



COSMOSIL

COSMOSIL

High Performance Liquid Chromatography

CATALOG 2019



**Reversed Phase
Specialty Columns**

1
p.9

**Reversed Phase
C₁₈ Series**

2
p.23

**Other Reversed
Phase Columns**

3
p.34

**Chiral Separation
Columns**

4
p.37

**Normal Phase
Columns**

5
p.42

**Hydrophilic Interaction
Columns**

6
p.44

**Mono- and Oligosaccharide
Analysis Columns**

7
p.47

**Protein Separation
Columns**

8
p.51

**Fullerene Separation
Columns**

9
p.61

**Soluble Carbon Nanotube
Separation Columns**

10
p.66

**SFC (Supercritical Fluid
Chromatography) Columns**

11
p.67

**Preparative Packing Materials
for Column Chromatography**

12
p.71

Related Products

13
p.74

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

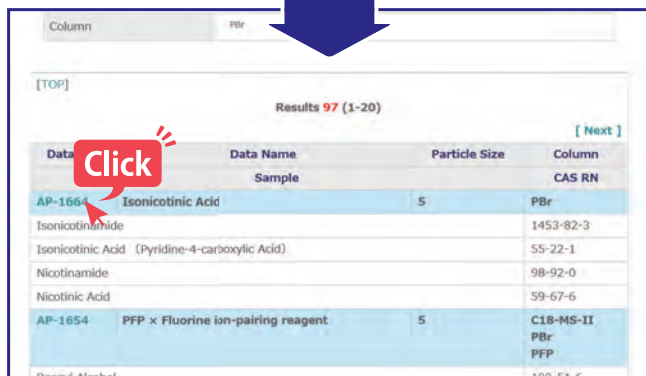


Visit our website at <http://www.nacalai.com>

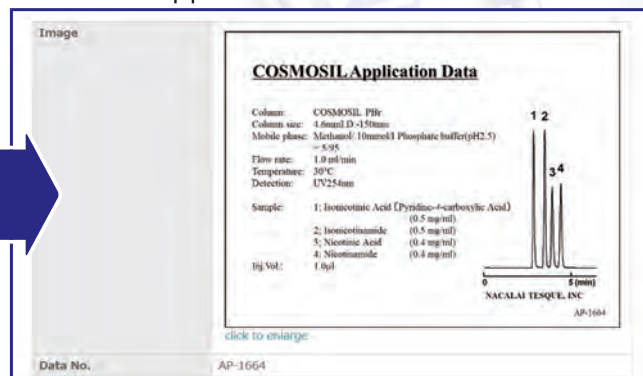


The applications are searchable by sample category, sample name, CAS RN., column name and particle size.

Search Result



COSMOSIL Applications



COSMOSIL Applications	2
COSMOSIL / COSMOGEL Packing Material List	4
Column Selection Guide	6
COSMOSIL Technical Notes	79

1. Reversed Phase Specialty Columns	9
Cholester, PBr, PFP, π NAP, PYE, NPE	
2. Reversed Phase C₁₈ Series	23
C ₁₈ -MS-II, C ₁₈ -AR-II, C ₁₈ -PAQ, C ₁₈ -EB, COSMOCORE 2.6C ₁₈	
3. Other Reversed Phase Columns	34
CN-MS, C ₂₂ -AR-II, C ₈ -MS, C ₄ -MS, TMS-MS, PE-MS	
4. Chiral Separation Columns	37
CHIRAL Series	
5. Normal Phase Columns	42
SL-II	
6. Hydrophilic Interaction Columns	44
HILIC	
7. Mono- and Oligosaccharide Analysis Columns	47
Sugar-D, NH ₂ -MS	
8. Protein Separation Columns	51
• Reversed Phase Columns	
Protein-R	
C ₁₈ -AR-300, C ₈ -AR-300, C ₄ -AR-300, Ph-AR-300	
• Gel Filtration Columns (Aqueous)	
Diol-120-II, Diol-300-II, Diol-1000-II	
• Ion Exchange Columns	
COSMOGEL IEX Series	
• Hydrophobic Interaction Columns	
HIC	
9. Fullerene Separation Columns	61
Buckyprep, Buckyprep-D, Buckyprep-M, PBB	
10. Soluble Carbon Nanotube Separation Columns	66
CNT-300, CNT-1000, CNT-2000	
11. SFC (Supercritical Fluid Chromatography) Columns	67
SFC Column Series	
12. Preparative Packing Materials for Column Chromatography	71
• Reversed Phase Packing Materials (C ₁₈ -OPN, C ₁₈ -PREP)	
• Normal Phase Packing Materials	
13. Related Products	74
• HPLC Solvents	
• Premixed Eluents for HPLC	
• Premixed Buffers for HPLC	
• Additives for HPLC Solvents	
• Arginine Mobile Phase	
• Arginine Buffer for Protein Purification	
• Ion-Pair Reagents	
• Labeling Reagents	
• Column Care Products	
• Prefiltration Tool (Cosmonice Filter, Cosmospin Filter)	
• COSMOSIL HPLC Accessories	

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	Mono- meric	2.5	130	18	Multi-purpose C ₁₈ column	L1	24	
				3, 5, 15	120	16				
	C ₁₈				2.6 (Core-Shell)	90	7			32
	C ₁₈ -AR-II			Polymeric	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		Mono- meric	3		14.5	Good for basic compounds.	L1	30	
	Cholester	Cholesteryl group	Mono- meric	2.5	130	21	Usable under the same conditions as C ₁₈ . Unique rigid cholesterol structure improves separation.	L101	10	
					2.6 (Core-Shell)	90				—
					5	120				20
	PBr	Pentabromobenzyl group	Mono- meric	2.6 (Core-Shell)	90	—	Separate hydrophilic compounds under reversed-phase conditions.	—	14	
				5	120	8				
	PFP	Pentafluorophenyl group		5	120	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	
						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		—	36
	C ₈ -MS	Octyl group		Mono- meric	5	120	10	Alkyl chain columns, excluding C ₁₈ .	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	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	
					120					
	Sugar-D	Polyamine	—	5	—	—	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					
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

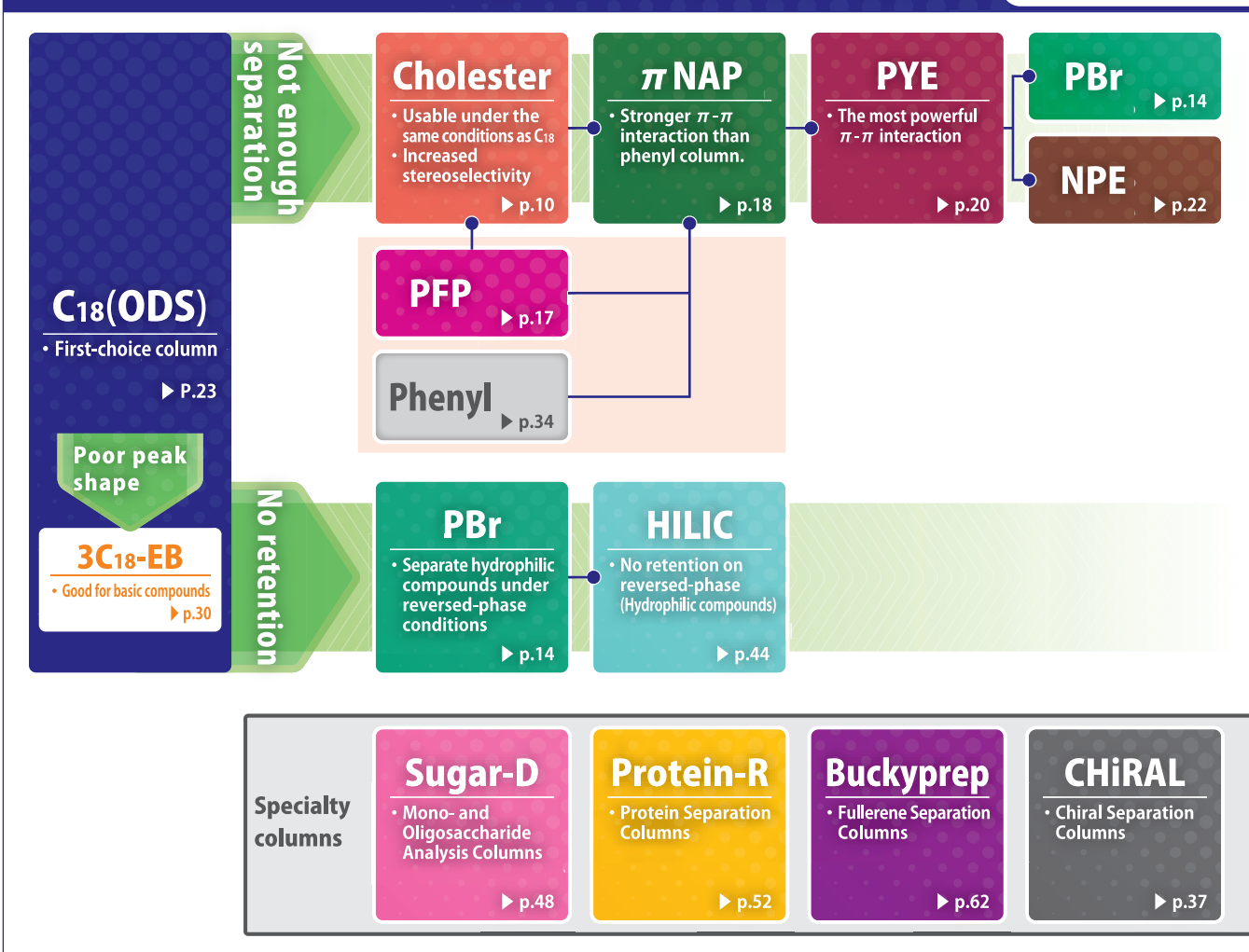
Separation Mode	Packing Material	Bonded Phase	Bonding Type	Average Particle Size (μm)	Average Pore Size (Å)	Carbon Content (%)	Special Features and Applications	USP Category	Page
SFC	PY	Pyridinyl group	—	3, 5	120	—	Similar separation properties as 2-Ethylpyridine, with stronger retention.	—	67
	HP	3-Hydroxyphenyl group					Good for hydrophilic compounds. Stronger retention for basic compounds than PY.		
	Diol	Diol group					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

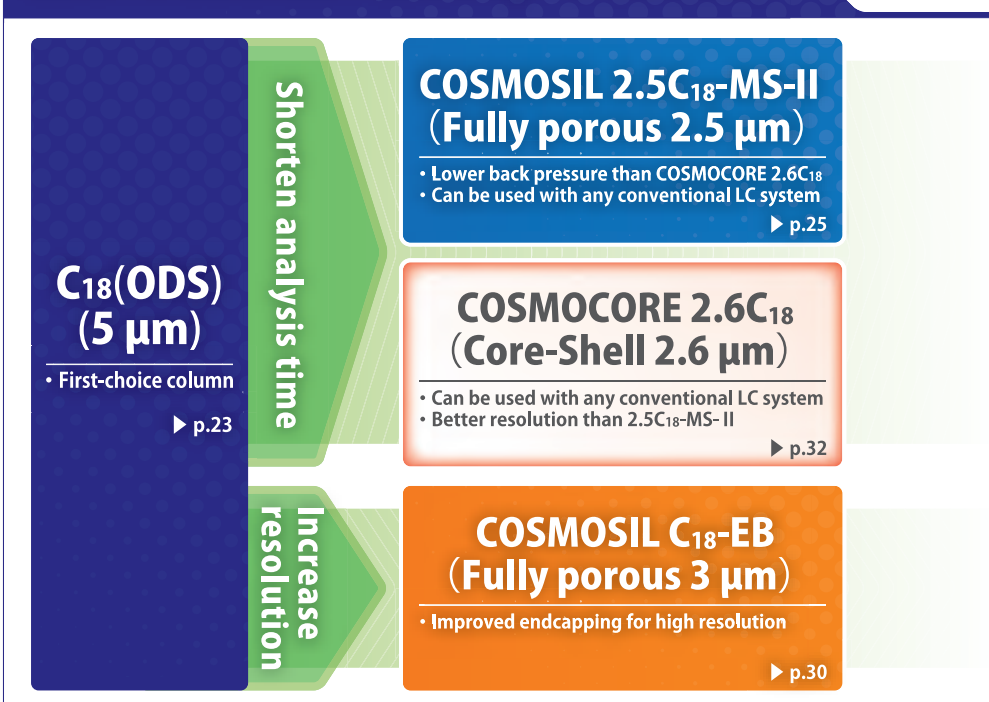
Sample	Category	Separation Mode	Recommended Column	Page	Remark
Low-MW drugs	—	Reversed phase	C ₁₈ -EB	30	Near perfect end capping treatment
			COSMOCORE C ₁₈	32	
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C ₁₈ column
Vitamins	Water-soluble vitamins	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
		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	
			π NAP	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 PBr	26 14	Features strong acid resistance Separation for oligopeptides
		Hydrophilic interaction	HILIC	44	For hydrophilic peptides not retained in reversed-phase mode
		Reversed phase	Protein-R C ₁₈ -AR-300 C ₄ -AR-300	52 54	Wide pore columns
	M. W. 3,000 or more	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
Hydrophilic interaction			HILIC	44	Different selectivity from reversed phase
Nucleosides Nucleotides		Reversed phase	C ₁₈ -PAQ PBr	28 14	Compatible with 100% water based mobile phase 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 NH ₂ -MS	48 50
	Reversed phase		C ₁₈ -PAQ	28	For pyridylaminated sugars
	Labeled saccharides	Hydrophilic interaction	Sugar-D NH ₂ -MS	48 50	For two-dimensional separations with reversed-phase
		Reversed phase	PBr	14	Retained in reversed-phase mode
	Oligosaccharides	Hydrophilic interaction	Sugar-D NH ₂ -MS	48 50	Separation in non-derivatized form
		Size exclusion	Diol-II	56	Separation utilizing molecular size
Fullerenes	Fullerenes	—	Buckyprep	62	Standard for fullerene separation
	Metallofullerenes	—	Buckyprep Buckyprep-M	62 64	Different selectivity for metallofullerenes
		—	Buckyprep Buckyprep-D	62 63	Separation in toluene mobile phase
	Derivatized fullerenes	—	Buckyprep Buckyprep-D	62 63	Separation in toluene mobile phase
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

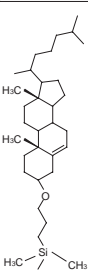
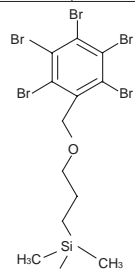
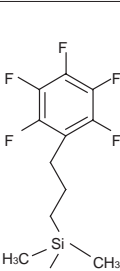
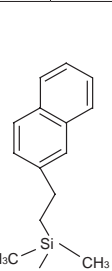
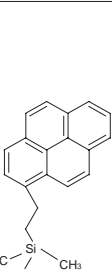
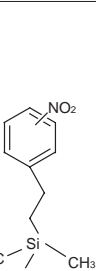


Column Selection Guide by Particle Size



1. Reversed Phase Specialty Columns

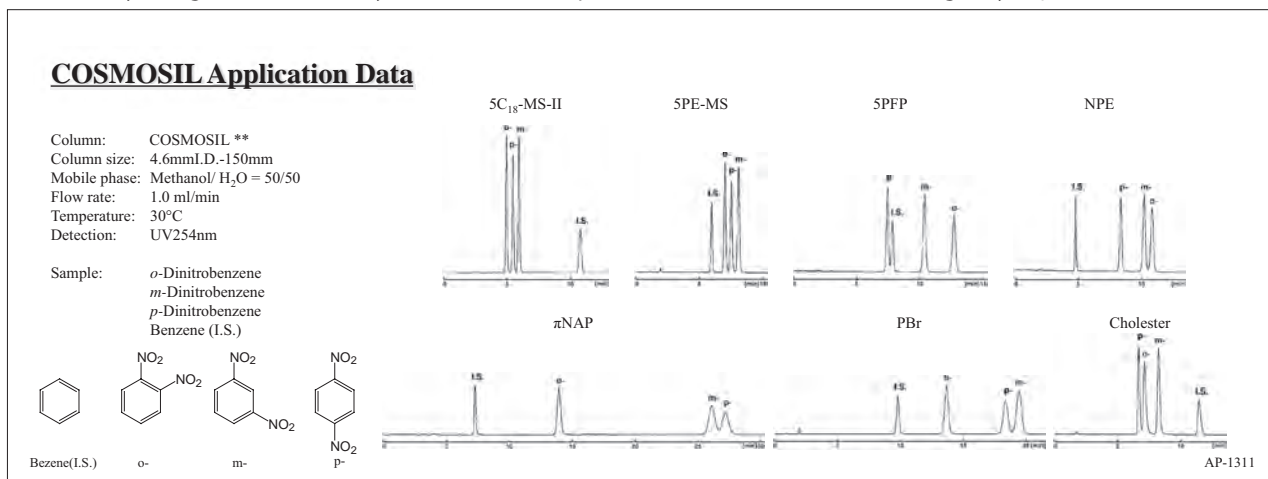
Specifications

Packing Material	Cholester			PBr		PFP	π NAP		PYE	NPE
	Fully-Porous	5 μ m	Core-Shell	Fully-Porous	Core-Shell	Fully-Porous	Fully-Porous	Fully-Porous	Fully-Porous	Fully-Porous
Average Particle Size	2.5 μ m	5 μ m	2.6 μ m	5 μ m	2.6 μ m	5 μ m	2.5 μ m	5 μ m	5 μ m	5 μ m
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 m ² /g	300 m ² /g	150 m ² /g	300 m ² /g	150 m ² /g	300 m ² /g	330 m ² /g	300 m ² /g	300 m ² /g	300 m ² /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	<ul style="list-style-type: none"> Usable under the same conditions as C₁₈ High molecular shape selectivity 			<ul style="list-style-type: none"> Separate hydrophilic compounds under reversed-phase conditions Separate using dispersion 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 C₁₈ (hydrophobic interaction) does not have. By using these columns, you can achieve separation that cannot be done using only C₁₈.



COSMOSIL Cholester / COSMOCORE Cholester



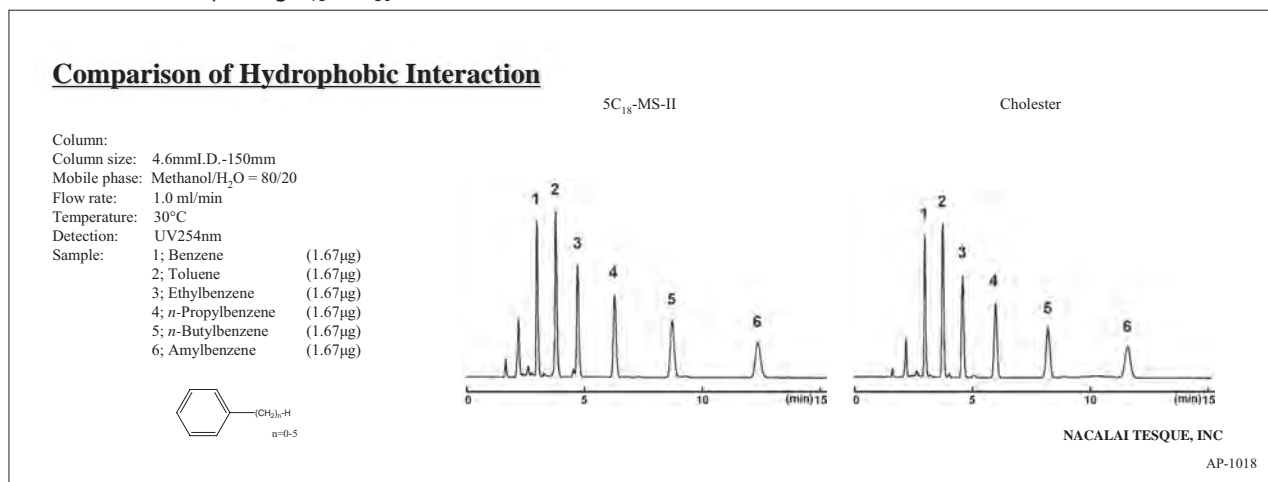
- Cholesterol-bonded stationary phase
- Increased stereoselectivity and improved resolution for geometric isomers
- Usable under the same conditions as C₁₈

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 C₁₈ columns. Cholester provides about the same hydrophobicity as alkyl group-bonded types (C₁₈, C₃₀). It is not necessary to change the analytical conditions when replacing C₁₈ or C₃₀ columns with Cholester.



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.

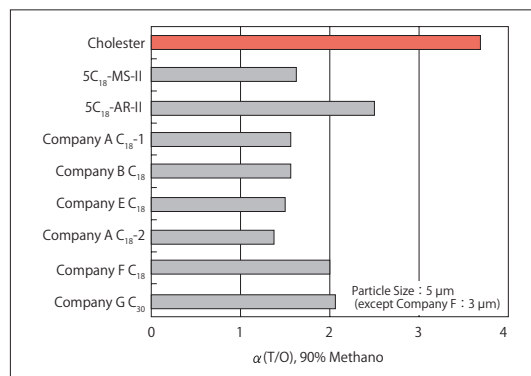
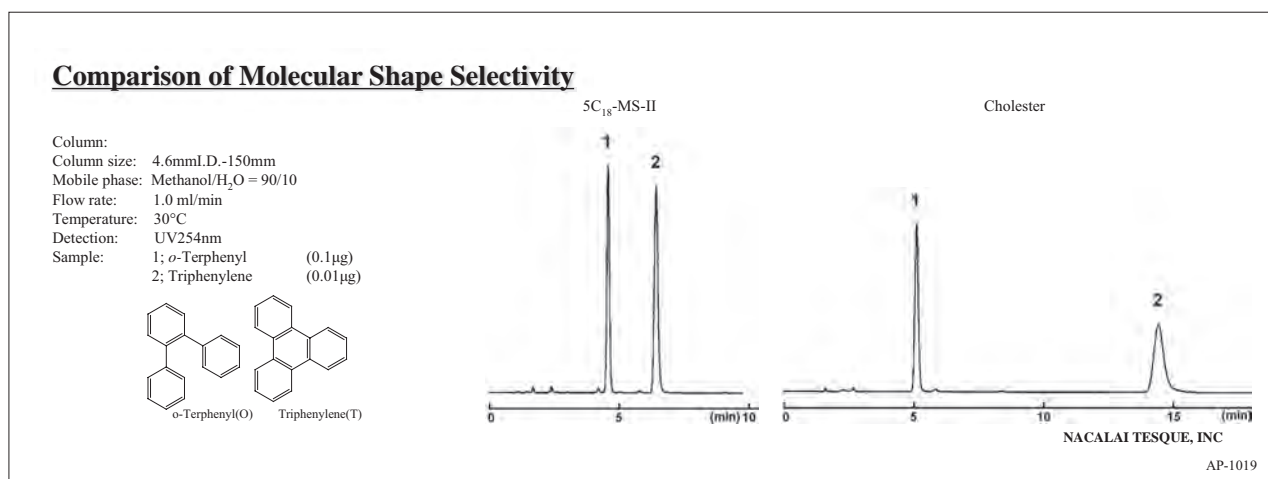


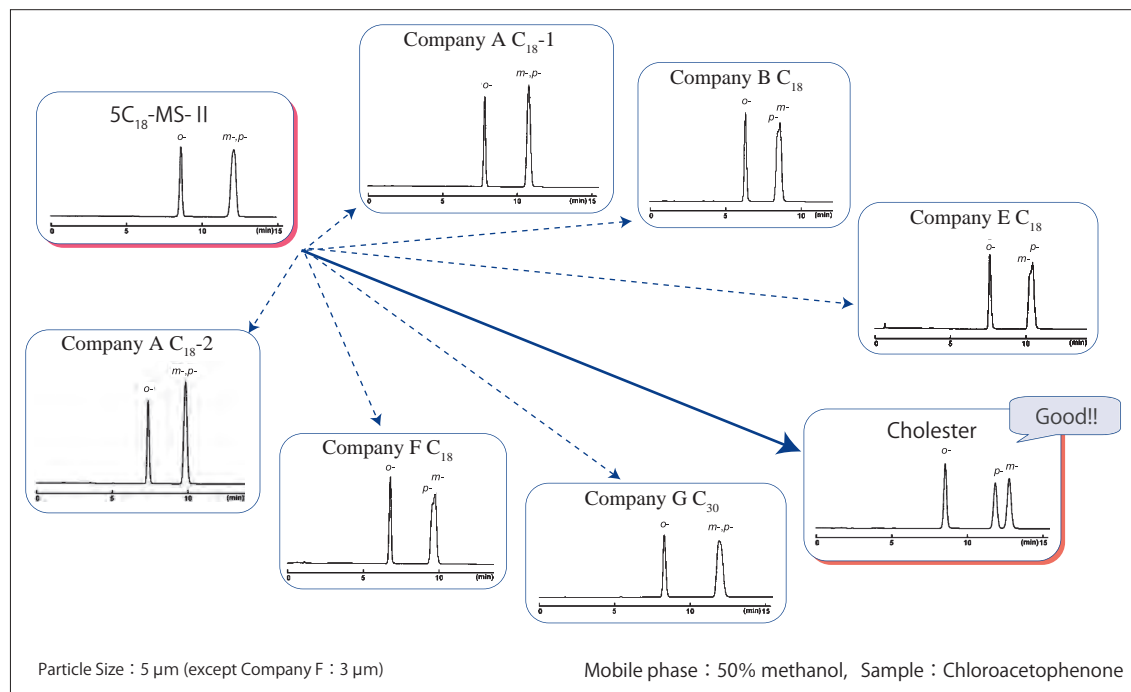
Figure. Comparison of molecular shape selectivity



Improvement in Separation

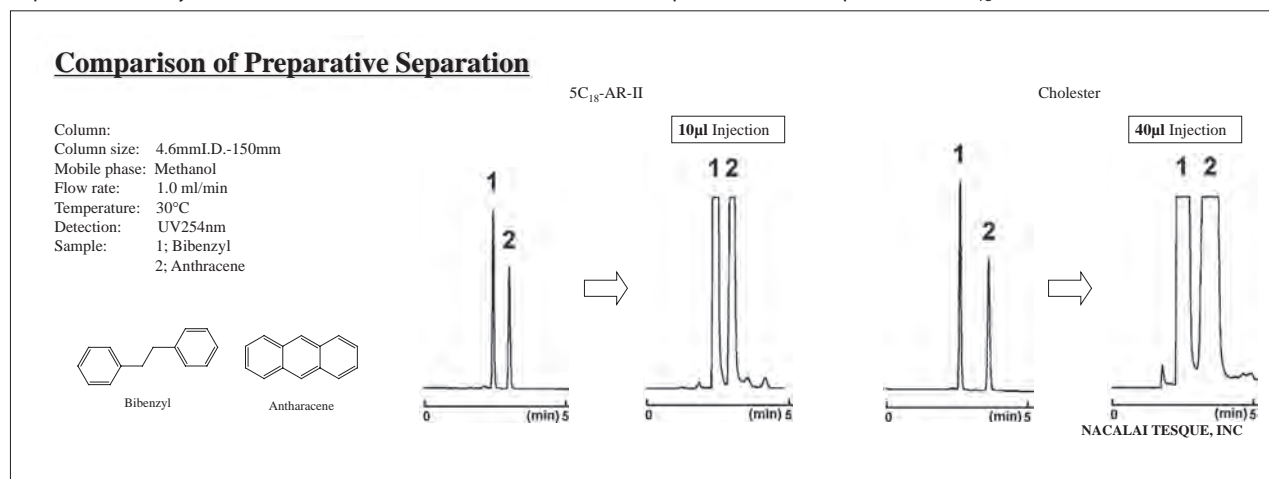
COSMOSIL Cholester provides enhanced selectivity over traditional C₁₈ columns and offers greater performance in separating isomer or other closely related compounds. COSMOSIL Cholester is ideal for method development and serves as an excellent alternative to traditional C₁₈ columns. The figure below shows analytical data of chloroacetophenone isomers. These isomers are difficult to separate with C₁₈ and C₃₀, but they are well resolved by COSMOSIL Cholester.

● Comparison with Competitor's C₁₈ and C₃₀ columns



Efficiency of Preparative Separation

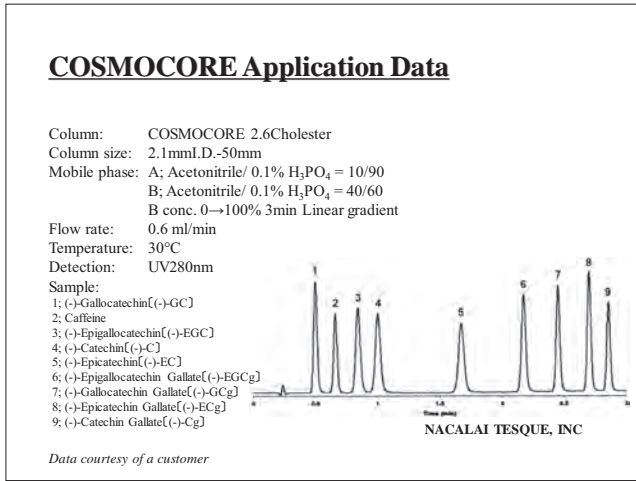
The figure below shows the comparison of efficiency of preparative separation with a C₁₈ column. Both columns show good separation. However, sample loading capacity for preparative separations can be affected by a slight difference in separation ability. COSMOSIL Cholester can load 4 times of sample volume compared with C₁₈ columns.



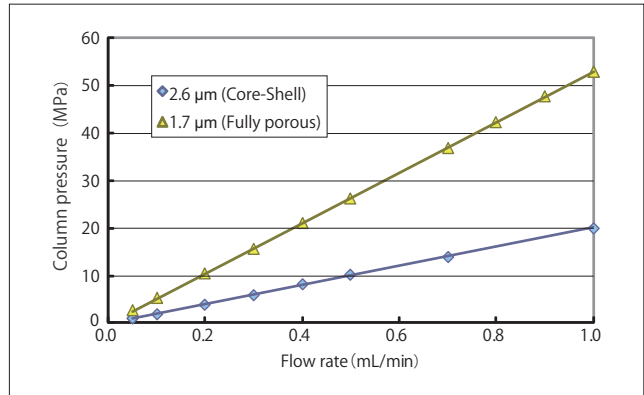
About Core-Shell 2.6Cholester Particles

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)



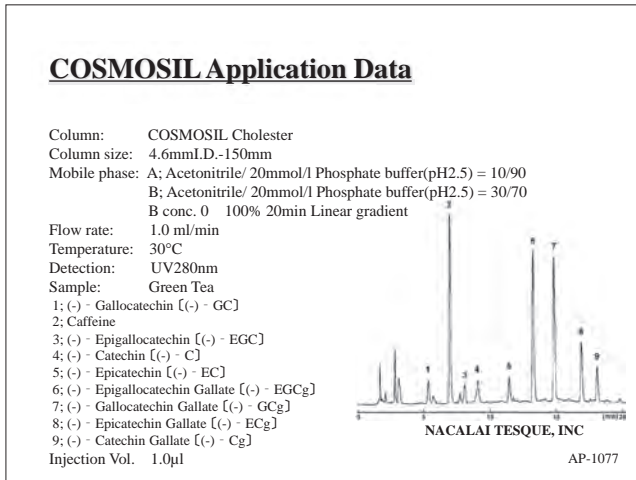
● Comparison of Column Pressure



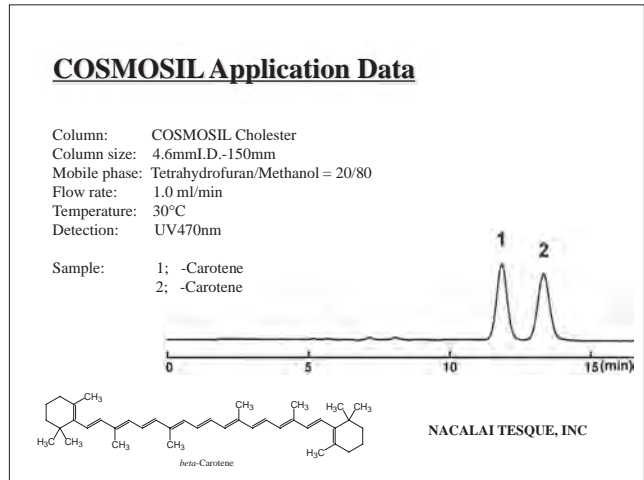
Column Size : 2.1 mmI.D. x 100 mm
 Mobile Phase : Acetonitrile/Water = 70/30
 Temperature : 40°C

Applications

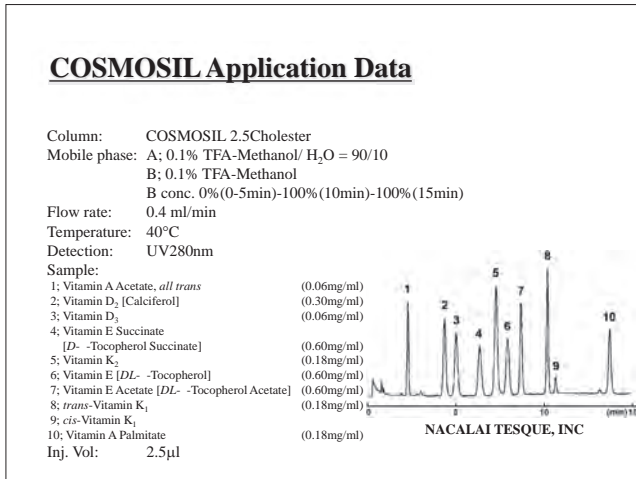
● Catechins (Commercial Green Tea)



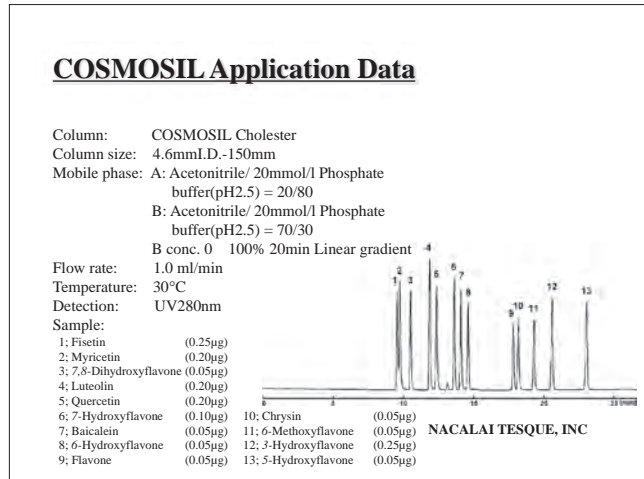
● Carotene



● Fat-Soluble Vitamins

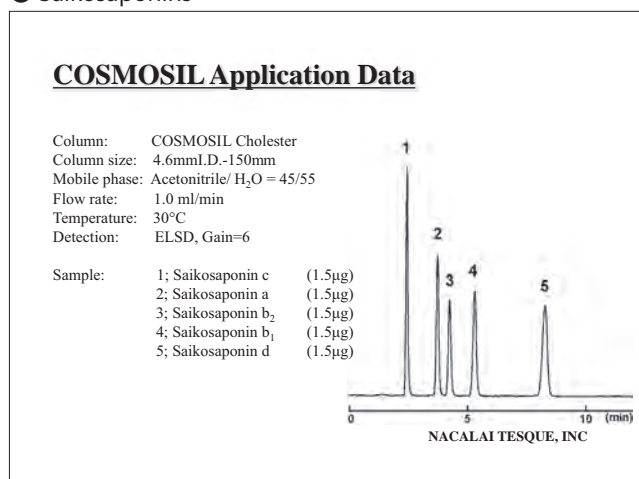


● Flavone

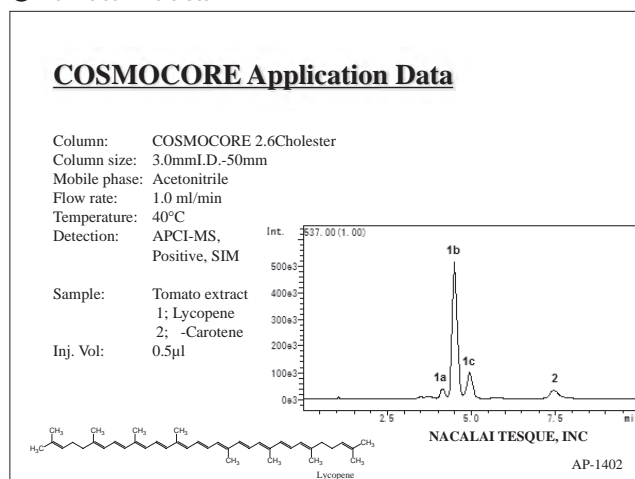


Applications

● Saikosaponins



● Tomato Extracts



Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
1.0 × 150	05968-71	4.6 × 250 ^{※1}	05977-51
1.0 × 250	05969-61	10 × 50	16590-61
2.0 × 30	08565-51	10 × 100	16591-51
2.0 × 50	06352-91	10 × 150	08011-91
2.0 × 100	06948-01	10 × 250	05979-31
2.0 × 150	05971-11	20 × 50	05981-81
2.0 × 250	05972-01	20 × 100	15995-01
3.0 × 150	05973-91	20 × 150	06088-71
3.0 × 250	05974-81	20 × 250	05982-71
4.6 × 50	06359-21	28 × 100	16592-41
4.6 × 100	06591-61	28 × 150	16593-31
4.6 × 150 ^{※1}	05976-61	28 × 250	05985-41
4.6 × 150 3 lots set ^{※1}	07970-03		

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	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0 × 50	09000-01	2.0 × 100	09048-01	3.0 × 75	09050-51
2.0 × 75	09047-11	3.0 × 50	09049-91	3.0 × 100	09051-41

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.1 × 30	12858-91	3.0 × 30	12863-11	4.6 × 30	12869-51
2.1 × 50	12859-81	3.0 × 50	12864-01	4.6 × 50	12870-11
2.1 × 75	12860-41	3.0 × 75	12866-81	4.6 × 75	12871-01
2.1 × 100	12861-31	3.0 × 100	12867-71	4.6 × 100	12872-91
2.1 × 150	12862-21	3.0 × 150	12868-61	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

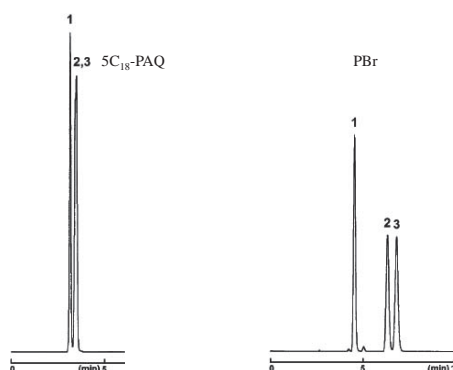
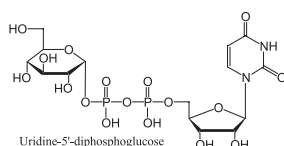
Comparison with C₁₈

COSMOSIL PBr retains hydrophilic compounds stronger than C₁₈ columns under the same reversed-phase conditions.

COSMOSIL Application Data

Column: 4.6mm I.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



NACALAI TESQUE, INC

AP-1397

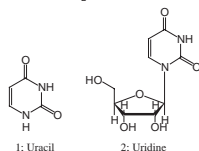
Comparison with HILIC

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.

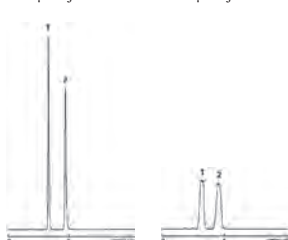
COSMOSIL Application Data

Column: COSMOSIL HILIC
Column size: 4.6mm I.D.-150mm
Mobile phase: Acetonitrile/H₂O = 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 H₂O



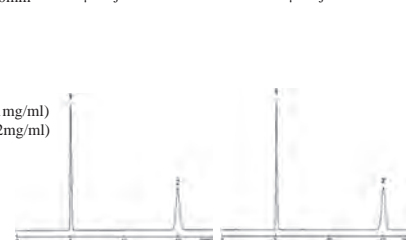
Undiluted sol.
1µl Injection



Column: COSMOSIL PBr
Column size: 4.6mm I.D.-150mm
Mobile phase: H₂O
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV260nm

Sample: 1; Uracil (0.1mg/ml)
2; Uridine (0.2mg/ml)
Sam. Solution H₂O

Undiluted sol.
1µl Injection

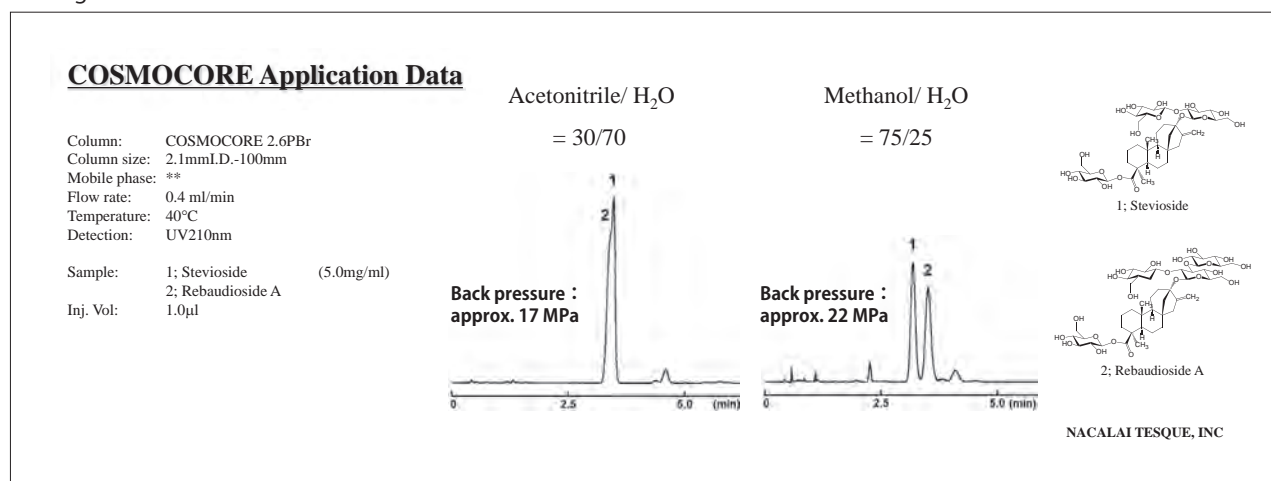


NACALAI TESQUE, INC

COSMOCORE 2.6PBr core-shell column

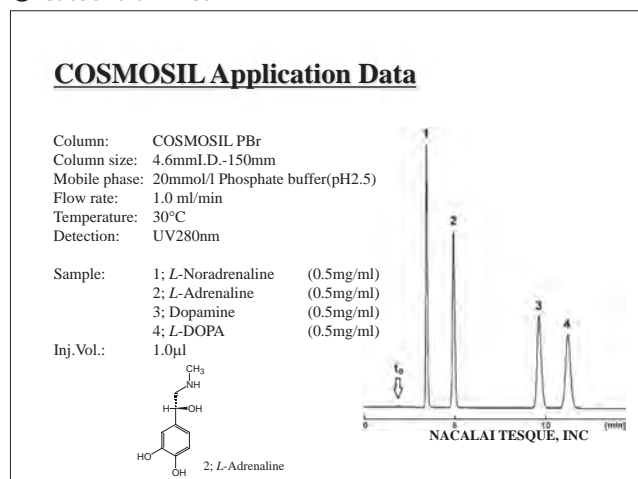
Difference between methanol and acetonitrile mobile phases

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.

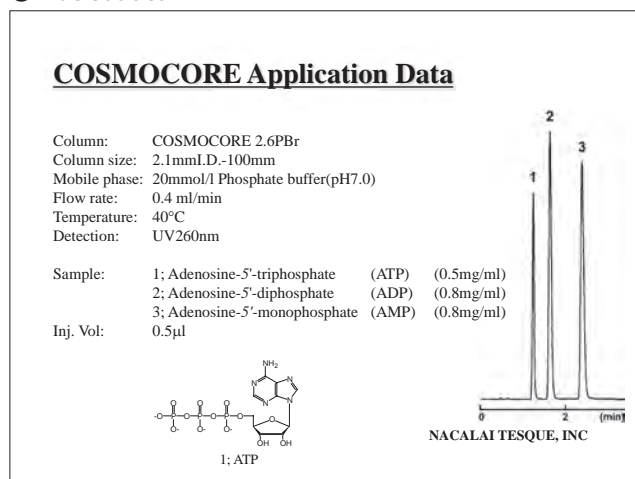


Applications

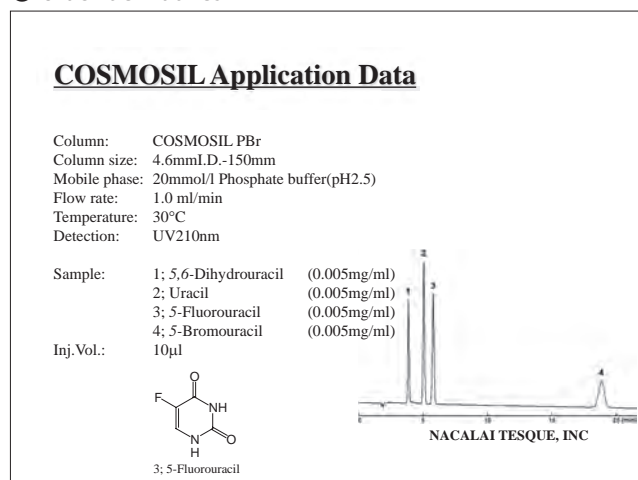
● Catecholamines



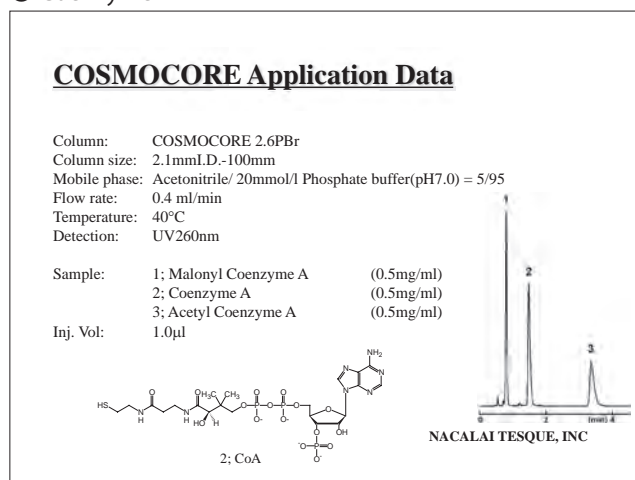
● Nucleotides



● Uracil derivatives



● Coenzyme A



Applications

● Oligopeptides

COSMOSIL Application Data

Column: COSMOSIL PBr
 Column size: 4.6mm I.D.-250mm
 Mobile phase: 0.1% TFA-H₂O
 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; Glycylglycylglycylglycine (5mg/ml)

Inj. Vol.: 1.0µl

NCC(=O)O Glycine NCC(=O)NCC(=O)O Glycylglycine

NACALAI TESQUE, INC

● Glutathione

COSMOSIL Application Data

Column: COSMOSIL PBr
 Column size: 4.6mm I.D.-150mm
 Mobile phase: 0.1% TFA-Acetonitrile/ H₂O = 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

NC(CCS)C(=O)NCC(=O)O 1; Glutathione (Reduced Form)

NACALAI TESQUE, INC
AP-1390

● Oligosaccharides

COSMOSIL Application Data

Column: COSMOSIL PBr
 Column size: 4.6mm I.D.-150mm
 Mobile phase: A; H₂O
 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; J-Kestose
 2; Nystose

Inj. Vol.: 0.5µl

OC[C@H]1O[C@@H](OC[C@H]2O[C@@H](CO)[C@H](O)[C@@H]2O)[C@H](O)[C@@H](O)[C@H]1O 1; J-Kestose

NACALAI TESQUE, INC

● Melamine

COSMOSIL Application Data

Column: COSMOSIL PBr
 Column size: 4.6mm I.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

Nc1nc(N)n(N)c1 4; Melamine

NACALAI TESQUE, INC

Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0× 50	12943-61	4.6× 150	12394-61	28× 100	13260-71
2.0× 100	13245-81	4.6× 250	12395-51	28× 150	13261-61
2.0× 150	12392-81	10× 50	13253-71	28× 250	13262-51
2.0× 250	13247-61	10× 100	13254-61	Guard Column / Guard Cartridge	
3.0× 50	12592-61	10× 150	13255-51	I.D. x Length (mm)	Product Number
3.0× 100	13249-41	10× 250	12397-31	4.6× 10 Cartridge*	12444-14
3.0× 150	13250-01	20× 50	13257-31	10× 20	12396-41
3.0× 250	13251-91	20× 100	13258-21	20× 20	13256-41
4.6× 50	13252-81	20× 150	13259-11	28× 50	12653-61
4.6× 100	12594-41	20× 250	12398-21	* 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	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.1× 30	13692-21	3.0× 30	13698-61	4.6× 30	13705-51
2.1× 50	13693-11	3.0× 50	13699-51	4.6× 50	13712-51
2.1× 75	13694-01	3.0× 75	13700-01	4.6× 75	13714-31
2.1× 100	13695-91	3.0× 100	13701-91	4.6× 100	13715-21
2.1× 150	13697-71	3.0× 150	13703-71	4.6× 150	13719-81
				4.6× 250	13734-71

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

COSMOSIL PFP



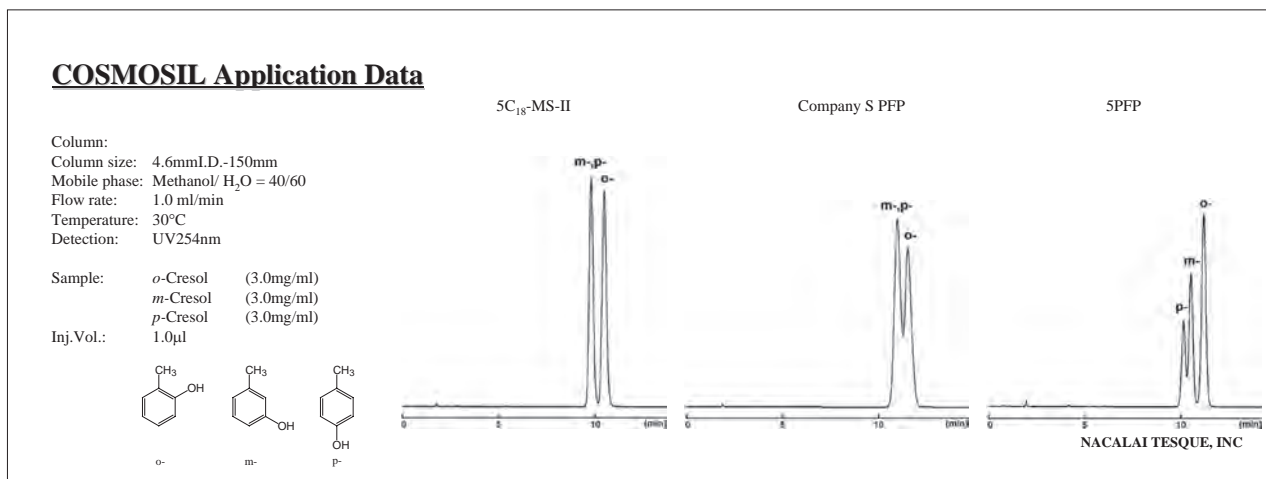
- Pentafluorophenyl-bonded stationary phase
- Alternative selectivity to C₁₈ columns

Suitable Samples

- Vitamin E
- Structural isomers and fluorides

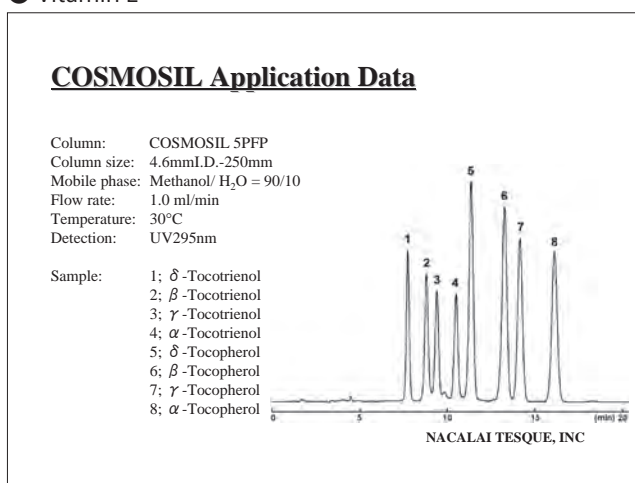
Alternative Selectivity to C₁₈ Columns

COSMOSIL PFP provides different selectivity from C₁₈ columns. Furthermore, it offers improved separation compared to other PFP columns.

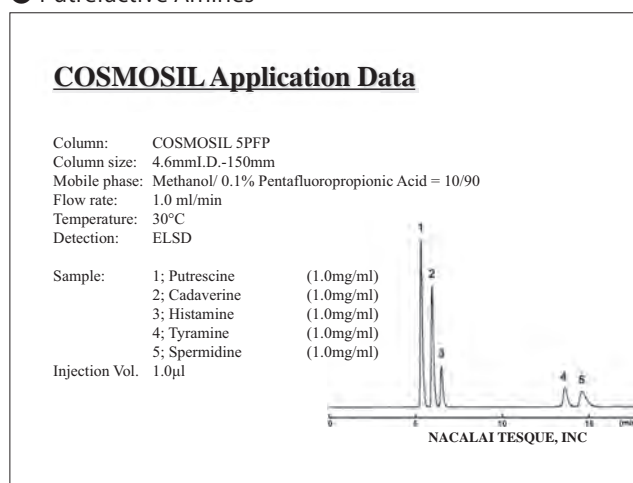


Applications

● Vitamin E



● Putrefactive Amines



Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0 × 50	13263-41	4.6 × 150	12383-01	28 × 100	13280-11
2.0 × 100	13264-31	4.6 × 250	12384-91	28 × 150	13281-01
2.0 × 150	12381-21	10 × 50	13272-21	28 × 250	13282-91
2.0 × 250	13265-21	10 × 100	13273-11	Guard Column / Guard Cartridge	
3.0 × 50	13266-11	10 × 150	13274-01	I.D. x Length (mm)	Product Number
3.0 × 100	13267-01	10 × 250	12386-71	4.6 × 10 Cartridge*	12443-24
3.0 × 150	13268-91	20 × 50	13276-81	10 × 20	12385-81
3.0 × 250	13269-81	20 × 100	13277-71	20 × 20	13275-91
4.6 × 50	13270-41	20 × 150	13278-61	28 × 50	13279-51
4.6 × 100	13271-31	20 × 250	12387-61	* 2 cartridges included. Guard cartridge holder required; refer to page 76.	

COSMOSIL π NAP

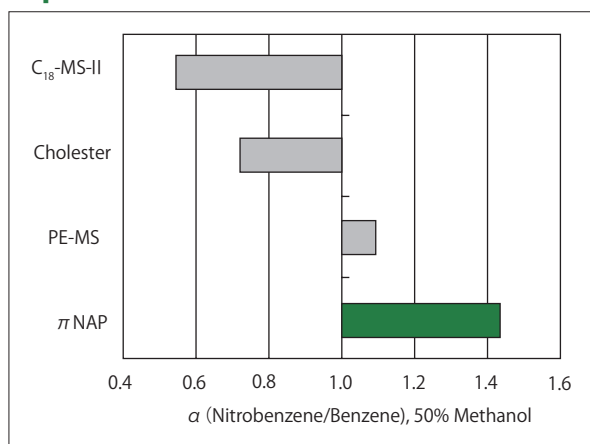


- Naphthalene-bonded stationary phase
- Enhanced π - π interactions

Suitable Samples

- Aromatic compounds and positional isomers

Comparison of π - π Interactions

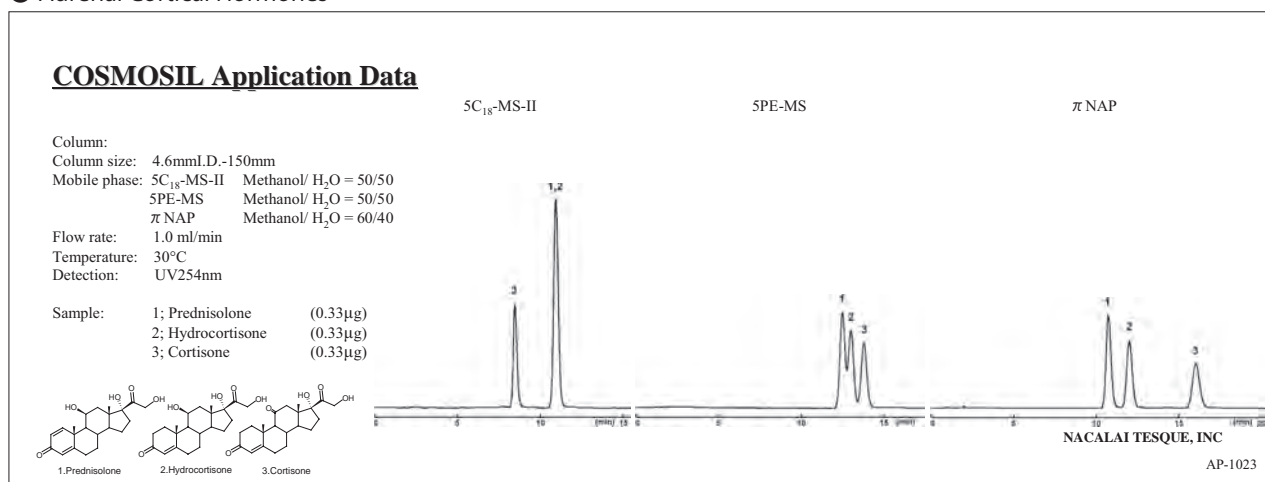


COSMOSIL π NAP shows stronger π - π interactions than phenyl columns. Its two fused aromatic rings retain nitrobenzene with more π electrons stronger than phenyl columns.

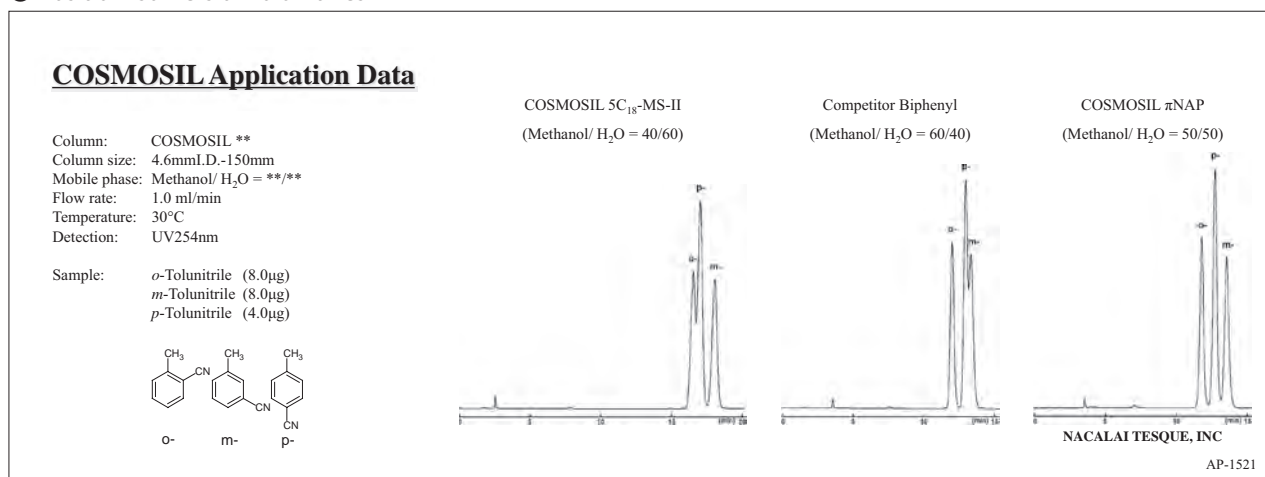
Figure. Comparison of π - π Interactions

Comparison with C₁₈ and Phenyl Columns

- Adrenal Cortical Hormones

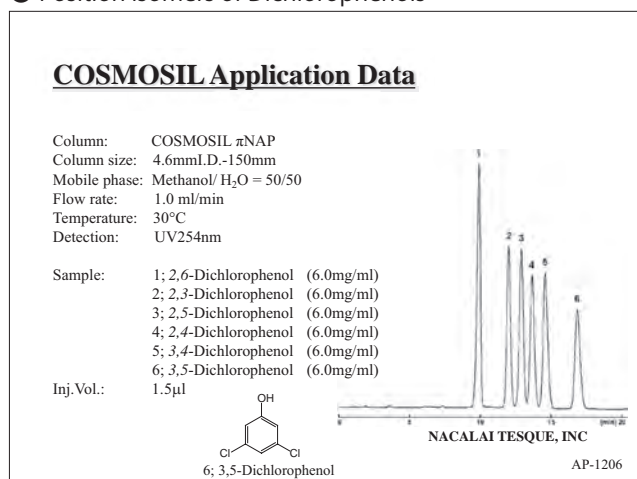


- Position Isomers of Tolunitriles

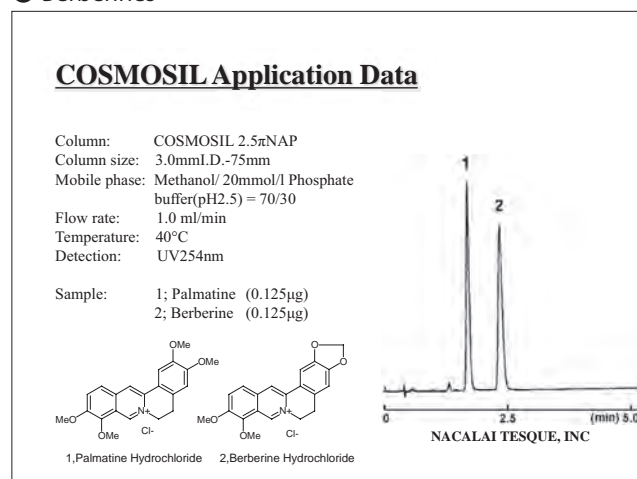


Applications

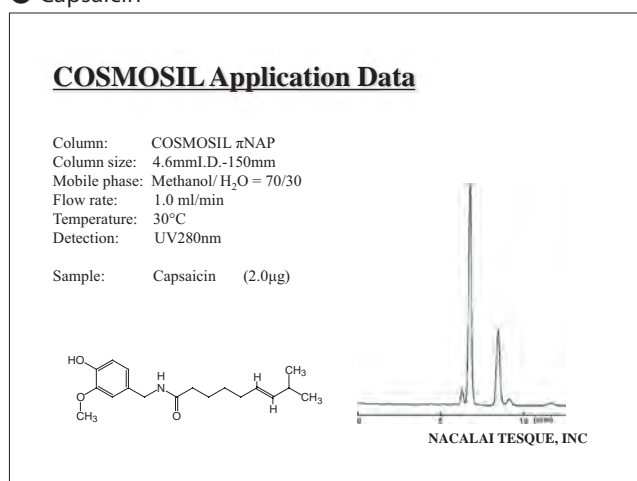
● Position Isomers of Dichlorophenols



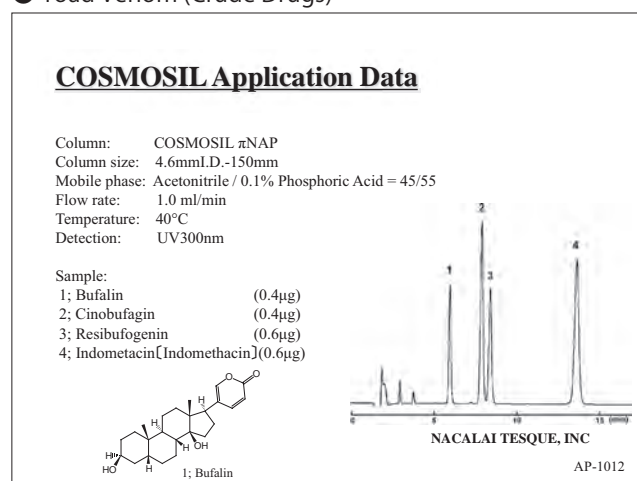
● Berberines



● Capsaicin



● Toad Venom (Crude Drugs)



Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
1.0 x 150	08076-61	4.6 x 100	08084-51	20 x 250	08093-31
1.0 x 250	08077-51	4.6 x 150	08085-41	28 x 100	12563-41
2.0 x 30	08566-41	4.6 x 250	08086-31	28 x 150	16597-91
2.0 x 50	08567-31	10 x 50	16594-21	28 x 250	08095-11
2.0 x 100	08299-51	10 x 100	16595-11	Guard Column	
2.0 x 150	08078-41	10 x 150	08088-11	I.D. x Length (mm)	Product Number
2.0 x 250	08079-31	10 x 250	08089-01	4.6 x 10	08082-71
3.0 x 150	08080-91	20 x 50	08091-51	10 x 20	08087-21
3.0 x 250	08081-81	20 x 100	16596-01	20 x 20	08090-61
4.6 x 50	08083-61	20 x 150	08092-41	28 x 50	08094-21

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0 x 50	06062-91	2.0 x 100	06052-21	3.0 x 75	06055-91
2.0 x 75	06051-31	3.0 x 50	06054-01	3.0 x 100	06057-71

COSMOSIL PYE

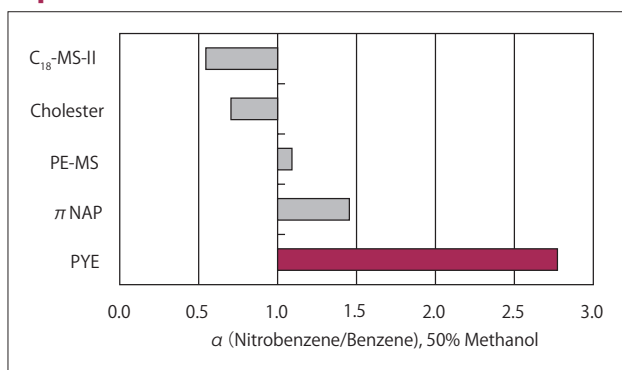


- Pyrenylethyl-bonded stationary phase
- Stronger π - π interactions

Suitable Samples

- Aromatic compounds, positional isomers, dioxins and PCBs

Comparison of π - π Interactions



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

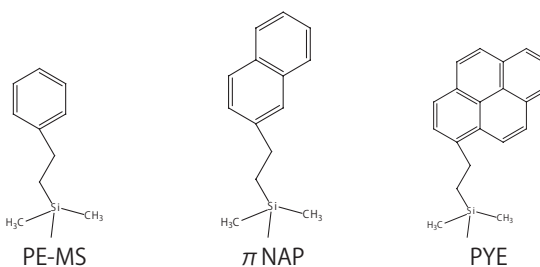


Figure. Comparison π - π Interactions

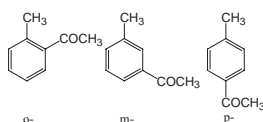
Comparison with C₁₈ and Phenyl Columns

- Methylacetophenone

COSMOSIL Application Data

Column: COSMOSIL **
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol / H₂O = **/
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

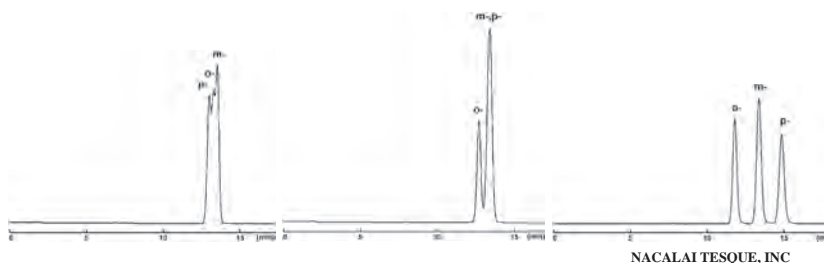
Sample: *o*-Methylacetophenone (0.15mg/ml)
m-Methylacetophenone (0.125mg/ml)
p-Methylacetophenone (0.075mg/ml)
 Inj. Vol: 1.0 μ l



COSMOSIL 5C₁₈-MS-II
 (Methanol / H₂O = 45/55)

COSMOSIL π NAP
 (Methanol / H₂O = 50/50)

COSMOSIL 5PYE
 (Methanol / H₂O = 55/45)

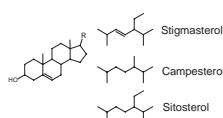


- Sterols

COSMOSIL Application Data

Column: COSMOSIL **
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol/ H₂O = **/**
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV210nm

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

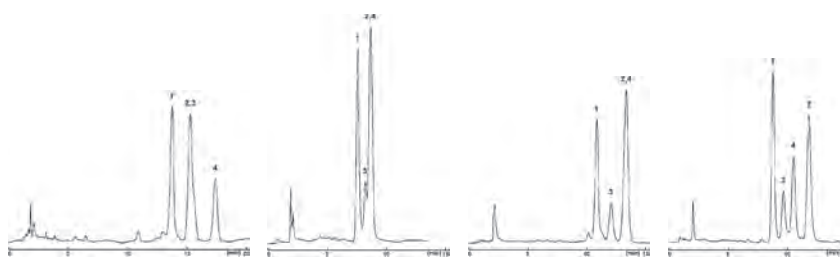


COSMOSIL 5C₁₈-MS-II
 (Methanol / H₂O = 98/2)

Competitor Biphenyl
 (Methanol / H₂O = 95/5)

COSMOSIL π NAP
 (Methanol / H₂O = 90/10)

COSMOSIL 5PYE
 (Methanol / H₂O = 95/5)



AP-1524

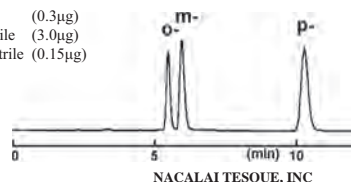
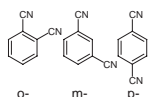
Applications

● Phthalonitrile Isomers

COSMOSIL Application Data

Column: COSMOSIL 5PYE
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol/ H₂O = 80/20
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

Sample: *o*-: Phthalonitrile (0.3μg)
m-: Isophthalonitrile (3.0μg)
p-: Terephthalonitrile (0.15μg)

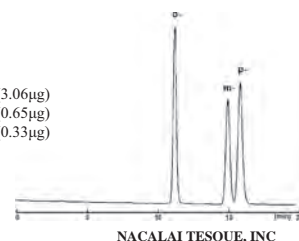
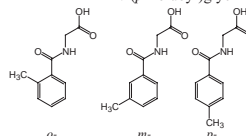


● Methylhippuric Acids

COSMOSIL Application Data

Column: COSMOSIL 5PYE
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Methanol/ 20mmol/l Phosphate buffer(pH2.5) = 40/60
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

Sample: *N*-(*o*-Toluoyl)glycine (3.06μg)
N-(*m*-Toluoyl)glycine (0.65μg)
N-(*p*-Toluoyl)glycine (0.33μg)

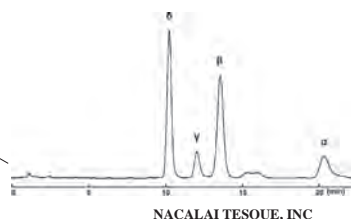
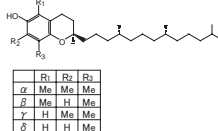


● Tocopherols

COSMOSIL Application Data

Column: COSMOSIL 5PYE
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol/ H₂O = 90/10
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV295nm

Sample: α-Tocopherol
 β-Tocopherol
 γ-Tocopherol
 δ-Tocopherol

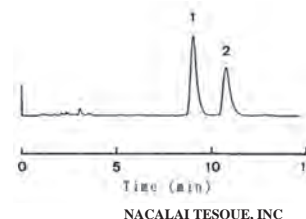
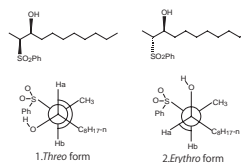


● Diastereomers

COSMOSIL Application Data

Column: COSMOSIL 5PYE
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol/ H₂O = 80/20
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

Sample: 1; *Threo* form
 2; *Erythro* form



Caution

1. Methanol is the recommended mobile phase for COSMOSIL PYE. Acetonitrile is not recommended because it has many $\pi-\pi$ electrons and interferes with $\pi-\pi$ 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



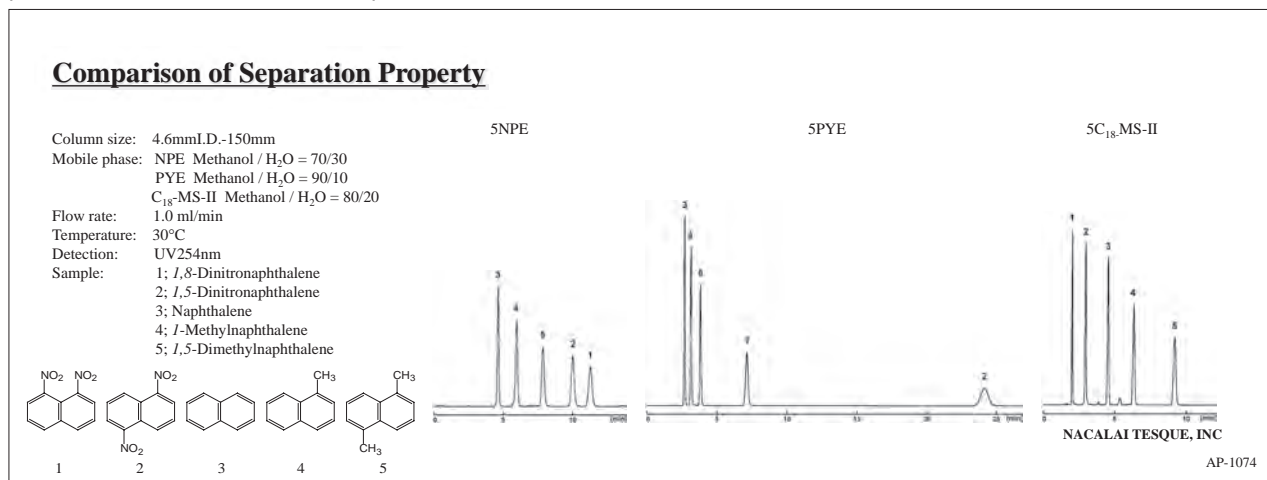
- Nitrophenylethyl-bonded stationary phase
- Separation with dipole-dipole and π - π interactions

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 μ m)

Packed Column

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

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

Guard Column

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

2. Reversed Phase C₁₈ Series

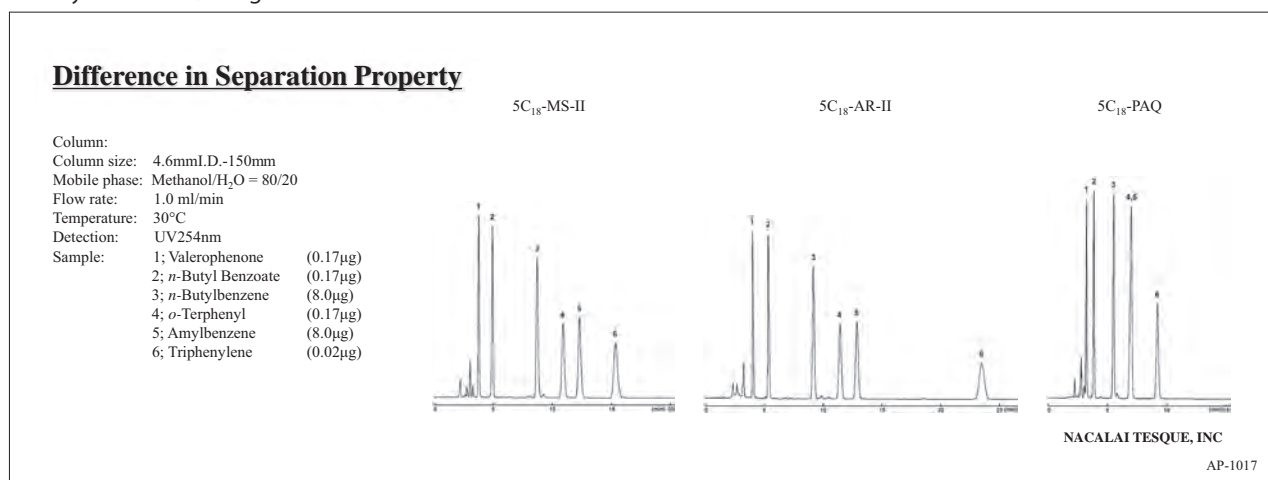
Specifications

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 5C₁₈-AR-II retains planar compounds (such as triphenylene) longer compared to COSMOSIL 5C₁₈-MS-II. COSMOSIL 5C₁₈-PAQ has shorter retention time in general, and retains polar compounds (such as valerophenone and *n*-butyl benzoate) longer.



COSMOSIL C₁₈-MS-II



- First-choice column of our ODS series
- Multi-purpose C₁₈ column
- High reproducibility
- A wide range of applications

Suitable Samples

- Low-MW compounds

Separation Property

The COSMOSIL 5C₁₈-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 5C₁₈-MS-II is the first-choice column for reversed-phase chromatography.

Separation Property

Column: COSMOSIL 5C₁₈-MS-II
Column size: 4.6mm I.D.-150mm
Mobile phase: Methanol/H₂O = 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)

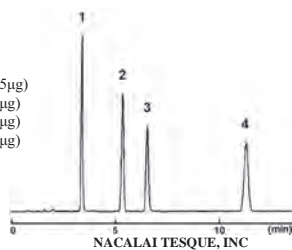


Table. Comparison of hydrophobic interaction, analytical pressure and theoretical plate number.

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

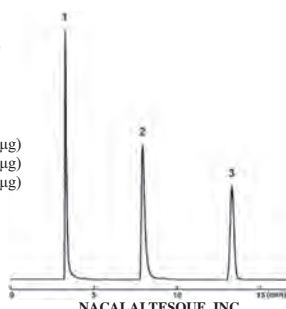
The COSMOSIL 5C₁₈-MS-II column, taking advantage of a new end-capping treatment, can replace the original COSMOSIL C₁₈ (ODS) column. A new end-capping treatment with polar groups for "shield effect" has significantly improved peak shape for basic compounds. Ultra pure silica gel with low trace-metal content is used for COSMOSIL columns; thus the columns provide excellent peak shapes for chelating compounds.

Basic Compounds

Column: 5C₁₈-MS-II
Column size: 4.6mm I.D.-150mm
Mobile phase: Methanol/ 20mmol/l Phosphate
buffer(pH7) = 20/80

Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV254nm

Sample: 1; Procainamide (0.38μg)
2; N-Acetylprocainamide (0.25μg)
3; Benzylalcohol (5.63μg)

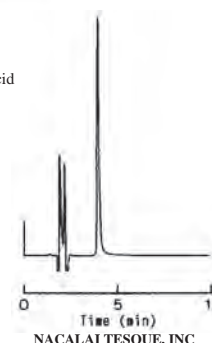


Metal Coordination Compounds

Column: COSMOSIL 5C₁₈-MS-II
Column size: 4.6mm I.D.-150mm
Mobile phase: Acetonitrile / 20mmol/l Phosphoric
Acid = 5/95

Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV240nm

Sample: Oxine-copper

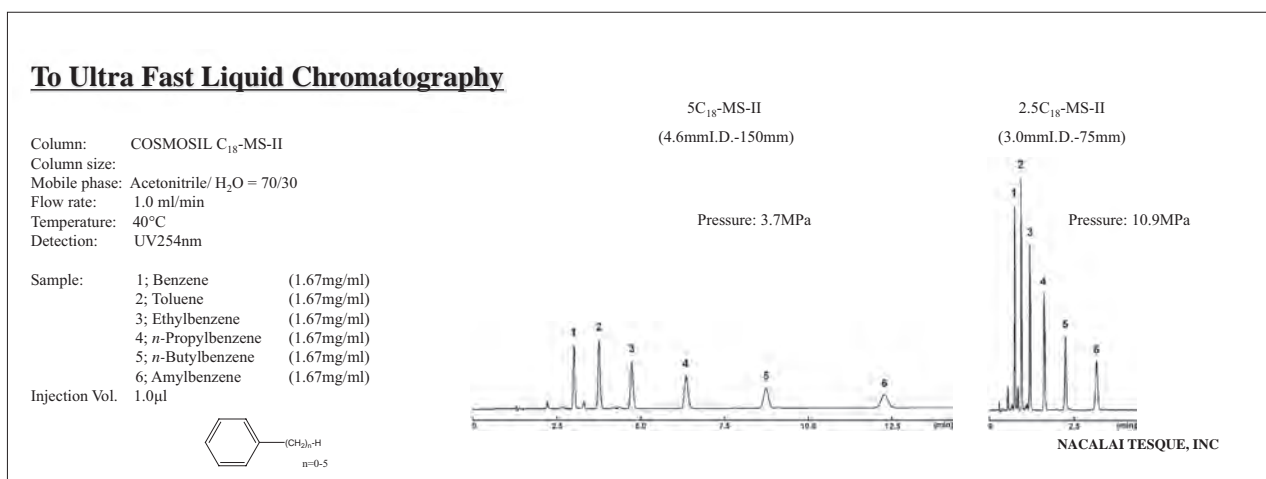


High Reproducibility

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 5C₁₈-MS-II (4.6 mm I.D. x 150 mm and 4.6 mm I.D. x 250 mm).

Ultra-High Performance Columns (COSMOSIL 2.5C₁₈-MS-II)

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



Ordering Information

● COSMOSIL 5C₁₈-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 15C₁₈-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 3C₁₈-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 2.5C₁₈-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 C₁₈-AR-II



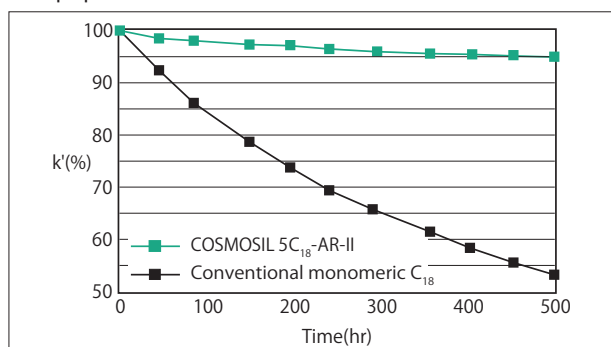
- Features strong acid resistance

Suitable Samples

- Peptides, acidic compounds, etc.

Acid Resistance

COSMOSIL 5C₁₈-AR-II packed column features a polymeric type of C₁₈ reversed phase material. The acidic resistance of COSMOSIL 5C₁₈-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 5C₁₈-AR-II
 Column size: 4.6mm I.D.-150mm
 Mobile phase: A; 0.05% TFA-H₂O
 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 5C₁₈-AR-II
 Column size: 4.6mm I.D.-150mm
 Mobile phase: A; 0.05% TFA-H₂O
 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(PO₃H₂)₄]-Angiotensin II(Human) (0.5mg/ml)

Inj. Vol.: 3.0μl

NACALAI TESQUE, INC

- Colistin

COSMOSIL Application Data

Column: COSMOSIL 5C₁₈-AR-II
 Column size: 4.6mm I.D.-150mm
 Mobile phase: A; 0.1% TFA-Acetonitrile/ H₂O = 20/80
 B; 0.1% TFA-Acetonitrile/ H₂O = 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 5C₁₈-AR-II
 Column size: 4.6mm I.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

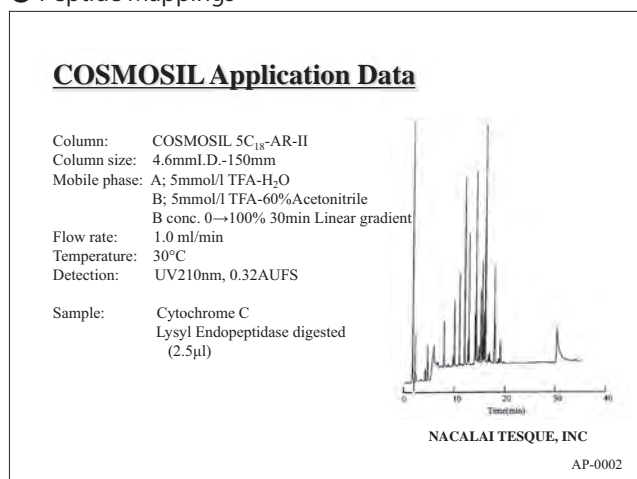
Sample: PTH-Asp (0.4mg/ml)
 PTH-His (0.3mg/ml)
 PTH-Arg (0.5mg/ml)
 PTH-Ser (0.3mg/ml)
 PTH-Trp (0.25mg/ml)
 PTH-Lys (0.35mg/ml)
 Others (0.2mg/ml)

Injection 2.0μl

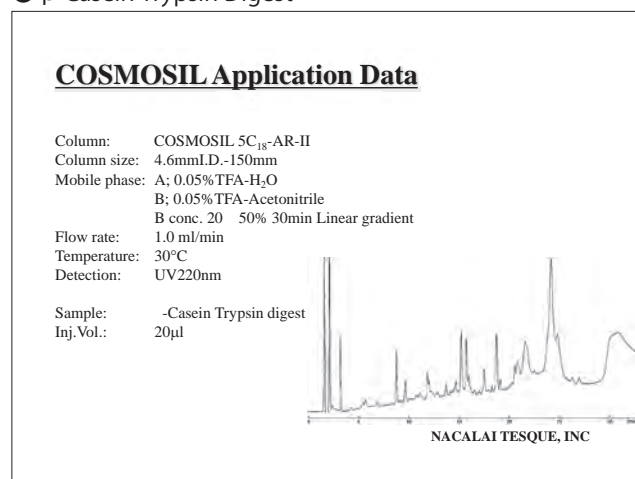
NACALAI TESQUE, INC
AP-0004

Applications

● Peptide Mappings



● β-Casein Trypsin Digest



Ordering Information

● COSMOSIL 5C₁₈-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 15C₁₈-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 3C₁₈-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



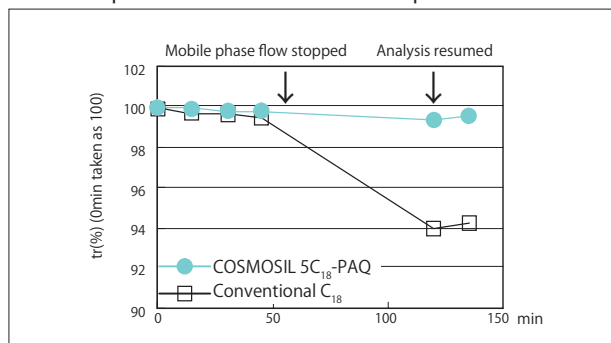
- Compatible with 100% water based mobile phase

Suitable Samples

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

Stable Performance

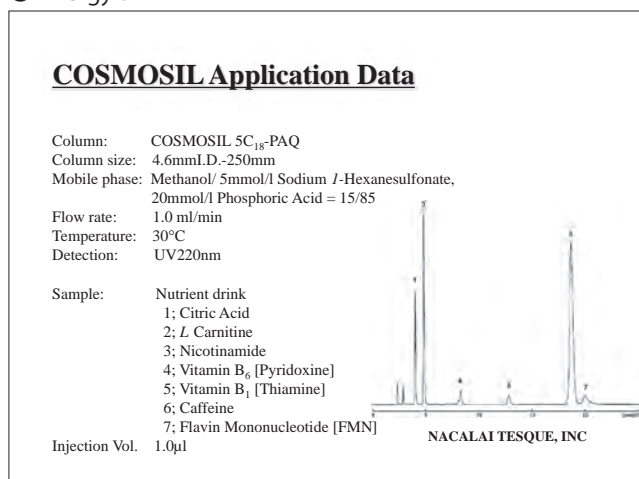
- Stable performance under 100% aqueous conditions



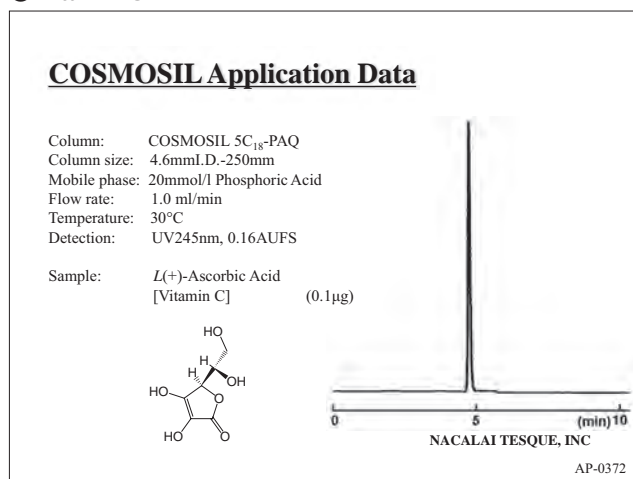
The figure shows the change of retention time for thymine with 100% aqueous mobile phase (20 mmol/l phosphate buffer, pH 7). The sample was analyzed 4 times (1 hour). Flow of mobile phase was then stopped for 1 hour. The sample was analyzed under the same condition again after 1 hour. The conventional C₁₈ column showed change of retention time, but COSMOSIL 5C₁₈-PAQ maintained stable retention time.

Applications

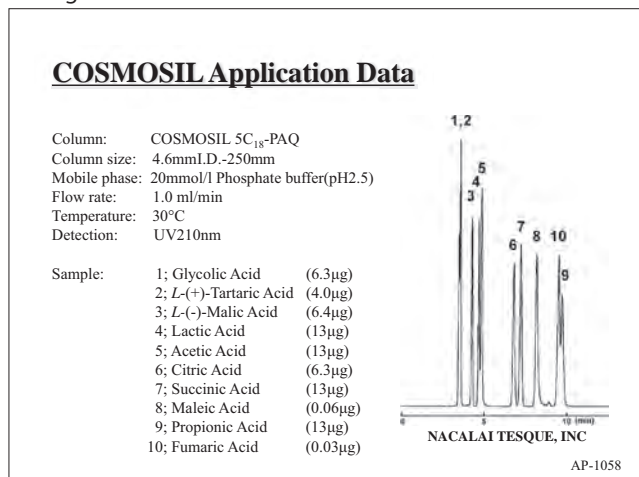
- Energy Drink



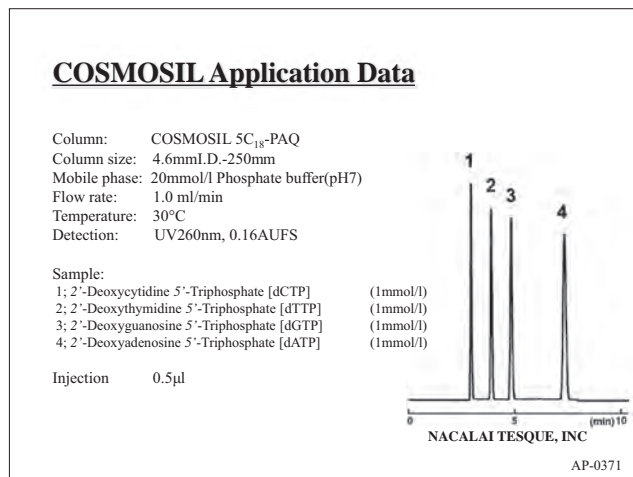
- Vitamin C



- Organic Acids

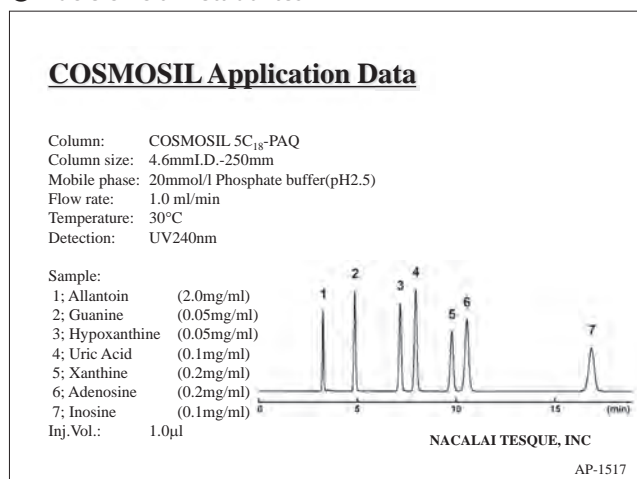


- dNTPs

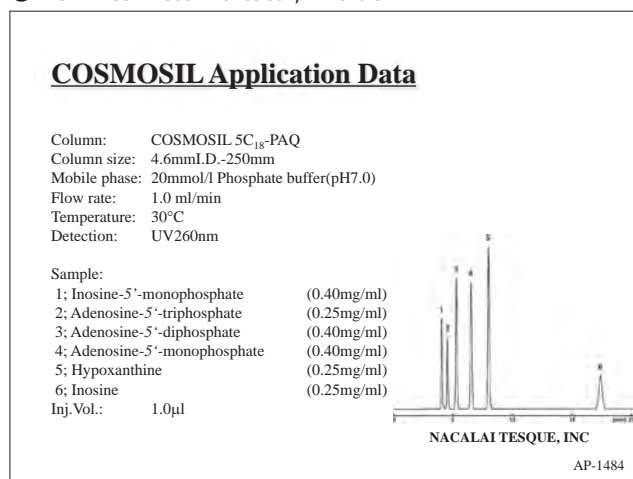


Applications

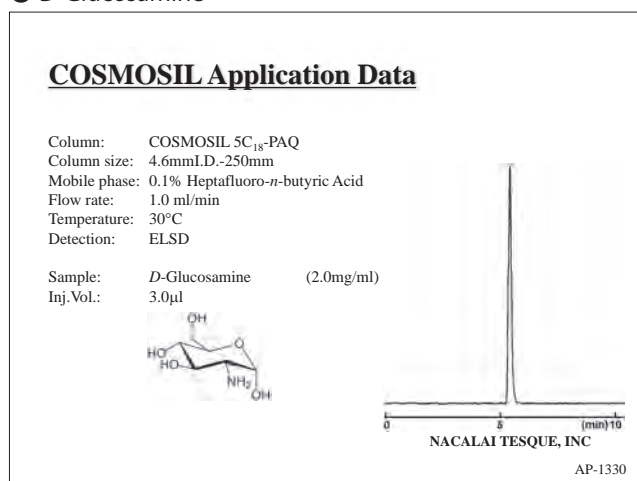
● Nucleic Acid Metabolites



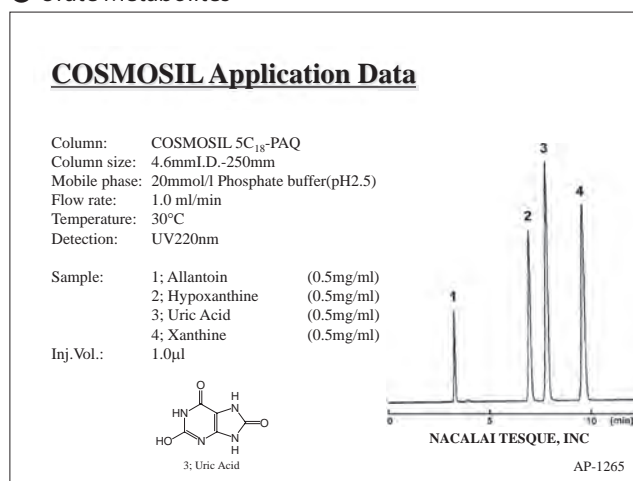
● Fish Freshness Indicator, K value



● D-Glucosamine



● Urate Metabolites



Ordering Information

● COSMOSIL 5C₁₈-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 15C₁₈-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 3C₁₈-EB



- Excellent for basic compounds
- 3 μm C₁₈ column with reduced tailing and high resolution

Suitable Samples

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

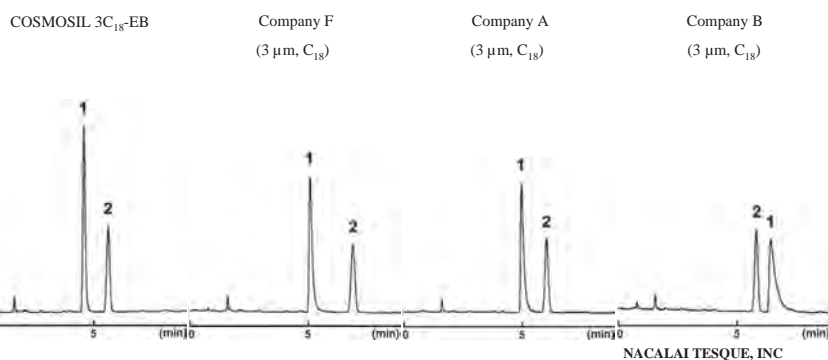
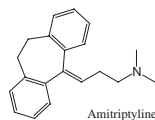
Analysis of Basic Compounds

COSMOSIL 3C₁₈-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: COSMOSIL 3C₁₈-EB
Column size: 4.6mm I.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



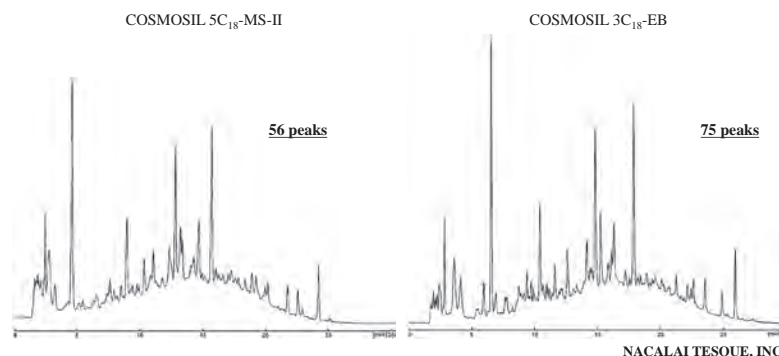
Advanced / Precise Separation of Multicompounds

The application below is analysis of red wine. COSMOSIL 3C₁₈-EB (3 μm) provides more peaks comparing to conventional 5 μm columns. COSMOSIL 3C₁₈-EB is suitable for analysis of many-component samples.

COSMOSIL Application Data

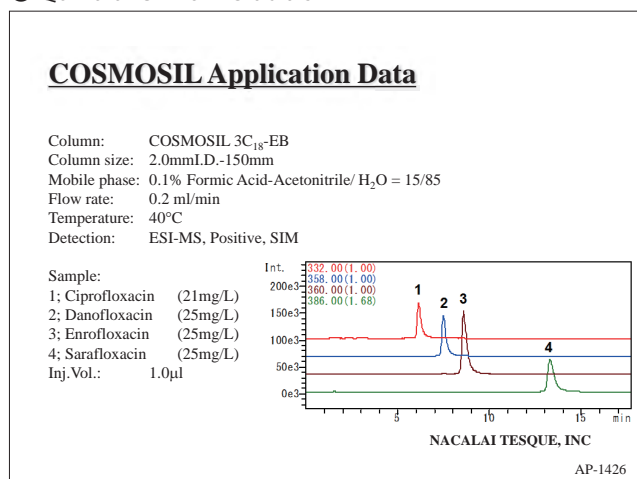
Column: COSMOSIL **
Column size: 4.6mm I.D.-150mm
Mobile phase: A: 20mmol/l Phosphate buffer(pH2.5)
B: Methanol
B conc. 10 90% 30min Linear gradient
Flow rate: 1.0 ml/min
Temperature: 30°C
Detection: UV300nm

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

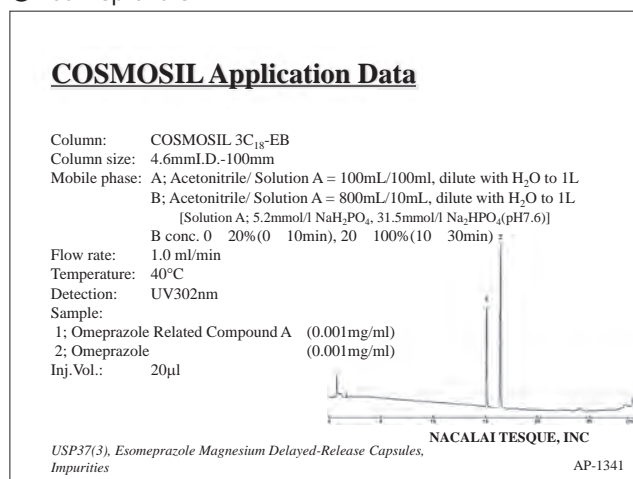


Applications

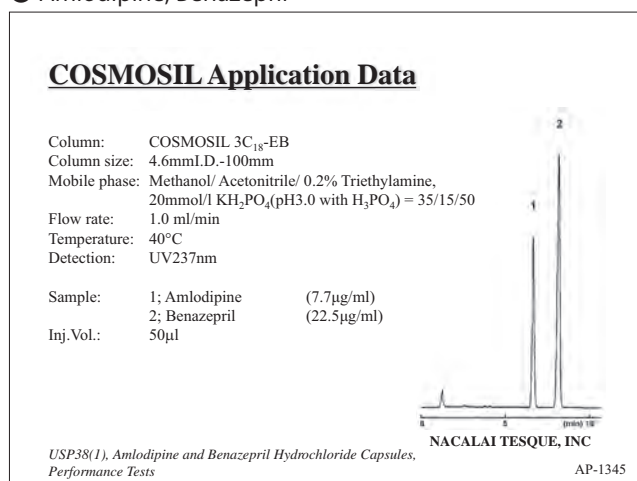
● Quinolone Antimicrobials



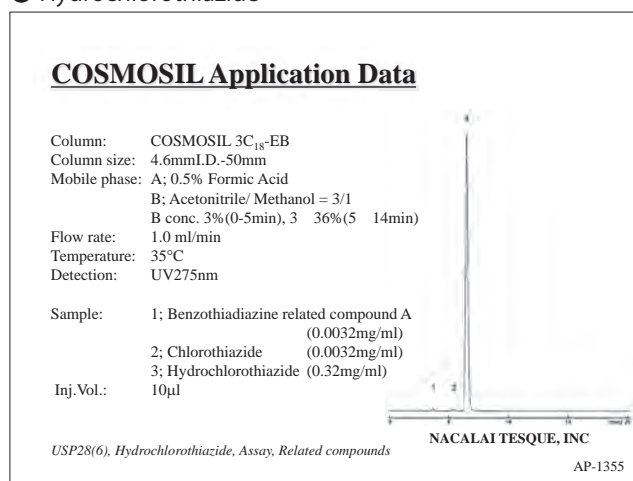
● Esomeprazole



● Amlodipine, Benazepril



● Hydrochlorothiazide



Ordering Information

● COSMOSIL 3C₁₈-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 2.6C₁₈



Reversed Phase C₁₈ Series

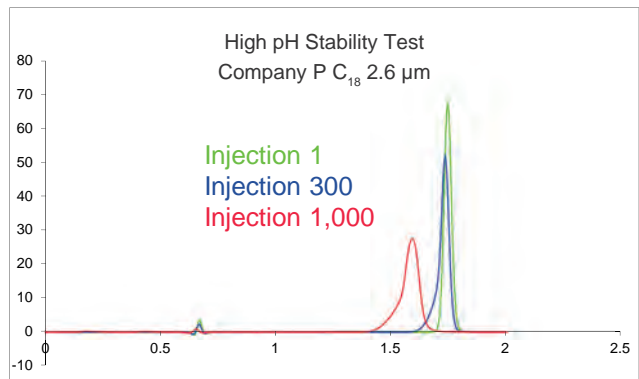
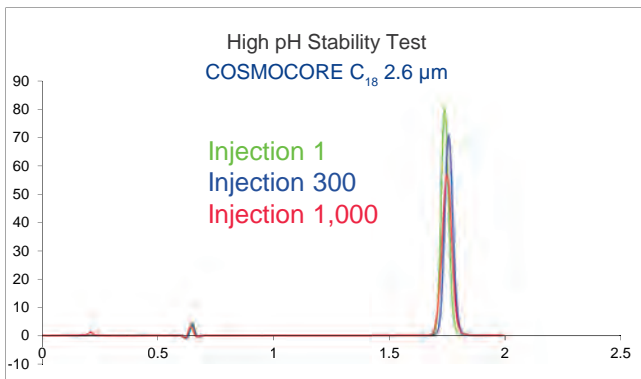
- Core-Shell Particles
- Ultra-high performance LC results with conventional HPLC equipment
- Same number of theoretical plates as sub-2 μm columns with half the back pressure

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 C₁₈ column shows superior stability compared with other core shell C₁₈ phases.

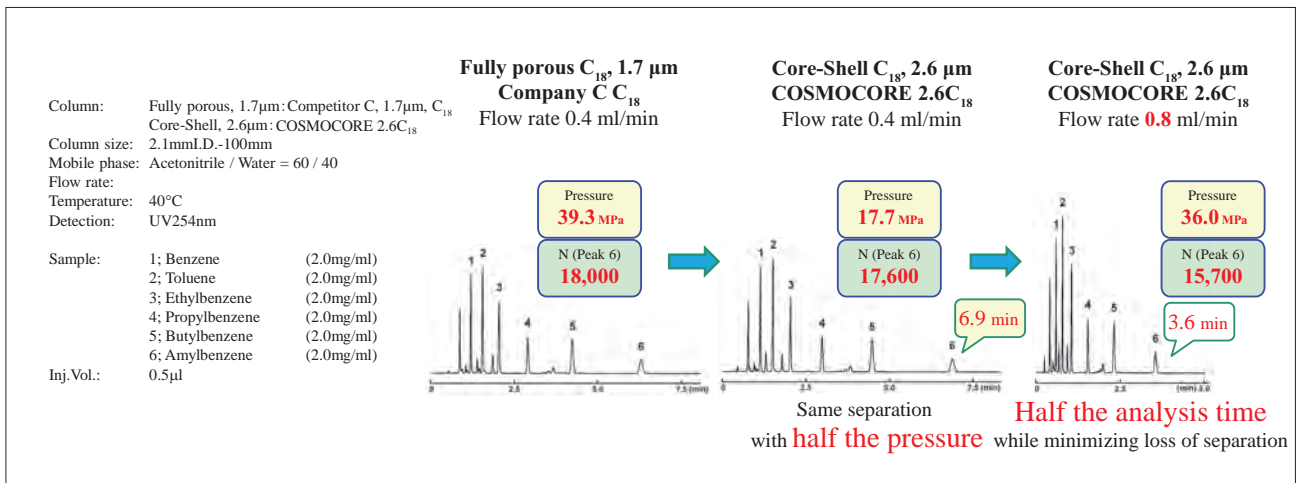


Column size: 2.1 mm x 100mm
Sample: Caffeine (0.05 mg/ml)
Flow rate: 0.4 ml/min

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

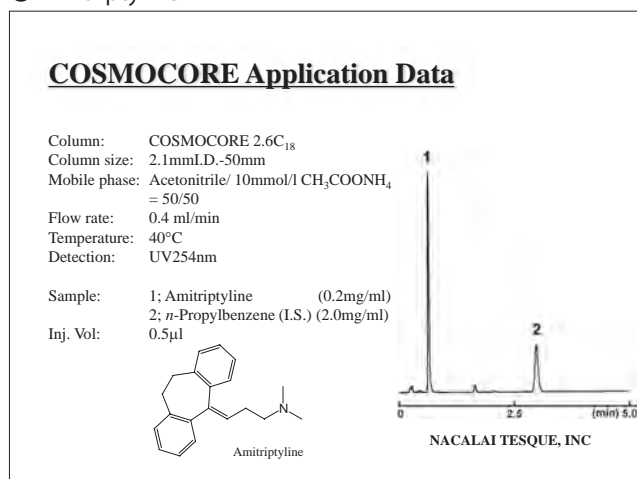
Reduced Back Pressure and Faster Analyses

COSMOCORE 2.6C₁₈ 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.

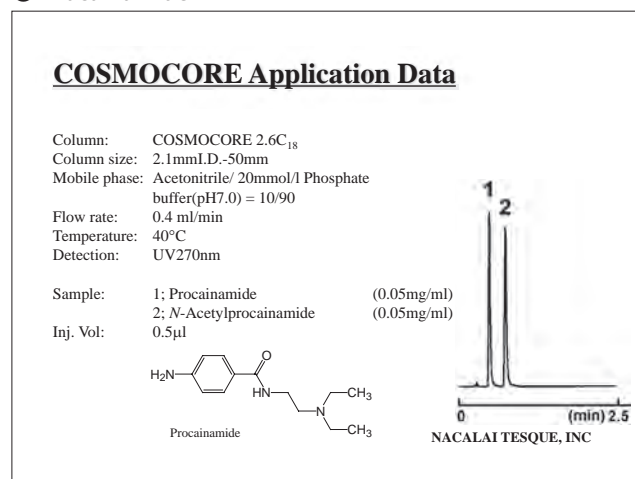


Applications

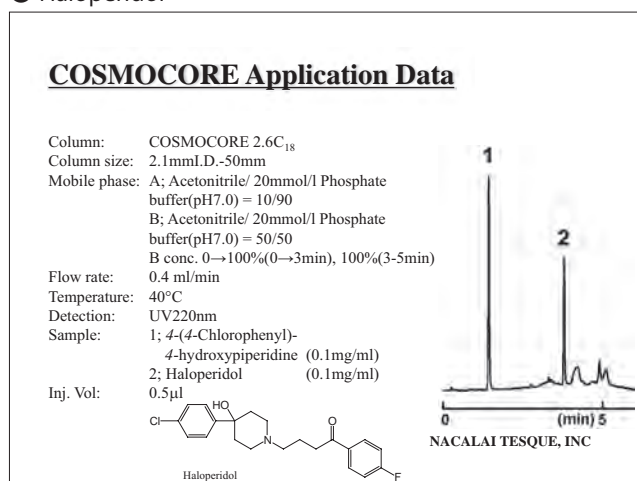
● Amitriptyline



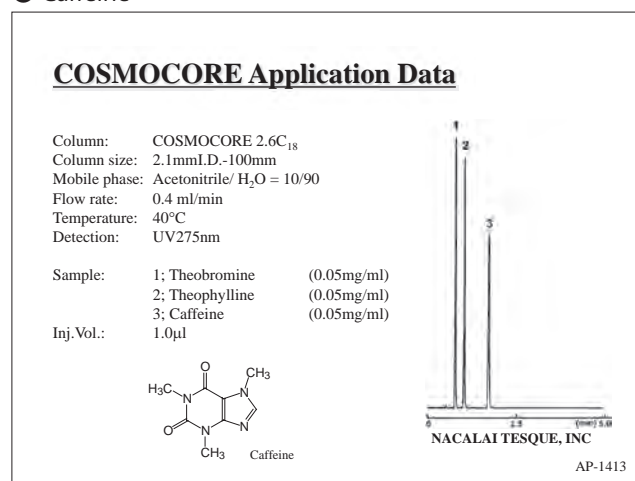
● Procainamide



● Haloperidol



● Caffeine



Ordering Information

● COSMOCORE 2.6C₁₈ Analytical Columns (Particle Size: 2.6 µm)

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.1 × 30	12632-31	3.0 × 30	12611-01	4.6 × 30	12601-31
2.1 × 50	12631-41	3.0 × 50	12609-51	4.6 × 50	12600-41
2.1 × 75	12630-51	3.0 × 75	12608-61	4.6 × 75	12599-91
2.1 × 100	12614-71	3.0 × 100	12607-71	4.6 × 100	12598-01
2.1 × 150	12612-91	3.0 × 150	12602-21	4.6 × 150	12597-11
				4.6 × 250	12596-21

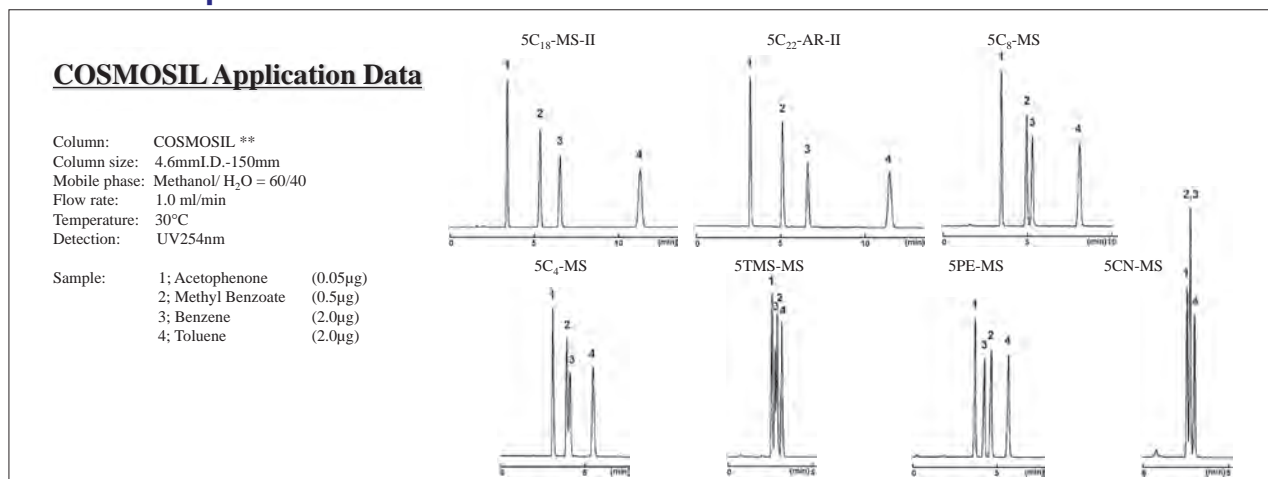
COSMOCORE's connector is the same type as Waters UPLC® columns.

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 Characteristics



COSMOSIL CN-MS



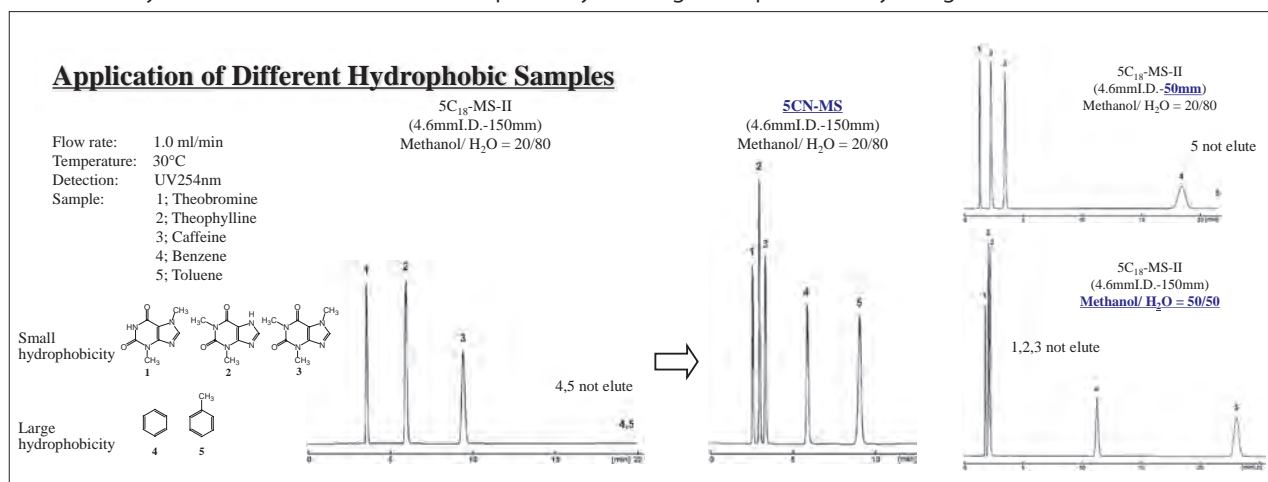
- Cyanopropyl-bonded stationary phase
- Enables separation of different hydrophobic samples without using gradient

Suitable Samples

- Mixtures of natural compounds

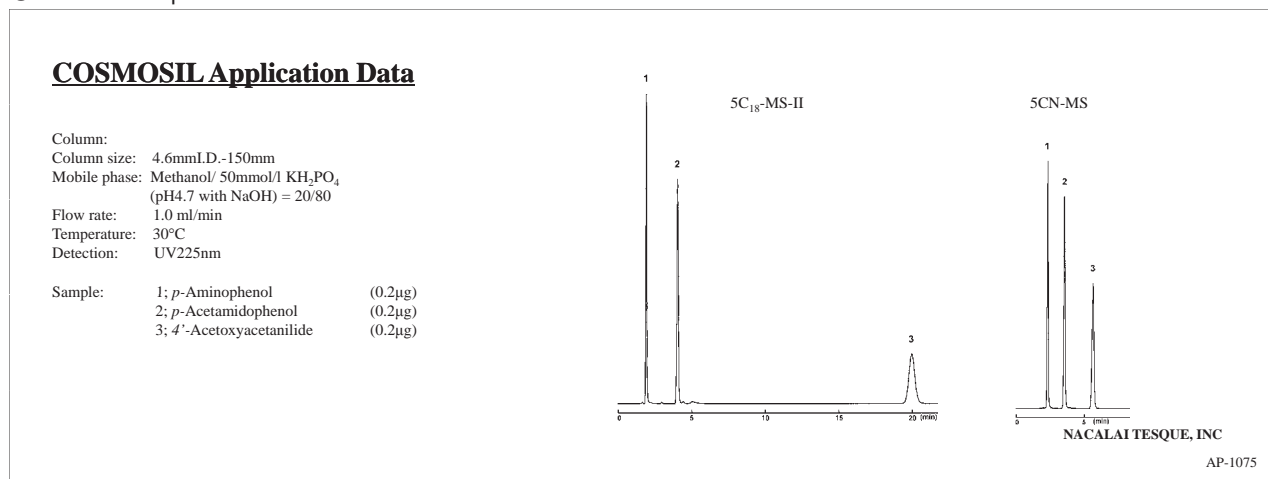
Rapid Analysis

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



Ordering Information

● COSMOSIL 5C₂₂-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 5C₈-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 5C₄-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

1

2

3

4

5

6

7

8

9

10

11

12

13

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

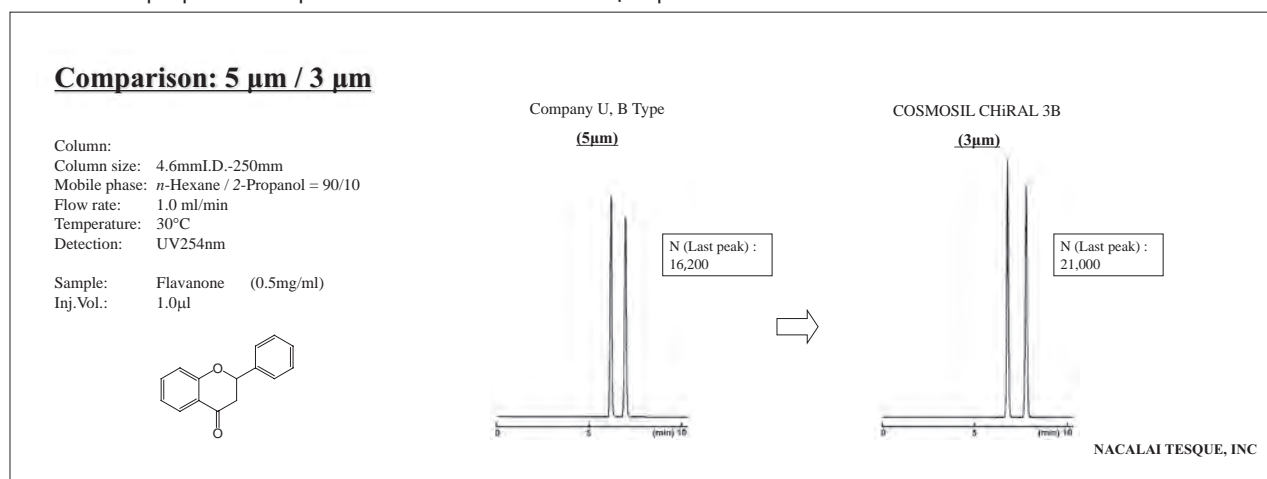
Specifications

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.



Immobilized Stationary Phase

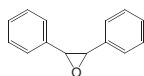
High Resistance to Solvents

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.

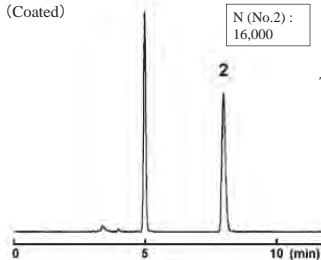
Comparison: Coated and Immobilized Selectors

Column: 4.6mm I.D. x 250mm
 Mobile phase: *n*-Hexane / 2-Propanol = 90/10
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV270nm

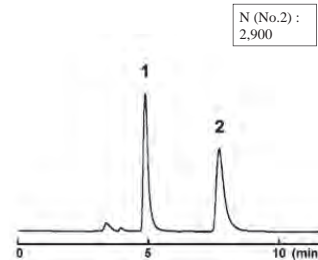
Sample: *trans*-Stilbene oxide (0.5mg/ml)
 Inj. Vol.: 10µl



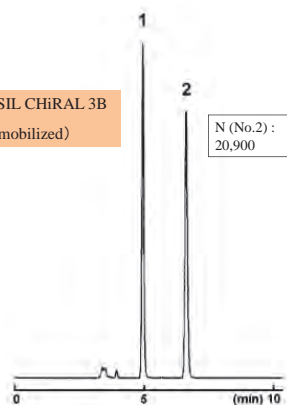
Company A, B Type
(Coated)



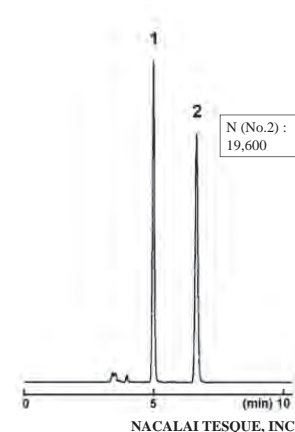
THF 100µl × 5 injections



COSMOSIL CHiRAL 3B
(Immobilized)



THF 100µl × 5 injections



NACALAI TESQUE, INC

Usable Solvents

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

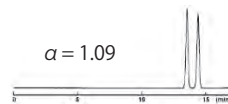
Solvent	Immobilized		Coated
	Normal Phase	Reversed Phase	Normal Phase
<i>n</i> -Hexane	○*	△	○*
<i>n</i> -Heptane	○	△	○
Methanol	○*	○	○*
Ethanol	○	○	○
2-Propanol (Isopropanol)	○	○	○
Acetonitrile	○*	○	○*
Tetrahydrofuran(THF)	○	○	×
<i>t</i> -Butyl Methyl Ether	○	△	×
Toluene	○	△	×
Chloroform	○	△	×
Dichloromethane (Methylene Chloride)	○	△	×
Ethyl 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.

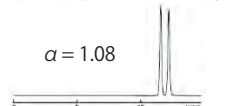
Selectivity Depends on the Solvent

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

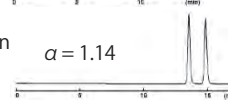
Hexane / Ethanol = 97 / 3



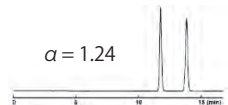
Hexane / 2-Propanol = 95 / 5



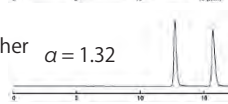
Hexane / Tetrahydrofuran = 90 / 10



Hexane / Chloroform = 65 / 35



Hexane / *t*-Butylmethylether = 60 / 40

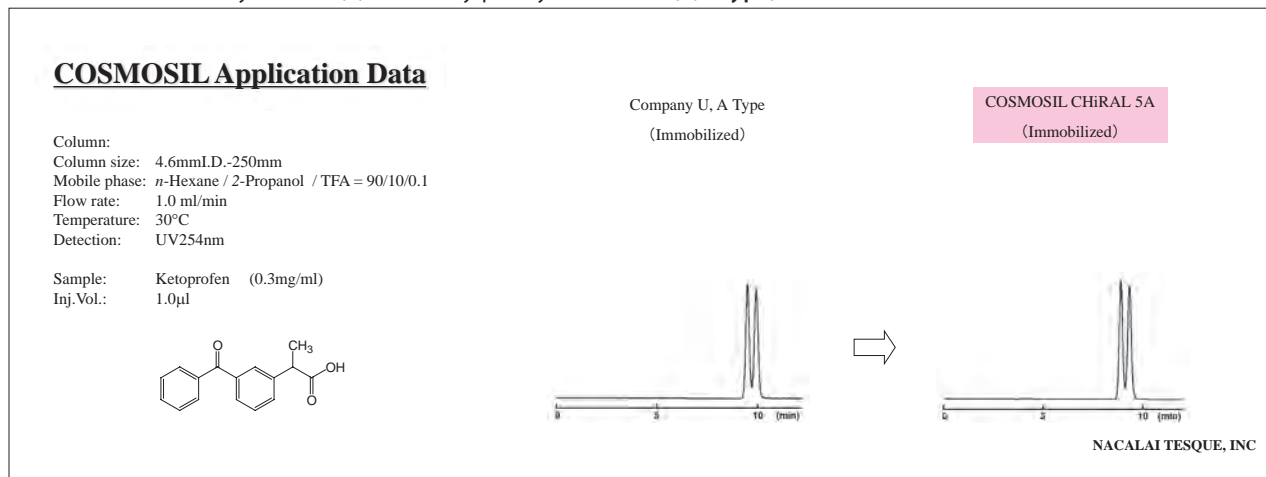


Elution strength: alcohols, THF >> chloroform > *t*-butyl methyl ether >> alkanes

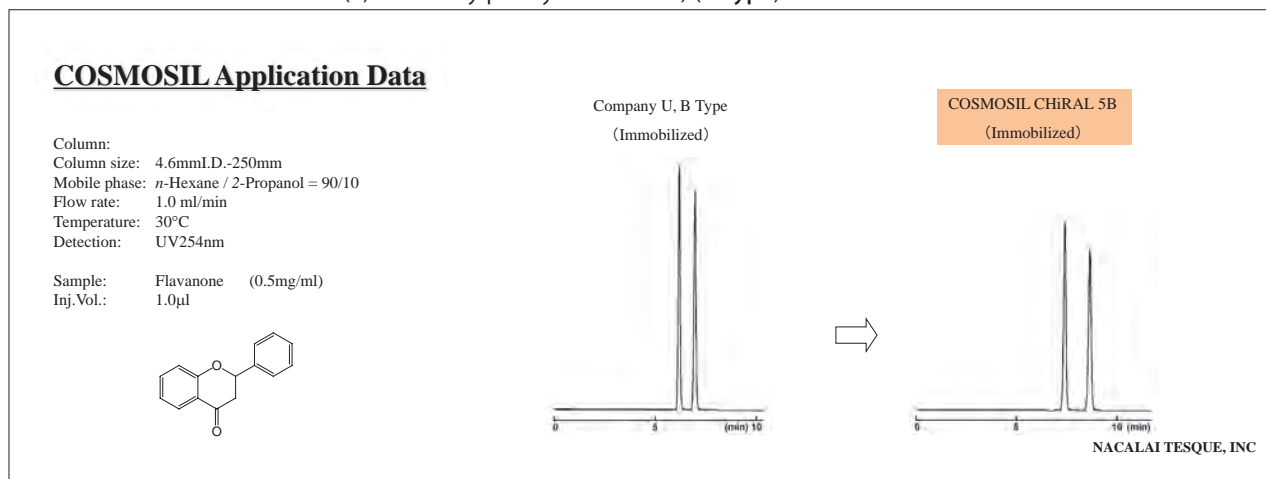
Equivalent Separation to Competitors' Columns

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

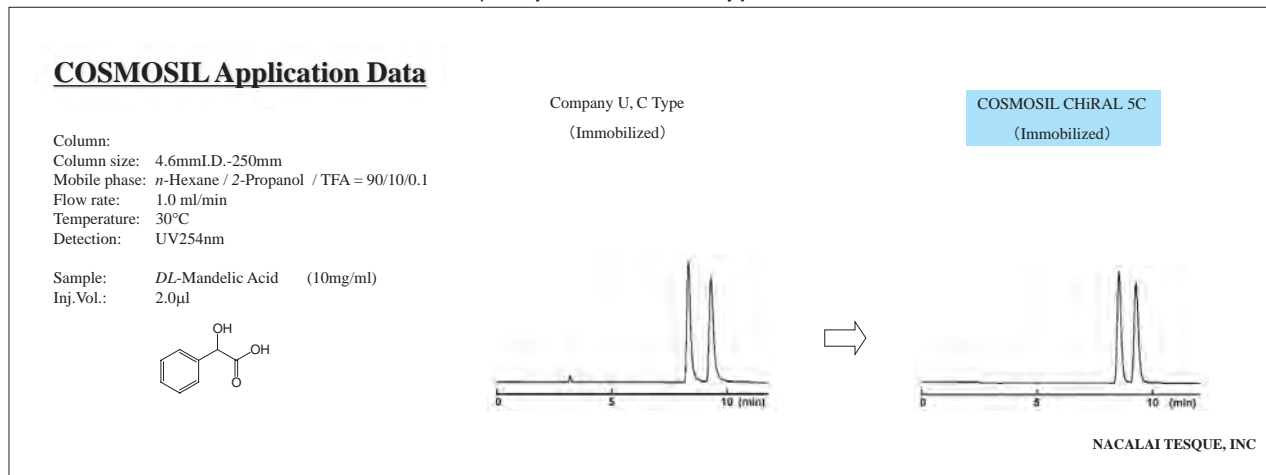
■ Chiral selector: Amylose tris (3,5-dimethylphenyl carbamate) (A Type)



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

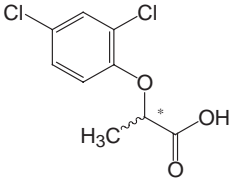

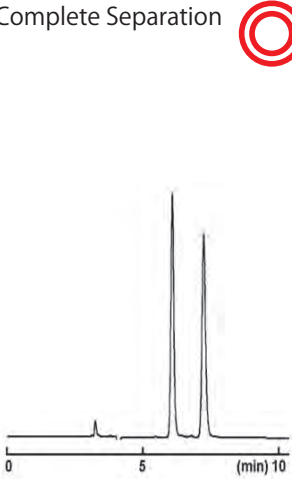


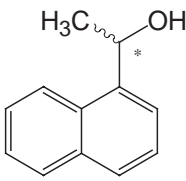


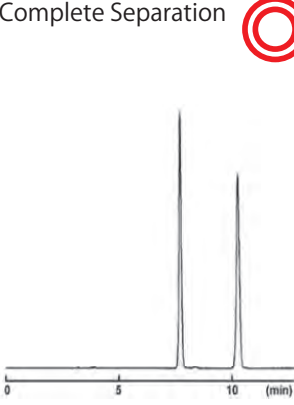

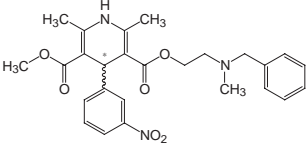
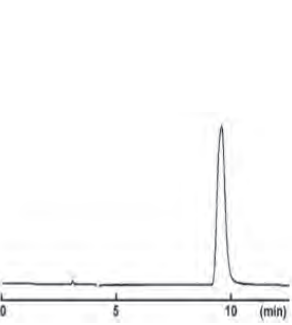
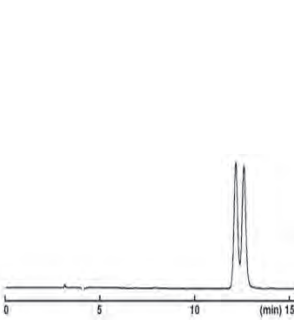

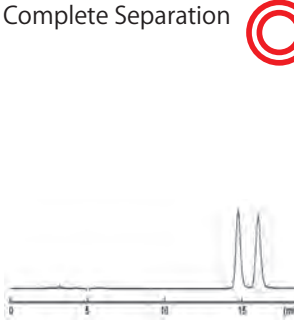


■ Chiral selector: Cellulose tris (3,5-dichlorophenyl carbamate) (C Type)



Column Selection

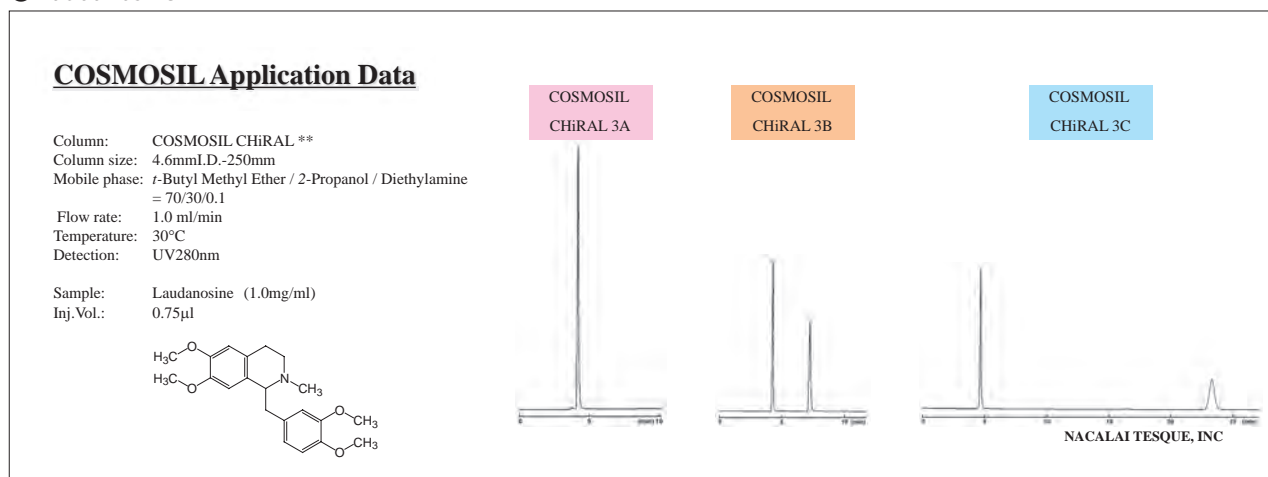
COSMOSIL CHiRAL offers 3 different chiral selectors that, together, have a high probability of separating your sample. Of 54 samples in our test, 53 pairs of enantiomers were fully separated. For samples that do not separate easily with any column, please adjust the type and concentration of solvents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

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 \AA
Specific Surface Area	300 m^2/g
Features	<ul style="list-style-type: none"> • High purity silica gel (>99.99%) with special treatment • Suitable for preparative separation (higher resolution than medium-pressure or open chromatography)

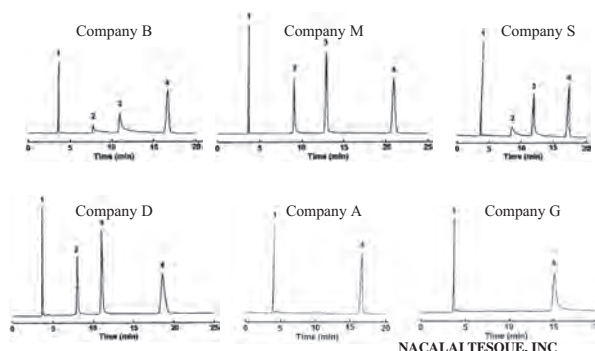
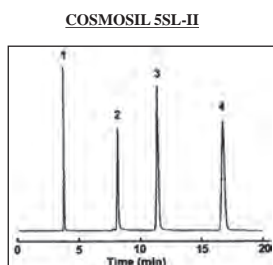
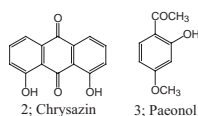
Comparison with Competitors' Columns in Separation of Phenols

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.

COSMOSIL Application Data

Column: **
 Column size: 4.6mm I.D. × 250mm
 Mobile phase: Hexane/ Ethyl Acetate = 95/5
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

Sample: 1; *p*-Xylene (0.004 μl)
 2; Chrysazin (0.2 μg)
 3; Paeonol (0.4 μg)
 4; *p*-Cresol (0.004 μl)



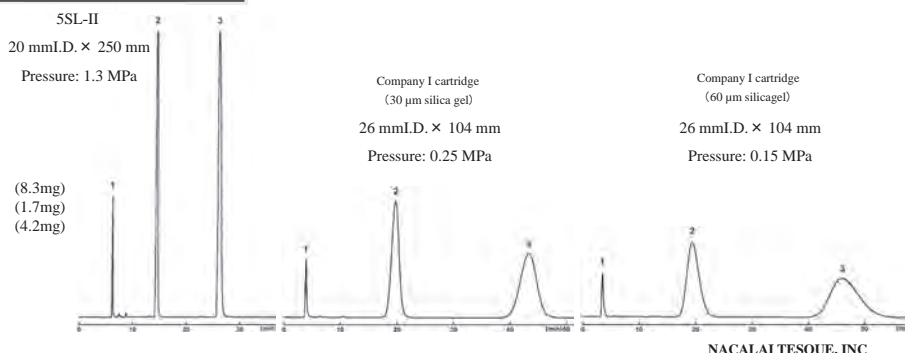
Comparison with Medium-Pressure Columns

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

Comparison with Medium-Pressure Columns

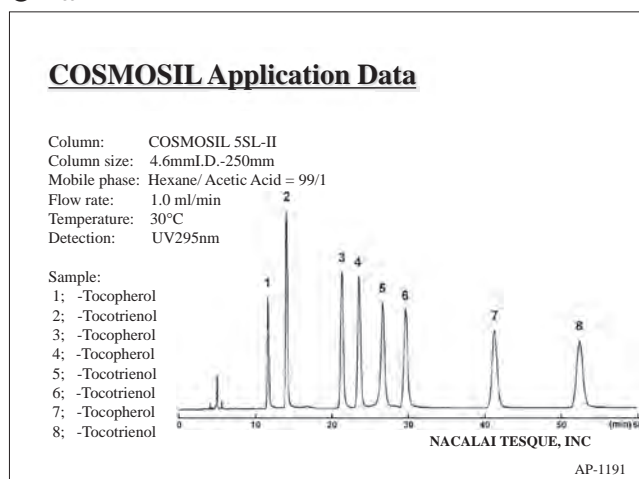
Column: 20 mm I.D. × 250 mm
 Column size: 20 mm I.D. × 250 mm
 Mobile phase: Ethanol/Hexane = 5/95
 Flow rate: 10 ml/min
 Temperature: room temperature
 Detection: UV254nm

Sample: 1; *p*-Xylene (8.3mg)
 2; Cinnamyl Alcohol (1.7mg)
 3; *p*-Nitrobenzyl Alcohol (4.2mg)

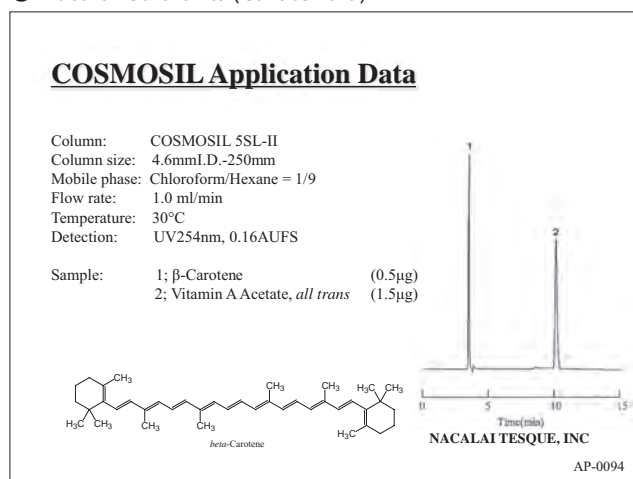


Applications

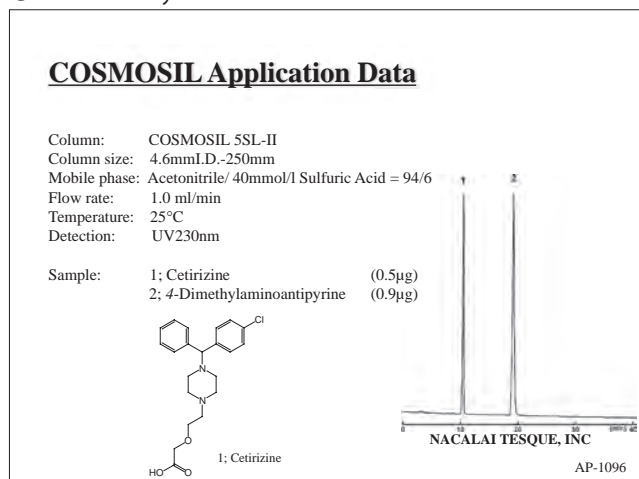
● Vitamin E



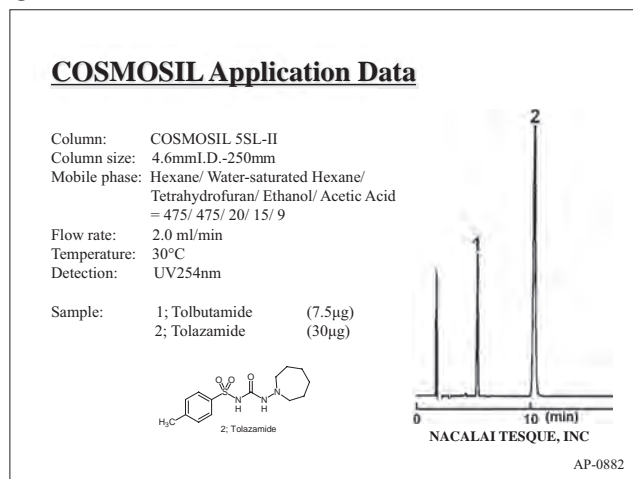
● Natural Colorants (Carotenoid)



● Cetirizine Hydrochloride



● Tolazamide



Ordering Information

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

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 μ m)

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 μ m)

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

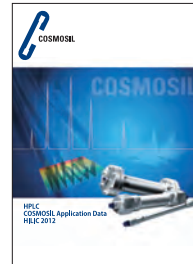
- Hydrophilic compounds that would not be retained in reversed phase chromatography
- Melamine, water-soluble vitamins, organic acids, free amino acids, peptides, nucleotides and natural compounds

Specifications

Packing Material	HILIC	
Silica Gel	High purity porous spherical silica	
Average Particle Size	2.5 μm	5 μm
Average Pore Size	130 \AA	120 \AA
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}	

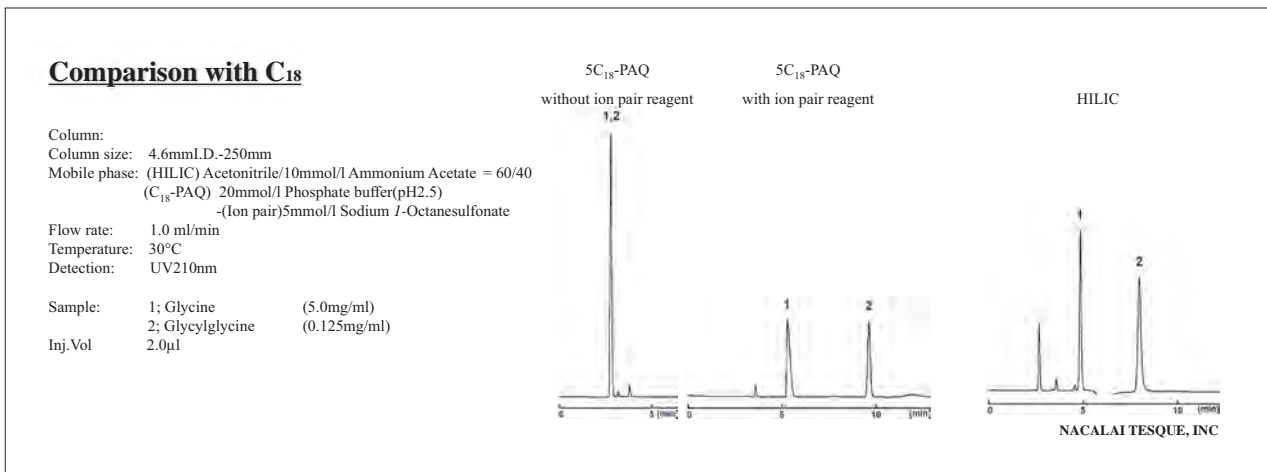
COSMOSIL HILIC Application Data

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.



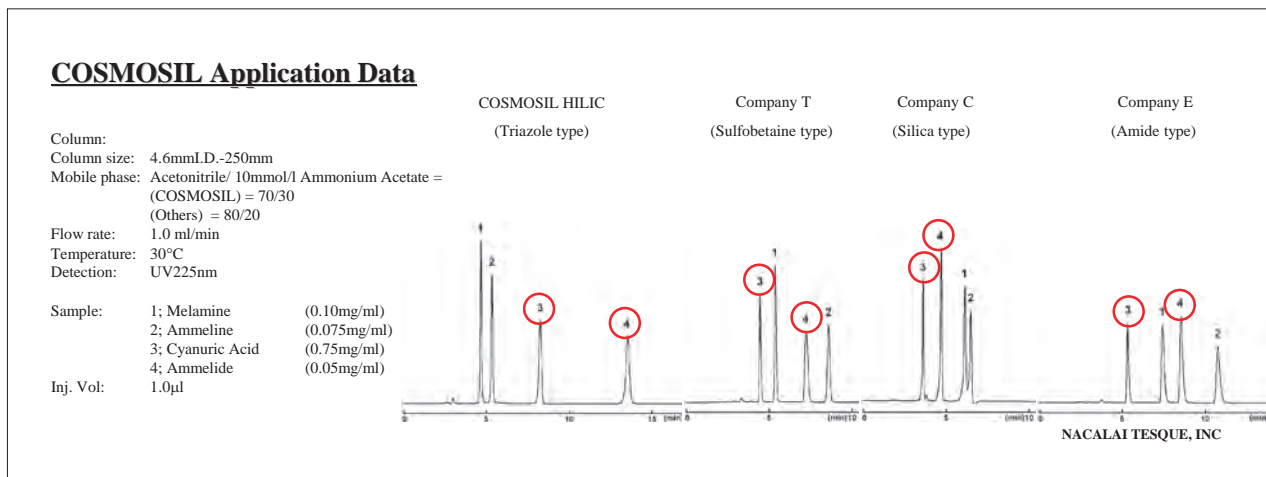
Comparison with Reversed Phase (C_{18}) Columns

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.



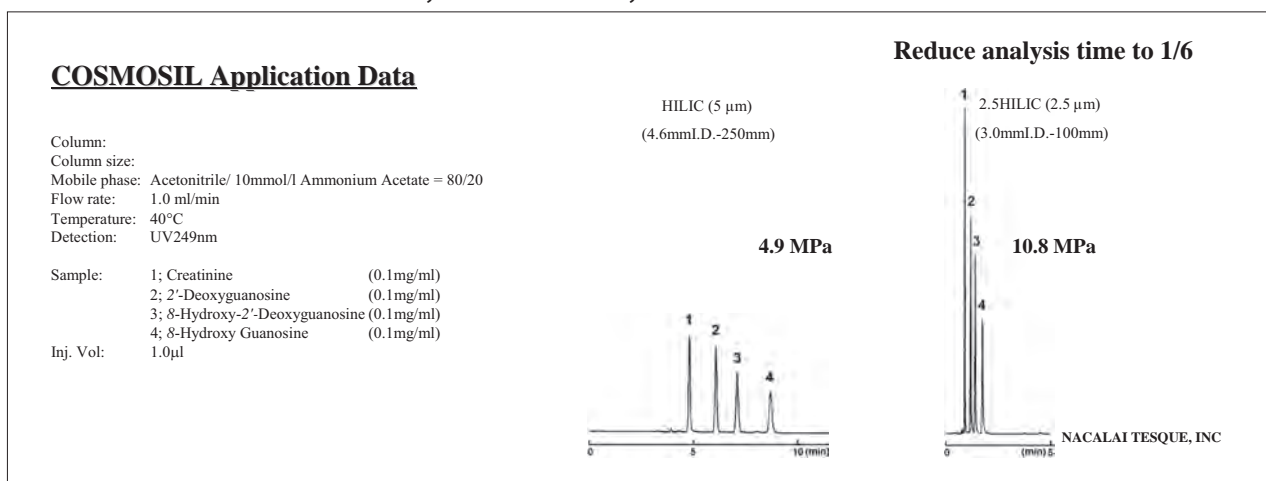
Alternative Selectivity

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



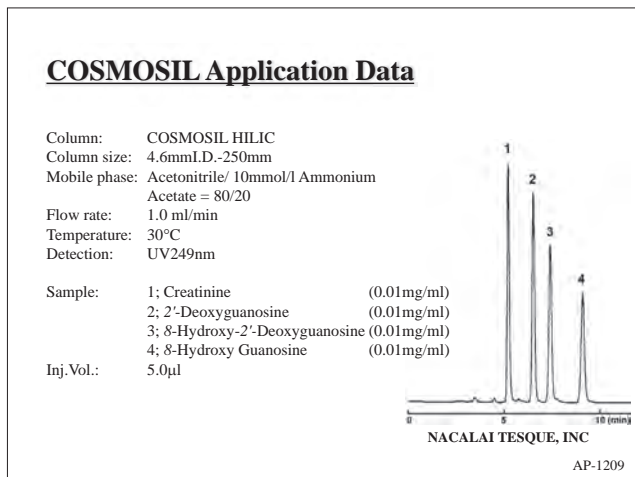
Ultra-High-Speed Analysis (COSMOSIL 2.5HILIC)

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

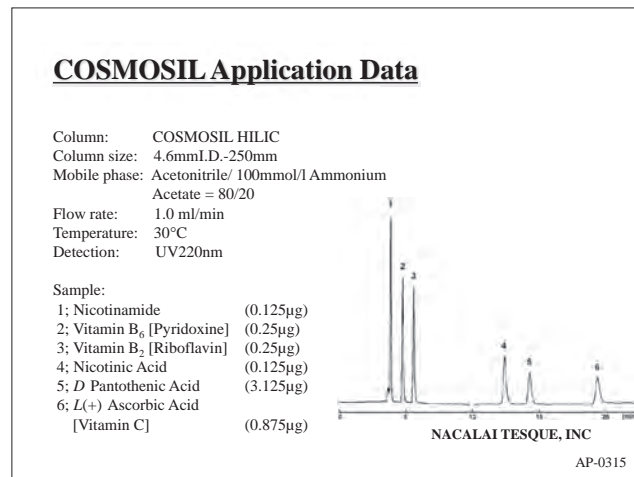


Applications

● Oxidative Stress Markers



● Water-Soluble Vitamins



Applications

● Nucleotides

COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
 Column size: 2.0mm I.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

NACALAI TESQUE, INC
AP-1275

C1=NC2=C(N1)N=CN=C2[C@@H]3O[C@H](COP(=O)(O)OP(=O)(O)OP(=O)(O)O)[C@@H](O)[C@H]3O
1; ATP

● Phosphopeptide

COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
 Column size: 2.0mm I.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(PO₃H₂)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: 4.6mm I.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

NACALAI TESQUE, INC
AP-1596

NC(CCC(=O)O)C(=O)O
1; L-Glutamine

● Sweeteners

COSMOSIL Application Data

Column: COSMOSIL 2.5HILIC
 Column size: 2.0mm I.D.-100mm
 Mobile phase: Acetonitrile/ H₂O = 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

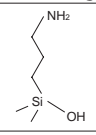
I.D. x Length (mm)	Product Number
2.0×150	11770-51
3.0× 50	11771-41
3.0× 75	11772-31

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

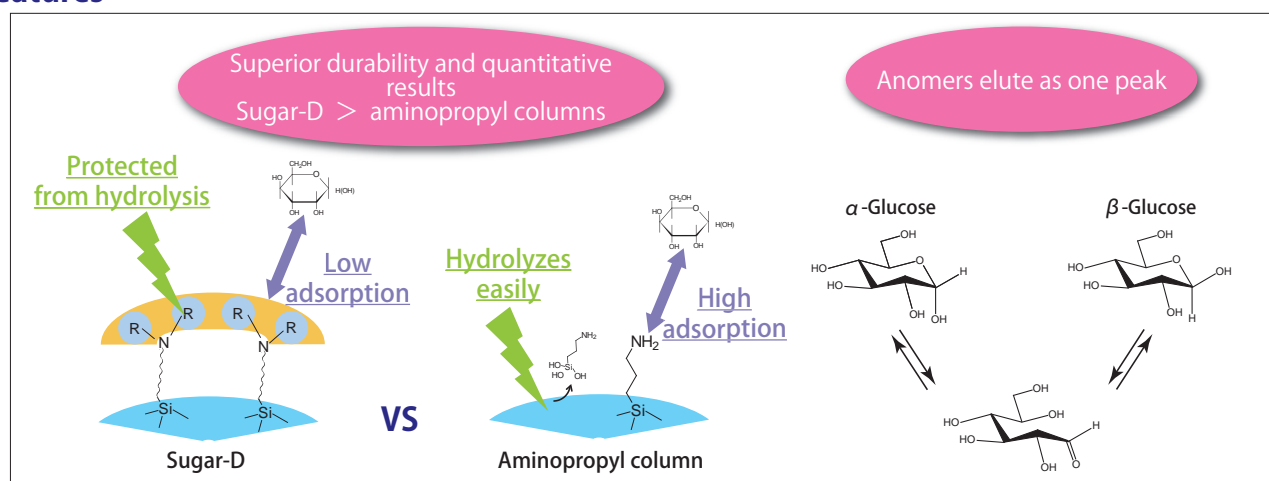
7. Mono- and Oligosaccharide Analysis Columns

Saccharides are not retained on standard C₁₈ columns because of their low hydrophobicity. COSMOSIL Sugar-D and NH₂-MS are specifically designed for separation of saccharides. COSMOSIL C₁₈-PAQ is recommended for hydrophobic glycosides and saccharide derivatives.

Specifications

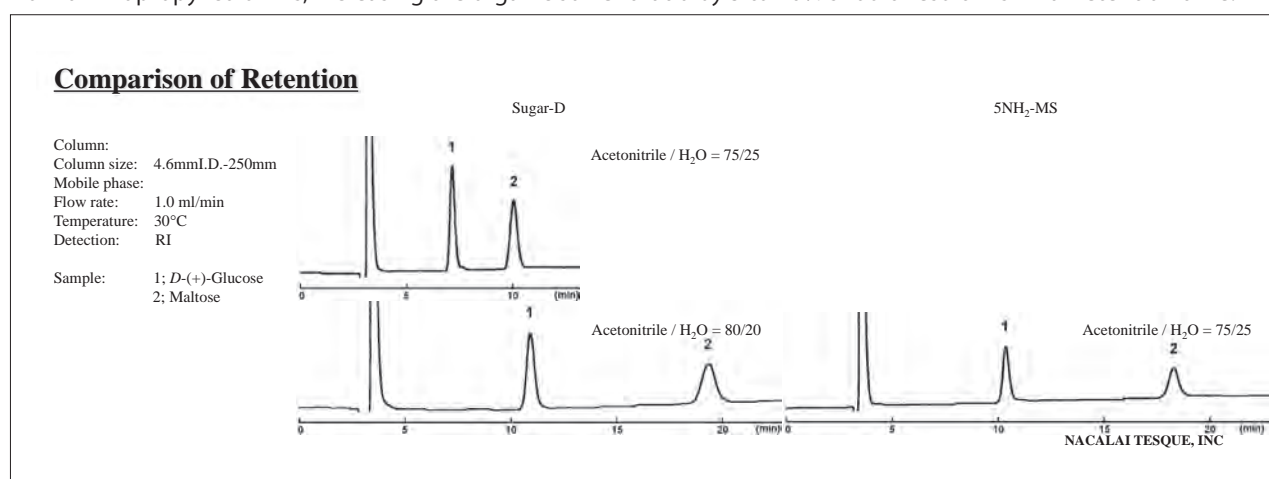
Packing Material	Sugar-D	NH ₂ -MS
Silica Gel	High purity porous spherical silica	
Average Particle Size	5 μm	
Average Pore Size	—	120 Å
Specific Surface Area	—	300 m ² /g
Bonded Phase Structure	—	
Bonded Phase	Polyamine	Aminopropyl group
Main Interaction	Hydrophilic interaction	
Features	<ul style="list-style-type: none"> • First choice for saccharide analysis • High durability • Good quantitative analysis 	<ul style="list-style-type: none"> • 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.



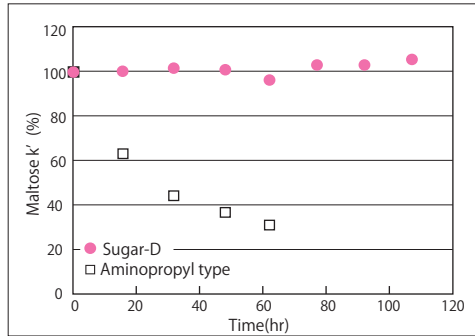
COSMOSIL Sugar-D



- 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.

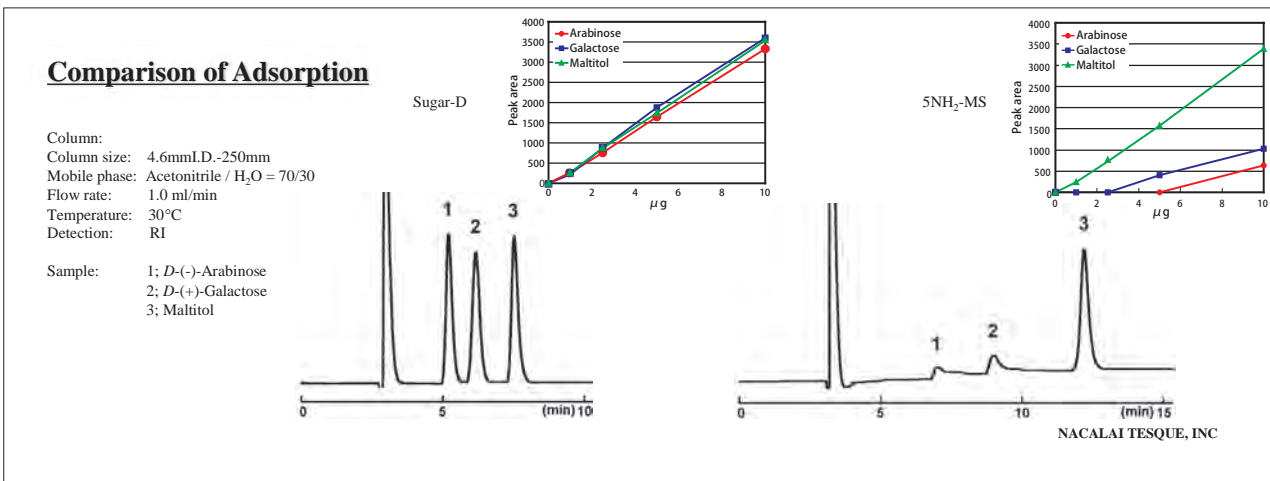


Decomposition Condition
 Solution Water
 Flow Rate 1.0 mL/min
 Temperature Room Temperature

Column 4.6 mmI.D. × 250 mm
 Mobile Phase Acetonitrile : Water = 70 : 30
 Flow Rate 1.0 mL/min
 Temperature 30°C
 Detection RI
 Sample Maltose

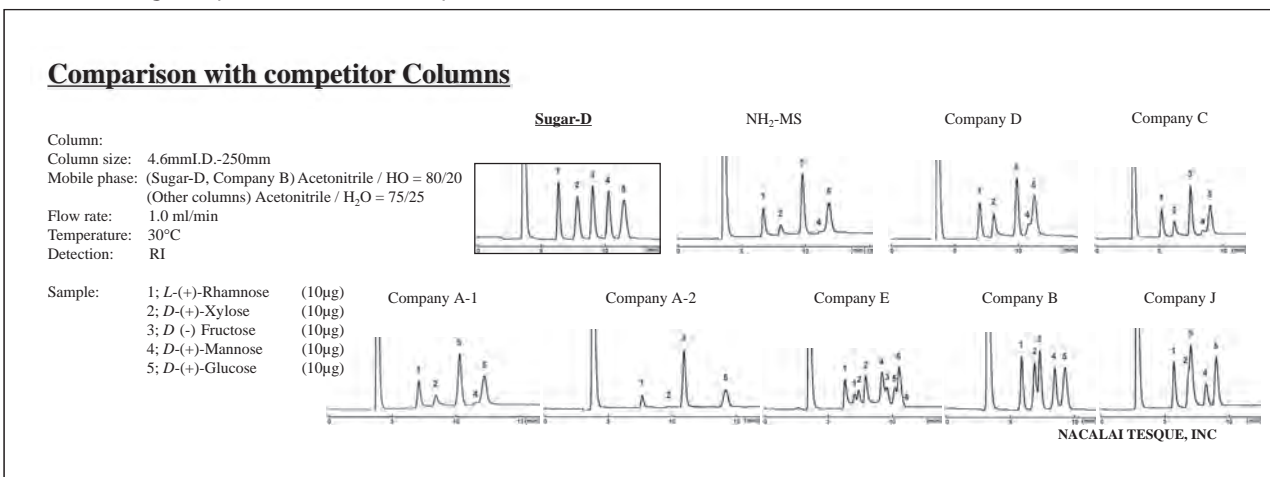
Comparison of Adsorption

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.



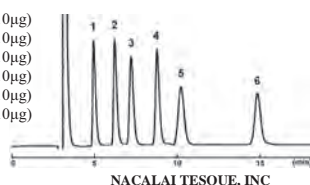
Applications

● Mono- and Oligosaccharides

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile / H₂O = 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

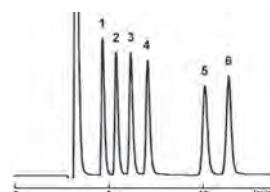
AP-0329

● Polyols

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile / H₂O = 75/25
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: RI

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



NACALAI TESQUE, INC

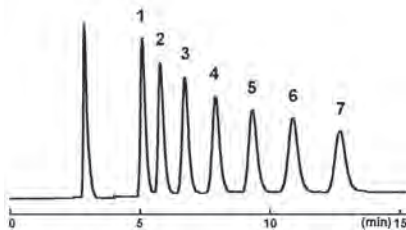
AP-0330

● Oligomaltoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile / H₂O = 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

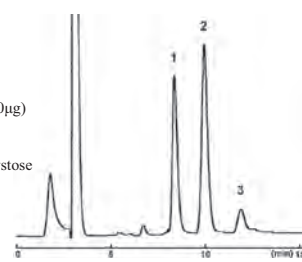
AP-0331

● Oligofructoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile / H₂O = 70/30
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: RI

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



NACALAI TESQUE, INC

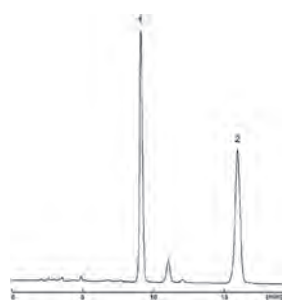
AP-0320

● Sweeteners

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile/ H₂O = 85/15
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV210nm

Sample: 1; Stevioside
 2; Rebaudioside A



NACALAI TESQUE, INC

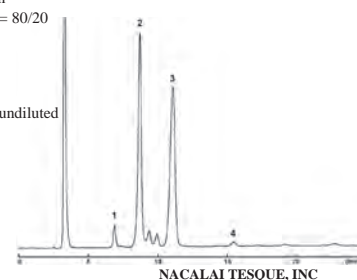
AP-1194

● Rare Sugar Soda

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mm I.D.-250mm
 Mobile phase: Acetonitrile/ H₂O = 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

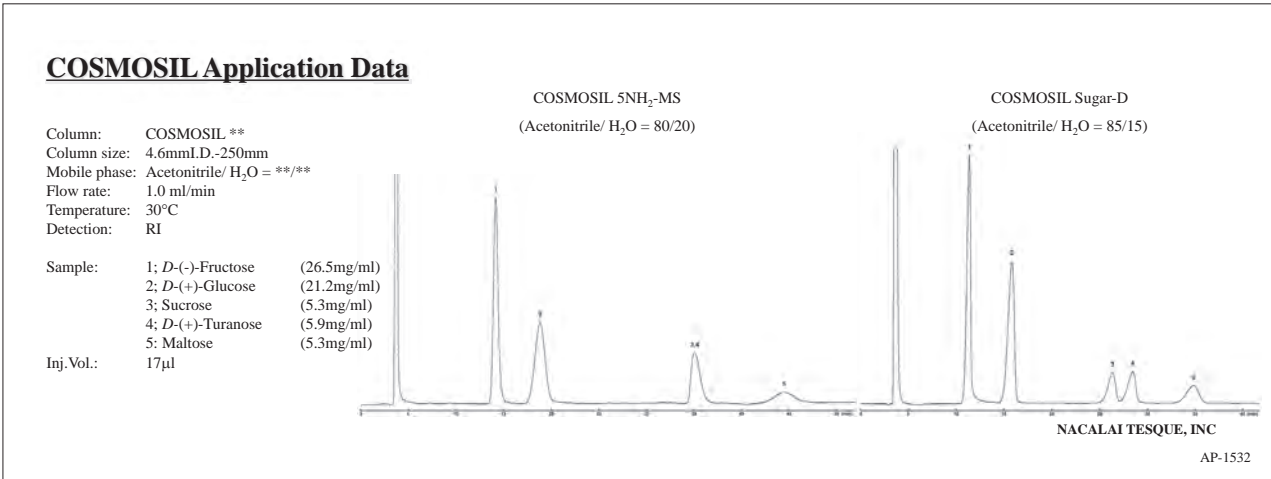
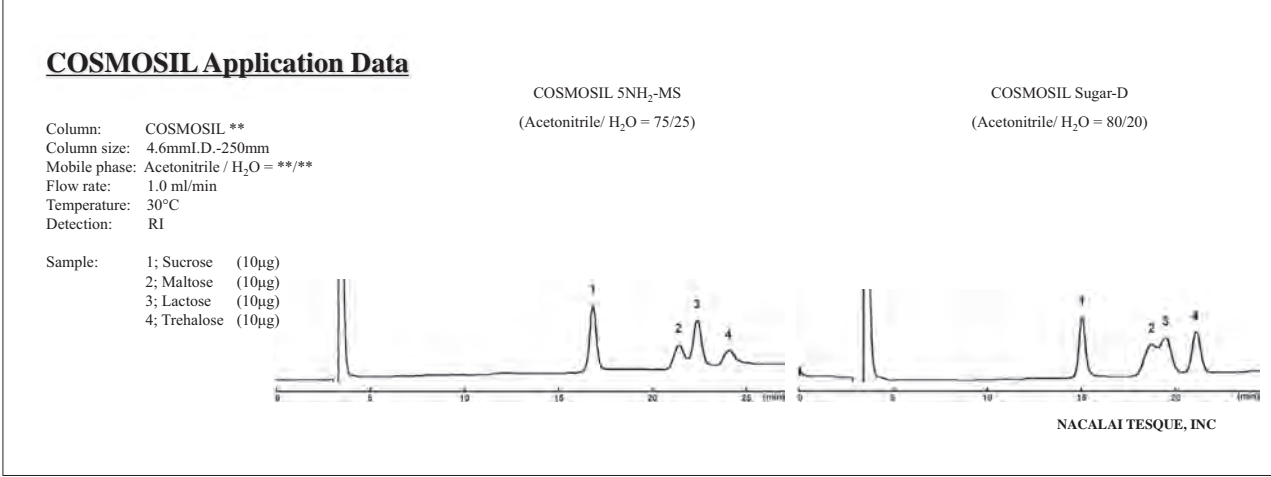
COSMOSIL NH₂-MS



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

Comparison of Adsorption

COSMOSIL NH₂-MS offers better separation than COSMOSIL Sugar-D for some samples.



Ordering Information

- COSMOSIL 5NH₂-MS Analytical / Preparative Columns (Particle Size: 5 µm)

Packed Column

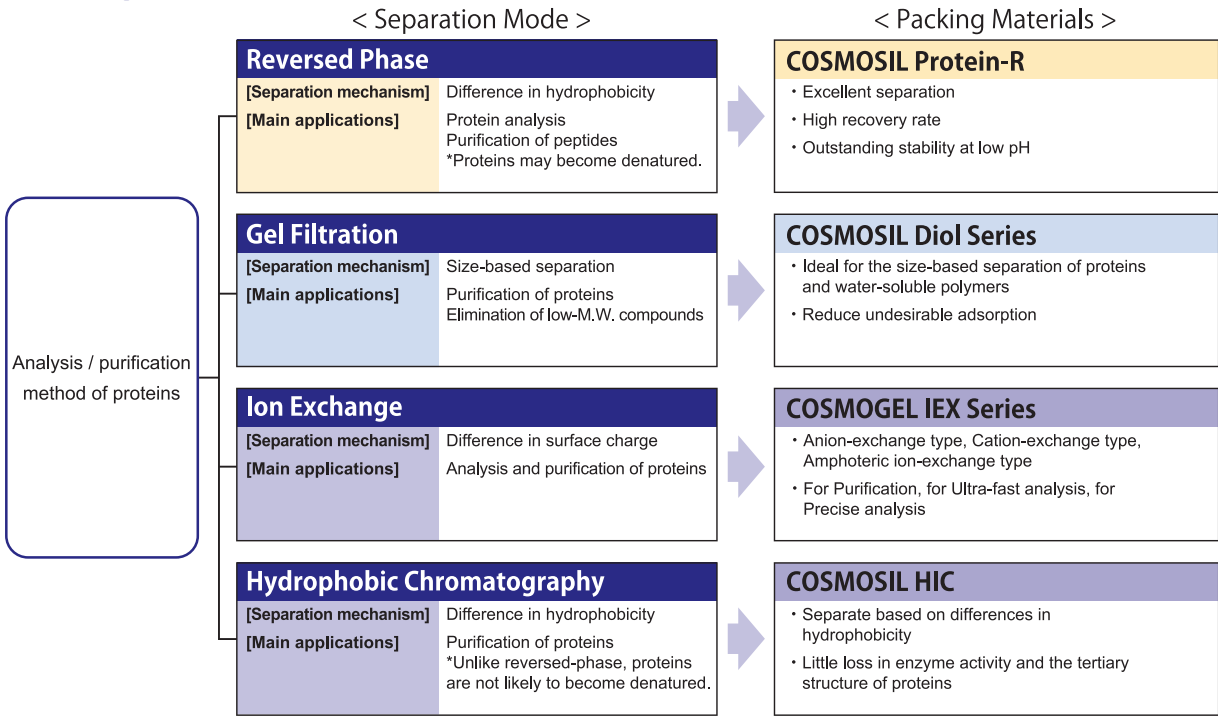
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6 × 150	38245-11	10 × 250	38249-71
4.6 × 250	38246-01	20 × 250	38250-31

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



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.*
 *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

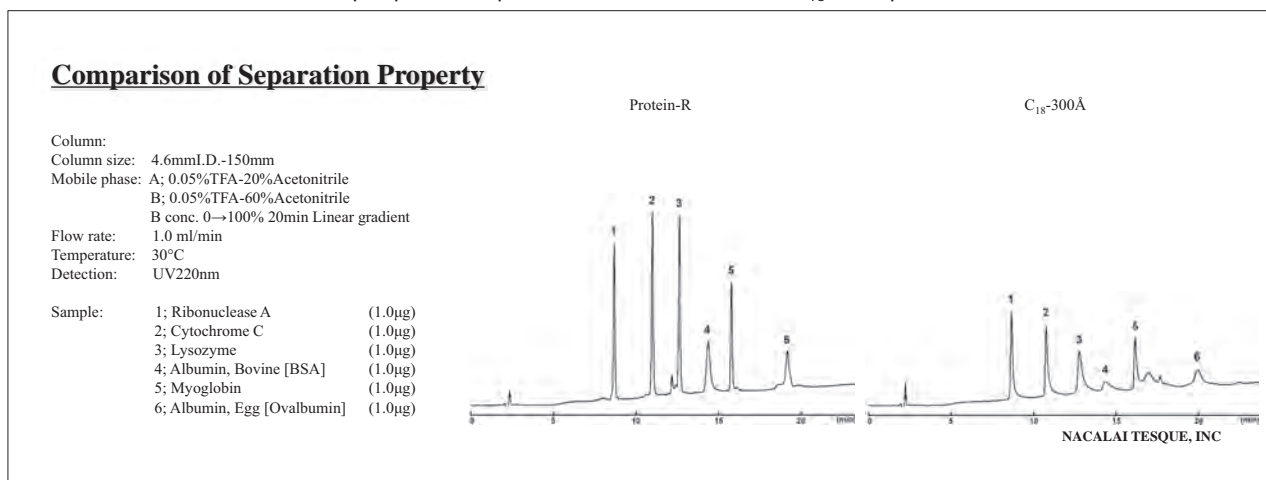
Specifications

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	<ul style="list-style-type: none"> • High recovery rate • Acid-resistance

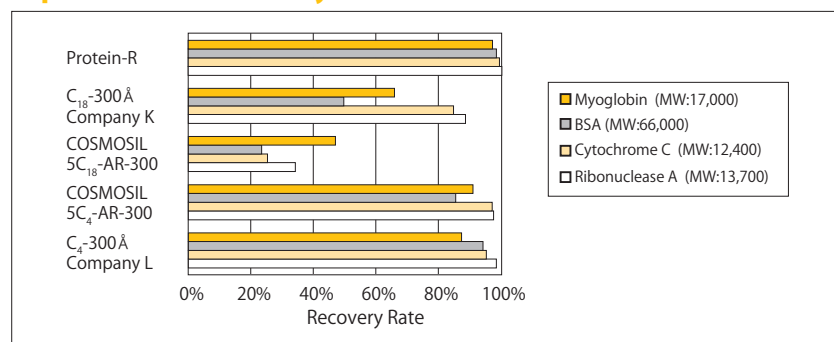
※Optimal pH range of silica-based columns is between 2 and 7.5. Extreme pH may significantly decrease column lifetime.

Comparison of Separation

COSMOSIL Protein-R shows sharper peaks for proteins than conventional C₁₈ wide pore columns.



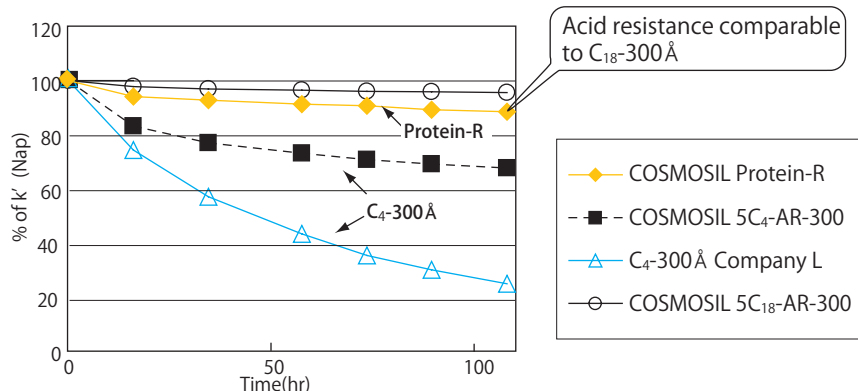
Comparison of Recovery Rate



The figure below shows recovery rates for proteins using different columns. Protein-R shows a higher recovery rate than C₄-300 and a much higher recovery rate than C₁₈-300.

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 C₄-300.



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

Applications

● Tau Protein

COSMOSIL Application Data

Column: COSMOSIL Protein-R
 Column size: 20mm I.D. -250mm
 Mobile phase: A; 0.1%TFA-H₂O
 B; 0.1%TFA-Acetonitrile
 B conc. 20%(0-13min), 20 50%(13 43min)
 Flow rate: 9.0 ml/min
 Temperature: Room temperature
 Detection: UV215nm

Sample: Recombinant human tau (2N4R)

NACALAI TESQUE, INC
AP-1150

Data courtesy of Akihiko Takashima, Ph.D.
Laboratory for Alzheimer's Disease, RIKEN Brain Science Institute

● Glycoproteins

COSMOSIL Application Data

Column: COSMOSIL Protein-R
 Column size: 4.6mm I.D. -150mm
 Mobile phase: A; 0.05%TFA-20%Acetonitrile
 B; 0.05%TFA-60%Acetonitrile
 B conc. 0→100% 20min Linear gradient
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV220nm

Sample: Concanavalin A (1.0µg)

NACALAI TESQUE, INC
AP-0352

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



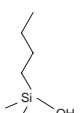

I.D. x Length (mm)	Product Number
4.6 × 10	06518-31
10 × 20	06528-01
20 × 20	08692-81

COSMOSIL C₁₈-AR-300, C₈-AR-300, C₄-AR-300, Ph-AR-300



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

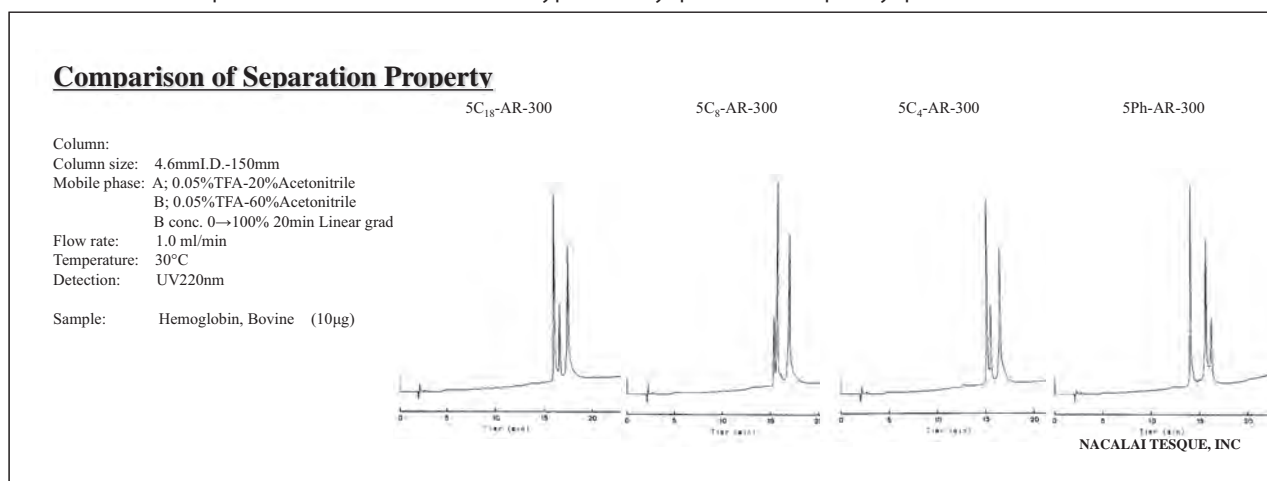
Specifications

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 5C₁₈-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 5C₈-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 5C₄-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

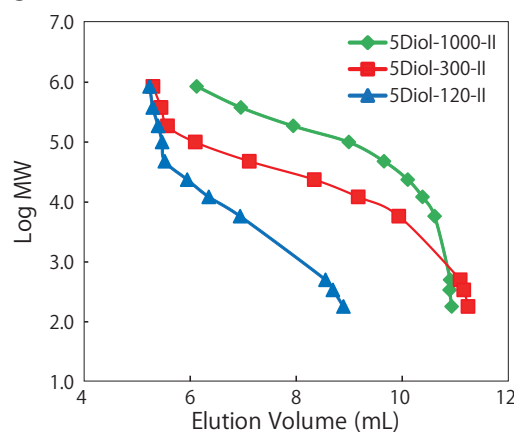
Packing Material	Diol-120-II	Diol-300-II	Diol-1000-II
Silica Gel	High purity porous spherical silica ⁽¹⁾		
Average Particle Size	5 μm		
Average Pore Size	120 Å	300 Å	1,000 Å ⁽²⁾
Bonded Phase	Diol group		
Flow Rate (mL/min)	0.5 ~ 1.0		
Pressure	20 MPa or less		15 MPa or less
Sample MW (Protein)	5,000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

Comparison with Other Company Columns

Column: 7.5mmI.D.-300mm
 Column size: 7.5mmI.D.-300mm
 Mobile phase: 20mmol/l Phosphate buffer(pH 7.0) + 100mmol/l Na₂SO₄
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV220nm

Sample: 1; Transferrin
 2; Hemoglobin, Human
 3; Angiotensin II(Human)

Company R

Company E

COSMOSIL
5Diol-300-II

NACALAI TESQUE, INC

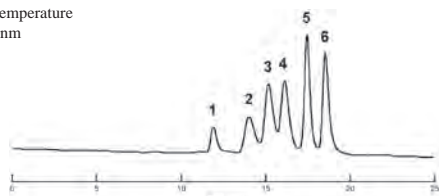
Applications

● 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 Na₂SO₄
 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 Na₂SO₄
 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

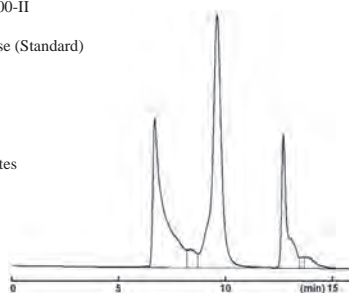
AP-1477

● 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



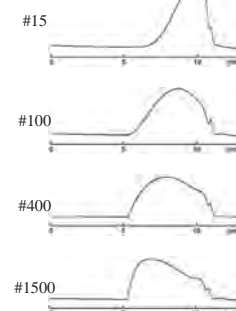
NACALAI TESQUE, INC

● Methyl Cellulose

COSMOSIL Application Data

Column: COSMOSIL 5Diol-1000-II
 Column size: 7.5mmI.D.-300mm
 Mobile phase: H₂O
 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 ₃ N ⁺ (CH ₃) ₃		-(CH ₂) ₃ SO ₃ ⁻		-CH ₃ N ⁺ (CH ₃) ₃ + -(CH ₂) ₃ SO 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)/
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					

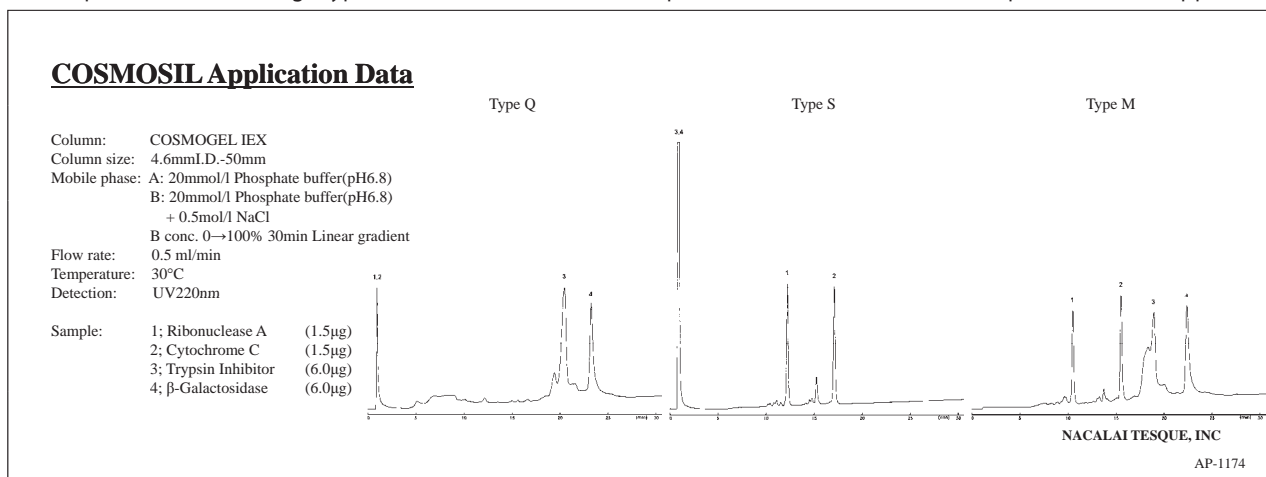
Type of Packing Material

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.



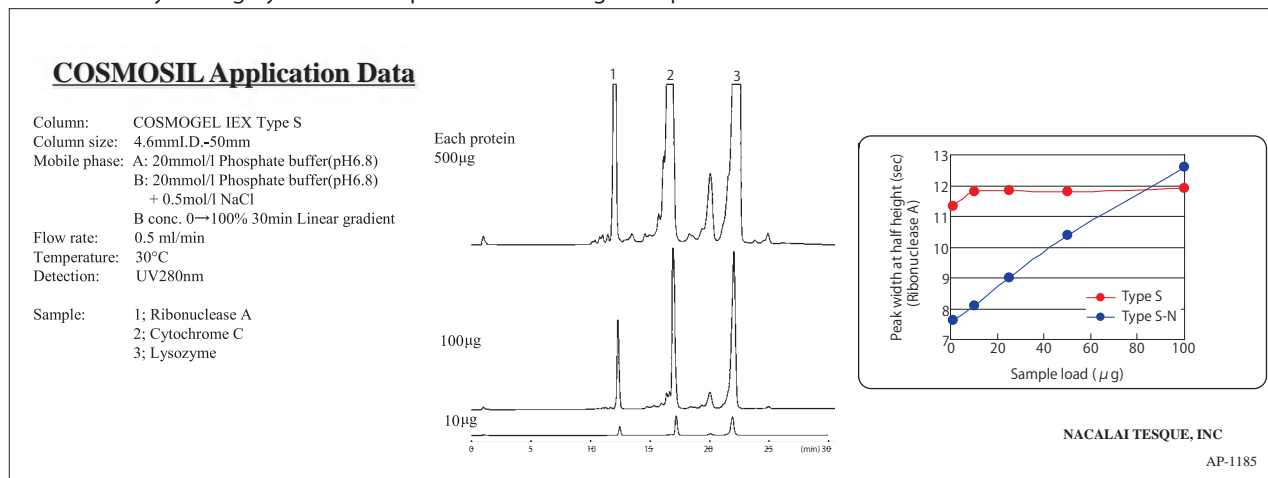
Type of Column

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	—

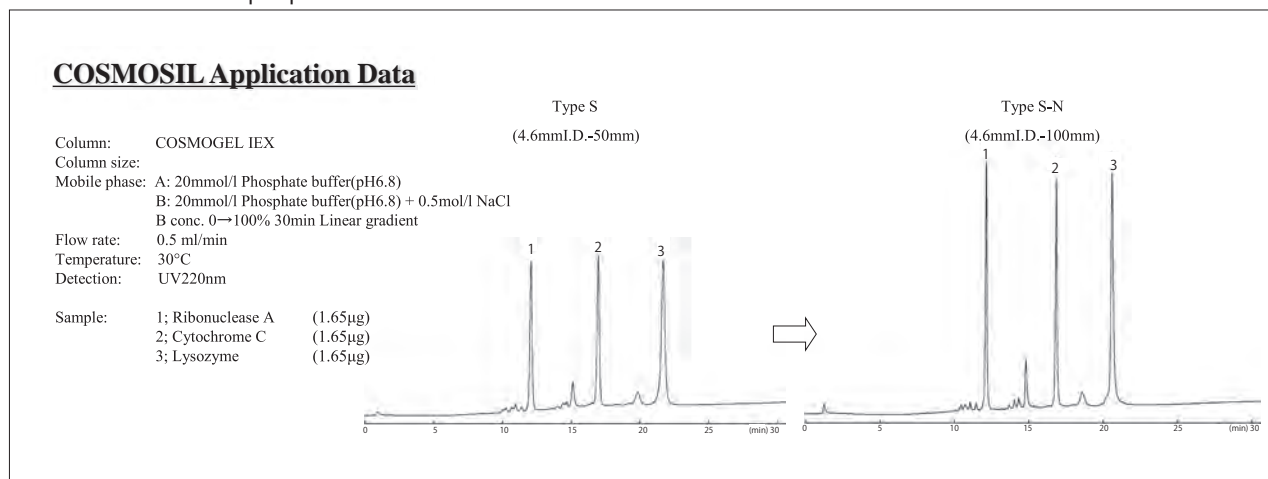
● For Purification: Type Q, Type S, Type M

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.



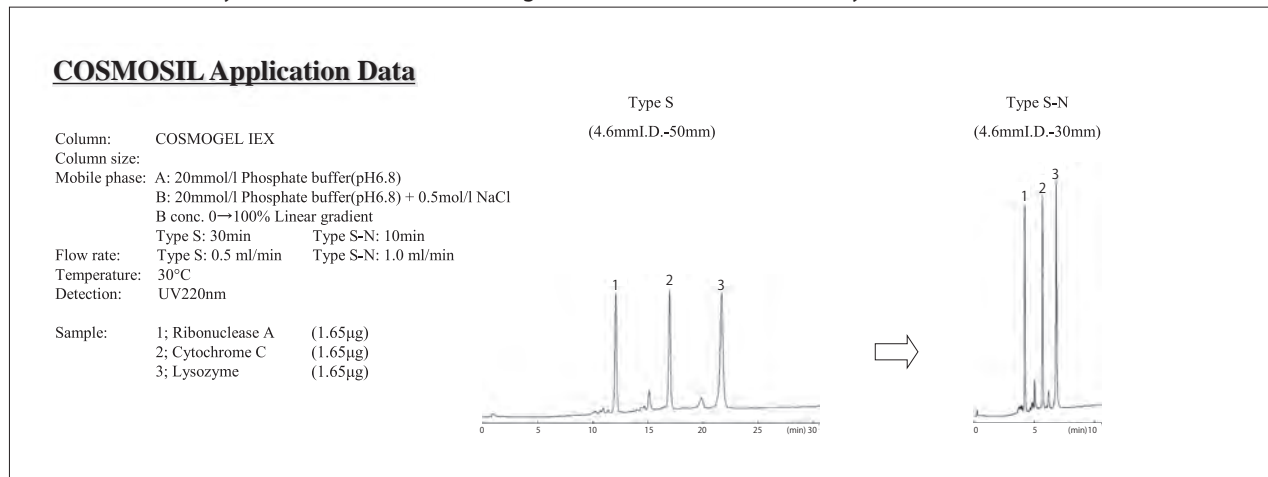
● For Precise Analysis: Type Q-N, Type S-N, Type M-N

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.



● 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.



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 \times 50	06266-31
	COSMOGEL IEX Type Q-N	For Ultra-Fast Analysis	4.6 \times 30	06264-51
	COSMOGEL IEX Type Q-N	For Precise Analysis	4.6 \times 100	06258-41
Cation-Exchange Type	COSMOGEL IEX Type S	For Purification	4.6 \times 50	06252-01
	COSMOGEL IEX Type S-N	For Ultra-Fast Analysis	4.6 \times 30	06251-11
	COSMOGEL IEX Type S-N	For Precise Analysis	4.6 \times 100	06250-21
Amphoteric Ion-Exchange Type	COSMOGEL IEX Type M	For Purification	4.6 \times 50	06248-71
	COSMOGEL IEX Type M-N	For Precise Analysis	4.6 \times 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

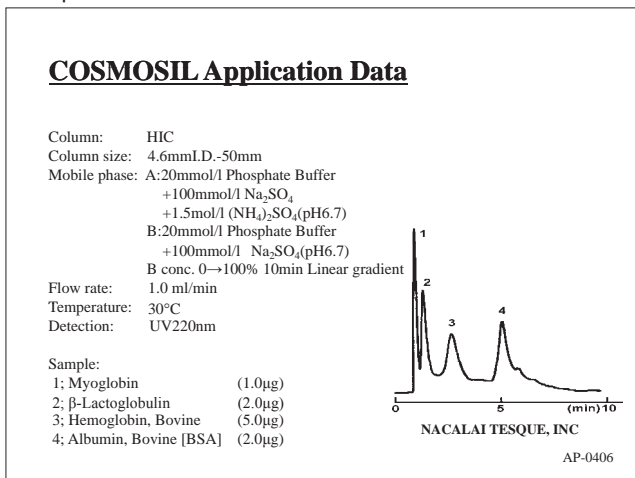
Specifications

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

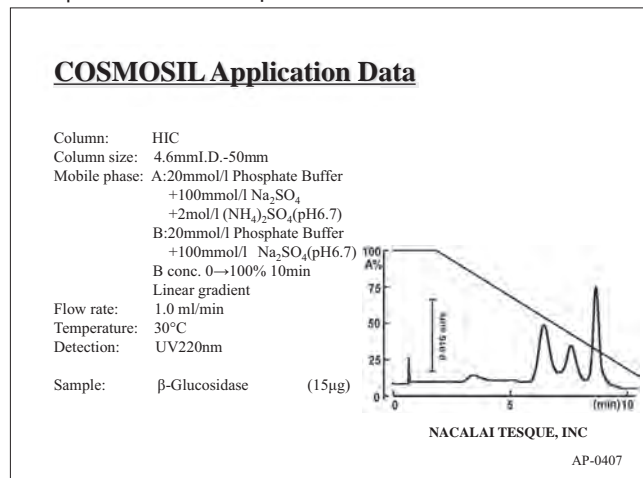
Applications

A buffer with high salt concentration, usually 1-2 mol/L of $(\text{NH}_4)_2\text{SO}_4$, 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



- Separation of Crude β -Glucosidase



Ordering Information

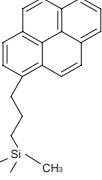
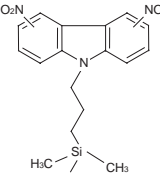
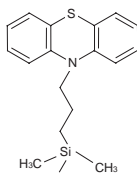
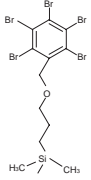
- COSMOSIL 5HIC Analytical Columns (Particle Size: 5 μm)
Packed Column

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

9. Fullerene Separation Columns

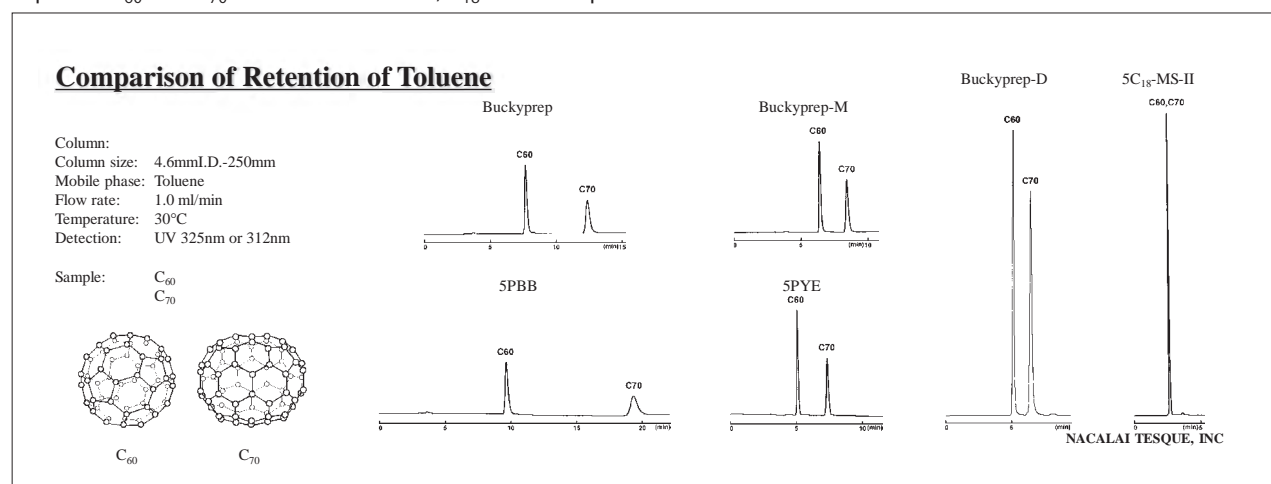
Separation of fullerenes, especially preparative scale separation, on conventional HPLC columns are always problematic due to the low solubility and low recovery rate of fullerenes. COSMOSIL offers a variety of columns designed for preparative scale separation of fullerenes including higher fullerenes,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

Specifications

Packing Material	Buckyrep	Buckyrep-D	Buckyrep-M	PBB
Silica Gel	High purity porous spherical silica			
Average Particle Size	5 μm			
Average Pore Size	120 \AA			
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. Buckyrep, Buckyrep-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)	Solvent	Features	Solubility of C_{60} (mg/mL)
Toluene	The most commonly used solvent	3.2	Acetonitrile	Weaker eluent than toluene. Recommended as a washing solvent Buckyrep-D	0.018
<i>n</i> -Hexane	Weaker eluent than toluene. Recommended for weakly retained fullerenes.	0.046	Chlorobenzene	Stronger eluent than toluene. Recommended for higher fullerenes	7.0
<i>n</i> -Heptane		—	<i>o</i> -Dichlorobenzene	Stronger eluent than chlorobenzene	27
Methanol		0.001	1,2,4-Trichlorobenzene	The strongest elution effect. Recommended as a washing solvent.	21.3
2-Propanol		—			

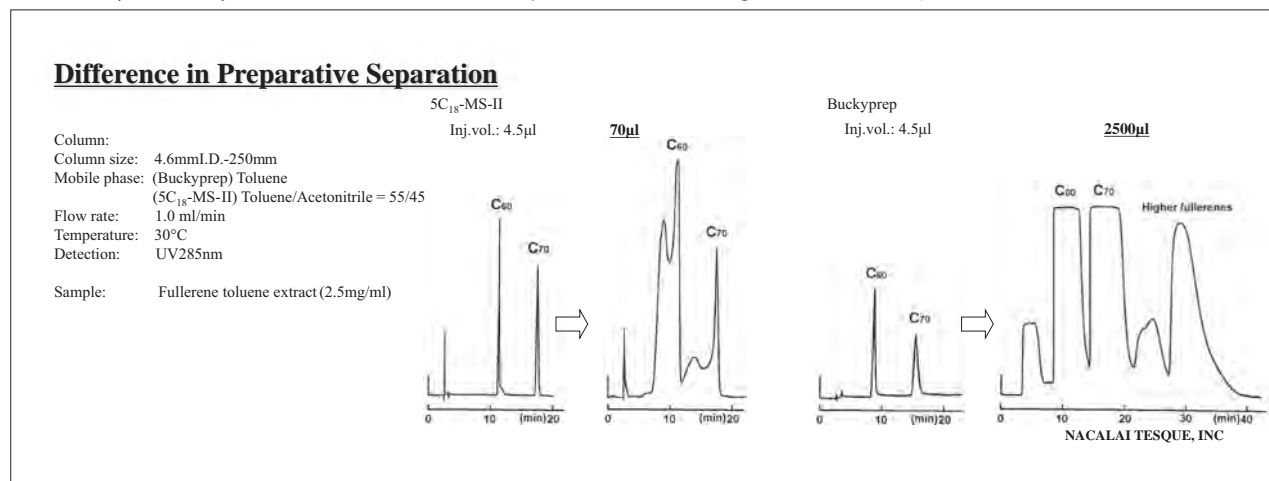
COSMOSIL Buckyprep



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

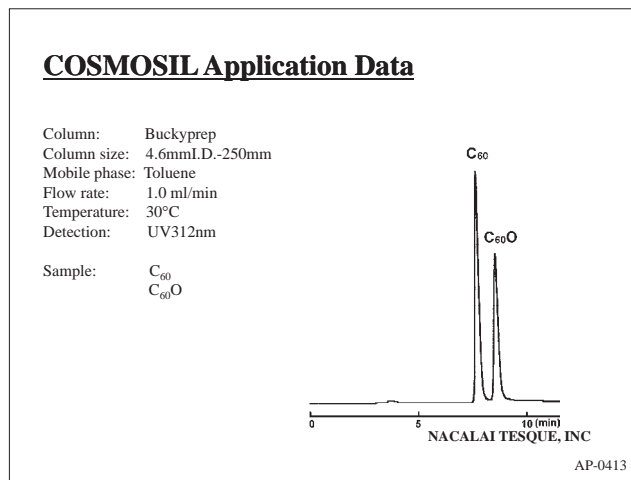
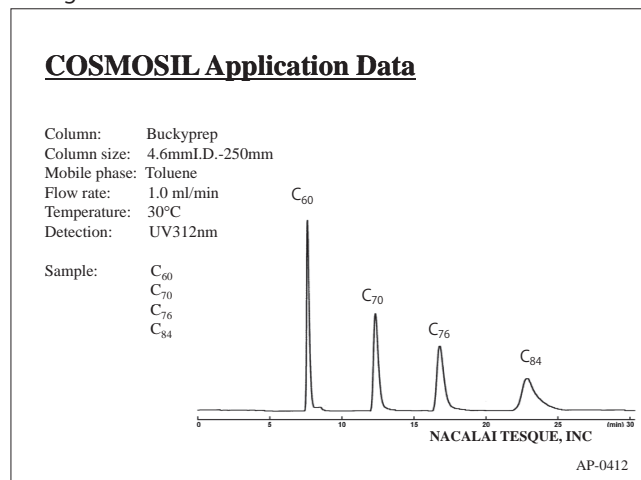
Difference in Preparative Separation

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		Guard Column	
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6 × 250	37977-61	4.6 × 10	37983-71
10 × 250	37981-91	10 × 20	37984-61
20 × 250	37982-81	20 × 50	34374-41
28 × 250	34346-11	28 × 50	05871-21

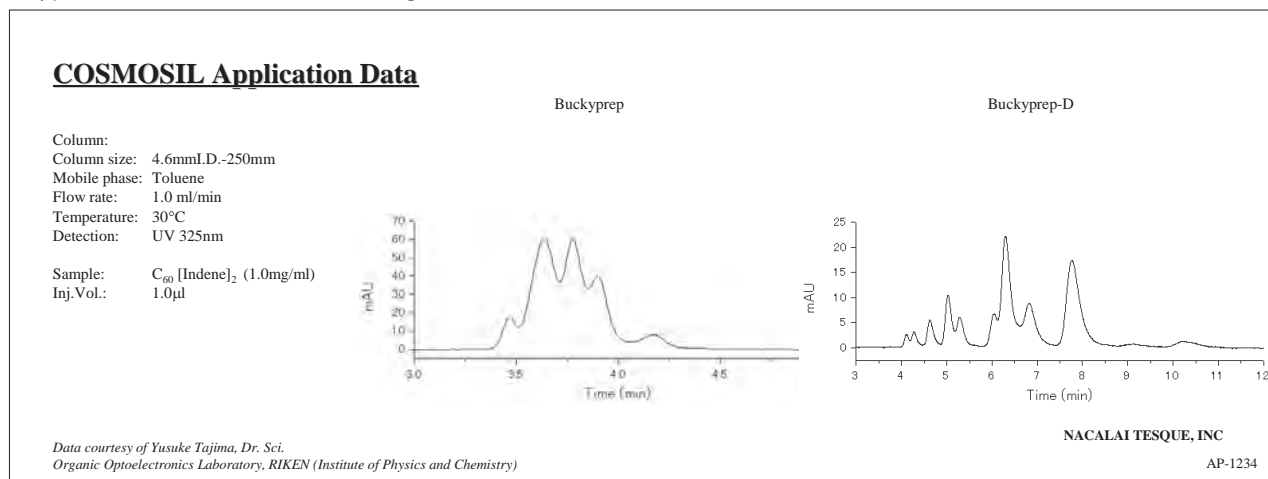
COSMOSIL Buckyprep-D



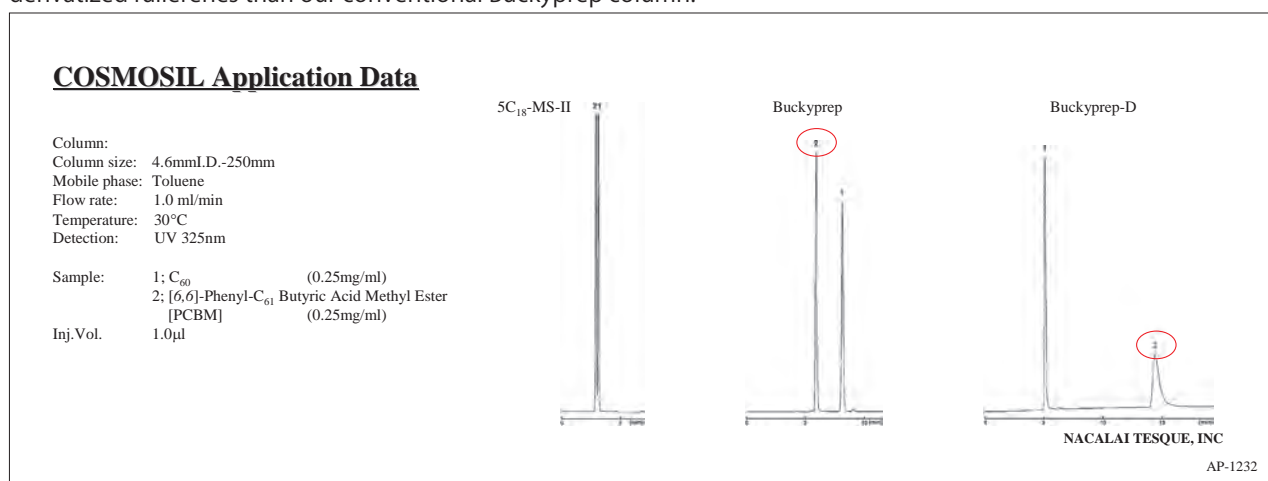
- For preparative separation of derivatized fullerenes
- For separation of derivatized fullerenes such as C₆₀ indene used for organic thin-film solar cell

Applications

Buckyprep-D offers improved separation for C₆₀ indene, a derivatized fullerene, that has received much attention as an n-type semiconductor material for organic thin-film solar cells.



Buckyprep-D retains derivatized fullerenes longer than C₆₀. Therefore it is more suitable for preparative separation of derivatized fullerenes than our conventional Buckyprep column.



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		Guard Column	
I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6 × 50	09646-61	4.6 × 10	09611-01
4.6 × 250	09647-51	10 × 20	09613-81
10 × 50	09648-41	20 × 50	09614-71
10 × 250	09650-91		
20 × 250	09651-81		

COSMOSIL Buckyprep-M



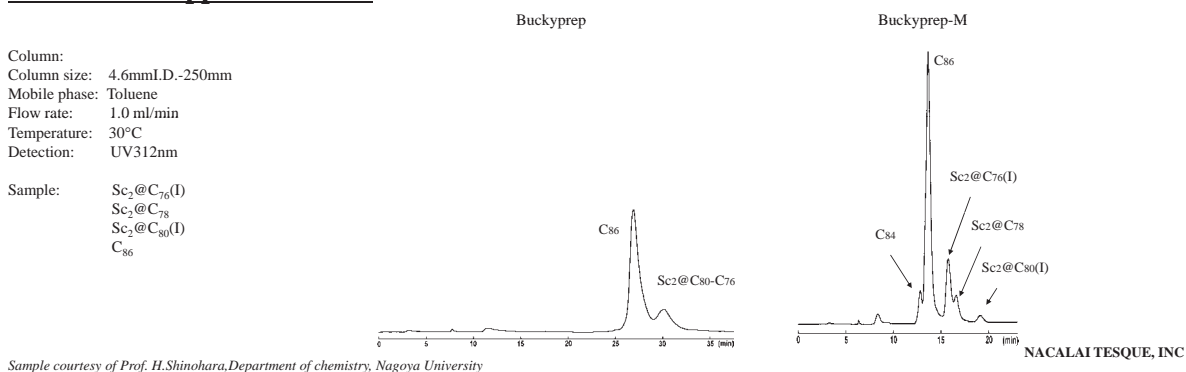
- Different selectivity from Buckyprep
- Excellent separation for metallofullerenes

Applications

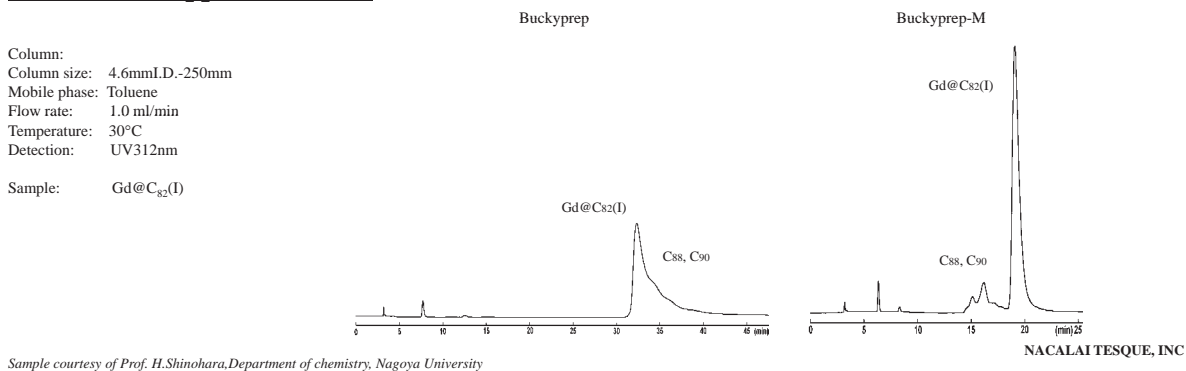
● Metallofullerenes

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



COSMOSIL Application Data



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

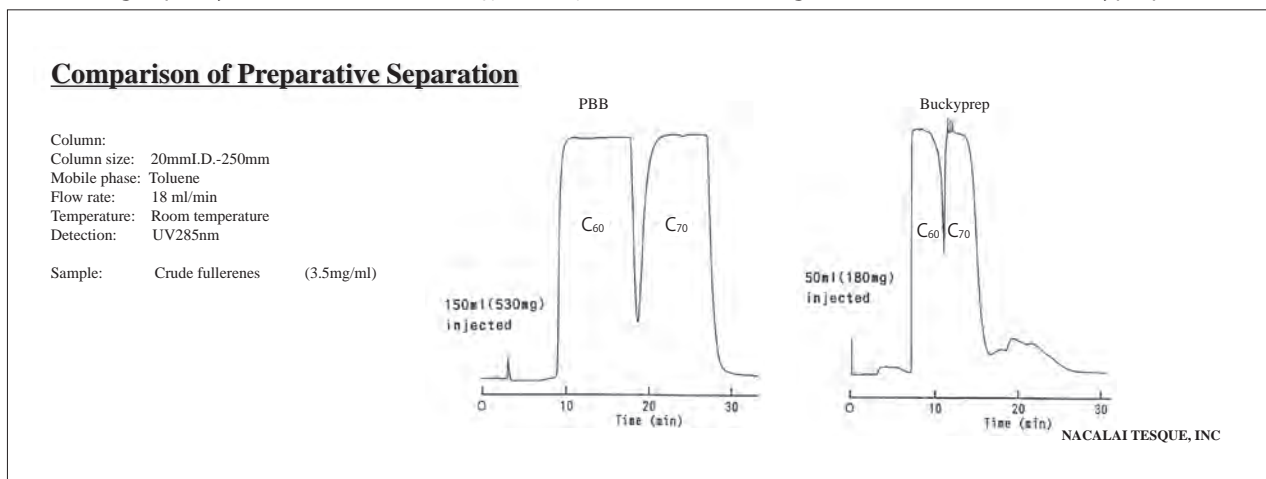


- Can be used with *o*-dichlorobenzene or carbon disulfide
- Suitable for preparative scale separation

Applications

- Preparative Separation of Fullerene

The loading capacity of COSMOSIL PBB for C₆₀ and C₇₀ can be three times greater than COSMOSIL Buckyrep.



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

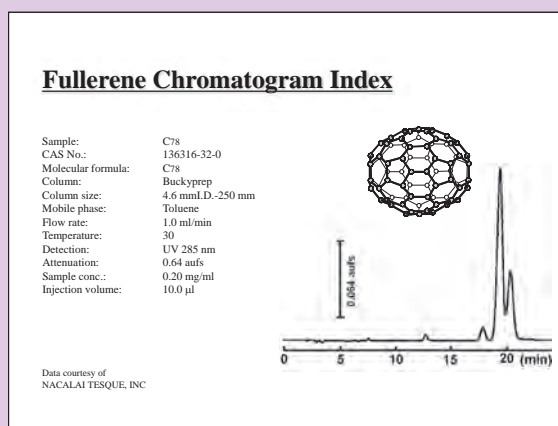
Guard Column

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

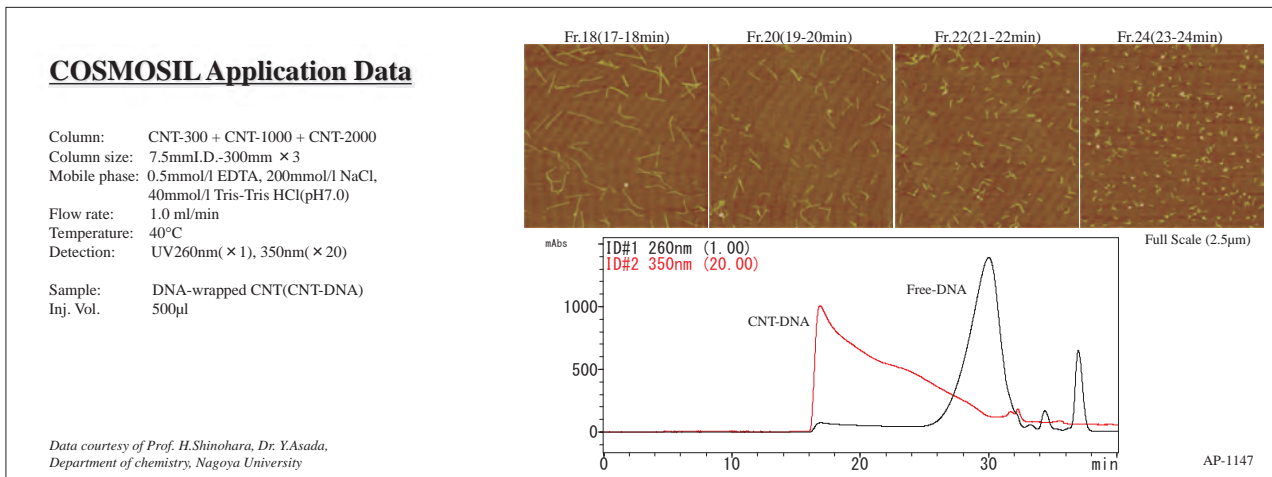
- Size-based separation of soluble carbon nanotubes
- 3 pore sizes (300 Å, 1,000 Å, 2,000 Å)
- High durability

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.



Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number
7.5 × 300	09195-71

Guard Column

I.D. x Length (mm)	Product Number
7.5 × 50	09194-81

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

Packed Column

I.D. x Length (mm)	Product Number
7.5 × 300	09197-51

Guard Column

I.D. x Length (mm)	Product Number
7.5 × 50	09196-61

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

Packed Column

I.D. x Length (mm)	Product Number
7.5 × 300	09199-31

Guard Column

I.D. x Length (mm)	Product Number
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 π MAX	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.

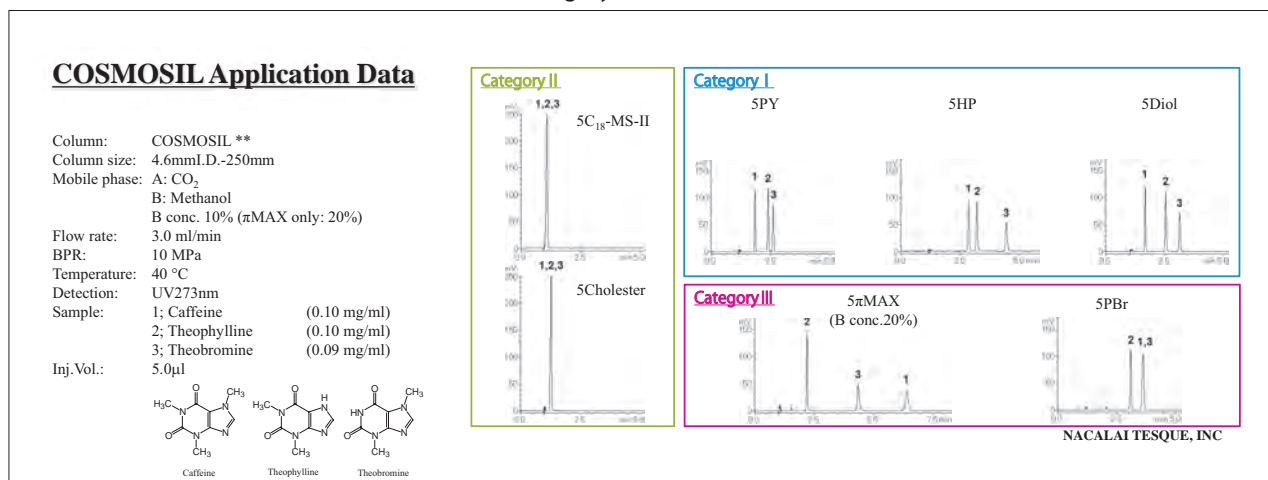
Specifications

Packing Material	PY	HP	Diol	Cholester	π MAX	PBr
Silica Gel	High purity porous spherical silica					
Average Particle Size	3, 5 μ m		5 μ m	5 μ m	5 μ m	5 μ m
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

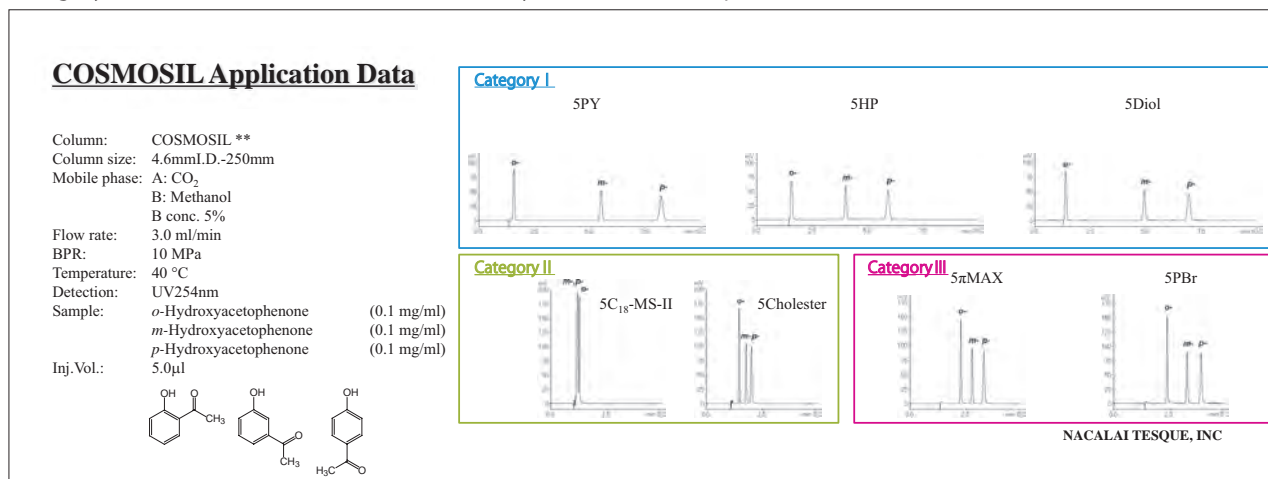
- Derivatives of xanthine (high-polarity compounds); XLogP3: -0.8 ~ 0.0

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.



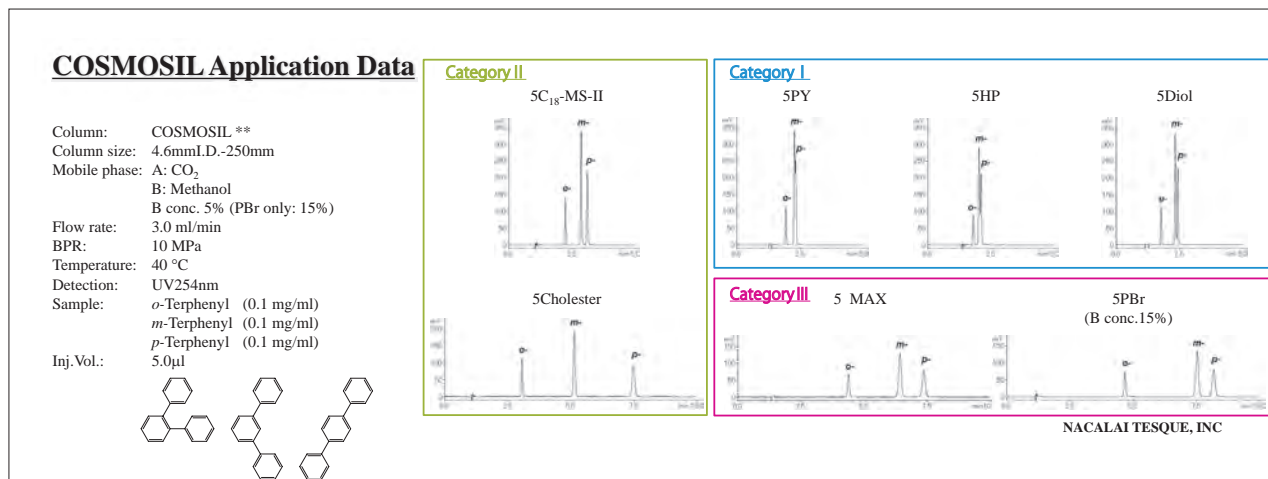
- Positional isomers (mid-polarity compounds); XLogP3: 1.4 ~ 1.9

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



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

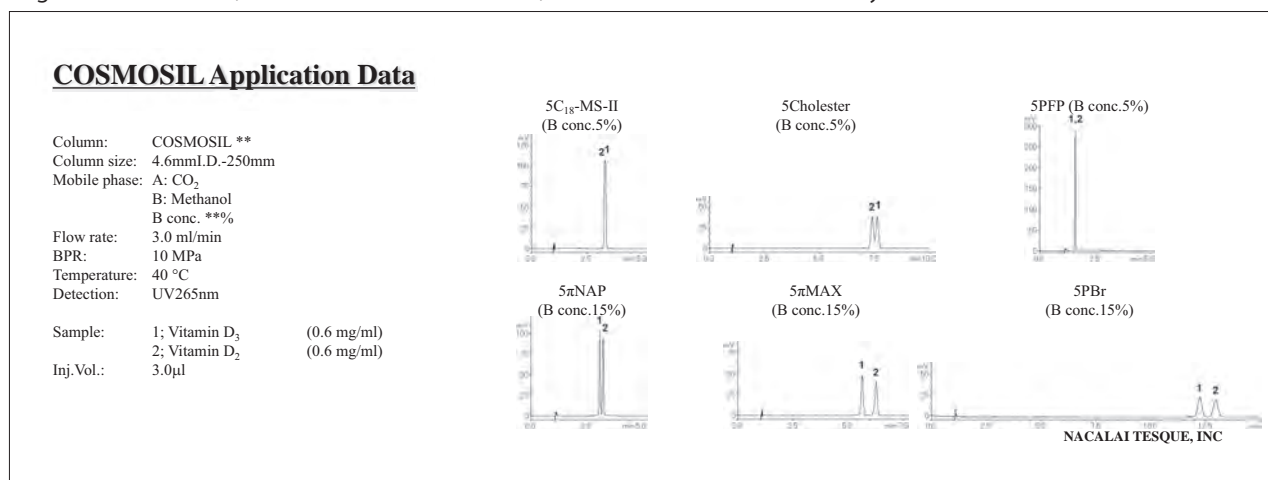
Category III (COSMOSIL 5 π MAX, 5PBr) and category II (5Cholester) columns separated most effectively.



Applications

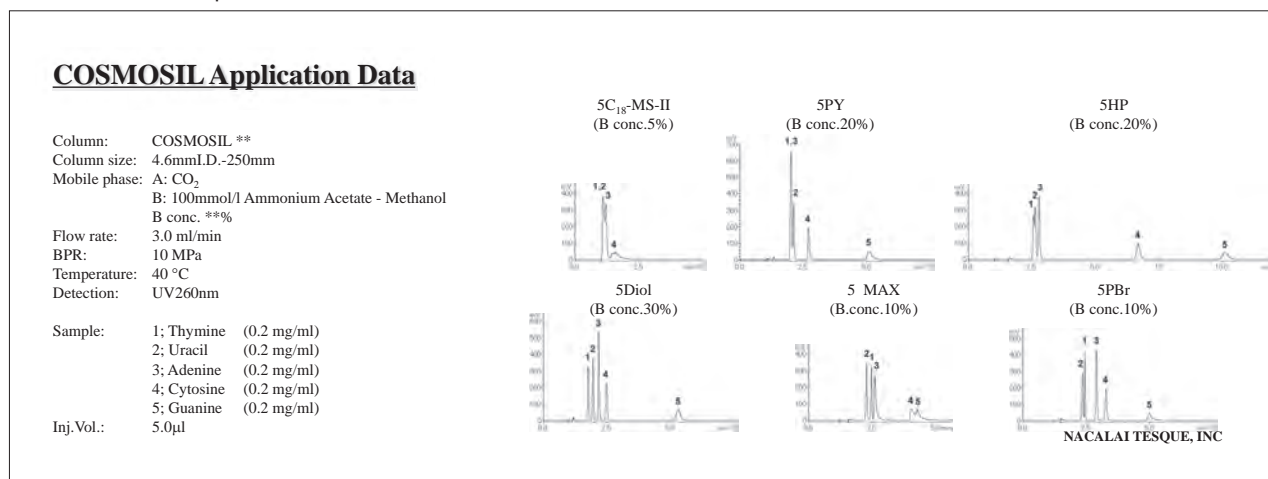
● Vitamin D

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.



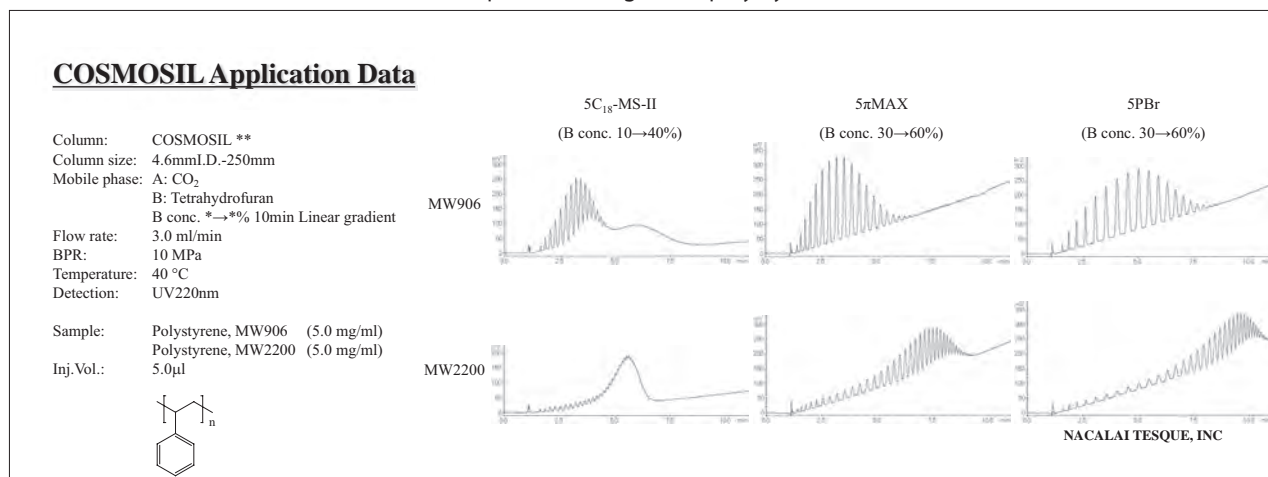
● Nucleobases

COSMOSIL 5Diol separated 5 nucleic acid bases.



● 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.



12. Preparative Packing Materials for Column Chromatography



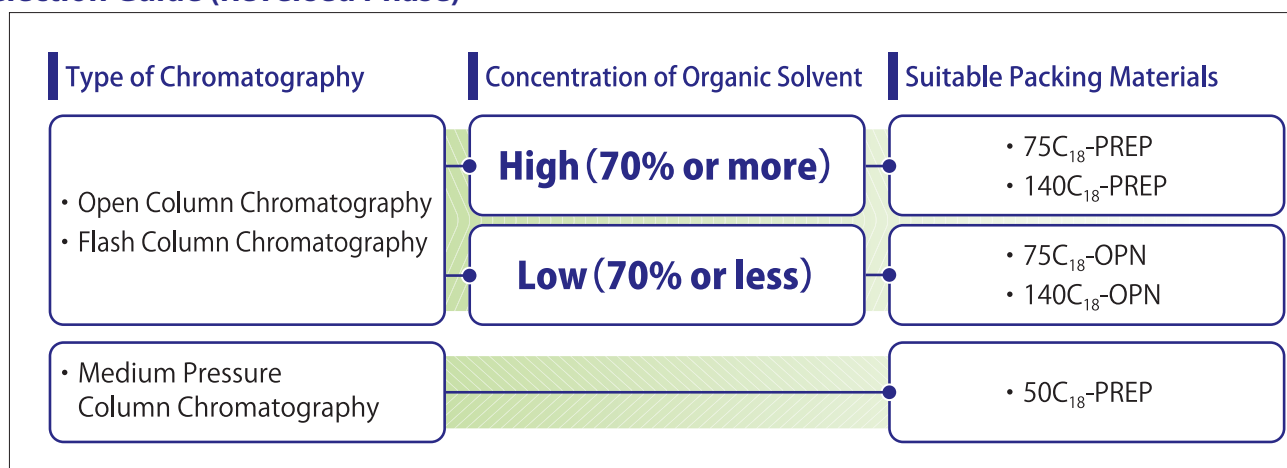
Introduction

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.

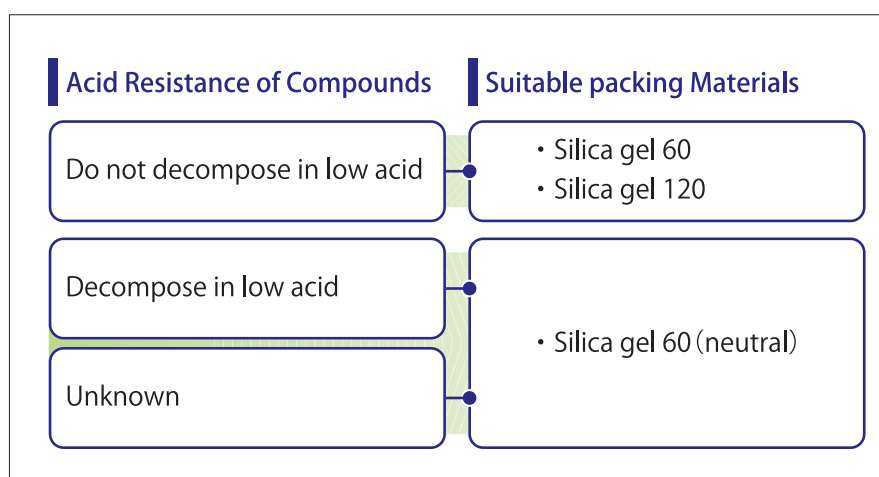
Specifications

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 Group	Yes	None	—		
Application	Open column chromatography / Flash column chromatography				
	Reversed phase chromatography		Normal phase chromatography		

Selection Guide (Reversed Phase)



Selection Guide (Normal Phase)



Reversed Phase Packing Materials (C₁₈)

COSMOSIL C₁₈-OPN

- A new "Water-Wet" C₁₈ 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 C₁₈-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

Alumina 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

1

2

3

4

5

6

7

8

9

10

11

12

13

13. Related Products

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
<i>t</i> -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
<i>o</i> -Dichlorobenzene	SP	11635-31	1 L
Dichloromethane	SP	22423-61	1 L
<i>N,N</i> -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
1 mol/l-Ammonium Formate Solution	SP	12235-54	100 mL
1 mol/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 0.5 M Solution	SP	31331-94	5 g
	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 0.5 M Solution	SP	31529-24	5 g
		31529-82	25 g
	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- <i>n</i> -butylammonium Bromide	SP	32824-72	25 g
Tetra- <i>n</i> -butylammonium Phosphate 0.5 M Solution	SP	32929-54	5 g
		32926-26	10 mL
	SP	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>

The screenshot shows the COSMOSIL website homepage. At the top, there is a search bar with "COSMOCORE UHPLC Columns" entered. Below the search bar, there are several navigation buttons: "COSMOSIL Applications", "Technical Notes", "Reference Lists", "Downloads", "Newsletter Subscription", and "Natural Compounds". A red "Click" callout points to the "Technical Notes" button.

The screenshot shows the "Technical Notes" page. It features a "FAQ and Troubleshooting" section with a red "Click" callout pointing to the "FAQ and Troubleshooting" link. Below this, there is a "Technical Information" section with a list of articles, including "Preparation of Mobile Phase for HPLC" and "Scale Up and Scale Down".

The screenshot shows the "FAQ and Troubleshooting" page. It contains a list of frequently asked questions (Q1-Q28) and a list of troubleshooting topics (T1-T11). A red "Click" callout points to the "FAQ" link, and another red "Click" callout points to the "Poor peak shape" link (T1).

The screenshot shows a technical note titled "Q7. Should I use acetonitrile or methanol for the mobile phase?". It includes two graphs comparing the backpressure of acetonitrile and methanol at different concentrations. The text explains that the backpressure of acetonitrile is lower than that of methanol at the same concentration.

The screenshot shows a technical note titled "T1. Poor peak shape". It includes a chromatogram showing various peak shapes: Normal Peak, Tailing Peak, Fronting Peak, Broad Peak, Peak Split, Peak Shift, and Peak Bifurcation. Below the chromatogram is a table with troubleshooting tips for different peak shapes.

Symptom	Cause	Solution
Normal Peak	Undesirable ion exchange interaction between basic compounds and packing material.	Use a column with fewer residual silanols (SILB-E) or (SILB-ME-U), or add 0.1-1% acid to mobile phase.
Tailing Peak	Undesirable coordinate interaction between metal coordination compound and packing material.	Add 5 mmol/L of di-sodium dihydrogen ethylenediaminetetraacetate dihydrate (EDTA-2Na) to mobile phase.
Fronting Peak	Undesirable hydrogen bonding interaction between sample and packing material.	Change the organic solvent (e.g., acetonitrile to methanol).
Broad Peak	Void in packing material or column deterioration.	Replace the column.



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.

NACALAI TESQUE, INC.

Nijo Karasuma, Nakagyo-ku, Kyoto
604-0855 JAPAN

TEL : +81 (0)75 251 1730

FAX : +81 (0)75 251 1763

E-mail : info.intl@nacalai.com

www.nacalai.com

Nacalai USA, Inc.

10225 Barnes Canyon Rd., Suite A 103
San Diego, CA 92121

TEL : (858) 404-0403

FAX : (858) 404-0408

E-mail : info@nacalaiusa.com

www.nacalaiusa.com