC C18	75
L3	Porous silica particles, 1.5 - 10 µm in diameter, or a monolithic rod.	Shim-pack GIS Sil	53
		Shim-pack Velox HILIC	21
		Shim-pack XR-SIL	56
		Shim-pack UC Sil	77
		Shim-pack UC SilⅡ	77
L7	Octylsilane chemically bonded to totally porous or superficially porous silica particles 1.5 to 10 µm in diameter, or a monolithic rod.	Shim-pack Scepter C8	16
		Shim-pack GIST C8	37
		Shim-pack GISS C8	-
		Shim-pack XR-C8	56
		Shim-pack VP-C8	56
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	49
		Shim-pack UC NH2	77
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	51
		Shim-pack UC CN	77
L11	Phenyl groups chemically bonded to porous silica particles 1.5 to 10 µm in diameter, or a monolithic silica rod.	Shim-pack GIST Phenyl	39
		Shim-pack GIST Phenyl-Hexyl	41
		Shim-pack Scepter Phenyl	16
		Shim-pack Velox Biphenyl	21
		Shim-pack XR-Phenyl	56
		Shim-pack VP-Phenyl	56
		Shim-pack UC Phenyl	77
L17	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 - 12 µm in diameter	Shim-pack Fast-OA	96
		Shim-pack SCR-101H	94
		Shim-pack SCR-102H	94
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	94

USP Code	Description	Shim-pack HPLC Column	Page
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 GIS HILIC	47
		Shim-pack Scepter Diol-HILIC	16
		Shim-pack UC Diol	77
		Shim-pack UC DiolⅡ	77
		Shim-pack Bio Diol-60, 120, 200, 250, 300	85
		Shim-pack Diol-150, 300	86
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 30 µm in diameter.	Shim-pack GPC-800 Series	84
L22	A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, 5 - 15 µm in diameter.	Shim-pack AMINO-LI	93
		Shim-pack AMINO-NA	93
L26	Butyl silane chemically bonded to totally porous or superficially porous silica particles, 1.5 to 10 µm in diameter.	Shim-pack Scepter C4-300	16
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 1.5 to 10 µm in diameter.	Shim-pack GIST PFPP	43
		Shim-pack Scepter PFPP	16
		Shim-pack Velox PFPP	21
		Mastro2 PFP	65
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 µm in diameter.	Shim-pack SUR-Na	95
		Shim-pack SCR-101N	94
L59	Packing having the capacity to separate proteins 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 Bio Diol-60, 120, 200, 250, 300	85
		Shim-pack Diol-150, 300	86
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	45
		Shim-pack UC Amide	77
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	77
L104	Triazole groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.	Shim-pack UC Triazole	77

Shim-pack Arata™ Series

Unprecedented Resolution and Peak Shape of Basic Compounds & Peptides

Shim-pack Arata C18

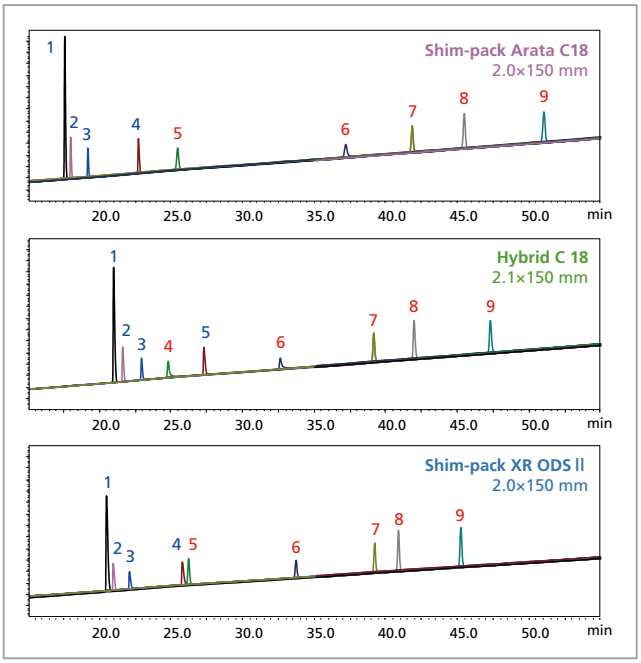
Even for LC columns that claim to be designed for basic compounds, adequate resolution often can not be obtained due to problems such as leading of highly polar basic compounds, peak shape deterioration of acidic compounds, or long equilibration time required for low ionic strength acidic mobile phase.
All of these issues have been solved with Shim-pack Arata that was specifically designed to give unmatched peak shape for basic compounds.

Shim-pack Arata	C18
Particle size	2.2 µm, 5 µm
Pore size	12 nm
Surface Area (m^2/g)	340
Carbon content (%)	17
End-cap	proprietary
pH range of use	2 -7.5
100 % aqueous condition	Yes
USP classification	L1

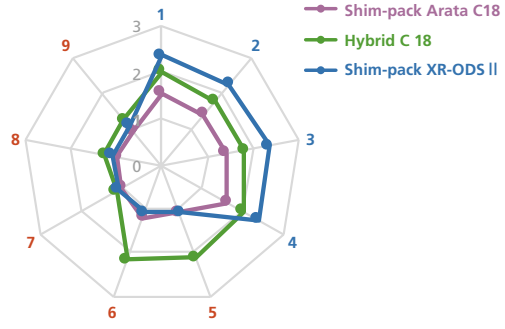
Unmatched Peak Shape

Unmatched peak shape of basic compounds can be achieved while maintaining good peak shape for acidic compounds using Shim-pack Arata LC columns.

Analysis of Mixtures of Basic and Acidic Drugs (Particle size: 2.2 -2.5 µm)



Conditions
LC system : Nexera X2_SPD20A (semi-micro cell)
LC column :
Shim-pack Arata C18 (2.0 × 150 mm I.D., 2.2 µm)
Hybrid C18 (2.1×150 mm, 2.5 µm)
Shim-pack XR ODS II (2.0 × 150 mm I.D., 2.2 µm)
Mobile phase : A) 0.1 % HCOOH in H^2O
B) 0.1 % HCOOH in Acetonitrile
Gradient : 10 %B (0 min) →70 %B (50-60 min)→10 %B (60.01-70 min.)
Flow rate : 0.2 mL/min
Detection : 226 nm
Column temp. : 40 °C
Injection volume : 1 µL



Symmetry factor for each drug

1. Cyproheptidine 2. Hydroxyzine 3. Mequitazine 4. Clemastine (basic drug)
5. Proxicam 6. Meloxicam 7. Flurbiprofen 8. Diclofenac 9. Mefenamic acid (acidic drug)

A mixture of 4 basic drugs and 5 acidic drugs was analyzed using a Shim-pack Arata C18 column (2.2 µm), a Hybrid C18 column (designed for improving peak shape of basic compounds: 2.5 µm), and a typcial ODS column (Shim-pack XR-ODSII column: 2.2 µm). This mixture was analyzed under the low ionic strength acidic mobile phase (0.1 % formic acid mobile phase) condition, in which the peak shape of basic compounds tends to deteriorate so that the peak shapes (symmetry factors) of each drug were compared. The peak symmetry of basic drugs (1-4) was improved using the hybrid C18 column, which is specifically claimed to be good for the peak shape of basic compounds under low ionic acidic mobile phase conditions, compared to the typical ODS column. While, the peak symmetry of acidic drugs (5 -9) on the hybrid C18 column was deteriorated showing tailing. On the other hand, the Shim-pack Arata C18 column not only showed the best peak symmetry for the basic drugs, but also showed similar or better peak symmetry for acidic drugs compared to the general ODS.

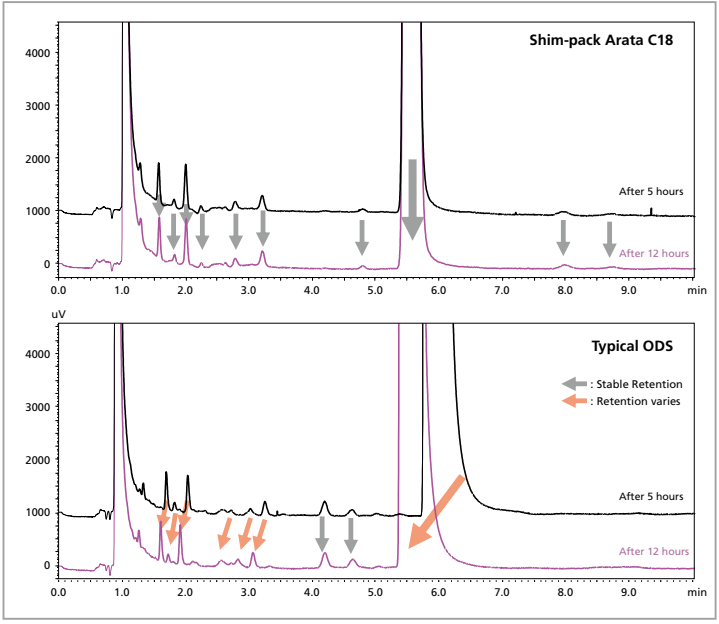
Rapid Equilibration and Stable Retention Times

When analyzing basic compounds on a typical ODS column with low ionic acidic mobile phase (0.1 % formic acid, phosphoric acid, and others), not only poor peak shape but also long equilibration time required to obtain stable data is a common problem faced by customers. Shim-pack Arata C18 column can be rapidly equilibrated in low ionic strength acidic mobile phase conditions yielding excellent peak shape and stable retention times, which allows reliable qualitative and quantitative analysis.

Drug Purity Test

~ Retention Behavior of Basic Drug and its Impurities under 0.1 % Phosphoric Acid Mobile Phase Condition ~

Impurity control in drug substances and drug products is strictly regulated in the quality control process of pharmaceutical manufacturing. Impurities in the drug substances and drug products, which are final products, are controlled through impurity control in the raw materials and in each manufacturing process. As the concept of "Quality by design in manufacturing processes" is basically required, it is particularly important to improve the qualitative efficiency of impurity management in the CMC departments of pharmaceutical companies. In particular, ensuring the reliability (ruggedness) of the methods used for impurity control is a key factor affecting the quality control of pharmaceutical products.
Shim-Pack Arata C18 columns provides a method that yields stable separation performance through rapid equilibration under 0.1 % phosphoric acid mobile phase condition and secures high reliability (ruggedness) not only for basic drugs but also for trace amounts of related impurities.



Conditions

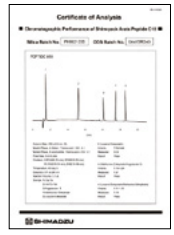
LC system : Nexera X2_M30A (STD Cell)
LC Column : Shim-pack Arata C18 (3.0 × 75 mm I.D., 2.2 µm)
Typical ODS column (3.0 × 75 mm I.D., sub 2 µm)
Mobile phase : 0.1 % H^3PO^4 in H^2O / Acetonitrile
= 76 / 24 (Shim-pack Arata C18)
= 70 / 30 (Typical ODS)
Flow rate : 0.4 mL/min
Detection : 210 nm
Column temp. : 40 °C
Injection volume : 1 µL
Sample : Amitriptyline

Both columns were equilibrated with mobile phase containing 0.1 % phosphoric acid and the retention behavior of Amitriptyline and its impurities were compared after 5 hours and 12 hours of equilibration.
Retention time change of Amitriptyline and many related impurities depend on the equilibration time with the typical ODS column. This results in a concern about what effect the change in the retention time has on the resolution and selectivity. On the other hand, no change was observed in the retention time of Amitriptyline and its impurities regardless of the equilibration time with the Shim-Pack Arata C18 column. This difference in retention time change is suggested to be due to the difference in column equilibration time required under 0.1 % phosphate mobile phase condition.

Shim-pack Arata C18

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.

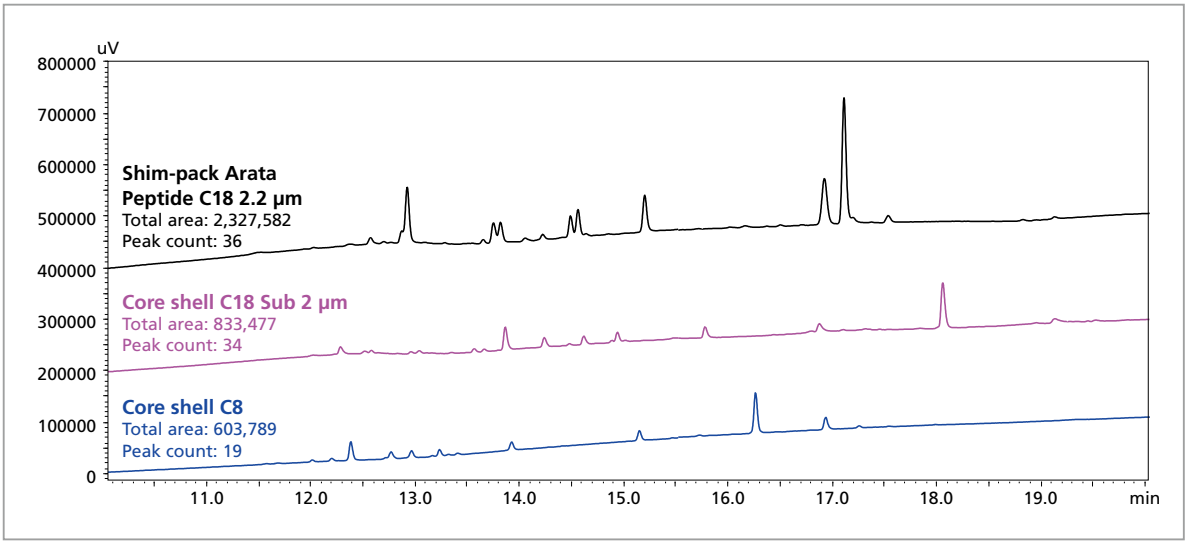
Increased Assurance of Peptide Analysis ~ Shim-pack Arata Peptide C 18 column ~



In order to ensure lot-to-lot reproducibility in peptide analysis, each lot of Shim-pack Arata Peptide C18 material is tested using a mixture of peptide standards in addition to the standard Shim-pack Arata C18 lot QC test. 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.

High Peptide Recovery enabled by Shim-pack Arata technology

Peptides are known to show non-specific adsorption to particles of LC columns. Since the adsorption of peptides to particles is minimized, high recovery of peptides is ensured and excellent peptides analysis can be provided by Shim-pack Arata Peptide C18 column.



Conditions

LC System : Nexera X2 M30A (STD Cell)
LC Column : Shim-pack Arata Peptide C18 (2.0 × 150 mm I.D., 2.2 µm)
Core shell Peptide C18 (2.1 × 150 mm I.D., sub 2 µm)
Core shell C8 (2.1 × 150 mm I.D., sub 4 µm)
Mobile phase : A) 0.1 % HCOOH in H^2O
B) 0.1 % HCOOH in Acetonitrile
Gradient : 2 %B (0-5 min)→45 %B (20 min)→ 100 %B (20.01 – 25 min)
→2 %B (25.01 – 30 min)
Flow rate : 0.2 mL/min
Detection : 214 nm
Column temp. : 40 °C
Injection volume : 5 µL
Sample : Myoglobin tryptic digest
Vial : TORAST-H Bio Vial

Order Information

Shim-pack Arata C18 2.2 µm

I.D. (mm) / Length (mm)	2.0	3.0
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

Shim-pack Arata C18 5 µm

I.D. (mm) / Length (mm)	2.0	3.0	4.6
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 C18 2.2 µm

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

Shim-pack Arata Validataion Kit*

P/N	Description
227-32807-01	Validation Kit Shim-pack Arata C18, 2.2 µm, 2.0 × 50 mm, 3/pk
227-32807-02	Validation Kit Shim-pack Arata C18, 2.2 µm, 2.0 × 100 mm, 3/pk
227-32807-03	Validation Kit Shim-pack Arata C18, 2.2 µm, 3.0 × 50 mm, 3/pk
227-32807-04	Validation Kit Shim-pack Arata C18, 2.2 µm, 3.0 × 100 mm, 3/pk
227-32808-01	Validation Kit Shim-pack Arata C18, 5 µm, 2.0 × 150 mm, 3/pk
227-32808-02	Validation Kit Shim-pack Arata C18, 5 µm, 3.0 × 150 mm, 3/pk
227-32808-03	Validation Kit Shim-pack Arata C18, 5 µm, 4.6 × 100 mm, 3/pk
227-32808-04	Validation Kit Shim-pack Arata C18, 5 µm, 4.6 × 150 mm, 3/pk
227-32808-05	Validation Kit Shim-pack Arata C18, 5 µm, 4.6 × 250 mm, 3/pk
227-32809-01	Validation Kit Shim-pack Arata Peptide C18, 2.2 µm, 2.0 × 100 mm, 3/pk
227-32809-02	Validation Kit Shim-pack Arata Peptide C18, 2.2 µm, 2.0 × 150 mm, 3/pk

* Validation Kit consists of three columns packed with three different batches of sorbent.

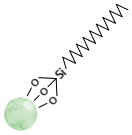
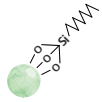
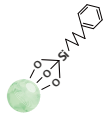
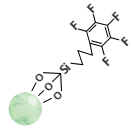
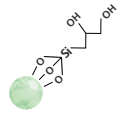
Shim-pack Scepter™ Series

Fully Porous Hybrid Particle Based Column Series

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.

Chemistries

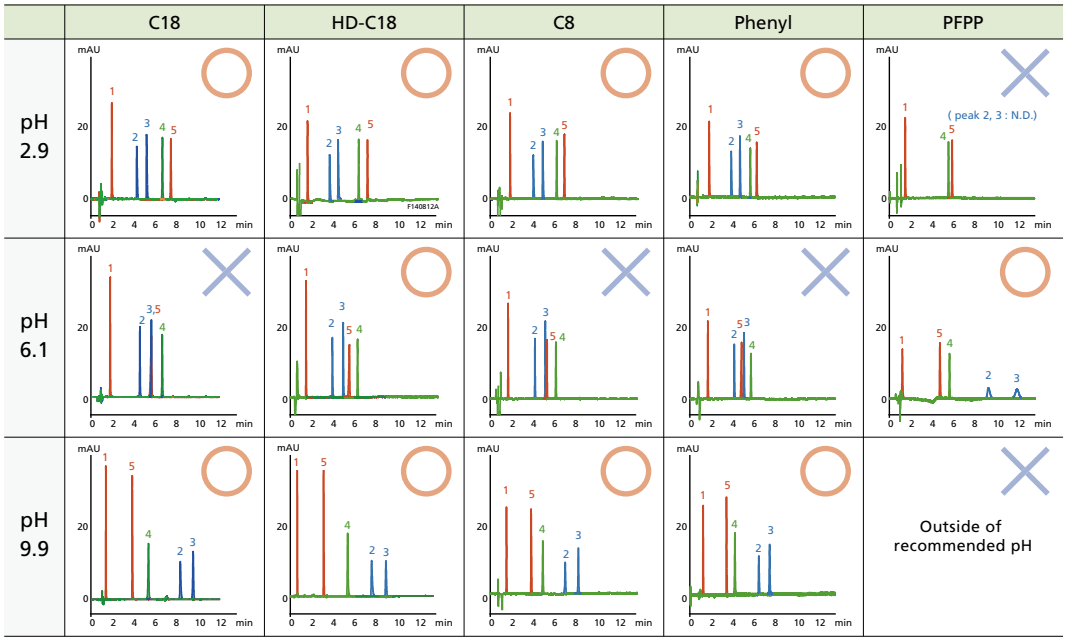
	Reveresed Phase							HILIC
	C18-120	C18-300	HD-C18	C8-120	C4-300	Phenyl	PFPP	Diol-HILIC
Chemistry								
Bonded Phase	Octadecyl groups		Octadecyl groups (High Density type)	Octyl groups	Butyl groups	Phenylbutyl groups	Pentaflorophenyl propyl groups	Dihydroxypropyl groups
Particle	Organic Silica Hybrid							
Particle Size (µm)	1.9, 3, 5							
Pore Size (nm)	12	30	8	12	30	12		
End Capping	Proprietary						None	
pH Range	1 - 12				1 - 10		1 - 8	2 - 10
100 % aqueous condition	Yes	Yes	No	No	Yes	Yes	Yes	N/A
USP Code	L1		L1	L7	L26	L11	L43	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

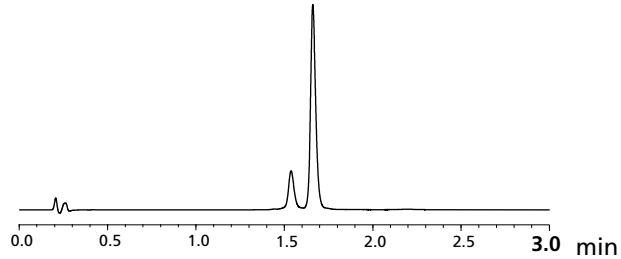
1. Saccharin (pKa = 2.2)
2. Dextromethorphan (pKa = 8.3)
3. Amitriptyline (pKa = 9.4)
4. N-Butyl paraben (pKa = 8.3)
5. Ibupurofen (pKa = 4.4)

Analysis Examples

Oligonucleotides Analysis using Shim-pack Scepter C18 Column

With excellent stability of organic silica hybrid particles, Shim-pack Scepter C18 columns are suitable for oligonucleotide analysis (under basic condition and high temperature).

Rapid UHPLC Analysis of Natural DNA (12 mer) and its impurities*

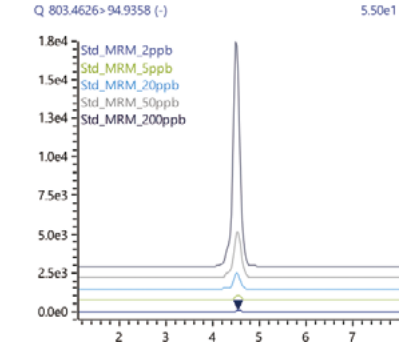


■ **Conditions**

Column	: Shim-pack Scepter C18 (50 mm × 2.1 mm I.D., 1.9 µm) P/N: 227-31012-03
Mobile phase	: A) 0.1M TEAA (pH = 7.0) B) CH^3CN A/B = 75/25 (v/v)
Flow rate	: 0.8 mL/min
Column temp.	: 50 °C
Detection	: UV 260 nm
Injection volume	: 5 µL

* The sample was provided by Professor Obika's laboratory, Graduate School of Pharmaceutical Sciences, Osaka University.

Analysis of Phosphorothioate Oligonucleotides (Mipomersen-2' -deoxy)



Conditions

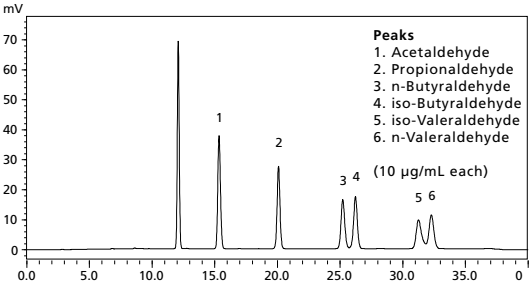
System	: Nexera/ LCMS-9030
Column	: Shim-pack Scepter C18 (75 mmL. × 2.0 mm I.D., 1.9 µm) P/N: 227-31011-04
Mobile phase	: A) 50 mM HFIP in water B) Acetonitrile
Gradient program	: 5 %B (0-0.5 min)→15 %B (0.5-6 min)
Flow rate	: 0.2 mL/min
Column temp.	: 50 °C
Injection volume	: 5 µL

Mipomersen-2'-deoxy:
5'-mG-mC*-mC*-mU*-mC*-dA-dG-dT-dC*-dT-dG-dC*-dT-dT-dC*-mG-mC*-mA-mC*-mC*-3

Simultaneous Analysis of Six DNPH-Derivatized Aldehydes using a Shim-pack Scepter PFPP Column

The structural isomers, normal butyraldehyde and isobutyraldehyde, as well as isovaleraldehyde and normal valeraldehyde, were well separated with Shim-pack Scepter PFPP column.

Chromatogram of Mixed Standard Solution



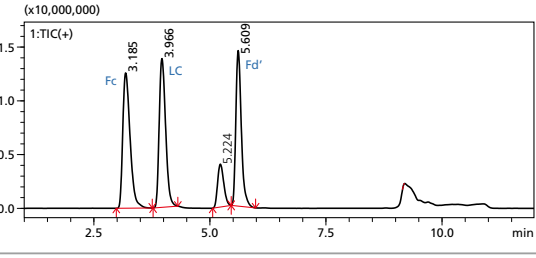
Conditions

Column	: Shim-pack Scepter PFPP (150 mm × 4.6 mm I.D., 3 µm)
Mobile phase	: A) Water B) Methanol/Acetonitrile = 8/2 (v/v)
Gradient	20 %B (0 min) →55 %B (5 min) →60 %B (25 min) →60 % (25-35 min) →20 % (35-40 min)
Flow rate	: 1.0 mL/min
Column temp.	: 35 °C
Injection volume	: 20 µL
Detection	: UV 360 nm

Monoclonal Antibory Subunit Analysis by LC/MS using Shim-pack Scepter C4-300 Column

Shim-pack Scepter C4-300 columns support protein analysis of molecular weight up to about 150,000, and the hybrid organic silica substrate material makes them well-suited for analyzing antibodies even under acidic and high-temperature conditions. Because they provide excellent peak shape even when using formic acid with poor ion pair effect as a mobile phase, they are also useful for high sensitivity analysis in an LC-MS system.

Monoclonal Antibody Subunit Analysis



Conditions

System	: Nexera X2/ LCMS-8060
Column	: Shim-pack Scepter C4-300, 50 mm × 2.1 mm I.D., 3 µm
Mobile phase	: A) 0.1% formic acid in Water B) 0.1% formic acid in Acetonitrile
Gradient	: 1 %B (1 min)→25 %B (1.1 min)→ 40 %B (8 min)→ 95 %B (8.1 min-10min)→ 1 % (10.1 min)
Flow rate	: 0.3 mL/min
Column temp.	: 50 ˚C
Injection volume	: 1 µL
Sample	: IdeZ digested + DTT treated Adalimumab 0.2 mg/mL

Order Information

Shim-pack Scepter

Chemistry		C18-120			HD-C18-80			C18-300		
Particle Size (μm)	ID (mm) / Length (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31012-03	227-31013-01		227-31026-03	227-31027-01		227-31203-03	227-31203-07	
	75	227-31012-04	227-31013-02		227-31026-04	227-31027-02		227-31203-04	227-31203-08	
	100	227-31012-05	227-31013-03		227-31026-05	227-31027-03		227-31203-05	227-31203-09	
	150	227-31012-06	227-31013-04		227-31026-06	227-31027-04		227-31203-06	227-31203-10	
3	50	227-31014-03	227-31015-01	227-31016-02	227-31028-03	227-31029-01	227-31030-02	227-31203-13	227-31203-17	227-31203-22
	75	227-31014-04	227-31015-02	227-31016-03	227-31028-04	227-31029-02	227-31030-03	227-31203-14	227-31203-18	227-31203-23
	100	227-31014-05	227-31015-03	227-31016-04	227-31028-05	227-31029-03	227-31030-04	227-31203-15	227-31203-19	227-31203-24
	150	227-31014-06	227-31015-04	227-31016-05	227-31028-06	227-31029-04	227-31030-05	227-31203-16	227-31203-20	227-31203-25
	250			227-31016-06			227-31030-06			227-31203-26
5	50	227-31017-03	227-31018-01	227-31020-02	227-31021-02	227-31022-01	227-31024-02	227-31203-29	227-31203-33	227-31203-40
	75	227-31017-04	227-31018-02	227-31020-03	227-31021-03	227-31022-02	227-31024-03	227-31203-30	227-31203-34	227-31203-41
	100	227-31017-05	227-31018-03	227-31020-04	227-31021-04	227-31022-03	227-31024-04	227-31203-31	227-31203-35	227-31203-42
	150	227-31017-06	227-31018-04	227-31020-05	227-31021-05	227-31022-04	227-31024-05	227-31203-32	227-31203-36	227-31203-43
	250			227-31020-06			227-31024-06			227-31203-44

Chemistry		C8-120			C4-300			Phenyl		
Particle Size (μm)	ID (mm) / Length (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31033-03	227-31034-01		227-31175-03	227-31176-01		227-31063-03	227-31064-01	
	75	227-31033-04	227-31034-02		227-31175-04	227-31176-02		227-31063-04	227-31064-02	
	100	227-31033-05	227-31034-03		227-31175-05	227-31176-03		227-31063-05	227-31064-03	
	150	227-31033-06	227-31034-04		227-31175-06	227-31176-04		227-31063-06	227-31064-04	
3	50	227-31035-03	227-31036-01	227-31037-02	227-31177-03	227-31178-01	227-31179-02	227-31065-03	227-31066-01	227-31067-02
	75	227-31035-04	227-31036-02	227-31037-03	227-31177-04	227-31178-02	227-31179-03	227-31065-04	227-31066-02	227-31067-03
	100	227-31035-05	227-31036-03	227-31037-04	227-31177-05	227-31178-03	227-31179-04	227-31065-05	227-31066-03	227-31067-04
	150	227-31035-06	227-31036-04	227-31037-05	227-31177-06	227-31178-04	227-31179-05	227-31065-06	227-31066-04	227-31067-05
	250			227-31037-06			227-31179-06			227-31067-06
5	50	227-31038-03	227-31039-01	227-31041-02	227-31180-03	227-31181-01	227-31183-02	227-31068-03	227-31069-01	227-31071-02
	75	227-31038-04	227-31039-02	227-31041-03	227-31180-04	227-31181-02	227-31183-03	227-31068-04	227-31069-02	227-31071-03
	100	227-31038-05	227-31039-03	227-31041-04	227-31180-05	227-31181-03	227-31183-04	227-31068-05	227-31069-03	227-31071-04
	150	227-31038-06	227-31039-04	227-31041-05	227-31180-06	227-31181-04	227-31183-05	227-31068-06	227-31069-04	227-31071-05
	250			227-31041-06			227-31183-06			227-31071-06

Chemistry		PFPP			Diol-HILIC		
Particle Size (μm)	ID (mm) / Length (mm)	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31053-03	227-31054-01		227-31043-03	227-31044-03	
	75	227-31053-04	227-31054-02		227-31043-01	227-31044-01	
	100	227-31053-05	227-31054-03		227-31043-02	227-31044-02	
	150	227-31053-06	227-31054-04				
3	50	227-31055-03	227-31056-01	227-31057-02	227-31045-03	227-31046-01	227-31047-02
	75	227-31055-04	227-31056-02	227-31057-03	227-31045-04	227-31046-02	227-31047-03
	100	227-31055-05	227-31056-03	227-31057-04	227-31045-05	227-31046-03	227-31047-04
	150	227-31055-06	227-31056-04	227-31057-05	227-31045-06	227-31046-04	227-31047-05
	250			227-31057-06			227-31047-06
5	50	227-31058-03	227-31059-01	227-31061-02	227-31048-03	227-31049-01	227-31051-02
	75	227-31058-04	227-31059-02	227-31061-03	227-31048-04	227-31049-02	227-31051-03
	100	227-31058-05	227-31059-03	227-31061-04	227-31048-05	227-31049-03	227-31051-04
	150	227-31058-06	227-31059-04	227-31061-05	227-31048-06	227-31049-04	227-31051-05
	250			227-31061-06			227-31051-06

Shim-pack Scepter Preparative Columns

Chemistry	ID (mm) / Length (mm)	10	20	30
C18-120	50		227-31102-01	227-31103-01
	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
HD-C18-80	50		227-31105-01	227-31106-01
	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
C18-300	50		227-31205-03	227-31205-07
	75			227-31205-08
	100		227-31205-04	227-31205-09
	150	227-31205-01	227-31205-05	227-31205-10
	250	227-31205-02	227-31205-06	227-31205-11

Chemistry	ID (mm) / Length (mm)	10	20	30
C8-120	50		227-31108-01	227-31109-01
	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
C4-300	50		227-31185-01	227-31186-01
	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
Phenyl	50		227-31114-01	227-31115-01
	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
PFPP	50		227-31111-01	227-31112-01
	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

* Main P/Ns are described in the list. Please contact your local representative for columns in dimensions other than listed above.

Shim-pack Scepter EXP Guard Cartridge (Particle size : 1.9 µm, 3 pk)

Chemistry / Dimension	C18-120	HD-C18-80	C18-300	C8-120	C4-300	Phenyl	PFPP
2.1×5 mm	227-31120-01	227-31128-01	227-31206-01	227-31136-01	227-31187-01	227-31158-01	227-31150-01
3.0×5 mm	227-31120-02	227-31128-02	227-31206-02	227-31136-02	227-31187-02	227-31158-02	227-31150-02

* EXP Cartridge holder for Shim-pack Scepter: 227-32041-01

Shim-pack Scepter Analytical Guard Cartridge (5 pk)

Particle Size (µm)	3							
Chemistry / Dimension	C18-120	HD-C18-80	C18-300	C8-120	C4-300	Phenyl	PFPP	Diol-HILIC
2.1×10 mm	227-31121-01	227-31129-01	227-31207-01	227-31137-01	227-31188-01	227-31159-01	227-31151-01	227-31144-01
3.0×10 mm	227-31122-01	227-31130-01	227-31207-03	227-31138-01	227-31189-01	227-31160-01	227-31152-01	227-31145-01
4.0×10 mm	227-31123-01	227-31131-01	227-31207-05	227-31139-01	227-31190-01	227-31161-01	227-31153-01	227-31146-01
2.1×20 mm	227-31121-02	227-31129-02	227-31207-02	227-31137-02	227-31188-02	227-31159-02	227-31151-02	227-31144-02
3.0×20 mm	227-31122-02	227-31130-02	227-31207-04	227-31138-02	227-31189-02	227-31160-02	227-31152-02	227-31145-02
4.0×20 mm	227-31123-02	227-31131-02	227-31207-06	227-31139-02	227-31190-02	227-31161-02	227-31153-02	227-31146-02

Particle Size (µm)	5							
Chemistry / Dimension	C18-120	HD-C18-80	C18-300	C8-120	C4-300	Phenyl	PFPP	Diol-HILIC
2.1×10 mm	227-31124-01	227-31132-01	227-31207-07	227-31140-01	227-31191-01	227-31162-01	227-31154-01	227-31147-01
3.0×10 mm	227-31125-01	227-31133-01	227-31207-09	227-31141-01	227-31192-01	227-31163-01	227-31155-01	227-31148-01
4.0×10 mm	227-31126-01	227-31134-01	227-31207-11	227-31142-01	227-31193-01	227-31164-01	227-31156-01	227-31149-01
2.1×20 mm	227-31124-02	227-31132-02	227-31207-08	227-31140-02	227-31191-02	227-31162-02	227-31154-02	227-31147-02
3.0×20 mm	227-31125-02	227-31133-02	227-31207-10	227-31141-02	227-31192-02	227-31163-02	227-31155-02	227-31148-02
4.0×20 mm	227-31126-02	227-31134-02	227-31207-12	227-31142-02	227-31193-02	227-31164-02	227-31156-02	227-31149-02

* Cartridge holder for Analytical Shim-pack Scepter guard cartridges (10 mm length): 227-31172-03

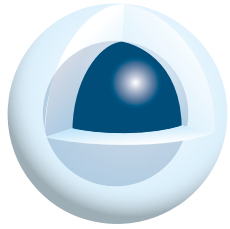
Shim-pack Scepter Preparative Guard Cartridge (Particle size : 5 µm, 2 pk)

Chemistry / Dimension	C18-120	HD-C18-80	C18-300	C8-120	C4-300	Phenyl	PFPP	Cartridge Holder
10×10 mm	227-31127-01	227-31135-01	227-31207-13	227-31143-01	227-31194-01	227-31165-01	227-31157-01	227-31171-01
20×10 mm	227-31127-02	227-31135-02	227-31207-14	227-31143-02	227-31195-01	227-31165-02	227-31157-02	227-31171-02
30×10 mm	227-31127-03	227-31135-03	227-31207-15	227-31143-03	227-31196-01	227-31165-03	227-31157-03	227-31171-03

Shim-pack Velox™ Series

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.

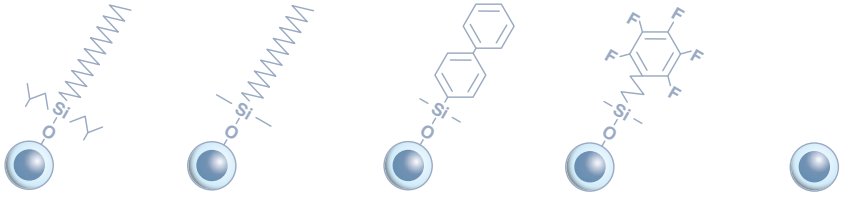


Shim-pack Velox column will deliver

- 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 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
Bonded Phase		Sterically protected octadecyl groups	Octadecyl groups	Biphenyl groups	Pentafluorophenyl propyl groups	None
Features		Sterically protected to regist strongly acidic mobile phase	General purpose core shell column for RP chromatography	Enhanced separation of aromatic compounds	Alterative selectivity to C18 columns	Increased retention of polar analytes
Particle Size		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 %	N/A
	5 µm	5 %	5 %	5 %	3 %	
End-Cap		No	YES	Yes	No	N/A
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 80 MPa.

Analysis Examples

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 %

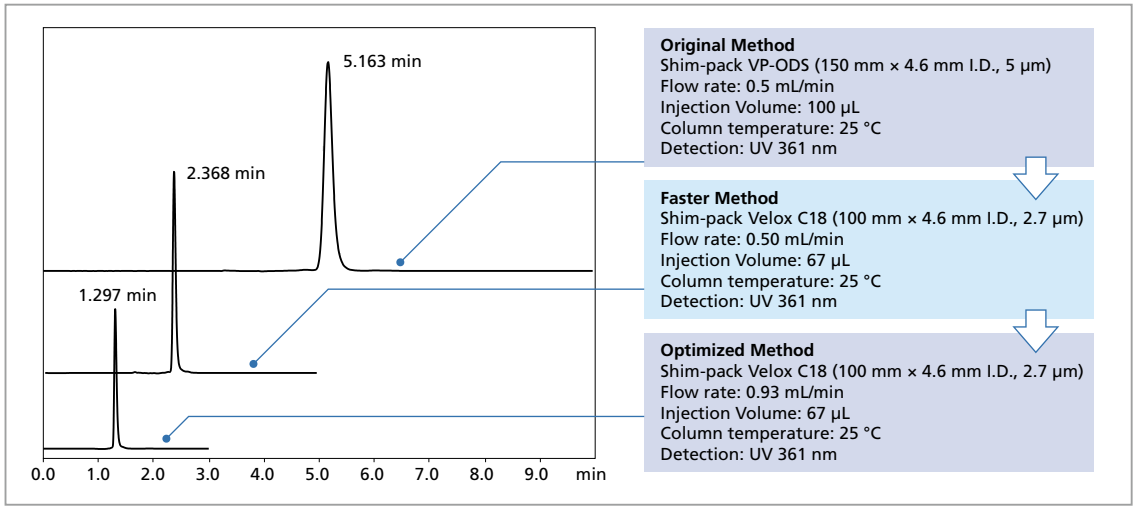
or

Number of theoretical plates (*N*): within -25 % to +50 % (For SPP)

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

$$* F^2 = F^1 \times \frac{dc^{22} \times dp^1}{dc^{12} \times dp^2}$$

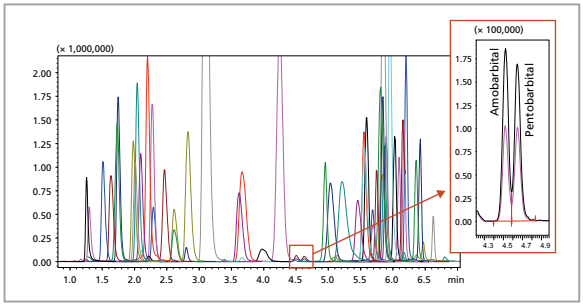
L : Column length
dp : Particle size
F : Flow rate
dc : Internal diameter of the column



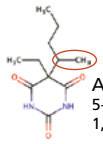
Column	*L*/*dp*	Flow rate (mL/min)	*N*	System suitability test result (Requirement: %RSD < 2.0 %)
VP-ODS (150 mm × 4.6 mm I.D., 5 µm)	30,000	0.50	5,244	tR: 0.025 % Area: 0.175 % (n=6)
Velox C18 (100 mm × 4.6 mm I.D., 2.7 µm)	37,037 (+23 %)	0.50	9,497 (+81 %)	tR: 0.035 % Area: 0.103 % (n=6)
		0.93	4,466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

Separating the Structural Isomers

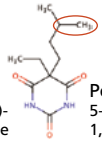
Even under the condition where 56 drugs of abuse and metabolites in human urine are quantitated within 10 minutes, two structural isomers, amobarmital and pentobarbital, which have been historically difficult to separate due to their similarity in chemical structures, could be relatively well resolved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

System : Nexera UHPLC System / LCMS-8050
Column : Shim-pack Velox Biphenyl 100 mm × 2.1 mm I.D., 2.7 µm (PN: 227-32015-03)
Flow rate : 0.5 mL/min
Mobile phase : A) 0.15 mM ammonium fluoride in water
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)
Column temp. : 30 °C
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.

Order Information

Shim-pack Velox 1.8 µm

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	227-32002-03	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

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

Shim-pack Velox 5 µm

Chemistry	SP-C18	C18	Biphenyl	PFPP
I.D. (mm) / Length(mm)	4.6			
50	227-32005-01	227-32012-01	227-32018-01	227-32024-01
100	227-32005-02	227-32012-02	227-32018-02	227-32024-02
150	227-32005-03	227-32012-03	227-32018-03	227-32024-03
250	227-32005-04	227-32012-04	227-32018-04	227-32024-04

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

Type	UHPLC				2.7 µm				
I.D. (mm)	SP-C18	C18	Biphenyl	PFPP	SP-C18	C18	Biphenyl	PFPP	HILIC
2.1	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	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	-	-	-	-	227-32029-03	227-32032-03	227-32035-03	227-32038-03	227-32040-03
Type	5 µm								
I.D. (mm)	SP-C18	C18	Biphenyl	PFPP					
4.6	227-32030-01	227-32033-01	227-32036-01	227-32039-01					

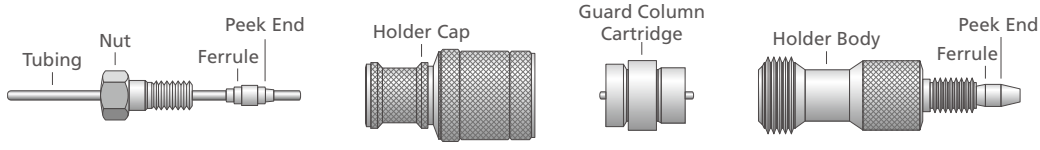
Shim-pack Velox UHPLC Precolumn Filter (0.2 µm)

Part No. 1 pack	227-32042-01
Part No. 5 pack	227-32042-02
Part No. 10 pack	227-32042-03

Shim-pack EXP Guard Column

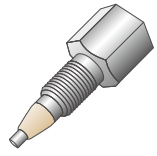
Free-turning architecture lets you change cartridges by hand without breaking inlet / outlet fluid connections — no tools needed.

Guard column cartridges require Shim-pack 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.

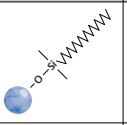
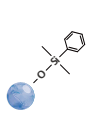
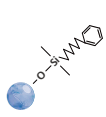
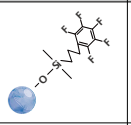
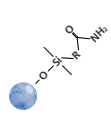
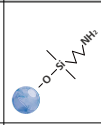


Shim-pack G Series

Fully Porous Silica Particle Based Column Series

Shim-pack GIST Series ~ High Inert & Highly Stable Fully Porous Silica Column Series ~

- Excellent peak shape and stability achieved by using uniquely modified high purity fully porous silica particles
- Excellent lot to lot reproducibility

	Shim-pack GIST							
	Reversed Phase						HILIC	
	C18	C18-AQ	C8	Phenyl	Pneyl-Hexyl	PFPP	Amide	NH2
Chemistry								
Bonded Phase	Octadecyl groups	Octadecyl groups	Octyl groups	Phenyl groups	Phenyl-Hexyl groups	Pentafluorophenylpropyl groups	Carbamoyl groups	Aminopropyl groups
Features	Ultra-high inertness and high stability	Excellent retentivity of highly polar compounds	Ultra-high inertness and high stability	Extremly strong π-π interactions	Alternative selectivity to C18 columns	Excellent retentivity of highly polar base	First choice HILIC column	Sugar analysis
Particle Size (μm)	2, 3, 5	1.9, 3, 5	2, 3, 5	2, 3, 5	3, 5	3, 5	1.9, 3, 5	3, 5
Pore Size (nm)	10	10	10	10	10	10	10	10
Surface Area (m^2/g)	350	350	350	350	350	350	350	350
Carbon Loading (%)	14	13	8	10	9	10	15	7
End Cap	Yes	Yes	Yes	No	Yes	Yes	No	No
pH Range	1-10	1-10	1-10	2-7.5	1-10	2-7.5	2-8.5	2-7.5
USP Code	L1	L1	L7	L11	L11	L43	L68	L8

Shim-pack GISS Series

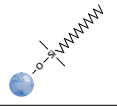
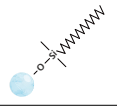
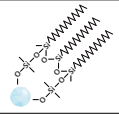
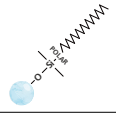
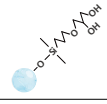
~ High Speed Analysis with High Inertness and High Stability ~

- Optimization of surface area of the inert fully porous silica using wider pore sizes provides rapid separation with excellent peak shapes

Shim-pack GIS Series

~ High Surface Area Fully Porous Silica ~

- Shim-pack GIS C18 is a fully porous high surface area column offering high retention and suitable fore preparative purification application.

	Shim-pack GISS	Shim-pack GIS					
	Reversed Phase	Reversed Phase			Normal Phase/RP		HILIC
	C18	C18	C18-P	RP-Shield	CN	SIL	HILIC
Chemistry							
Bonded Phase	Octadecyl groups	Octadecyl groups	Octadecyl groups	Octadecyl groups	Cyanopropryl groups	-	Diol groups
Features	High speed analysis with ultra-high inertness and high stability	High retentivity, lower column back pressure, high inertness	High steric selectivity	Embedded with a polar functional group	Suitable in either reversed phase or normal phase mode	Suitable in either reversed phase or normal phase mode	Ideal for the separation of highly polar basic compounds
Particle Size (μm)	1.9, 3, 5	2, 3, 4, 5, 10	3, 5	5	3, 5	3, 5	3, 5
Pore Size (nm)	20	10	10	10	10	10	10
Surface Area (m^2/g)	200	450	450	450	450	450	450
Carbon Loading (%)	9	15	29	9	14	-	20
End Cap	Yes	Yes	No	No	No	No	No
pH Range	1-10	2-7.5	2-7.5	2-7.5	2-7.5	2-7.5	2-7.5
USP Code	L1	L1	L1	L1	L10	L3	L20

Shim-pack GIST C18

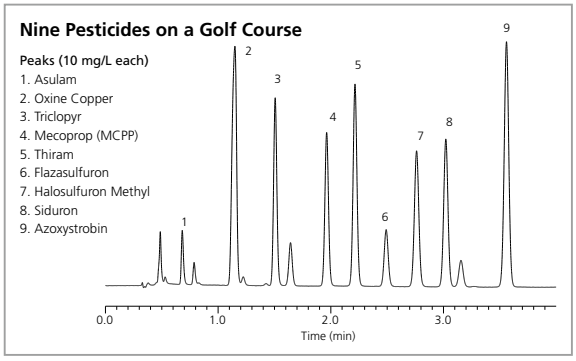
Ultra-High Inertness, High Stability

Shim-pack GIST C18 has superior inertness, which improves analysis precision and increases column stability. 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 m^2/g
Carbon Loading	14 %
End-capping	Yes
pH Range	1 - 10
USP Code	L1

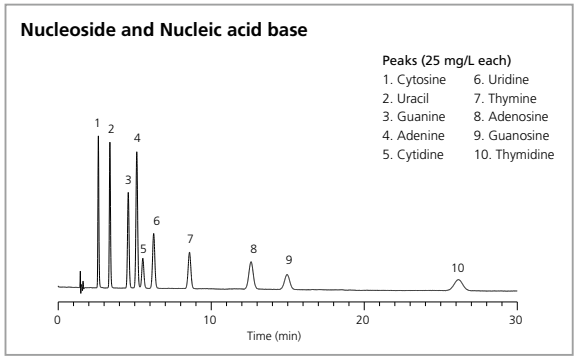
Analysis Examples

Nine Pesticides on a Golf Course



Conditions
Column : Shim-pack GIST-HP C18 (150 mm × 3.0 mm I.D., 3 µm) (P/N: 227-30040-05)
Mobile phase : A) 50 mmol/L Monopotassium phosphate buffer solution (pH 3.5)
B) Acetonitrile
40%B (0 min)→60%B (4 min)
Flow rate : 1.5 mL/min
Column temp. : 40 °C
Detection : UV 235 nm
Injection volume : 5.0 µL

Nucleoside and Nucleic acid base



Conditions
Column : Shim-pack GIST C18 (150 mm × 4.6 mm I.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
Column temp. : 40 °C
Detection : UV 260 nm
Injection volume : 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 (2 pcs)				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 (2 pcs) 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

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	-	80
	50	227-30001-02	227-30002-02	-	
	75	227-30001-03	227-30002-03	-	
	100	227-30001-04	227-30002-04	-	
	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 (2 pcs)			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 (2 pcs) 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

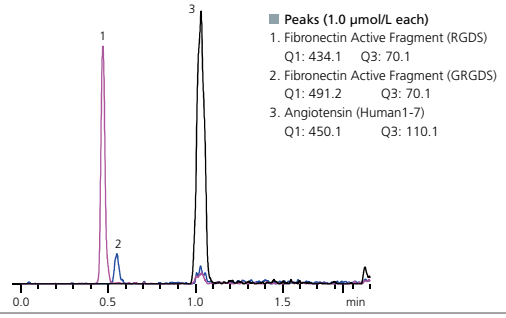
Excellent Retentivity of Highly Polar Compounds

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 m^2/g
Carbon Loading	13 %
End-capping	Yes
pH Range	1 - 10
USP Code	L1

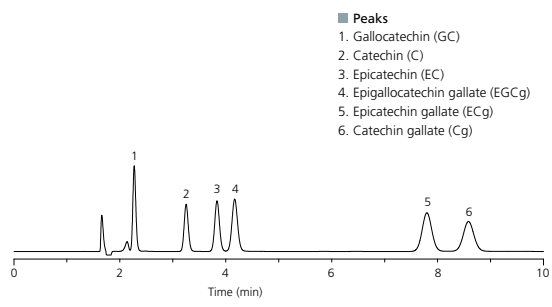
Analysis Example

Analysis of Polar Peptides



Conditions
Column : Shim-pack GIST C18-AQ (100 mm × 2.1 mm I.D., 1.9 µm) (P/N: 227-30807-02)
Mobile phase : A) 0.1 % Formic acid in Water
B) Acetonitrile
0%B (0-0.5 min)→85%B (1.5 min)→0%B (1.52-2.5 min)
Flow rate : 0.8 mL/min
Column temp. : 40 °C
Detection : LC/MS/MS (LCMS-8030, ESI, Positive, SRM)
Injection volume : 2 µL

Analysis of Catechin



Conditions
Column : Shim-pack GIST C18-AQ (150 mm × 4.6 mm I.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
Column 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 (2 pcs)				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 (2 pcs) 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	-	80
	100	227-30807-02	227-30808-02	-	
	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 (2 pcs)			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 (2 pcs) 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

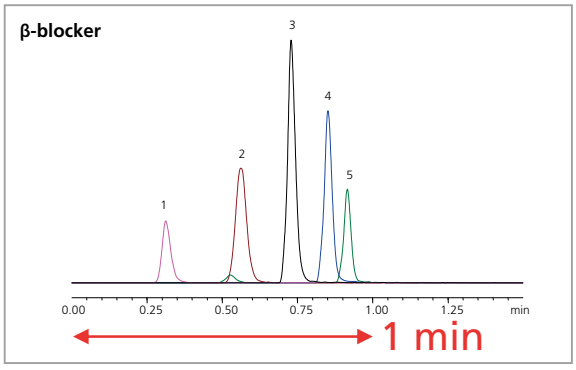
Shim-pack GISS C18

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 - 10
USP Code	L1

Analysis Example



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 mm × 2.1 mm I.D., 1.9 µm) (P/N: 227-30048-01)
Mobile phase	: A) 10 mmol/L Ammonium formate in Water B) 10 mmol/L Ammonium formate in Methanol 30%B (0-0.3 min)→60%B (0.8 min)→100%B (0.9 min)→30%B (0.91-1.4 min)
Flow rate	: 0.6 mL/min
Column temp.	: 40 °C
Detection	: LC/MS/MS (ESI, Positive, Negative MRM)

Analytical Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	30	227-30050-01	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 (2 pcs)				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 (2 pcs) 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	-	80
	100	227-30048-02	227-30049-02	-	
	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 (2 pcs)			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 (2 pcs) 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

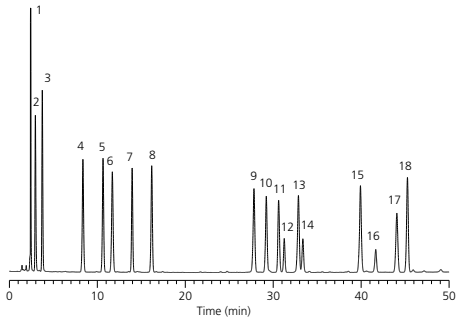
High Retentivity, Lower Column Back Pressure

Widely used octadecyl bonded silica gel enables the Shim-pack GIS C18 to have strong hydrophobic interaction and low adsorption 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	2 µm, 3 µm, 4 µm, 5 µm, 10 µm
Pore Size	10 nm
Surface Area	450 m^2/g
Carbon Loading	15 %
End-capping	Yes
pH Range	2 - 7.5
USP Code	L1

Analysis Example

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 mm × 4.6 mm I.D., 4 µm) (P/N: 227-30100-07)
Mobile phase : A) 10 mmol/L Disodium phosphate buffer solution (pH 6.9)
B) Acetonitrile
10%B (0 min)→35%B (50 min)
Flow rate : 1.0 mL/min
Detection : UV 270 nm
Column temp. : 40 °C
Injection volume : 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)	4.0	4.6
10	150	227-30111-01	227-30112-01
	250	227-30111-02	227-30112-02

Cartridge Guard Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)				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 (2 pcs) 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	-	80
	50	227-30093-02	227-30094-02	-	
	75	227-30093-03	227-30094-03	-	
	100	227-30093-04	227-30094-04	-	
	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 (2 pcs)			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 (2 pcs) 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

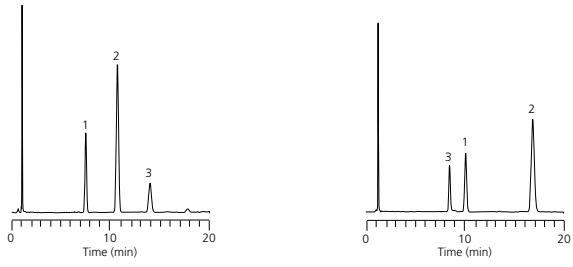
Shim-pack GIS C18-P is designed with a polymerically bonded octadecyl group, which provides high steric selectivity for separation of planar and non-planar compounds. It achieves complete baseline separation of structurally similar compounds such as vitamin D2 and D3 because of the planarity recognition 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 m^2/g
Carbon Loading	29 %
End-capping	-
pH range	2 - 7.5
USP Code	L1

Analysis Example

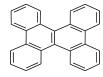
Due to increased retention of planar structural compounds, Shim-pack GIS C18-P shows different selectivity compared to Shim-pack GIS C18.

Analysis of Planar and Non-planar Compounds

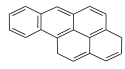


Peaks
1. Phenanthro[3,4-c]phenanthrene (PhPh)

2. Tetrabenzonaphthalene (TBN)



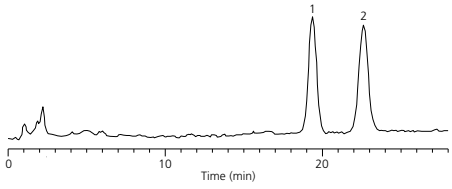
3. Benzo[a]pyrene (BaP)



Conditions

Column	: 250 mm × 4.6 mm I.D., 5 µm
Mobile phase	: A) Water B) Acetonitrile A/B = 15/85 (v/v)
Flow rate	: 2.0 mL/min
Column temp.	: 30 °C
Detection	: UV 254 nm
Samples	: Standard Reference Material 869

Analysis of Vitamin D in Food



Peaks (0.1 mg/L each)
1. Vitamin D2 (Calciferol)
2. Vitamin D3 (Cholecarciferol)

Conditions

Column	: Shim-pack GIS C18-P (250 mm × 4.6 mm I.D., 5 µm, P/N: 227-30557-07)
Mobile phase	: Acetonitrile
Flow rate	: 1.5 mL/min
Column temp.	: 40 °C
Detection	: UV 265 nm
Injection volume	: 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 (2 pcs)				Holder
		1.0	1.5	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 (2 pcs) 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 72.

Shim-pack GIS RP-Shield

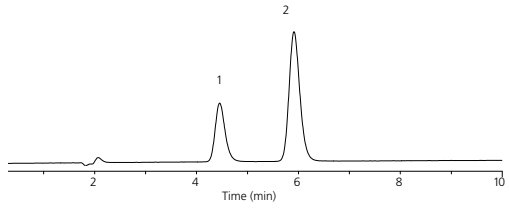
Embedded with a Polar Functional Group

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 m^2/g
Carbon Loading	9 %
End-capping	-
pH Range	2 - 7.5
USP Code	L1

Analysis Example

Analysis of Phenoxyacetic Acid and Benzoic Acid



Peaks
1. Phenoxyacetic acid
2. Benzoic acid

Conditions
Column : Shim-pack GIS RP-Shield (150 mm × 3.0 mm I.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
Column 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 (2 pcs)				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 (2 pcs) 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 GIST C8

Ultra-High Inertness, High Durability

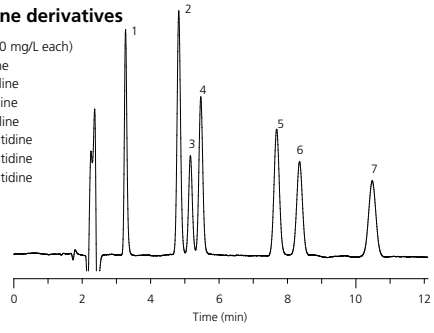
Shim-pack GIST C8 is packed with high-purity porous spherical silica for delivering the same extreme inertness to elute either basic or acidic compounds without undesired adsorption. Low retentivity and no sample adsorption enable analysis of natural samples. Shim-pack GIST C8 is the ideal choice for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

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

Analysis Examples

Pyridine derivatives

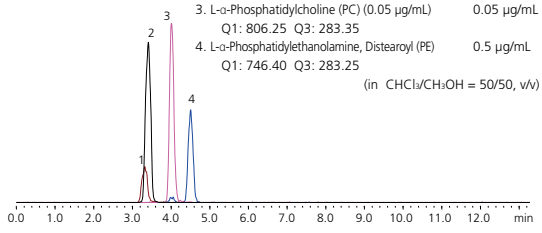
Peaks (10 mg/L each)
1. Pyridine
2. α-Picoline
3. γ-Picoline
4. β-Picoline
5. 2,6-Lutidine
6. 2,4-Lutidine
7. 3,5-Lutidine



Conditions
Column : Shim-pack GIST C8 (150 mm × 4.6 mm I.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
Column temp. : 40 °C
Detection : UV 260 nm
Injection volume : 5 µL

Phospholipids

Peaks
1. Phosphatidyl-L-Serine (PS) 10 µg/mL
Q1: 788.20 Q3: 283.30
2. L-α-Phosphatidyl-DL-glycerol, Distearoyl (PG) 0.2 µg/mL
Q1: 777.50 Q3: 283.25
3. L-α-Phosphatidylcholine (PC) (0.05 µg/mL) 0.05 µg/mL
Q1: 806.25 Q3: 283.35
4. L-α-Phosphatidylethanolamine, Distearoyl (PE) 0.5 µg/mL
Q1: 746.40 Q3: 283.25
(in $CHCl_3/CH_3OH$ = 50/50, v/v)



Conditions
Column : Shim-pack GIST C8 (150 mm × 2.1 mm I.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
Column temp. : 40 °C
Detection : LC/MS/MS (ESI, Negative, MRM)
Injection volume : 2 µL

Analytical Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30164-01	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

Shim-pack GIST C8

Cartridge Guard Columns

Particle Size (μm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)				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 (2 pcs) 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	-	80
	50	227-30160-02	227-30161-02	-	
	75	227-30160-03	227-30161-03	-	
	100	227-30160-04	227-30161-04	-	
	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 (2 pcs)			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 (2 pcs) 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

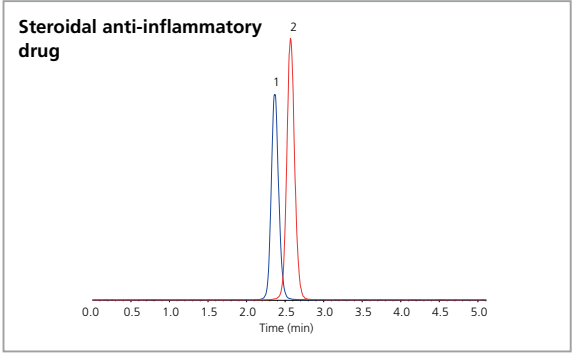
Shim-pack GIST Phenyl

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 groups
Particle Size	2 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m^2/g
Carbon Loading	10 %
End-capping	-
pH Range	2 - 7.5
USP Code	L11

Analysis Example



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

Conditions

Column	: Shim-pack GIST Phenyl (50 mm × 2.1 mm I.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
Column temp.	: 40 °C
Detection	: LC/MS/MS (ESI, Positive, MRM)
Injection volume	: 5 µL

Analytical Columns

Particle Size (µm)	Length (mm) \ I.D. (mm)	1.0	1.5	2.1	3.0	4.0	4.6
3	20	-	-	227-30211-01	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

Shim-pack GIST Phenyl

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)				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 (2 pcs) 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	-	80
	50	227-30207-02	227-30208-02	-	
	75	227-30207-03	227-30208-03	-	
	100	227-30207-04	227-30208-04	-	
	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 (2 pcs)			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 (2 pcs) 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

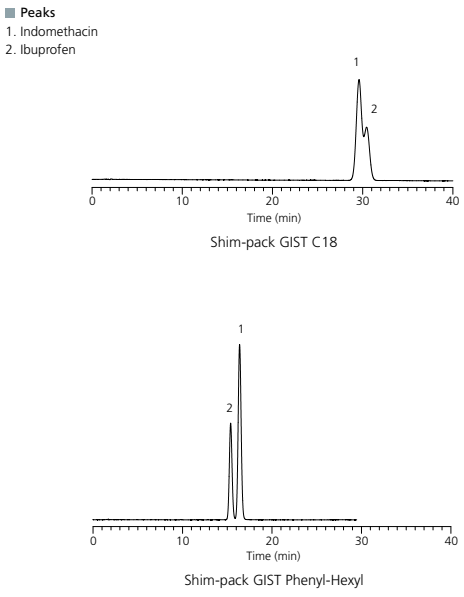
Shim-pack GIST Phenyl-Hexyl columns are bonded with a phenyl ring together with a hexyl (C6) chain, which provides complementary selectivity to straight alkyl-chain columns due to its π-π interactions and hydrophobic interactions. Furthermore, Shim-pack GIST Phenyl-Hexyl maintains the same ultra-high 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 - 10
USP Code	L11

Analysis Example

Different Selectivity to Shim-pack GIST C18

Analysis of Analgesic Drugs

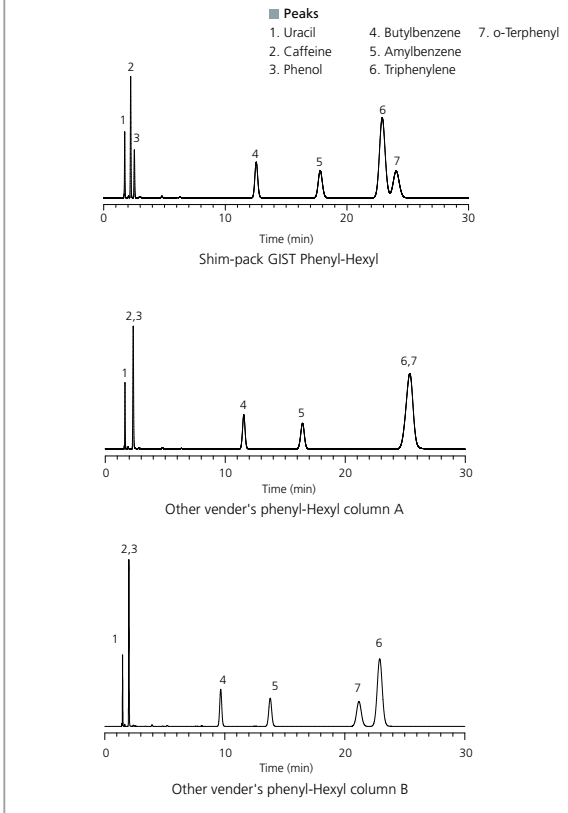


Conditions

Column : 150 mm × 4.6 mm I.D., 5 µm
Mobile phase : A) Acetonitrile
B) 25 mmol/L Monopotassium phosphate buffer solution (pH 3.0)
A/B = 45/55 (v/v)
Flow rate : 1.0 mL/min
Column temp. : 40 °C
Detection : UV 230 nm

Stronger Retentivity Than Other Phenyl Phase

Analysis of Samples for Column Selectivity



Conditions

Column : 150 mm × 4.6 mm I.D., 5 µm
Mobile phase : A) Water
B) Methanol
A/B = 30/70 (v/v)
Flow rate : 1.0 mL/min
Column temp. : 40 °C
Detection : UV 254 nm

Shim-pack GIST Phenyl-Hexyl

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 (2 pcs)				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 (2 pcs) and Holder			
		1.0	1.5	3.0	4.0
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	
	75	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 (2 pcs)			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 (2 pcs) 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

Excellent Retention of Highly Polar Bases

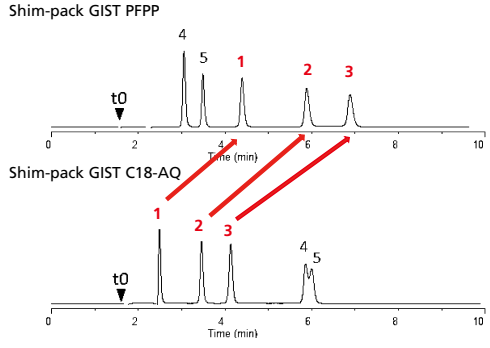
Shim-pack GIST PFPP delivers unique separation patterns by multiple interactions such as π-π, dipole, hydrogen bonding and ionic interactions with ultra high inertness and stability which are characteristics of Shim-pack GIST Series.

One of the characteristics of Shim-pack GIST PFPP column is its extremely strong retention capability highly polar basic compounds. In addition, the inertness of Shim-pack GIST PFPP columns offer excellent peak symmetry for compounds that commonly adsorb to conventional column packing.

Bonded Phase	Pentafluorophenyl propyl groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m^2/g
Carbon Loading	10 %
End-capping	Yes
pH Range	2 - 7.5
USP Code	L43

Analysis Example

Stronger Retentivity of Highly Polar Bases than Shim-pack GIST C18-AQ

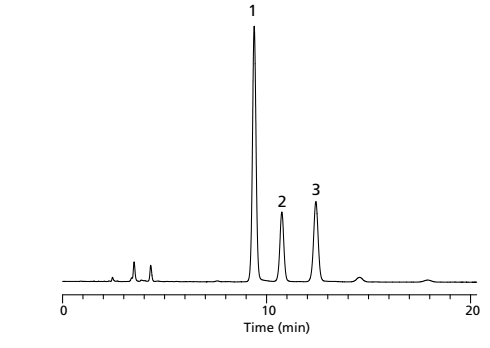


Peaks
1. Norepinephrine
2. L-Adrenaline
3. Dopamine
4. L-DOPA
5. L-(-)-Tyrosine

Conditions
Column : 150 mm × 2.1 mm I.D., 3 µm

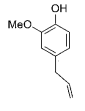
Mobile phase : 10 mM $HCOONH_4$ + 0.1 % HCOOH in H_2O
Flow rate : 0.2 mL/min
Column temp. : 40 °C
Detection : UV 210 nm

Good Separation of Geometrical Isomers

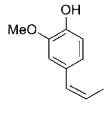


Conditions
Column : Shim-pack GIST-HP PFPP (150 mm × 2.1 mm I.D., 3 µm, P/N: 227-30890-05)
Mobile phase : A) Methanol
B) H_2O
A/B = 40/60, v/v
Flow rate : 0.2 mL/min
Column temp. : 40 °C
Detection : UV 210 nm
Injection volume : 2.5 µL

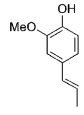
1. Eugenol



2. *cis*-Isoeugenol



3 *trans*-Isoeugenol



Shim-pack GIST PFPP

Order Information

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	-	227-30863-01	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 (2 pcs)				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 (2 pcs) 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 Column (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 (2 pcs)			Pressure Tolerance (MPa)	Holder
		1.5	2.1	3.0		
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 (2 pcs) and Holder			Pressure Tolerance (MPa)
		1.5	2.1	3.0	
3	10	227-30893-02	227-30894-02	227-30895-02	80

Shim-pack GIST Amide

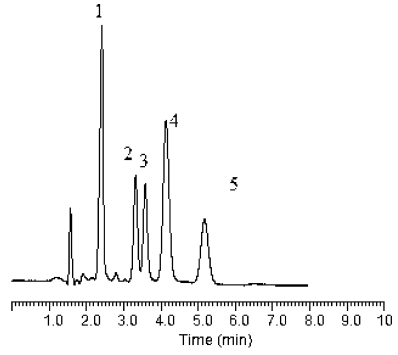
Enhanced Retention of Polar Analytes with Higher Chemical Stability

Shim-pack GIST Amide provides relatively strong retention of highly polar compounds in HILIC mode due to its amide (carbamoyl group) ligand. It is also highly stable, which is a characteristic of Shim-pack GIST series. The column also exhibits great stability under 100% aqueous mobile phase conditions.

Bonded Phase	Carbamoyl groups
Particle Size	1.9 µm, 3 µm, 5 µm
Pore Size	10 nm
Surface Area	350 m^2/g
Carbon Loading	15 %
End-capping	Yes
pH Range	2 - 8.5
USP Code	L68

Analysis Example

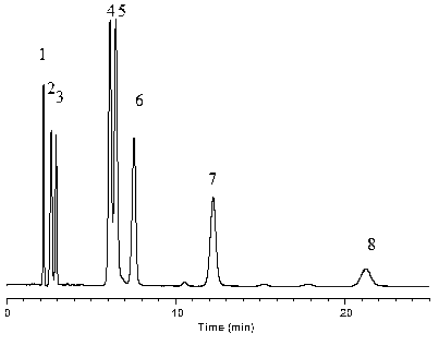
Analysis of Tasty Components



Peaks
1. Succinic acid 5 mg/mL
2. Glutamic acid 5 mg/mL
3. Aspartic acid 5 mg/mL
4. Inosinic acid (IMP) 0.1 mg/mL
5. Guanylic acid (GMP) 0.1 mg/mL

Conditions
Column : Shim-pack GIST Amide (150 mm × 2.1 mm I.D., 5 µm, P/N: 227-30824-06)
Mobile phase : A) Acetonitrile
B) 25 mM Phosphate Buffer (K^2HPO^4 and KH^2PO^4)
A/B = 75/25 (v/v)
Flow rate : 0.2 mL/min
Column temp. : 40 °C
Detection : UV 210 nm
Injection volume : 1 µL

Analysis of Purine Bases



Peaks
1. Caffeine
2. Theophylline
3. Theobromine
4. Hypoxanthine
5. Adenine
6. Xanthine
7. Guanine
8. Uric acid
(100 mg/L each)

Conditions
Column : Shim-pack GIST Amide (150 mm × 2.1 mm I.D., 5 µm, P/N: 227-30824-06)
Mobile phase : A) Acetonitrile
B) 50 mM $HCOONH^4$ in H^2O
C) HCOOH
A/B/C = 90/10/0.1 (v/v/v)
Flow rate : 0.2 mL/min
Column temp. : 40 °C
Detection : UV 254 nm
Injection volume : 0.5 µL

Shim-pack GIST Amide

Order Information

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 (2 pcs)				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 (2 pcs) 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

Analytical Column (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3	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	

Cartriege Guard Columns (High-Pressure Series)

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)		Pressure Tolerance (MPa)	Holder
		2.1	3		
1.9	10	227-30949-01	227-30950-01	80	227-30533-01

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartriege Guard Column (2pcs)		Pressure Tolerance (MPa)
		2.1	3	
1.9	10	227-30949-02	227-30950-02	80

Shim-pack GIS HILIC

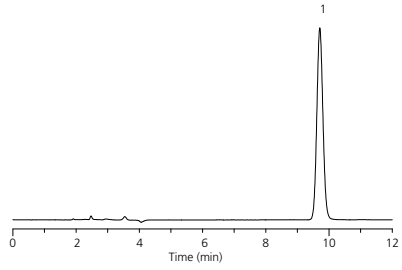
Ideal for the Separation of Highly Polar Basic Compounds

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 m^2/g
Carbon Loading	20 %
End-capping	-
pH Range	2 - 7.5
USP Code	L20

Analysis Example

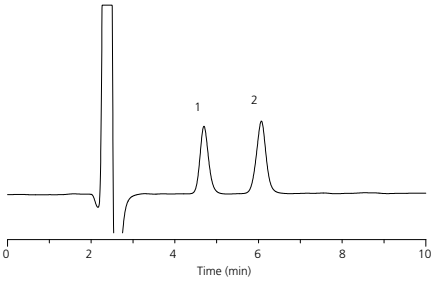
Analysis of Allantoin



Peaks
1. Allantoin

Conditions
Column : Shim-pack GIS HILIC (250 mm × 3.0 mm I.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
Column 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 mm I.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
Column temp. : 40 °C
Detection : RID (35 °C, positive)
Injection volume : 20 µL

Shim-pack GIS HILIC

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 (2 pcs)				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 (2 pcs) 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 72.

Shim-pack GIST NH2

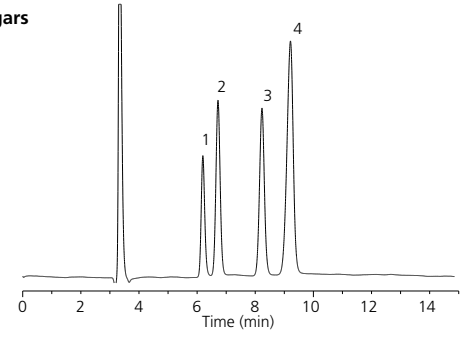
Ideal for Sugar Analysis

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

Analysis Examples

Sugars

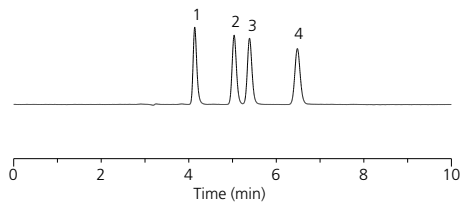


Peaks
1. Fructose
2. Glucose
3. Sucrose
4. Maltose

Conditions

Column	: Shim-pack GIST NH2 (250 mm × 4.6 mm I.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
Column temp.	: 40 °C
Detection	: RID
Injection volume	: 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 mm × 4.6 mm I.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
Column temp.	: 30 °C
Detection	: UV 290 nm
Injection volume	: 10 µL

Shim-pack GIST NH2

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 (2 pcs)				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 (2 pcs) 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 GIS CN

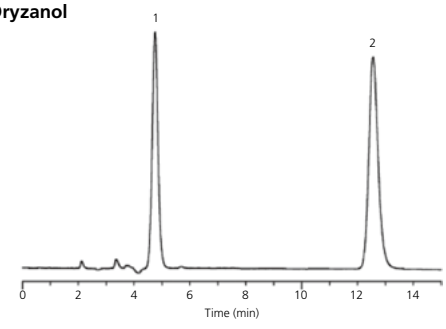
Suitable in Either Reversed Phase or Normal Phase Mode

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 groups
Particle Size	3 µm, 5 µm
Pore Size	10 nm
Surface Area	450 m^2/g
Carbon Loading	14 %
End-capping	-
pH Range	2 - 7.5
USP Code	L10

Analysis Examples

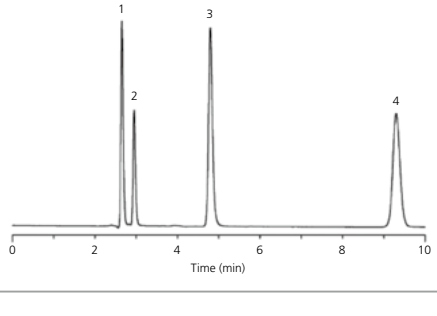
γ - Oryzanol



Peaks
1. gamma-oryzanol
2. vanillin

Conditions
Column : Shim-pack GIS CN (150 mm × 4.6 mm I.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
Column temp. : 30 °C
Detection : UV 320 nm
Injection volume : 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 mm × 4.6 mm I.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
Column temp. : 40 °C
Detection : UV 210 nm
Injection volume : 5 µL

Shim-pack GIS CN

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 (2 pcs)				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 (2 pcs) 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

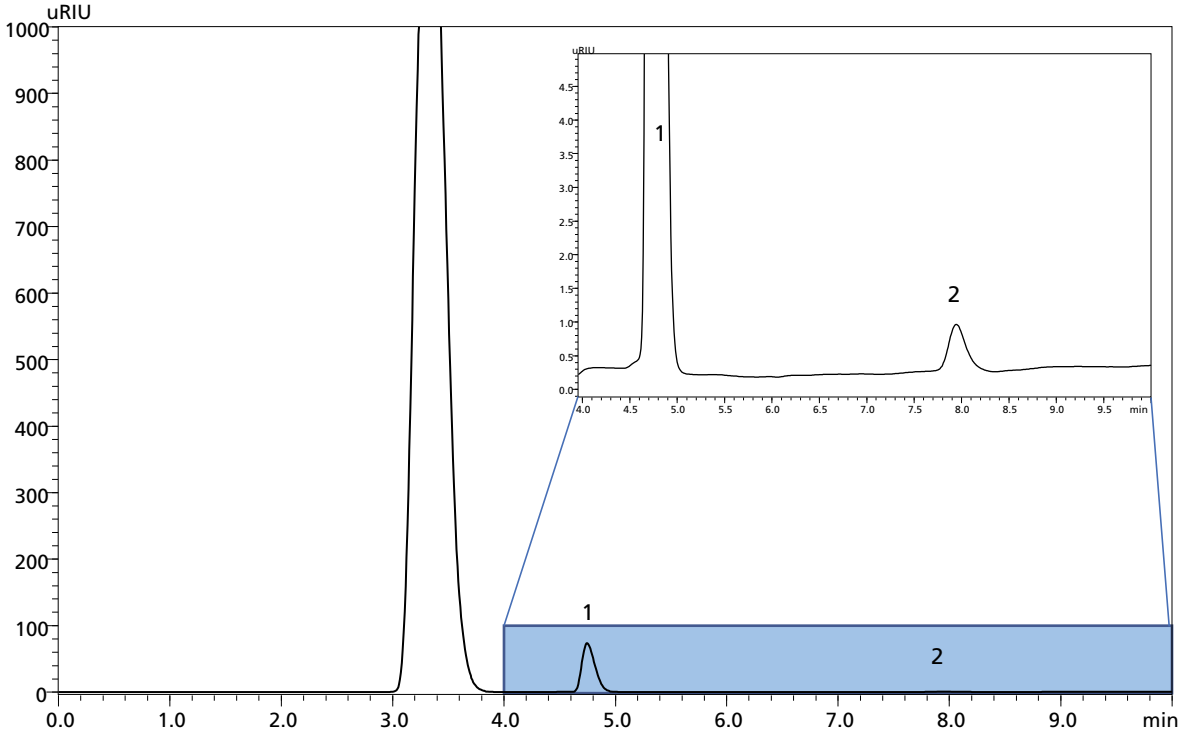
Shim-pack GIS SIL

Suitable in Either Reversed Phase or Normal Phase Mode

Shim-pack GIS SIL is a high quality of pure silica gel column that achieves separation with sharp peaks and provides high column-to-column reproducibility. Shim-pack GIS SIL tends to strongly retain basic compounds due to the silanol groups of the silica gel.

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

Analysis Examples



Conditions

Column	: Shim-pack GIS SIL (250 mm × 4.6 mm I.D., 5 µm) (P/N: 227-30954-28)
Mobile phase	: n-Hexane / 2-Propanol = 0.4 / 99.6 v/v
Flow rate	: 1.0 mL/min
Column temp.	: 40 °C
Detection	: RID-20A
Injection volume	: 5.0 µL

Peaks

1. Methyl Stearate
2. Trilinolein

Shim-pack GIS SIL

Analytical Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	2.1	3.0	4.0	4.6
3	30	227-30953-01	227-30953-08	227-30953-15	227-30953-22
	33	227-30953-02	227-30953-09	227-30953-16	227-30953-23
	50	227-30953-03	227-30953-10	227-30953-17	227-30953-24
	75	227-30953-04	227-30953-11	227-30953-18	227-30953-25
	100	227-30953-05	227-30953-12	227-30953-19	227-30953-26
	150	227-30953-06	227-30953-13	227-30953-20	227-30953-27
	250	227-30953-07	227-30953-14	227-30953-21	227-30953-28
5	30	227-30954-01	227-30954-08	227-30954-15	227-30954-22
	33	227-30954-02	227-30954-09	227-30954-16	227-30954-23
	50	227-30954-03	227-30954-10	227-30954-17	227-30954-24
	75	227-30954-04	227-30954-11	227-30954-18	227-30954-25
	100	227-30954-05	227-30954-12	227-30954-19	227-30954-26
	150	227-30954-06	227-30954-13	227-30954-20	227-30954-27
	250	227-30954-07	227-30954-14	227-30954-21	227-30954-28

Cartridge Guard Columns

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs)				Holder
		1.0	1.5	3.0	4.0	
3	10	-	227-30955-01	227-30955-03	227-30955-07	227-30532-01
	20	-	-	227-30955-05	227-30955-09	227-30532-02
5	10	-	227-30955-11	227-30955-13	227-30955-17	227-30532-01
	20	-	-	227-30955-15	227-30955-19	227-30532-02

Particle Size (µm)	I.D. (mm) / Length (mm)	Cartridge Guard Column (2 pcs) and Holder			
		1.0	1.5	3.0	4.0
3	10	-	227-30955-02	227-30955-04	227-30955-08
	20	-	-	227-30955-06	227-30955-10
5	10	-	227-30955-12	227-30955-14	227-30955-18
	20	-	-	227-30955-16	227-30281-20

Shim-pack GWS C18

Economical Choice

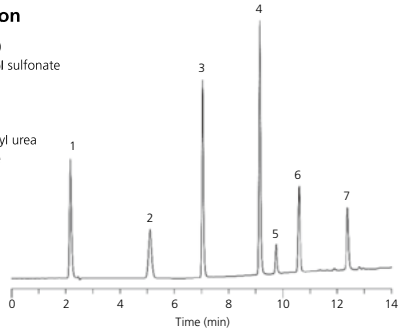
Shim-pack GWS C18 is packed with high-purity silica gel. A uniform pore size ensures low pressure, while complete end-capping makes it possible for analysis of acidic or basic compounds.
Shim-pack GWS series is an ideal choice for cost control.

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 - 7.5
USP Code	L1

Analysis Examples

Cold medication

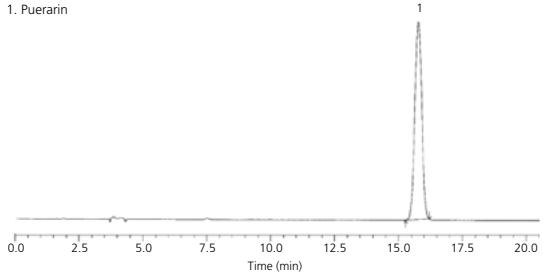
Peaks (10 mg/L each)
1. Potassium Guaiacol sulfonate
2. Acetaminophen
3. Caffeine
4. Ethenzamide
5. Allyl isopropyl acetyl urea
6. Isopropylantipyrine
7. Ibuprofen



Conditions
Column : Shim-pack GWS C18 (150 mm × 4.6 mm I.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
Column temp. : 40 °C
Detection : UV 210 nm
Injection volume : 10 µL

Puerariae radix

Peaks
1. Puerarin



Conditions
Column : Shim-pack GWS C18 (250 mm × 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
Column temp. : 20 °C
Detection : UV 250 nm
Injection volume : 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 (2 pcs)	Holder	Cartridge Guard Column (2 pcs) and Holder
		4.0		4.0
5	10	227-30159-01	227-30532-01	227-30159-02

Shim-pack VP/XR Series

Shim-pack XR-ODS II / III

While the Shim-pack XR-ODSII 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.

	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 (m^2/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

Shim-pack XR Series

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 (m^2/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

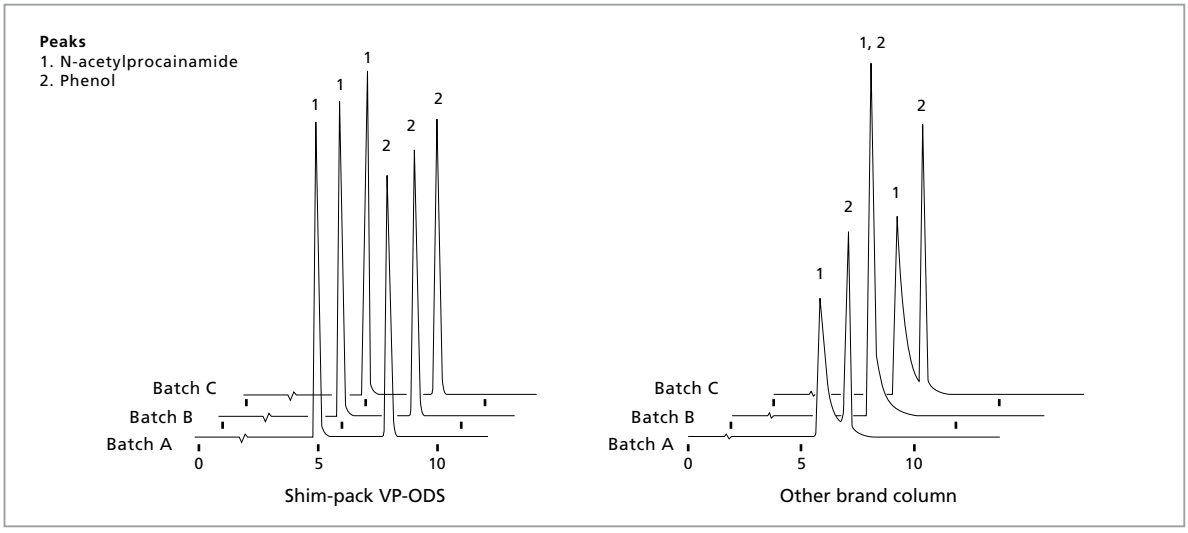
Shim-pack VP Series

Shim-pack VP-ODS columns are standard columns that use a homogeneous high-purity silica gel as the substrate. They achieve analysis with a high number of theoretical plates without raising the pressure.
They optimize the surface modification ratio and provide favorable peak shapes and separation for compounds with a wide range of physical properties.

	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 (m^2/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

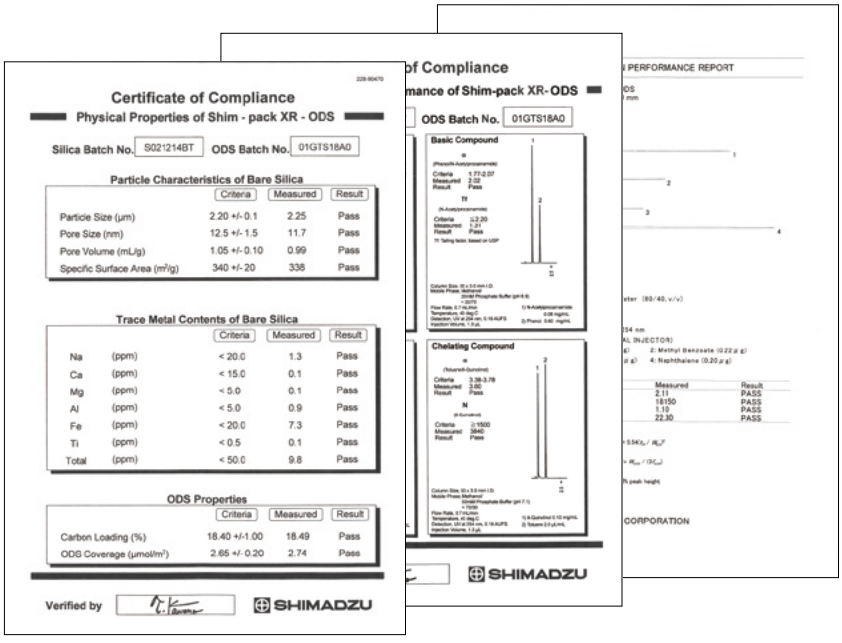
Shim-pack VP series ensures high column-to-column performance reproducibility, which is ideal for method development and validation. Silica-bases, surface treatment and packing procedures are subjected to a strict array of quality criteria tests and controlled respectively. Each column is delivered together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



Comparison of reproducibility between three batches of silica-based materials

Quality Certificate Ensuring Traceability

Multiple inspection items have been established for the Shim-pack VP/XR series including silica substrate particle size, metallic content, surface modification ratio, and packing. A quality certificate certifying that rigorous controls are enforced with respect to these inspection results is delivered with the columns, so they can be used with confidence.



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

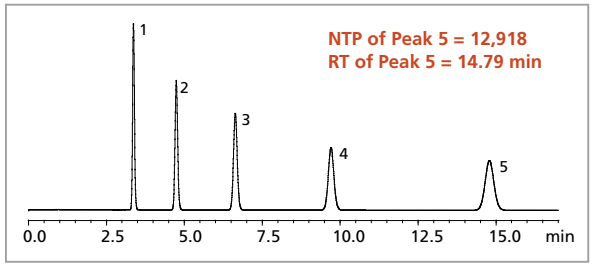
The Shim-pack XR-ODS II range includes a 1.5 mm I.D. model in addition to normal 2 mm and 3 mm I.D. columns. With an optimal flow rate of 0.2 to 0.3 mL/min, the 1.5 mm I.D. column offers the optimal flow rate for LC/MS and reduces mobile phase consumption.

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.

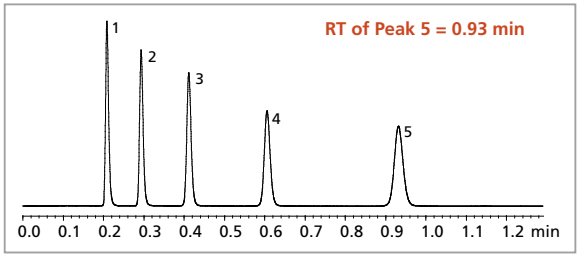
Shim-pack VP-ODS (150 mm × 4.6 mm I.D., 5 µm, P/N: 228-34937-91)

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



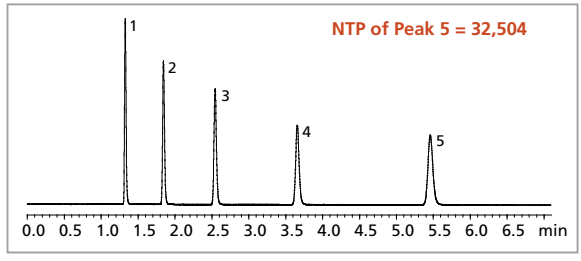
Conditions
Mobile phase : 55 % Aqueous Acetonitrile Solution
Flow rate : 1.0 mL/min
Column temp. : 40 °C
Injection volume : 5 µL

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



Conditions
Mobile phase : 55 % Aqueous Acetonitrile Solution
Flow rate : 1.1 mL/min
Column temp. : 40 °C
Injection volume : 0.5 µL

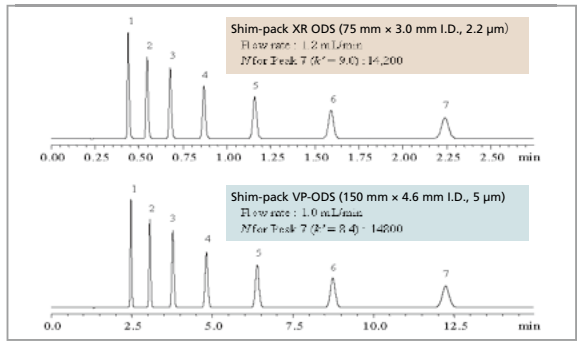
Shim-pack XR-ODS III (200 mm × 2 mm I.D., 2.2 µm, P/N: 228-59910-92)



Conditions
Mobile phase : 55 % Aqueous Acetonitrile Solution
Flow rate : 0.6 mL/min
Column temp. : 50 °C
Injection volume : 0.5 µL

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.



Order 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 III	1.6	50	-	228-59922-91	-	-	100
		75	-	228-59922-92	-	-	
	2.2	150	-	228-59910-91	-	-	
		200	-	228-59910-92	-	-	
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	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	-	

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	-

Guard 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

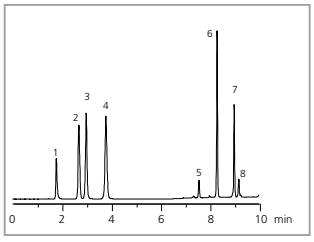
Shim-pack MAqC-ODS

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

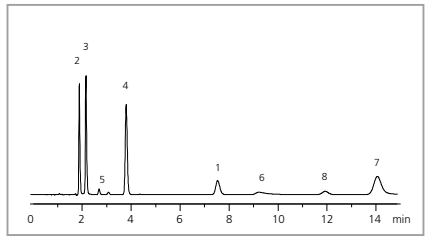


Peaks
1. Thiamine
2. Niacin
3. Nicotinamide
4. Pyridoxine
5. Ca Pantothenate
6. Folic acid
7. Riboflavin
8. Biotin

Conditions

Column	: Shim-pack MAqC-ODS I (150 mm × 4.6 mm I.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 - 2.5 min - 99/1 - 7.5 min - 50/50 - 0.01 min - 99/1 - 5 min
Flow rate	: 1.2 mL/min
Column temp.	: 40 °C
Detection	: UV 210 nm
Injection volume	: 10 µL

Shim-pack VP-ODS



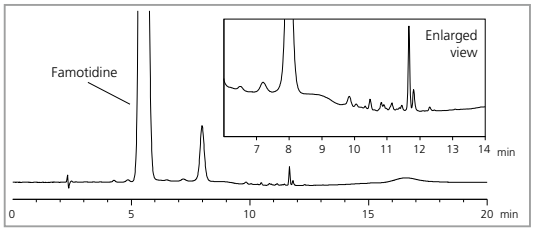
Conditions

Column	: IShim-pack VP-ODS (150 mm × 4.6 mm I.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
Column temp.	: 40 °C
Detection	: UV 210 nm
Injection volume	: 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 case of the mobile phase used for famotidine analysis with Shim-pack MAqC-ODS I, LC/MS analysis is also possible by desalting the mobile phase using an automatic pretreatment system such as Co-Sense for 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.

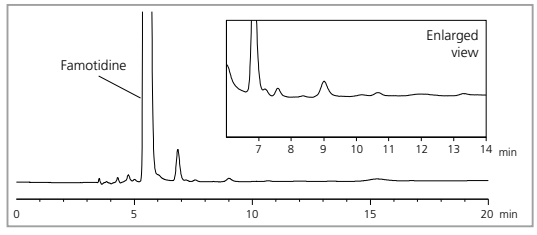
Shim-pack MAqC-ODS I



Conditions

Column	: Shim-pack MAqC-ODS I (150 mm × 4.6 mm I.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 - 5 min - 92/8 - 7 min - 50/50 - 0.01 min - 92/8 - 8 min
Flow rate	: 1.0 mL/min
Column temp.	: 25 °C
Detection	: UV 254 nm
Injection volume	: 5 µL

Shim-pack VP-ODS

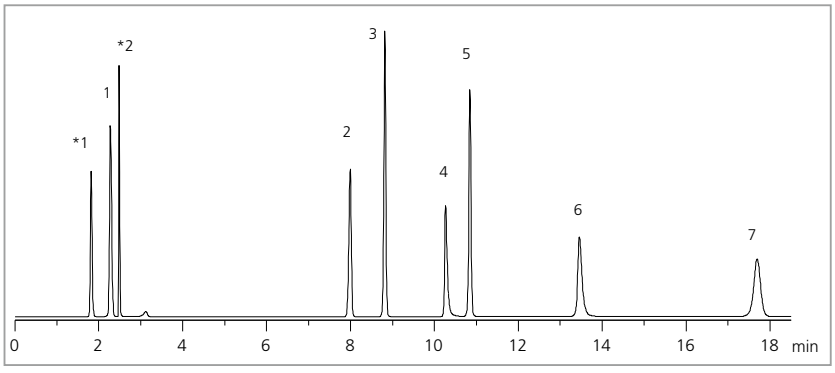


Conditions

Column	: Shim-pack VP-ODS (150 mm × 4.6 mm I.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
Column temp.	: 25 °C
Detection	: UV 254 nm
Injection volume	: 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 mm × 4.6 mm I.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 - 2 min – 99/1 – 6 min – 50/50 – 10 min – 50/50 - 0.01 min - 99/1 - 5 min
Flow rate : 1.0 mL/min
Column temp. : 40 °C
Detection : UV 220 nm
Injection volume : 10 µL

Order 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 FC-ODS

Shortens the Analysis Time Using a Conventional System

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

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

Analysis Examples

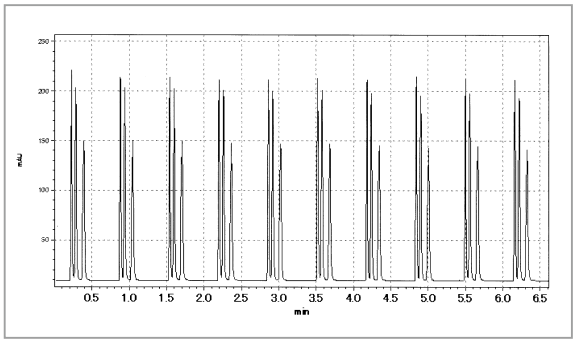
Shim-pack FC-ODS separates components by hydrophobic interaction like other ODS columns. It is possible to change to Shim-pack FC-ODS from other ODS columns under the same analytical conditions. On the other hand, hydrophilic interaction (hydrogen bond, coordination bond) has been restricted to a minimum, 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.

30 mm
Recommended for use in high-throughput analysis of samples that do not have a complex matrix.

75 mm
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.)

150 mm
Recommended for analyzing samples that are difficult to be retained in other 150 mm ODS columns.

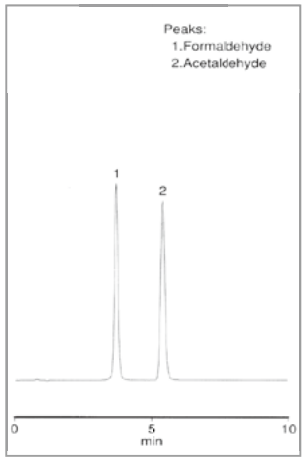
High-Throughput Analysis



10 times repeated analysis in 6.5 minutes is possible.

Conditions
Column : Shim-pack FC-ODS (30 mm × 4.6 mm I.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.8 MPa)
Column temp. : 50 °C
Detection : 254 nm Response 1, AuxRNG×2
Instrument : LC-2010+C-R8A

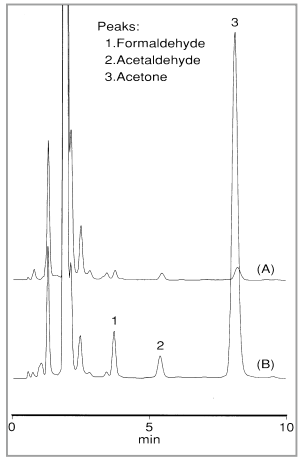
High-speed analysis of 2,4-DNPH derivatized aldehydes / ketones



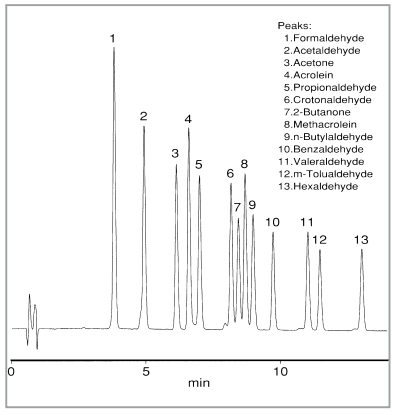
Chromatogram of Standard Sample
(formaldehyde 0.35 µg/mL, acetaldehyde 0.55 µg/mL, 10 µL injected)

Conditions

Column	: Shim-pack FC-ODS (75 mm × 4.6 mm I.D., 3 µm) (P/N: 228-40511-92)
Mobile phase	: Water/Acetonitrile = 55/45 (v/v)
Flow rate	: 1.0 mL/min
Column temp.	: 40 °C
Detection	: UV 360 nm



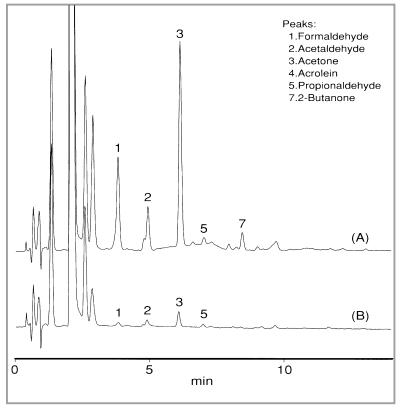
Chromatograms of Environmental Air (A) and Indoor Air at Laboratory (B)



Chromatogram of Standard Sample
(each 0.3 µg/mL as carbonyl compounds, 10 µL injected)

Conditions

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



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

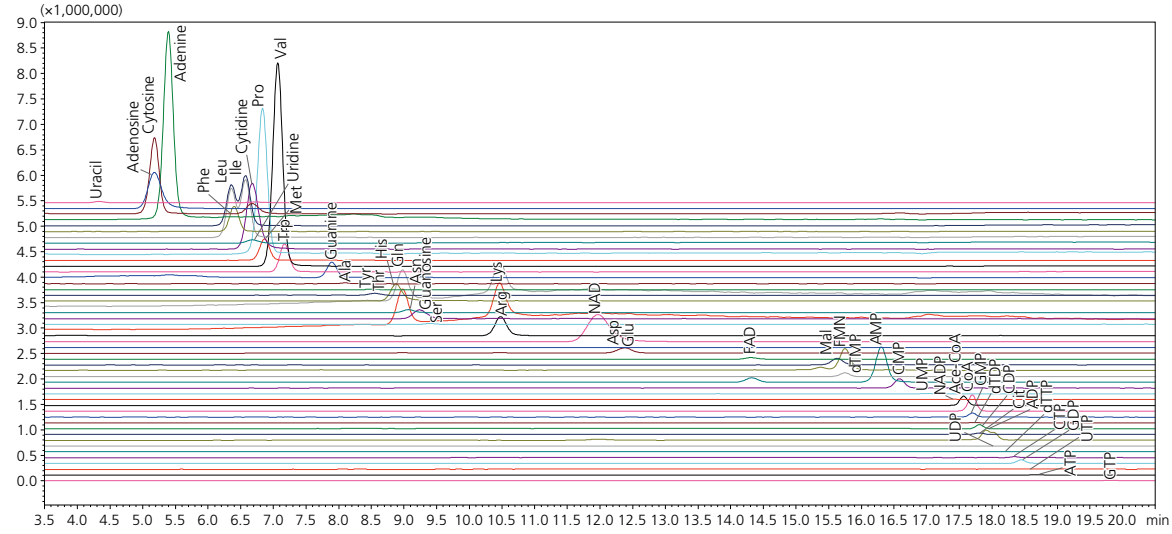
Order Information

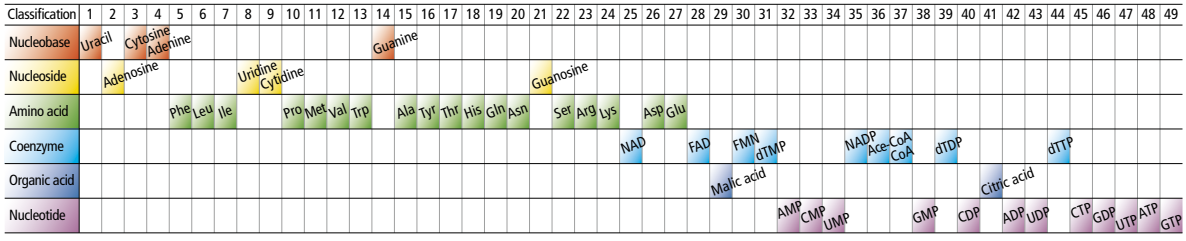
Particle Size (µm)	I.D. (mm) / Length (mm)	2.0	4.6
3	30	-	228-40511-91
	75	228-40511-94	228-40511-92
	150	228-40511-95	228-40511-93

Shim-pack Mix-HILIC

Shim-pack Mix-HILIC chromatography column for hydrophilic interactions enables separation of important amino acids in organisms as well as nucleobases, nucleosides, nucleotides, coenzymes, and organic acids via characteristic hydrophilic interactions and ionic interactions. Accordingly, it is suitable for the simultaneous monitoring of hydrophilic metabolites with a variety of physicochemical properties.

Analysis Example





Conditions

Column	: Shim-pack Mix-HILIC (150 mm ×2.1 mm I.D., 5 µm, P/N: 227-32751-01)
Mobile phase	: A) Water + 40 mmol/L ammonium bicarbonate (pH 9.7) B) Acetonitrile B conc. 95% (0-0.5 min)→ 40% (15.5 min) → 0% (16.5-26.5 min) → 95% (27.5-35 min)
Flow rate	: 0.4 mL/min
Column temp.	: 40 °C
Detection	: LC/MS/MS (LCMS-8060NX, ESI, MRM)
Injection volume	: 5 µL

Analytical Columns

Column	Particle Size	Size	P/N
Shim-pack Mix-HILIC	5 µm	150 mm × 2.1 mm I.D.	227-32751-01

It is generally known that metal chelating compounds such as compounds containing phosphate groups cause peak tailing and/or adsorption during LC analysis. These chelating compounds are widely found in metabolites, drugs and so on. The adsorption can be reduced by adding salt or chelating agents to the mobile phase. However, such eluents cannot be used for mass spectrometry analysis. In addition, there is a concern that such salts and chelating agents might remain in flow path of an HPLC system and they may be the cause of ghost peaks.
This type of adsorption is caused by the metal parts of flow path including column. PEEK column body is highly inert against chelating compounds. However it is difficult to produce high efficiency columns due to its limited pressure resistance. Mastro2 Series, Shim-pack Scepter Series and Shim-pack G Series (≦3 µm) Metal Free Columns satisfy both inertness and high pressure resistance by adopting a stainless steel column with the inner surface coated with polymer and frits made of high pressure resistant polymer, providing a completely metal free flow path.

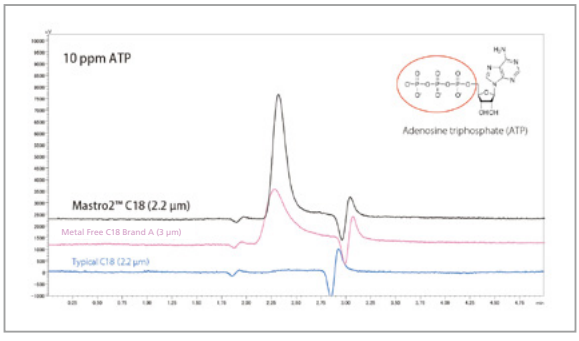
Mastro2 Series

Because of its innovative column hardware design, Mastro2 series column is less prone to metal chelate formation than a typical metal free column, as well as less likely to deform the polymer part inside the column, which is a problem with typical metal free columns. It is therefore less prone to problems compared to other typical metal free columns.

Stable and Reliable Data

A typical C18 column, a typical metal free C18 column and Mastro2 C18 column were compared for ATP analysis. Along with increase peak response, the resulting CV shows very little variation in peak area with Mastro2 C18. In addition, since the peak shape was also improved, the S/N ratio was large and the detection sensitivity was also improved.

Analysis of 10 ppm ATP



Conditions

LC System	: Nexera Bio
Column Dimension	: 150 mm × 2.0 (or 2.1) mm I.D.
Mobile phase	: A) 10 mM $HCOONH_4$ in H_2O B) Acetonitrile A/B = 95/5, v/v
Flow rate	: 0.2 mL/min
Column temp.	: 40 °C
Detection	: UV 254 nm
Injection volume	: 1 µL
Sample	: ATP (10 ppm)

	Area average (n=3)	CV	Asymetry	S/N
Mastro2 C18	50482	0.4	1.47	109
Metal Free C18 Brand A	38481	4.5	1.83	46
Typical C18	No data	-	-	-

Order Information

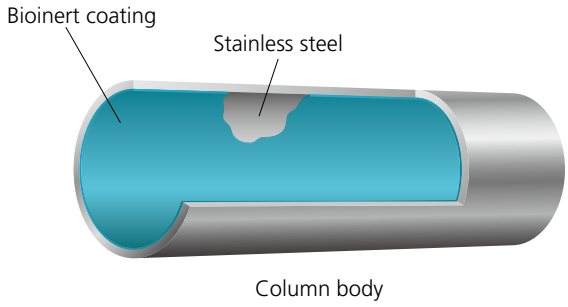
Analytical Columns

P/N	Description
370-01003-44	Mastro2 C18, 50 mm × 2.0 mm I.D. 2.2 µm
370-01003-64	Mastro2 C18, 100 mm × 2.0 mm I.D. 2.2 µm
370-01003-84	Mastro2 C18, 150 mm × 2.0 mm I.D. 2.2 µm
370-01007-44	Mastro2 C18, 50 mm × 2.0 mm I.D. 5.0 µm
370-01007-64	Mastro2 C18, 100 mm x 2.0 mm I.D. 5.0 µm
370-01007-84	Mastro2 C18, 150 mm × 2.0 mm I.D. 5.0 µm
370-01015-64	Mastro2 PFP, 100 mm × 2.0 mm I.D. 3 µm
370-01015-84	Mastro2 PFP, 150 mm × 2.0 mm I.D. 3 µm

Shim-pack Scepter Claris

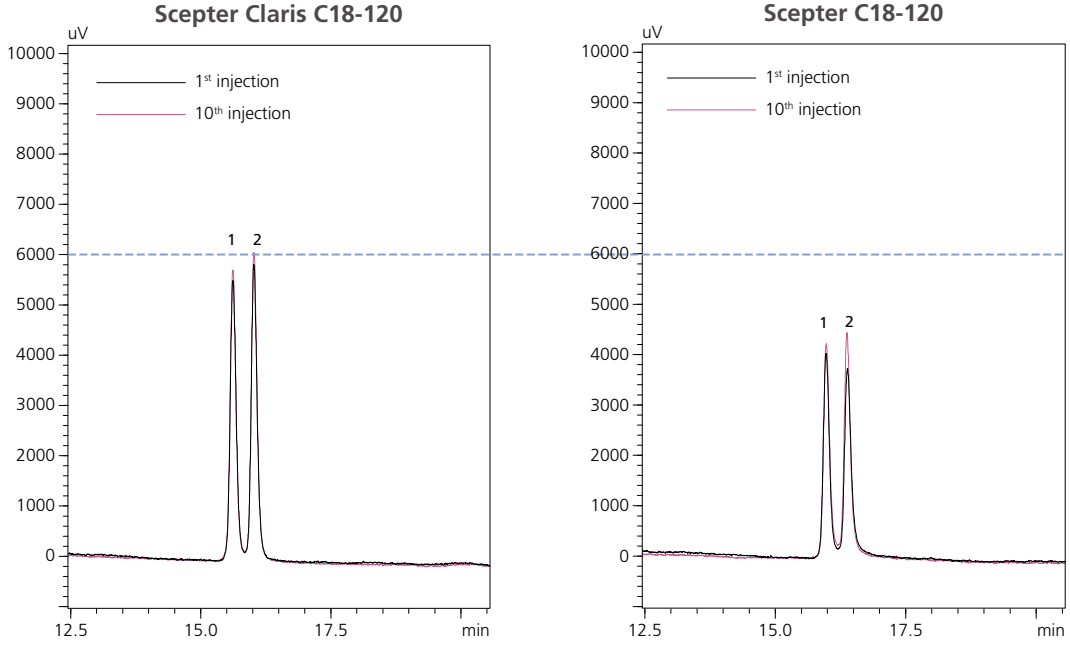
Shim-pack Scepter Claris features a column body with a newly-developed bioinert coating packed with Scepter series stationary phases.

- Bioinert coating is applied to the column body and stainless steel frit
- Ideal for analysis of metal-coordinating and hydrophobically adsorbing compounds such as nucleic acids, proteins, and lipids
- Outstanding pH and lifetime stability due to Scepter organic silica hybrid packing



Superior Sensitivity and Separation Performance in Nucleic Acid Analysis

Shim-pack Scepter Claris C18-120 with the bioinert coating and Scepter C18-120 with traditional stainless steel hardware were compared in this example of an analysis of a synthetic oligonucleotide. Results from Claris were highly sensitive and reproducible from the rst injection, with no loss of sample signal. Scepter C18-120 in a stainless steel column body produced low-sensitivity results and showed adsorption from the rst sample injection



System	: Nexera XS inert
Mobile phase	: A) 100 mmol/L HFIP + 10 mmol/L TEA in water B) Methanol
Flow rate	: 0.3 mL/min
Column temp.	: 60 °C
Injection volume	: 1 µL
Sample	: 1.Synthetic oligonucleotide 20 mer (10 mg/L) 2.Synthetic oligonucleotide 21 mer (10 mg/L)
Detection	: UV 260 nm

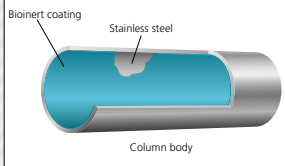
Shim-pack Scepter Claris Series

Shim-pack Scepter Claris

Chemistry		C18-120			HD-C18-80			C18-300		
Particle Size (μm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31210-01			227-31211-01			227-31209-01		
	75									
	100	227-31210-02			227-31211-02			227-31209-02		
	150	227-31210-03			227-31211-03			227-31209-03		
3	50	227-31210-04		227-31210-07	227-31211-04		227-31211-07	227-31209-04		227-31209-07
	75									
	100	227-31210-05		227-31210-08	227-31211-05		227-31211-08	227-31209-05		227-31209-08
	150	227-31210-06		227-31210-09	227-31211-06		227-31211-09	227-31209-06		227-31209-09
	250									
5	50	227-31210-10		227-31210-13	227-31211-10		227-31211-13	227-31209-10		227-31209-13
	75									
	100	227-31210-11		227-31210-14	227-31211-11		227-31211-14	227-31209-11		227-31209-14
	150	227-31210-12		227-31210-15	227-31211-12		227-31211-15	227-31209-12		227-31209-15
	250									

Chemistry		C8-120			C4-300			Phenyl		
Particle Size (μm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31212-01			227-31208-01			227-31215-01		
	75									
	100	227-31212-02			227-31208-02			227-31215-02		
	150	227-31212-03			227-31208-03			227-31215-03		
3	50	227-31212-04		227-31212-07	227-31208-04		227-31208-07	227-31215-04		227-31215-07
	75									
	100	227-31212-05		227-31212-08	227-31208-05		227-31208-08	227-31215-05		227-31215-08
	150	227-31212-06		227-31212-09	227-31208-06		227-31208-09	227-31215-06		227-31215-09
	250									
5	50	227-31212-10		227-31212-13	227-31208-10		227-31208-13	227-31215-10		227-31215-13
	75									
	100	227-31212-11		227-31212-14	227-31208-11		227-31208-14	227-31215-11		227-31215-14
	150	227-31212-12		227-31212-15	227-31208-12		227-31208-15	227-31215-12		227-31215-15
	250									

Chemistry		PFPP			Diol-HILIC		
Particle Size (μm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31214-01			227-31213-01		
	75						
	100	227-31214-02			227-31213-02		
	150	227-31214-03			227-31213-03		
3	50	227-31214-04		227-31214-07	227-31213-04		227-31213-07
	75						
	100	227-31214-05		227-31214-08	227-31213-05		227-31213-08
	150	227-31214-06		227-31214-09	227-31213-06		227-31213-09
	250						
5	50	227-31214-10		227-31214-13	227-31213-10		227-31213-13
	75						
	100	227-31214-11		227-31214-14	227-31213-11		227-31213-14
	150	227-31214-12		227-31214-15	227-31213-12		227-31213-15
	250						

	Scepter Claris
	
Wetted materials for body	Bioinert coating
Wetted materials for frit	Bioinert coating

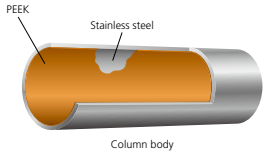
Shim-pack Scepter Series (Metal Free Columns)

Shim-pack Scepter [metal-free]

Chemistry		C18-120			HD-C18-80			C18-300		
Particle Size (µm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31072-01			227-31173-01			227-31204-01		
	75									
	100	227-31072-02			227-31173-02			227-31204-02		
	150							227-31204-03		
3	50	227-31073-01		227-31074-01	227-31077-01		227-31078-01	227-31204-04		227-31204-07
	75									
	100	227-31073-02		227-31074-02	227-31077-02		227-31078-02	227-31204-05		227-31204-08
	150	227-31073-03		227-31074-03			227-31078-03	227-31204-06		227-31204-09
	250									
5	50	227-31075-01		227-31076-01	227-31079-01		227-31080-01	227-31204-10		227-31204-13
	75									
	100	227-31075-02		227-31076-02	227-31079-02		227-31080-02	227-31204-11		227-31204-14
	150			227-31076-03			227-31080-03	227-31204-12		227-31204-15
	250									

Chemistry		C8-120			C4-300			Phenyl		
Particle Size (µm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31166-01			227-31197-01			227-31169-01		
	75									
	100	227-31166-02			227-31197-02			227-31169-02		
	150	227-31166-03			227-31197-03					
3	50	227-31081-01		227-31082-01	227-31198-01		227-31199-01	227-31093-01		227-31094-03
	75									
	100	227-31081-02		227-31082-02	227-31198-02		227-31199-02	227-31093-02		227-31094-01
	150	227-31081-03		227-31082-03	227-31198-03		227-31199-03			227-31094-02
	250									
5	50	227-31083-01		227-31084-01	227-31200-01		227-31201-01	227-31095-01		227-31096-01
	75									
	100	227-31083-02		227-31084-02	227-31200-02		227-31201-02	227-31095-02		227-31096-02
	150	227-31083-03		227-31084-03	227-31200-03		227-31201-03			227-31096-03
	250									

Chemistry		PFPP			Diol-HILIC		
Particle Size (µm)	Length (mm) \ ID (mm)	2.1	3	4.6	2.1	3	4.6
1.9	50	227-31168-01			227-31167-01		
	75						
	100	227-31168-02			227-31167-02		
	150						
3	50	227-31089-01		227-31090-03	227-31085-01		227-31086-01
	75						
	100	227-31089-02		227-31090-01	227-31085-02		227-31086-02
	150			227-31090-02			227-31086-03
	250						
5	50	227-31091-01		227-31092-01	227-31087-01		227-31088-03
	75						
	100	227-31091-02		227-31092-02	227-31087-02		227-31088-01
	150			227-31092-03			227-31088-02
	250						

	Scepter [metal-free]
	
Wetted materials for body	PEEK
Wetted materials for body	PEEK

Shim-pack G Series (Metal Free Columns)

Analytical Columns

Chemistry		GIST C18		GIST C18-AQ	GISS C18		Pressure Tolerance (MPa)
Particle Size (μm)	I.D. (mm) / Length (mm)	2.1	4.6	2.1	2.1	4.6	
1.9 or 2	50	227-30914-01	227-30915-01	227-30936-01	227-30922-01	227-30923-01	80
	100	227-30914-02	227-30915-02	227-30936-02	227-30922-02	227-30923-02	
	150	227-30914-03	227-30915-03	227-30936-03	-	227-30923-03	
3	50	227-30916-01	227-30917-01	227-30938-01	227-30924-01	227-30925-01	50
	100	227-30916-02	227-30917-02	227-30938-02	227-30924-02	227-30925-02	
	150	227-30916-03	227-30917-03	227-30938-03	227-30924-03	227-30925-03	
	250	227-30916-04	227-30917-04	227-30938-04	227-30924-04	227-30925-04	
5	50	227-30918-01	227-30919-01	227-30940-01	227-30926-01	227-30927-01	20
	100	227-30918-02	227-30919-02	227-30940-02	227-30926-02	227-30927-02	
	150	227-30918-03	227-30919-03	227-30940-03	227-30926-03	227-30927-03	
	250	227-30918-04	227-30919-04	227-30940-04	227-30926-04	227-30927-04	

Chemistry		GISS C8		GIST PFPP		GIST Amide		Pressure Tolerance (MPa)
	I.D. (mm) / Length (mm)	2.1	4.6	2.1	4.6	2.1	4.6	
1.9 or 2	50	227-30928-01	227-30929-01	-	-	227-30951-01	-	80
	100	227-30928-02	227-30929-02	-	-	227-30951-02	-	
	150	-	227-30929-03	-	-	227-30951-03	-	
3	50	227-30930-01	227-30931-01	227-30896-01	227-30897-01	227-30850-01	227-30851-01	50
	100	227-30930-02	227-30931-02	227-30896-02	227-30897-02	227-30850-02	227-30851-02	
	150	227-30930-03	227-30931-03	227-30896-03	227-30897-03	227-30850-03	227-30851-03	
	250	227-30930-04	227-30931-04	227-30896-04	227-30897-04	227-30850-04	227-30851-04	
5	50	227-30932-01	227-30933-01	227-30898-01	227-30899-01	227-30852-01	227-30853-01	20
	100	227-30932-02	227-30933-02	227-30898-02	227-30899-02	227-30852-02	227-30853-02	
	150	227-30932-03	227-30933-03	227-30898-03	227-30899-03	227-30852-03	227-30853-03	
	250	227-30932-04	227-30933-04	227-30898-04	227-30899-04	227-30852-04	227-30853-04	

Cartridge Guard Columns

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

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

Shim-pack Scepter Series

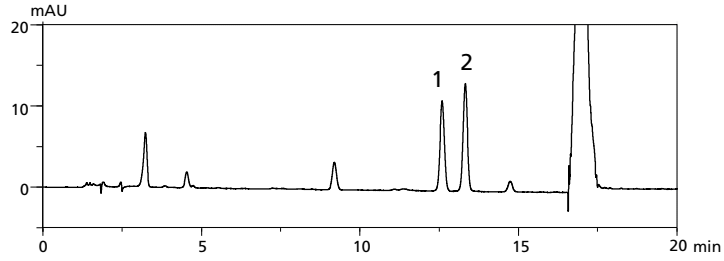
Shim-pack Scepter Series preparative columns are ideal for preparative purification with their excellent stability and efficiency. 1.9 µm UHPLC columns and 3 and 5 µm HPLC columns are also available, enabling seamless transfer of analytical methods from UHPLC and analytical HPLC to preparative HPLC.

Seamless Scale up to Preparative Separation

– Separation of Sennosides A and B in Senna Powder –

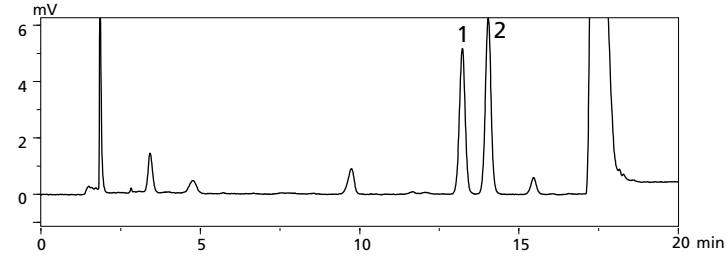
Analytical separation developed with Shim-pack Scepter C18 analytical column could be seamlessly scaled up to preparative separation with Shim-pack Scepter C18 preparative column because of their full scalability.

Analytical Separation (Shim-pack Scepter C18 150 mm × 4.6 mm I.D., 5 µm)



Scale Up

Preparative Separation (Shim-pack Scepter C18 150 mm × 20 mm I.D., 5 µm)



Conditions

Column	: Shim-pack Scepter C18 Analytical 150 mm × 4.6 mm I.D., 5 µm, P/N: 227-31020-05 Preparative 150 mm × 20 mm I.D., 5 µm, P/N: 227-31103-04
Mobile phase	: A) 0.1M Ammonium acetate (pH 6.9) B) Acetonitrile
Gradient	: 5 %B (0 min)→15 %(15 min) →100 %(15.01-20 min) →5 %(20.01-30 min)
Flow rate	: Analytical 1.0 mL/min Preparative 19 mL/min
Column temp.	: Ambient
Detection	: UV 340 nm
Injection volume	: Analytical 2 µL Preparative 500 µL
Sample	: 100 mg of Powdered Senna leaf was dissolved in 10 mL of 70 % MeOH. After 30 minutes of sonication, the solution was filtered for analysis.

Peaks

1. Sennoside B
2. Sennoside A

Order Information

For information of analytical columns and each chemistry, please refer to page 16.

Preparative Columns (5 µm)

Chemistry	I.D. (mm) / Length (mm)	10	20	30
C18	50	-	227-31102-01	227-31103-01
	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
HD-C18	50	-	227-31105-01	227-31106-01
	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
C8	50	-	227-31108-01	227-31109-01
	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
Chemistry	I.D. (mm) / Length (mm)	10	20	30
C4-300	50	-	227-31185-01	227-31186-01
	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
Phenyl	50	-	227-31114-01	227-31115-01
	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
PFPP	50	-	227-31111-01	227-31112-01
	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

Shim-pack Scepter Preparative Guard Cartridge (5 µm, 2/pk)

Dimension / Chemistry	C18	HD-C18	C8	C4-300	Phenyl	PFPP	Cartridge Holder
10 × 10 mm	227-31127-01	227-31135-01	227-31143-01	227-31194-01	227-31165-01	227-31157-01	227-31171-01
20 × 10 mm	227-31127-02	227-31135-02	227-31143-02	227-31195-01	227-31165-02	227-31157-02	227-31171-02
30 × 10 mm	227-31127-03	227-31135-03	227-31143-03	227-31196-01	227-31165-03	227-31157-03	227-31171-03

Shim-pack G Series

Order Information

For information of analytical columns and each chemistry, please refer to page 25.

Chemistry	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
Shim-pack GIST PFPP	5	50	227-30868-01	227-30869-01	227-30870-01	227-30871-01	227-30872-01
		100	227-30868-02	227-30869-02	227-30870-02	227-30871-02	227-30872-02
		150	227-30868-03	227-30869-03	227-30870-03	227-30871-03	227-30872-03
		250	227-30868-04	227-30869-04	227-30870-04	227-30871-04	227-30872-04
└ Guard Column	5	50	227-30885-01	227-30886-01	227-30887-01	227-30888-01	227-30889-01
Shim-pack GIST Amide	5	50	227-30828-01	227-30829-01	227-30830-01	227-30831-01	227-30832-01
		100	227-30828-02	227-30829-02	227-30830-02	227-30831-02	227-30832-02
		150	227-30828-03	227-30829-03	227-30830-03	227-30831-03	227-30832-03
		250	227-30828-04	227-30829-04	227-30830-04	227-30831-04	227-30832-04
└ Guard Column	5	50	227-30845-01	227-30846-01	227-30847-01	227-30848-01	227-30849-01

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
Shim-pack GIS SIL	5	50	227-30954-29	227-30954-33	227-30954-37	227-30954-41	227-30954-45
		100	227-30954-30	227-30954-34	227-30954-38	227-30954-42	227-30954-46
		150	227-30954-31	227-30954-35	227-30954-39	227-30954-43	227-30954-47
		250	227-30954-32	227-30954-36	227-30954-40	227-30954-44	227-30954-48
└ Guard Column	5	50	227-30955-21	227-30955-22	227-30955-23	227-30955-24	227-30955-25

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.

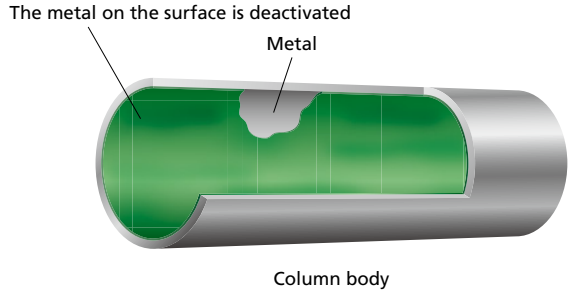
Shim-pack PREP Series

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).

Order Information

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 MC C18



Versatility

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

Order information

Analytical Columns

Shim-pack MC C18 (particle size 1.9 µm)

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

Shim-pack MCT Series

Trap Columns Wide Portfolio

- **Shim-pack MCT C18/C8**

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

- **Shim-pack MCT LC18/LC8**

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

Order information

Shim-pack MCT series (particle size 3 µm)

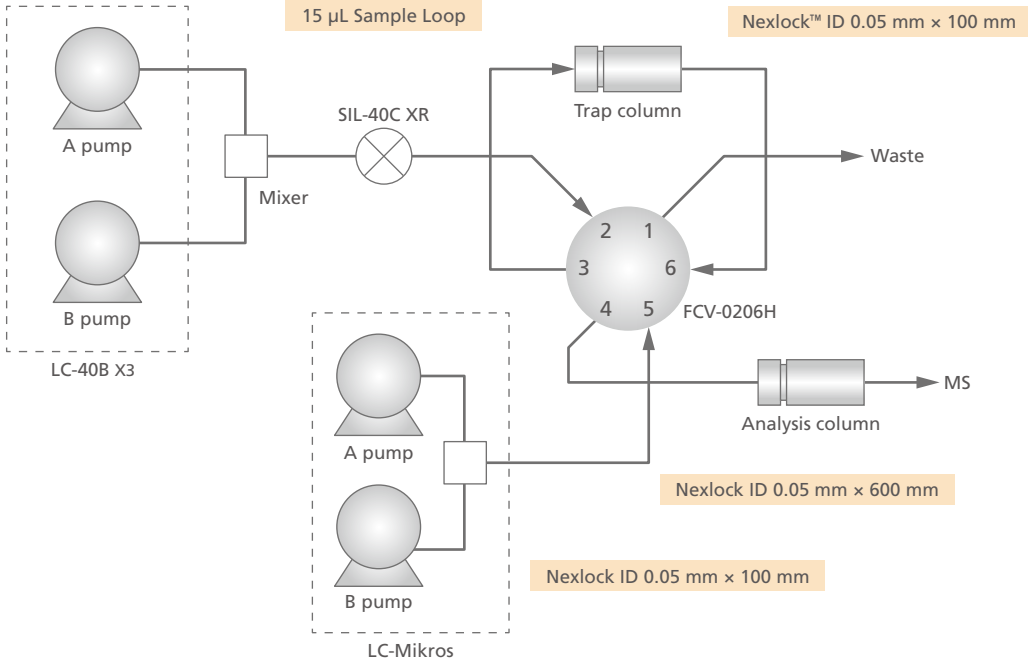
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
228-59938-91	C18	0.3	35
228-59938-92		0.5	
228-59939-91	C8	0.3	35
228-59939-92		0.5	

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

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

Nexera Mikros: Trap and Elute Configuration

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

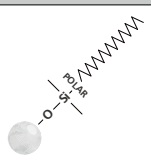
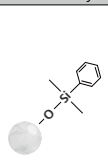
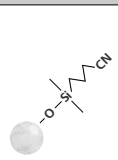
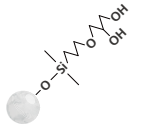
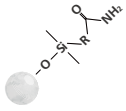
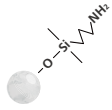


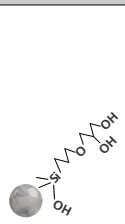
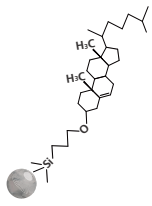
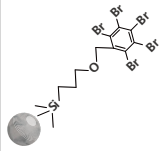
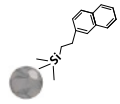
Shim-pack UC Series

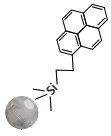
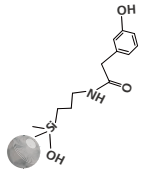
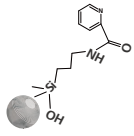
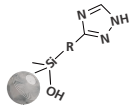
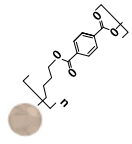
Fully Porous Silica Particle Based Columns for Supercritical Fluid Chromatography

Chemistries

The Shim-pack UC series columns offer a wide variety of stationary phases for separating all sorts of compounds using the unique characteristics of supercritical fluid chromatography (SFC).
The series includes twenty kinds of packing materials and a wide range of particle and columns sizes that can be selected based on the purpose of analysis.

	RP	GIS Ⅱ	Phenyl	CN
Chemistry				
Bonded Phase	Polar-Embedded Octadecyl Group	Octadecyl Group	Phenyl group	Cyanopropyl group
Particle Size (µm)	3, 5			
Pore Size (nm)	10			
Surface Area (m^2/g)	450			
Carbon Loading	9 %	11 %	9.5 %	14 %
Pressure Tolerance (MPa)	50 (3 µm), 30 (5 µm, I.D. 2.1-10 mm), 23 (5 µm, I.D. 20-28 mm)			
Pore Volume (mL/g)	1.05			
End Capping	No	Yes	No	No
USP Code	L1	L1	L11	L10
	Diol	Sil	Amide	NH2
Chemistry				
Bonded Phase	Diol Group	-	Carbamoyl Group	Aminopropyl Group
Particle Size (µm)	3, 5			
Pore Size (nm)	10			
Surface Area (m^2/g)	450			
Carbon Loading	20 %	-	18 %	8 %
Pressure Tolerance (MPa)	50 (3 µm), 30 (5 µm, I.D. 2.1-10 mm), 23 (5 µm, I.D. 20-28 mm)			
Pore Volume (mL/g)	1.05			
End Capping	No	No	No	No
USP Code	L20	L3	L68	L8

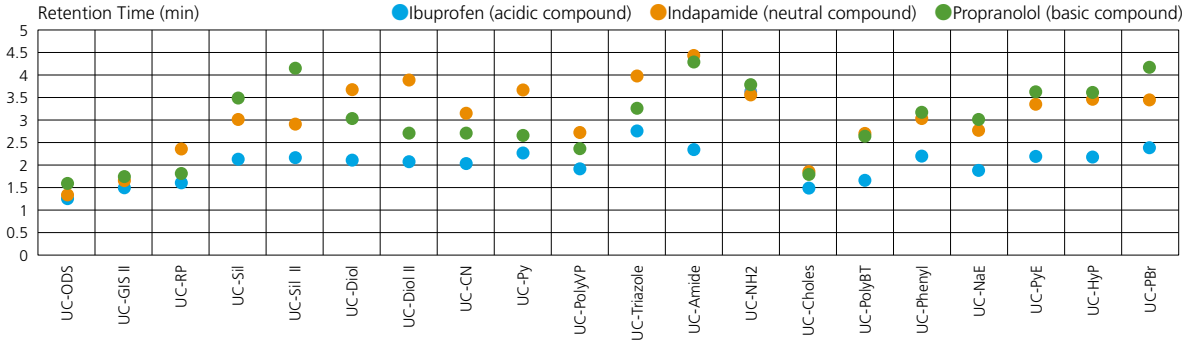
	Diol Ⅱ	Sil Ⅱ	Choles	PBr	ODS	NaE
Chemistry						
Bonded Phase	Diol Group	-	Cholesteryl Group	Pentabromobenzyl Group	Octadecyl Group	Naphtylethyl group
Particle Size (μm)	3, 5					
Pore Size (nm)	12					
Surface Area (m^2/g)	340 (3 um), 300 (5 um)					
Carbon Loading	-	-	20 %	8 %	16 %	11 %
Pressure Tolerance (MPa)	50 (3 μm), 30 (5 μm, I.D. 2.1-10 mm), 23 (5 μm, I.D. 20-28 mm)					
Pore Volume (mL/g)	1.00 (3 μm), 0.90 (5 μm)					
End Capping	No	No	Yes	Yes	Yes	Yes
USP Code	L20	L3	L101	-	L1	-

	PyE	HyP	Py	Triazole	Poly BT	Poly VP
Chemistry						
Bonded Phase	Pyrenylethyl Group	3-Hydroxyphenyl Group	Pyridinyl Group	Triazolyl group	Polybutylene terephthalate	Poly (4-vinylpyridine) group
Particle Size (μm)	3, 5					
Pore Size (nm)	12				N.D.	
Surface Area (m^2/g)	340 (3 um), 300 (5 um)				N.D.	
Carbon Loading	18 %	-	-	-	N.D.	
Pressure Tolerance (MPa)	50 (3 μm), 30 (5 μm, I.D. 2.1-10 mm), 23 (5 μm, I.D. 20-28 mm)				N.D.	
Pore Volume (mL/g)	1.00 (3 μm), 0.90 (5 μm)				N.D.	
End Capping	Yes	Yes	Yes	No	N.D.	
USP Code	-	-	-	L104	-	

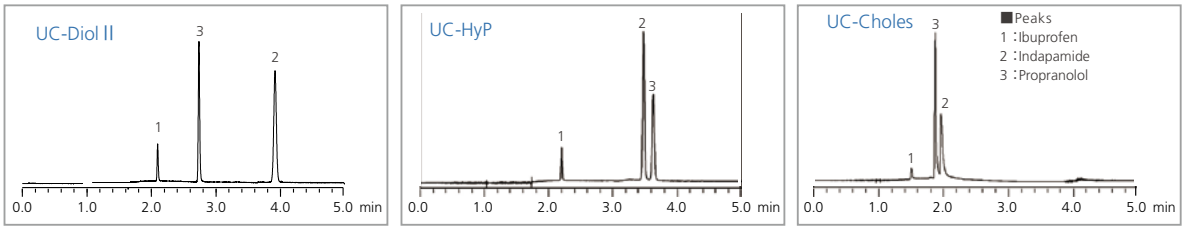
Shim-pack UC

Retention Behavior of Respective Columns

Since the hydrophobicity of supercritical carbon dioxide is similar to hexane, the primary separation behavior of SFC is considered generally similar to the normal phase mode. Depending on the stationary phase selected, other interactions can also occur, such as pi-pi interactions or electrostatic reactions similar to HPLC.
All 20 column types can be used for compounds with approximately neutral polarity. The figure below shows how retention behavior can vary significantly depending on the type of stationary phase used when analyzing typical acidic, neutral, or basic compounds. Stronger retention can be achieved by selecting a stationary phase expected to interact with the target compound.



Retention Time and Elution Order of Acidic, Neutral, and Basic Compounds



Differences in Retention Behavior for Each Stationary Phase
(Main separation modes: Normal phase for Diol II, normal phase + electrostatic reaction for HyP, and hydrophobic interaction for Choles columns)

Selecting an SFC Column

First Choice

Given that normal phase separation is the main separation mode used for SFC, normal phase UC-Diol and UC-Diol II columns are commonly used. They are followed by UC-Py columns that exhibit similar behavior to ethylpyridine-based columns.

UC-Diol and UC-Diol II normal phase columns can even be used for lipids and other compounds with low polarity. However, given that normal phase columns separate by class, UC-HyP columns may be better suited for separation by molecular type.

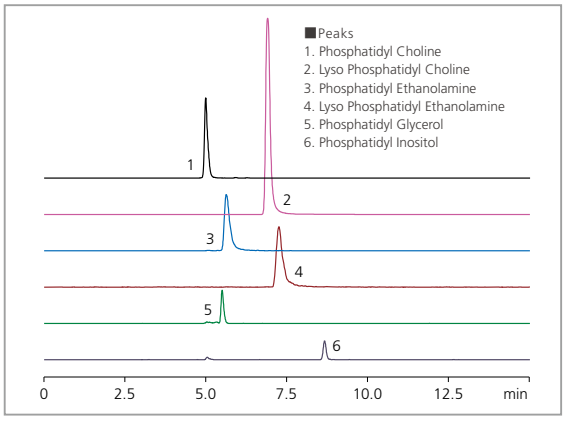
That means it may be possible to separate isomers and other compounds by SFC that are difficult to separate by HPLC. Columns with specific or multiple interaction modes may help improve separation. UC-Choles columns, which contain a rigid cholesteryl group, UC-PyE columns, which can be expected to have strong pi-pi interactions, and UC-PBr columns, which apply a dispersive force with respect to Br, can be especially effective.

Useful for Column Scouting

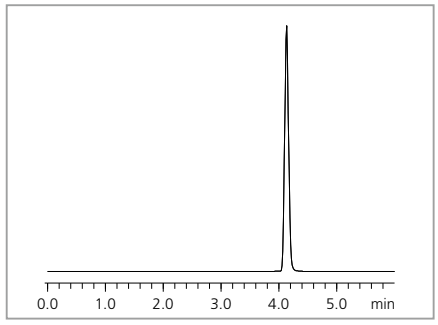
HPLC involves using mobile phases with very different compositions for reverse phase and normal phase analysis, such as water-based versus non-water based mobile phases. In contrast, SFC uses a mixture of supercritical carbon dioxide and a modifier (an organic solvent such as methanol) regardless of the stationary phase used. Therefore, the same mobile phase composition can be used for serial analysis through all columns.

Supports Analyzing a Wide Range of Polarities, from Lipids to Peptides (UC-Diol and UC-Diol II)

UC-Diol and UC-Diol II columns, which are mainly for normal phase separation, offer excellent general applicability for analyzing a wide variety of compounds, from phospholipids and other lipids to highly polar peptide compounds. However, a column with an ODS group stationary phase, such as the Shim-pack UC-GIS II, must be used to separate phospholipids by molecular species

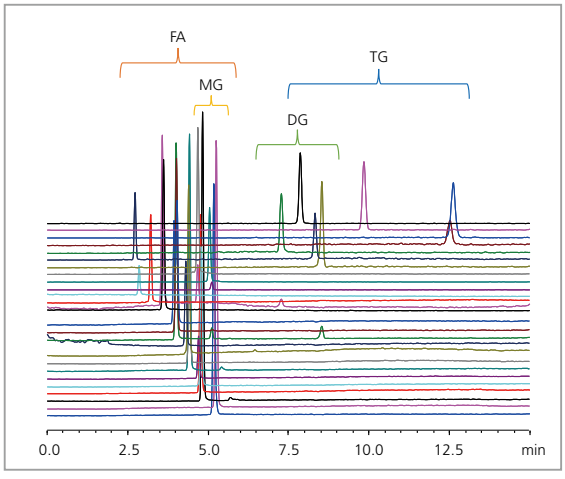


Analysis of Phospholipids



Analysis of Peptides (Cyclosporin A)

Simultaneously Analyzing Fatty Acids to Triglycerides in a Single Analysis (UC-HyP)



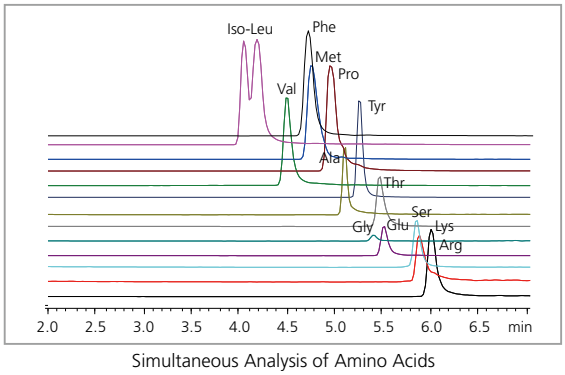
Simultaneous Analysis of Lipids

Different separation methods are generally used for fatty acids, which are typically analyzed by GC, and glycerides, which are typically analyzed by HPLC.

However, because supercritical carbon dioxide has properties similar to hexane, SFC is well-suited to analyzing compounds with low polarity.

UC-HyP columns can be used to simultaneously analyze everything from fatty acids to glycerides.

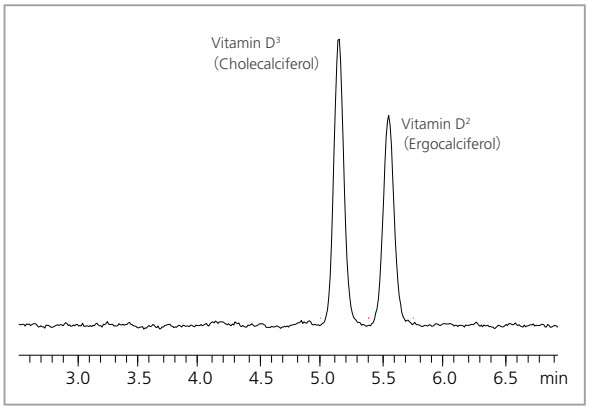
Analyzing Amino Acids and Other Highly Polar Compounds (UC-Amide)



Simultaneous Analysis of Amino Acids

Highly polar compounds, such as amino acids, can be analyzed by selecting an appropriate stationary phase and modifier. By using a UC-Amide column, amino acids can be analyzed without the time and trouble of derivatization.

Separation of Vitamins D² and D³ (UC-PyE)



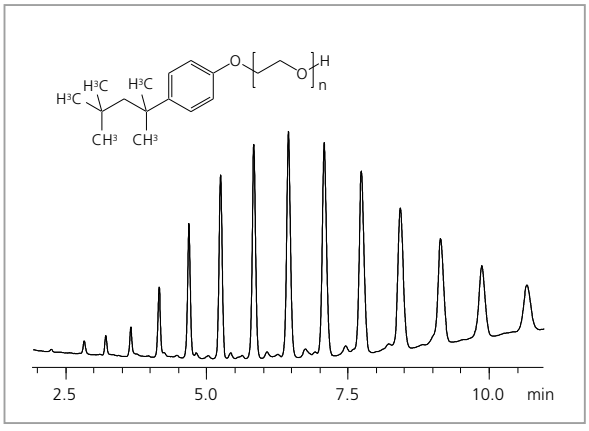
Analysis of Vitamin D

Vitamins D² and D³ are difficult to separate by normal phase HPLC. To use the reverse phase mode, samples must be pretreated to remove especially fat-soluble contaminant components prior to analysis.

Due to the compatibility of SFC with fat-soluble compounds, the time and trouble involved in pretreatment can be eliminated.

If a UC-PyE column is used, the slight differences between vitamins D² and D³ can be quickly separated based on differences in their mutual interaction with the pyrenylethyl group.

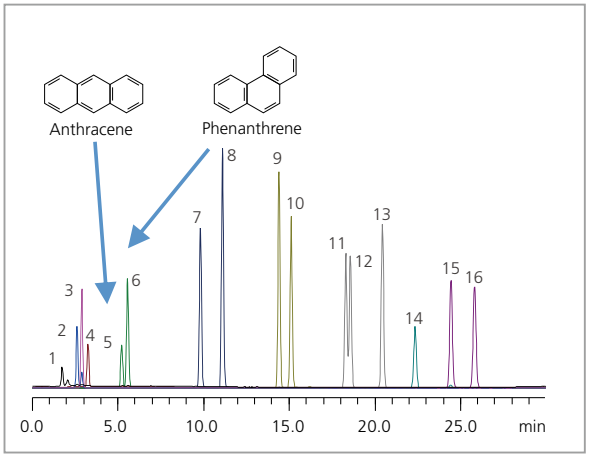
Separation of Surfactants (UC-PBr)



Analysis of Tritonx-100

Surfactants contain polymers with a range of polymerization levels. That distribution of polymerization is known to affect surfactant performance. If a UC-PBr column is used, compounds can be separated based on differences in the degree of Tritonx-100 polymerization in about 10 minutes. That enables the polymerization distribution to be compared.

Separation of Isomers of Polycyclic Aromatic Hydrocarbons (PAH) (UC-Choles)



Analysis of 16 Polycyclic Aromatic Hydrocarbon Components

PAHs contain multiple isomers, such as anthracene and phenanthrene, which cannot be separated with a mass spectrometer. Therefore, they must be separated by chromatography.

All five isomer combinations can be separated using a UC-Choles column. The rigid stationary phase structure of the cholesteryl group presumably contributes to recognition of the molecular form.

■Peaks

1. Naphthalene
2. Acenaphthylene
3. Acenaphthene
4. Fluorene
5. Anthracene
6. Phenanthrene
7. Fluoranthene
8. Pyrene
9. Benzo(a)anthracene
10. Chrysene
11. Benzo(k)fluoranthene
12. Benzo(b)fluoranthene
13. Benzo(a)pyrene
14. Dibenzo(a,h)anthracene
15. Indeno(1,2,3-cd)pyrene
16. Benzo(g,h,i)perylene

Order Information

	I.D. × L (mm)	3 µm	5 µm
Shim-pack UC-ODS	2.1×150	227-32608-01	–
	3.0×50	227-32608-02	–
	3.0×100	227-32608-03	–
	3.0×150	227-32608-04	–
	4.6×250	–	227-32608-05
	10×50	–	227-32608-10
	10×250	–	227-32608-06
	20×50	–	227-32608-11
	20×250	–	227-32608-07
	28×250	–	227-32608-08
Shim-pack UC-GIS II	2.1×150	227-30404-03	227-30406-03
	2.1×250	227-30404-04	227-30406-04
	4.6×150	227-30405-03	227-30407-03
	4.6×250	227-30405-04	227-30407-04
Shim-pack UC-RP	2.1×150	227-30400-03	227-30402-03
	2.1×250	227-30400-04	227-30402-04
	4.6×150	227-30401-03	227-30403-03
	4.6×250	227-30401-04	227-30403-04
Shim-pack UC-Sil	2.1×150	227-30412-03	227-30414-03
	2.1×250	227-30412-04	227-30414-04
	4.6×150	227-30413-03	227-30415-03
	4.6×250	227-30413-04	227-30415-04
Shim-pack UC-Sil II	2.1×150	227-32607-01	–
	3.0×50	227-32607-07	–
	3.0×100	227-32607-08	–
	3.0×150	227-32607-09	–
	4.6×250	–	227-32607-02
	10×50	–	227-32607-10
	10×250	–	227-32607-03
	20×50	–	227-32607-11
	20×250	–	227-32607-04
	28×250	–	227-32607-05
Shim-pack UC-Diol	2.1×150	227-30408-03	227-30410-03
	2.1×250	227-30408-04	227-30410-04
	4.6×150	227-30409-03	227-30411-03
	4.6×250	227-30409-04	227-30411-04
Shim-pack UC-Diol II	2.1×150	227-32606-01	–
	3.0×50	227-32606-07	–
	3.0×100	227-32606-08	–
	3.0×150	227-32606-09	–
	4.6×250	–	227-32606-02
	10×50	–	227-32606-10
	10×250	–	227-32606-03
	20×50	–	227-32606-11
	20×250	–	227-32606-04
	28×250	–	227-32606-05
Shim-pack UC-CN	2.1×150	227-30428-03	227-30430-03
	2.1×250	227-30428-04	227-30430-04
	4.6×150	227-30429-03	227-30431-03
	4.6×250	227-30429-04	227-30431-04
Shim-pack UC-Py	2.1×150	227-32601-01	–
	3.0×50	227-32601-07	–
	3.0×100	227-32601-08	–
	3.0×150	227-32601-09	–
	4.6×250	–	227-32601-02
	10×50	–	227-32601-10
	10×250	–	227-32601-03
	20×50	–	227-32601-11
	20×250	–	227-32601-04
	28×250	–	227-32601-05

	I.D. × L (mm)	3 µm	5 µm
Shim-pack UC-PolyVP	2.1×50	227-32506-11	–
	2.1×100	227-32506-12	–
	2.1×150	227-32506-13	–
	3.0×50	227-32507-11	–
	3.0×100	227-32507-12	–
	3.0×150	227-32507-13	–
	4.6×50	227-32508-11	–
	4.6×100	227-32508-12	–
	4.6×150	227-32508-13	–
	4.6×250	227-32508-14	–
	4.6×150	–	227-32509-11
	4.6×250	–	227-32509-12
	10×250	–	227-32510-11
	20×250	–	227-32511-11
Shim-pack UC-Triazole	2.1×150	227-32605-01	–
	3.0×50	227-32605-07	–
	3.0×100	227-32605-08	–
	3.0×150	227-32605-09	–
	4.6×250	–	227-32605-02
	10×50	–	227-32605-10
	10×250	–	227-32605-03
	20×50	–	227-32605-11
	20×250	–	227-32605-04
	28×250	–	227-32605-05
Shim-pack UC-Amide	2.1×150	227-30416-03	227-30418-03
	2.1×250	227-30416-04	227-30418-04
	4.6×150	227-30417-03	227-30419-03
	4.6×250	227-30417-04	227-30419-04
Shim-pack UC-NH2	2.1×150	227-30420-03	227-30422-03
	2.1×250	227-30420-04	227-30422-04
	4.6×150	227-30421-03	227-30423-03
	4.6×250	227-30421-04	227-30423-04
Shim-pack UC-Choles	2.1×150	227-32603-01	–
	3.0×50	227-32603-07	–
	3.0×100	227-32603-08	–
	3.0×150	227-32603-09	–
	4.6×250	–	227-32603-02
	10×50	–	227-32603-10
	10×250	–	227-32603-03
	20×50	–	227-32603-11
	20×250	–	227-32603-04
	28×250	–	227-32603-05
Shim-pack UC-PolyBT	2.1×50	227-32500-11	–
	2.1×100	227-32500-12	–
	2.1×150	227-32500-13	–
	3.0×50	227-32501-11	–
	3.0×100	227-32501-12	–
	3.0×150	227-32501-13	–
	4.6×50	227-32502-11	–
	4.6×100	227-32502-12	–
	4.6×150	227-32502-13	–
	4.6×250	227-32502-14	–
	4.6×150	–	227-32503-11
	4.6×250	–	227-32503-12
	10×250	–	227-32504-11
	20×250	–	227-32505-11
Shim-pack UC-Phenyl	2.1×150	227-30424-03	227-30426-03
	2.1×250	227-30424-04	227-30426-04
	4.6×150	227-30425-03	227-30427-03
	4.6×250	227-30425-04	227-30427-04

	I.D. × L (mm)	3 µm	5 µm
Shim-pack UC-NaE	2.1×150	227-32609-01	–
	3.0×50	227-32609-02	–
	3.0×100	227-32609-03	–
	3.0×150	227-32609-04	–
	4.6×250	–	227-32609-05
	10×50	–	227-32609-10
	10×250	–	227-32609-06
	20×50	–	227-32609-11
	20×250	–	227-32609-07
	28×250	–	227-32609-08
Shim-pack UC-PyE	2.1×150	227-32604-01	–
	3.0×50	227-32604-07	–
	3.0×100	227-32604-08	–
	3.0×150	227-32604-09	–
	4.6×250	–	227-32604-02
	10×50	–	227-32604-10
	10×250	–	227-32604-03
	20×50	–	227-32604-11
	20×250	–	227-32604-04
	28×250	–	227-32604-05
Shim-pack UC-HyP	2.1×150	227-32600-01	–
	3.0×50	227-32600-07	–
	3.0×100	227-32600-08	–
	3.0×150	227-32600-09	–
	4.6×250	–	227-32600-02
	10×50	–	227-32600-10
	10×250	–	227-32600-03
	20×50	–	227-32600-11
	20×250	–	227-32600-04
	28×250	–	227-32600-05

	I.D. × L (mm)	3 µm	5 µm
Shim-pack UC-PBr	2.1×150	227-32602-01	–
	3.0×50	227-32602-07	–
	3.0×100	227-32602-08	–
	3.0×150	227-32602-09	–
	4.6×250	–	227-32602-02
	10×50	–	227-32602-10
	10×250	–	227-32602-03
	20×50	–	227-32602-11
	20×250	–	227-32602-04
	28×250	–	227-32602-05
Shim-pack UC-ODS (G)	10×20	–	227-32608-09
Shim-pack UC-Sil II (G)	10×20	–	227-32607-06
Shim-pack UC-Diol II (G)	10×20	–	227-32606-06
Shim-pack UC-Py (G)	10×20	–	227-32601-06
Shim-pack UC-Triazole (G)	10×20	–	227-32605-06
Shim-pack UC-Choles (G)	10×20	–	227-32603-06
Shim-pack UC-NaE (G)	10×20	–	227-32609-09
Shim-pack UC-PyE (G)	10×20	–	227-32604-06
Shim-pack UC-HyP (G)	10×20	–	227-32600-06
Shim-pack UC-PBr (G)	10×20	–	227-32602-06

Column Pressure Tolerance
- 3 µm particle diameter: 50 MPa
- 5 µm particle diameter (with 2.1 to 10 mm I.D.): 30 MPa
- 5 µm particle diameter (with 20 to 28 mm I.D.): 23 MPa

Shim-pack GPC Series

Shim-pack GPC series columns are used for the determination of tetrahydrofuran (800 Series), and dimethylformamide (800D series).
The technique of GPC does not utilize such chemical reactions as partition, adsorption, and ion exchange, but a physical reaction consisting of a separation based on molecular size of the sample components. Therefore, this method is suitable for the measurement of molecular weight distribution of high polymers and oligomers.
Shim-pack GPC series are packed with polystyrene polymers with respective degrees of cross-linking in order to meet exact analysis requirements, ranging from analysis of high polymers to that of oligomers. GPC-80M/80MD are mixed gel columns.

Determination of Tetrahydrofuran

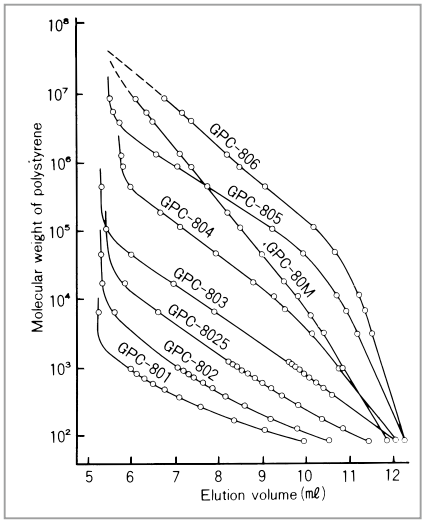
Analytical Columns

Column	Exclusion Limit (polystyrene)	Target moleluar weight range	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801	1.5×10^3	100-700	300 × 8.0	228-20803-91
Shim-pack GPC 802	5.0×10^3	300-3,000	300 × 8.0	228-20804-91
Shim-pack GPC 8025	2.0×10^4	300-8,000	300 × 8.0	228-20805-91
Shim-pack GPC 803	7.0×10^4	1,000-50,000	300 × 8.0	228-20806-91
Shim-pack GPC 804	4.0×10^5	7,000-300,000	300 × 8.0	228-20807-91
Shim-pack GPC 805	4.0×10^6	50,000-2,000,000	300 × 8.0	228-20808-91
Shim-pack GPC 806	4.0×10^7	150,000-20,000,000*	300 × 8.0	228-20809-91
Shim-pack GPC 80M	4.0×10^7, Mixed gel	1,000-20,000,000*	300 × 8.0	228-20810-91
Shim-pack GPC-800P	Guard Column		10 × 4.6	228-20812-91

* Estimated Value

Analysis Examples

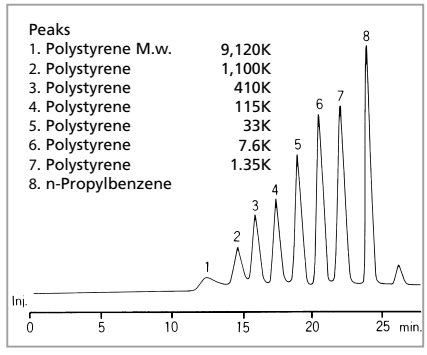
Calibration Curves



Conditions

Mobile phase : Tetrahydrofuran
Flow rate : 1.0 mL/min
Column temp. : Ambient
Detection : UV 254 nm

Analysis of Polystyrene Standard



Conditions

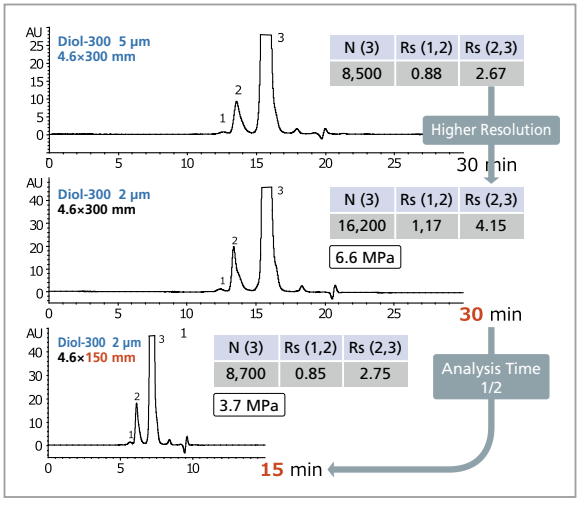
Column : Shim-pack GPC-80M (2 columns in series) (P/N: 228-20810-91)
Mobile phase : Tetrahydrofuran
Flow rate : 1.0 mL/min
Column temp. : Ambient
Detection : UV 254 nm

Shim-pack Bio Diol Columns

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

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

Shim-pack Bio Diol	Diol-60	Diol-120	Diol-200	Diol-250	Diol-300
Particle	Silica				
Ligand	Dihydroxypropyl(Diol)				
Particle Size	3 µm, 5 µm		2 µm, 3 µm, 5 µm	3 µm	2 µm, 3 µm, 5 µm
Pore Size	6 nm	12 nm	20 nm	25 nm	30 nm
pH Range	5.0 - 7.5				
Molecular Weight Range	below 10,000	1,000 - 100,000	5,000 - 300,000	10,000 - 700,000	20,000 - 1,000,000



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

Column	: Shim-pack Bio Diol-300
Eluent	: 0.1 M KH_2PO_4-K_2HPO_4 (pH 7.0) with 0.2 M NaCl
Flow rate	: 0.2 mL/min
Column temp.	: Ambient
Detection	: UV 280 nm
Sample	: Humanized monoclonal IgG1

Order Information

Particle Size	2 µm		3 µm				
Chemistry / Column Dimension	Diol-200	Diol-300	Diol-60	Diol-120	Diol-200	Diol-250	Diol-300
150 × 4.6 mm	227-31009-01	227-31010-01					
300 × 4.6 mm	227-31009-02	227-31010-02	227-31007-01	227-31008-01	227-31009-03	227-31216-01	227-31010-03
300 × 8.0 mm	-	-	-	-	-	227-31216-02	-
10 × 4.0 mm (Guard Column)	227-31202-02	227-31202-01	-	-	227-31202-04	-	227-31202-03
Pressure Tolerance (MPa)	45		20			4.6 mmI.D. : 14 8.0 mmI.D. : 12	20

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

Shim-pack Diol series

Shim-pack Diol series is a kind of gel filtration chromatography (GFC) column. GFC is used to separate water-soluble high polymers such as polysaccharides, proteins, and nucleic acids according to their molecular sizes by using hydrophilic packing materials and aqueous mobile phase.
Shim-pack Diol series is packed with porous spherical silica gel chemically bonded with a hydroxyl group. Due to the hydrophilic hydroxyl group, Shim-pack Diol series can be used in high-speed GFC and provide sharp peaks during the analysis of protein and biochemicals (such as enzymes).

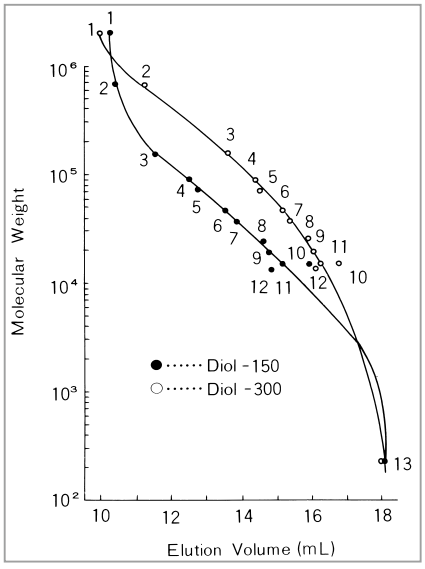
Order Information

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

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

Analysis Examples

Calibration Curves

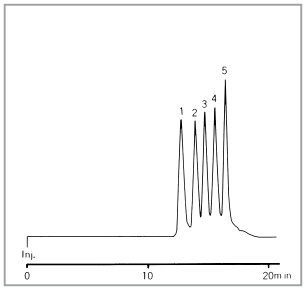


Peaks
1. Blue dextran 2000
2. Thyroglobulin
3. γ-Globulin
4. Transferrin
5. Human serum albumin
6. Ovalbumin
7. β-Lactoglobulin
8. Chymotrypsin
9. Myoglobin
10. Lysozyme
11. Ribonuclease A
12. Cytochrome C
13. Gly-Tyr

Conditions

Column : Shim-pack Diol Series (500 mm × 7.9 mm I.D., 5 µm)
Mobile phase : A) 10 mmol/L phosphate buffer solution (pH 7)
B) 0.2 mol/L sodium sulfate
Flow rate : 1.0 mL/min
Column temp. : Ambient
Detection : UV 280 nm

Analysis of Protein Standard



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

Conditions

Column : Shim-pack Diol-300 (500 mm × 7.9 mm I.D., 5 µm)
(P/N: 228-14776-92)
Mobile phase : A) 10 mmol/L phosphate buffer solution (pH 7)
B) 0.1 mol/L sodium chloride
Flow rate : 1.0 mL/min
Column temp. : Ambient
Detection : UV 280 nm

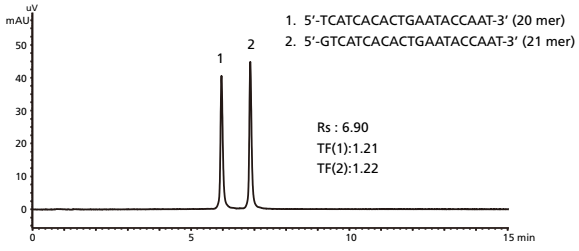
Shim-pack Bio IEX Columns

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

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

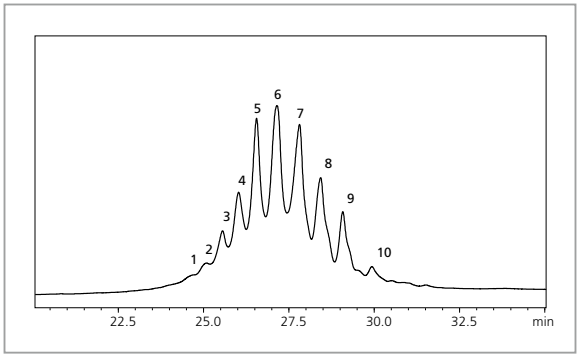
Analysis Examples

Analysis of Synthesized Oligonucleotide (Single Strand DNA) using Shim-pack BIO IEX Q-NP



Column	: Shim-pack Bio IEX Q-NP 100 × 4.6 mm I.D., 5 µm (P/N : 227-31003-03)
Mobile phase	: A) 10 mM NaOH B) 10 mM NaOH with 1.0 M $NaClO_4$
Gradient	: 25→55 %B (0-15 min), 100 %B (15-20 min)
Flow rate	: 1.0 mL/min
Column temp.	: 25 °C
Detection	: UV 260 nm
Injection volume	: 4 µL (5 nmol/mL)

Charge Variant Analysis of mAb Biosimilar by pH Gradient using Shim-pack Bio IEX Column



Conditions

Column	: Shim-pack Bio SP-NP (100 mm × 4.6 mm I.D., 3 µm) P/N: 227-31005-03
Mobile phase	: A) 10 mM sodium phosphate buffer, pH 6.0 B) 10 mM sodium bicarbonate buffer, pH 10.0
Gradient	: 35 %B (0 min)→55 %B (2 min) →100 %B (12-16 min) →35 %B (16.1 – 20 min)
Flow rate	: 0.6 mL/min
Column temp.	: Ambient
Detection	: UV 280 nm
Injection volume.	: 5 µL

Order Information

Shim-pack Bio IEX	Q-NP		SP-NP		Q	SP
Polarity	Non-Porous				Porous	
Particle Size / Dimension	3 µm	5 µm	3 µm	5 µm	5 µm	
30 × 4.6 mm	227-31002-01	227-31003-01	227-31005-01	227-31006-01	227-31001-01	227-31004-01
50 × 4.6 mm	227-31002-02	227-31003-02	227-31005-02	227-31006-02	227-31001-02	227-31004-02
100 × 4.6 mm	227-31002-03	227-31003-03	227-31005-03	227-31006-03	227-31001-03	227-31004-03

Analysis of Nucleotides, Oligonucleotides and Protein

Shim-pack WAX/WCX Series

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

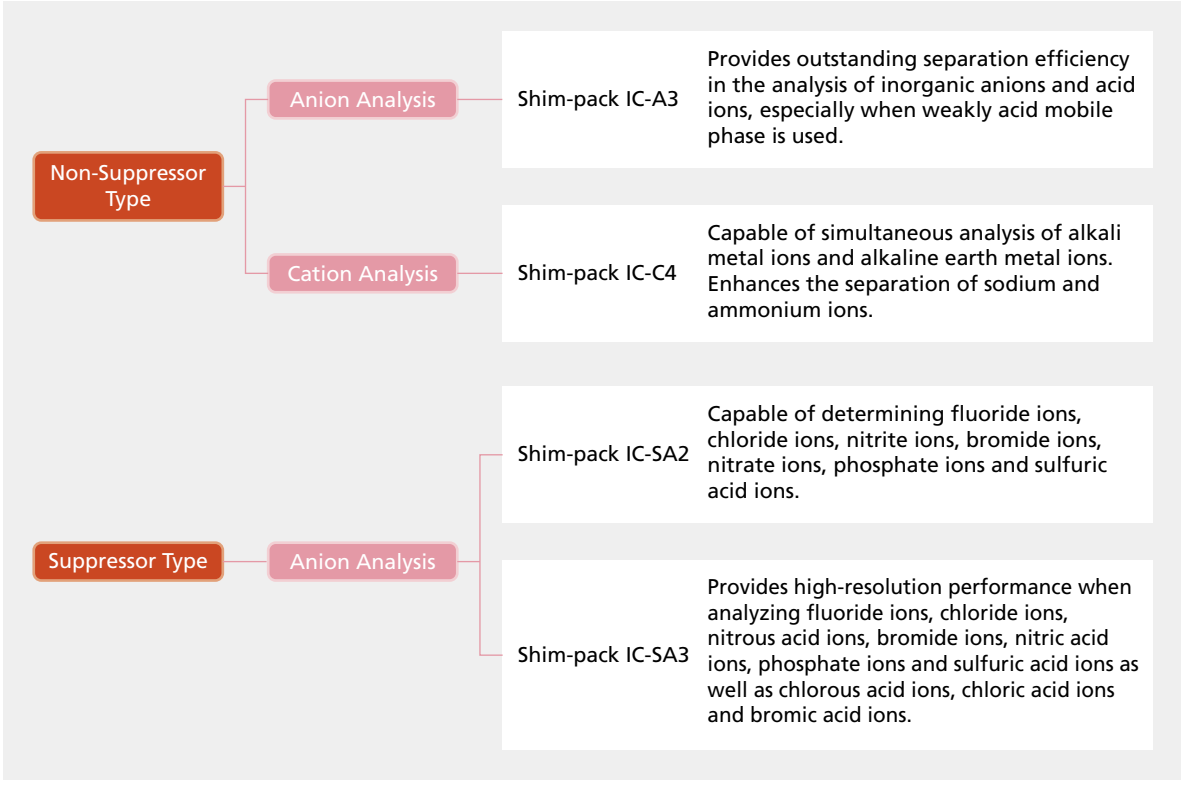
Order Information

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

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

Shim-pack IC Series

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



Order Information

Column	Stationary Phase	Particle Size (µm)	Dimensions (Length × I.D., mm)	P/N	Guard Column
Shim-pack IC-A3	Quaternary ammonium groups	5	150 × 4.6	228-31076-91	228-31076-92
Shim-pack IC-C4	Carboxyl groups	7	150 × 4.6	228-41616-91	228-59900-91 (Cartridge+ Holder) 228-59900-92 (Cartrdge)
Shim-pack IC-SA2	Quaternary ammonium groups	9	250 × 4.0	228-38983-91	228-38983-92
Shim-pack IC-SA3	Quaternary ammonium groups	5	250 × 4.0	228-41600-91	228-41600-92

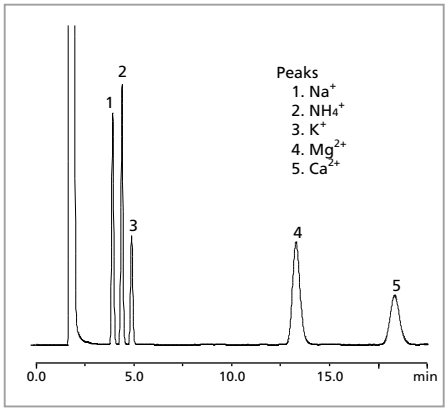
Analysis Examples

Examples of Cation Analysis

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

High Resolution of Na^+ and NH_4^+

Greater resolution of Na^+ and NH_4^+ has been achieved by improving the peak shape of Na^+. The influence on the peak shape of NH_4^+ from a high concentration of Na^+ has been reduced, making it possible to analyze tap water of normal concentration under standard mobile phase conditions. The resolution can be further improved by using a mobile phase treated with 18-crown-6 additive.



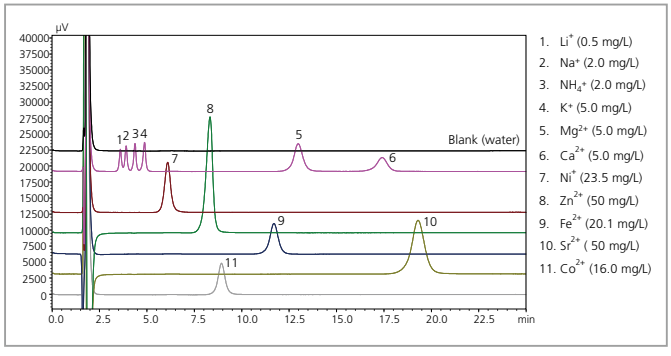
Analysis of a Standard Mixture of 5 Cations

Conditions

Column	: Shim-pack IC-C4 (150 mm × 4.6 mm I.D., 7 µm) (P/N: 228-41616-91)
Mobile phase	: 2.5 mmol/L oxalic acid
Flow rate	: 1.0 mL/min
Column temp.	: 40 °C
Detection	: CDD
Injection volume	: 50 µL

Flexible Mobile Phase Selection

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



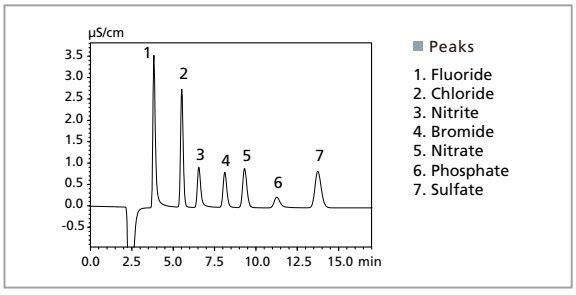
Analysis of inorganic cations and transition metals

Conditions

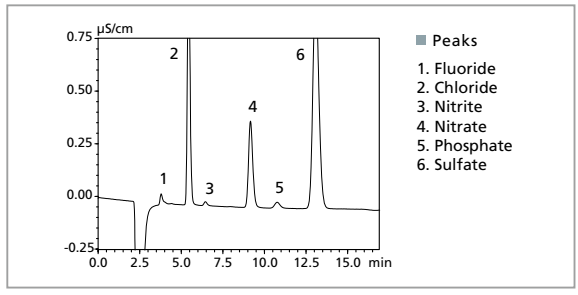
System	: Prominence™ HIC-NSP
Column	: Shim-pack IC-C4 (150 mmL × 4.6 mm I.D., 7 µm), P/N: 228-41616-91 Shim-pack IC-C4 (G) (10 mmL × 4.6 mm I.D., 7 µm), P/N: 228-41616-92
Mobile phase	: 2.5 mmol/L Oxalic acid / 2.5 mmol/L Methanesulfonic acid = 50 / 50 (v/v)
Flow rate	: 1.0 mL/min
Column temp.	: 40 °C
Detection	: Conductivity (CDD-10Asp)
Injection volume	: 20 µL

Analysis of Anions in Water

Shim-pack IC-SA2 and IC-SA3 columns were developed for anion analysis with a Shimadzu Ion Chromatograph HIC-SP (suppressor type). Both columns are capable of analyzing fluoride ions, chloride ions, nitrite ions, bromide ions, nitrate ions, phosphate ions, sulfate ions, etc. allowing both the IC-SA2 and IC-SA3 columns to be used for analysis of tap water and environmental water samples.
The Shim-pack IC-SA3 is a high-separation column that can analyze more components than Shim-pack IC-SA2.



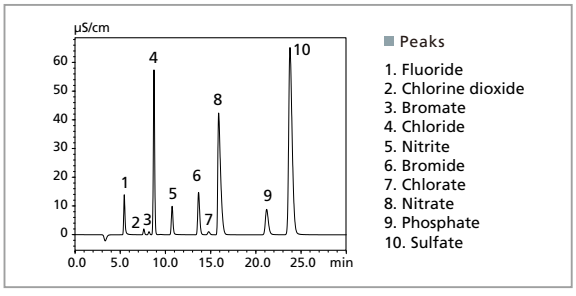
Analysis of Standard Inorganic Anion Samples



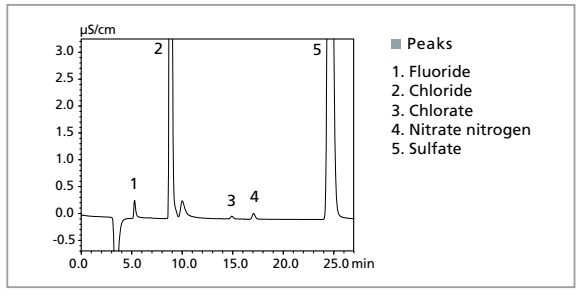
Analysis of Waste Water

Conditions

Column	: Shim-pack IC-SA2
Mobile phase	: A) 12 mmol/L sodium hydrogen carbonate B) 0.6 mmol/L sodium carbonate
Flow rate	: 1.0 mL/min
Column temp.	: 30 °C
Detection	: CDD (a suppressor is used)
Injection volume	: 50 µL



Analysis of Standard Inorganic Anion Samples



Analysis of Tap Water

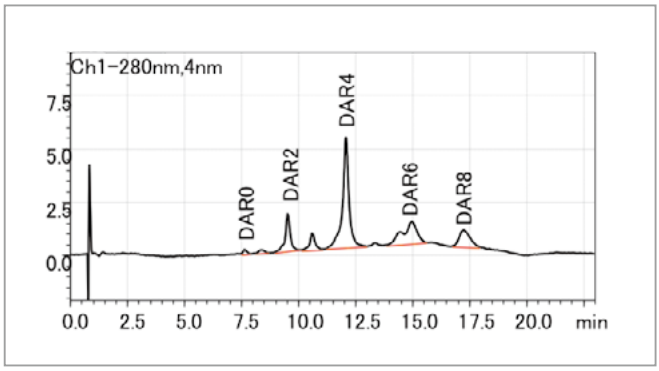
Conditions

Column	: Shim-pack IC-SA3
Mobile phase	: 3.6 mmol/L sodium carbonate
Flow rate	: 0.8 mL/min
Column temp.	: 45 °C
Detection	: CDD (a suppressor is used)
Injection volume	: 50 µL

Shim-pack Bio HIC Column

Shim-pack Bio HIC Column is a hydrophobic interaction chromatography (HIC) column packed with butyl bonded hydrophilic nonporous polymer particles (4 µm). HIC is suitable for the separation of anlaytes with slightly different hydrophobicity, such as antibody-drug conjugate (ADC) with different drug-antibody ratios (DAR). Shim-pack Bio HIC can be used for the analysis of DAR of ADC with relatively low pressure and high resolution.

ADC DAR Analysis using Shim-pack BIO HIC Column



Conditions

LC System : Inert LC (1.6 mL mixer)
Workstation : LabSolutions™ LC/GC
Column : Shim-pack Bio HIC (100 mm. x 4.6 mmI.D., 4 µm)
Mobile phase : A) 50 mM NaH^2PO^4-Na^2HPO^4 (pH 7.0)
containing 1.5 M $(NH^4)^2SO^4$/2-propanol (95/5)
B) 50 mM NaH^2PO^4-Na^2HPO^4 (pH 7.0)/2-propanol (80/20)
Gradient : 0 %B (0-1 min), 0-100 %B (1-18 min), 100 %B (18-23 min)

Flow rate : 1.0 mL/min
Injection volume : 5 µL
Column temp. : 25 °C
Detection : 280 nm (PDA)
Sample : Cysteine-liked ADC Mimic (5 mg/mL)

Peak area reproducibility (n = 6)

	%RSD
DAR0	5.98
DAR2	2.57
DAR4	1.62
DAR6	2.23
DAR8	2.87

＊Peaks were automatically integrated using i-peak finder (peak integration algorithm for LabSolutions)

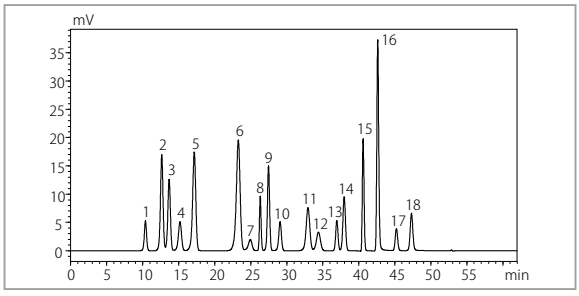
Order Information

P/N	Description
227-31174-01	Shim-pack Bio HIC Butyl, 100 × 4.6 mm I.D., 4 µm

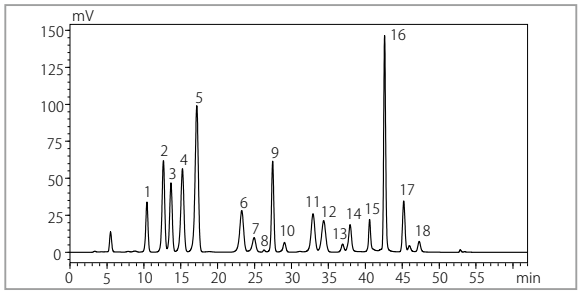
Analysis of Amino Acids

Shim-pack Amino Series

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



Analysis of Amino Acid Standard



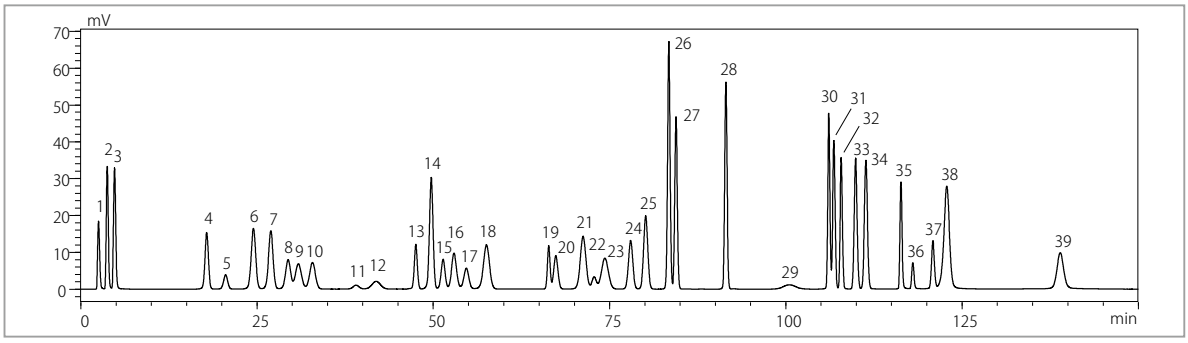
Analysis of Infant Formula

Conditions

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

Peaks

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



Simultaneous Analysis of 38 Amino Acids

Conditions

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

Peaks

1. o-Phosphoserine
2. Taurine
3. o-Phosphoethanolamine
4. Aspartic acid
5. Hydroxyproline
6. Threonine
7. Serine
8. Asparagine
9. Glutamic acid
10. Glutamine
11. Sarcosine
12. α-Aminoadipic acid
13. Proline
14. Glycine
15. Alanine
16. Citrulline
17. α-Amino-n-butyricacid
18. Valine
19. Cystine
20. Methionine
21. Isoleucine
22. Cystathionine
23. Leucine
24. Tyrosine
25. Phenylalanine
26. β-Alanine
27. β-Aminoisobutyric acid
28. γ-Aminobutyric acid (GABA)
29. Tryptophan
30. Histidine
31. 3-Methylhistidine
32. 1-Methylhistidine
33. Carnosine
34. Anserine
35. Hydroxylysine
36. Ornithine
37. Lysine
38. Ammonia
39. Arginine

Order Information

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

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

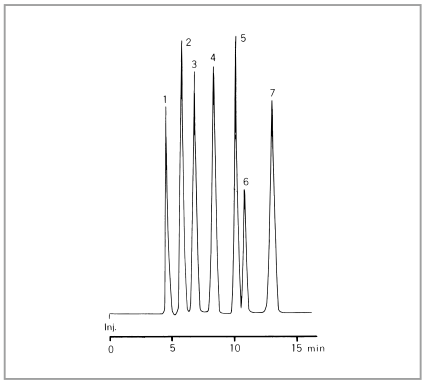
In the analysis of amino acids, the following trap columns are required.

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

Analysis of Sugar and Organic Acid

Shim-pack SCR Series

Shim-pack SCR-101N/C/P are suitable for the analysis of monosaccharides. Since the samples are separated under a mixed mode of gel filtration and ligand exchange, the selectivity differs depending on the type of cation.
Shim-pack SCR-101H and SCR-102H are ion exclusion chromatography columns, using H type sulfonated styrene polymer as stationary phase. They are ideal for analysis of organic acids using an acid aqueous solution (e.g. aqueous solution of perchloric acid) as mobile phase.

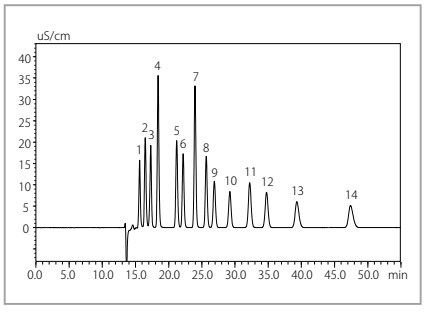


Analysis of Saccharide Standard

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

Conditions

Column	: Shim-pack SCR-101C (300 mm × 7.9 mm I.D., 10 µm, P/N: 228-17889-91)
Mobile phase	: Water
Flow rate	: 1.0 mL/min
Column temp.	: 80 °C
Detection	: RID



Analysis of Organic Acids

Peaks
1. Phosphoric acid
2. Citric acid
3. Pyruvic acid
4. Malic acid
5. Succinic acid
6. Lactic acid
7. Formic acid
8. Acetic acid
9. Levulinic acid
10. Pyroglutamic acid
11. Isobutyric acid
12. Butyric acid
13. Isovaleric acid
14. Valeric acid

Conditions

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

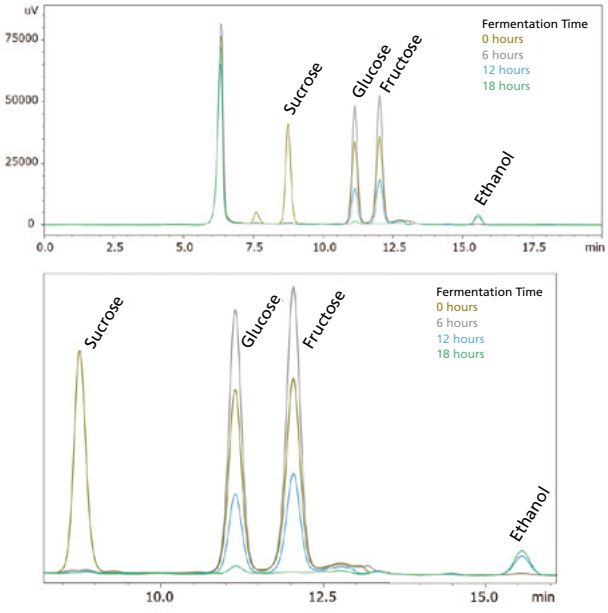
Order Information

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

Analysis of Sugar and Alcohol

Shim-pack SUR-Na

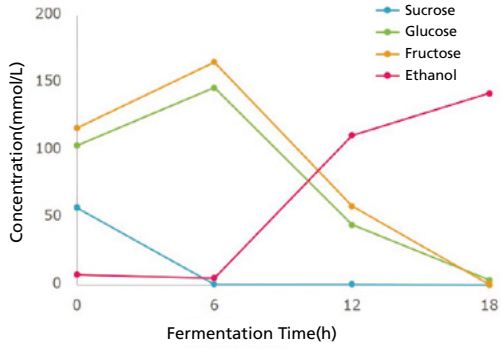
Sugar analysis is commonly conducted in a variety of markets. The ethanol production process in the food and biofuels fields, which utilizes the sugar digestion system of yeast microorganisms, requires measuring and monitoring sugar components and amounts accurately for process design and quality control.
Shim-pack SUR-Na, a ligand exchange chromatography column, offers excellent performance by combining size exclusion mode and sodium-based ligand exchange mode to provide superior separation of sugar components. Pure water can be used for the mobile phase, resulting in less effort to prepare for the analysis.



Conditions

Column	: Shim-pack SUR-Na
Guard column	: Shim-pack SUR-Na (G)
Mobile phase	: Ultrapure water Column
temp.	: 80 °C
Detector	: RI detector (RID-20A)

Fermentation Monitoring Results



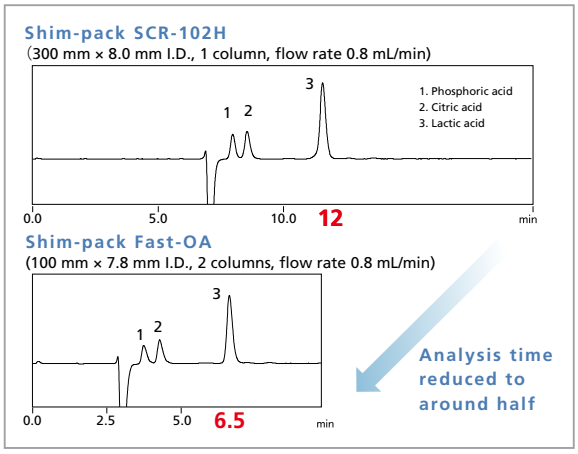
Order Information

P/N	Description	Size	Remarks
228-59529-01	Shim-pack SUR-Na	250 mm x 7.8 mm I.D.	Analytical column
228-59529-02	Shim-pack SUR-Na (G)	50 mm x 7.8 mm I.D.	Guard column

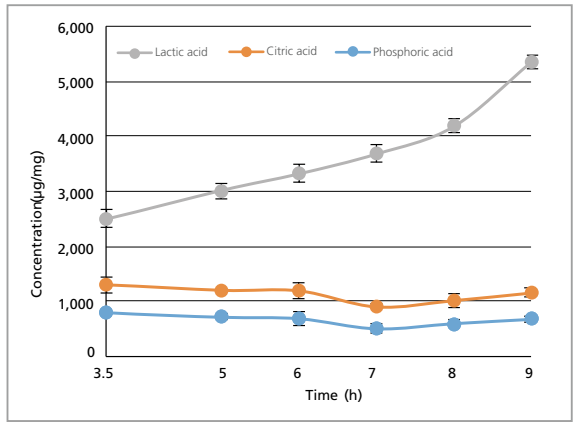
Shim-pack Fast-OA

High-speed Organic Acid Analysis Column

In the fields of fermented food production and bio-industry, organic acid metabolites are monitored to control the activity of yeast or bacteria. The quantity of organic acids needs to be checked and the production environment adjusted accordingly in order to improve production and quality control, and these checks must be carried out in a timely manner.
The Shim-pack Fast-OA is a column for the high-speed analysis of organic acids. It can separate multiple organic acids in a short time and supports real-time monitoring of their concentration levels.



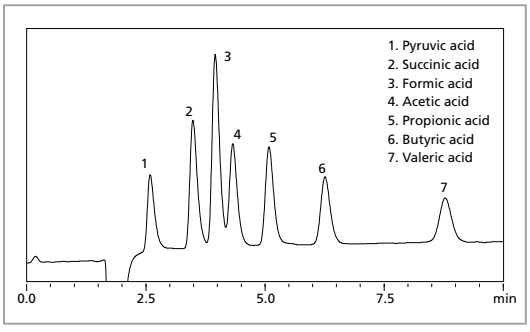
Chromatograms of home-fermented yogurt



Monitoring of organic acid content in home-fermented yogurt

Analysis of short-chain fatty acids with strong retention in under 10 minutes

The Shim-pack Fast-OA column can also be used to analyze short-chain fatty acids with strong retention, of interest in the study of intestinal flora, in less than 10 minutes.



Chromatogram of a standard mixture containing seven organic acids

Conditions

Column	: Shim-pack Fast-OA
Mobile phase	: 5 mmol/L p-toluenesulfonic acid
pH buffer solution	: 5 mmol/L p-toluenesulfonic acid 20 mmol/L Bis- Tris 0.1 mmol/L EDTA
Flow rate	: 0.8 mL/min
Detection method	: Conductivity detector (CDD-10 AVP)

Order Information

Shim-pack Fast-OA is an ion-exclusion chromatography column. Up to three columns can be connected according to the target compounds*. A guard column, the Shim-pack Fast-OA (G), can be used in combination to protect the analysis column. The guard column is a cartridge-type, and the cartridge can be replaced.

P/N	Product name	Dimensions (Length × I.D., mm)	Remarks
228-59942-41	Shim-pack Fast-OA	100 × 7.8	Analytical column
228-59942-42	Shim-pack Fast-OA (G)	10 × 4.0	Guard column, includes a column holder and a cartridge
228-59942-43	Shim-pack Fast-OA (G) Cartridge (4 pcs)	-	Replacement cartridge for guard column

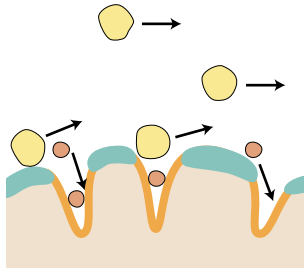
*For details about the piping, please refer to the technical report *High-Speed Analysis of Organic Acids Using Shim-pack Fast-OA and pH-Buffered Electrical Conductivity Detection* (C190-E237)

Shim-pack MAYI Series

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

How the Shim-pack MAYI Series Works

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

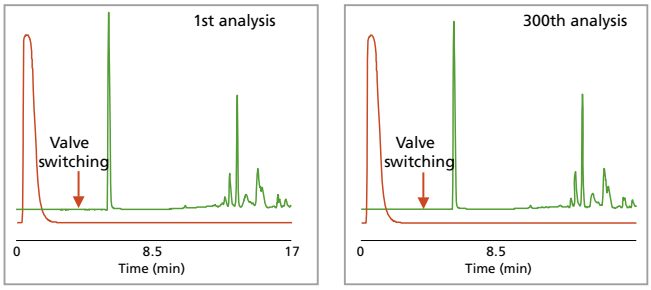


Quick and Reliable Protein Removal

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

Outstanding Durability

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



Comparison of 1st and 300th Analyses

Conditions

Samples	: Isopropylantipyrine added Blood plasma Sample solution: 0.1 % phosphoric acid and acetonitrile mixture (95:5) Dilution: 8 times
Detection	: Analysis: 275 nm, Blood plasma matrix: 280 nm
Injection volume	: 100 µL

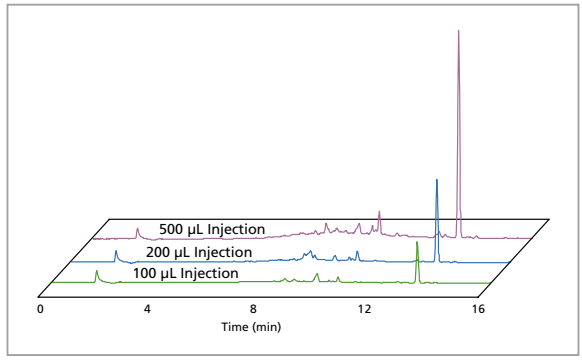
Shim-pack MAYI Series

Stable Trap Even for Large Injection Volumes

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

Conditions

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



Comparison Data for Injecting 100, 200, and 500 µL

Order Information

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

Cartridge

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

Column Holder

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

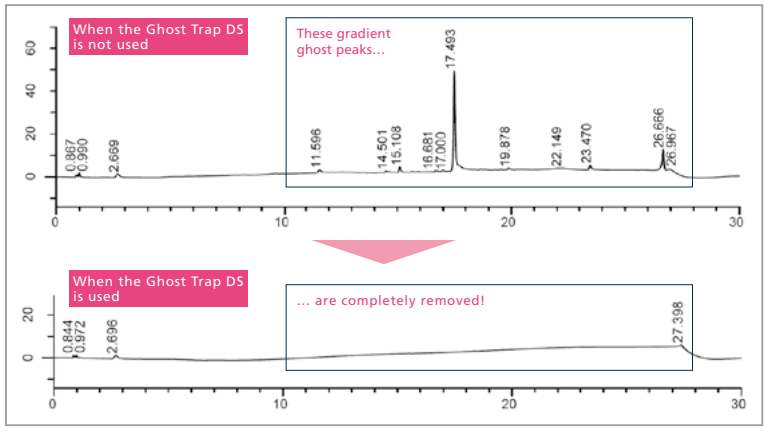
Ghost Trap DS/DS-HP

A new high-pressure model for the elimination of impurities from organic solvents has been added to the Ghost Trap DS* lineup. The Ghost Trap DS was co-developed with Daiichi Sankyo Co., Ltd. It has been designed to effectively adsorb impurities in the mobile phase in order to reduce the time required for method development and impurity analysis.
The 100 MPa pressure tolerance of the Ghost Trap DS-HP allows it to be used with UHPLC systems. This permits the effective use of the Ghost Trap DS for method development by UHPLC and subsequent transfer to conventional analysis.

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

Consistently Traps Impurities, Even in Organic Solvents

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



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

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

Order Information

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

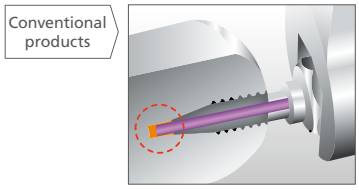
*1 Note that a delay volume equivalent to the internal volume of the product occurs if the product is installed downstream of the gradient mixer or the confluence of two pumps.
* The product service life differs according to analysis conditions, such as the mobile phase used.
* In analysis using an ion-pairing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

Column Fittings

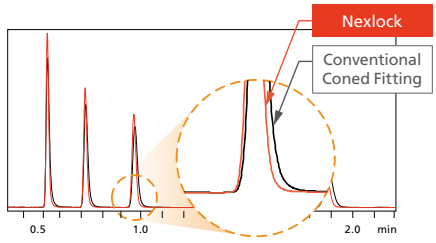
Nexlock Finger-Tight Fittings

Nexlock is a re-usable finger-tight fitting that is easy to use, and provides excellent pressure capacity, and durability. The fitting and tube combination ensures proper sealing to achieve a zero dead volume connection, thus minimizing peak broadening and tailing. It withstands pressures up to 130 MPa without the use of tools.

Minimized dispersion



Connection ports vary in depth, but Nexlock ensures zero dead volume every time by removing human error.



Using Nexlock, peak shape is improved.

Reusable up to 100 times

Tubes can be connected and disconnected 100 times.

Note: this is standard in use of installation method.

Order Information

Description	P/N	Tube Length	I.D.	Remarks
Tubing and fitting set	228-62544-11	600 mm	100 µm I.D.	
	228-62544-13	800 mm		
	228-52597-48			With preheat block for CTO-30A
	228-52597-47			With preheat block for CTO-30A for dual flow line system*
Tube only (for maintenance)	228-62544-61	600 mm		
	228-62544-63	800 mm		
	228-52597-49			With pre-heat block for CTO-30A
Fitting only (for maintenance)	228-62544-90	-	-	Can be used with all Nexlock tubing.

* Used when analysis is performed by installing two columns in parallel.

UHPLC Fittings (Pressure Tolerance: 130 MPa)

A UHPLC fitting is installed to the column inlet tubing in a UHPLC system. Not only can it tolerate pressure of 130 MPa, it can be re-used when following the proper tightening torque specifications.

228-56867-41

228-56867-42

228-56866

P/N	Description	Pack
228-56867-41	UHPLC Fitting S	1
228-56867-42	UHPLC Fitting L*	1
228-56867-43	UHPLC Fitting S	10
228-56866	Extender Tool for UHPLC Fitting	1

* UHPLC Fitting L is 5 mm longer than UHPLC Fitting S. It is recommended for use when a channel switching valve (FCV-32AH/34AH/36AH) is installed.

Male Nut Fitting Set (Pressure Tolerance: 35 MPa)

The male nut fitting set is assembled with two SUS hand-tightened male nuts and two PEEK ferrules with taper-shaped ends. This product can be tightened by hand to connect with columns that tolerate pressure of 35 MPa.

P/N	Description	Pack
228-45717-01	Male Nut Fitting Set	2
228-45717-02	PEEK Ferrule	10

Male Nut PEEK (Pressure Tolerance: 20 MPa)

This nut is superior in chemical compatibility and mechanical strength. It is available for 1.6 mmI.D. pipe such as stainless, titanium, PEEK etc. Maximum pressure is 20 MPa.
Some Shim-pack columns are packed with two piece of PEEK male nuts. Extra nuts can be ordered by referring to the part number on the right.

P/N	Description	Pack
228-18565-84	Male Nut, PEEK	5

MEMO

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