COSMOSIL

COSMOSIL

High Performance Liquid Chromatography

CATALOG 2019

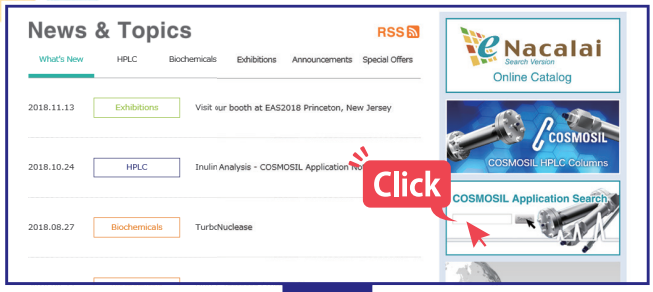
BGB GC LC MS CE

COSMOSIL Applications

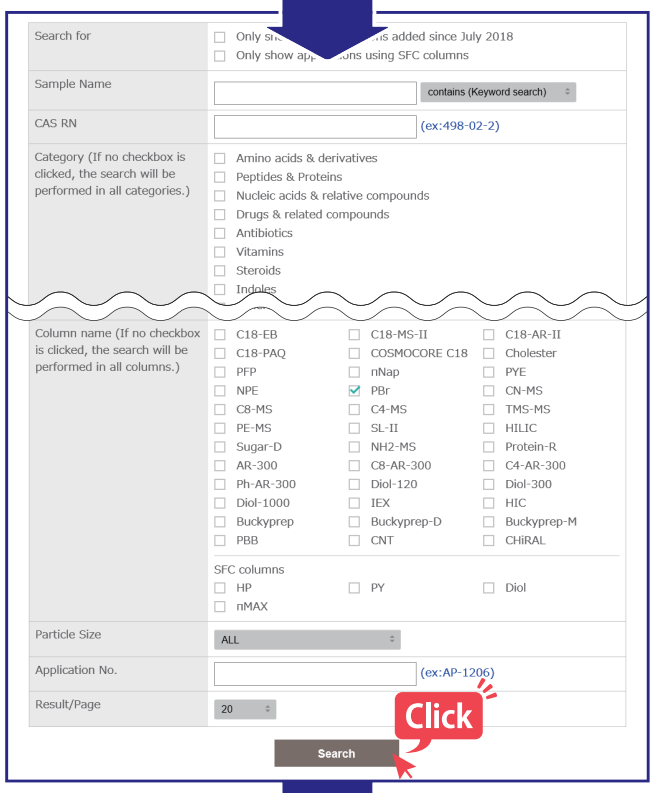
COSMOSIL Applications has more than **7,700 applications** using COSMOSIL columns. Setting optimal HPLC experimental parameters is an important process that requires experience and time. COSMOSIL Applications provides you with sample analysis conditions for widely used ODS columns and our specialty columns.

POINT

- Over **7,700** applications
- Easy to search

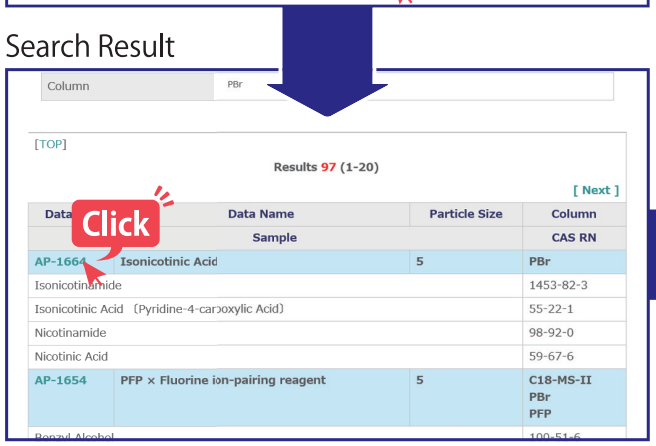


Visit our website at
http://www.nacalai.com

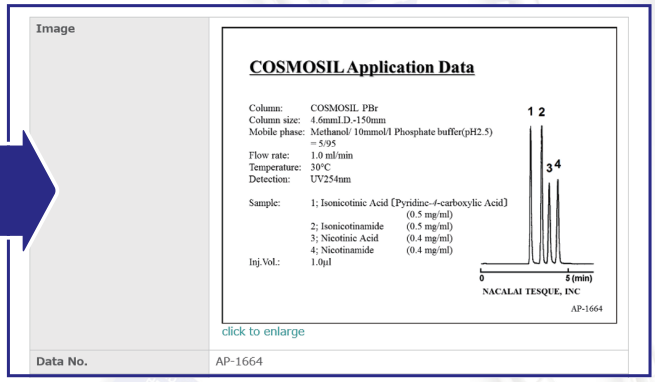


The applications are searchable by sample category, sample name, CAS RN., column name and particle size.

Search Result



COSMOSIL Applications



CONTENTS

COSMOSIL / COSMOGEL Packing Material List

Separation Mode	Packing Material	Bonded Phase	Bonding Type	Average Particle Size (μm)	Average Pore Size (Å)	Carbon Content (%)	Special Features and Applications	USP Category	Page
Reversed phase	C_{18}-MS-II	Octadecyl group	Monomeric	2.5	130	18	Multi-purpose C_{18} column	L1	24
				3, 5, 15	120	16			
	C_{18}		Polymeric	2.6 (Core-Shell)	90	7			32
	C_{18}-AR-II			3, 5, 15	120	17	Features strong acid resistance, good for acidic compounds and peptides.	L1	26
	C_{18}-PAQ			5, 15		11	Good for hydrophilic compounds and stable performance under 100% aqueous conditions.	L1	28
	C_{18}-EB		Monomeric	3		14.5	Good for basic compounds.	L1	30
	Cholester	Cholesteryl group	Monomeric	2.5	130	21	Usable under the same conditions as C_{18}. Unique rigid cholestertl structure improves separation.	L101	10
				2.6 (Core-Shell)	90	—			
				5	120	20			
	PBr	Pentabromobenzyl group		2.6 (Core-Shell)	90	—	Separate hydrophilic compounds under reversed-phase conditions.	—	14
				5	120	8			
	PFP	Pentafluorophenyl group				10	Separation utilizing weak dipole-dipole interaction	L43	17
	π NAP	Naphthylethyl group		2.5	130	14	Stronger π-π interaction than phenyl column.	—	18
				5	120	11			
	PYE	Pyrenylethyl group				18	The most powerful π-π interaction	—	20
	NPE	Nitrophenylethyl group				9	Separation utilizing dipole-dipole interaction	—	22
	CN-MS	Cyanopropyl group				7	Enables separation of different hydrophobic samples without using gradients.	L10	35
	C_{22}-AR-II	Docosyl group	Polymeric			19	Alkyl chain columns, excluding C_{18}.	—	36
	C_8-MS	Octyl group	Monomeric			10		L7	
	C_4-MS	Butyl group				7		L26	
	TMS-MS	Trimethyl group				5		L13	
	PE-MS	Phenylethyl group				10	π-π interaction	L11	
	Protein-R	Octadecyl group	Polymeric		300	—	Wide pore column with the advantages of both C_{18} and C_4.	L1	52
	C_{18}-AR-300	Octadecyl group				12	Wide pore type	L1	54
	C_8-AR-300	Octyl group				7		L7	
	C_4-AR-300	Butyl group				6		L26	
	Ph-AR-300	Phenyl group				7		L11	
Normal phase	SL-II	—	—	3, 5, 15	120	—	Suitable for preparative separation.	L3	42

Separation Mode	Packing Material	Bonded Phase	Bonding Type	Average Particle Size (μm)	Average Pore Size (Å)	Carbon Content (%)	Special Features and Applications	USP Category	Page
Hydrophilic interaction	HILIC	Triazole	—	2.5	130	—	Retains highly polar compounds that would not be retained in a C_{18} column.	L104	44
				5	120				
	Sugar-D	Polyamine	—		—	—	A novel stationary phase for mono- and oligosaccharides.	—	48
	NH_2-MS	Aminopropyl group	Polymeric		120	4	Primary amino bonded column	L8	50
Gel filtration	Diol-120-II	Diol group	—	5	120	—	Sample MW Protein: 5,000-100,000 Water-Soluble Polymer: 1,000-20,000	L20	56
	Diol-300-II				300		Sample MW Protein: 10,000-700,000 Water-Soluble Polymer: 5,000-100,000		
	Diol-1000-II				1,000		Sample MW Water-Soluble Polymer: 50,000-500,000		
Ion-exchange	IEX Type Q	Trimethylaminopropyl type	—	5	1,000	—	Anion-exchange type (purification)	—	58
	IEX Type Q-N				—		Anion-exchange type (ultra-fast analysis, precise analysis)		
	IEX Type S	Sulfopropyl type			1,000		Cation-exchange type (purification)		
	IEX Type S-N				—		Cation-exchange type (ultra-fast analysis, precise analysis)		
	IEX Type M	Trimethylaminopropyl type /Sulfopropyl type			1,000		Amphoteric ion-exchange type (purification)		
	IEX Type M-N				—		Amphoteric ion-exchange type (precise analysis)		
Hydrophobic interaction	HIC	—	—	5	300	—	Little loss in enzyme activity and the tertiary structure of proteins	—	60
—	Buckyprep	Pyrenylpropyl group	Mono-meric	5	120	17	Standard column for fullerene separation	—	62
	Buckyprep-D	Nitro-carbazoyl group				—	Good for derivatized fullerenes		63
	Buckyprep-M	Phenothiazinyl group				13	Good for metallofullerenes		64
	PBB	Pentabromobenzyl group				8	Good for preparative separation of C_{60} or C_{70}.		65
Gel filtration	CNT-300	Hydrophilic group (neutral)	—	5	300	—	Separation of soluble carbon nanotubes.	—	66
	CNT-1000				1,000				
	CNT-2000				2,000				

SFC Columns

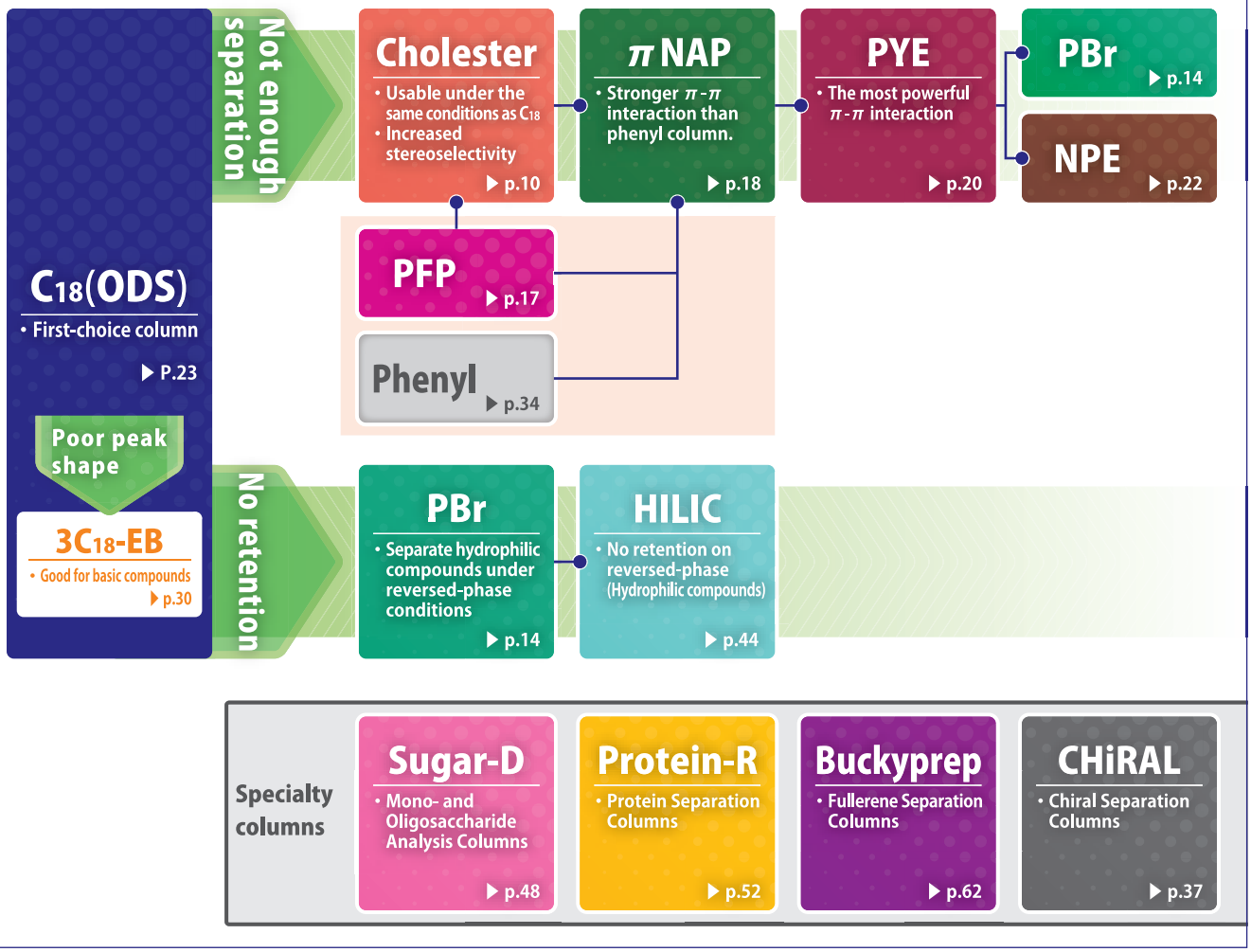
Separation Mode	Packing Material	Bonded Phase	Bonding Type	Average Particle Size (μm)	Average Pore Size (Å)	Carbon Content (%)	Special Features and Applications	USP Category	Page
SFC	PY	Pyridinyl group	—	3, 5	120	—	Similar separation properties as 2-Ethylpyridine, with stronger retention.	—	67
	HP	3-Hydroxyphenyl group					Good for hydrophilic compounds. Stronger retention for basic compounds than PY.		
	Diol	Diol group		5			Less effect from ionic interaction.		
	Cholester	Cholesteryl group					Longer retention and better separation than C_{18}.		
	π MAX	Pyrenylethyl group					Stronger π-π interaction than phenyl column.		
	PBr	Pentabromobenzyl group					Unique separations using dispersion force.		

Column Selection Guide

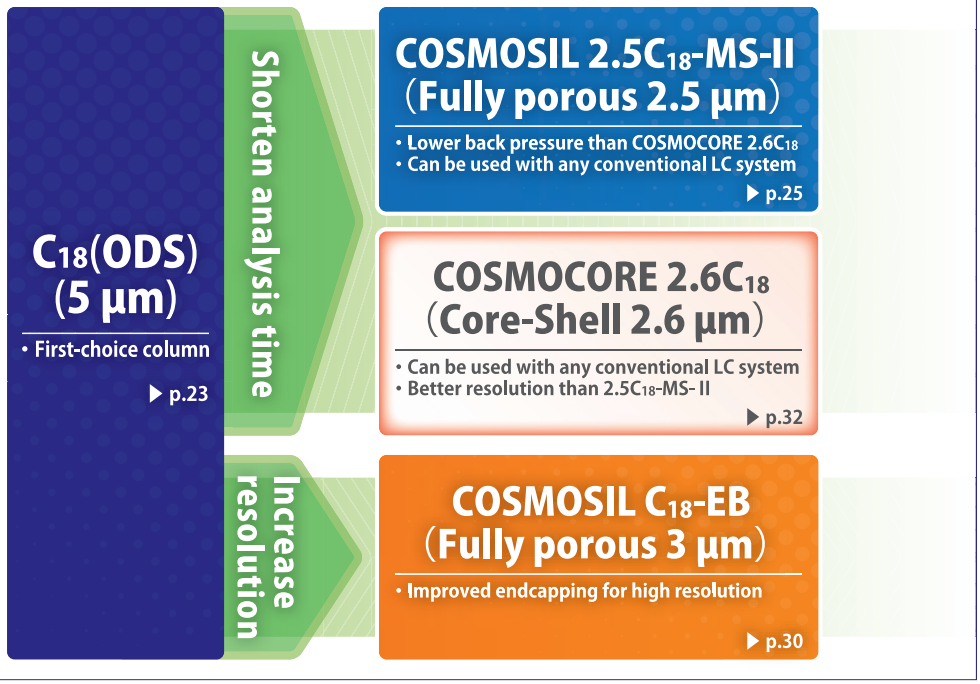
Sample	Category	Separation Mode	Recommended Column	Page	Remark
Low-MW drugs	—	Reversed phase	C_{18}-EB	30	Near perfect end capping treatment
			COSMOCORE C_{18}	32	
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
		Normal phase	SL-II	42	Standard for normal phase
Vitamins	Water-soluble vitamins	Reversed phase	C_{18}-PAQ	28	Compatible with 100% water based mobile phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
	Fat-soluble vitamins	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
			Cholester	10	Different selectivity from C_{18}
		Normal phase	SL-II	42	Standard for normal phase
Natural products	—	Reversed phase	C_{18}-MS-II	24	Utilize various interactions for versatile separations. See each product page for details.
			Cholester	10	
			PBr	14	
			π NAP	18	
		Normal phase	SL-II	42	Suitable for preparative separation
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
Organic acids	—	Reversed phase	C_{18}-PAQ	28	Compatible with 100% water based mobile phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
Fatty acids	—	Reversed phase	C_{18}-AR-II	26	Features strong acid resistance
			Cholester	10	Different selectivity from C_{18}
Phospholipids	Molecular species	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
	Class species	Normal phase	SL-II	42	Standard for normal phase
Agricultural Chemicals	—	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
			Cholester	10	Different selectivity from C_{18}
		Normal phase	SL-II	42	Standard for normal phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
Metabolites	—	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
			Cholester	10	Different selectivity from C_{18}
		Normal phase	SL-II	42	Standard for normal phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
Food additives	—	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
			Cholester	10	Different selectivity from C_{18}
		Normal phase	SL-II	42	Standard for normal phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column
Other low-MW compounds	—	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
			Cholester	10	Different selectivity from C_{18}
		Normal phase	SL-II	42	Standard for normal phase
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C_{18} column

Sample	Category	Separation Mode	Recommended Column	Page	Remark
Structural isomers Structural analogs	—	Reversed phase	C_{18}-MS-II	24	Utilize various interactions for versatile separations. See each product page for details.
			C_{18}-AR-II	26	
			Cholester	10	
			πNAP	18	
			PYE	20	
			NPE	22	
			PBr	14	
			PFP	17	
		Normal phase	SL-II	42	Standard for normal phase
Optical isomers	—	Normal phase Reversed phase	CHiRAL A Type, B Type, C Type	37	3 chiral selectors with high overall hit rate
Amino acids	Free amino acids	Reversed phase	PBr	14	Retains aromatic amino acids
		Hydrophilic interaction	HILIC	44	For amino acids not retained in reversed-phase mode
	Labeled amino acids	Reversed phase	C_{18}-AR-II	26	Features strong acid resistance
Peptides Proteins	M. W. 3,000 or less	Reversed phase	C_{18}-AR-II	26	Features strong acid resistance
			PBr	14	Separation for oligopeptides
		Hydrophilic interaction	HILIC	44	For hydrophilic peptides not retained in reversed-phase mode
	M. W. 3,000 or more	Reversed phase	Protein-R	52	Wide pore columns
			C_{18}-AR-300	54	
			C_4-AR-300		
		Size exclusion	Diol-II	56	Separation utilizing molecular size
		Ion exchange	IEX	58	Separation based on charge
Nucleic acids	Nucleic acid bases	Reversed phase	PBr	14	Separate under reversed-phase condition
		Hydrophilic interaction	HILIC	44	Different selectivity from reversed phase
	Nucleosides Nucleotides	Reversed phase	C_{18}-PAQ	28	Compatible with 100% water based mobile phase
			PBr	14	Strong retain than C_{18}
		Hydrophilic interaction	HILIC	44	Different separatin from reversed phase
	Oligonucleotides	Reversed phase	C_{18}-MS-II	24	Standard for reversed phase
		Size exclusion	Diol-II	56	Separation utilizing molecular size
		Size exclusion	IEX	58	Separation based on charge
Sugars	Monosaccharides	Hydrophilic interaction	Sugar-D	48	Separation in non-derivatized form
			NH_2-MS	50	
	Labeled saccharides	Reversed phase	C_{18}-PAQ	28	For pyridylaminated sugars
		Hydrophilic interaction	Sugar-D	48	For two-dimensional separations with reversed-phase
			NH_2-MS	50	
	Oligosaccharides	Reversed phase	PBr	14	Retained in reversed-phase mode
		Hydrophilic interaction	Sugar-D	48	Separation in non-derivatized form
			NH_2-MS	50	
	Polysaccharides	Size exclusion	Diol-II	56	Separation utilizing molecular size
Fullerenes	Fullerenes	—	Buckyprep	62	Standard for fullerene separation
	Metallofullerenes	—	Buckyprep	62	Different selectivity for metallofullerenes
			Buckyprep-M	64	
	Derivatized fullerenes	—	Buckyprep	62	Separation in toluene mobile phase
			Buckyprep-D	63	
Carbon nanotubes	—	Size exclusion	CNT	66	Separation of soluble carbon nanotubes
Water-soluble polymer	—	Size exclusion	Diol-II	56	Separation utilizing molecular size

Column Selection Guide by Stationary Phase Type

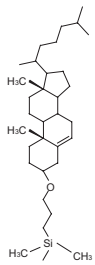
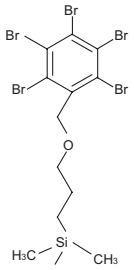
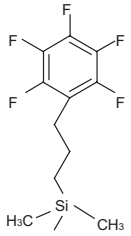
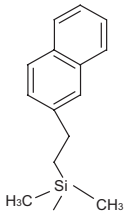
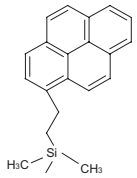
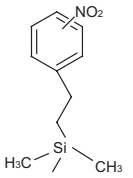


Column Selection Guide by Particle Size



1. Reversed Phase Specialty Columns

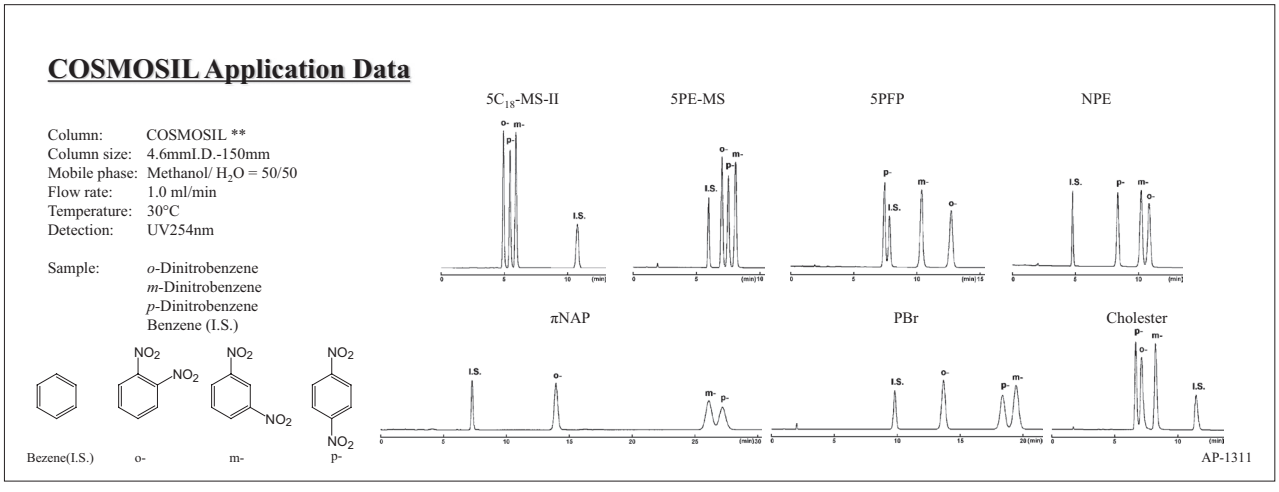
Specifications

Packing Material	Cholester			PBr		PFP	π NAP		PYE	NPE
Silica Gel※	Fully-Porous		Core-Shell	Fully-Porous	Core-Shell	Fully-Porous	Fully-Porous		Fully-Porous	Fully-Porous
Average Particle Size	2.5 μm	5 μm	2.6 μm	5 μm	2.6 μm	5 μm	2.5 μm	5 μm	5 μm	5 μm
Average Pore Size	130 Å	120 Å	90 Å	120 Å	90 Å	120 Å	130 Å	120 Å	120 Å	120 Å
Specific Surface Area	330 m²/g	300 m²/g	150 m²/g	300 m²/g	150 m²/g	300 m²/g	330 m²/g	300 m²/g	300 m²/g	300 m²/g
Bonded Phase Structure										
Bonded Phase	Cholesteryl group			Pentabromobenzyl group		Pentafluorophenyl group	Naphtylethyl group		Pyrenylethyl group	Nitrophenylethyl group
Bonding Type	Monomeric									
Main Interaction	Hydrophobic interaction Molecular shape selectivity			Hydrophobic interaction Dispersion force		Hydrophobic interaction π-π interaction Dipole-dipole interaction	Hydrophobic interaction π-π interaction		Hydrophobic interaction π-π interaction Dispersion force Molecular shape selectivity	Hydrophobic interaction π-π interaction Dipole-dipole interaction
End-Capping	Near-perfect treatment									
Carbon Content	21%	20%	—	8%	—	10%	14%	11%	18%	9%
Usable pH Range	2 ～ 7.5									
Features	• Usable under the same conditions as C_{18} • High molecular shape selectivity			• Separate hydrophilic compounds under reversed-phase conditions • Separate using dispoerson force		• Weak dipole-dipole interaction	• Stronger π-π interaction than phenyl column		• Very strong π-π interaction	• Strong dipole-dipole interaction

※Silica Gel：Fully-Porous…High purity porous spherical silica　　Core-Shell…Core-Shell silica gel

Selectivity for positional isomers of dinitrobenzene

Different stationary phases exhibit different selectivity due to the use of forces that C_{18} (hydrophobic interaction) does not have. By using these columns, you can achieve separation that cannot be done using only C_{18}.



COSMOSIL Cholester / COSMOCORE Cholester

- Cholesterol-bonded stationary phase
- Increased stereoselectivity and improved resolution for geometric isomers
- Usable under the same conditions as C_{18}

Suitable Samples
- Natural compounds
- Structural similar compounds
- Polyphenols, catechins, fat-soluble vitamins and flavones

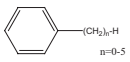
Hydrophobic Interaction

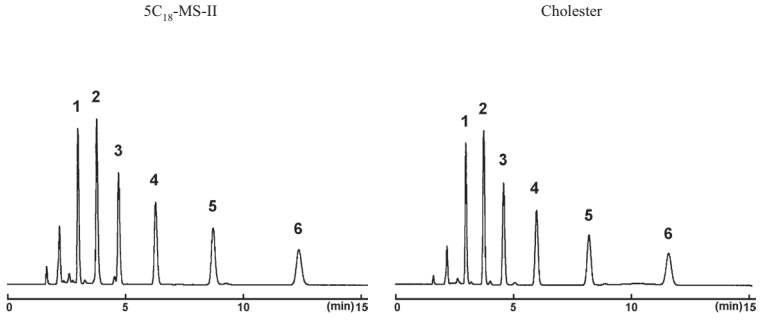
The below figure shows the comparison of hydrophobic interactions with competitor C_{18} columns. Cholester provides about the same hydrophobicity as alkyl group-bonded types (C_{18}, C_{30}). It is not necessary to change the analytical conditions when replacing C_{18} or C_{30} columns with Cholester.

Comparison of Hydrophobic Interaction

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm
Sample:

1;	Benzene	(1.67µg)
2;	Toluene	(1.67µg)
3;	Ethylbenzene	(1.67µg)
4;	*n*-Propylbenzene	(1.67µg)
5;	*n*-Butylbenzene	(1.67µg)
6;	Amylbenzene	(1.67µg)





NACALAI TESQUE, INC
AP-1018

Molecular Shape Selectivity

The stationary phase of Cholester has a very rigid structure and can distinguish different molecular shapes. Cholester retains planar triphenylene longer than non-planar *o*-Terphenyl.

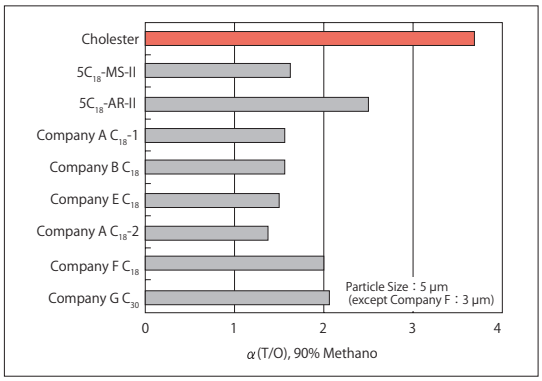
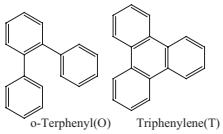


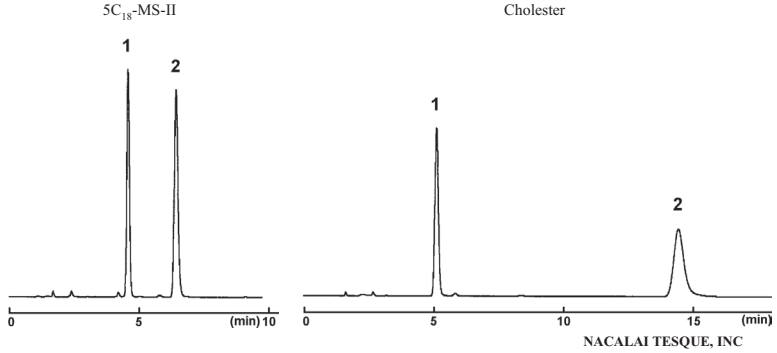
Figure. Comparison of molecular shape selectivty

Comparison of Molecular Shape Selectivity

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm
Sample:

1;	*o*-Terphenyl	(0.1µg)
2;	Triphenylene	(0.01µg)



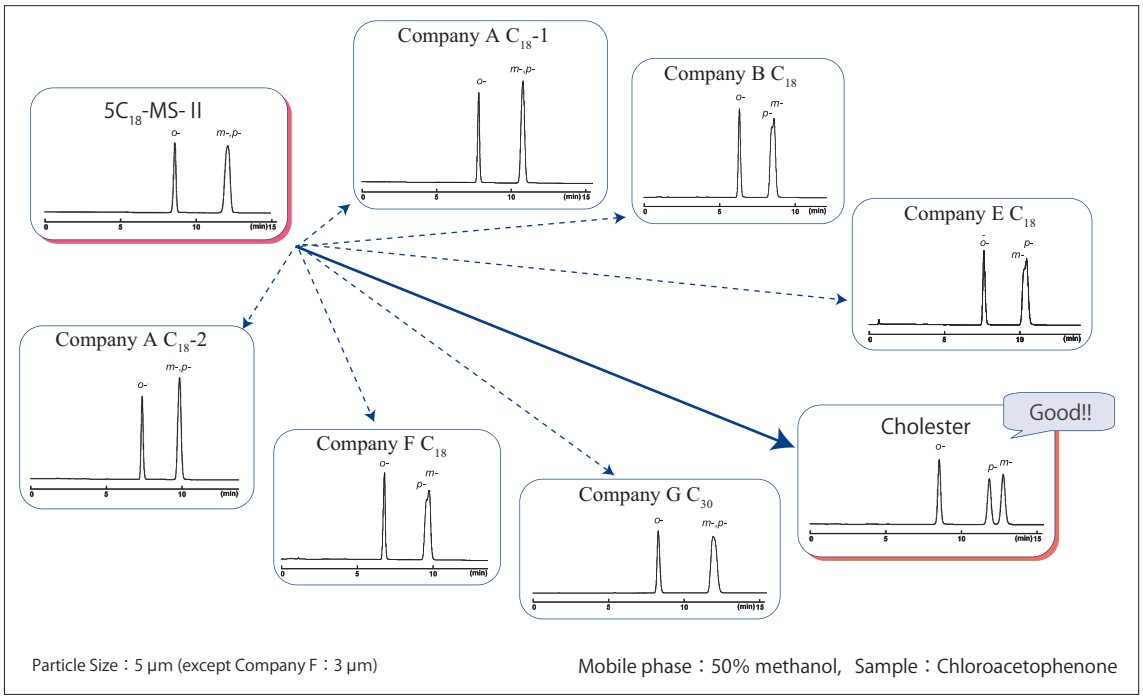


NACALAI TESQUE, INC
AP-1019

Improvement in Separation

COSMOSIL Cholester provides enhanced selectivity over traditional C_{18} columns and offers greater performance in separating isomer or other closely related compounds. COSMOSIL Cholester is ideal for method development and serves as an excellent alternative to traditional C_{18} columns. The figure below shows analytical data of chloroacetophenone isomers. These isomers are difficult to separate with C_{18} and C_{30}, but they are well resolved by COSMOSIL Cholester.

● Comparison with Competitor's C_{18} and C_{30} columns

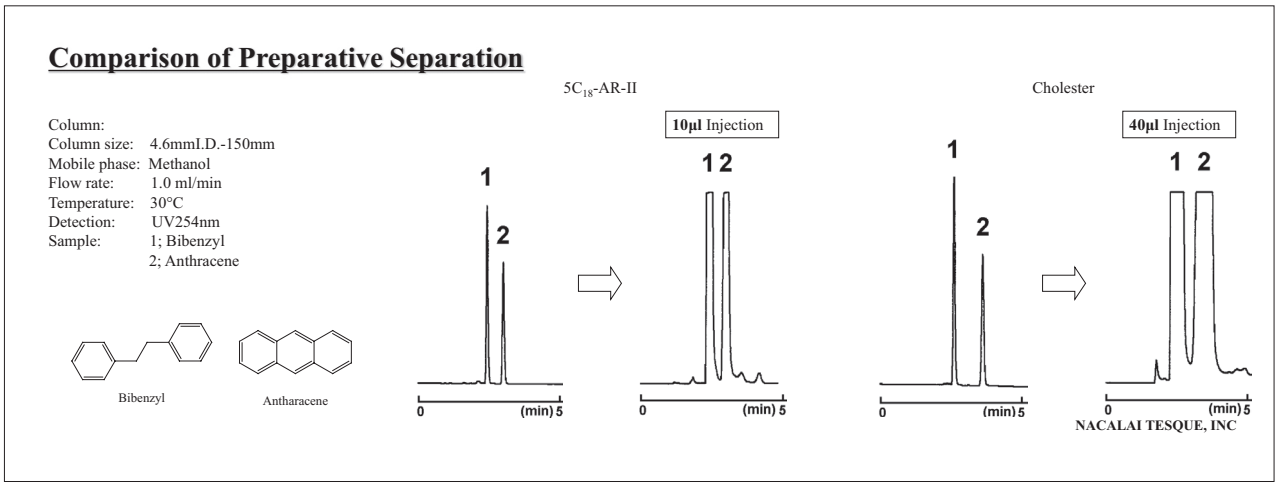


Particle Size：5 µm (except Company F：3 µm)

Mobile phase：50% methanol, Sample：Chloroacetophenone

Efficiency of Preparative Separation

The figure below shows the comparison of efficiency of preparative separation with a C_{18} column. Both columns show good separation. However, sample loading capacity for preparative separations can be affected by a slight difference in separation ability. COSMOSIL Cholester can load 4 times of sample volume compared with C_{18} columns.



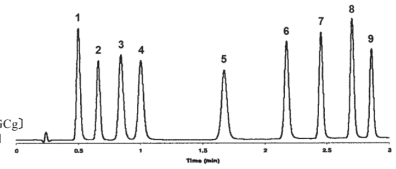
About Core-Shell 2.6Cholester Particles

COSMOCORE 2.6Cholester is packed with cholesterol-bonded 2.6 µm core-shell particles. It delivers performance equivalent to sub-2 µm particles at faster flow rate and analysis time while maintaining a lower back pressure. COSMOCORE can also be used in longer column size to gain additional resolution.

● Catechins (Standard)

COSMOCORE Application Data

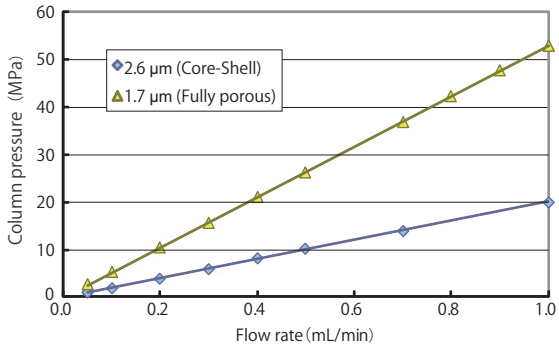
Column: COSMOCORE 2.6Cholester
Column size: 2.1mmI.D.-50mm
Mobile phase: A; Acetonitrile/ 0.1% H_3PO_4 = 10/90
B; Acetonitrile/ 0.1% H_3PO_4 = 40/60
B conc. 0→100% 3min Linear gradient
Flow rate: 0.6 ml/min
Temperature: 30°C
Detection: UV280nm
Sample:
1; (-)-Gallocatechin[(-)-GC]
2; Caffeine
3; (-)-Epigallocatechin[(-)-EGC]
4; (-)-Catechin[(-)-C]
5; (-)-Epicatechin[(-)-EC]
6; (-)-Epigallocatechin Gallate[(-)-EGCg]
7; (-)-Gallocatechin Gallate[(-)-GCg]
8; (-)-Epicatechin Gallate[(-)-ECg]
9; (-)-Catechin Gallate[(-)-Cg]



NACALAI TESQUE, INC

Data courtesy of a customer

● Comparison of Column Pressure



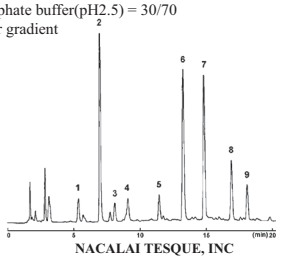
Column Size : 2.1 mmI.D. x 100 mm
Mobile Phase : Acetonitrile/Water = 70/30
Temperature : 40°C

Applications

● Catechins (Commercial Green Tea)

COSMOSIL Application Data

Column: COSMOSIL Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 10/90
B; Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 30/70
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm
Sample: Green Tea
1; (-) - Gallocatechin [(-) - GC]
2; Caffeine
3; (-) - Epigallocatechin [(-) - EGC]
4; (-) - Catechin [(-) - C]
5; (-) - Epicatechin [(-) - EC]
6; (-) - Epigallocatechin Gallate [(-) - EGCg]
7; (-) - Gallocatechin Gallate [(-) - GCg]
8; (-) - Epicatechin Gallate [(-) - ECg]
9; (-) - Catechin Gallate [(-) - Cg]
Injection Vol. 1.0µl



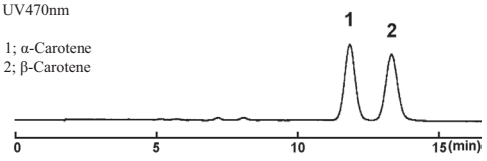
NACALAI TESQUE, INC

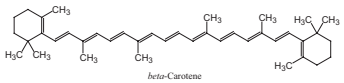
AP-1077

● Carotene

COSMOSIL Application Data

Column: COSMOSIL Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: Tetrahydrofuran/Methanol = 20/80
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV470nm
Sample: 1; α-Carotene
2; β-Carotene





beta-Carotene

NACALAI TESQUE, INC

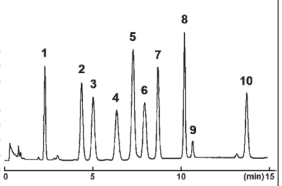
● Fat-Soluble Vitamins

COSMOSIL Application Data

Column: COSMOSIL 2.5Cholester
Mobile phase: A; 0.1% TFA-Methanol/ H_2O = 90/10
B; 0.1% TFA-Methanol
B conc. 0%(0-5min)-100%(10min)-100%(15min)
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV280nm
Sample:

1; Vitamin A Acetate, *all trans*	(0.06mg/ml)
2; Vitamin D_2 [Calciferol]	(0.30mg/ml)
3; Vitamin D_3	(0.06mg/ml)
4; Vitamin E Succinate [*D*-α-Tocopherol Succinate]	(0.60mg/ml)
5; Vitamin K_2	(0.18mg/ml)
6; Vitamin E [*DL*-α-Tocopherol]	(0.60mg/ml)
7; Vitamin E Acetate [*DL*-α-Tocopherol Acetate]	(0.60mg/ml)
8; *trans*-Vitamin K_1	(0.18mg/ml)
9; *cis*-Vitamin K_1	
10; Vitamin A Palmitate	(0.18mg/ml)

Inj. Vol: 2.5µl



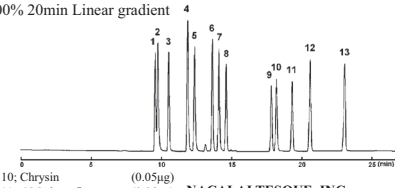
NACALAI TESQUE, INC

● Flavone

COSMOSIL Application Data

Column: COSMOSIL Cholester
Column size: 4.6mmI.D.-150mm
Mobile phase: A: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 20/80
B: Acetonitrile/ 20mmol/l Phosphate buffer(pH2.5) = 70/30
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm
Sample:

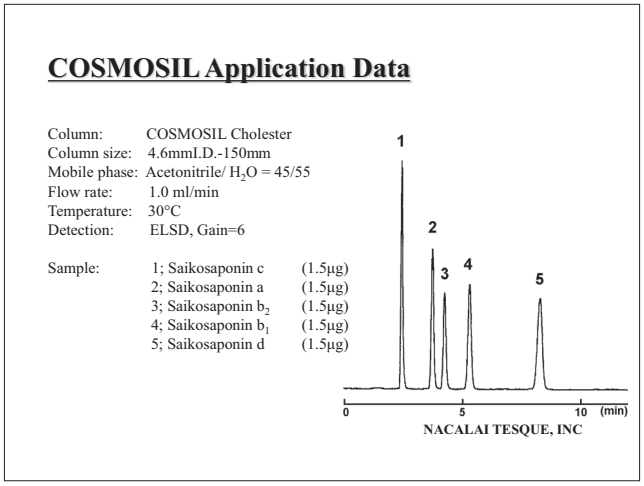
1; Fisetin	(0.25µg)		
2; Myricetin	(0.20µg)		
3; 7,8-Dihydroxyflavone	(0.05µg)		
4; Luteolin	(0.20µg)		
5; Quercetin	(0.20µg)		
6; 7-Hydroxyflavone	(0.10µg)	10; Chrysin	(0.05µg)
7; Baicalein	(0.05µg)	11; 6-Methoxyflavone	(0.05µg)
8; 6-Hydroxyflavone	(0.05µg)	12; 3-Hydroxyflavone	(0.25µg)
9; Flavone	(0.05µg)	13; 5-Hydroxyflavone	(0.05µg)



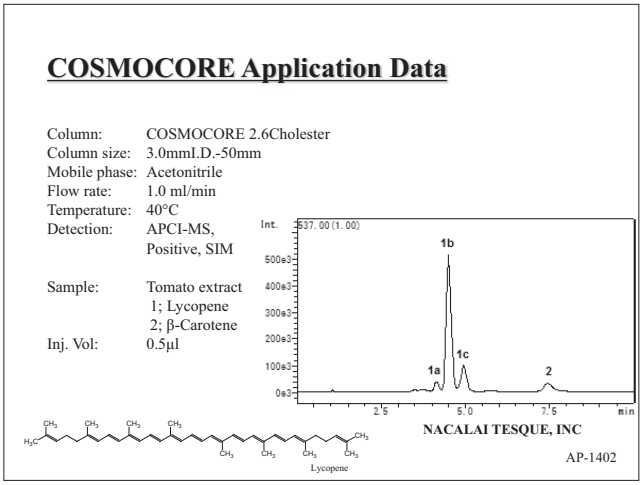
NACALAI TESQUE, INC

Applications

● Saikosaponins



● Tomato Extracts



Ordering Information

● COSMOSIL Cholester Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0×150	05968-71
1.0×250	05969-61
2.0× 30	08565-51
2.0× 50	06352-91
2.0×100	06948-01
2.0×150	05971-11
2.0×250	05972-01
3.0×150	05973-91
3.0×250	05974-81
4.6× 50	06359-21
4.6×100	06591-61
4.6×150※1	05976-61
4.6×150 3 lots set※1	07970-03

I.D. x Length (mm)	Product Number
4.6×250※1	05977-51
10× 50	16590-61
10×100	16591-51
10×150	08011-91
10×250	05979-31
20× 50	05981-81
20×100	15995-01
20×150	06088-71
20×250	05982-71
28×100	16592-41
28×150	16593-31
28×250	05985-41

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	05975-71
10×20	05978-41
20×20	05980-91
28×50	05983-61

※1 Columns for validation

● COSMOSIL 2.5Cholester Analytical Columns (Particle Size: 2.5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0×50	09000-01
2.0×75	09047-11

I.D. x Length (mm)	Product Number
2.0×100	09048-01
3.0× 50	09049-91

I.D. x Length (mm)	Product Number
3.0× 75	09050-51
3.0×100	09051-41

● COSMOCORE 2.6Cholester Analytical Columns (Particle Size: 2.6 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.1× 30	12858-91
2.1× 50	12859-81
2.1× 75	12860-41
2.1×100	12861-31
2.1×150	12862-21

I.D. x Length (mm)	Product Number
3.0× 30	12863-11
3.0× 50	12864-01
3.0× 75	12866-81
3.0×100	12867-71
3.0×150	12868-61

I.D. x Length (mm)	Product Number
4.6× 30	12869-51
4.6× 50	12870-11
4.6× 75	12871-01
4.6×100	12872-91
4.6×150	12873-81
4.6×250	12875-61

COSMOCORE's connector is the same type as Waters UPLC® columns.

COSMOSIL PBr / COSMOCORE PBr

- Pentabromobenzyl-bonded stationary phase
- Separate hydrophilic compounds in reversed-phase conditions

Suitable Samples
- Hydrophilic compounds
- Nucleotides, peptides, catecholamines and oligosaccharides

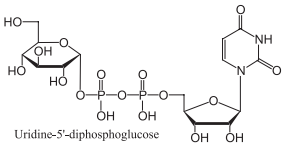
Comparison with C_{18}

COSMOSIL PBr retains hydrophilic compounds stronger than C_{18} columns under the same reversed-phase conditions.

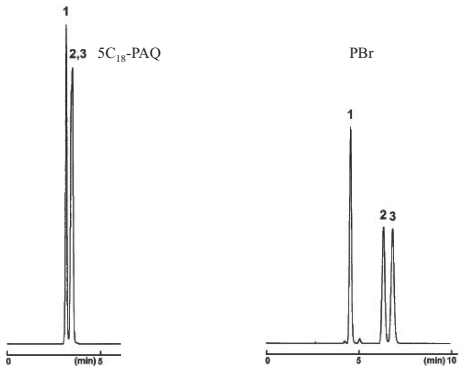
COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: 100mmol/l Phosphate buffer(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: 1; Uridine-5'-diphosphate (0.8mg/ml)
2; Uridine-5'-diphosphogalactose (0.8mg/ml)
3; Uridine-5'-diphosphoglucose (0.8mg/ml)
Inj.Vol.: 1.0µl



Uridine-5'-diphosphoglucose



NACALAI TESQUE, INC

AP-1397

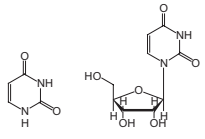
Comparison with HILIC

HILIC is widely recognized as a method for separating hydrophilic compounds. However, because it differs from the commonly used reversed-phase mode, setting mobile phase conditions can be difficult. In addition, the use of acetonitrile in high concentration can cause problems with peak shape when using water as a sample solvent. COSMOSIL PBr can retain hydrophilic compounds under reversed-phase conditions, and maintains good peak shape even when injecting large amounts of water.

COSMOSIL Application Data

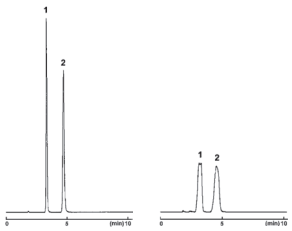
Column: COSMOSIL HILIC
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile/ H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: 1; Uracil (0.1mg/ml)
2; Uridine (0.2mg/ml)
Sam. Solution H_2O



1; Uracil 2; Uridine

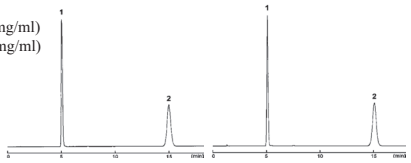
Undiluted sol. 1µl Injection
1/20 dilute sol. 20µl Injection



Column: COSMOSIL PBr
Column size: 4.6mmI.D.- 150mm
Mobile phase: H_2O
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: 1; Uracil (0.1mg/ml)
2; Uridine (0.2mg/ml)
Sam. Solution H_2O

Undiluted sol. 1µl Injection
1/20 dilute sol. 20µl Injection



NACALAI TESQUE, INC

COSMOCORE 2.6PBr core-shell column

Difference between methanol and acetonitrile mobile phases

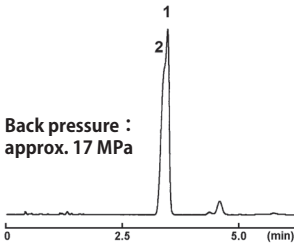
Acetonitrile is frequently used in HPLC to reduce backpressure. However, the π electrons in acetonitrile interfere with the dispersion force interaction between the sample and stationary phase. Therefore, we recommend using methanol as the organic solvent.

COSMOCORE Application Data

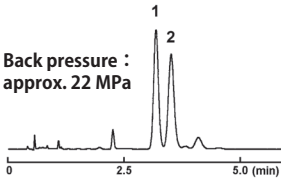
Column: COSMOCORE 2.6PBr
Column size: 2.1mmI.D.-100mm
Mobile phase: **
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV210nm

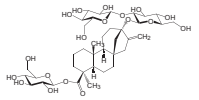
Sample: 1; Stevioside (5.0mg/ml)
2; Rebaudioside A
Inj. Vol: 1.0µl

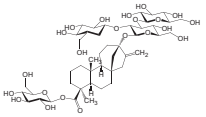
Acetonitrile/ H_2O = 30/70



Methanol/ H_2O = 75/25




1; Stevioside


2; Rebaudioside A

NACALAI TESQUE, INC

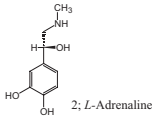
Applications

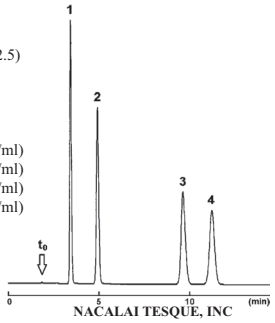
● Catecholamines

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; *L*-Noradrenaline (0.5mg/ml)
2; *L*-Adrenaline (0.5mg/ml)
3; Dopamine (0.5mg/ml)
4; *L*-DOPA (0.5mg/ml)
Inj.Vol.: 1.0µl


2; *L*-Adrenaline



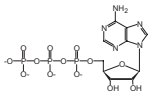
NACALAI TESQUE, INC

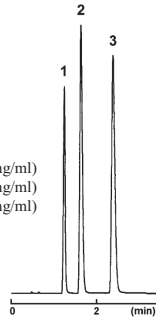
● Nucleotides

COSMOCORE Application Data

Column: COSMOCORE 2.6PBr
Column size: 2.1mmI.D.-100mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0)
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV260nm

Sample: 1; Adenosine-5'-triphosphate (ATP) (0.5mg/ml)
2; Adenosine-5'-diphosphate (ADP) (0.8mg/ml)
3; Adenosine-5'-monophosphate (AMP) (0.8mg/ml)
Inj. Vol: 0.5µl


1; ATP



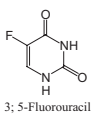
NACALAI TESQUE, INC

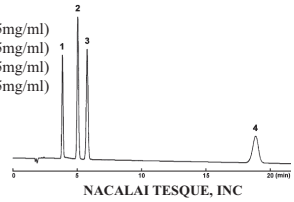
● Uracil derivatives

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-150mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; *5,6*-Dihydrouracil (0.005mg/ml)
2; Uracil (0.005mg/ml)
3; *5*-Fluorouracil (0.005mg/ml)
4; *5*-Bromouracil (0.005mg/ml)
Inj.Vol.: 10µl


3; 5-Fluorouracil



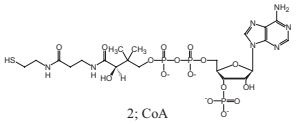
NACALAI TESQUE, INC

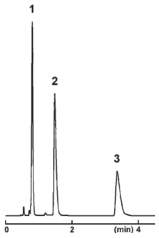
● Coenzyme A

COSMOCORE Application Data

Column: COSMOCORE 2.6PBr
Column size: 2.1mmI.D.-100mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 5/95
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV260nm

Sample: 1; Malonyl Coenzyme A (0.5mg/ml)
2; Coenzyme A (0.5mg/ml)
3; Acetyl Coenzyme A (0.5mg/ml)
Inj. Vol: 1.0µl


2; CoA



NACALAI TESQUE, INC

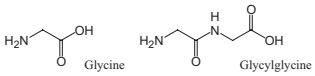
Applications

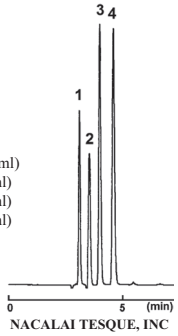
● Oligopeptides

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.1%TFA-H_2O
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Glycine (25mg/ml)
2; Glycylglycine (5mg/ml)
3; Glycylglycylglycine (5mg/ml)
4; Glycylglycylglycylglycylglycine (5mg/ml)
Inj.Vol.: 1.0µl



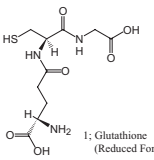


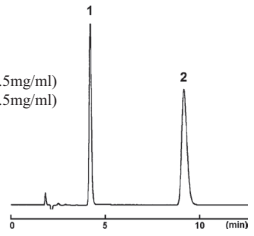
● Glutathione

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-150mm
Mobile phase: 0.1%TFA-Acetonitrile/ H_2O = 5/95
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Glutathione(Reduced Form) (2.5mg/ml)
2; Glutathione(Oxidized Form) (2.5mg/ml)
Inj.Vol.: 1.5µl





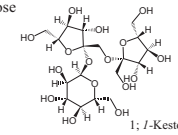
AP-1390

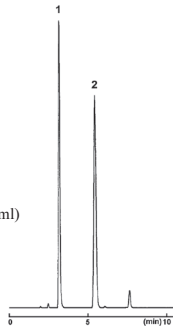
● Oligosaccharides

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-150mm
Mobile phase: A; H_2O
B; Acetonitrile
B conc. 2→10% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: Fructooligosaccharides (50mg/ml)
1; 1-Kestose
2; Nystose
Inj.Vol.: 0.5µl



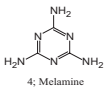


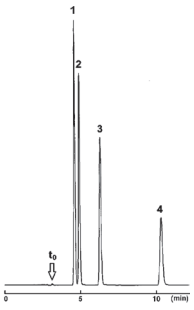
● Melamine

COSMOSIL Application Data

Column: COSMOSIL PBr
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV225nm

Sample: 1; Ammelide (0.1mg/ml)
2; Cyanuric Acid (0.5mg/ml)
3; Ammeline (0.1mg/ml)
4; Melamine (0.1mg/ml)
Inj.Vol.: 1.0µl





Ordering Information

● COSMOSIL PBr Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	12943-61
2.0×100	13245-81
2.0×150	12392-81
2.0×250	13247-61
3.0× 50	12592-61
3.0×100	13249-41
3.0×150	13250-01
3.0×250	13251-91
4.6× 50	13252-81
4.6×100	12594-41

I.D. x Length (mm)	Product Number
4.6×150	12394-61
4.6×250	12395-51
10× 50	13253-71
10×100	13254-61
10×150	13255-51
10×250	12397-31
20× 50	13257-31
20×100	13258-21
20×150	13259-11
20×250	12398-21

I.D. x Length (mm)	Product Number
28×100	13260-71
28×150	13261-61
28×250	13262-51

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6×10 Cartridge※	12444-14
10×20	12396-41
20×20	13256-41
28×50	12653-61

※ 2 cartridges included. Guard cartridge holder required; refer to page 76.

● COSMOCORE 2.6PBr Analytical Columns (Particle Size: 2.6 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.1× 30	13692-21
2.1× 50	13693-11
2.1× 75	13694-01
2.1×100	13695-91
2.1×150	13697-71

I.D. x Length (mm)	Product Number
3.0× 30	13698-61
3.0× 50	13699-51
3.0× 75	13700-01
3.0×100	13701-91
3.0×150	13703-71

I.D. x Length (mm)	Product Number
4.6× 30	13705-51
4.6× 50	13712-51
4.6× 75	13714-31
4.6×100	13715-21
4.6×150	13719-81
4.6×250	13734-71

COSMOCORE's connector is the same type as Waters UPLC® columns.

COSMOSIL PFP

- Pentafluorophenyl-bonded stationary phase
- Alternative selectivity to C_{18} columns

Suitable Samples
- Vitamin E
- Structural isomers and fluorides

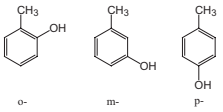
Alternative Selectivity to C_{18} Columns

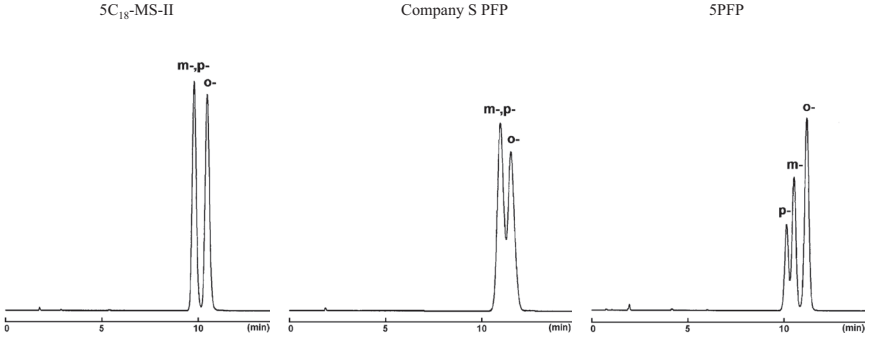
COSMOSIL PFP provides different selectivity from C_{18} columns. Furthermore, it offers improved separation compared to other PFP columns.

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 40/60
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Cresol (3.0mg/ml)
m-Cresol (3.0mg/ml)
p-Cresol (3.0mg/ml)
Inj.Vol.: 1.0µl





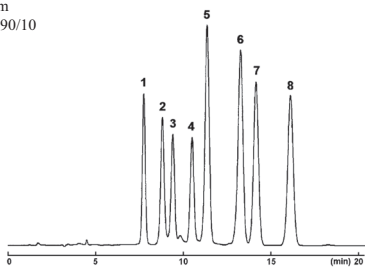
Applications

● Vitamin E

COSMOSIL Application Data

Column: COSMOSIL 5PFP
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ H_2O = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV295nm

Sample:
1; δ-Tocotrienol
2; β-Tocotrienol
3; γ-Tocotrienol
4; α-Tocotrienol
5; δ-Tocopherol
6; β-Tocopherol
7; γ-Tocopherol
8; α-Tocopherol

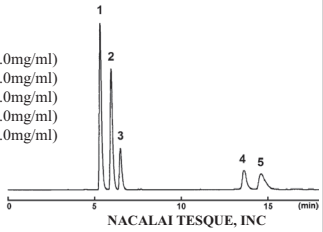


● Putrefactive Amines

COSMOSIL Application Data

Column: COSMOSIL 5PFP
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ 0.1% Pentafluoropropionic Acid = 10/90
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample:
1; Putrescine (1.0mg/ml)
2; Cadaverine (1.0mg/ml)
3; Histamine (1.0mg/ml)
4; Tyramine (1.0mg/ml)
5; Spermidine (1.0mg/ml)
Injection Vol. 1.0µl



Ordering Information

● COSMOSIL PFP Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	13263-41
2.0×100	13264-31
2.0×150	12381-21
2.0×250	13265-21
3.0× 50	13266-11
3.0×100	13267-01
3.0×150	13268-91
3.0×250	13269-81
4.6× 50	13270-41
4.6×100	13271-31

I.D. x Length (mm)	Product Number
4.6×150	12383-01
4.6×250	12384-91
10× 50	13272-21
10×100	13273-11
10×150	13274-01
10×250	12386-71
20× 50	13276-81
20×100	13277-71
20×150	13278-61
20×250	12387-61

I.D. x Length (mm)	Product Number
28×100	13280-11
28×150	13281-01
28×250	13282-91

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6×10 Cartridge※	12443-24
10×20	12385-81
20×20	13275-91
28×50	13279-51

※ 2 cartridges included. Guard cartridge holder required; refer to page 76.

COSMOSIL π NAP

- Naphthalene-bonded stationary phase
- Enhanced π-π interactions

Suitable Samples
・Aromatic comopunds and positional isomers

Comparison of π-π Interactions

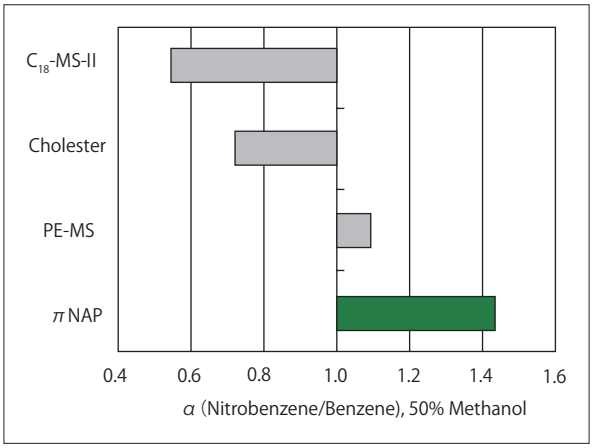


Figure. Comparison of π-π Interactions

COSMOSIL π NAP shows stronger π-π interactions than phenyl columns. Its two fused aromatic rings retain nitrobenzene with more π electrons stronger than phenyl columns.

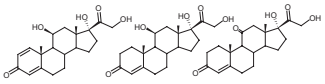
Comparison with C_{18} and Phenyl Columns

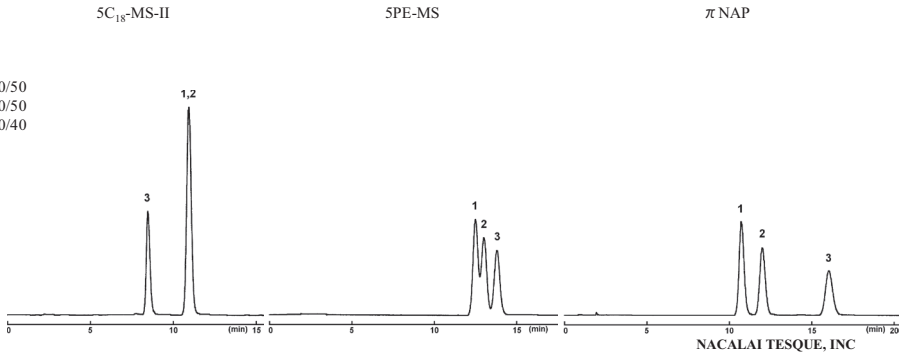
● Adrenal Cortical Hormones

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-150mm
Mobile phase: $5C_{18}$-MS-II Methanol/ H_2O = 50/50
5PE-MS Methanol/ H_2O = 50/50
π NAP Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Prednisolone (0.33μg)
2; Hydrocortisone (0.33μg)
3; Cortisone (0.33μg)





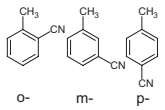
AP-1023

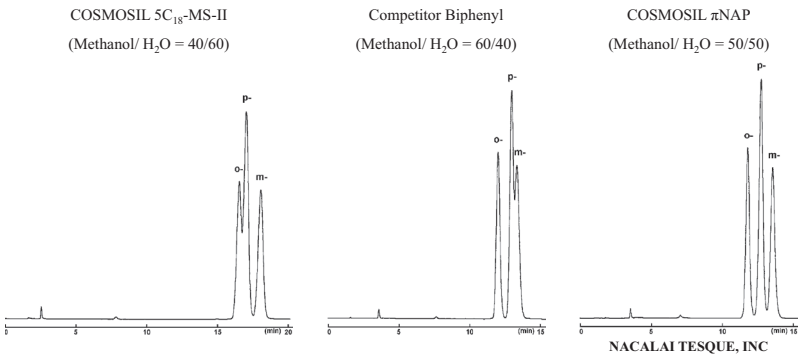
● Position Isomers of Tolunitriles

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = **/**
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Tolunitrile (8.0μg)
m-Tolunitrile (8.0μg)
p-Tolunitrile (4.0μg)





AP-1521

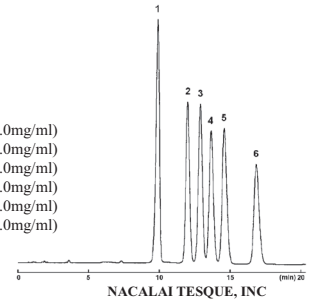
Applications

● Position Isomers of Dichlorophenols

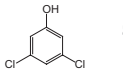
COSMOSIL Application Data

Column: COSMOSIL πNAP
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 50/50
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; *2,6*-Dichlorophenol (6.0mg/ml)
2; *2,3*-Dichlorophenol (6.0mg/ml)
3; *2,5*-Dichlorophenol (6.0mg/ml)
4; *2,4*-Dichlorophenol (6.0mg/ml)
5; *3,4*-Dichlorophenol (6.0mg/ml)
6; *3,5*-Dichlorophenol (6.0mg/ml)
Inj.Vol.: 1.5µl



NACALAI TESQUE, INC



6; 3,5-Dichlorophenol

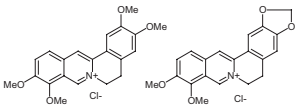
AP-1206

● Berberines

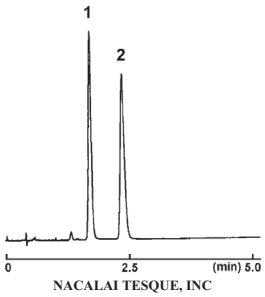
COSMOSIL Application Data

Column: COSMOSIL 2.5πNAP
Column size: 3.0mmI.D.-75mm
Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH2.5) = 70/30
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Palmatine (0.125µg)
2; Berberine (0.125µg)



1,Palmatine Hydrochloride 2,Berberine Hydrochloride



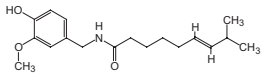
NACALAI TESQUE, INC

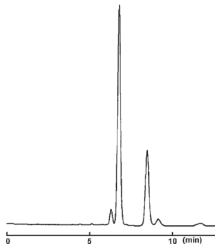
● Capsaicin

COSMOSIL Application Data

Column: COSMOSIL πNAP
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: Capsaicin (2.0µg)





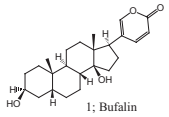
NACALAI TESQUE, INC

● Toad Venom (Crude Drugs)

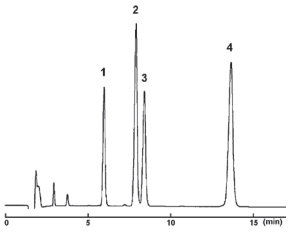
COSMOSIL Application Data

Column: COSMOSIL πNAP
Column size: 4.6mmI.D.-150mm
Mobile phase: Acetonitrile / 0.1% Phosphoric Acid = 45/55
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV300nm

Sample:
1; Bufalin (0.4µg)
2; Cinobufagin (0.4µg)
3; Resibufogenin (0.6µg)
4; Indometacin〔Indomethacin〕(0.6µg)



1; Bufalin



NACALAI TESQUE, INC

AP-1012

Ordering Information

● COSMOSIL π NAP Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0×150	08076-61
1.0×250	08077-51
2.0× 30	08566-41
2.0× 50	08567-31
2.0×100	08299-51
2.0×150	08078-41
2.0×250	08079-31
3.0×150	08080-91
3.0×250	08081-81
4.6× 50	08083-61

I.D. x Length (mm)	Product Number
4.6×100	08084-51
4.6×150	08085-41
4.6×250	08086-31
10× 50	16594-21
10×100	16595-11
10×150	08088-11
10×250	08089-01
20× 50	08091-51
20×100	16596-01
20×150	08092-41

I.D. x Length (mm)	Product Number
20×250	08093-31
28×100	12563-41
28×150	16597-91
28×250	08095-11

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	08082-71
10×20	08087-21
20×20	08090-61
28×50	08094-21

● COSMOSIL 2.5 π NAP Analytical Columns (Particle Size: 2.5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0×50	06062-91
2.0×75	06051-31

I.D. x Length (mm)	Product Number
2.0×100	06052-21
3.0× 50	06054-01

I.D. x Length (mm)	Product Number
3.0× 75	06055-91
3.0×100	06057-71

COSMOSIL PYE

- Pyrenylethyl-bonded stationary phase
- Stronger π-π interactions

Suitable Samples
・Aromatic compounds, positional isomers, dioxins and PCBs

Comparison of π-π Interactions

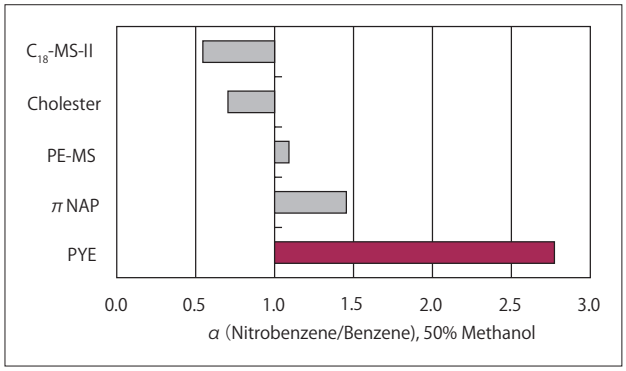
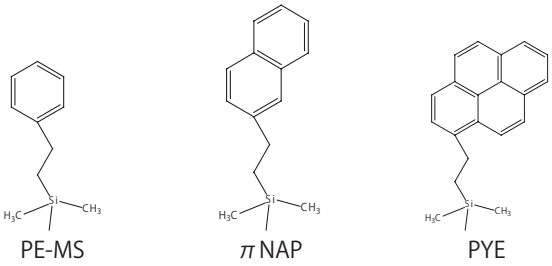


Figure. Comparison π-π Interactions

COSMOSIL PYE provides much stronger π-π interactions than πNAP on page 18.



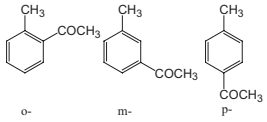
Comparison with C_{18} and Phenyl Columns

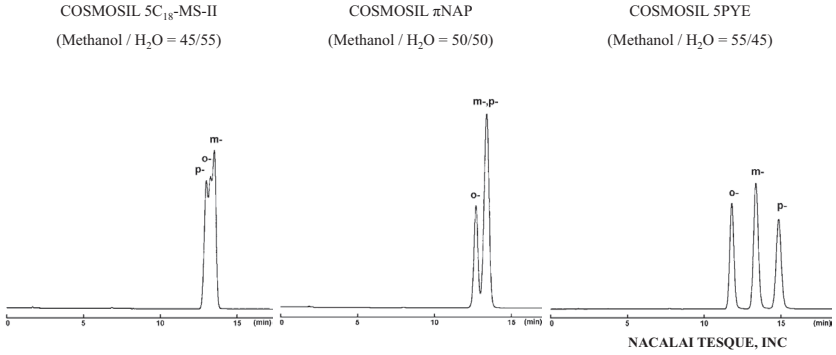
● Methylacetophenone

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol / H_2O = */*
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: *o*-Methylacetophenone (0.15mg/ml)
m-Methylacetophenone (0.125mg/ml)
p-Methylacetophenone (0.075mg/ml)
Inj. Vol: 1.0µl



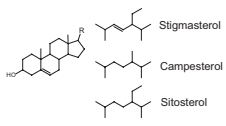


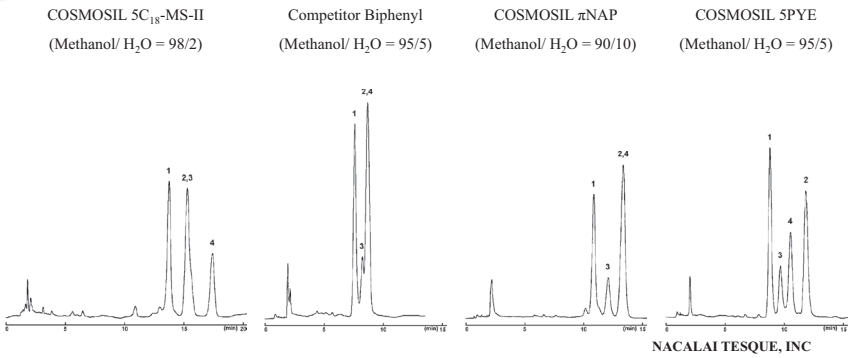
● Sterols

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = **/**
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Cholesterol (3.0µg)
2; Stigmasterol (3.0µg)
3; Campesterol
4; Sitosterol

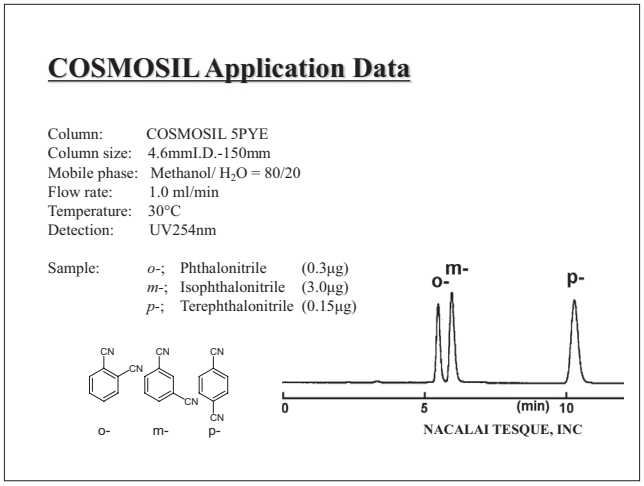




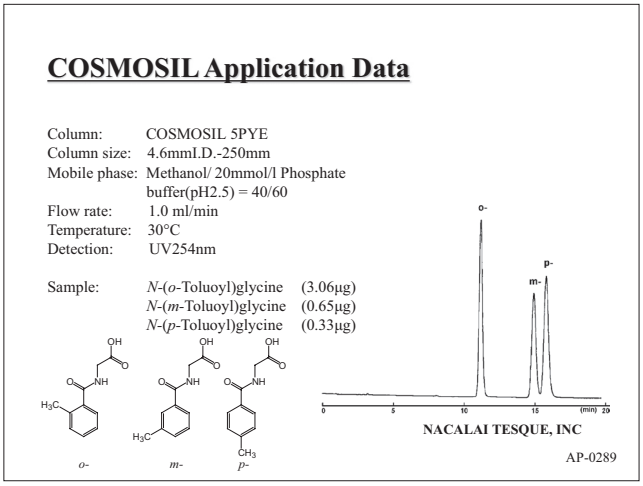
AP-1524

Applications

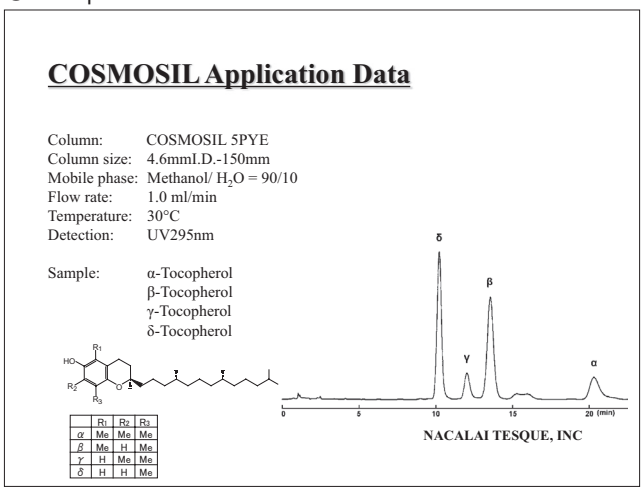
● Phthalonitrile Isomers



● Methylhippuric Acids

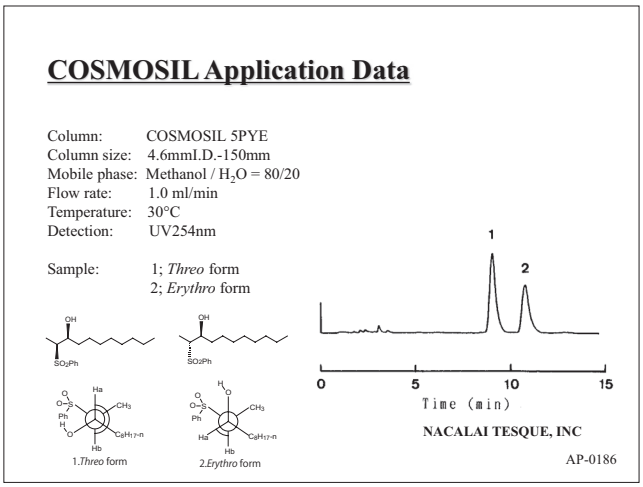


● Tocopherols



	R1	R2	R3
α	Me	Me	Me
β	Me	H	Me
γ	H	Me	Me
δ	H	H	Me

● Diastereomers



Caution

1. Methanol is the recommended mobile phase for COSMOSIL PYE. Acetonitrile is not recommended because it has many π-π electrons and interferes with π-π interactions between the sample and the stationary phase.
2. The stationary phase of COSMOSIL PYE, pyrenylethyl group, has a large UV absorption. When the stationary phase detaches from silica gel and elutes, even a slight quantity can be detected and causes baseline noise. In such cases, wash the column with tetrahydrofuran. Detachment of a small amount of the stationary phase does not deteriorate a column's separation ability.
3. COSMOSIL PYE is not suitable for gradient analysis.

Ordering Information

● COSMOSIL 5PYE Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0×150	02851-71
2.0×150	38042-61
2.0×250	34450-31

I.D. x Length (mm)	Product Number
4.6×150	37837-91
4.6×250	37989-11
10×250	37996-11
20×250	38044-41

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37903-11
10×20	38041-71
20×20	05867-91
20×50	34475-21

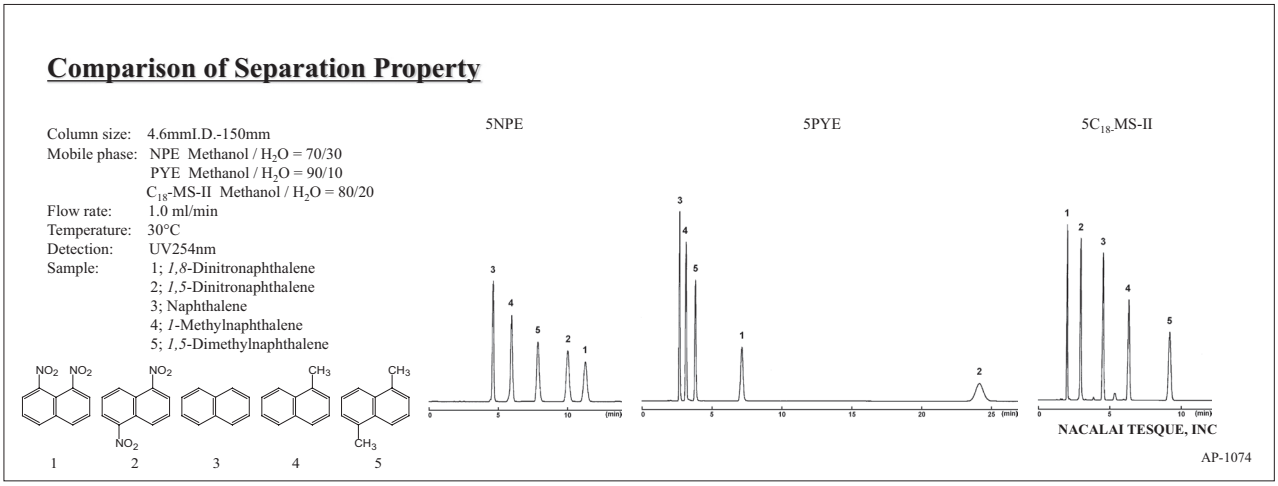
COSMOSIL NPE

- Nitrophenylethyl-bonded stationary phase
- Separation with dipole-dipole and π-π interactions

Suitable Samples
・Isomers and nitro compounds

Selectivity for dipole-dipole interactions

COSMOSIL NPE strongly retains 1,8-dinitronaphthalene because of the strong dipole formed by the two nitro groups positioned on the same side of naphthalene.



Attention

1. Methanol is the recommended mobile phase for COSMOSIL NPE. Acetonitrile is not recommended because it has many π-π electrons and interferes with π-π interactions between the sample and the stationary phase.
2. The stationary phase of COSMOSIL NPE, nitrophenyl group, has a large UV absorption. When the stationary phase detaches from silica gel and elutes, even a slight quantity can be detected and causes baseline noise. In such cases, wash the column with tetrahydrofuran. Detachment of a small amount of the stationary phase does not deteriorate a column's separation ability.
3. COSMOSIL NPE is not suitable for gradient analysis.

Ordering Information

● COSMOSIL 5NPE Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0×150	05897-01
2.0×150	34328-51
2.0×250	34379-91

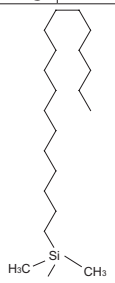
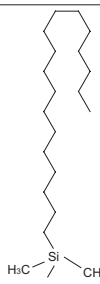
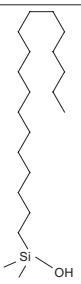
I.D. x Length (mm)	Product Number
4.6×150	37902-21
4.6×250	37990-71
10×250	05469-11
20×250	38046-21

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37904-01
10×20	38045-31
20×20	05868-81
20×50	05869-71

2. Reversed Phase C_{18} Series

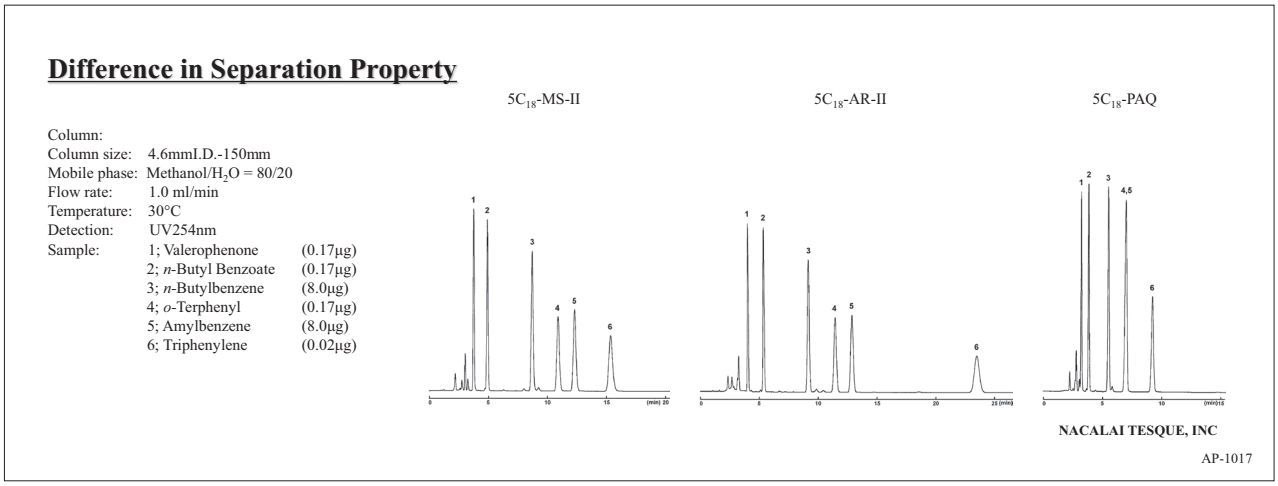
Specifications

Packing Material	C_{18}-MS-II		C_{18}-AR-II	C_{18}-PAQ	C_{18}-EB	COSMOCORE C_{18}
Silica Gel	High purity porous spherical silica					Core-Shell Silica Gel
Average Particle Size	2.5 µm	3, 5, 15 µm	3, 5, 15 µm	5, 15 µm	3 µm	2.6 µm
Average Pore Size	approx. 130 Å	approx. 120 Å				approx. 90 Å
Specific Surface Area	approx. 330 m^2/g	approx. 300 m^2/g				approx. 150 m^2/g
Bonded Phase Structure						
Bonded Phase	Octadecyl Group					
USP Category	L1					
Bonding Type	Monomeric		Polymeric		Monomeric	Polymeric
Main Interaction	Hydrophobic interaction					
End-Capping	Near-perfect treatment					
Carbon Content	approx. 18%	approx. 16%	approx. 17%	approx. 11%	approx. 14.5%	approx. 7%
Usable pH Range	2 ~ 10※		1.5 ~ 7.5※	2 ~ 7.5	2 ~ 10※	2 ~ 7.5
Features	• Multi-purpose C_{18} Column		• Features strong acid resistance. • Good for acidic compounds and peptides	• Good for hydrophilic compounds • Stable performance under 100% aqueous conditions	• Good for basic compounds	• Same number of theoretical plates as sub-2 µm columns with half the back pressure

※Optimal pH range of silica-based columns is between 2 and 7.5. Extreme pH may significantly decrease column lifetime.

Difference in Separation Properties (5 µm)

COSMOSIL 5C_{18}-AR-II retains planar compounds (such as triphenylene) longer compared to COSMOSIL 5C_{18}-MS-II. COSMOSIL 5C_{18}-PAQ has shorter retention time in general, and retains polar compounds (such as valerophenone and *n*-butyl benzoate) longer.



COSMOSIL C_{18}-MS-II

- First-choice column of our ODS series
- Multi-purpose C_{18} column
- High reproducibility
- A wide range of applications

Suitable Samples
・Low-MW compounds

Separation Property

The COSMOSIL $5C_{18}$-MS-II is a well-balanced column with better basic performance, such as sharper peaks for basic compounds and chelating compounds, strong hydrophobic interaction, low analytical pressure, and high theoretical plate number. COSMOSIL $5C_{18}$-MS-II is the first-choice column for reversed-phase chromatography.

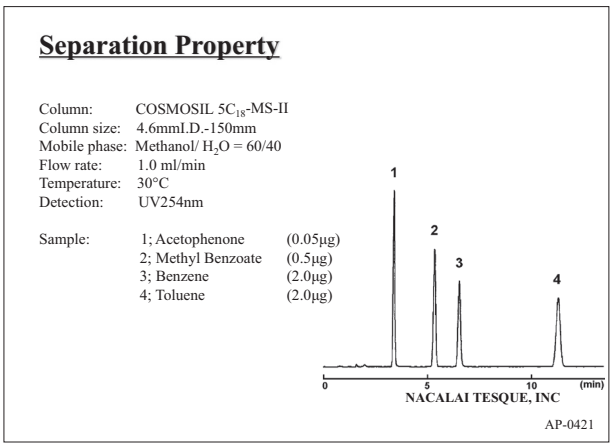
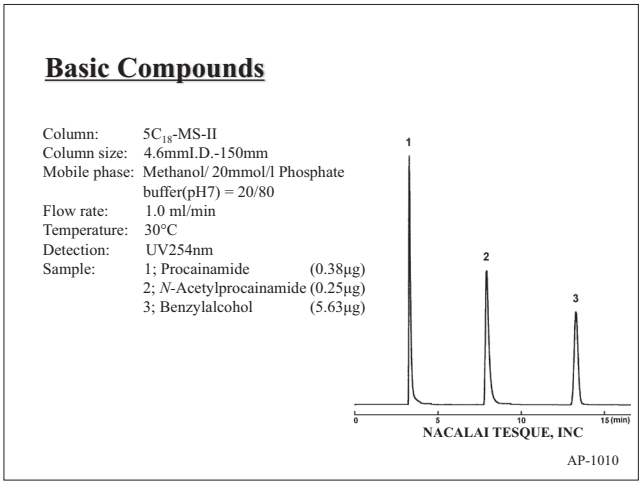


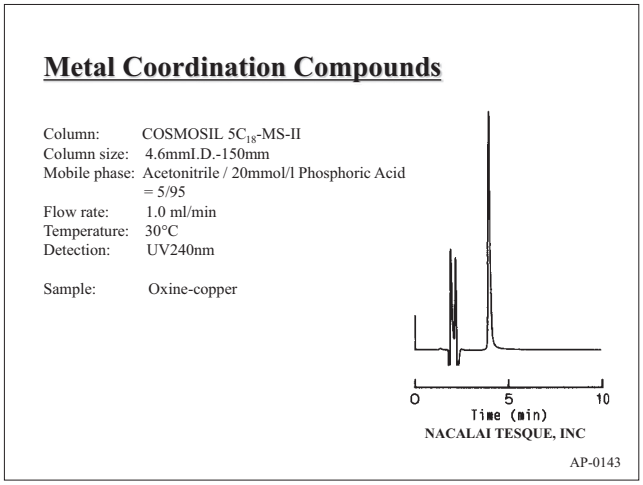
Table. Comparison of hydrophobic interaction, analytical pressure and theoretical plate number.

Column	Hydrophobic Interaction α (Toluene/Benzene)	Pressure (MPa)	Theoretical Plate Number (Toluene)
COSMOSIL $5C_{18}$-MS-II	1.96	8.3	14,300
Company A C_{18}	1.99	13.0	16,800
Company B C_{18}	1.94	8.0	14,000
Company C C_{18}	1.69	11.2	5,600
Company D C_{18}	1.84	10.5	14,200

Analysis of Basic Compounds and Metal Coordination Compounds

The COSMOSIL $5C_{18}$-MS-II column, taking advantage of a new end-capping treatment, can replace the original COSMOSIL C_{18} (ODS) column. A new end-capping treatment with polar groups for "shield effect" has significantly improved peak shape for basic compounds. Ultra pure silica gel with low trace-metal content is used for COSMOSIL columns; thus the columns provide excellent peak shapes for chelating compounds.



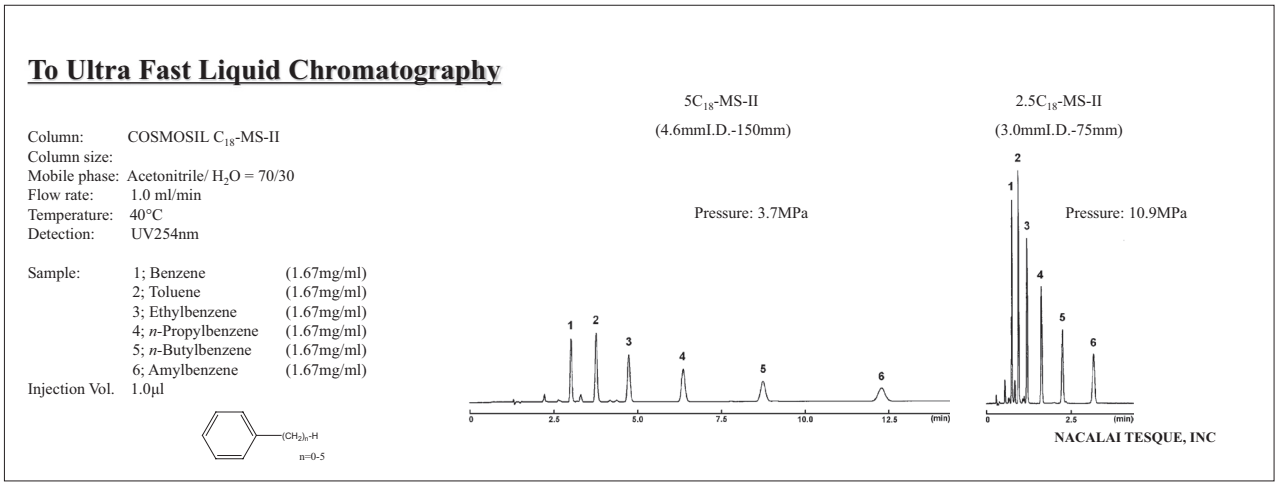


High Reproducibility

The strict quality control system of Nacalai Tesque supports the customers with an individual “Inspection Report” which accompanies each and every COSMOSIL and COSMOGEL Packed Column (except guard columns) and an additional “Certificate of Analysis” for the COSMOSIL $5C_{18}$-MS-II (4.6 mm I.D. x 150 mm and 4.6 mm I.D. x 250 mm).

Ultra-High Performance Columns (COSMOSIL 2.5C_{18}-MS-II)

※ This application was taken using a semi-micro HPLC instrument, setting the detector response time to 0.02 sec.



Ordering Information

● COSMOSIL 5C_{18}-MS-II Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0× 50	02824-31
1.0×150	02896-01
2.0× 30	05876-71
2.0× 50	04355-21
2.0×100	05597-31
2.0×150	38025-91
2.0×250	05761-61
3.0×100	05458-51
3.0×150	34245-31
3.0×250	34254-11
4.6× 30	34341-61
4.6× 50	38017-01
4.6×100	38018-91
4.6×150※1	38019-81
4.6×150 3 Lots Set※1	09397-73

I.D. x Length (mm)	Product Number
4.6×250※1	38020-41
6.0×150	38021-31
6.0×250	38022-21
10× 50	05789-21
10×100	09479-61
10×150	34355-91
10×250	38023-11
20× 50	34371-71
20×100	16580-91
20×150	05091-41
20×250	38024-01
28×100	16582-71
28×150	16583-61
28×250	05760-71

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6×10	38014-31
4.6×10 Cartridge※2	38015-89
10×20	38016-11
20×20	05790-81
28×50	34347-01

※1 Validated columns
※2 3 cartridges included. Guard cartridge holder required; refer to page 76.

● COSMOSIL 15C_{18}-MS-II Preparative Columns (Particle Size: 15 µm)

Packed Column

I.D. x Length (mm)	Product Number
28×250	34525-61
50×250	05886-41
50×500	34531-71

Guard Column

I.D. x Length (mm)	Product Number
28×50	05885-51
50×50	34527-41

● COSMOSIL 3C_{18}-MS-II Fast LC Columns (Particle Size: 3 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	05514-01
2.0× 75	34470-71
2.0×100	34367-41

I.D. x Length (mm)	Product Number
2.0×150	08723-71
4.6× 50	38066-61
4.6× 75	08758-31

I.D. x Length (mm)	Product Number
4.6×100	38067-51
4.6×150	04785-91

● COSMOSIL 2.5C_{18}-MS-II Analytical Columns (Particle Size: 2.5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	08994-31
2.0× 75	08995-21

I.D. x Length (mm)	Product Number
2.0×100	08996-11
3.0× 50	08997-01

I.D. x Length (mm)	Product Number
3.0× 75	08998-91
3.0×100	08999-81

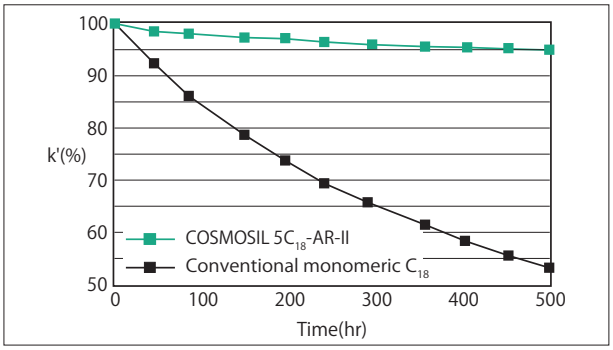
COSMOSIL C_{18}-AR-II

● Features strong acid resistance

Suitable Samples
・Peptides, acidic compounds, etc.

Acid Resistance

COSMOSIL 5C_{18}-AR-II packed column features a polymeric type of C_{18} reversed phase material. The acidic resistance of COSMOSIL 5C_{18}-AR-II is much improved compared with commercially available monomeric type octadecyl stationary phases. It retains high performance even in case of acidic mobile phases commonly used to separate acidic compounds and peptides.



Acid resistance test
Columns were filled with 0.1% trifluoroacetic acid solution and left at 60°C .
Capacity factor (k') for naphthalene
Mobile phase: 70% methanol

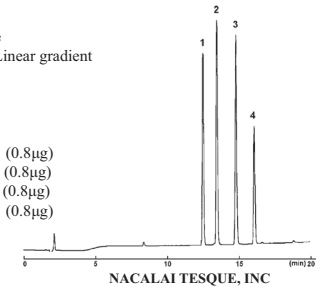
Applications

● Peptides

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 10→40% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Oxytocin (0.8µg)
2; Angiotensin II(Human) (0.8µg)
3; Angiotensin I(Human) (0.8µg)
4; Substance P (0.8µg)



NACALAI TESQUE, INC

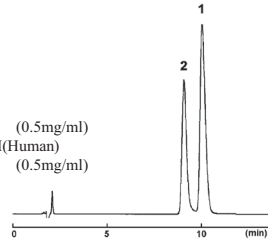
AP-0351

● Phosphopeptide

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 20%
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Angiotensin II(Human) (0.5mg/ml)
2; [Tyr(PO_3H_2)$_4$]-Angiotensin II(Human) (0.5mg/ml)
Inj.Vol.: 3.0µl



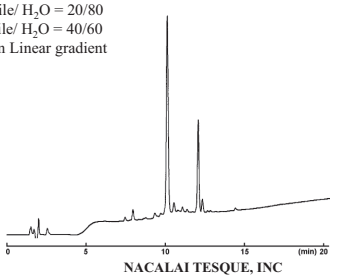
NACALAI TESQUE, INC

● Colistin

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.1% TFA-Acetonitrile/ H_2O = 20/80
B; 0.1% TFA-Acetonitrile/ H_2O = 40/60
B conc. 0→100% 20min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: Colistin (5mg/ml)
Inj.Vol.: 1.0µl



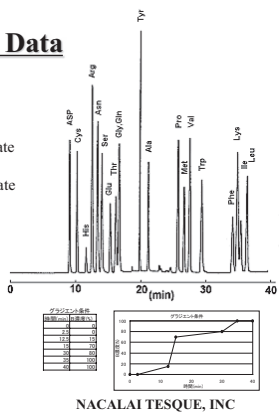
NACALAI TESQUE, INC

AP-1502

● PTH-Amino Acids

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; Acetonitrile/ 20mmol/l Acetate buffer(pH4.8) =10/90
B; Acetonitrile/ 20mmol/l Acetate buffer(pH4.8) =50/50
Step wise gradient
Flow rate: 1.0 ml/min
Temperature: 60°C
Detection: UV270nm, 0.16AUFS
Sample: PTH-Asp (0.4mg/ml)
PTH-His (0.3mg/ml)
PTH-Arg (0.5mg/ml)
PTH-Ser (0.3mg/ml)
PTH-Trp (0.25mg/ml)
PTH-Lys (0.35mg/ml)
Others (0.2mg/ml)
Injection 2.0µl



NACALAI TESQUE, INC

AP-0004

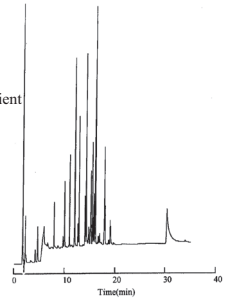
Applications

● Peptide Mappings

COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 5mmol/l TFA-H_2O
B; 5mmol/l TFA-60%Acetonitrile
B conc. 0→100% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm, 0.32AUFS

Sample: Cytochrome C
Lysyl Endopeptidase digested
(2.5µl)



NACALAI TESQUE, INC

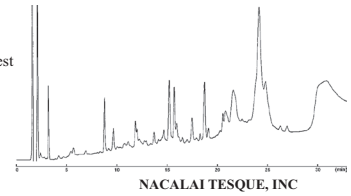
AP-0002

● β-Casein Trypsin Digest

COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-AR-II
Column size: 4.6mmI.D.-150mm
Mobile phase: A; 0.05%TFA-H_2O
B; 0.05%TFA-Acetonitrile
B conc. 20→50% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: β-Casein Trypsin digest
Inj.Vol.: 20µl



NACALAI TESQUE, INC

Ordering Information

● COSMOSIL $5C_{18}$-AR-II Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0× 50	02955-21
1.0×150	02951-61
2.0× 30	05098-71
2.0× 50	34400-81
2.0×100	34469-11
2.0×150	37992-51
2.0×250	05272-71
3.0×100	05791-71
3.0×150	38028-61
3.0×250	38029-51
4.6× 30	05877-61
4.6× 50	38142-51
4.6×100	38143-41
4.6×150※1	38144-31
4.6×150 3 Lots Set※1	09396-83

I.D. x Length (mm)	Product Number
4.6×250※1	38145-21
6.0×150	38146-11
6.0×250	38147-01
10× 50	05369-21
10×100	07800-81
10×150	34350-41
10×250	38149-81
20× 50	34479-81
20×100	08059-91
20×150	34316-01
20×250	38150-41
28×100	16584-51
28×150	16585-41
28×250	34362-91

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6×10	38141-61
4.6×10 Cartridge※2	38008-89
10×20	38148-91
20×20	34458-51
28×50	34363-81

※1 Columns for validation
※2 3 cartridges included. Guard cartridge holder required; refer to page 76.

● COSMOSIL $15C_{18}$-AR-II Preparative Columns (Particle Size: 15 µm)

Packed Column

I.D. x Length (mm)	Product Number
28×250	37978-51
50×250	38058-71

I.D. x Length (mm)	Product Number
50×500	05884-61

Guard Column

I.D. x Length (mm)	Product Number
28×50	38030-11
50×50	38057-81

● COSMOSIL $3C_{18}$-AR-II Fast LC Columns (Particle Size: 3 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	05478-91
2.0× 75	34471-61
2.0×100	06941-71

I.D. x Length (mm)	Product Number
2.0×150	07583-41
4.6× 50	38069-31
4.6× 75	13362-41

I.D. x Length (mm)	Product Number
4.6×100	38070-91
4.6×150	06887-01

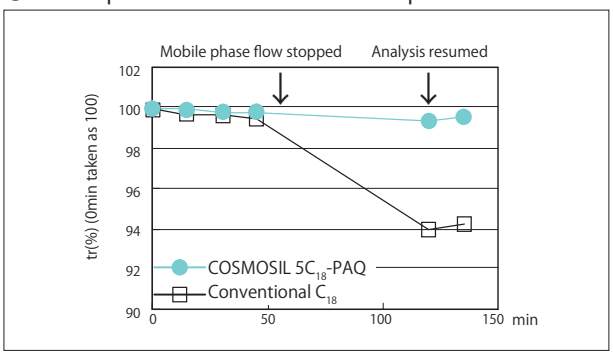
COSMOSIL C_{18}-PAQ

● Compatible with 100% water based mobile phase

Suitable Samples
- Hydrophilic compounds
- Organic acids, nucleic acid bases, etc.

Stable Performance

● Stable performance under 100% aqueous conditions



The figure shows the change of retention time for thymine with 100% aqueous mobile phase (20 mmol/l phosphate buffer, pH 7). The sample was analyzed 4 times (1 hour). Flow of mobile phase was then stopped for 1 hour. The sample was analyzed under the same condition again after 1 hour. The conventional C_{18} column showed change of retention time, but COSMOSIL 5C_{18}-PAQ maintained stable retention time.

Applications

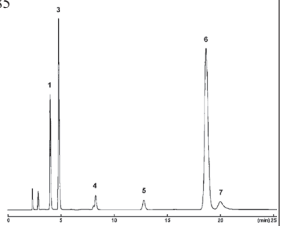
● Energy Drink

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: Methanol/ 5mmol/l Sodium *1*-Hexanesulfonate, 20mmol/l Phosphoric Acid = 15/85
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: Nutrient drink
1; Citric Acid
2; *L*-Carnitine
3; Nicotinamide
4; Vitamin B_6 [Pyridoxine]
5; Vitamin B_1 [Thiamine]
6; Caffeine
7; Flavin Mononucleotide [FMN]

Injection Vol. 1.0µl



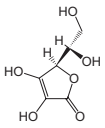
NACALAI TESQUE, INC

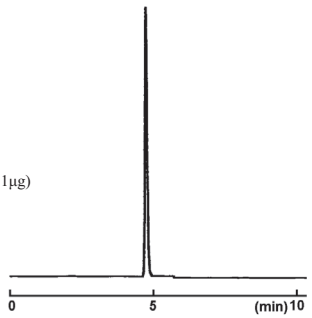
● Vitamin C

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphoric Acid
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV245nm, 0.16AUFS

Sample: *L*(+)-Ascorbic Acid
[Vitamin C] (0.1µg)





NACALAI TESQUE, INC

AP-0372

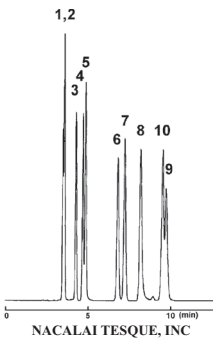
● Organic Acids

COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample:

1; Glycolic Acid	(6.3µg)
2; *L*-(+)-Tartaric Acid	(4.0µg)
3; *L*-(-)-Malic Acid	(6.4µg)
4; Lactic Acid	(13µg)
5; Acetic Acid	(13µg)
6; Citric Acid	(6.3µg)
7; Succinic Acid	(13µg)
8; Maleic Acid	(0.06µg)
9; Propionic Acid	(13µg)
10; Fumaric Acid	(0.03µg)



NACALAI TESQUE, INC

AP-1058

● dNTPs

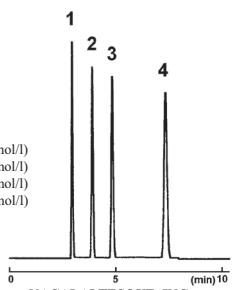
COSMOSIL Application Data

Column: COSMOSIL 5C_{18}-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm, 0.16AUFS

Sample:

1; *2'*-Deoxycytidine *5'*-Triphosphate [dCTP]	(1mmol/l)
2; *2'*-Deoxythymidine *5'*-Triphosphate [dTTP]	(1mmol/l)
3; *2'*-Deoxyguanosine *5'*-Triphosphate [dGTP]	(1mmol/l)
4; *2'*-Deoxyadenosine *5'*-Triphosphate [dATP]	(1mmol/l)

Injection 0.5µl



NACALAI TESQUE, INC

AP-0371

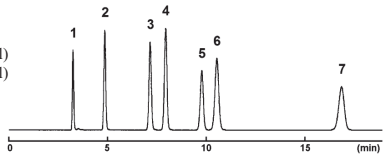
Applications

● Nucleic Acid Metabolites

COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV240nm

Sample:
1; Allantoin (2.0mg/ml)
2; Guanine (0.05mg/ml)
3; Hypoxanthine (0.05mg/ml)
4; Uric Acid (0.1mg/ml)
5; Xanthine (0.2mg/ml)
6; Adenosine (0.2mg/ml)
7; Inosine (0.1mg/ml)
Inj.Vol.: 1.0µl



NACALAI TESQUE, INC

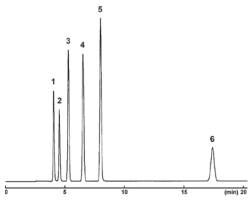
AP-1517

● Fish Freshness Indicator, K value

COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample:
1; Inosine-5'-monophosphate (0.40mg/ml)
2; Adenosine-5'-triphosphate (0.25mg/ml)
3; Adenosine-5'-diphosphate (0.40mg/ml)
4; Adenosine-5'-monophosphate (0.40mg/ml)
5; Hypoxanthine (0.25mg/ml)
6; Inosine (0.25mg/ml)
Inj.Vol.: 1.0µl



NACALAI TESQUE, INC

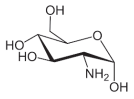
AP-1484

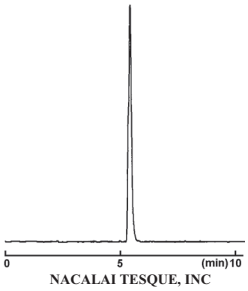
● D-Glucosamine

COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 0.1% Heptafluoro-*n*-butyric Acid
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: ELSD

Sample: *D*-Glucosamine (2.0mg/ml)
Inj.Vol.: 3.0µl





NACALAI TESQUE, INC

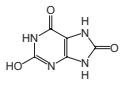
AP-1330

● Urate Metabolites

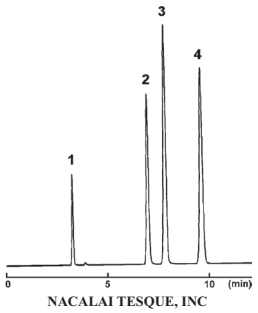
COSMOSIL Application Data

Column: COSMOSIL $5C_{18}$-PAQ
Column size: 4.6mmI.D.-250mm
Mobile phase: 20mmol/l Phosphate buffer(pH2.5)
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Allantoin (0.5mg/ml)
2; Hypoxanthine (0.5mg/ml)
3; Uric Acid (0.5mg/ml)
4; Xanthine (0.5mg/ml)
Inj.Vol.: 1.0µl



3; Uric Acid



NACALAI TESQUE, INC

AP-1265

Ordering Information

● COSMOSIL $5C_{18}$-PAQ Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0× 50	05792-61
1.0×150	05793-51
2.0× 30	05878-51
2.0× 50	05794-41
2.0×100	05470-71
2.0×150	34449-71
2.0×250	05795-31
3.0×100	05796-21
3.0×150	05797-11
3.0×250	05798-01
4.6× 30	05879-41
4.6× 50	34451-21

I.D. x Length (mm)	Product Number
4.6×100	05799-91
4.6×150	02486-71
4.6×250	02485-81
6.0×150	34419-61
6.0×250	05800-41
10× 50	05801-31
10×100	16586-31
10×150	34466-41
10×250	34376-21
20× 50	05804-01
20×100	16587-21

I.D. x Length (mm)	Product Number
20×150	34476-11
20×250	34373-51
28×100	16588-11
28×150	16589-01
28×250	34456-71

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	02484-91
10×20	34457-61
20×20	05803-11
28×50	34455-81

● COSMOSIL $15C_{18}$-PAQ Preparative Columns (Particle Size: 15 µm)

Packed Column

I.D. x Length (mm)	Product Number
28×250	05888-21
50×250	05890-71
50×500	05891-61

Guard Column

I.D. x Length (mm)	Product Number
28×50	05887-31
50×50	05889-11

COSMOSIL $3C_{18}$-EB

- Excellent for basic compounds
- 3 µm C_{18} column with reduced tailing and high resolution

Suitable Samples
- For quality control of drugs
- Compounds that induce peak tailing, such as basic compounds

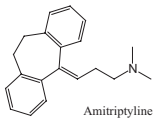
Analysis of Basic Compounds

COSMOSIL $3C_{18}$-EB uses a new end-capping method to reduce the number of residual silanol groups, which can cause peak tailing with basic compounds.

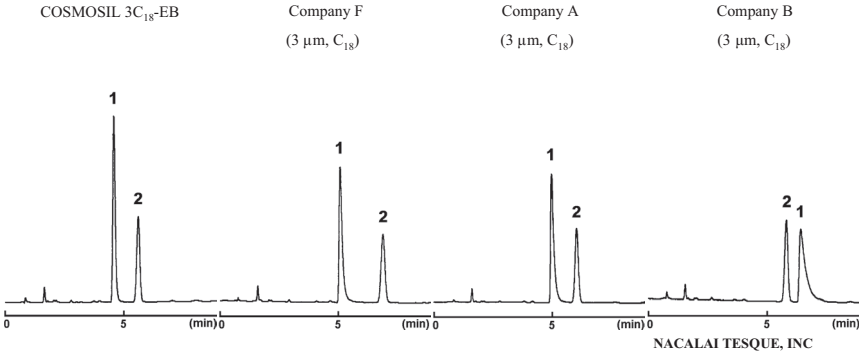
COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-75mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 60/40
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Amitriptyline (0.2mg/ml)
2; Propylbenzene (I.S.) (2.0mg/ml)
Inj. Vol: 1.0µl



Amitriptyline



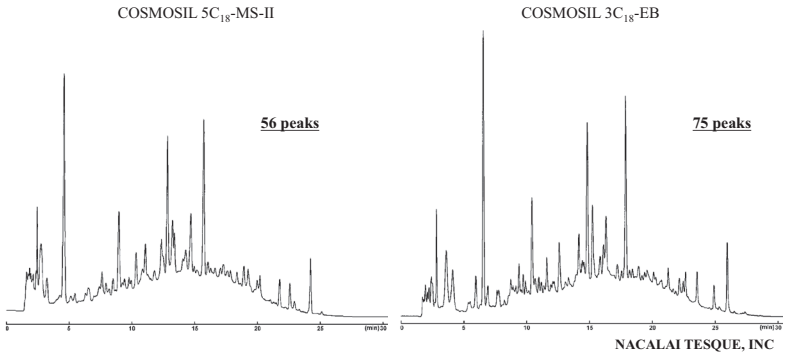
Advanced / Precise Separation of Multicompounds

The application below is analysis of red wine. COSMOSIL $3C_{18}$-EB (3 µm) provides more peaks comparing to conventional 5 µm columns. COSMOSIL $3C_{18}$-EB is suitable for analysis of many-component samples.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-150mm
Mobile phase: A: 20mmol/l Phosphate buffer(pH2.5)
B: Methanol
B conc. 10→90% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV300nm

Sample: Red Wine (Cabernet Sauvignon)
Inj. Vol: 10µl



AP-1268

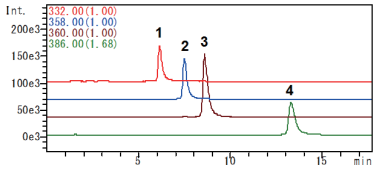
Applications

● Quinolone Antimicrobials

COSMOSIL Application Data

Column: COSMOSIL $3C_{18}$-EB
Column size: 2.0mmI.D.-150mm
Mobile phase: 0.1% Formic Acid-Acetonitrile/ H_2O = 15/85
Flow rate: 0.2 ml/min
Temperature: 40°C
Detection: ESI-MS, Positive, SIM

Sample:
1; Ciprofloxacin (21mg/L)
2; Danofloxacin (25mg/L)
3; Enrofloxacin (25mg/L)
4; Sarafloxacin (25mg/L)
Inj.Vol.: 1.0µl



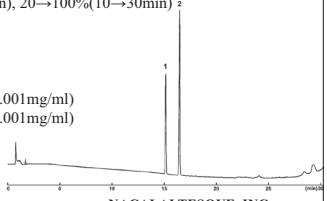
NACALAI TESQUE, INC

AP-1426

● Esomeprazole

COSMOSIL Application Data

Column: COSMOSIL $3C_{18}$-EB
Column size: 4.6mmI.D.-100mm
Mobile phase: A; Acetonitrile/ Solution A = 100mL/100ml, dilute with H_2O to 1L
B; Acetonitrile/ Solution A = 800mL/10mL, dilute with H_2O to 1L
[Solution A; 5.2mmol/l NaH_2PO_4, 31.5mmol/l Na_2HPO_4(pH7.6)]
B conc. 0→20%(0→10min), 20→100%(10→30min)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV302nm
Sample:
1; Omeprazole Related Compound A (0.001mg/ml)
2; Omeprazole (0.001mg/ml)
Inj.Vol.: 20µl



NACALAI TESQUE, INC

USP37(3), Esomeprazole Magnesium Delayed-Release Capsules, Impurities

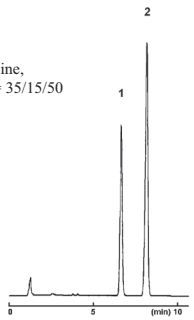
AP-1341

● Amlodipine, Benazepril

COSMOSIL Application Data

Column: COSMOSIL $3C_{18}$-EB
Column size: 4.6mmI.D.-100mm
Mobile phase: Methanol/ Acetonitrile/ 0.2% Triethylamine,
20mmol/l KH_2PO_4(pH3.0 with H_3PO_4) = 35/15/50
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV237nm

Sample: 1; Amlodipine (7.7µg/ml)
2; Benazepril (22.5µg/ml)
Inj.Vol.: 50µl



NACALAI TESQUE, INC

USP38(1), Amlodipine and Benazepril Hydrochloride Capsules, Performance Tests

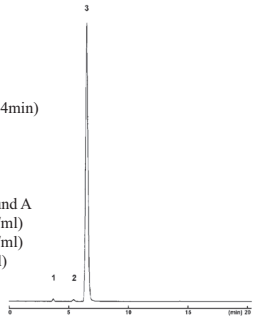
AP-1345

● Hydrochlorothiazide

COSMOSIL Application Data

Column: COSMOSIL $3C_{18}$-EB
Column size: 4.6mmI.D.-50mm
Mobile phase: A; 0.5% Formic Acid
B; Acetonitrile/ Methanol = 3/1
B conc. 3%(0-5min), 3→36%(5→14min)
Flow rate: 1.0 ml/min
Temperature: 35°C
Detection: UV275nm

Sample: 1; Benzothiadiazine related compound A (0.0032mg/ml)
2; Chlorothiazide (0.0032mg/ml)
3; Hydrochlorothiazide (0.32mg/ml)
Inj.Vol.: 10µl



NACALAI TESQUE, INC

USP28(6), Hydrochlorothiazide, Assay, Related compounds

AP-1355

Ordering Information

● COSMOSIL $3C_{18}$-EB Fast LC Columns (Particle Size: 3 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	09794-21
2.0× 75	09795-11
2.0×100	09796-01
2.0×150	09797-91
2.0×250	09798-81
3.0× 50	09799-71
3.0× 75	09800-21
3.0×100	09811-81

I.D. x Length (mm)	Product Number
3.0×150	09814-51
3.0×250	09827-91
4.6× 50	09840-01
4.6× 75※1	09841-91
4.6×100※1	09842-81
4.6×150※1	09843-71
4.6×250	09844-61

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
2.0×10 Cartridge※2	11892-74
4.6×10	09839-41
4.6×10 Cartridge※2	11890-94

※1 Columns for validation
※2 2 cartridges included. Guard cartridge holder required; refer to page 76.

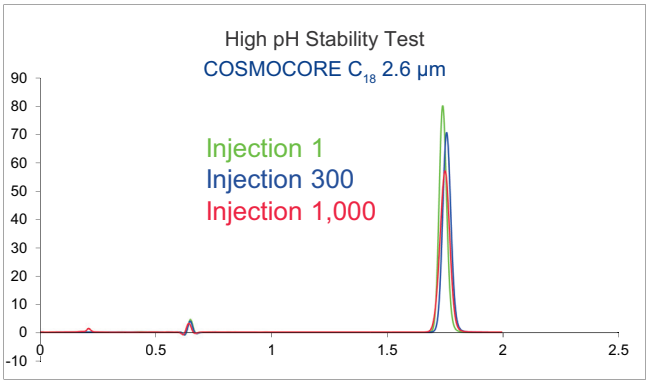
COSMOCORE 2.6C_{18}

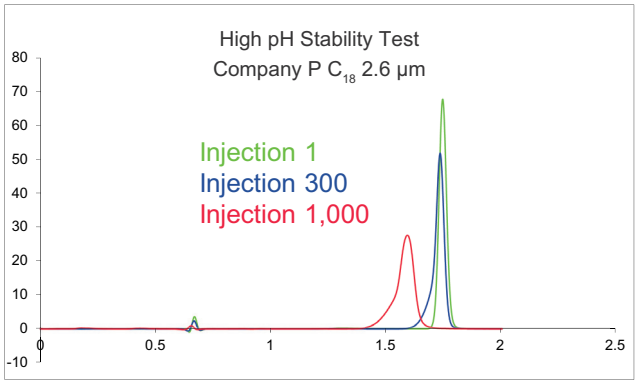
- Core-Shell Particles
- Ultra-high performance LC results with conventional HPLC equipment
- Same number of theoretical plates as sub-2 µm columns with half the back pressure

Suitable Samples
- For quality control of drugs
- Compounds that induce peak tailing, such as basic compounds

Excellent pH Stability

Under accelerated pH 10.4, 40°C stability test, COSMOCORE C_{18} column shows superior stability compared with other core shell C_{18} phases.





Column size: 2.1 mm x 100mm
Sample: Caffeine (0.05 mg/ml)
Flow rate: 0.4 ml/min

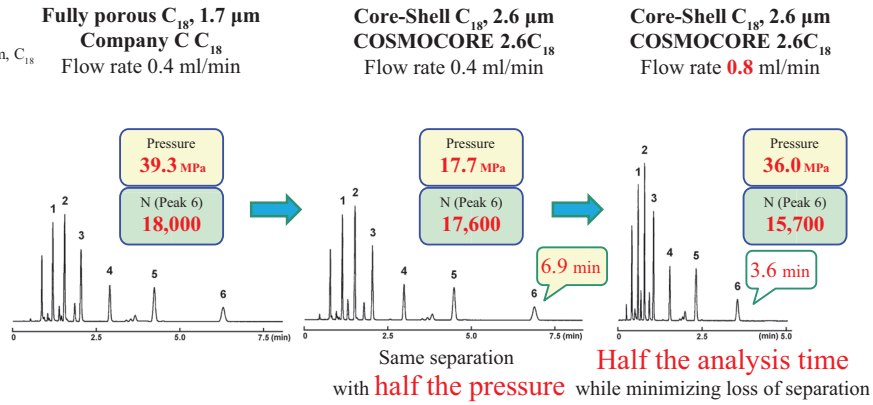
Mobile phase: 0.35% Ammounium hydroxide/acetonitrile = 90/10 (pH 10.4)
Injection volume: 1 µL
Temperature: 40°C

Reduced Back Pressure and Faster Analyses

COSMOCORE 2.6C_{18} delivers performance equivalent to sub-2 µm particles at faster flow rate and analysis time while maintaining a lower back pressure. COSMOCORE can also be used in longer column size to gain additional resolution.

Column: Fully porous, 1.7µm: Competitor C, 1.7µm, C_{18}
Core-Shell, 2.6µm: COSMOCORE 2.6C_{18}
Column size: 2.1mmI.D.-100mm
Mobile phase: Acetonitrile / Water = 60 / 40
Flow rate:
Temperature: 40°C
Detection: UV254nm

Sample:		
	1; Benzene	(2.0mg/ml)
	2; Toluene	(2.0mg/ml)
	3; Ethylbenzene	(2.0mg/ml)
	4; Propylbenzene	(2.0mg/ml)
	5; Butylbenzene	(2.0mg/ml)
	6; Amylbenzene	(2.0mg/ml)
Inj.Vol.:	0.5µl	



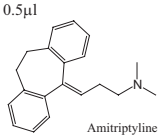
Applications

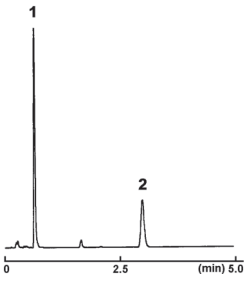
● Amitriptyline

COSMOCORE Application Data

Column: COSMOCORE 2.6C_{18}
Column size: 2.1mmI.D.-50mm
Mobile phase: Acetonitrile/ 10mmol/l CH_3COONH_4 = 50/50
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV254nm

Sample: 1; Amitriptyline (0.2mg/ml)
2; *n*-Propylbenzene (I.S.) (2.0mg/ml)
Inj. Vol: 0.5µl


Amitriptyline



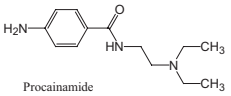
NACALAI TESQUE, INC

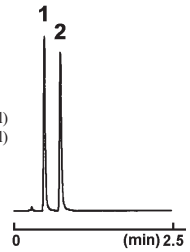
● Procainamide

COSMOCORE Application Data

Column: COSMOCORE 2.6C_{18}
Column size: 2.1mmI.D.-50mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 10/90
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV270nm

Sample: 1; Procainamide (0.05mg/ml)
2; *N*-Acetylprocainamide (0.05mg/ml)
Inj. Vol: 0.5µl


Procainamide

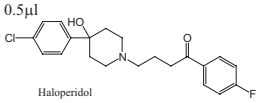


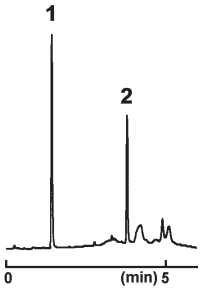
NACALAI TESQUE, INC

● Haloperidol

COSMOCORE Application Data

Column: COSMOCORE 2.6C_{18}
Column size: 2.1mmI.D.-50mm
Mobile phase: A; Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 10/90
B; Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 50/50
B conc. 0→100%(0→3min), 100%(3-5min)
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV220nm
Sample: 1; *4*-(*4*-Chlorophenyl)-*4*-hydroxypiperidine (0.1mg/ml)
2; Haloperidol (0.1mg/ml)
Inj. Vol: 0.5µl


Haloperidol



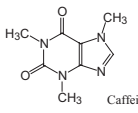
NACALAI TESQUE, INC

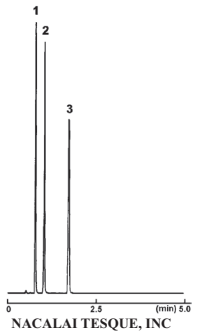
● Caffeine

COSMOCORE Application Data

Column: COSMOCORE 2.6C_{18}
Column size: 2.1mmI.D.-100mm
Mobile phase: Acetonitrile/ H_2O = 10/90
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV275nm

Sample: 1; Theobromine (0.05mg/ml)
2; Theophylline (0.05mg/ml)
3; Caffeine (0.05mg/ml)
Inj.Vol.: 1.0µl


Caffeine



NACALAI TESQUE, INC

AP-1413

Ordering Information

● COSMOCORE 2.6C_{18} Analytical Columns (Particle Size: 2.6 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.1× 30	12632-31
2.1× 50	12631-41
2.1× 75	12630-51
2.1×100	12614-71
2.1×150	12612-91

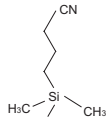
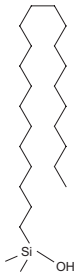
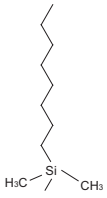
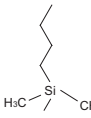
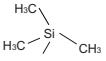
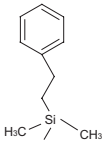
I.D. x Length (mm)	Product Number
3.0× 30	12611-01
3.0× 50	12609-51
3.0× 75	12608-61
3.0×100	12607-71
3.0×150	12602-21

I.D. x Length (mm)	Product Number
4.6× 30	12601-31
4.6× 50	12600-41
4.6× 75	12599-91
4.6×100	12598-01
4.6×150	12597-11
4.6×250	12596-21

COSMOCORE's connector is the same type as Waters UPLC® columns.

3. Other Reversed Phase Columns

Specifications

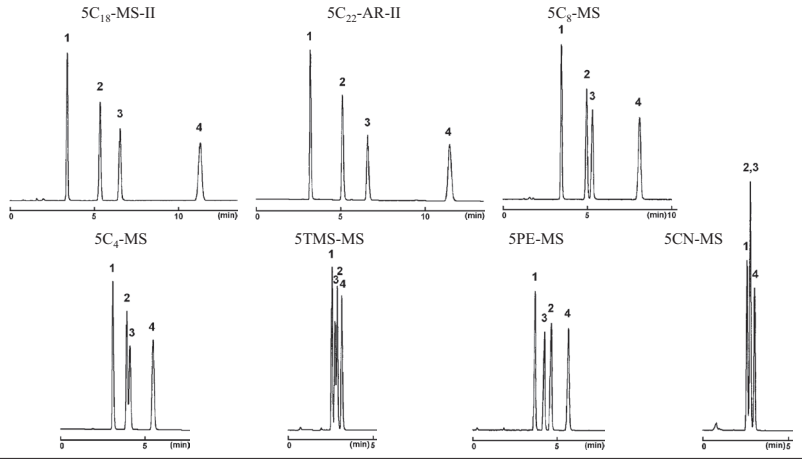
Packing Material	CN-MS	C_{22}-AR-II	C_8-MS	C_4-MS	TMS-MS	PE-MS
Silica Gel	High purity porous spherical silica					
Average Particle Size	5 μm					
Average Pore Size	120 Å					
Specific Surface Area	300 m^2/g					
Bonded Phase Structure						
Bonded Phase	Cyanopropyl group	Dococyl group	Octyl group	Butyl group	Trimethyl group	Phenylethyl group
Bonding Type	Monomeric	Polymeric	Monomeric			
Main Interaction	Hydrophobic interaction π-π interaction	Hydrophobic interaction				Hydrophobic interaction π-π interaction
End-Capping	Near-perfect treatment					
Carbon Content	7%	19%	10%	7%	5%	10%
Usable pH Range	2 ~ 7.5					

Difference in Separation Chracteristics

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-150mm
Mobile phase: Methanol/ H_2O = 60/40
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample:
1; Acetophenone (0.05μg)
2; Methyl Benzoate (0.5μg)
3; Benzene (2.0μg)
4; Toluene (2.0μg)



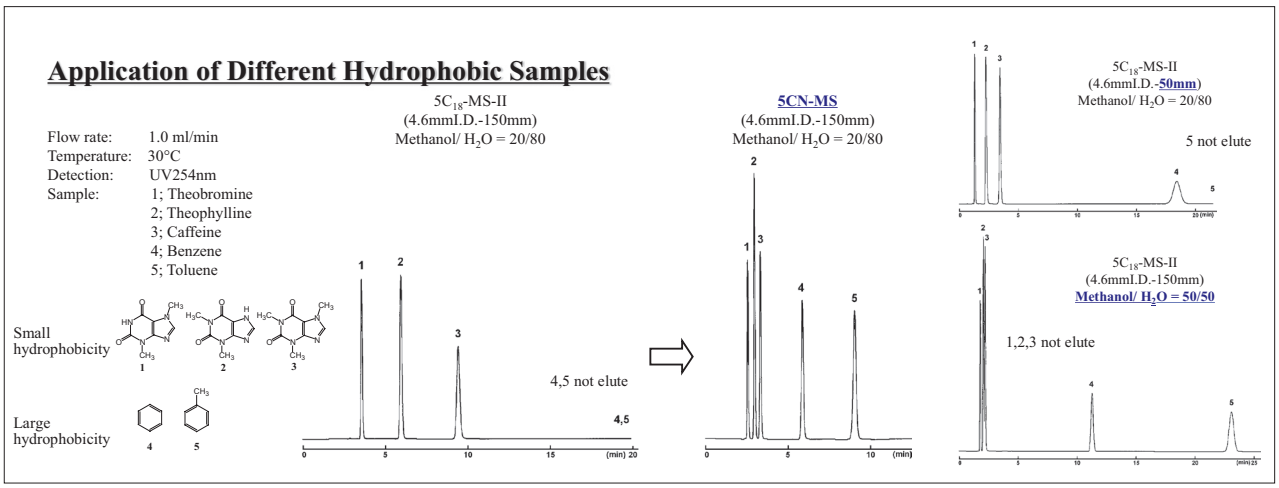
COSMOSIL CN-MS

- Cyanopropyl-bonded stationary phase
- Enables separation of different hydrophobic samples without using gradient

Suitable Samples
・Mixtures of natural compounds

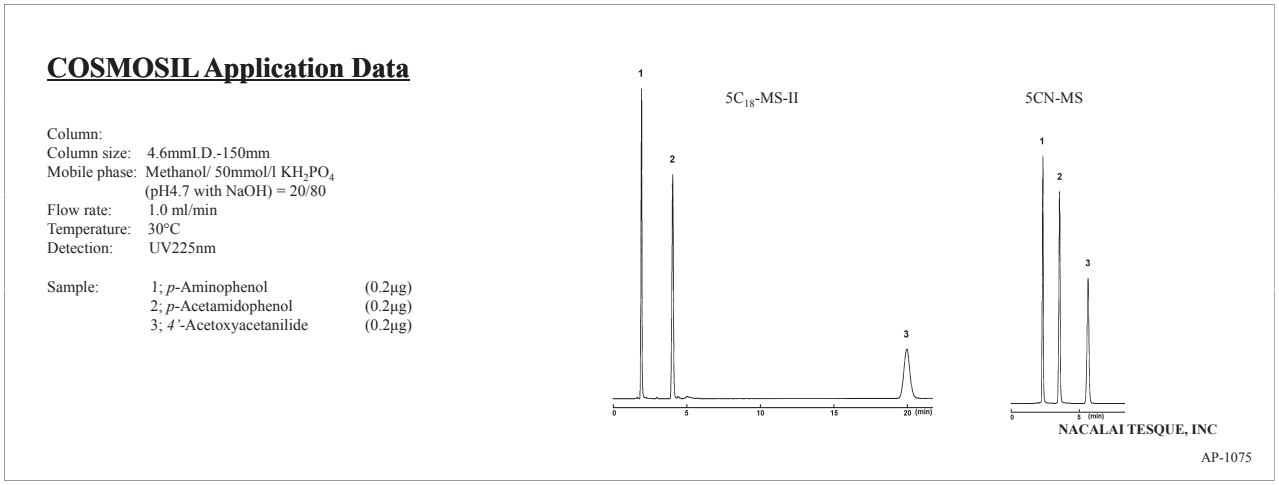
Rapid Analysis

Gradient elution is commonly used for the samples containing both polar and non-polar compounds. However, gradient elution may cause reproducibility problem depending on the gradient mixer and pump, and need an equilibration time for each analysis. COSMOSIL 5CN-MS offers rapid analysis and great reproducibility using isocratic elution mode.



Applications

- Acetoaminophen



Ordering Information

- COSMOSIL 5CN-MS Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
2.0×150	34270-91
4.6× 50	38233-61
4.6×100	38234-51
4.6×150	38235-41
4.6×250	38236-31

I.D. x Length (mm)	Product Number
6.0×150	38237-21
6.0×250	38238-11
10×250	38239-01
20×250	38240-61

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	38231-81
10×20	38232-71

COSMOSIL C_{22}-AR-II, C_8-MS, C_4-MS, TMS-MS, PE-MS

Ordering Information

● COSMOSIL 5C_{22}-AR-II Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6× 50	05848-41	6.0×150	05850-91
4.6×100	05849-31	6.0×250	05851-81
4.6×150	04598-51	10×250	04969-91
4.6×250	04599-41	20×250	05183-41

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	04881-21
10×20	05554-81

● COSMOSIL 5C_8-MS Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6× 50	38153-11	6.0×150	38157-71
4.6×100	38154-01	6.0×250	38158-61
4.6×150	38155-91	10×250	38159-51
4.6×250	38156-81	20×250	38160-11

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	38151-31
10×20	38152-21

● COSMOSIL 5C_4-MS Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6× 50	38163-81	6.0×150	38167-41
4.6×100	38164-71	6.0×250	38168-31
4.6×150	38165-61	10×250	38169-21
4.6×250	38166-51	20×250	38170-81

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	38161-01
10×20	38162-91

● COSMOSIL 5TMS-MS Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6× 50	38173-51	6.0×150	38177-11
4.6×100	38174-41	6.0×250	38178-01
4.6×150	38175-31	10×250	38179-91
4.6×250	38176-21	20×250	38180-51

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	38171-71
10×20	38172-61

● COSMOSIL 5PE-MS Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6× 50	38183-21	6.0×150	38187-81
4.6×100	38184-11	6.0×250	38188-71
4.6×150	38185-01	10×250	38189-61
4.6×250	38186-91	20×250	38190-21

Guard Column

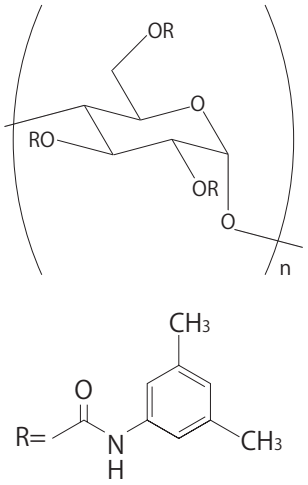
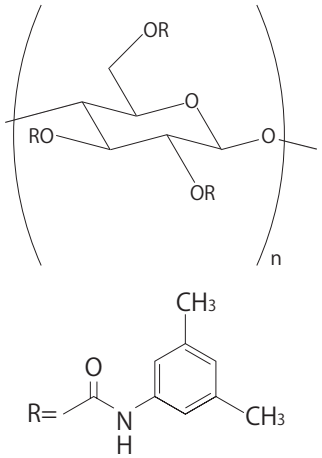
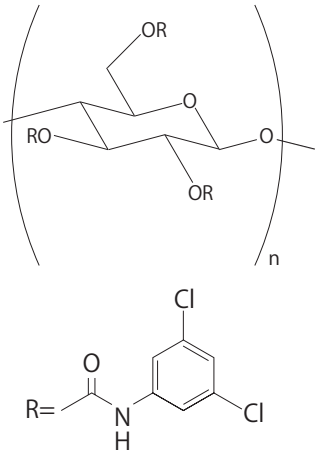
I.D. x Length (mm)	Product Number
4.6×10	38181-41
10×20	38182-31

4. Chiral Separation Columns

COSMOSIL CHiRAL Series

- Immobilized selectors can withstand many different solvents
- Sharpen peaks with CHiRAL 3 Series (Particle Size: 3 µm)
- Preparative separations with CHiRAL 5 Series (Particle Size: 5 µm)
- Equivalent performance to columns currently on the market
- Competitive price

Specifications

Packing Material	COSMOSIL CHiRAL 3A, 5A	COSMOSIL CHiRAL 3B, 5B	COSMOSIL CHiRAL 3C, 5C
Based Material	Silica Gel		
Average Particle Size	3, 5 µm		
Chiral Selector	Amylose tris (3,5-dimethylphenyl carbamate)	Cellulose tris (3,5-dimethylphenyl carbamate)	Cellulose tris (3,5-dichlorophenyl carbamate)
			
Bonding Type	Immobilized		
Usable pH Range	2 ~ 9		

Available in 3 µm Particles

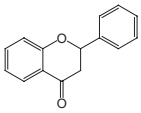
Sharp Peaks

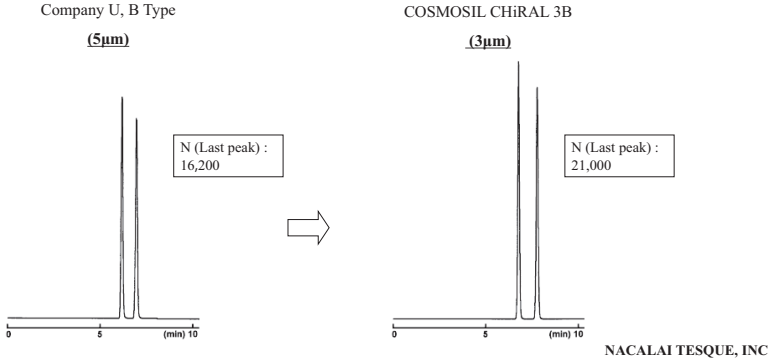
COSMOSIL CHiRAL columns are available in 3 µm particles, which yield sharper peaks than conventional 5 µm particles. Columns for preparative separations are available with 5 µm particles.

Comparison: 5 µm / 3 µm

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane / *2*-Propanol = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: Flavanone (0.5mg/ml)
Inj.Vol.: 1.0µl

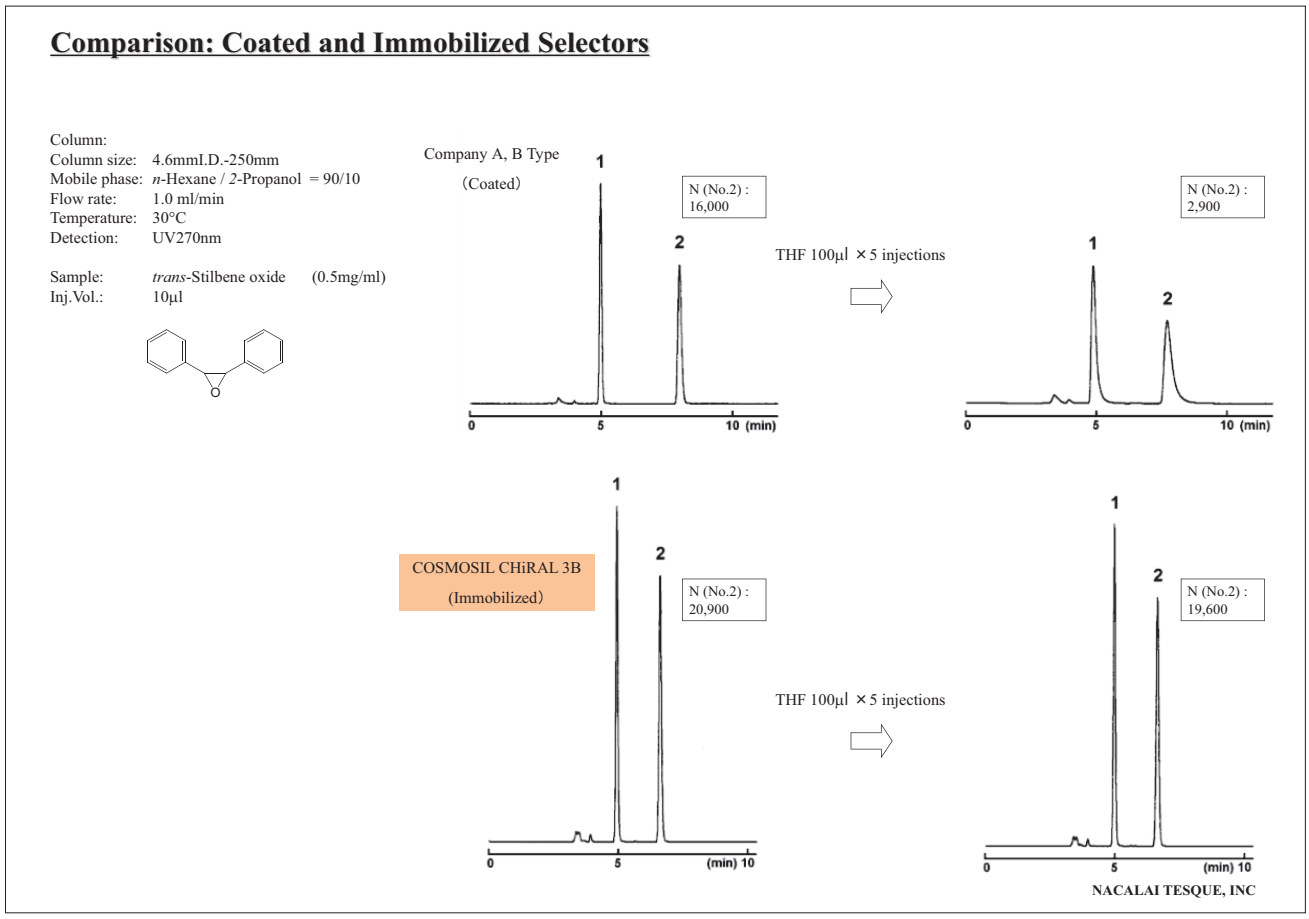




Immobilized Stationary Phase

High Resistance to Solvents

The COSMOSIL CHiRAL series uses a chiral selector that is chemically bonded to the silica gel, which results in high resistance to solvents. Tetrahydrofuran (THF) strips coated selectors from the stationary phase, reducing theoretical plates to less than 1/5 in our experiment. However, the same selectors bonded to the silica withstood repeated injections of THF.



Usable Solvents

Due to its immobilized selectors, various solvents are usable with COSMOSIL CHiRAL. A wide variety of solvents increases your selectivity options.

Solvent	Immobilized		Coated
	Normal Phase	Reversed Phase	Normal Phase
n-Hexane	○※		○※
n-Heptane	○		○
Methanol	○※	○	○※
Ethanol	○	○	○
2-Propanol (Isopropanol)	○	○	○
Acetonitrile	○※	○	○※
Tetrahydrofuran(THF)	○	○	×
t-Butyl Methyl Ether	○		×
Toluene	○		×
Chloroform	○		×
Dichloromethane (Methylene Chloride)	○		×
Ehtyl Acetate	○		×
Water		○	
Aqueous Buffer		○	

○ : Usable × : Unusable
※ Methanol / acetonitrile and n-hexane are not miscible with each other, so they should not be mixed for LC.

Selectivity Depends on the Solvent

Column : COSMOSIL CHiRAL 3B, 4.6 mmI.D. x 250 mm
Sample : 1-Acenaphthenol

Hexane / Ethanol = 97 / 3 — $\alpha = 1.09$

Hexane / 2-Propanol = 95 / 5 — $\alpha = 1.08$

Hexane / Tetrahydrofuran = 90 / 10 — $\alpha = 1.14$

Hexane / Chloroform = 65 / 35 — $\alpha = 1.24$

Hexane /*t*-Butylmethylether = 60 / 40 — $\alpha = 1.32$

Elution strength: alcohols, THF >> chloroform > t-butyl methyl ether >> alkanes

Equivalent Separation to Competitors' Columns

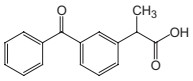
The COSMOSIL CHiRAL 5 series (5 µm particles) is equivalent to other companies' immobilized polysaccharide derivative-based chiral columns.

■ Chiral selector: Amylose tris (3,5-dimethylphenyl carbamate) (**A Type**)

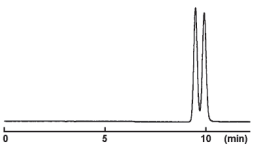
COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane / *2*-Propanol / TFA = 90/10/0.1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

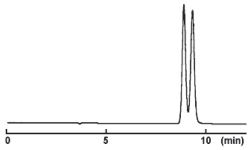
Sample: Ketoprofen (0.3mg/ml)
Inj.Vol.: 1.0µl



Company U, A Type
(Immobilized)



COSMOSIL CHiRAL 5A
(Immobilized)



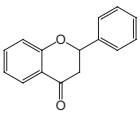
NACALAI TESQUE, INC

■ Chiral selector: Cellulose tris (3,5-dimethylphenyl carbamate) (**B Type**)

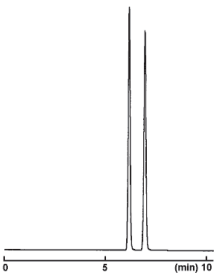
COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane / *2*-Propanol = 90/10
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

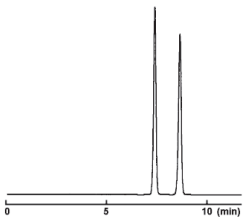
Sample: Flavanone (0.5mg/ml)
Inj.Vol.: 1.0µl



Company U, B Type
(Immobilized)



COSMOSIL CHiRAL 5B
(Immobilized)



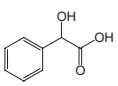
NACALAI TESQUE, INC

■ Chiral selector: Cellulose tris (3,5-dichlorophenyl carbamate) (**C Type**)

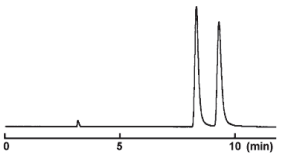
COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: *n*-Hexane / *2*-Propanol / TFA = 90/10/0.1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

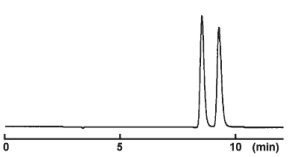
Sample: *DL*-Mandelic Acid (10mg/ml)
Inj.Vol.: 2.0µl



Company U, C Type
(Immobilized)



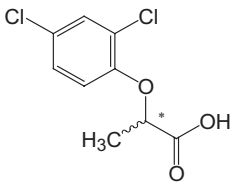
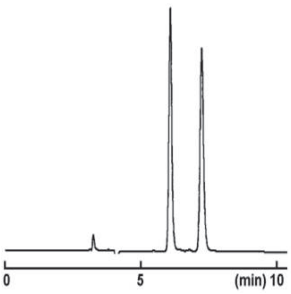
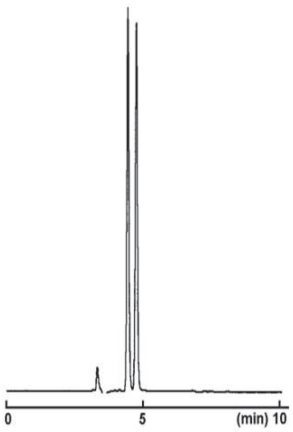
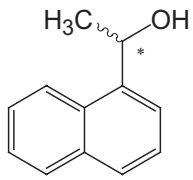
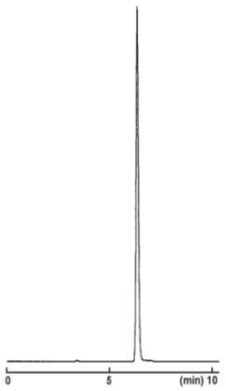
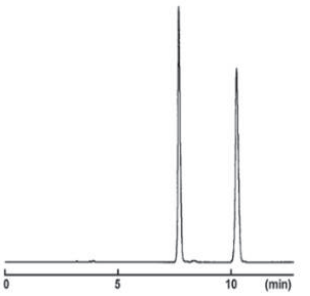
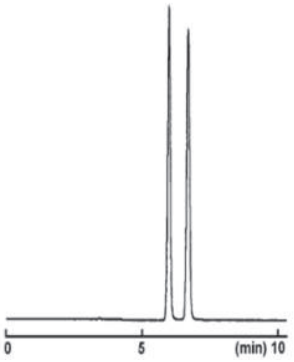
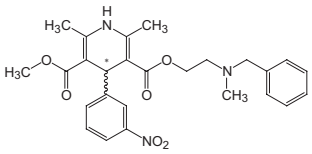
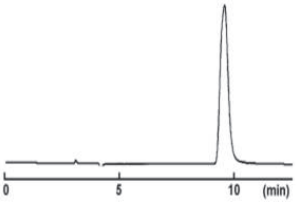
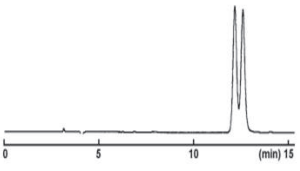
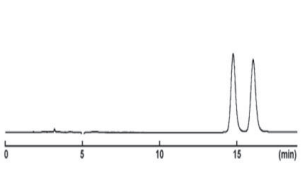
COSMOSIL CHiRAL 5C
(Immobilized)



NACALAI TESQUE, INC

Column Selection

COSMOSIL CHiRAL offers 3 different chiral selectors that, together, have a high probability of separating your sample. Of 54 samples in our test, 53 pairs of enantiomers were fully separated. For samples that do not separate easily with any column, please adjust the type and concentration of solvents in your mobile phase.

Sample, Mobile Phase	CHiRAL A	CHiRAL B	CHiRAL C
2-(2,4-Dichlorophenoxy) propionic acid  Mobile Phase: Hexane / 2-Propanol / TFA = 95 / 5 / 0.1	Complete Separation 		Complete Separation 
1-(1-Naphtyl) ethanol  Mobile Phase: Hexane / 2-Propanol = 90 / 10		Complete Separation 	Complete Separation 
Nicardipine  Mobile Phase: Hexane / 2-Propanol / Diethylamine = 90 / 10 / 0.1			Complete Separation 
Chiral selector hit rate* (n=54)	51.9%	74.1%	66.7%
Best separation (fraction of total)	11/54	29/54	14/54

※Complete separation (hit) is defined as the two enantiomer peaks having resolution (Rs) greater than or equal to 1.5.
The best separation for each sample is marked with double rings.

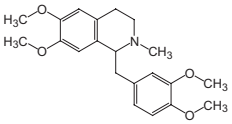
Applications

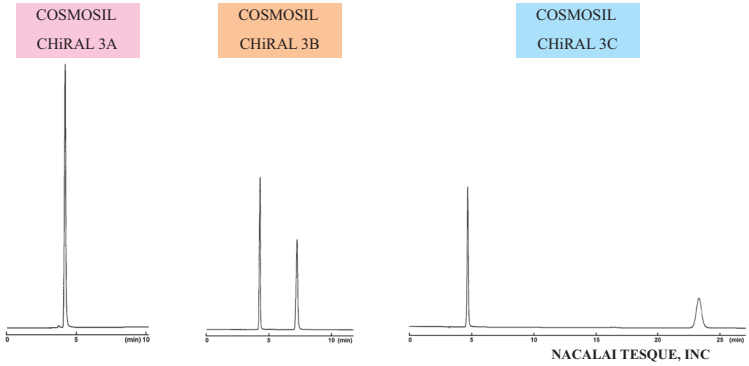
● Laudanosine

COSMOSIL Application Data

Column: COSMOSIL CHiRAL **
Column size: 4.6mmI.D.-250mm
Mobile phase: *t*-Butyl Methyl Ether / *2*-Propanol / Diethylamine = 70/30/0.1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: Laudanosine (1.0mg/ml)
Inj.Vol.: 0.75µl





COSMOSIL Application

COSMOSIL CHiRAL applications are available on our website.
Please visit COSMOSIL top page at http://www.nacalai.com.

Ordering Information

● **COSMOSIL CHiRAL 3 Fast LC Columns (Particle Size: 3 µm)**
Packed Column

Product Name	I.D. x Length (mm)	Product Number
COSMOSIL CHiRAL 3A	4.6×150	15778-51
	4.6×250	15779-41
COSMOSIL CHiRAL 3B	4.6×150	15783-71
	4.6×250	15784-61
COSMOSIL CHiRAL 3C	4.6×150	15788-21
	4.6×250	15789-11

● **COSMOSIL CHiRAL 5 Analytical / Preparative Columns (Particle Size: 5 µm)**
Packed Column

Product Name	I.D. x Length (mm)	Product Number
COSMOSIL CHiRAL 5A	4.6×250	15780-01
	10×250	15781-91
	20×250	15782-81
COSMOSIL CHiRAL 5B	4.6×250	15785-51
	10×250	15786-41
	20×250	15787-31
COSMOSIL CHiRAL 5C	4.6×250	15790-71
	10×250	15791-61
	20×250	15792-51

※ For 10 mm I.D. and 20 mm I.D. columns, please inquire about delivery time.

5. Normal Phase Columns

COSMOSIL SL-II

- High purity silica gel (>99.99%) with special treatment
- Suitable for preparative separation

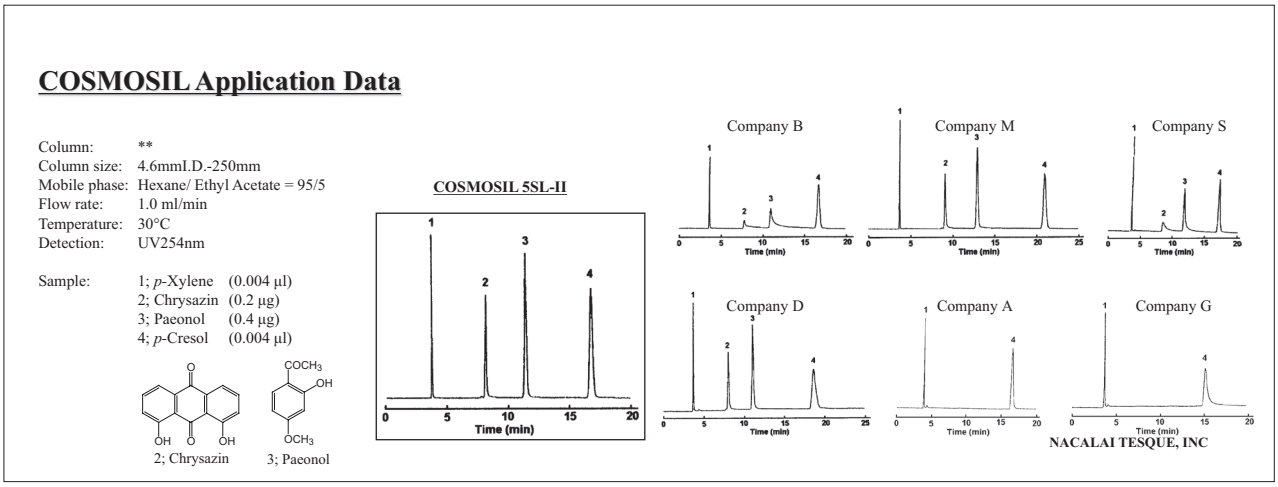
Suitable Samples
・Fat-soluble vitamins, natural products, phospholipids, structural analogs, low-MW drugs, etc.

Specifications

Packing Material	SL-II
Silica Gel	High purity porous spherical silica
Average Particle Size	3, 5, 15 µm
Average Pore Size	120 Å
Specific Surface Area	300 m^2/g
Features	・High purity silica gel (>99.99%) with special treatment ・Suitable for preparative separation (higher resolution than medium-pressure or open chromatography)

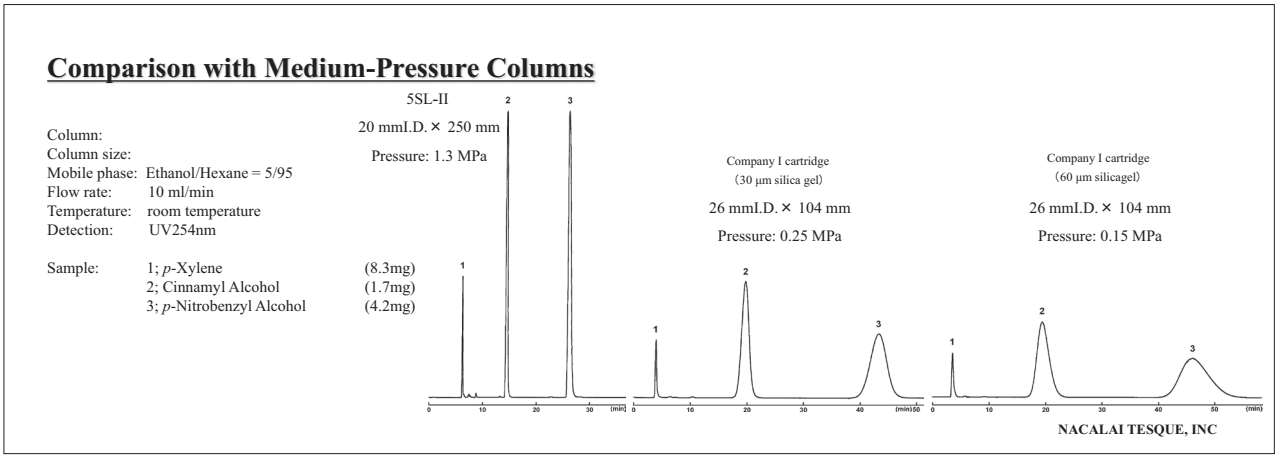
Comparison with Competitors' Columns in Separation of Phenols

Ultra-pure silica gel of more than 99.99% purity is used for the COSMOSIL SL-II packed column series. This column provides improved separation and reproducibility for compounds with phenol groups without ionic additives by using mobile phases of hexane and ethanol.



Comparison with Medium-Pressure Columns

COSMOSIL SL-II offers sharper peak compared with packing materials for medium-pressure liquid chromatography and open chromatography.



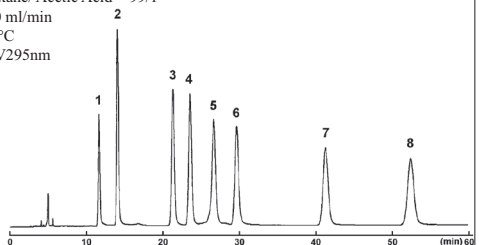
Applications

● Vitamin E

COSMOSIL Application Data

Column: COSMOSIL 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Hexane/ Acetic Acid = 99/1
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV295nm

Sample:
1; α-Tocopherol
2; α-Tocotrienol
3; β-Tocopherol
4; γ-Tocopherol
5; β-Tocotrienol
6; γ-Tocotrienol
7; δ-Tocopherol
8; δ-Tocotrienol



NACALAI TESQUE, INC

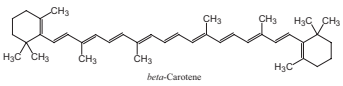
AP-1191

● Natural Colorants (Carotenoid)

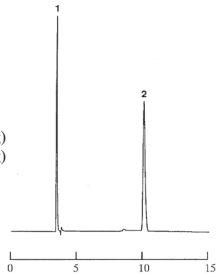
COSMOSIL Application Data

Column: COSMOSIL 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Chloroform/Hexane = 1/9
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm, 0.16AUFS

Sample: 1; β-Carotene (0.5µg)
2; Vitamin A Acetate, *all trans* (1.5µg)



beta-Carotene



NACALAI TESQUE, INC

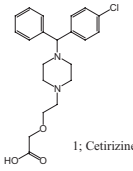
AP-0094

● Cetirizine Hydrochloride

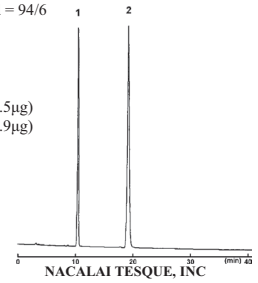
COSMOSIL Application Data

Column: COSMOSIL 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 40mmol/l Sulfuric Acid = 94/6
Flow rate: 1.0 ml/min
Temperature: 25°C
Detection: UV230nm

Sample: 1; Cetirizine (0.5µg)
2; *4*-Dimethylaminoantipyrine (0.9µg)



1; Cetirizine



NACALAI TESQUE, INC

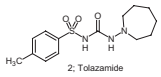
AP-1096

● Tolazamide

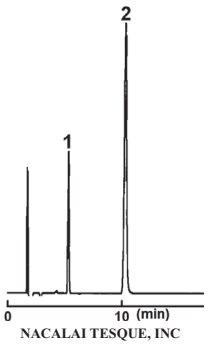
COSMOSIL Application Data

Column: COSMOSIL 5SL-II
Column size: 4.6mmI.D.-250mm
Mobile phase: Hexane/ Water-saturated Hexane/ Tetrahydrofuran/ Ethanol/ Acetic Acid = 475/ 475/ 20/ 15/ 9
Flow rate: 2.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Tolbutamide (7.5µg)
2; Tolazamide (30µg)



2; Tolazamide



NACALAI TESQUE, INC

AP-0882

Ordering Information

● COSMOSIL 5SL-II Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	37999-81
4.6×100	38000-01
4.6×150	38001-91
4.6×250	38002-81

I.D. x Length (mm)	Product Number
6.0×150	38003-71
6.0×250	38004-61
10×250	38005-51
20×250	38006-41
28×250	34358-61

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37997-01
10×20	37998-91
20×20	05874-91
20×50	05875-81
28×50	34359-51

● COSMOSIL 15SL-II Preparative Columns（Particle Size: 15 µm）

Packed Column

I.D. x Length (mm)	Product Number
28×250	05893-41
50×250	05895-21
50×500	05896-11

Guard Column

I.D. x Length (mm)	Product Number
28×50	05892-51
50×50	05894-31

● COSMOSIL 3SL-II Fast LC Columns（Particle Size: 3 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6×10	38059-61
4.6×50	38060-21

I.D. x Length (mm)	Product Number
4.6×100	38061-11

6. Hydrophilic Interaction Columns

COSMOSIL HILIC

- Triazole-bonded stationary phase
- Unique anion-exchange mechanism (Hydrophilic interaction + Anion-exchange)

Suitable Samples
- Hydrophilic compounds that would not be retained in reversed phase chromatography
- Melamine, water-soluble vitamins, organic acids, free amino acods, peptides, nucleotides and natural compounds

Specifications

Packing Material	HILIC	
Silica Gel	High purity porous spherical silica	
Average Particle Size	2.5 µm	5 µm
Average Pore Size	130 Å	120 Å
Specific Surface Area	330 m^2/g	300 m^2/g
Bonded Phase	Triazole	
Main Interaction	Hydrophilic interaction, Anion-exchange	
Features	Suitable for compounds not retained by C_{18}	

COSMOSIL HILIC Application Data

COSMOSIL HILIC Application Notebook contains about 200 chromatograms for the separation of polar compounds using COSMOSIL HILIC column. It also describes how the mobile phase conditions, such as buffer pH and salt concentration influence the separation in HILIC mode.

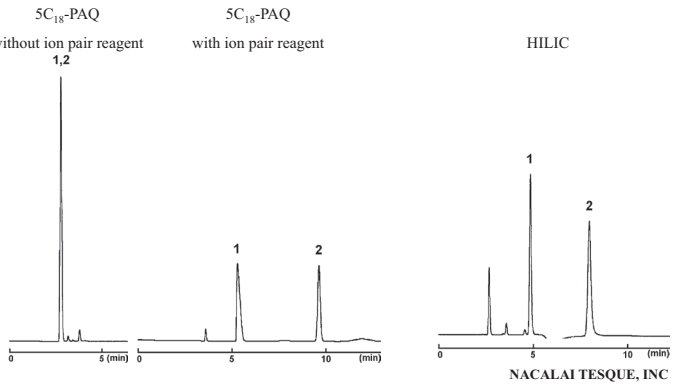
Comparison with Reversed Phase (C_{18}) Columns

The hydrophilic interaction chromatography is a variation of normal phase chromatography where a polar stationary phase is used with a mobile phase which contains a high concentration of water miscible organic solvent and a low concentration of aqueous eluent. The main retention mechanism is the partitioning of the polar analytes between the polar stationary and the non-polar mobile phase. As it is also called "aqueous normal phase", the elution order is similar to that of normal phase, and the sample elution is in the order of increasing hydrophilicity. Without using ion-pair reagent COSMOSIL HILIC retains highly polar analytes that would not be retained in reversed phase chromatography. It also shows a weak anion-exchange mechanism with the positively charged stationary phase, thus acidic compounds are strongly retained.

Comparison with C_{18}

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: (HILIC) Acetonitrile/10mmol/l Ammonium Acetate = 60/40
(C_{18}-PAQ) 20mmol/l Phosphate buffer(pH2.5)
-(Ion pair)5mmol/l Sodium *1*-Octanesulfonate
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Glycine (5.0mg/ml)
2; Glycylglycine (0.125mg/ml)
Inj.Vol 2.0µl



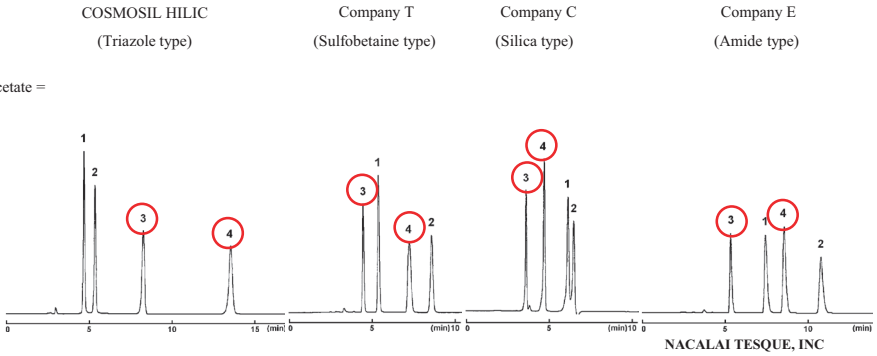
Alternative Selectivity

Anionic compounds were used to evaluate the anion-exchange capability. The only COSMOSIL HILIC showed strong selectivity of anionic compounds. The positively charged triazole stationary phase shows anion-exchange mechanism, thus acidic compounds (peak 3, 4) can be more strongly retained than with competitors' columns

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Ammonium Acetate =
(COSMOSIL) = 70/30
(Others) = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV225nm

Sample: 1; Melamine (0.10mg/ml)
2; Ammeline (0.075mg/ml)
3; Cyanuric Acid (0.75mg/ml)
4; Ammelide (0.05mg/ml)
Inj. Vol: 1.0µl



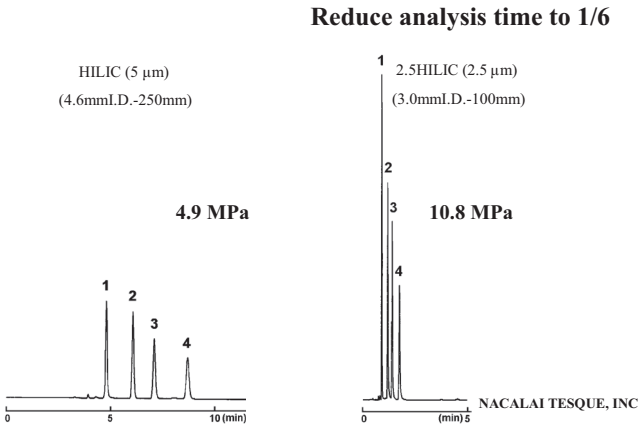
Ultra-High-Speed Analysis（COSMOSIL 2.5HILIC）

COSMOSIL 2.5HILIC can be used with any conventional LC system.

COSMOSIL Application Data

Column:
Column size:
Mobile phase: Acetonitrile/ 10mmol/l Ammonium Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV249nm

Sample: 1; Creatinine (0.1mg/ml)
2; *2′*-Deoxyguanosine (0.1mg/ml)
3; *8*-Hydroxy-*2′*-Deoxyguanosine (0.1mg/ml)
4; *8*-Hydroxy Guanosine (0.1mg/ml)
Inj. Vol: 1.0µl



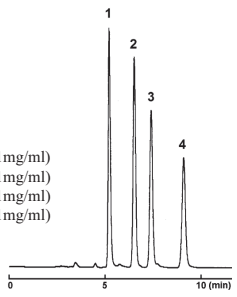
Applications

● Oxidative Stress Markers

COSMOSIL Application Data

Column: COSMOSIL HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Ammonium
Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV249nm

Sample: 1; Creatinine (0.01mg/ml)
2; *2′*-Deoxyguanosine (0.01mg/ml)
3; *8*-Hydroxy-*2′*-Deoxyguanosine (0.01mg/ml)
4; *8*-Hydroxy Guanosine (0.01mg/ml)
Inj.Vol.: 5.0µl



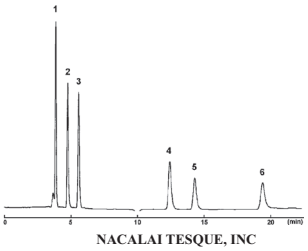
AP-1209

● Water-Soluble Vitamins

COSMOSIL Application Data

Column: COSMOSIL HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 100mmol/l Ammonium
Acetate = 80/20
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample:
1; Nicotinamide (0.125µg)
2; Vitamin B_6 [Pyridoxine] (0.25µg)
3; Vitamin B_2 [Riboflavin] (0.25µg)
4; Nicotinic Acid (0.125µg)
5; *D*-Pantothenic Acid (3.125µg)
6; *L*(+)-Ascorbic Acid
[Vitamin C] (0.875µg)



AP-0315

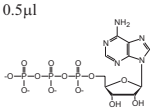
Applications

● Nucleotides

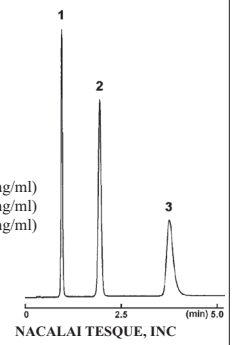
COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
Column size: 2.0mmI.D.-50mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 50/50
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV260nm

Sample: 1; Adenosine-5'-monophosphate (0.25mg/ml)
2; Adenosine-5'-diphosphate (0.50mg/ml)
3; Adenosine-5'-triphosphate (0.50mg/ml)
Inj.Vol.: 0.5µl



1; ATP



NACALAI TESQUE, INC

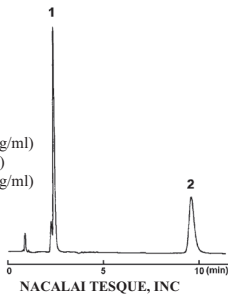
AP-1275

● Phosphopeptide

COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
Column size: 2.0mmI.D.-150mm
Mobile phase: Acetonitrile/ 20mmol/l Phosphate buffer(pH7.0) = 70/30
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV220nm

Sample: 1; Angiotensin II(Human) (0.5mg/ml)
2; [Tyr(PO_3H_2)$_4$]-Angiotensin II(Human) (0.5mg/ml)
Inj.Vol.: 2.0µl



NACALAI TESQUE, INC

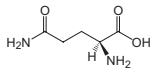
AP-1280

● Glutamine, Glutamic acid

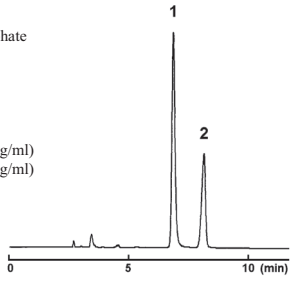
COSMOSIL Application Data

Column: COSMOSIL HILIC
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ 10mmol/l Phosphate buffer(pH7.0) = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; *L*-Glutamine (10mg/ml)
2; *L*-Glutamic Acid (10mg/ml)
Inj. Vol: 1.0µl



1; *L*-Glutamine



NACALAI TESQUE, INC

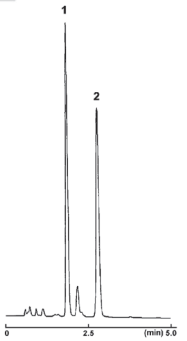
AP-1596

● Sweeteners

COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
Column size: 2.0mmI.D.-100mm
Mobile phase: Acetonitrile/ H_2O = 80/20
Flow rate: 0.4 ml/min
Temperature: 40°C
Detection: UV210nm

Sample: 1; Stevioside
2; Rebaudioside A



NACALAI TESQUE, INC

AP-1281

Ordering Information

● COSMOSIL HILIC Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
1.0×150	07869-11
1.0×250	07870-71
2.0× 30	08568-21
2.0× 50	07052-91
2.0×100	08569-11
2.0×150	07054-71
2.0×250	07489-91
3.0×150	07871-61
3.0×250	07872-51

I.D. x Length (mm)	Product Number
4.6×150※1	07056-51
4.6×150 3 Lots Set※1	09385-23
4.6×250※1	07057-41
10×150	05564-51
10×250	07059-21
20×250	07060-81
28×250	07875-21

※1 Columns for validation

Guard Column

I.D. x Length (mm)	Product Number
2.0×10	07569-41
4.6×10	07055-61
10×20	07058-31
20×20	07854-91
20×50	07873-41
28×50	07874-31

● COSMOSIL 2.5HILIC Analytical Columns (Particle Size: 2.5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0× 50	11766-21
2.0× 75	11768-01
2.0×100	11769-91

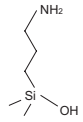
I.D. x Length (mm)	Product Number
2.0×150	11770-51
3.0× 50	11771-41
3.0× 75	11772-31

I.D. x Length (mm)	Product Number
3.0×100	11773-21
3.0×150	11774-11

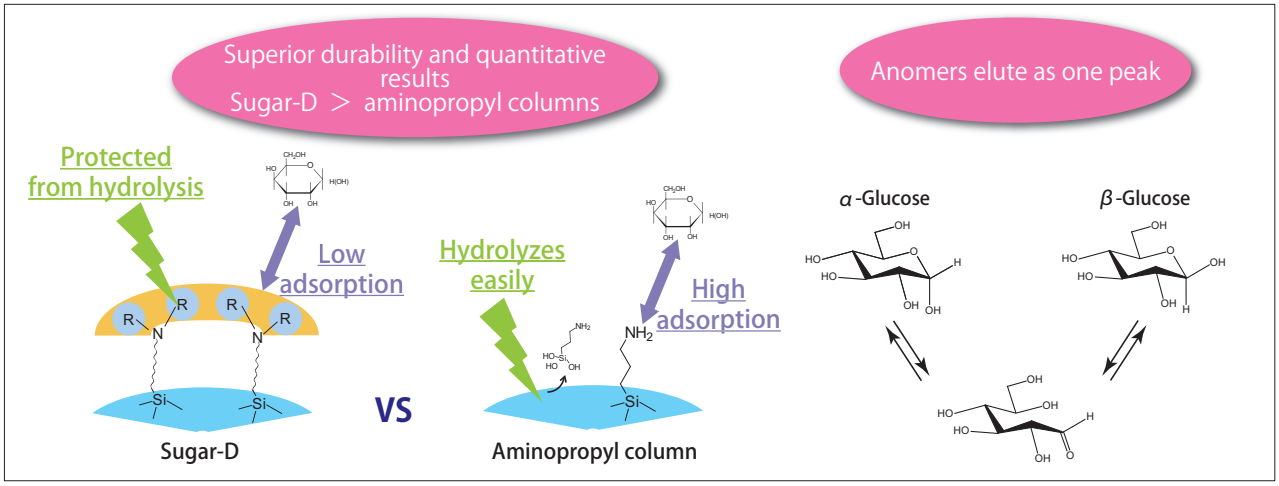
7. Mono- and Oligosaccharide Analysis Columns

Saccharides are not retained on standard C_{18} columns because of thier low hydrophobicity. COSMOSIL Sugar-D and NH_2-MS are specifically designed for separation of saccharides. COSMOSIL C_{18}-PAQ is recommended for hydrophobic glycosides and saccharide derivatives.

Specifications

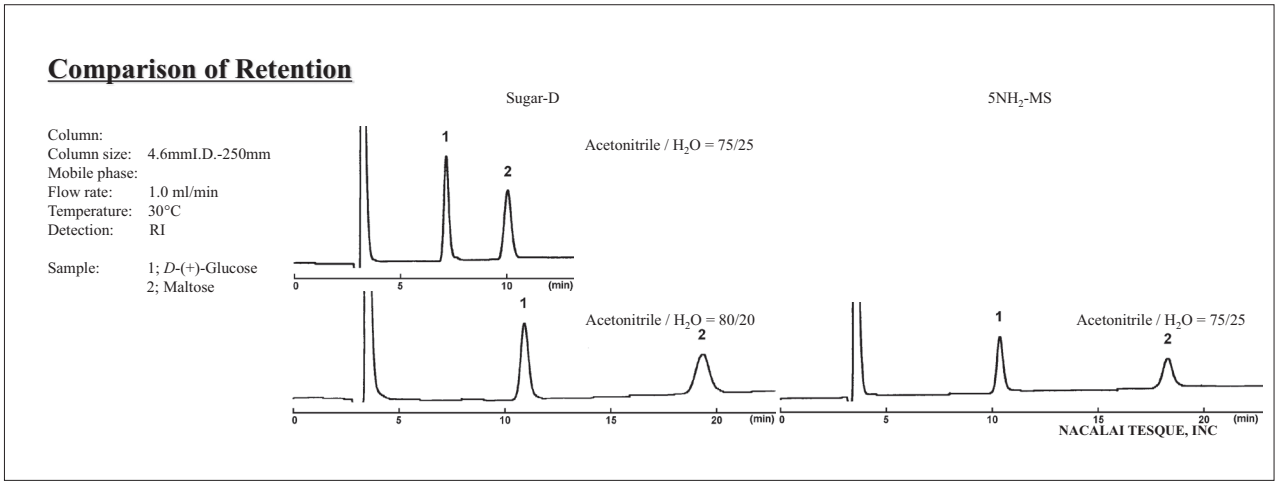
Packing Material	Sugar-D	NH_2-MS
Silica Gel	High purity porous spherical silica	
Average Particle Size	5 µm	
Average Pore Size	—	120 Å
Specific Surface Area	—	300 m^2/g
Bonded Phase Structure	—	
Bonded Phase	Polyamine	Aminopropyl group
Main Interaction	Hydrophilic interaction	
Features	• First choice for saccharide analysis • High durability • Good quantative analysis	• Different selectivity from Sugar-D

Features



Retention Comparison

Compared to conventional aminopropyl columns, Sugar-D exhibits slightly lower retention. When transferring methods from aminopropyl columns, increasing the organic solvent ratio by 5 to 10% should result in similar retention time.

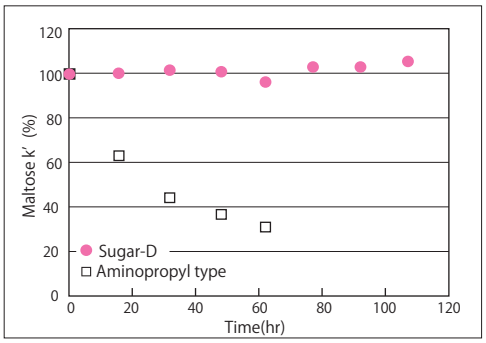


COSMOSIL Sugar-D

- Different selectivity from aminopropyl columns
- Superior durability compared to conventional amino columns
- Minimized undesirable adsorption

Comparison of Durability

The decrease of retention time was compared between COSMOSIL Sugar-D and conventional aminopropyl bonded stationary phase with a severe 100% water eluent between tests. The capacity factor of Sugar-D did not decrease.

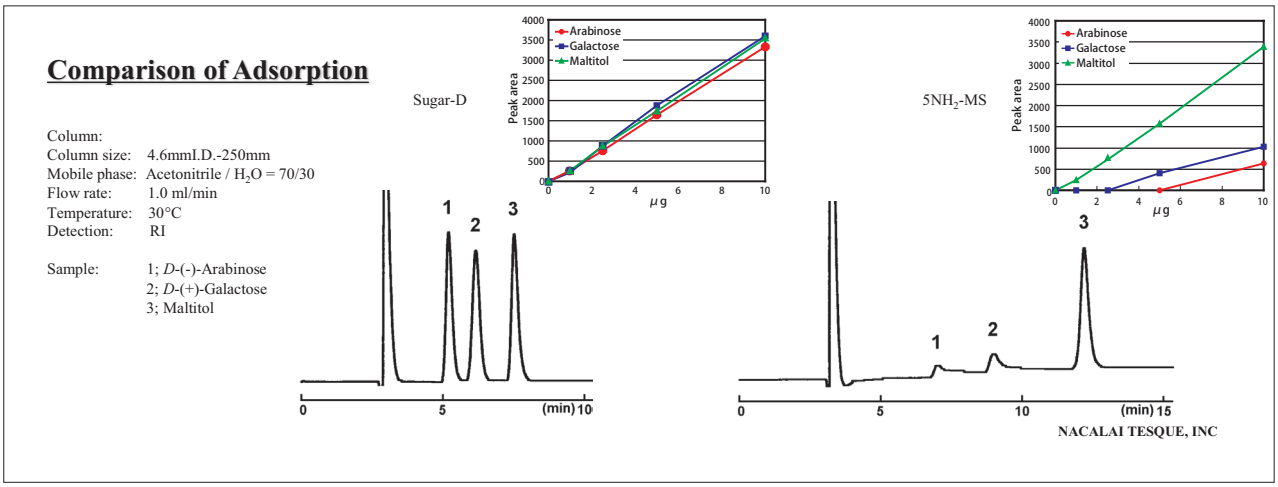


Decomposition Condition

Solution	Water
Flow Rate	1.0 mL/min
Temperarture	Room Temperature
Column	4.6 mmI.D.×250 mm
Moble Phase	Acetonitrile : Water=70 : 30
Flow Rate	1.0 mL/min
Temperature	30℃
Detection	RI
Sample	Maltose

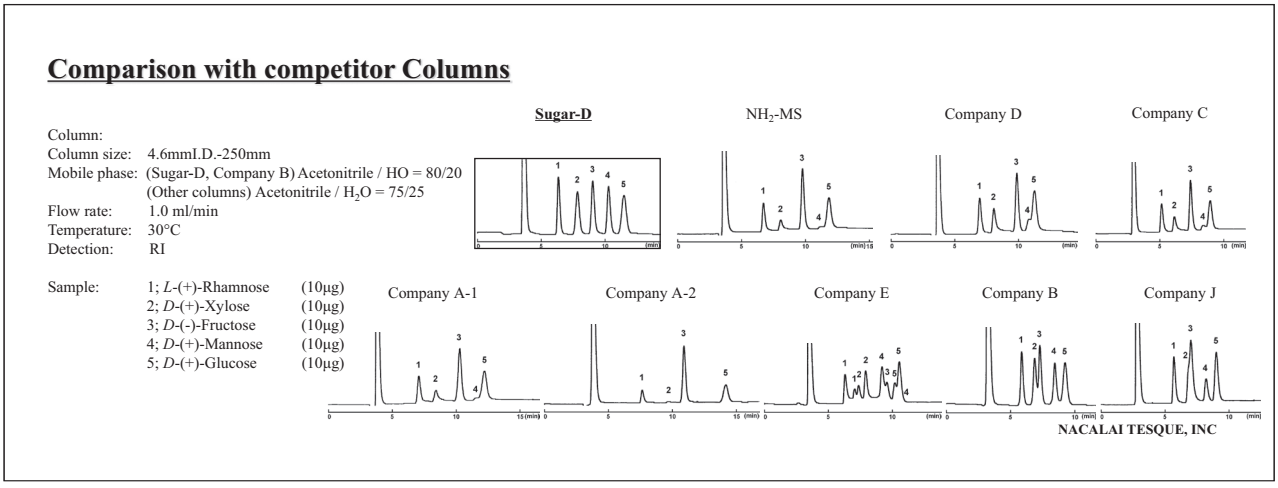
Comparison of Adsorption

Certain types of saccharides, such as arabinose or galactose, are partially or temporarily adsorbed on conventional aminopropyl stationary phases, causing tailing or no elution at all. COSMOSIL Sugar-D provides superior separation and high recovery for these saccharides.



Comparison to competitor columns

The separation and the adsorption of monosaccharides were compared using COSMOSIL Sugar-D and competitor columns. Separation of aldoses, which have an aldehyde group, is usually problematic with undesirable adsorption. COSMOSIL Sugar-D provides excellent separations for these saccharides.



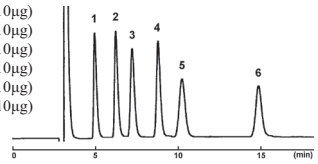
Applications

● Mono- and Oligosaccharides

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; *L*-(+)-Rhamnose (10µg)
2; *D*-(-)-Fructose (10µg)
3; *D*-(+)-Glucose (10µg)
4; Sucrose (10µg)
5; Maltose (10µg)
6; *D*-(+)- Raffinose (10µg)



NACALAI TESQUE, INC

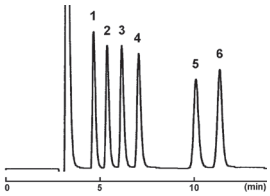
AP-0329

● Polyols

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 75/25
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; Glycerol (10µg)
2; *meso*-Erythritol
〔*meso*-Erythrite〕 (10µg)
3; Xylitol (10µg)
4; *D*-Glucitol (10µg)
5; Maltitol (10µg)
6; *myo*-Inositol (10µg)



NACALAI TESQUE, INC

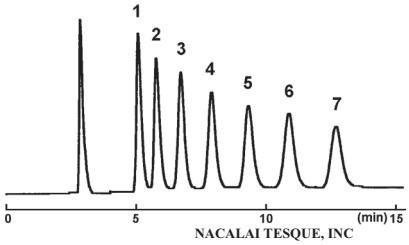
AP-0330

● Oligomaltoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 65/35
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample:
1; *D*-(+)-Glucose (10µg)
2; Maltose (10µg)
3; Maltotriose (10µg)
4; Maltotetraose (10µg)
5; Maltopentaose (10µg)
6; Maltohexaose (10µg)
7; Maltoheptaose (10µg)



NACALAI TESQUE, INC

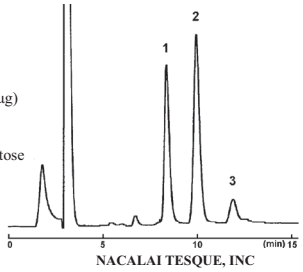
AP-0331

● Oligofructoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile / H_2O = 70/30
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Fructooligosaccharides (50µg)
1; *1*-Kestose
2; Nystose
3; *1*-Fructofuranosyl-*D*-nystose



NACALAI TESQUE, INC

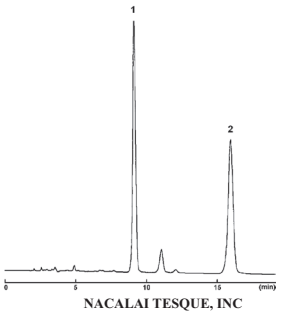
AP-0320

● Sweeteners

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 85/15
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV210nm

Sample: 1; Stevioside
2; Rebaudioside A



NACALAI TESQUE, INC

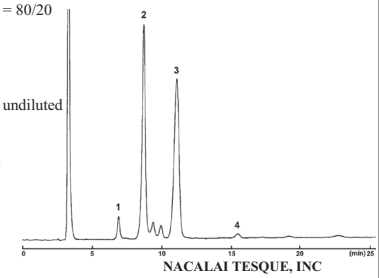
AP-1194

● Rare Sugar Soda

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
Column size: 4.6mmI.D.-250mm
Mobile phase: Acetonitrile/ H_2O = 80/20
Flow rate: 1.0 ml/min
Temperature: 30 °C
Detection: RI

Sample: Rare-Sugar Soda, undiluted
1; *D*-Psicose
2; *D*-(-)-Fructose
3; *D*-(+)-Glucose
4; Sucrose
Inj.Vol.: 2.0µl



NACALAI TESQUE, INC

AP-1436

Ordering Information

● COSMOSIL Sugar-D Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
2.0×150	05688-41
2.0×250	05689-31
3.0×150	05690-91
3.0×250	05691-81

I.D. x Length (mm)	Product Number
4.6×150	05395-71
4.6×250	05397-51
10×250	05692-71
20×250	05693-61

Guard Column

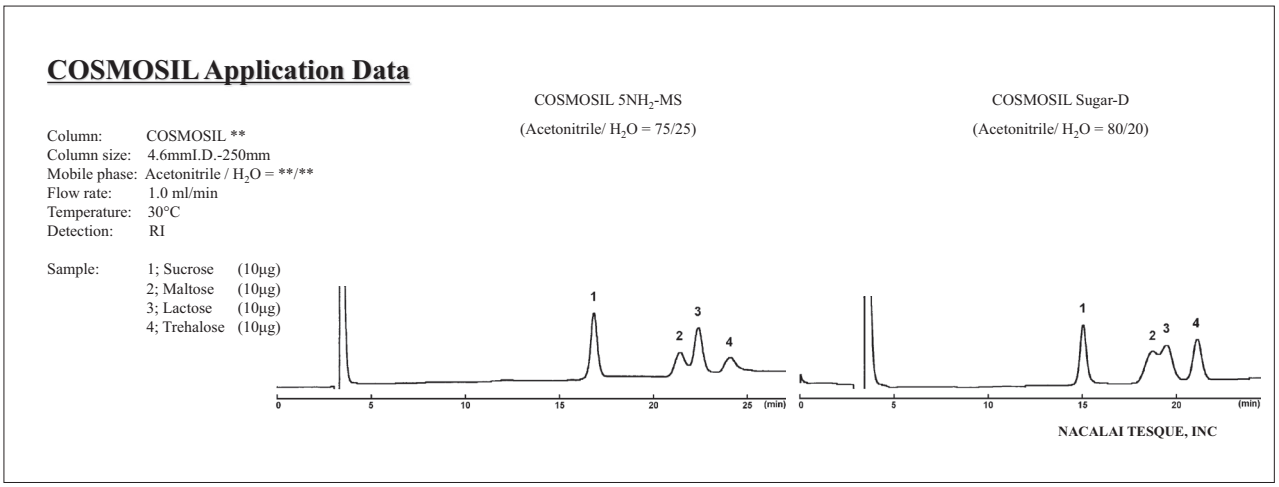
I.D. x Length (mm)	Product Number
4.6×10	05394-81
10×20	05696-31
20×50	05694-51

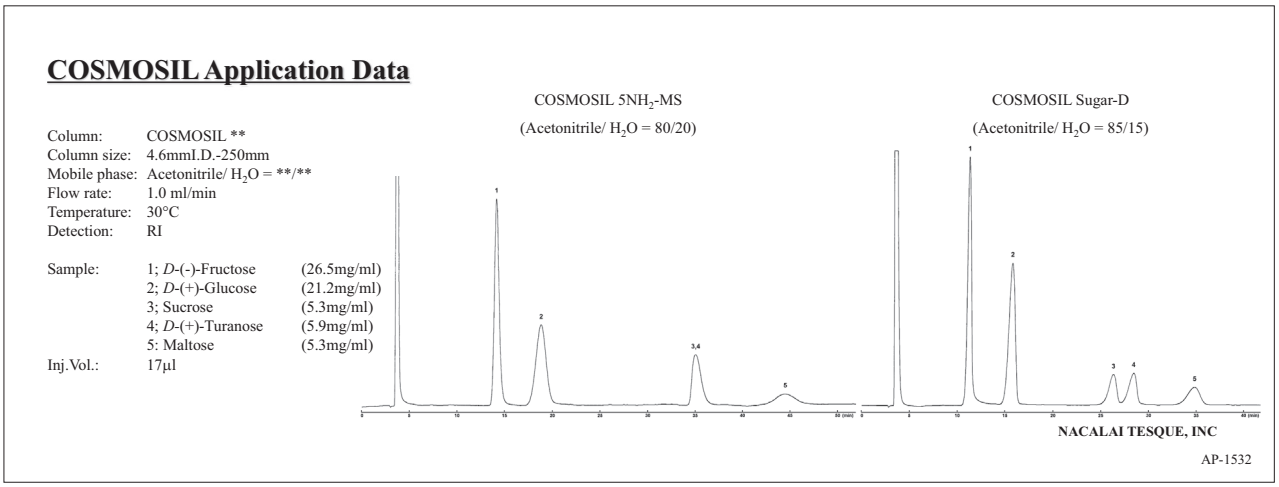
COSMOSIL NH_2-MS

- Aminopropyl-bonded stationary phase
- Different selectivity from Sugar-D

Comparison of Adsorption

COSMOSIL NH_2-MS offers better separation than COSMOSIL Sugar-D for some samples.





Ordering Information

● COSMOSIL 5NH_2-MS Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6×150	38245-11
4.6×250	38246-01

I.D. x Length (mm)	Product Number
10×250	38249-71
20×250	38250-31

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	38241-51
10×20	38242-41
20×50	06093-91

8. Protein Separation Columns

Protein Separation with HPLC

Analysis / purification method of proteins

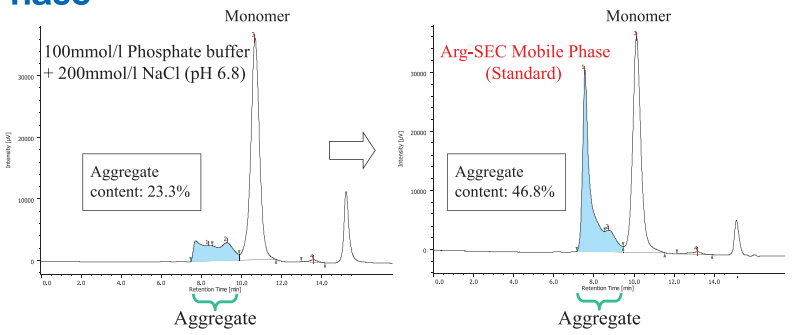
< Separation Mode >		< Packing Materials >
Reversed Phase	[Separation mechanism] Difference in hydrophobicity [Main applications] Protein analysis, Purification of peptides, *Proteins may become denatured.	**COSMOSIL Protein-R** ・Excellent separation ・High recovery rate ・Outstanding stability at low pH
Gel Filtration	[Separation mechanism] Size-based separation [Main applications] Purification of proteins, Elimination of low-M.W. compounds	**COSMOSIL Diol Series** ・Ideal for the size-based separation of proteins and water-soluble polymers ・Reduce undesirable adsorption
Ion Exchange	[Separation mechanism] Difference in surface charge [Main applications] Analysis and purification of proteins	**COSMOGEL IEX Series** ・Anion-exchange type, Cation-exchange type, Amphoteric ion-exchange type ・For Purification, for Ultra-fast analysis, for Precise analysis
Hydrophobic Chromatography	[Separation mechanism] Difference in hydrophobicity [Main applications] Purification of proteins, *Unlike reversed-phase, proteins are not likely to become denatured.	**COSMOSIL HIC** ・Separate based on differences in hydrophobicity ・Little loss in enzyme activity and the tertiary structure of proteins

Arginine Mobile Phase / Arginine Buffer for Protein Purification

Mobile Phase for Size-Exclusion Chromatography

Arg-SEC Mobile Phase

- Increased recovery of proteins and peptides that are more hydrophobic and have stronger tendency to stick to the columns.
- Effective separation of protein conjugates, e.g., ADC and sticky cytokines.



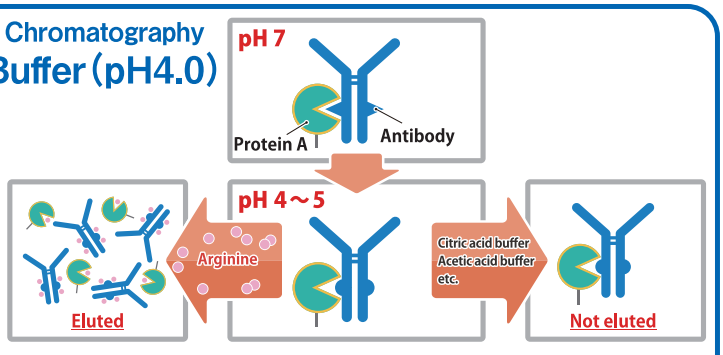
This product is manufactured with permission from Ajinomoto Co., Inc. based on the patent JP 4941882.*2

*1 Arginine is effective in suppressing non-specific molecular interactions. *2 JP: 4941882, US: 7501495, EP: 1698637

Elution Buffer for Protein Affinity Chromatography

Arg-Antibody Elution Buffer (pH4.0)

- Enables effective elution of antibodies from protein A column, reducing potential risk of acid denaturation and resultant aggregation.



This product is manufactured with permission from Ajinomoto Co., Inc. based on the patent JP 4826995*.

*JP: 4826995, US: 8084032, 8435527, 2012-0264918, EP: 1568710, CN: 1680426

For ordering information, please refer to page 75.

Reversed Phase Columns

COSMOSIL Protein-R

- Excellent separation
- High recovery rate
- Outstanding stability at low pH

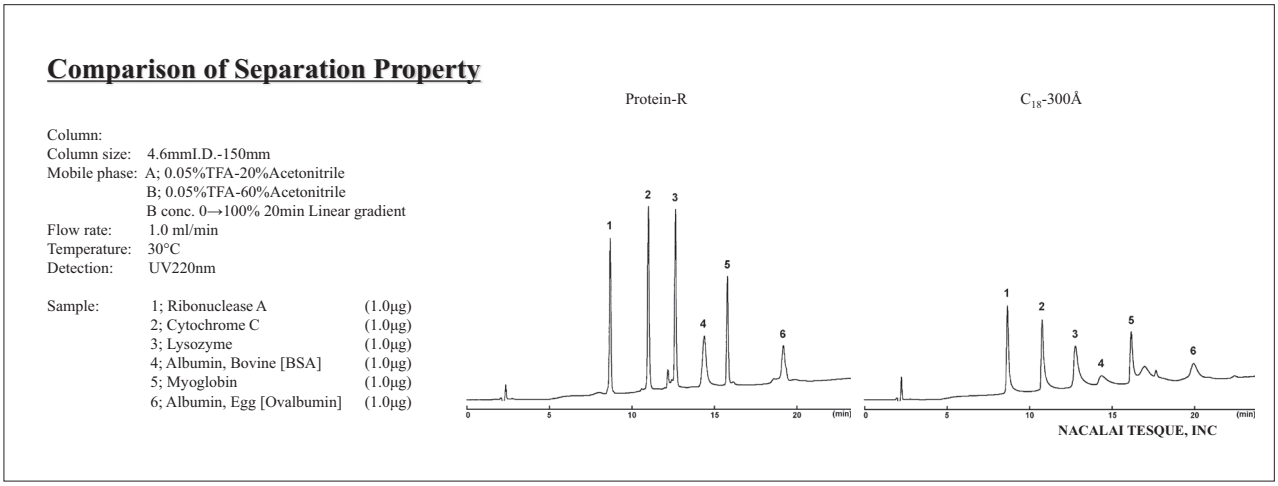
Specifications

Packing Material	Protein-R
Silica Gel	High purity porous spherical silica
Average Particle Size	5 µm
Average Pore Size	300 Å
Specific Surface Area	150 m^2/g
Bonded Phase	Octadecyl group
Bonding Type	Polymeric
Main Interaction	Hydrophobic interaction
End-Capping Treatment	Near-perfect treatment
Usable pH Range	1.5 ～ 7.5※
Features	• High recovery rate • Acid-resistance

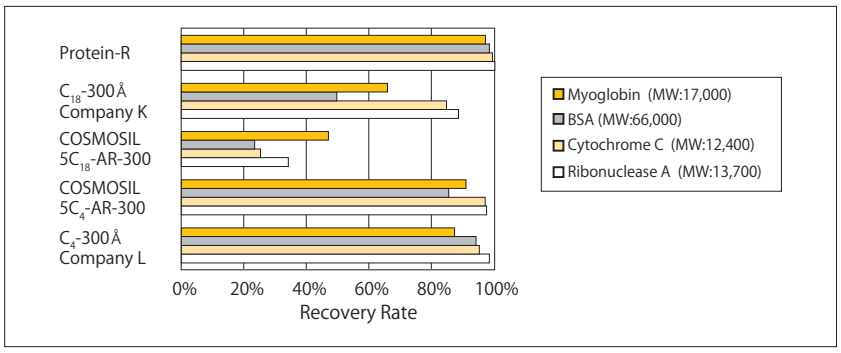
※Optimal pH range of silica-based columns is between 2 and 7.5. Extreme pH may significantly decrease column lifetime.

Comparison of Separation

COSMOSIL Protein-R shows sharper peaks for proteins than conventional C_{18} wide pore columns.



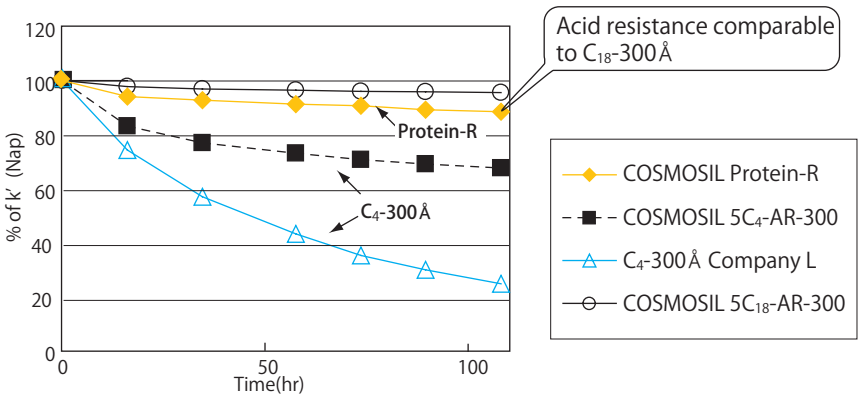
Comparison of Recovery Rate



The figure below shows recovery rates for proteins using different columns. Protein-R shows a higher recovery rate than C_4-300 and a much higher recovery rate than C_{18}-300.

Comparison of durability against acidic mobile phase

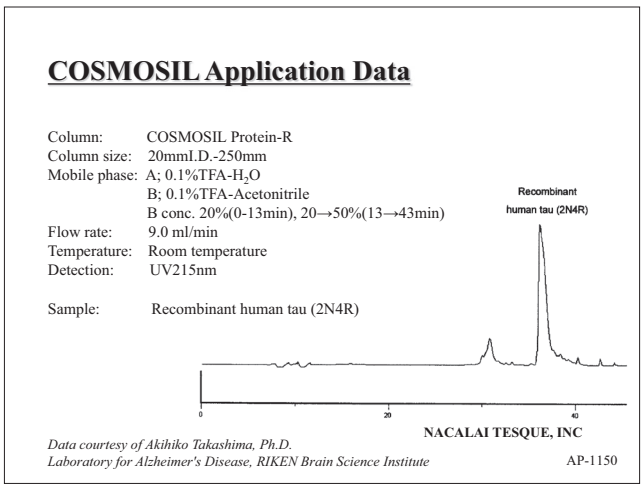
The figure below shows durability against acidic mobile phase of various columns. Protein-R shows a higher acid durability than C_4-300.



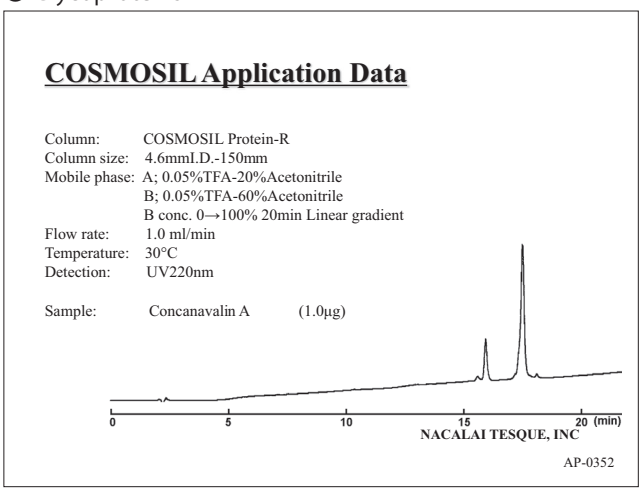
Degradation test with 0.1% Trifluoroacetic Acid at 60℃
(k') : Naphthalene in the mobile phase (methanol : water = 50 : 50)

Applications

● Tau Protein



● Glycoproteins



Ordering Information

● COSMOSIL Protein-R Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0×150	06514-71
4.6× 50	06525-31
4.6×150	06526-21
4.6×250	06527-11

I.D. x Length (mm)	Product Number
10×150	06529-91
10×250	06530-51
20×150	06531-41
20×250	06532-31

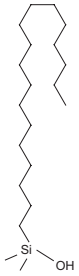
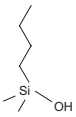
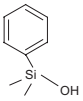
Guard Column

I.D. x Length (mm)	Product Number
4.6×10	06518-31
10×20	06528-01
20×20	08692-81

COSMOSIL C_{18}-AR-300, C_8-AR-300, C_4-AR-300, Ph-AR-300

- Wide-pore reversed-phase columns
- 4 types of phases (octadecyl, octyl, butyl and phenyl)

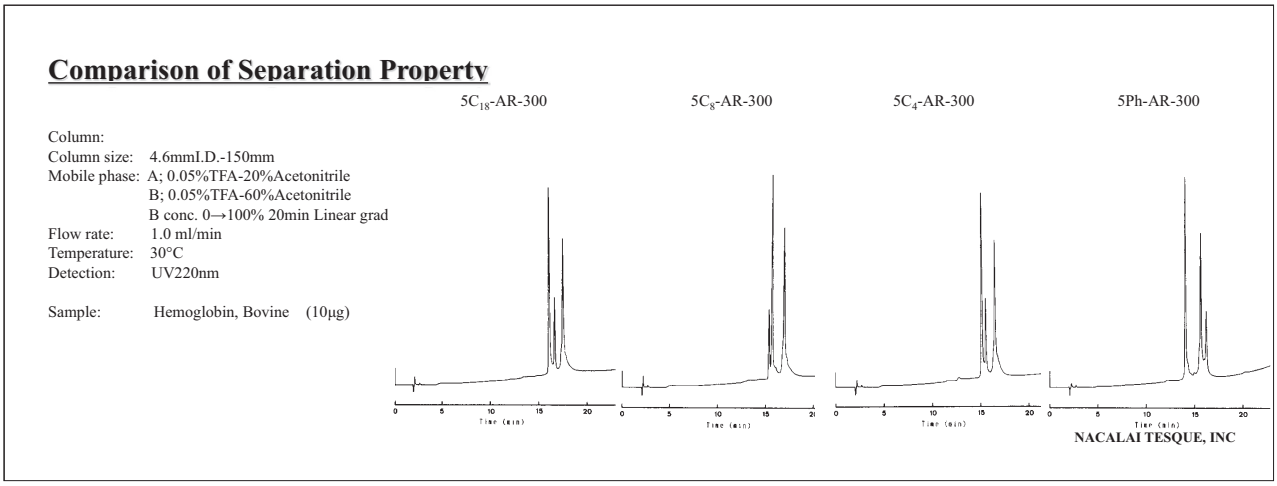
Specifications

Packing Material	C_{18}-AR-300	C_8-AR-300	C_4-AR-300	Ph-AR-300
Silica Gel	High purity porous spherical silica			
Average Particle Size	5 µm			
Average Pore Size	300 Å			
Specific Surface Area	150 m^2/g			
Bonded Phase Structure				
Bonded Phase	Octadecyl group	Octyl group	Butyl group	Phenyl group
Bonding Type	Polymeric			
Main Interaction	Hydrophobic interaction			Hydrophobic interaction π-π interaction
End-Capping	Near-perfect treatment			
Usable pH Range	1.5 ~ 7.5※			
Carbon Content	12%	7%	6%	7%

※Optimal pH range of silica-based columns is between 2 and 7.5. Extreme pH may significantly decrease column lifetime.

Comparison of Separation

COSMOSIL AR-300 packed column series offers 3 types of alkyl phases and a phenyl phase.



Ordering Information

● COSMOSIL 5C_{18}-AR-300 Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	37911-01
4.6×150	37913-81
4.6×250	37914-71

I.D. x Length (mm)	Product Number
10×150	37917-41
10×250	37918-31
20×150	37919-21
20×250	37920-81

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37910-11
10×20	37965-11

● COSMOSIL 5C_8-AR-300 Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	37951-81
4.6×150	37953-61
4.6×250	37954-51

I.D. x Length (mm)	Product Number
10×150	34345-21
10×250	34247-11
20×150	05861-51
20×250	34364-71

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37950-91
10×20	34464-61

● COSMOSIL 5C_4-AR-300 Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	37956-31
4.6×150	37958-11
4.6×250	37959-01

I.D. x Length (mm)	Product Number
10×150	34249-91
10×250	38047-11
20×150	34477-01
20×250	38048-01

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37955-41
10×20	05862-41

● COSMOSIL 5Ph-AR-300 Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	37961-51
4.6×150	37963-31
4.6×250	37964-21

I.D. x Length (mm)	Product Number
10×150	05865-11
10×250	34267-51
20×150	05866-01
20×250	34468-21

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37960-61
10×20	34268-41

Gel Filtration Columns (Aqueous)

COSMOSIL Diol-120-II, Diol-300-II, Diol-1000-II

- Ideal for the size-based separation of proteins and water-soluble polymers
- Reduce undesirable adsorption

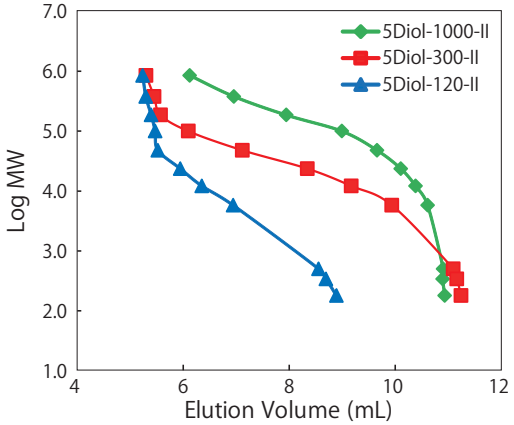
Specifications

Packing Material	Diol-120-II	Diol-300-II	Diol-1000-II
Silica Gel	High purity porous spherical silica(1)		
Average Particle Size	5 µm		
Average Pore Size	120 Å	300 Å	1,000 Å (2)
Bonded Phase	Diol group		
Flow Rate (mL/min)	0.5 ~ 1.0		
Pressure	20 MPa or less		15 MPa or less
Sample MW (Protein)	5,000 ~ 100,000	10,000 ~ 700,000	—
Sample MW (Water-Soluble Polymers)	1,000 ~ 20,000	5,000 ~ 100,000	50,000 ~ 500,000

(1) With the silica-based gel, organic solvents, including methanol and acetonitrile, can be used.
(2) If you require pore sizes greater than 1000 Å , please contact us.

Calibration Curve

- Linear Pullulan Calibration Curve

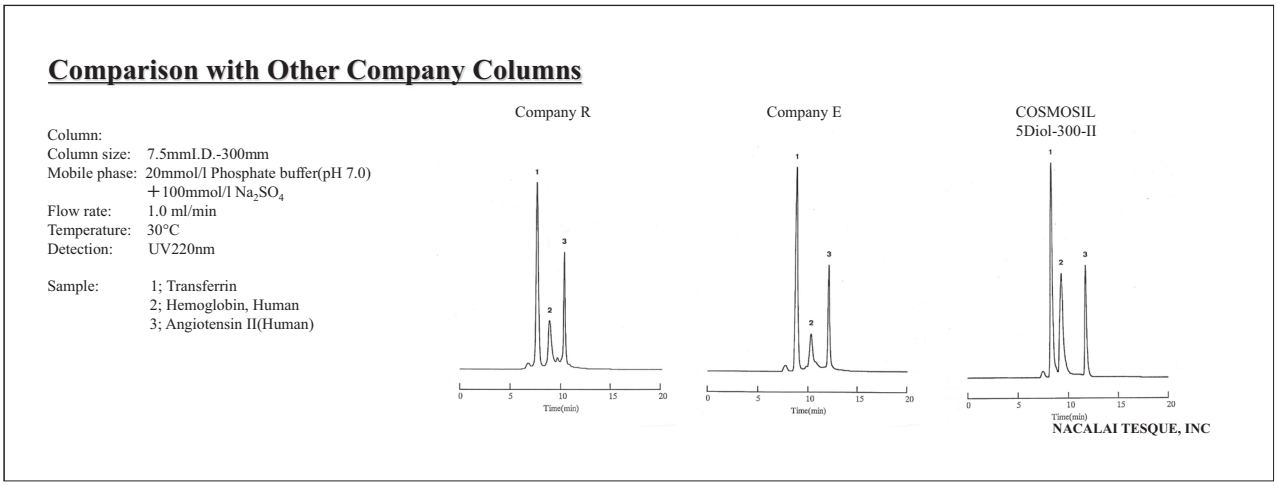


Column	COSMOSIL 5Diol-II (7.5 mmI.D. × 300 mm)
Mobile Phase	Water
Flow Rate	1.0 mL/min
Temperature	30°C
Detection	RI
Sample	Linear Pullulan

Sample	M.W.
1; P-800	853,000
2; P-400	380,000
3; P-200	186,000
4; P-100	100,000
5; P-50	48,000
6; P-20	23,700
7; P-10	12,200
8; P-5	5,800
9; Maltotriose	504
10; Maltose	342
11; Glucose	180

Comparison with Other Companies' Columns

COSMOSIL Diol-II demonstrates high performance compared to other companies' columns.



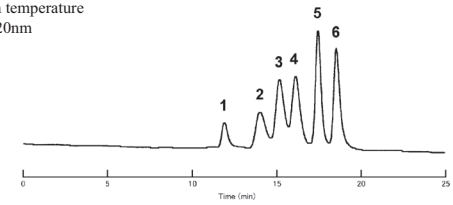
Applications

● Proteins

COSMOSIL Application Data

Column: COSMOSIL 5Diol-300-II
Column size: 7.5mmI.D.-600mm
Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
＋100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: Room temperature
Detection: UV220nm

Sample:
1; Thyroglobulin
2; Glucose Oxidase
3; Conalbumin
4; Peroxidase
5; Myoglobin
6; Aprotinin



NACALAI TESQUE, INC

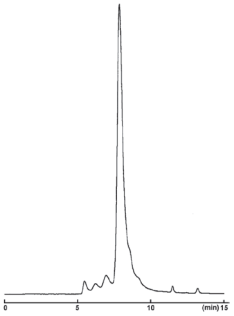
AP-0391

● Anti-IgG(H+L), Mouse, Goat-Poly

COSMOSIL Application Data

Column: COSMOSIL 5Diol-300-II
Column size: 7.5mmI.D.-300mm
Mobile phase: 20mmol/l Phosphate buffer(pH7.0),
100mmol/l Na_2SO_4
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: Anti-IgG(H+L), Mouse, Goat-Poly,
Unlabeled, Serum (10mg/ml)
Inj.Vol.: 2µl



NACALAI TESQUE, INC

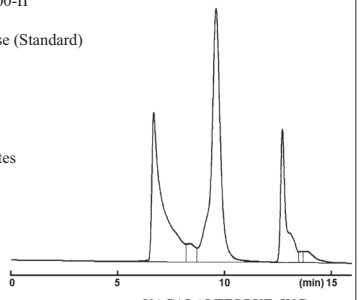
AP-1477

● Mouse IgG1, with aggregates

COSMOSIL Application Data

Column: COSMOSIL 5Diol-300-II
Column size: 7.5mmI.D.-300mm
Mobile phase: Arg-SEC mobile phase (Standard)
(#17000-51)
Flow rate: 0.8 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: mIgG1, with aggregates
Injection Vol. 10µl



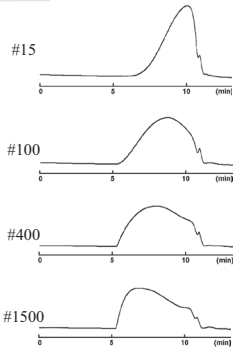
NACALAI TESQUE, INC

● Methyl Cellulose

COSMOSIL Application Data

Column: COSMOSIL 5Diol-1000-II
Column size: 7.5mmI.D.-300mm
Mobile phase: H_2O
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: RI

Sample: Methyl Cellulose (5mg/ml)
Inj.Vol.: 20µl



NACALAI TESQUE, INC

AP-1449

Ordering Information

● COSMOSIL 5Diol-120-II Analytical Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
7.5×300	38050-51
7.5×600	38051-41

Guard Column

I.D. x Length (mm)	Product Number
7.5×50	38049-91

● COSMOSIL 5Diol-300-II Analytical Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
7.5×300	38053-21
7.5×600	38054-11

Guard Column

I.D. x Length (mm)	Product Number
7.5×50	38052-31

● COSMOSIL 5Diol-1000-II Analytical Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
7.5×300	13338-71

Guard Column

I.D. x Length (mm)	Product Number
7.5×50	13337-81

Ion Exchange Columns

COSMOGEL IEX Series

- Available in 3 different ion-exchange modes (Anion-exchange type, Cation-exchange type, Amphoteric ion-exchange type)
- Available for 3 different application areas (for Purification, for Ultra-fast analysis, for Precise analysis)
- For separation of biopolymers such as proteins or nucleic acids

Specifications

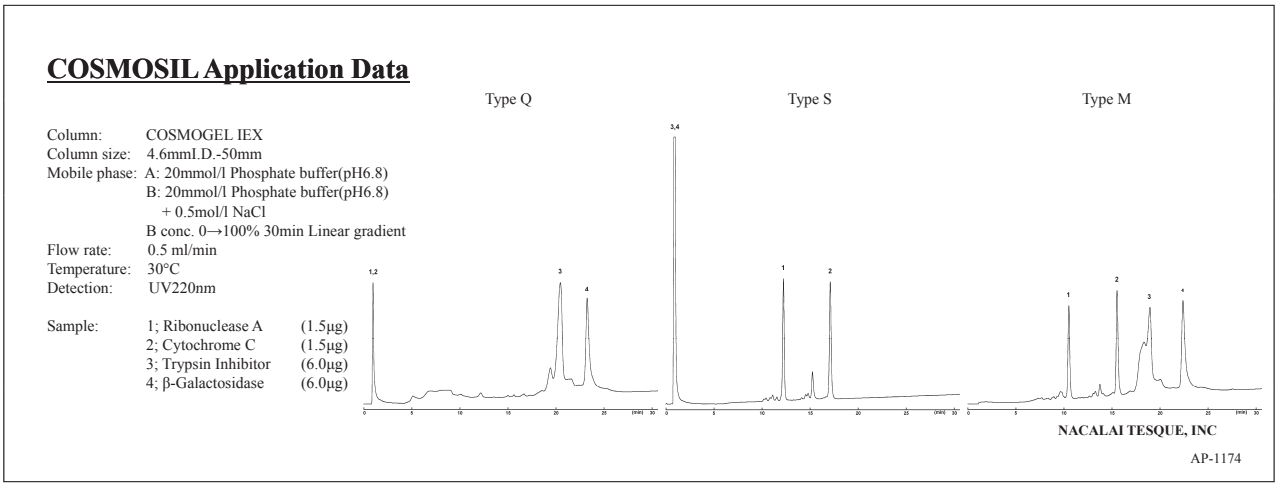
Packing Material	Type Q	Type Q-N	Type S	Type S-N	Type M	Type M-N
Gel / Average Particle Size	Hydrophilic polymer / 5 µm					
Average Pore Size	1,000 Å	Non-porous	1,000 Å	Non-porous	1,000 Å	Non-porous
Functional Group	$-CH_3N^+(CH_3)_3$		$-(CH_2)_3SO_3^-$		$-CH_3N^+(CH_3)_3$ + $-(CH_2)_3SO_3^-$	
Protein Binding Capacity (mg/mL)	110 ～ 150	12 ～ 20	70 ～ 100	10 ～ 18	55 ～ 75(BSA) 35 ～ 50(IgG)	6 ～ 10(BSA)/ 5 ～ 9(IgG)/
	BSA/mL-resin		human IgG/mL-resin			
Column Size I.D. x Length (mm)	4.6 x 50	4.6 x 30 / 4.6 x 100	4.6 x 50	4.6 x 30 4.6 x 100	4.6 x 50	4.6 x 100
Usable pH Range	2 ～ 12					
Column Material	PEEK					
Connection	Waters type					

Type of Packing Material

COSMOGEL IEX Series are available in amphoteric ion-exchange type in which two kinds of packing materials are mixed, as well as in widely used anion-exchange type and cation-exchange type.

Type of Packing Material	Target Sample	Average Pore Size	
		Porous (1,000 Å)	Non-porous
Anion-Exchange Type	Acidic proteins / DNA	Type Q	Type Q-N
Cation-Exchange Type	Basic proteins	Type S	Type S-N
Amphoteric Ion-Exchange Type	All proteins	Type M	Type M-N

● Comprehensive Isolation of Proteins by Amphoteric Ion-exchange Type (Type M)
The amphoteric ion-exchange type enables the simultaneous separation of both acidic and basic proteins in one application.



Type of Column

COSMOGEL IEX Series are available for 3 types of applications.

Application	Pore Size	Column Size I.D. x Length (mm)	Column		
For Purification	Porous (1,000 Å)	4.6 x 50	Type Q	Type S	Type M
For Precise Analysis	Non-porous	4.6 x 100	Type Q-N	Type S-N	Type M-N
For Ultra-Fast Analysis	Non-porous	4.6 x 30	Type Q-N	Type S-N	—

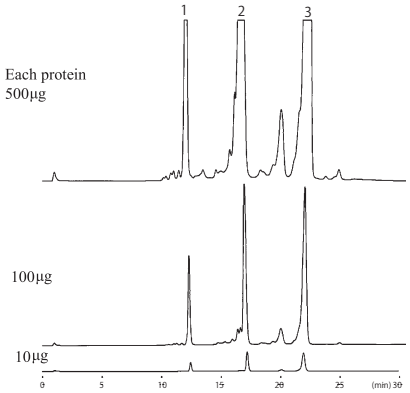
● For Purification: Type Q, Type S, Type M

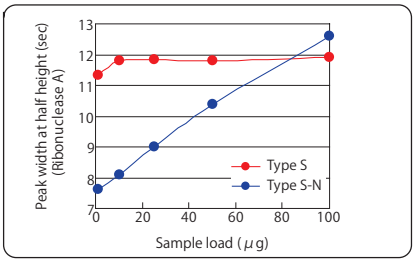
Type Q, Type S and Type M with porous packing materials have higher binding capacity of proteins than the respective non-porous type, which means that peak shape does not spread even with injection of a large volume of sample. Therefore they are highly suitable for purification of large sample.

COSMOSIL Application Data

Column: COSMOGEL IEX Type S
Column size: 4.6mmI.D.-50mm
Mobile phase: A: 20mmol/l Phosphate buffer(pH6.8)
B: 20mmol/l Phosphate buffer(pH6.8) + 0.5mol/l NaCl
B conc. 0→100% 30min Linear gradient
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV280nm

Sample: 1; Ribonuclease A
2; Cytochrome C
3; Lysozyme





NACALAI TESQUE, INC
AP-1185

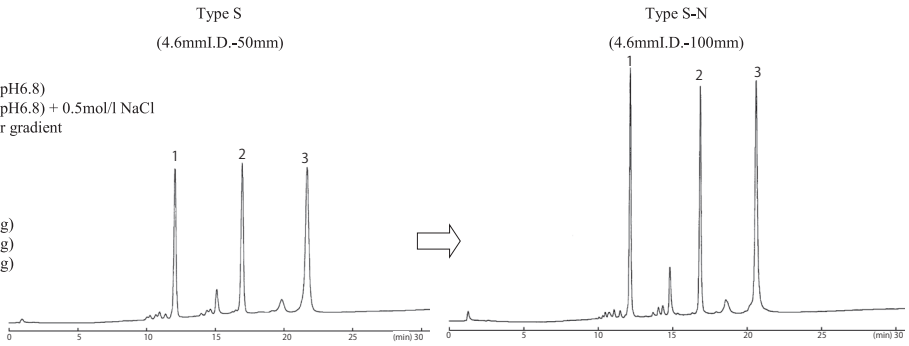
● For Precise Analysis: Type Q-N, Type S-N, Type M-N

Type Q-N, Type S-N, Type M-N with non-porous packing materials reduce spreading of samples in packing materials, result in high resolution separation for precise analysis such as quality control of antibody drugs. The longer column length also contributes to the sharper peaks.

COSMOSIL Application Data

Column: COSMOGEL IEX
Column size:
Mobile phase: A: 20mmol/l Phosphate buffer(pH6.8)
B: 20mmol/l Phosphate buffer(pH6.8) + 0.5mol/l NaCl
B conc. 0→100% 30min Linear gradient
Flow rate: 0.5 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Ribonuclease A (1.65µg)
2; Cytochrome C (1.65µg)
3; Lysozyme (1.65µg)



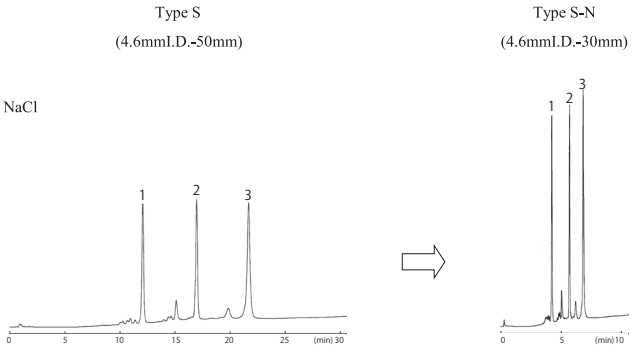
● For Ultra-fast Analysis: Type Q-N, Type S-N

The resolution with non-porous packing materials is not much affected by high flow rate and thus the materials are suitable for fast analysis. The shorter column length contributes to the fast analysis.

COSMOSIL Application Data

Column: COSMOGEL IEX
Column size:
Mobile phase: A: 20mmol/l Phosphate buffer(pH6.8)
B: 20mmol/l Phosphate buffer(pH6.8) + 0.5mol/l NaCl
B conc. 0→100% Linear gradient
Type S: 30min Type S-N: 10min
Flow rate: Type S: 0.5 ml/min Type S-N: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: 1; Ribonuclease A (1.65µg)
2; Cytochrome C (1.65µg)
3; Lysozyme (1.65µg)



Ordering Information

● COSMOGEL IEX Analytical Columns (Particle Size: 5 µm)

Packed Column

Type of Packing Material	Product Name	Application	I.D. x Length (mm)	Product Number
Anion-Exchange Type	COSMOGEL IEX Type Q	For Purification	4.6× 50	06266-31
	COSMOGEL IEX Type Q-N	For Ultra-Fast Analysis	4.6× 30	06264-51
	COSMOGEL IEX Type Q-N	For Precise Analysis	4.6×100	06258-41
Cation-Exchange Type	COSMOGEL IEX Type S	For Purification	4.6× 50	06252-01
	COSMOGEL IEX Type S-N	For Ultra-Fast Analysis	4.6× 30	06251-11
	COSMOGEL IEX Type S-N	For Precise Analysis	4.6×100	06250-21
Amphoteric Ion-Exchange Type	COSMOGEL IEX Type M	For Purification	4.6× 50	06248-71
	COSMOGEL IEX Type M-N	For Precise Analysis	4.6×100	06244-11

Hydrophobic Interaction Columns

COSMOSIL HIC

● Separate based on differences in hydrophobicity
● Little loss in enzyme activity and the tertiary structure of proteins

Specifications

Packing Material	HIC
Silica Gel	High purity porous spherical silica
Average Particle Size	5 µm
Average Pore Size	300 Å
Specific Surface Area	150 m^2/g
Main Interaction	Hydrophobic interaction

Applications

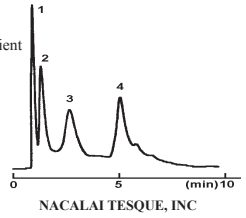
A buffer with high salt concentration, usually 1-2 mol/L of $(NH_4)_2SO_4$, is used as an initial mobile phase for adsorption of samples to a weakly hydrophobic stationary phase. The elution is done with a decreasing salt gradient. The application in lower left shows myoglobin elutes first than BSA under the buffer with high salt concentration, suggesting that myoglobin is less hydrophobic than BSA.

● Separation of Protein Standards

COSMOSIL Application Data

Column: HIC
Column size: 4.6mmI.D.-50mm
Mobile phase: A:20mmol/l Phosphate Buffer
+100mmol/l Na_2SO_4
+1.5mol/l $(NH_4)_2SO_4$(pH6.7)
B:20mmol/l Phosphate Buffer
+100mmol/l Na_2SO_4(pH6.7)
B conc. 0→100% 10min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample:
1; Myoglobin (1.0µg)
2; β-Lactoglobulin (2.0µg)
3; Hemoglobin, Bovine (5.0µg)
4; Albumin, Bovine [BSA] (2.0µg)



NACALAI TESQUE, INC

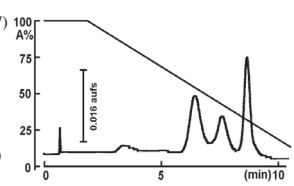
AP-0406

● Separation of Crude β-Glucosidase

COSMOSIL Application Data

Column: HIC
Column size: 4.6mmI.D.-50mm
Mobile phase: A:20mmol/l Phosphate Buffer
+100mmol/l Na_2SO_4
+2mol/l $(NH_4)_2SO_4$(pH6.7)
B:20mmol/l Phosphate Buffer
+100mmol/l Na_2SO_4(pH6.7)
B conc. 0→100% 10min
Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV220nm

Sample: β-Glucosidase (15µg)



NACALAI TESQUE, INC

AP-0407

Ordering Information

● COSMOSIL 5HIC Analytical Columns (Particle Size: 5 µm)

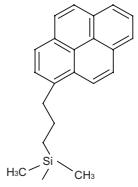
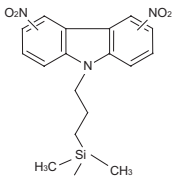
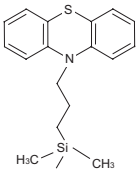
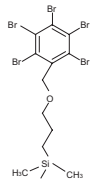
Packed Column

I.D. x Length (mm)	Product Number
4.6×50	04263-21

9. Fullerene Separation Columns

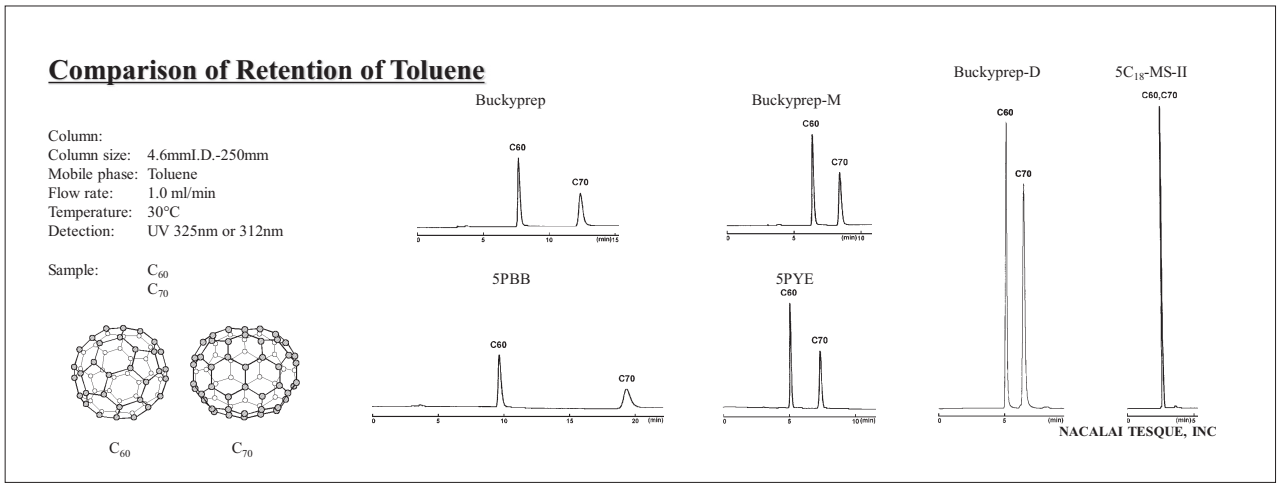
Separation of fullerenes, especially preparative scale separation, on conventional HPLC columns are always problematic due to the low solubility and low recovery rate of fullerenes. COSMOSIL offers a variety of columns designed for preparative scale separation of fullerenes including higher fullerenes, metallofullerenes and fullerene derivatives.

Specifications

Packing Material	Buckyprep	Buckyprep-D	Buckyprep-M	PBB
Silica Gel	High purity porous spherical silica			
Average Particle Size	5 µm			
Average Pore Size	120 Å			
Specific Surface Area	300 m^2/g			
Bonded Phase Structure				
Bonded Phase	Pyrenylpropyl group	Nitro-carbazoyl group	Phenothiazinyl group	Pentabromobenzyl group
Bonding Type	Monomeric			
End-Capping Treatment	Near-perfect treatment		None	Near-perfect treatment
Carbon Content	17%	—	13%	8%
Features	• Standard column for fullerenes separation	• Separation of fullerene derivatives	• Designed to separate metallofullerenes	• Designed for preparative separation of C_{60}, C_{70}.

Comparison of Retention

The figure below shows the retention time of C_{60} and C_{70} in toluene. Buckyprep, Buckyprep-M and PBB, and PYE nicely separate C_{60} and C_{70}. On the other hand, C_{18} cannot separate them in toluene.



Suggested Solvents for Fullerene Separation

Solvent	Features	Solubility of C_{60}(mg/mL)
Toluene	The most commonly used solvent	3.2
n-Hexane	Weaker eluent than toluene. Recommended for weakly retained fullerenes.	0.046
n-Heptane		—
Methanol		0.001
2-Propanol		—

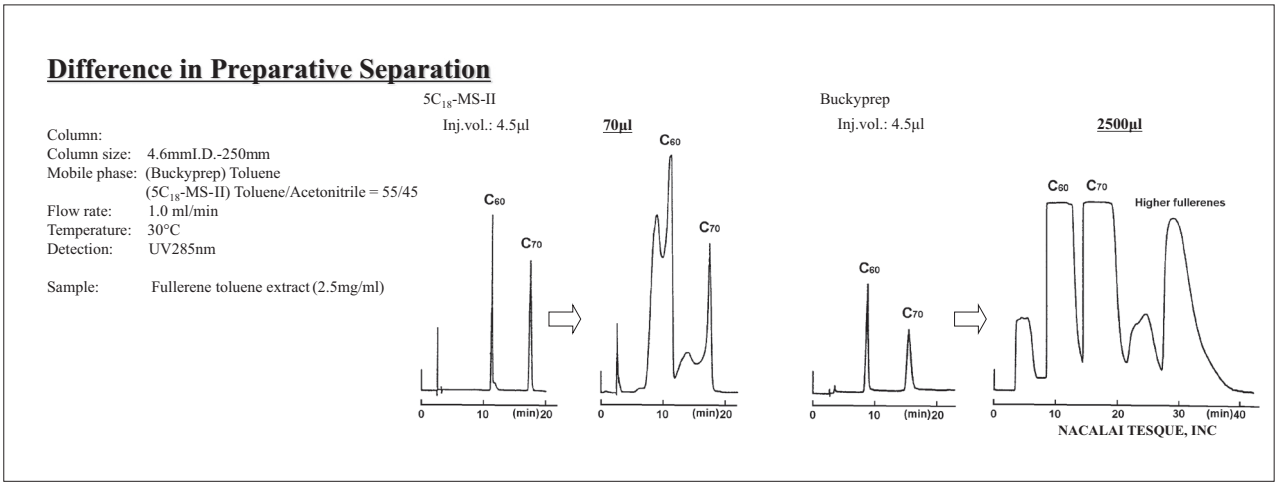
Solvent	Features	Solubility of C_{60}(mg/mL)
Acetonitrile	Weaker eluent than toluene. Recommended as a washing solvent Buckyprep-D	0.018
Chlorobenzene	Stronger eluent than toluene. Recommended for higher fullerenes	7.0
o-Dichlorobenzene	Stronger eluent than chlorobenzene	27
1,2,4-Trichlorobenzene	The strongest elution effect. Recommended as a washing solvent.	21.3

COSMOSIL Buckyprep

- Standard column for fullerene separation
- Excellent separation for higher and derivatized fullerenes

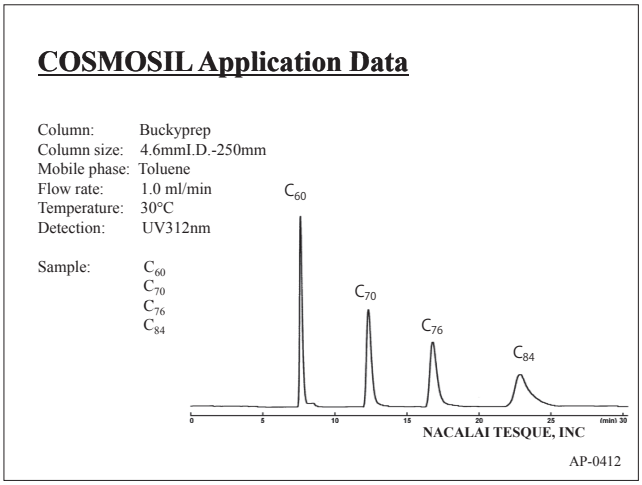
Difference in Preparative Separation

COSMOSIL Buckyprep can be used with toluene, the most commonly-used solvent in fullerene separation. Because tailing does not occur, you can inject about 35 times more sample, 2,500 µL (6.25 mg), than with a C_{18} column.

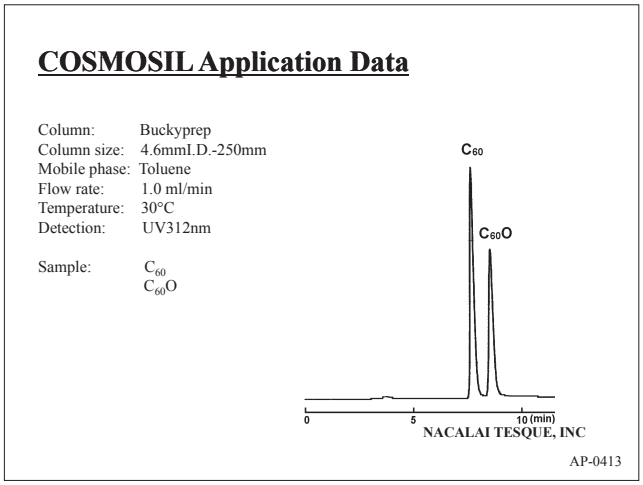


Applications

- Higher Fullerenes



- Oxidized Fullerenes



Ordering Information

- COSMOSIL Buckyprep Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
4.6×250	37977-61
10×250	37981-91
20×250	37982-81
28×250	34346-11

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37983-71
10×20	37984-61
20×50	34374-41
28×50	05871-21

COSMOSIL Buckyprep-D

- For preparative separation of derivatized fullerenes
- For separation of derivatized fullerenes such as C_{60} indene used for organic thin-film solar cell

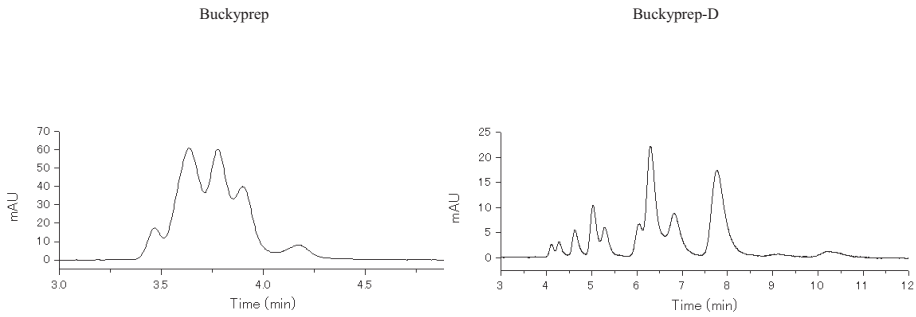
Applications

Buckyprep-D offers improved separation for C_{60} indene, a derivatized fullerene, that has received much attention as an n-type semiconductor material for organic thin-film solar cells.

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: Toluene
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV 325nm

Sample: C_{60} [Indene]$_2$ (1.0mg/ml)
Inj.Vol.: 1.0µl



Data courtesy of Yusuke Tajima, Dr. Sci.
Organic Optoelectronics Laboratory, RIKEN (Institute of Physics and Chemistry)

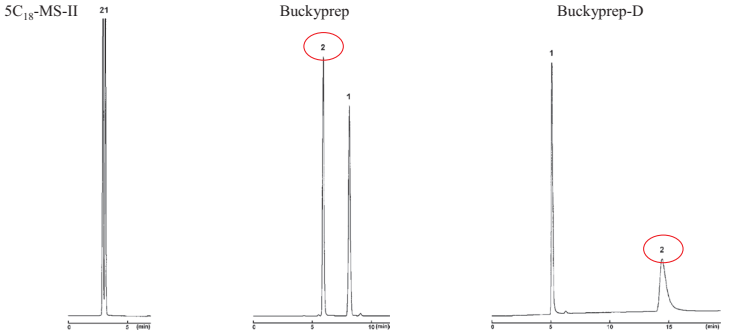
NACALAI TESQUE, INC
AP-1234

Buckyprep-D retains derivatized fullerenes longer than C_{60}. Therefore it is more suitable for preparative separation of derivatized fullerenes than our conventional Buckyprep column.

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: Toluene
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV 325nm

Sample: 1; C_{60} (0.25mg/ml)
2; [6,6]-Phenyl-C_{61} Butyric Acid Methyl Ester [PCBM] (0.25mg/ml)
Inj.Vol. 1.0µl



NACALAI TESQUE, INC
AP-1232

Note

The baseline of COSMOSIL Buckyprep-D is less stable relative to other fullerene columns. To stabilize baseline, let acetonitrile run through for 10 minutes before analysis.

Ordering Information

● COSMOSIL Buckyprep-D Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

I.D. x Length (mm)	Product Number
4.6× 50	09646-61
4.6×250	09647-51
10× 50	09648-41
10×250	09650-91
20×250	09651-81

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	09611-01
10×20	09613-81
20×50	09614-71

COSMOSIL Buckyprep-M

- Different selectivity from Buckyprep
- Excellent separation for metallofullerenes

Applications

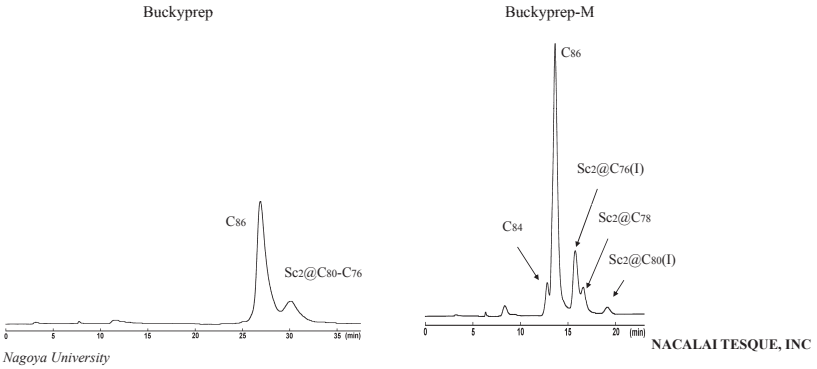
● Metallofullerenes

COSMOSIL Buckyprep-M is a phenothiazinyl-bonded silica-based column specifically designed for metallofullerene separation. Metallofullerenes are retained more strongly than other fullerenes on this column. COSMOSIL Buckyprep-M is also effective for the separation of higher fullerenes and fullerene derivatives.

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: Toluene
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV312nm

Sample: $Sc_2@C_{76}(I)$
$Sc_2@C_{78}$
$Sc_2@C_{80}(I)$
C_{86}

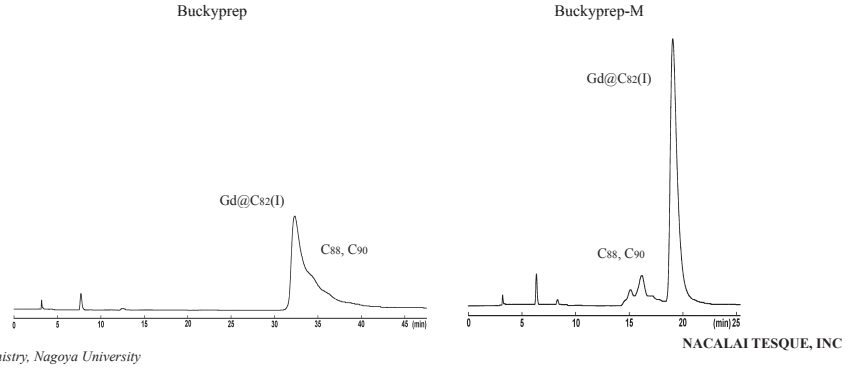


Sample courtesy of Prof. H.Shinohara,Department of chemistry, Nagoya University

COSMOSIL Application Data

Column:
Column size: 4.6mmI.D.-250mm
Mobile phase: Toluene
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV312nm

Sample: $Gd@C_{82}(I)$



Sample courtesy of Prof. H.Shinohara,Department of chemistry, Nagoya University

Ordering Information

● COSMOSIL Buckyprep-M Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6×250	04138-71
10×250	04141-11
20×250	04142-01
28×250	05873-01

Guard Column

I.D. x Length (mm)	Product Number
4.6×10	04139-61
10×20	04140-21
20×50	34474-31
28×50	05872-11

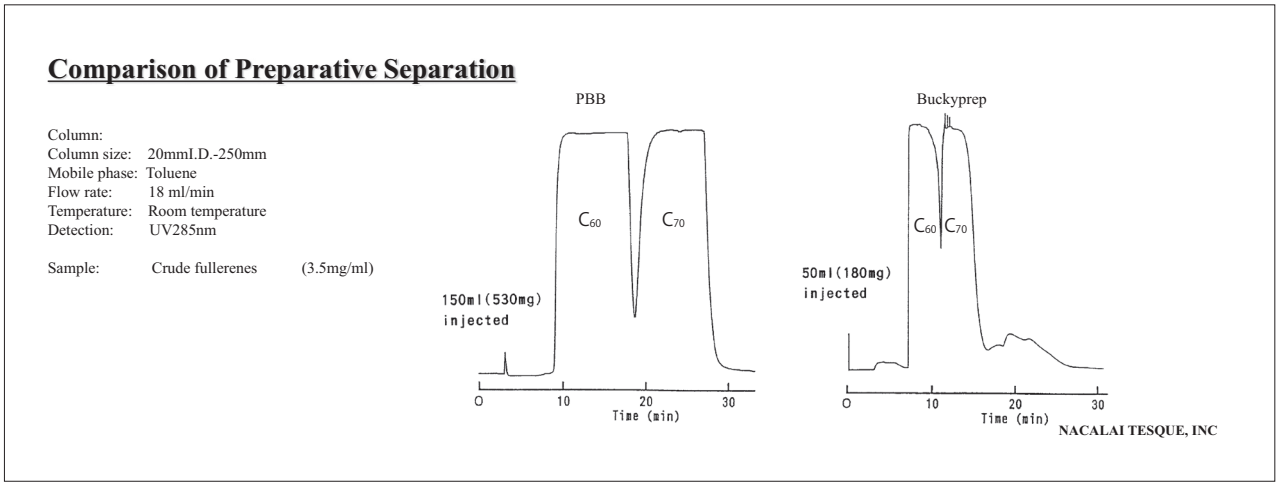
COSMOSIL PBB

- Can be used with *o*-dichlorobenzene or carbon disulfide
- Suitable for preparative scale separation

Applications

- Preparative Separation of Fullerene

The loading capacity of COSMOSIL PBB for C_{60} and C_{70} can be three times greater than COSMOSIL Buckyprep.



Ordering Information

- COSMOSIL 5PBB Analytical / Preparative Columns（Particle Size: 5 µm）

Packed Column

I.D. x Length (mm)	Product Number
4.6×250	37980-01
10×250	37985-51
20×250	37986-41

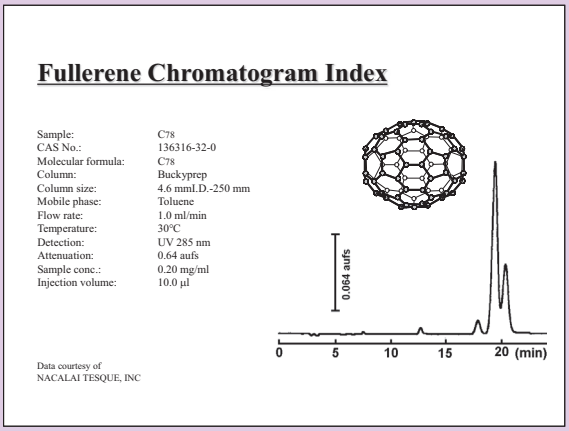
Guard Column

I.D. x Length (mm)	Product Number
4.6×10	37987-31
10×20	37988-21
20×50	34375-31

Fullerene Chromatogram Index

Fullerene Chromatogram Index includes more than 100 chromatograms. If you are interested in this index, please feel free to contact us. The online version is available at the website of The Fullerenes, Nanotubes and Graphene Research Society below.

Website:
http://fntg.jp/en/chromato_index_3.pdf



10. Soluble Carbon Nanotube Separation Columns

COSMOSIL CNT-300, CNT-1000, CNT-2000

- Size-based separation of soluble carbon nanotubes
- 3 pore sizes (300 Å , 1,000 Å , 2,000 Å)
- High durability

Specifications

Packing Material	CNT-300	CNT-1000	CNT-2000
Silica Gel	High purity porous spherical silica		
Average Particle Size	5 µm		
Average Pore Size	300 Å	1,000 Å	2,000 Å
Bonded Phase	Hydrophilic group (neutral)		
Usable pH Range	2 ~ 7.5		
Pressure	15 MPa and below		

Applications

- Carbon Nanotubes

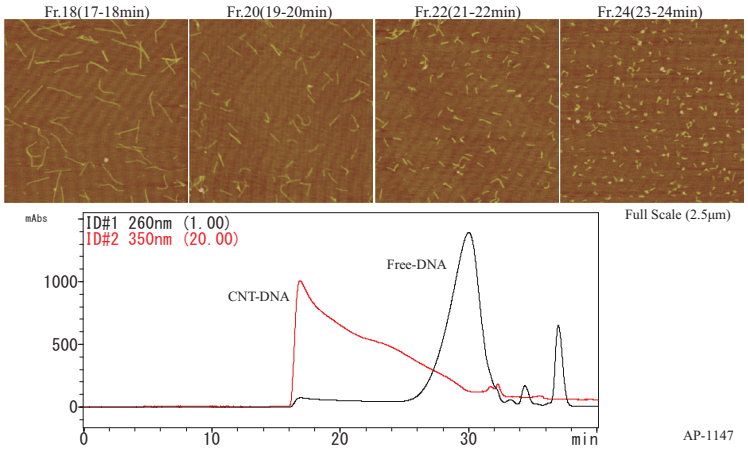
COSMOSIL CNT columns offered improved separation for DNA-wrapped carbon nanotubes by connecting three columns with different pore sizes.

COSMOSIL Application Data

Column: CNT-300 + CNT-1000 + CNT-2000
Column size: 7.5mmI.D.-300mm × 3
Mobile phase: 0.5mmol/l EDTA, 200mmol/l NaCl, 40mmol/l Tris-Tris HCl(pH7.0)
Flow rate: 1.0 ml/min
Temperature: 40°C
Detection: UV260nm(×1), 350nm(×20)

Sample: DNA-wrapped CNT(CNT-DNA)
Inj. Vol. 500µl

Data courtesy of Prof. H.Shinohara, Dr. Y.Asada, Department of chemistry, Nagoya University



Ordering Information

● COSMOSIL CNT-300 Analytical Columns (Particle Size: 5 µm)

Packed Column		Guard Column	
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
7.5×300	09195-71	7.5×50	09194-81

● COSMOSIL CNT-1000 Analytical Columns (Particle Size: 5 µm)

Packed Column		Guard Column	
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
7.5×300	09197-51	7.5×50	09196-61

● COSMOSIL CNT-2000 Analytical Columns (Particle Size: 5 µm)

Packed Column		Guard Column	
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
7.5×300	09199-31	7.5×50	09198-41

11. SFC (Supercritical Fluid Chromatography) Columns

COSMOSIL SFC Column Series

- Three categories of stationary phase for different types of compounds
- Different selectivity from HPLC

Products

Category I: Columns for mid- to high-polarity compounds

For these compounds, a high-polarity stationary phase is suitable. More polar compounds are retained longer.

Product Name	Bonded Phase	Features
COSMOSIL PY	Pyridinyl group	Similar selectivity to 2-ethylpyridine; strong retention in general.
COSMOSIL HP	3-Hydroxyphenyl group	Different selectivity from PY; strong retention for basic compounds.
COSMOSIL Diol	Diol group	Less effect from ionic interaction.

Category II: Columns for low-polarity compounds

For these compounds, a low-polarity stationary phase is suitable.

Product Name	Bonded Phase	Features
COSMOSIL Cholester	Cholesteryl group	Longer retention and better separation than C_{18}.

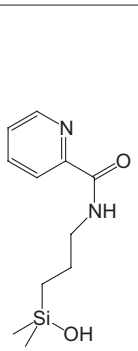
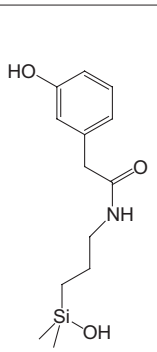
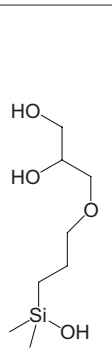
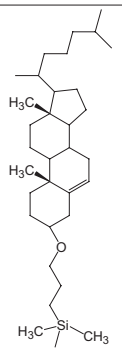
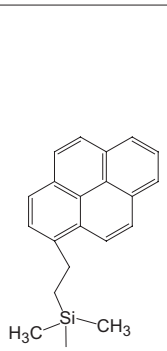
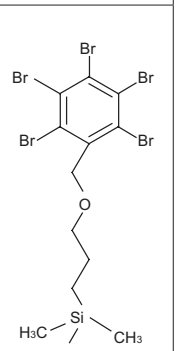
Category III: Columns for SFC-specific separations

In supercritical fluid chromatography (SFC), secondary interactions such as π-π and dispersion force* are stronger compared to high-performance liquid chromatography (HPLC). As a result, these columns are capable of unique separations in SFC.

Product Name	Bonded Phase	Features
COSMOSIL πMAX	Pyrenylethyl group	Stronger π-π interaction than phenyl column.
COSMOSIL PBr	Pentabromobenzyl group	Unique separations using dispersion force.*

* Dispersion force: London dispersion force is a weak intermolecular force that results from dipoles temporarily induced from random unsymmetrical electron positions in two adjacent atoms, also known as "instantaneous dipole-induced dipole force". It is present in all molecules, regardless of whether they are polar or non-polar. Compounds with high polarizability have stronger dispersion force.

Specifications

Packing Material	PY	HP	Diol	Cholester	πMAX	PBr
Silica Gel	High purity porous spherical silica					
Average Particle Size	3, 5 µm		5 µm	5 µm	5 µm	5 µm
Average Pore Size	120 Å					
Bonded Phase Structure						
Bonded Phase	Pyridinyl group	3-Hydroxyphenyl group	Diol group	Cholesteryl group	Pyrenylethyl group	Pentabromobenzyl group
End-Capping	Near-perfect treatment					

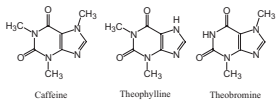
Applications

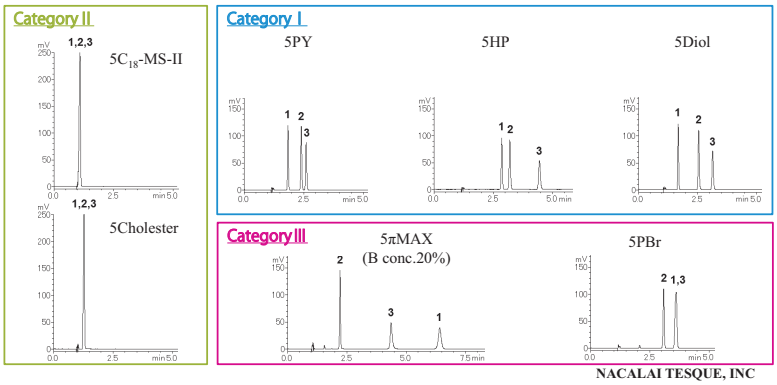
● Derivatives of xanthine (high-polarity compounds); XLogP3: -0.8 ～ 0.0

Category I columns (COSMOSIL 5PY, 5HP, 5Diol) and COSMOSIL 5 π MAX separated the sample well. The elution order with COSMOSIL 5 π MAX was different than the category I columns.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Methanol
B conc. 10% (πMAX only: 20%)
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV273nm
Sample: 1; Caffeine (0.10 mg/ml)
2; Theophylline (0.10 mg/ml)
3; Theobromine (0.09 mg/ml)
Inj.Vol.: 5.0µl



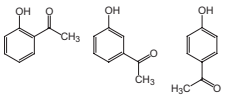


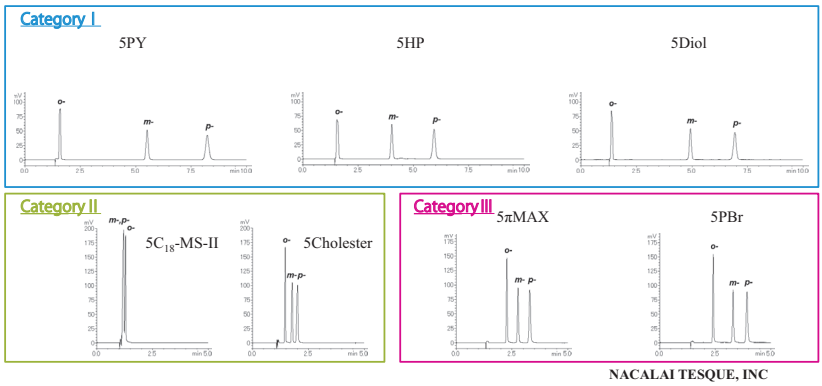
● Positional isomers (mid-polarity compounds); XLogP3: 1.4 ～ 1.9

Category I columns (COSMOSIL 5PY, 5HP, 5Diol) yielded the best separation.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Methanol
B conc. 5%
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV254nm
Sample: *o*-Hydroxyacetophenone (0.1 mg/ml)
m-Hydroxyacetophenone (0.1 mg/ml)
p-Hydroxyacetophenone (0.1 mg/ml)
Inj.Vol.: 5.0µl



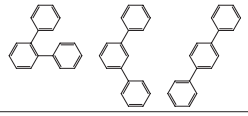


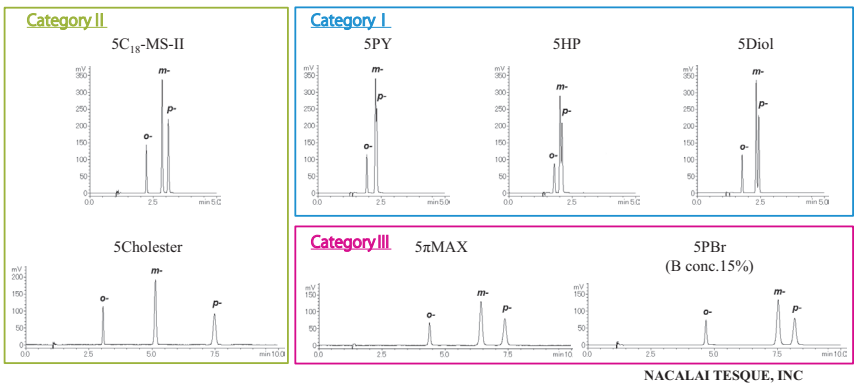
● Positional isomers (low-polarity compounds); XLogP3: 5.8 ～ 6.0

Category III (COSMOSIL 5 π MAX, 5PBr) and category II (5Cholester) columns separated most effectively.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Methanol
B conc. 5% (PBr only: 15%)
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV254nm
Sample: *o*-Terphenyl (0.1 mg/ml)
m-Terphenyl (0.1 mg/ml)
p-Terphenyl (0.1 mg/ml)
Inj.Vol.: 5.0µl





Applications

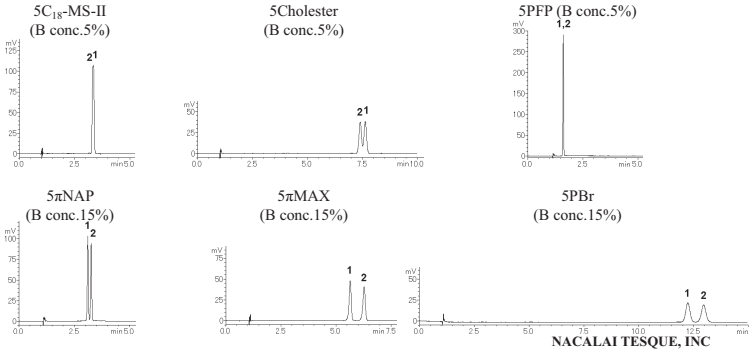
● Vitamin D

COSMOSIL 5 π MAX and 5PBr were able to separate the vitamins. The PFP (pentafluorophenyl) column, which also uses a halogenated stationary phase, could not separate them. The dispersion force used by PBr interacts more strongly with larger molecules. PFP, which is a smaller molecule, does not exhibit this selectivity.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Methanol
B conc. **%
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV265nm

Sample: 1; Vitamin D_3 (0.6 mg/ml)
2; Vitamin D_2 (0.6 mg/ml)
Inj.Vol.: 3.0µl



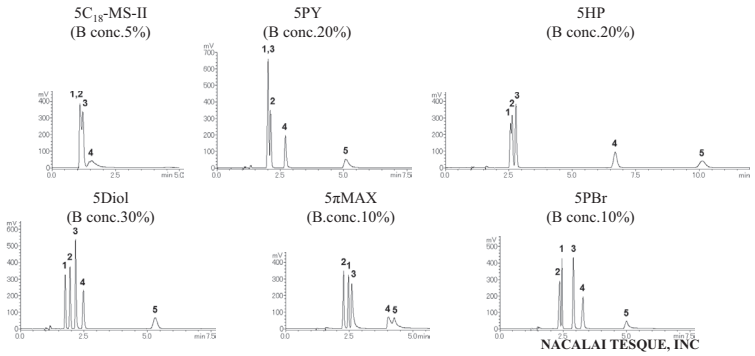
● Nucleobases

COSMOSIL 5Diol separated 5 nucleic acid bases.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: 100mmol/l Ammonium Acetate - Methanol
B conc. **%
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV260nm

Sample: 1; Thymine (0.2 mg/ml)
2; Uracil (0.2 mg/ml)
3; Adenine (0.2 mg/ml)
4; Cytosine (0.2 mg/ml)
5; Guanine (0.2 mg/ml)
Inj.Vol.: 5.0µl



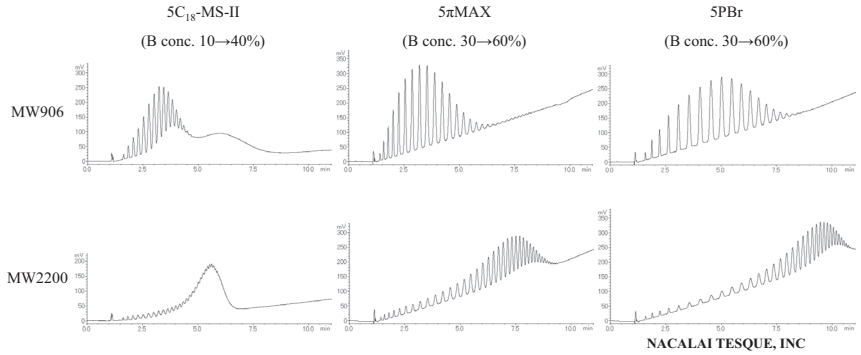
● Polystyrene

These polystyrene samples with different degrees of polymerization are likely separated by number of monomer units. COSMOSIL 5 π MAX and 5PBr were able to separate the high-MW polystyrene.

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Tetrahydrofuran
B conc. *→*% 10min Linear gradient
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV220nm

Sample: Polystyrene, MW906 (5.0 mg/ml)
Polystyrene, MW2200 (5.0 mg/ml)
Inj.Vol.: 5.0µl



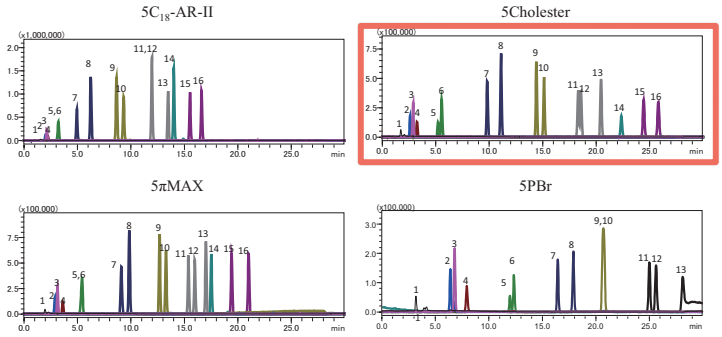
Applications

● Polyaromatic Compounds

COSMOSIL Application Data

Column: COSMOSIL **
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Acetonitrile
B conc. 5% (0-7min), 5→50% (20→22min), 50% (22-25min)
Flow rate: 3.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: APCI-MS, Positive, MRM
Sample:

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



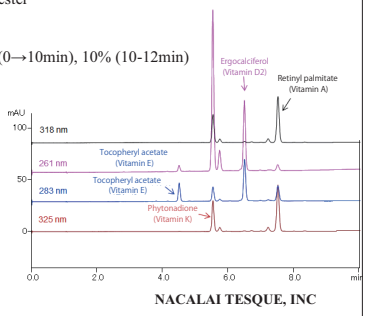
Data courtesy of SHIMADZU CORPORATION

AP-1634

● Fat-Soluble Vitamins

COSMOSIL Application Data

Column: COSMOSIL 5Cholester
Column size: 4.6mmI.D.-250mm
Mobile phase: IPA in CO_2
IPA conc. 0→10% (0→10min), 10% (10-12min)
Flow rate: 3.0 ml/min
BPR: 15 MPa
Temperature: 40 °C
Detection: UV-VIS
Sample conc: 2.0 mg/ml
Inj.Vol.: 1.0µl

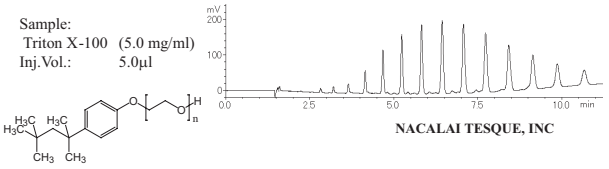


Data courtesy of SHIMADZU CORPORATION

● Surfactant

COSMOSIL Application Data

Column: COSMOSIL 5PBr
Column size: 4.6mmI.D.-250mm
Mobile phase: A: CO_2
B: Methanol
B conc. 2→100% 10min Linear gradient
Flow rate: 2.0 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: UV220nm
Sample:
Triton X-100 (5.0 mg/ml)
Inj.Vol.: 5.0µl



Ordering Information

	Packing Material							
Bonded Phase	PY		HP		Diol	Cholester *	π MAX	PBr **
Particle Size	3 µm	5 µm	3 µm	5 µm	5 µm	5 µm	5 µm	5 µm
2.0 mmI.D.×150 mm	13831-91	13818-81	13792-11	13787-91	inquire	05971-11	inquire	12392-81
4.6 mmI.D.×250 mm	13832-81	13827-61	13793-01	13788-81	inquire	05977-51	inquire	12395-51
10 mmI.D.× 20 mm		13830-01		13791-21	inquire	05978-41	inquire	12396-41
10 mmI.D.×250 mm		13828-51		13789-71	inquire	05979-31	inquire	12397-31
20 mmI.D.×250 mm		13829-41		13790-31	inquire	05982-71	inquire	12398-21

Other packing material and column size are available, please contact us.
* For ordering information for COSMOSIL Cholester, refer to page 10.
** For ordering information for COSMOSIL PBr, refer to page 14.

(**Pressure Limit**)
- 2.1 mmI.D., 4.6 mmI.D., 10.0 mmI.D. : 30 MPa
- 20.0 mmI.D. : 23 MPa

12. Preparative Packing Materials for Column Chromatography

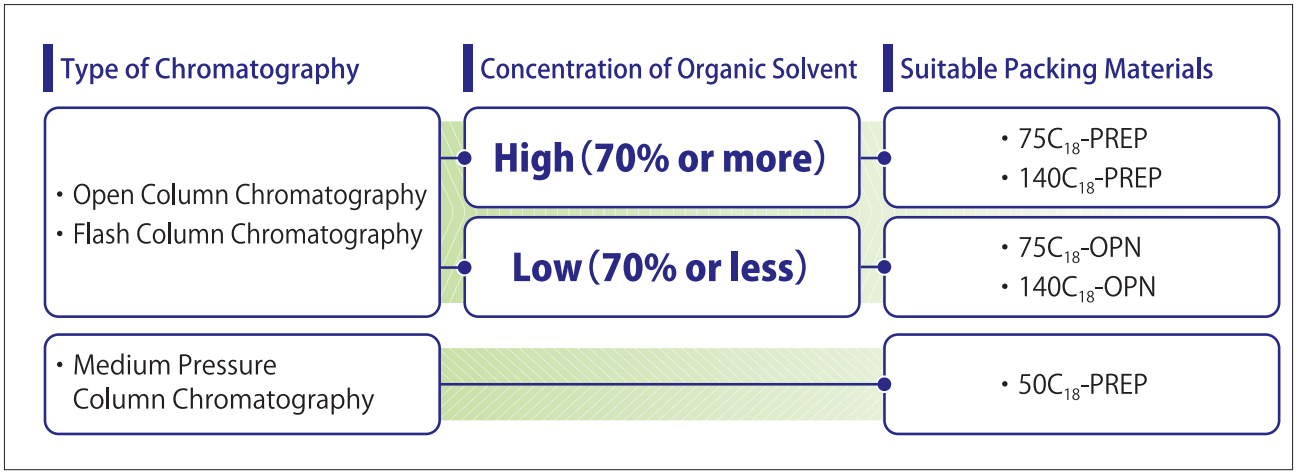
Introduction

Open column chromatography is an excellent and easy technique for large-scale preparation and purification at low cost. COSMOSIL offers both normal and reversed phase packing materials based on totally porous spherical silica, which provides higher separation, less pressure and higher reproducibility than irregular silica.

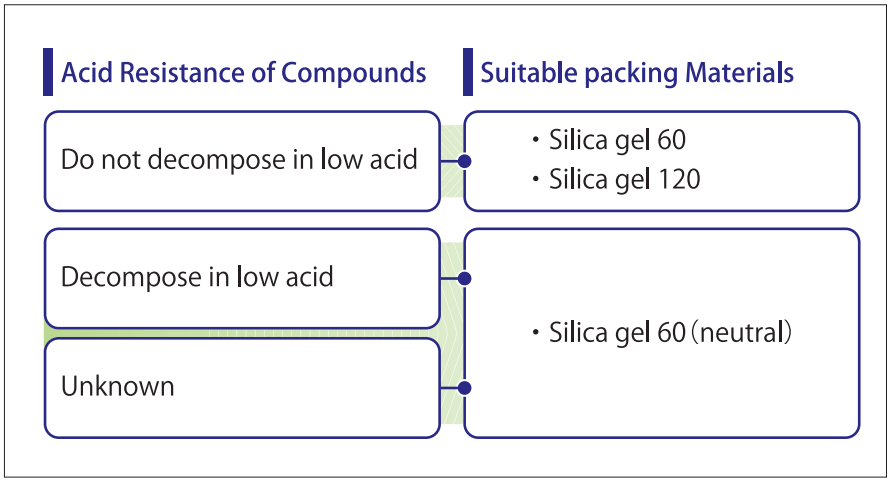
Specifications

Packing Material	C_{18}-OPN	C_{18}-PREP	Silica Gel 60 (Neutral)	Silica Gel 60	Silica Gel 120
Silica Gel	High purity porous spherical silica				
Average Particle Size	75, 140 µm	50, 75, 140 µm	75, 140 µm	140 µm	
Average Pore Size	120 Å		60 Å	60 Å	120 Å
Specific Surface Area	300 m^2/g		500 m^2/g	500 m^2/g	300 m^2/g
Bonded Phase	Octadecyl group		None		
Carbon Content	—	19%	0%		
Residual Silanol Gruop	Yes	None	—		
Application	Open column chromtography / Flash column chromtography				
	Reversed phase chromatography		Normal phase chromatography		

Selection Guide (Reversed Phase)



Selection Guide (Normal Phase)



Reversed Phase Packing Materials (C_{18})

COSMOSIL C_{18}-OPN

- A new "Water-Wet" C_{18} packing material for reversed phase open column chromatography
- Usable under 100% aqueous eluents

Product Name	Average Particle Size	Grade	Product Number	PKG Size
COSMOSIL 75C_{18}-OPN	75 µm	SP	37842-66	100 g
			37842-95	500 g
			37842-11	1 kg
COSMOSIL 140C_{18}-OPN	140 µm	SP	37878-16	100 g
			37878-45	500 g
			37878-61	1 kg

COSMOSIL C_{18}-PREP

Product Name	Average Particle Size	Grade	Product Number	PKG Size
COSMOSIL 50C_{18}-PREP	50 µm	SP	12065-84	100 g
			12065-55	500 g
			12065-71	1 kg
COSMOSIL 75C_{18}-PREP	75 µm	SP	12061-24	100 g
			12061-95	500 g
			12061-11	1 kg
COSMOSIL 140C_{18}-PREP	140 µm	SP	12063-04	100 g
			12063-75	500 g
			12063-91	1 kg

Normal Phase Packing Materials

Silica Gel 60 (Spherical, Neutral)

Product Name	Average Particle Size	Grade	Product Number	PKG Size
Silica Gel 60, spherical, neutral	42 ～ 105 µm	SP	30511-64	100 g
			30511-35	500 g
			30511-51	1 kg
			30511-06	5 kg
			30511-22	25 kg
Silica Gel 60, spherical, neutral	105 ～ 210 µm	SP	30518-94	100 g
			30518-65	500 g
			30518-81	1 kg

Silica Gel (for Column Chromatography)

Product Name	Particle Size	Grade	Product Number	PKG Size
Silica Gel 60, spherical	approx. 70 ～ 230 mesh	SP	30731-71	1 kg
			30731-42	25 kg
Silica Gel 120, spherical	approx. 70 ～ 230 mesh	SP	30734-41	1 kg
Silica Gel 60, irregular	approx. 70 ～ 230 mesh	SP	30724-55	500 g
			30724-71	1 kg
			30724-84	5 kg
			30724-42	25 kg
	approx. 230 ～ 400 mesh	SP	30721-85	500 g
			30721-01	1 kg
			30721-14	5 kg

Almina Activated (for Column Chromatography)

Product Name	Particle Size	Grade	Product Number	PKG Size
Alumina Activated 200	approx. 200 mesh	SP	01512-25	500 g
			01512-54	15 kg
Alumina Activated 300	approx. 300 mesh	SP	01513-15	500 g

13. Related Produts

HPLC Solvents

Product Name	Grade	Product Number	PKG Size
Acetone	SP	00325-31	1 L
Acetonitrile	SP	00430-25	500 mL
		00430-41	1 L
		00430-83	3 L
Benzene	SP	04028-11	1 L
t-Butyl Methyl Ether	SP	06332-64	200 mL
		06332-51	1 L
Chloroform	SP	08426-71	1 L
		08426-13	3 L
Cyclohexane	SP	10034-31	1 L
o-Dichlorobenzene	SP	11635-31	1 L
Dichloromethane	SP	22423-61	1 L
N,*N*-Dimethylformamide	SP	13024-71	1 L
1,4-Dioxane	SP	13631-11	1 L
Distilled Water	SP	14029-91	1 L
		14029-33	3 L
Ethanol(99.5)	SP	14741-25	500 mL
		14741-41	1 L
		14741-83	3 L
Ethyl Acetate	SP	14746-91	1 L
		14746-33	3 L
Heptane	SP	17623-01	1 L
1,1,1,3,3,3-Hexafluoro-2-propanol	SP	17814-14	100 g
		17814-85	500 g
Hexane	SP	17929-11	1 L
		17929-53	3 L
Methanol	SP	21929-81	1 L
		21929-23	3 L
1-Propanol	SP	29033-61	1 L
2-Propanol	SP	29128-31	1 L
		29128-73	3 L
Tetrahydrofuran	SP	33125-31	1 L
		33125-73	3 L
Toluene	SP	34130-21	1 L
		34130-63	3 L

Premixed Eluents for HPLC

Product Name	Grade	Product Number	PKG Size
0.1vol% Formic Acid-Acetonitrile	SP	12578-61	1 L
		12578-03	3 L
0.1vol% Formic Acid-Distilled Water	SP	12582-91	1 L
		12582-33	3 L
0.1vol% Trifluoroacetic Acid-Acetonitrile	SP	12583-81	1 L
		12583-23	3 L
0.1vol% Trifluoroacetic Acid-Distilled Water	SP	12584-13	3 L

Premixed Buffers for HPLC

Product Name	Grade	Product Number	PKG Size
1mol/l-Ammonium Formate Solution	SP	12235-54	100 mL
1mol/l-Ammonium Acetate Solution	SP	12236-44	100 mL
Phosphate Buffer Solution(pH 2.5)(5x)	SP	08969-71	1 L
Phosphate Buffer Solution(pH 7.0)(5x)	SP	08968-81	1 L

Additives for HPLC Solvents

Product Name	Grade	Product Number	PKG Size
Acetic Acid	SP	08963-02	25 mL
Formic Acid	SP	08965-82	25 mL
Phosphoric Acid, Ortho	SP	08964-92	25 mL
Trifluoroacetic Acid	SP	34840-21	5×1 mL
		34840-76	5×1.5 mL
		34840-63	5×3 mL
		34840-34	10 mL

Arginine Mobile Phase

Product Name	Grade	Product Number	PKG Size
Arg-SEC Mobile Phase(Mild)	SP	16998-41	1 L
Arg-SEC Mobile Phase(Standard)	SP	16999-31	1 L
Arg-SEC Mobile Phase(Strong)	SP	17000-51	1 L

Arginine Buffer for Protein Purification

Product Name	Grade	Product Number	PKG Size
Arg-Antibody Elution Buffer(pH 4.0)	SP	17088-15	500 mL

Ion-Pair Reagents

Product Name	Grade	Product Number	PKG Size
Sodium 1-Butanesulfonate	SP	31331-94	5 g
0.5 M Solution	SP	31332-84	5×10 mL
Sodium 1-Decanesulfonate	SP	31429-34	5 g
		31429-92	25 g
Sodium 1-Dodecanesulfonate	SP	31426-64	5 g
Sodium 1-Heptanesulfonate	SP	31528-34	5 g
		31528-92	25 g
Sodium 1-Hexanesulfonate	SP	31529-24	5 g
		31529-82	25 g
0.5 M Solution	SP	31532-64	10 mL
Sodium Lauryl Sulfate〔Sodium Dodecyl Sulfate;SDS〕	SP	31623-32	25 g
		31623-45	500 g
Sodium 1-Pentanesulfonate	SP	31730-64	5 g
		31730-22	25 g
Tetra-*n*-butylammonium Bromide	SP	32824-72	25 g
Tetra-*n*-butylammonium Phosphate	SP	32929-54	5 g
0.5 M Solution	SP	32926-26	10 mL
		32926-84	5×10 mL

Labeling Reagents

Visible labeling Reagent

Product Name	Grade	Product Number	PKG Size
Dabsyl Chloride	SP	10427-91	1 g

UV labeling Reagent

Product Name	Grade	Product Number	PKG Size
3,5-Dinitrobenzoyl Chloride	SP	13530-44	5 g

Fluorescence labeling Reagents

Product Name	Grade	Product Number	PKG Size
NBD Chloride	SP	24113-61	1 g
o-Phthalaldehyde	SP	27824-61	1 g
		27824-74	5 g
		27824-32	25 g

Column Care Products

Product Name	Grade	Product Number	PKG Size
Cleaning Solution Kit for Reversed Phase HPLC Columns	SP	08966-30	1 kit
Storage Solution for Reversed Phase HPLC Columns	SP	08967-20	1 kit

Prefiltration Tool

Cosmonice Filter

Product Name	Diameter	Pore Size	Process Volume	Hold-up Volume	Product Number	PKG Size
COSMONICE Filter (W)	4 mm	0.45 µm	1 mL or less	＜10 µL	06543-04	100 pkg
	13 mm		0.5 ～ 10 mL	＜30 µL	06544-94	100 pkg
COSMONICE Filter (S)	4 mm	0.45 µm	1 mL or less	＜10 µL	06541-24	100 pkg
	13 mm		0.5 ～ 10 mL	＜30 µL	06542-14	100 pkg

Cosmospin Filter

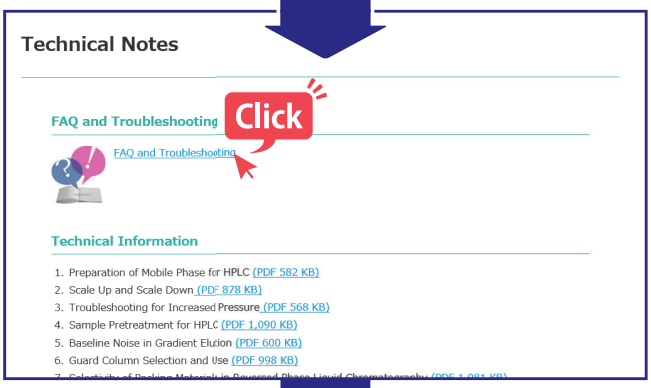
Product Name	Pore Size	Maximum Sample Volume	Hold-up Volume	Maximum Centrifugal Force	Rotor Size (Fixed-angle)	Filtration Area	Color	Product Number	PKG Size
Cosmospin Filter G	0.2 µm	0.4 mL	5 µL	5,000 ×g	1.5 mL	0.2 cm^2	Brown	06549-44	100 pkg
Cosmospin Filter H	0.45 µm	0.4 mL	5 µL	5,000 ×g	1.5 mL	0.2 cm^2	White	06540-34	100 pkg

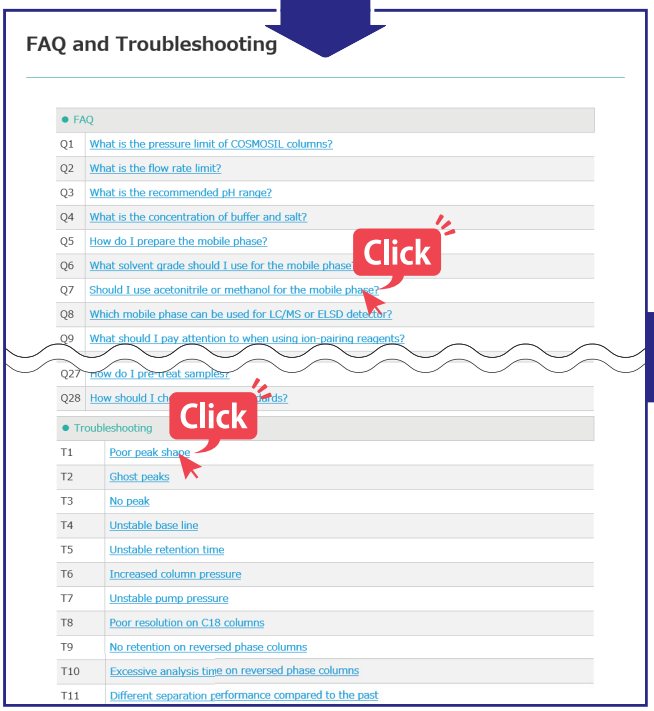
COSMOSIL HPLC Accessories

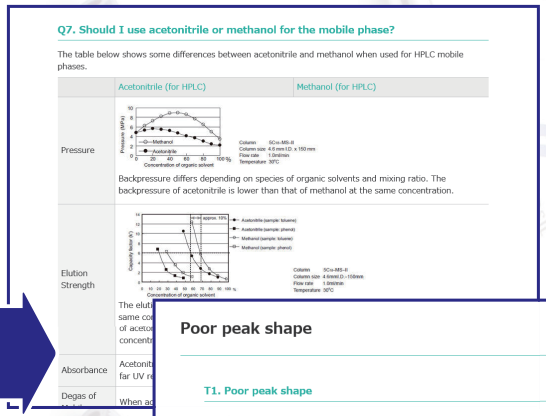
Product Name	Product Number	PKG Size
COSMOSIL Guard Cartridge Holder 2.0mmI.D.	11884-71	1 pkg
COSMOSIL Guard Cartridge Holder 4.6mmI.D.	38009-79	1 pkg
COSMOSIL Column Prefilter	39361-19	1 pkg
COSMOSIL Column Spare Filter for Prefilter	39539-09	2 pkg
COSMOSIL Column Connecting Tube(0.1mmI.D.)	12570-41	1 pkg
COSMOSIL Column Connecting Tube(0.25mmI.D.)	37843-69	1 pkg

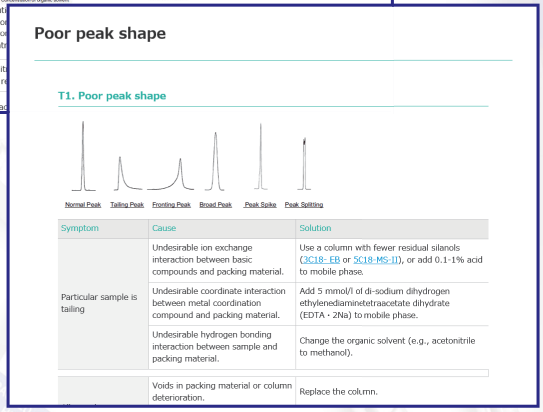
COSMOSIL Technical Notes

For our COSMOSIL FAQ, troubleshooting and technical information, please visit our website at http://www.nacalai.co.jp/global/cosmosil









nacalai tesque
The quality for certainty.

Warranties and Disclaimers:

Nacalai Tesque warrants that its products shall conform to the description of such products as provided by Nacalai Tesque through its catalog, analytical data or other literature. Nacalai Tesque makes no other warranty, express or implied, as to the fitness of these products for any particular purpose. Nacalai Tesque shall not in any event be liable for incidental or consequential damages that may result from any use or failure of the products.

For more information on products and pricing, please contact your local distributor.

BGB GC|LC MS|CE

www.bgb-shop.com

Switzerland: BGB Analytik AG • Rohrmattstrasse 4 • 4461 Böckten • Phone +41 61 991 00 46 • Fax +41 61 991 00 25 • sales@bgb-analytik.com
BGB Analytik SA • Route de Pré-Bois 20 • 1215 Genève 15 • Phone +41 22 788 49 43 • Fax +41 22 788 49 45 • sales.fr@bgb-analytik.com
Benelux: BGB Analytik Benelux B.V. • Drielandendreef 42-44 • 3845 CA Harderwijk • Phone +31 341 700270 • Fax +31 341 700271 • sales.benelux@bgb-analytik.com
France: BGB Analytik France S.A.S. • 81 Vie de l'Etraz • 01630 St. Jean de Gonville • Phone +33 450 488567 • Fax +33 450 562378 • sales.fr@bgb-analytik.com
Germany: BGB Analytik Vertrieb GmbH • Mühlestraße 1 • 79539 Lörrach • Phone +49 7621 5884270 • Fax +49 7621 5884289 • sales.de@bgb-analytik.com