Analytical Columns

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

Cartridge Guard Columns

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

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

Shim-pack GIST Amide

Strong retention of polar compounds

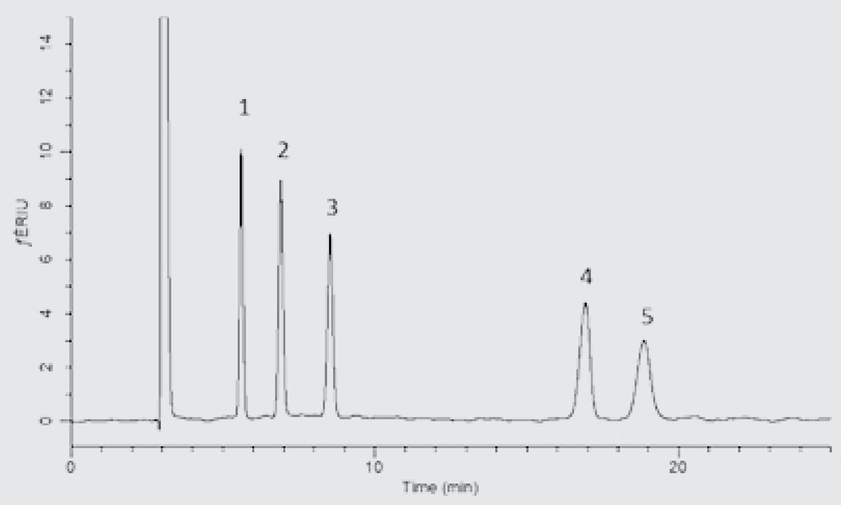
This is the amide type HILIC column in the Shim-pack Series. It shows stronger retention of polar compounds than other HILIC columns such as unmodified silica and Diol type and it provides a different selectivity. It is also highly durable, which is a characteristic of the Shim-pack GIST Series.

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

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

Analysis Examples

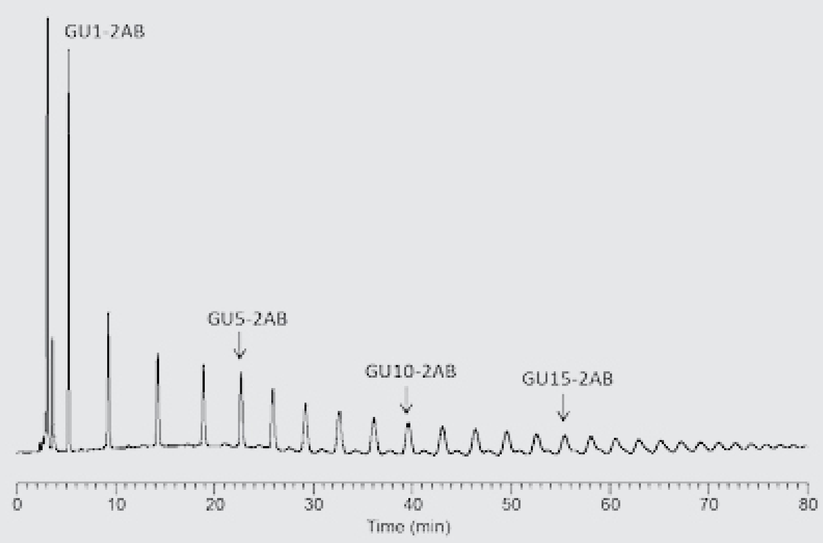
Analysis of Sugar Alcohol



Conditions

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

Analysis of Oligosaccharides derivatized with 2-AB



Conditions

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

Analytical Columns

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

Cartridge Guard Columns

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

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

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

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

Cartridge Guard Column (High-Pressure Series)

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

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

Shim-pack GIS CN

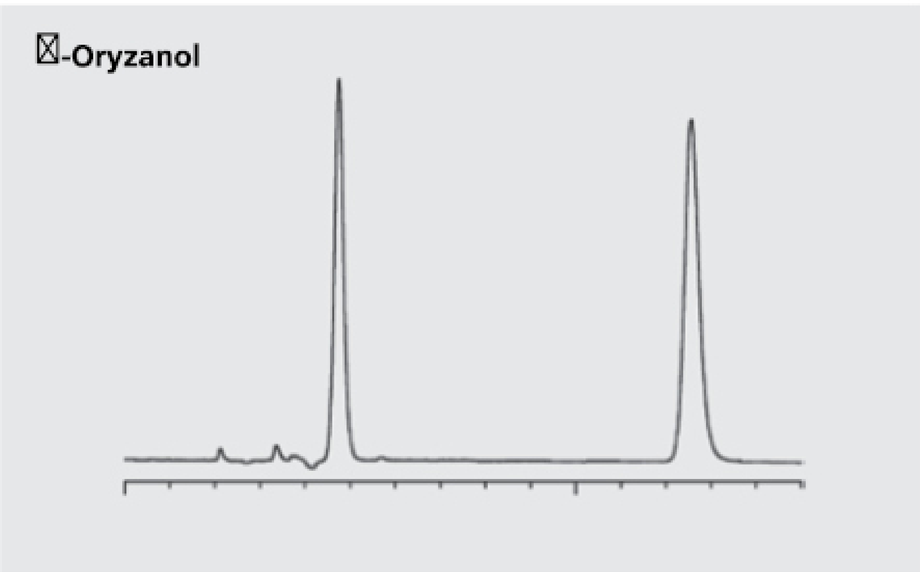
Suitable in Either Reversed Phase or Normal Phase Mode

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

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

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

Analysis Examples

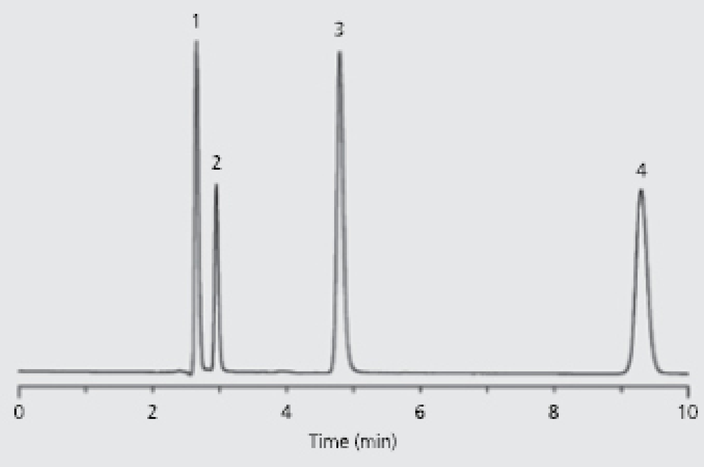


Peaks
1. gamma-oryzanol
2. vanillin

Conditions

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

Free Amino acids and Organic acids



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

Conditions

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

Analytical Columns

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

Cartridge Guard Columns

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

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

Shim-pack Solar

Good hydrophobic retention, low absorption of ionic compounds

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

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

Analytical Columns

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

Shim-pack FC-ODS

Shortens the Analysis Time Using a Conventional System

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

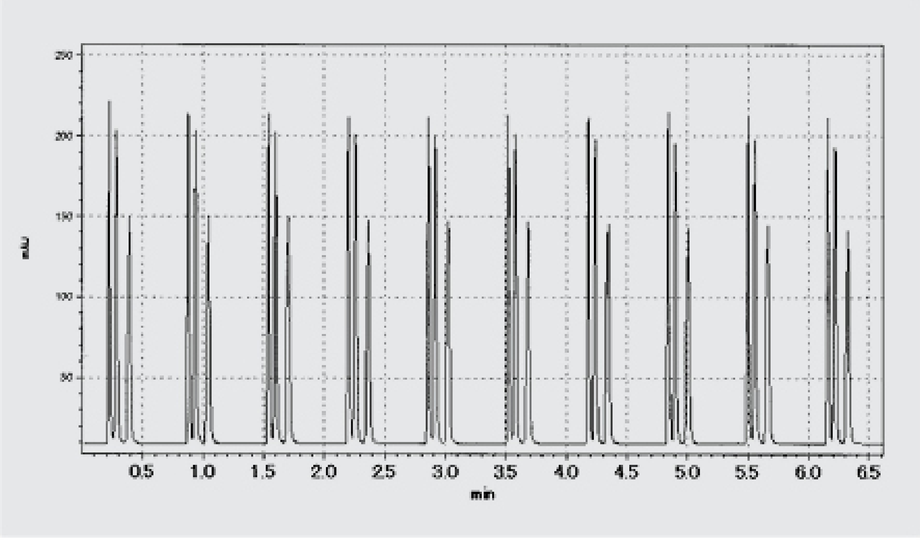
Particle Size	3 µm
Pore Size	12 nm
Surface Area	315 m^2/g
Carbon Loading	18%
Pressure Tolerance	20 MPa
Pore Volume	1 mL/g
End-capping	Yes
Bonding Type	Monomeric
pH Range	1.5 - 9
USP Code	L1

Analysis Examples

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

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

High-Throughput Analysis



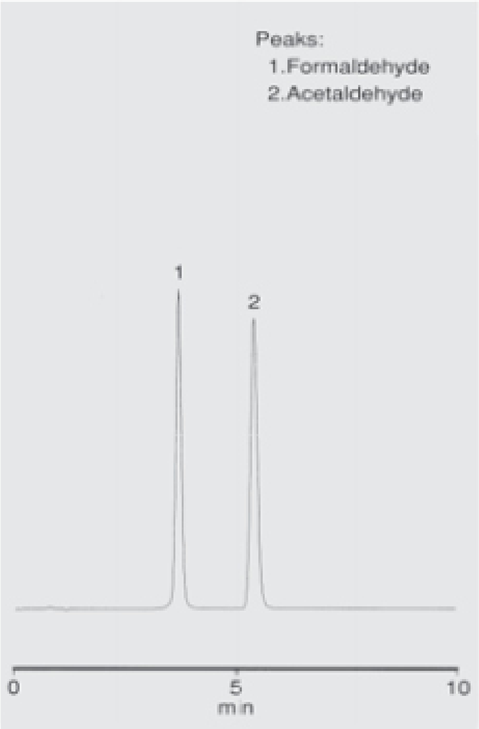
10 times repeated analysis in 6.5 minutes is possible.

Conditions

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

Shim-pack FC-ODS

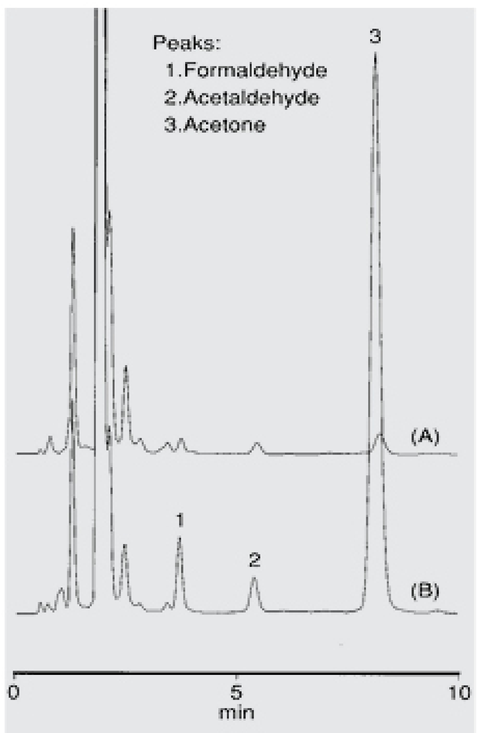
High-speed analysis of 2,4-DNPH derivatized aldehydes / ketones



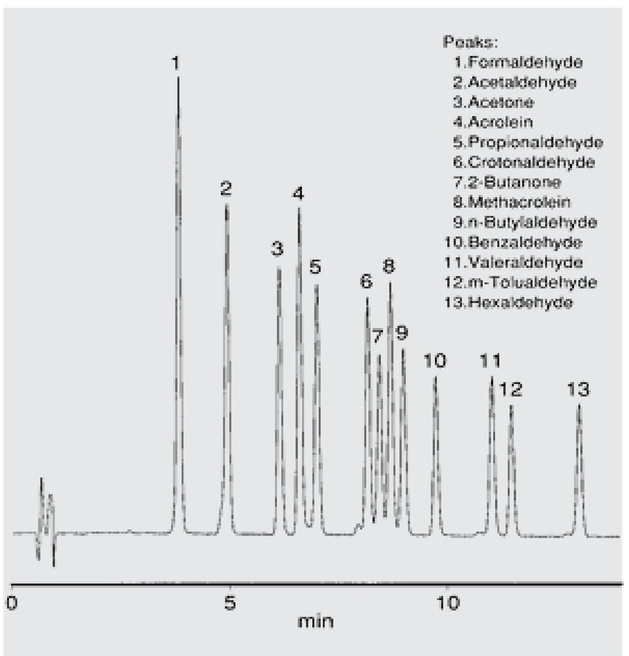
Chromatogram of Standard Sample (formaldehyde 0.35µg/mL, acetaldehyde 0.55µg/mL, 10µL injected)

■ **Conditions**

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



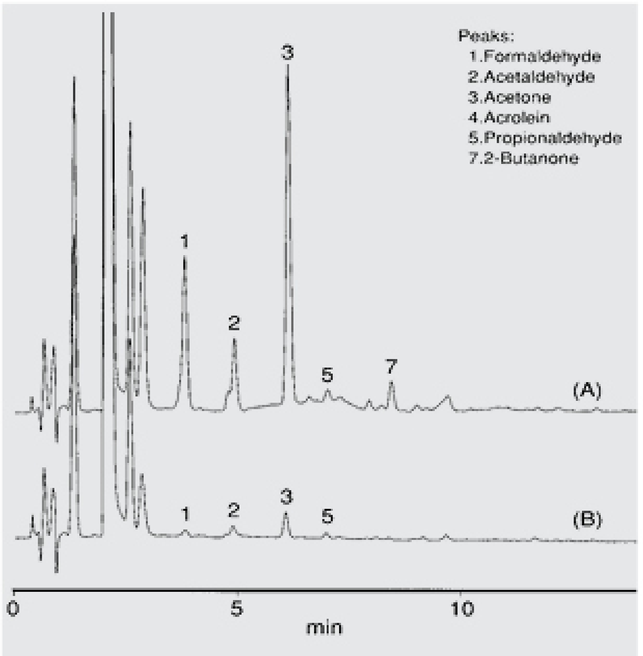
Chromatograms of Environmental Air (A) and Indoor Air at Laboratory (B)



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

■ **Conditions**

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



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

■ Product Information

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

Shim-pack PREP Series

Shim-pack PREP Series

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

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

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

Shim-pack G Series

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

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

Shim-pack G Series

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

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

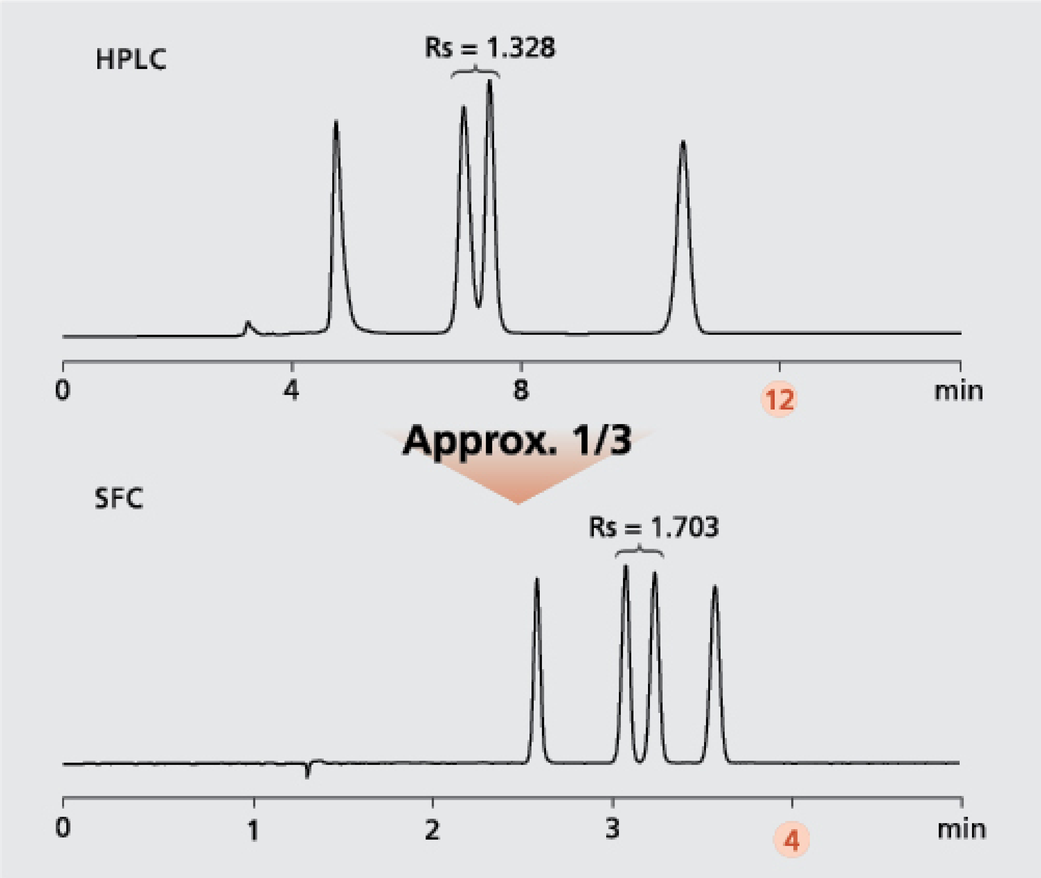
* Length of guard columns for 50 mm I.D. preparative columns is 75 mm.

Shim-pack UC Series

Analysis Examples

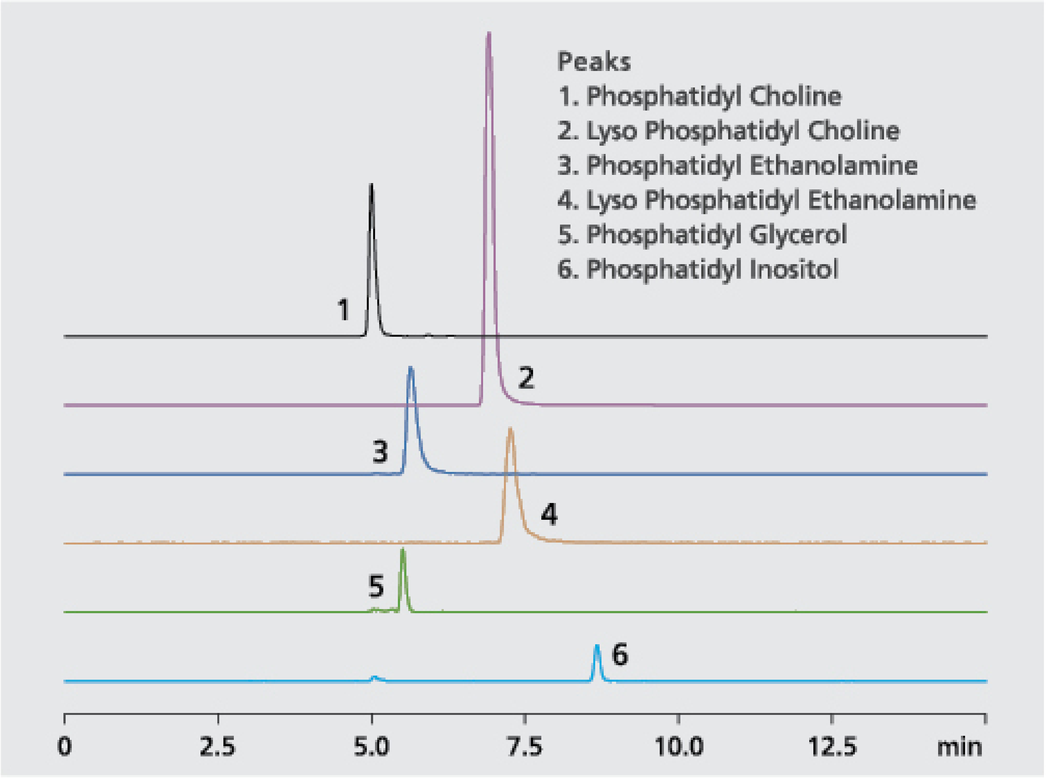
Tocopherol Isomers

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



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

Phospholipid Classes



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

Preparative Columns

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

Shim-pack Ultron VX Series

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

Shim-pack STR-ODS Series

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

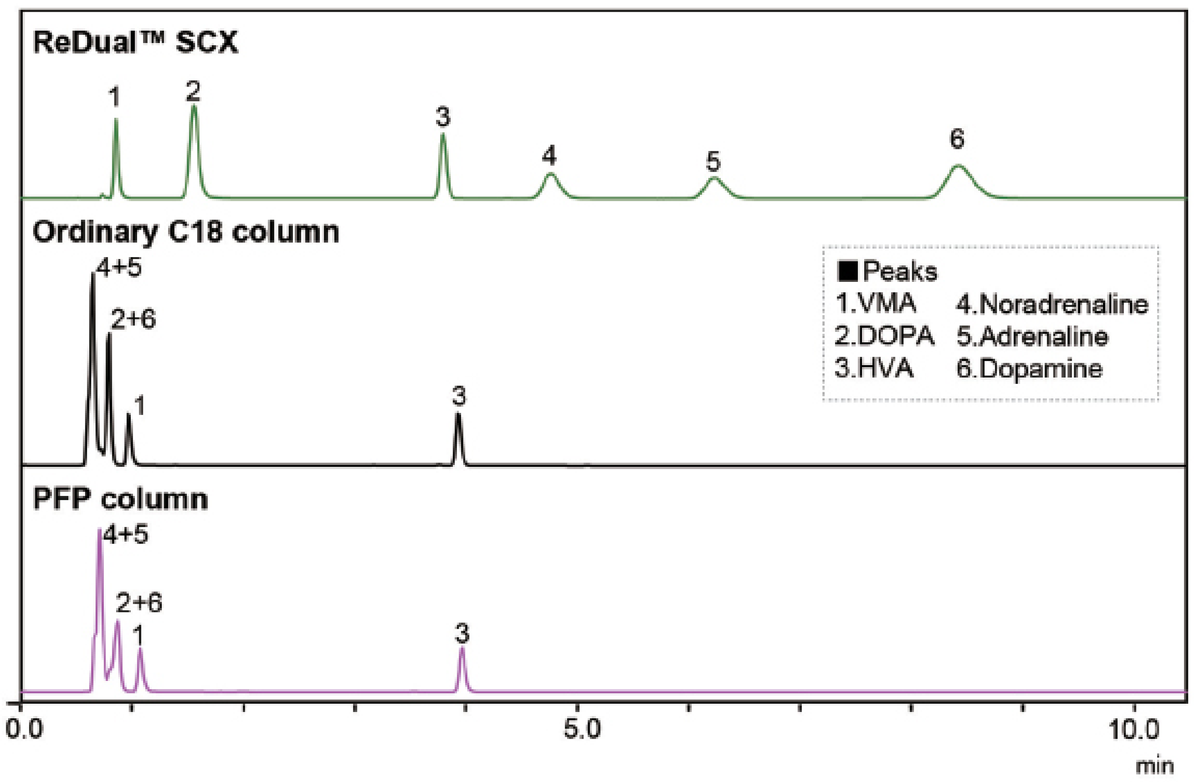
Mixed-Mode Columns

Shimadzu Redual™ LC column

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

There are three types of Redual LC columns:

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



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

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

Shim-pack Scepter C4

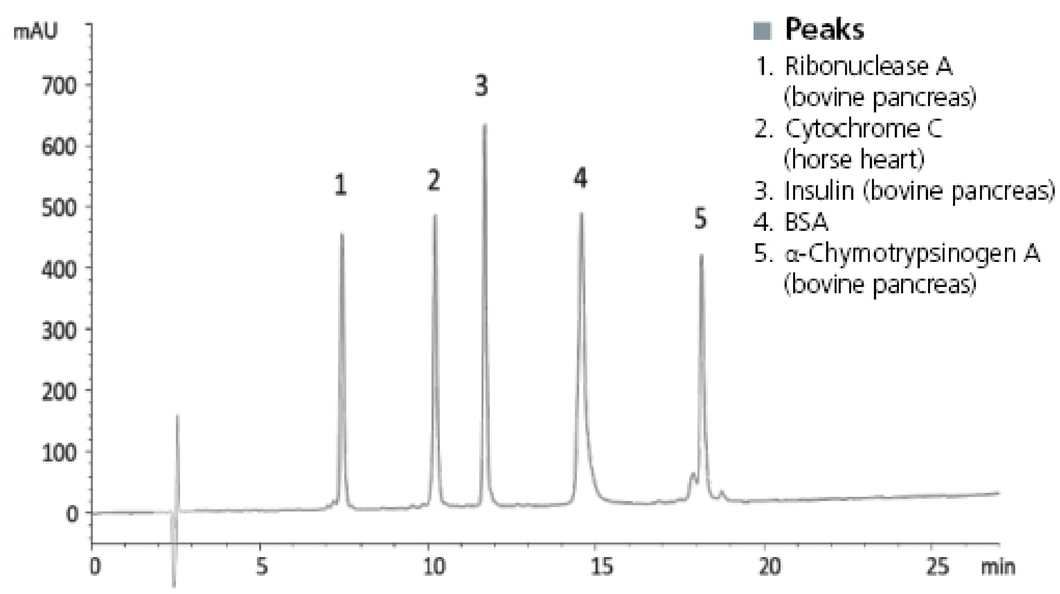
Design for biomolecules separations

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

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

Analysis Examples

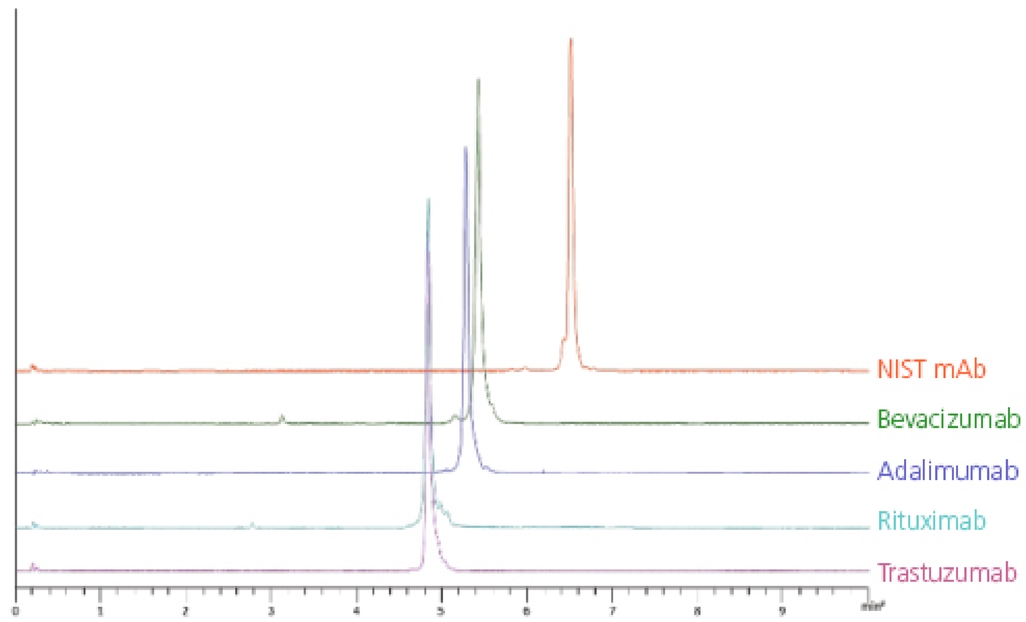
Analysis of Proteins



Conditions

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

Analysis of Monoclonal Antibodies



Conditions

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

Analytical Columns

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

Analytical guard cartridges columns

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

Preparative Columns

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

Preparative guard cartridges columns

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

Shim-pack Bio LC Columns

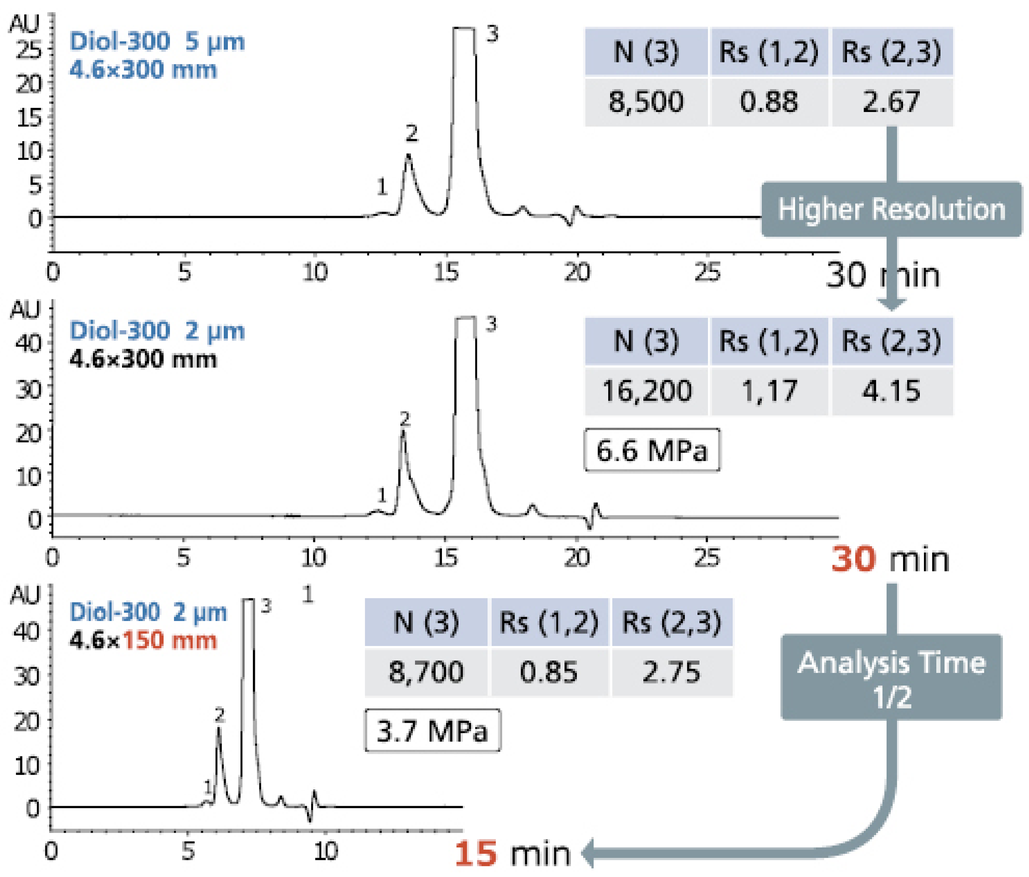
Solution for Analysis of Peptides, Oligonucleotides and Biopharmaceuticals

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

Shim-pack Bio Diol : Size Exclusion Chromatography Columns

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

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



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

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

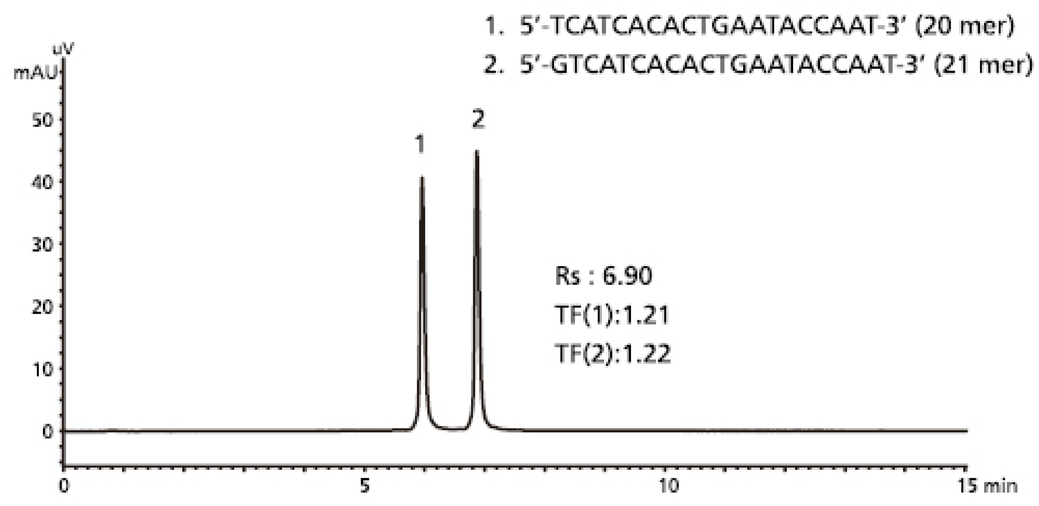
Conditions

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

Shim-pack Bio IEX : Ion Exchange Chromatography Columns

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

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



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

Conditions

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

Shim-pack Bio Diol Columns

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

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

Shim-pack Bio IEX Columns

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

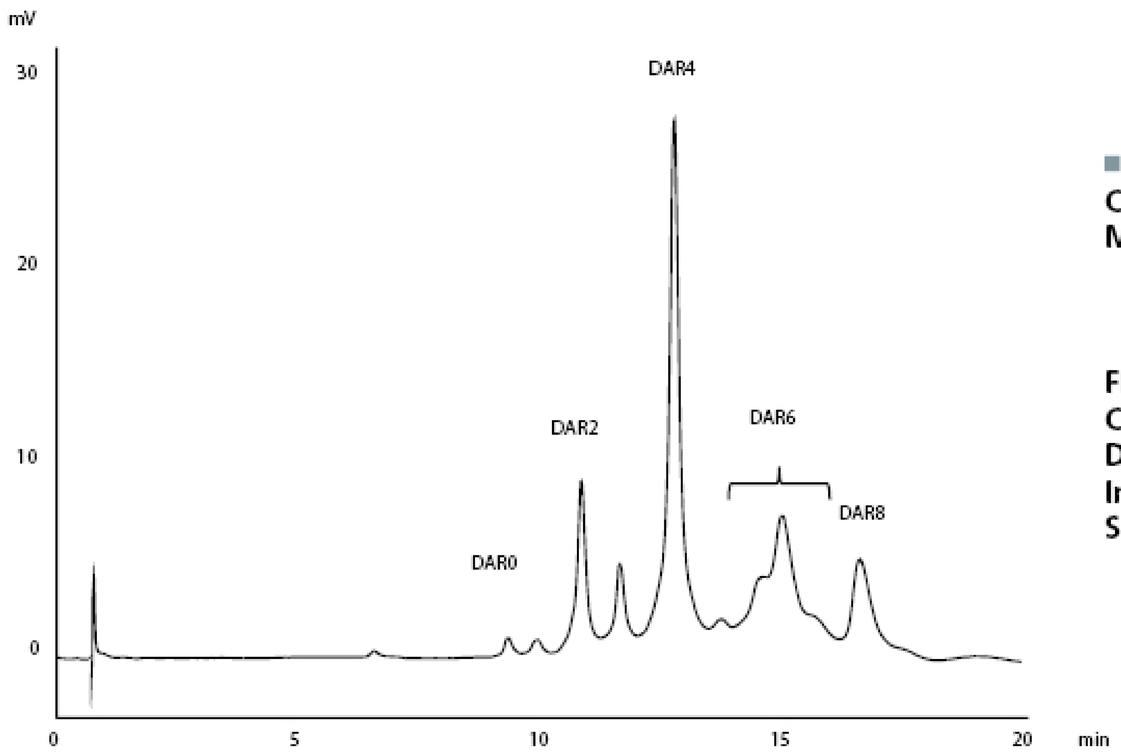
Shim-pack Arata Peptide C18

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

Shim-pack Bio HIC: Hydrophobic Interaction Chromatography Column

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

Drug to Antibody Ratio (DAR) analysis of ADCs



Conditions

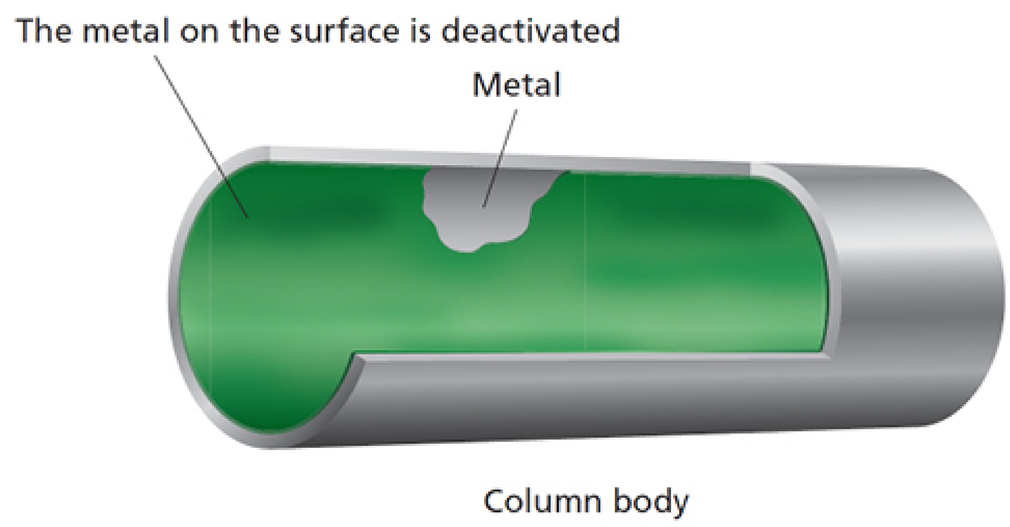
Column	: Shim-pack Bio HIC, 4 µm, 4.6×100mm
Mobile Phase	: A) 50 mM NaH_2PO_4-Na_2HPO_4 (pH 7.0) containing 1.5 M $(NH_4)_2SO_4$/2-propanol (95/5) B) 50 mM NaH_2PO_4-Na_2HPO_4 (pH 7.0)/2-propanol (80/20) 0%B (0-1 min), 0-100%B (1-15 min), 100%B (15-20 min)
Flow Rate	: 1.0 mL/min
Col. Temp.	: 25 °C
Detection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

Shim-pack Bio HIC Butyl

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

Microscale Columns

Shim-pack ™ MC C18



Versatility

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

Shim-pack MC PLONAS Series

Shim-pack MC PLONAS 90Å 2.7 µm

Superior Performances with Superficially Porous Particles (SPP)

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

Shim-pack MC PLONAS Series

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

Order information

Analytical Columns

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

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

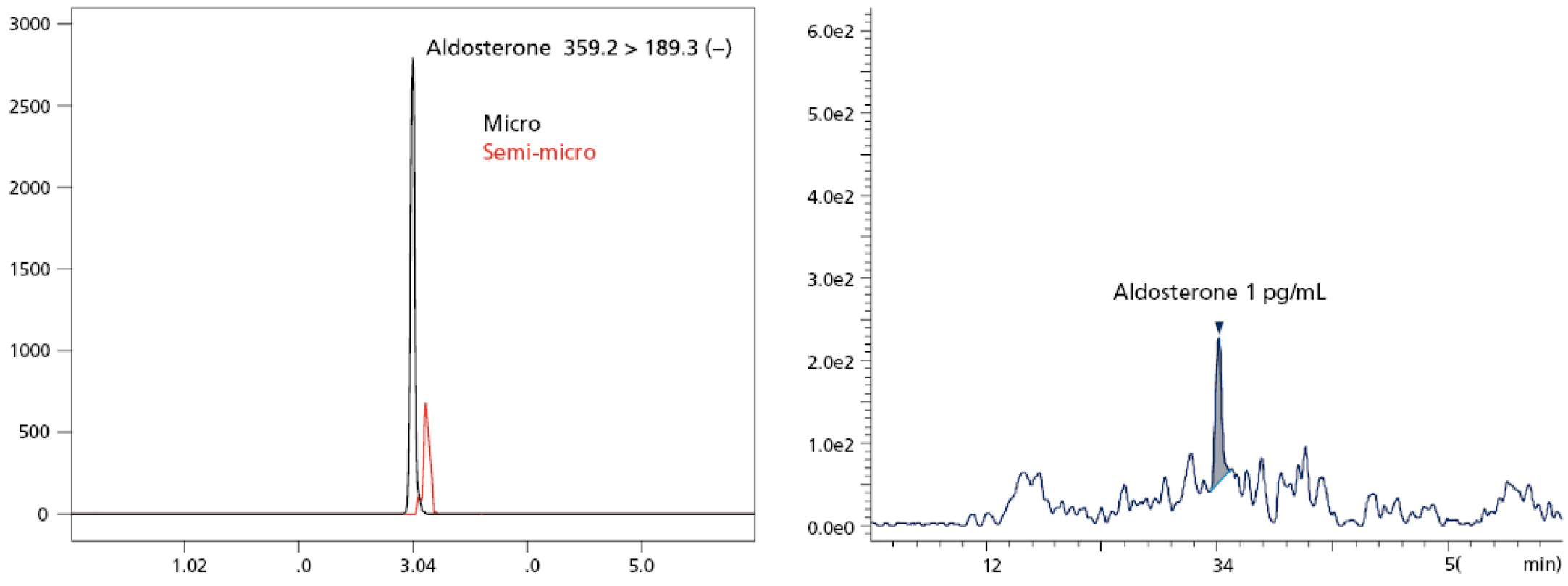
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
227-32104-01	Biphenyl	0.2	50
227-32104-11		0.3	
227-32104-02		0.2	100
227-32104-12		0.3	
227-32104-03		0.2	150
227-32104-13		0.3	
227-32103-01	PFPP	0.2	50
227-32103-11		0.3	
227-32103-02		0.2	100
227-32103-12		0.3	
227-32103-03		0.2	150
227-32103-13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

Shim-pack MC C18 (particle size 1.9 µm)

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

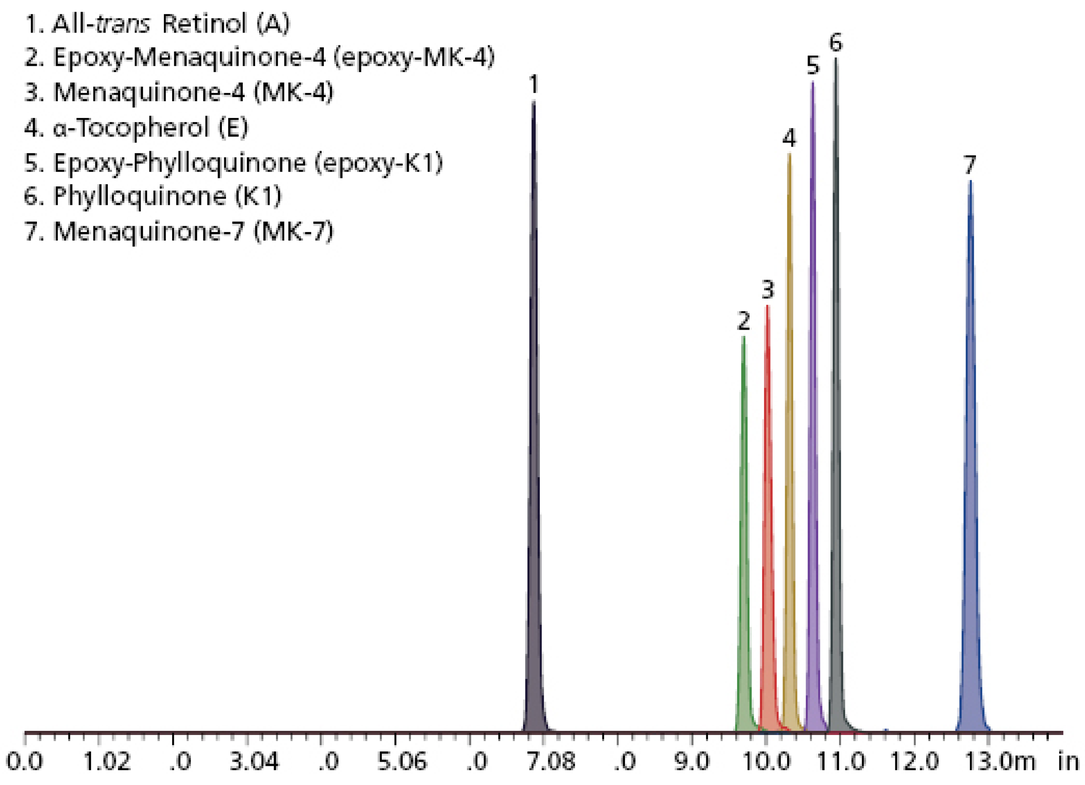
Various molecules give an increase in the peak intensity on Nexera Mikros™ LC-MS/MS platform with an MC PLONAS column.

Shim-pack MC PLONAS C18



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

Shim-pack MC PLONAS C8



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

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

Shim-pack Trap Columns

Trap Columns Wide Portfolio

- Shim -pack MCT C18/C8

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

- Shim -pack MCT LC18/LC8

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

Order information

Shim-pack MCT series

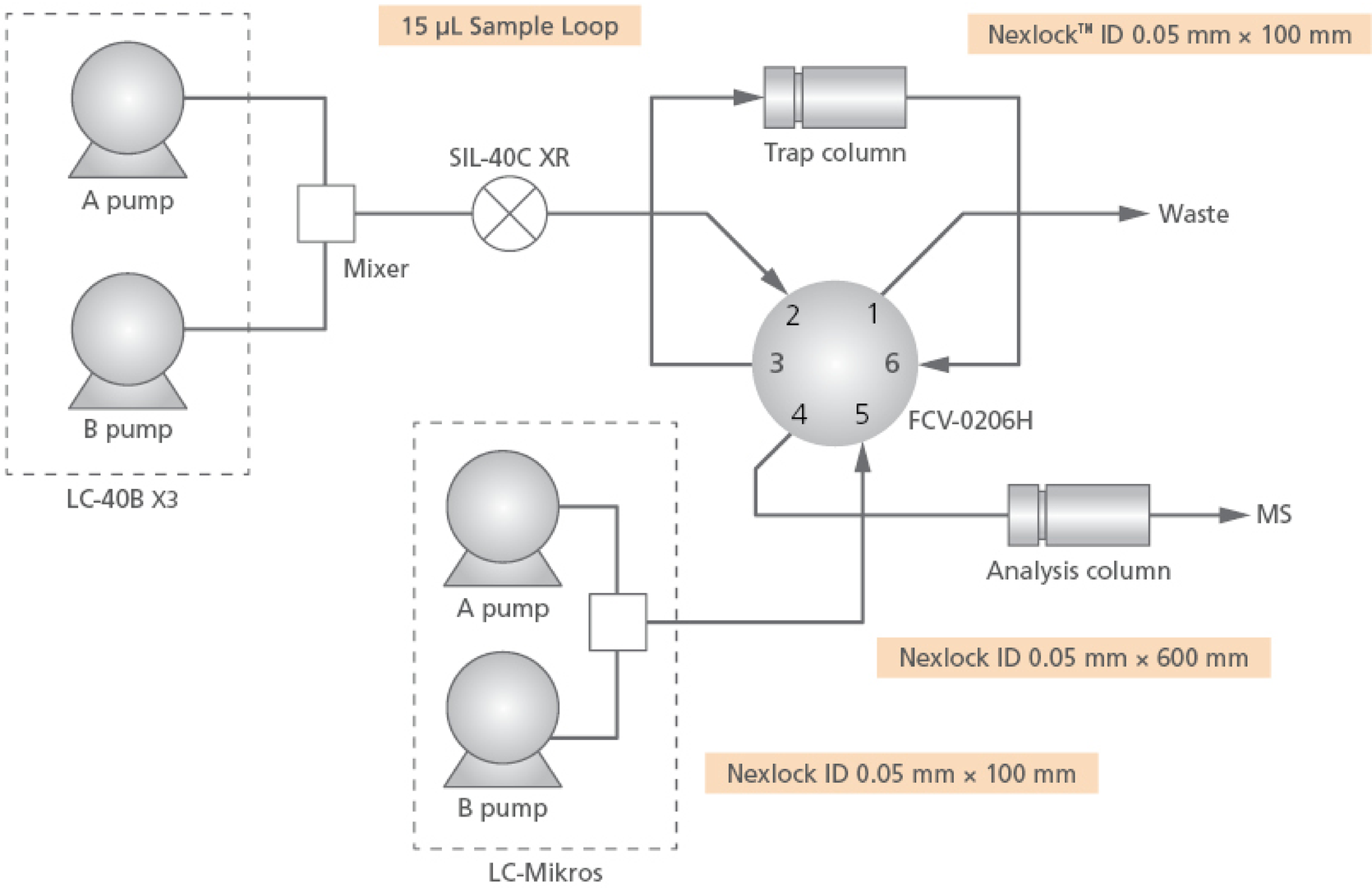
Part Number	Bonded Phase	Diameter (mm)	Length (mm)
228-59938-91	C18	0.3	35
228-59938-92		0.5	
228-59939-91	C8	0.3	35
228-59939-92		0.5	

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

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

Nexer Mikros: Trap and Elute Confirguration

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



Shim-pack GPC Series

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

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

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

Determination of Tetrahydrofuran

Analytical Columns

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

Guard Columns

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

Determination of Chloroform

Analytical Columns

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

Guard Columns

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

Shim-pack GPC Series

Determination of Dimethylformamide

Analytical Columns

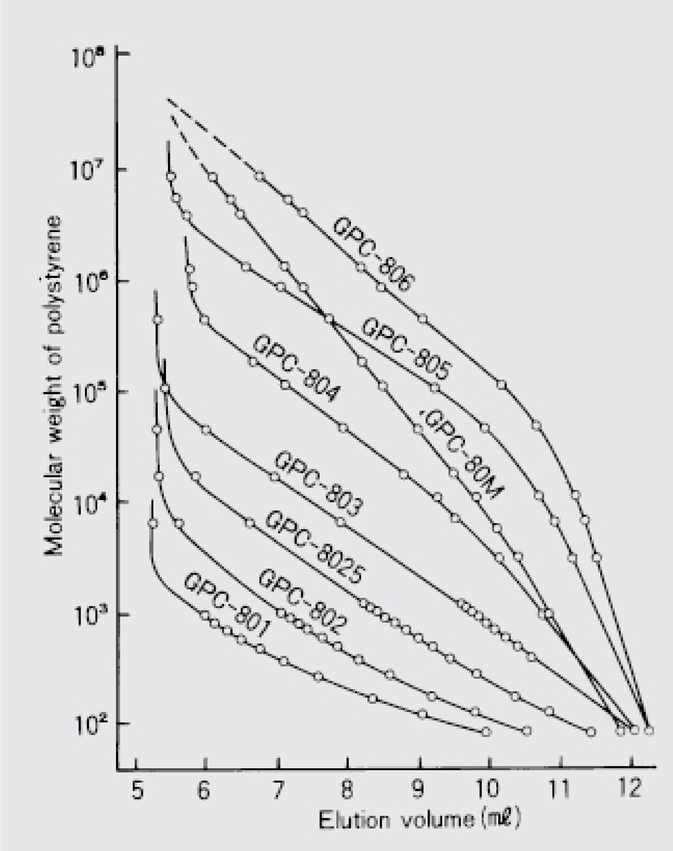
Column	Exclusion Limit (polystyrene)	Dimensions (Length × I.D., mm)	P/N
Shim-pack GPC-801D	1.5×10^3	300 × 8.0	228-20803-93
Shim-pack GPC-802D	5×10^3	300 × 8.0	228-20804-93
Shim-pack GPC-8025D	2×10^4	300 × 8.0	228-20805-93
Shim-pack GPC-803D	7×10^4	300 × 8.0	228-20806-93
Shim-pack GPC-804D	4×10^5	300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

Guard Columns

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

Analysis Examples

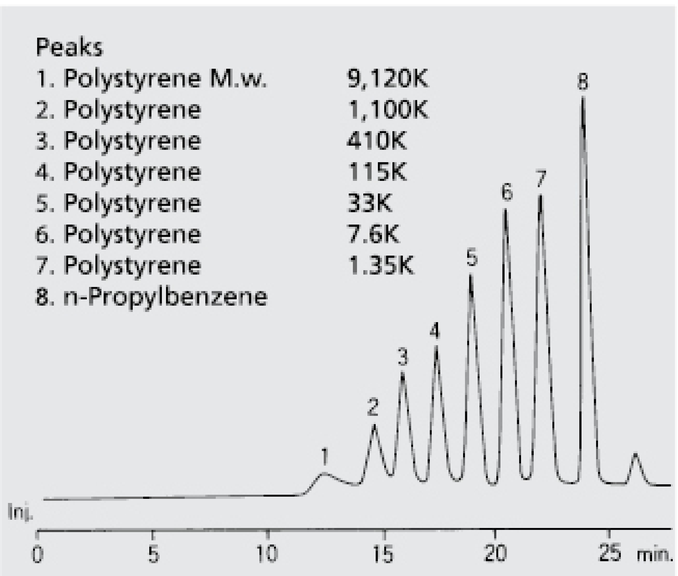
Calibration Curves



Conditions

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

Analysis of Polystyrene Standard



Conditions

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

Shim-pack Diol Series

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

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

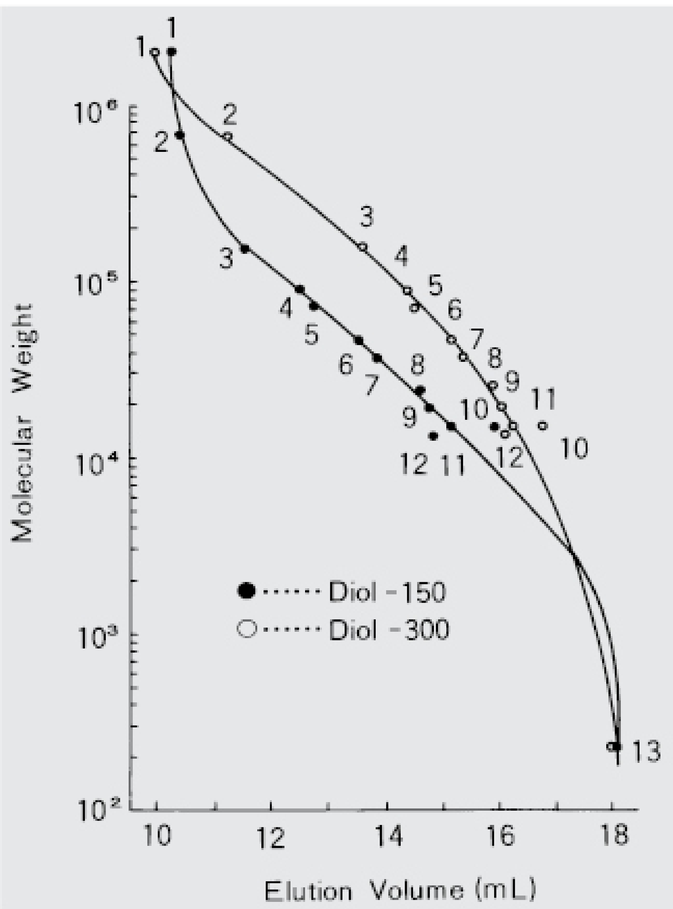
Product Information

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

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

Analysis Examples

Calibration Curves



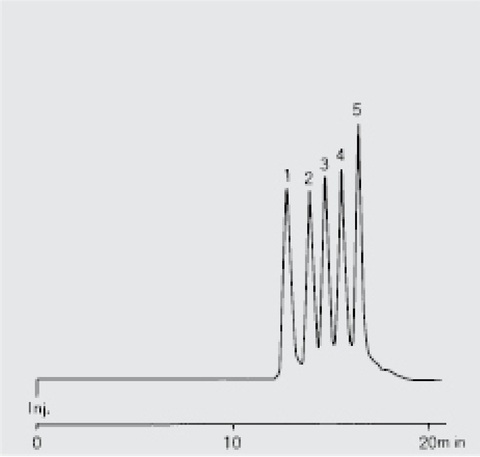
Peaks

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

Conditions

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

Analysis of Protein Standard



Peaks

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

Conditions

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

Metal Free Columns

Shim-pack Scepter Series

Analytical Columns

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

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

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

Metal Free Columns

Shim-pack G Series

Analytical Columns

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

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

Cartridge Guard Columns

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

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

Mastro™ LC Series

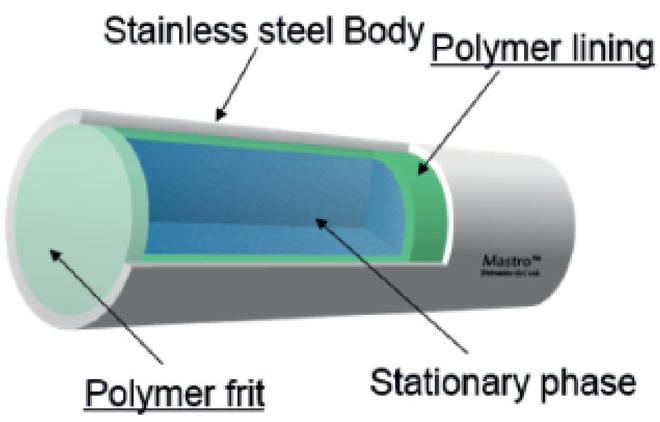
High pressure tolerance metal free column, best solution for chelating compound

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

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

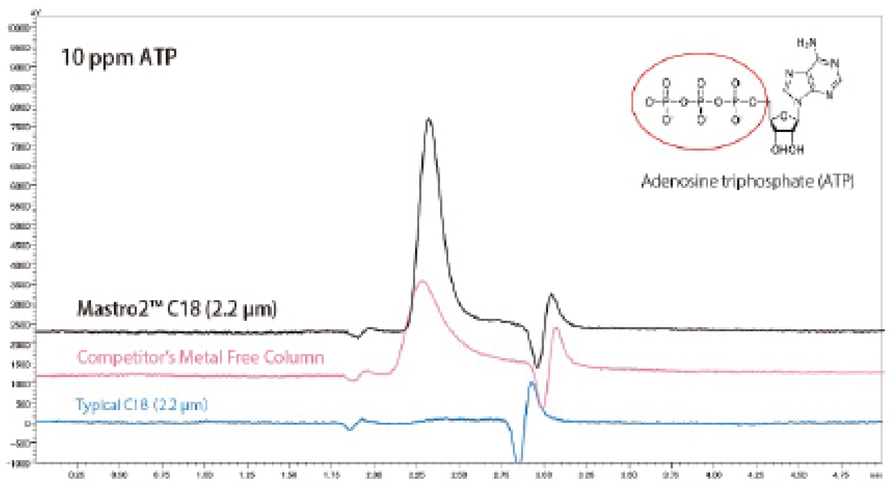
Features

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



Mastro2™ C18

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



Analytical condition

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

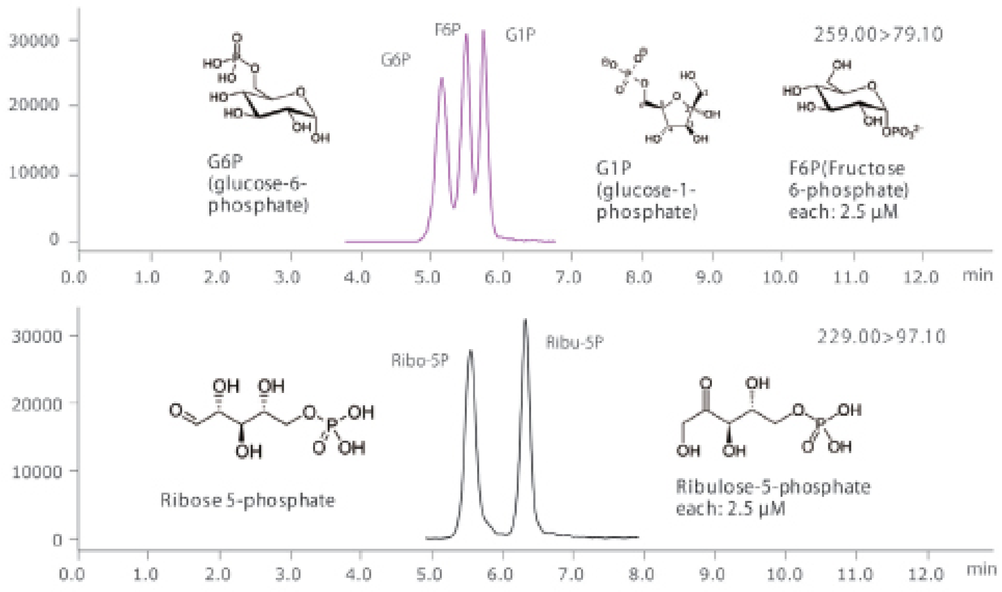
Unlike other products, Mastro2 ™ has a structure that does not generate metal chelates because all liquid contact parts are PEEK resin. In addition, a line-up of 2.2 µm microparticles is introduced as the PEEK resin parts are designed to be resistant to deformation even under high pressure.

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

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

Mastro™ SP

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



■ **Analytical condition**

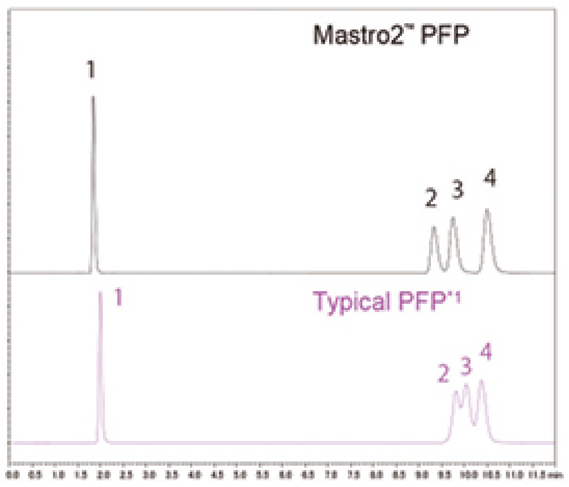
Instruments : Shimadzu Nexera/LCMS-8050
Column : Mastro™ SP (2.1 mmI.D × 100 mmL., 5 µm)
Mobile phase : A) 10 mM Ammonium acetate/ACN=90/10
Mobile phase : B) 50 mM Ammonium acetate/ACN=80/20
0% B (0-4.0 min) ⇒ 60% B (9.0 min)
⇒ 00% B (11.0-20.0 min)
⇒ 0% B (20.1-25.0 min)
T. Flow : 0.5 mL/min
Nebulizing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

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

Mastro2™ PFP

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

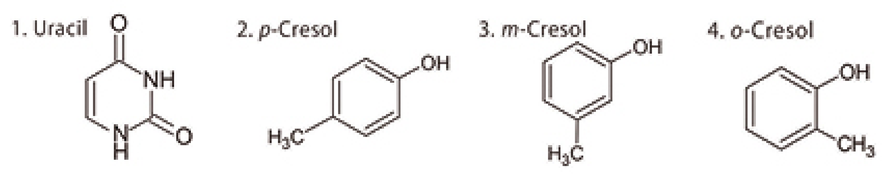
■ Separation of cresol



■ **Analytical conditions**

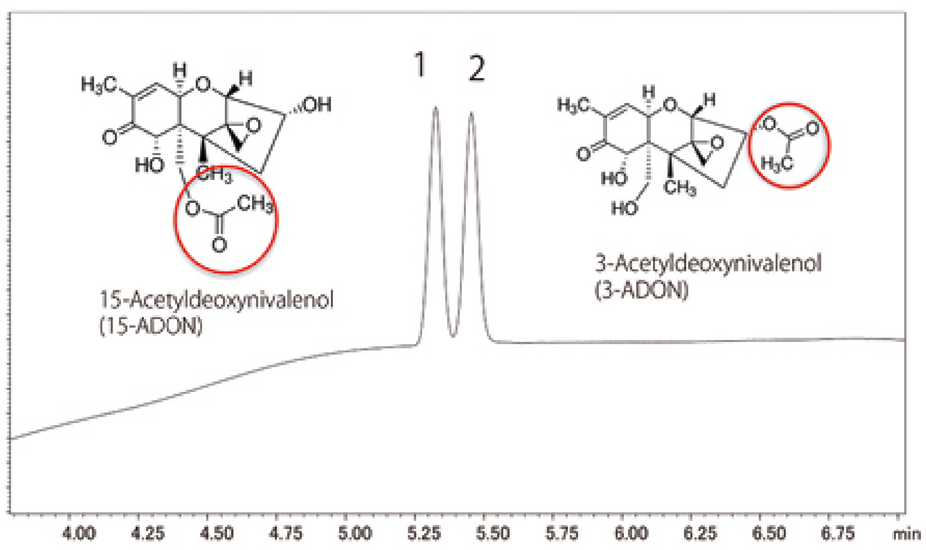
Instrument : NexeraX2_SPD20A(Semi-micro cell)
Column : Mastro2™ PFP (150 mmL. × 2.0 mm I.D. 3 µm)
Typical PFP*1 (150 mmL. × 2.1 mm I.D. 3 µm)
Mobile phase : H_2O / CH_3OH = 60 / 40
Flow rate : 0.2 mL/min
Detection : UV 254 nm
Column oven : 40 °C
Sample : 1. Uracil, 2. p-Cresol, 3. m-Cresol, 4. o-Cresol

**1 Metal free column*



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

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



■ **Analytical conditions**

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

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

Shim-pack UC Series

Packed Columns for Supercritical Fluid Chromatograph

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

Achieve high speed and high performance

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

Wide range of stationary phases meets diverse needs

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

High durability and stable reproducibility

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

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

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

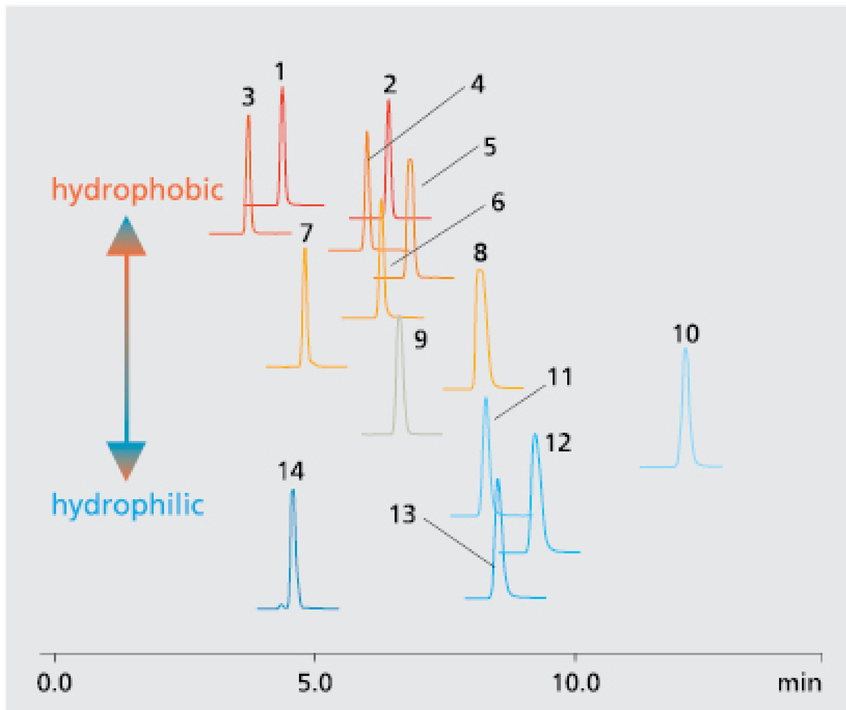
	Shim-pack UC-Diol II	Shim-pack UC-Sil II	Shim-pack UC-Choles	Shim-pack UC-PBr
Bonded Phase	Diol Group	-	Cholesteryl Groups	Pentabromobenzyl Group
Particle Size (µm)	3, 5	3, 5	3, 5	3, 5
Pore Size (nm)	12	12	12	12
Surface area (m^2/g)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm), 300 (5µm)	340 (3µm),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

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

Analysis Examples

Multiple Pesticides with a Wide Polarity Range

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

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

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