



COSMOSIL

COSMOSIL

High Performance Liquid Chromatography

Catalog **12th Edition**



From Kyoto

There was a time when gas chromatography was the most powerful separation technique, without any good alternatives. Then liquid chromatography was developed, and it has been gaining popularity since the 1970s.

We launched the COSMOSIL Development project to collect information about customers' needs to develop our first HPLC column. In 1980, COSMOSIL was born in Kyoto.

Kyoto is well known as old Japan, but its role as a high technology center is less familiar.

Companies with cutting-edge technology in entertainment, telecommunication and analytics, as well as academic achievements, such as induced pluripotent stem cell (iPSC) development and identification of programmed cell death protein 1 (PD-1), rose from Kyoto.

This is the place where we were born and continue to grow, the place where history and future are fused. COSMOSIL was born and lives here.

To contribute to the development of happiness—this is our creed.

All isomers of dioxin, an environmental toxin, were separated by a research team from Kyoto institute of Technology using COSMOSIL in 1994. Since, we have developed methods for analysis of other difficult targets, such as amino acids, pharmaceutical impurities, and mRNA.

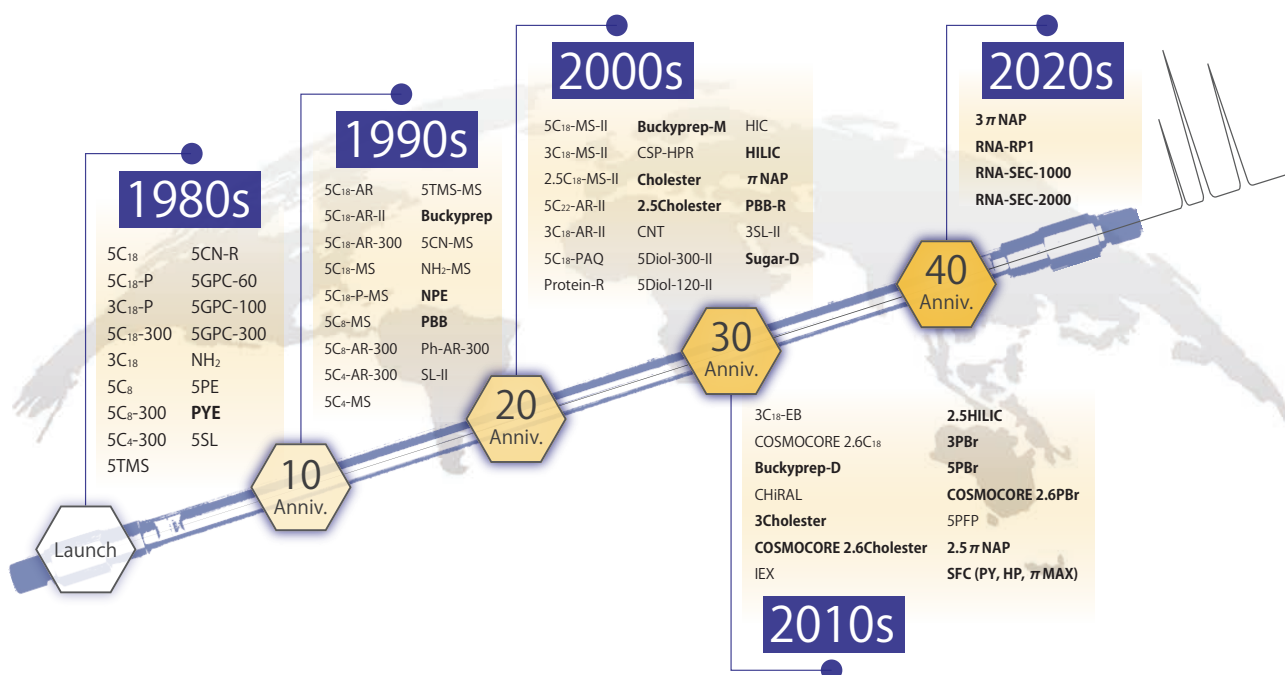
Others' happiness is our own.

What can you contribute to the world with COSMOSIL?



COSMOSIL Brand History

What are you expecting next?



Bold font: Specialty column

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COSMOSIL 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			32			
	COSMOCORE C ₁₈		C ₁₈ -AR-II	Polymeric	2.6 (Core-Shell)	90	7	Features strong acid resistance, good for acidic compounds and peptides	L1	26		
	C ₁₈ -PAQ				3, 5, 15	120	11			Good for hydrophilic compounds and stable performance under 100% aqueous conditions	L1	28
	C ₁₈ -EB				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	—						
				3, 5	120	20						
	PBr	Pentabromobenzyl group	Mono- meric	2.6 (Core-Shell)	90	—	Separate hydrophilic compounds under reversed-phase conditions.	—	14			
				3, 5	120	8						
	PFP	Pentafluorophenyl group	Mono- meric	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			
	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		Polymeric	5	120	7	Enables separation of different hydrophobic samples without using gradients	L10	35		
							19	Alkyl chain columns, excluding C ₁₈	—	36		
	C ₂₂ -AR-II	Docosyl group		Polymeric	10	π-π interaction	L7					
	C ₈ -MS	Octyl group		Mono- meric	7		L26					
	C ₄ -MS	Butyl group			10	L11						
	PE-MS	Phenylethyl group		—	Wide pore column with the advantages of both C ₁₈ and C ₄	L1	55					
	Protein-R	Octadecyl group	Polymeric	300		12	Wide pore type	L1	57			
	C ₁₈ -AR-300	Octadecyl group				7		L7				
	C ₈ -AR-300	Octyl group				6		L26				
	C ₄ -AR-300	Butyl group				7		L11				
	Ph-AR-300	Phenyl group			—	5		—		—	52	
	RNA-RP1	Octadecyl group	—	5	—	—	—	52				
	Normal phase	SL-II	—	—	3, 5, 15	120	—	Suitable for preparative separation	L3	42		
	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			

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
Gel filtration	Diol-120-II	Diol group	—	5	120	—	Sample MW Protein: 5,000-100,000 Water-Soluble Polymer: 1,000-20,000	L20	59
	Diol-300-II				300		Sample MW Protein: 10,000-700,000 Water-Soluble Polymer: 5,000-100,000		
	Diol-1000-II				1,000		Sample MW Water-Soluble Polymer: 50,000-500,000		
	RNA-SEC-1000	Hydrophilic group			1,000		For analysis of nucleic acids longer than 100 nt	—	51
	RNA-SEC-2000				2,000				
Hydrophobic interaction	HIC	—	—	5	300	—	Little loss in enzyme activity and the tertiary structure of proteins	—	61
—	Buckyprep	Pyrenylpropyl group	Mono- meric	5	120	17	Standard column for fullerene separation	—	63
	Buckyprep-D	Nitro-carbazoyl group				—	Good for derivatized fullerenes		64
	Buckyprep-M	Phenothiazinyl group				13	Good for metallofullerenes		65
	PBB	Pentabromobenzyl group				8	Good for preparative separation of C ₆₀ or C ₇₀		66
Gel filtration	CNT-300	Hydrophilic group (neutral)	—	5	300	—	Separation of soluble carbon nanotubes	—	67
	CNT-1000				1,000				
	CNT-2000				2,000				
Chiral Separation	CHiRAL A	Amylose tris (3,5-dimethyl-phenyl carbamate)	—	3, 5	—	—	Immobilized selectors can withstand many different solvents.	L 99	37
	CHiRAL B	Cellulose tris (3,5-dimethyl-phenyl carbamate)						—	
	CHiRAL C	Cellulose tris (3,5-dichloro-phenyl carbamate)						—	

SFC Columns

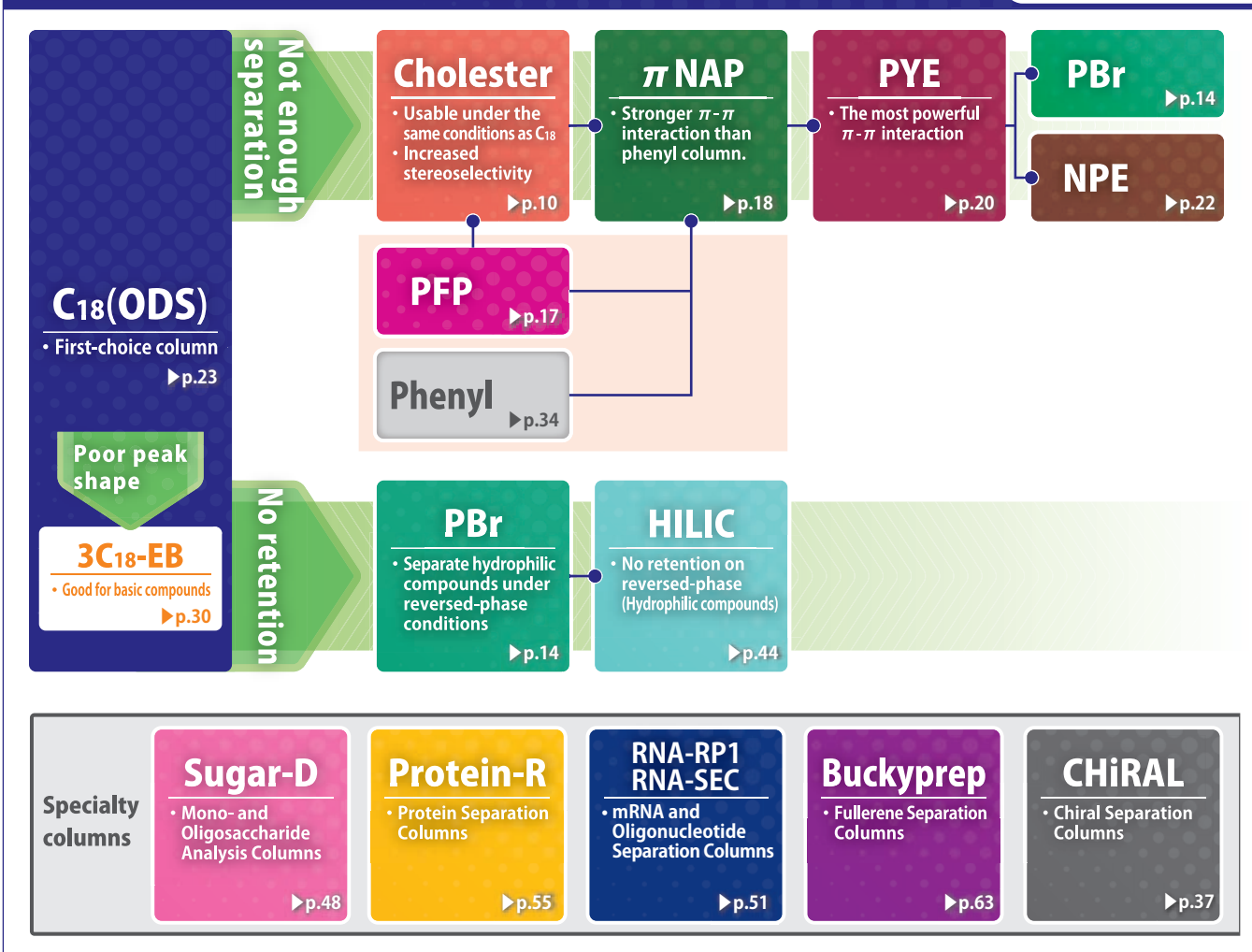
Separation Mode	Packing Material	Bonded Phase	Bonding Type	Average Particle Size (μm)	Average Pore Size (Å)	Carbon Content (%)	Special Features and Applications	USP Category	Page
SFC	PY	Pyridinyl group	—	3, 5	120	—	Similar separation properties as 2-Ethylpyridine, with stronger retention	—	68
	HP	3-Hydroxyphenyl 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

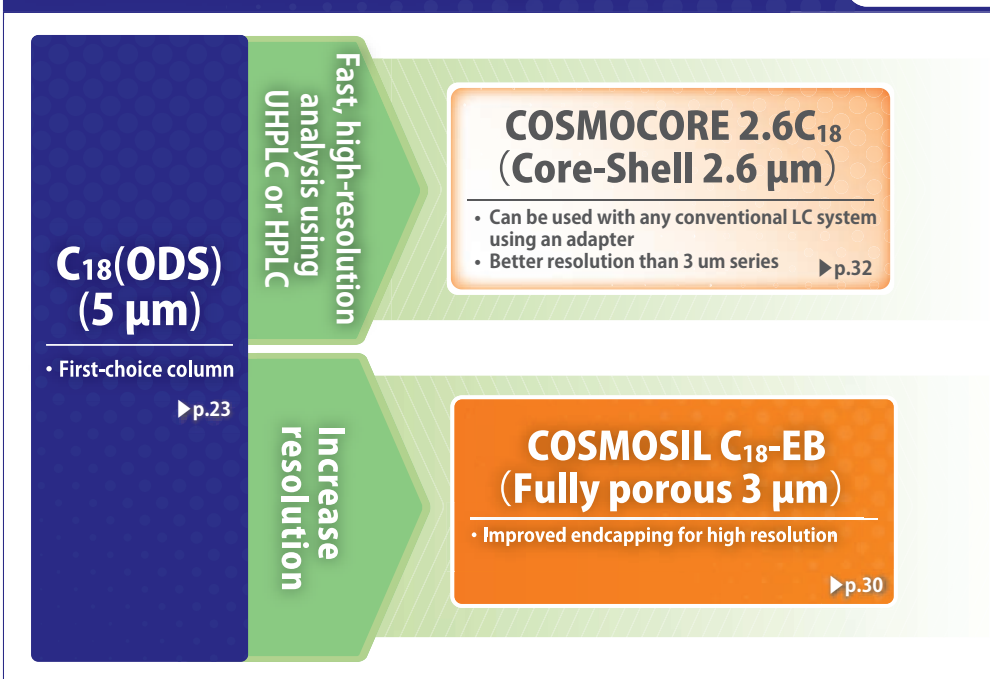
Sample	Category	Separation Mode	Recommended Column	Page	Remark
Low-MW drugs	—	Reversed phase	C ₁₈ -EB	30	Near-perfect end capping treatment
			COSMOCORE C ₁₈	32	
		Hydrophilic interaction	HILIC	44	Retains highly polar compounds that would not be retained in C ₁₈ column
		Normal phase	SL-II	42	Standard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

Sample	Category	Separation Mode	Recommended Column	Page	Remark
Optical isomers	—	Normal phase Reversed phase	CHIRAL A Type, B Type, C Type	37	3 chiral selectors with high overall hit rate
Amino acids	Free amino acids	Reversed phase	PBr	14	Retains aromatic amino acids
		Hydrophilic interaction	HILIC	44	For amino acids not retained in reversed-phase mode
	Labeled amino acids	Reversed phase	C ₁₈ -AR-II	26	Features strong acid resistance
Peptides Proteins	M. W. 3,000 or less	Reversed phase	C ₁₈ -AR-II	26	Features strong acid resistance
			PBr	14	Separation for oligopeptides
		Hydrophilic interaction	HILIC	44	For hydrophilic peptides not retained in reversed-phase mode
	M. W. 3,000 or more	Reversed phase	Protein-R	57	Wide pore columns
			C ₁₈ -AR-300 C ₄ -AR-300		
	Size exclusion	Diol-II	59	Separation utilizing molecular size	
Nucleic acids	Nucleic acid bases	Reversed phase	PBr	14	Separate under reversed-phase condition
		Hydrophilic interaction	HILIC	44	Different selectivity from reversed phase
	Nucleosides Nucleotides	Reversed phase	C ₁₈ -PAQ	28	Compatible with 100% water based mobile phase
			PBr	14	Strong retain than C ₁₈
		Hydrophilic interaction	HILIC	44	Different separatin from reversed phase
	Oligonucleotides	Reversed phase	RNA-RP1	52	High resolution with standard C ₁₈ phase
		Size exclusion	RNA-SEC-1000	51	Analyze a wide range of molecular weights
Size exclusion		RNA-SEC-2000	51	Analyze a wide range of molecular weights	
Sugars	Monosaccharides	Hydrophilic interaction	Sugar-D	48	Separation in non-derivatized form
			NH ₂ -MS	50	
	Labeled saccharides	Reversed phase	C ₁₈ -PAQ	28	For pyridylaminated sugars
		Hydrophilic interaction	Sugar-D	48	For two-dimensional separations with reversed-phase
	NH ₂ -MS		50		
	Oligosaccharides	Reversed phase	PBr	14	Retained in reversed-phase mode
		Hydrophilic interaction	Sugar-D	48	Separation in non-derivatized form
NH ₂ -MS	50				
Polysaccharides	Size exclusion	Diol-II	59	Separation utilizing molecular size	
Fullerenes	Fullerenes	—	Buckyprep	63	Standard for fullerene separation
	Metallofullerenes	—	Buckyprep	63	Different selectivity for metallofullerenes
			Buckyprep-M	65	
	Derivatized fullerenes	—	Buckyprep	63	Separation in toluene mobile phase
Buckyprep-D			64		
Carbon nanotubes	—	Size exclusion	CNT	67	Separation of soluble carbon nanotubes
Water-soluble polymer	—	Size exclusion	Diol-II	59	Separation utilizing molecular size

Column Selection Guide by Stationary Phase Type

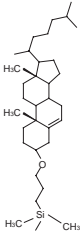
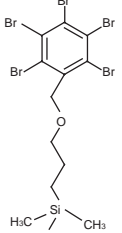
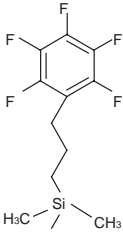
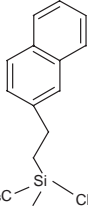
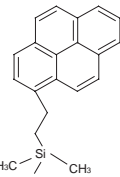
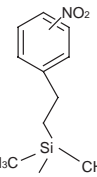


Column Selection Guide by Particle Size



1. Reversed Phase Specialty Columns

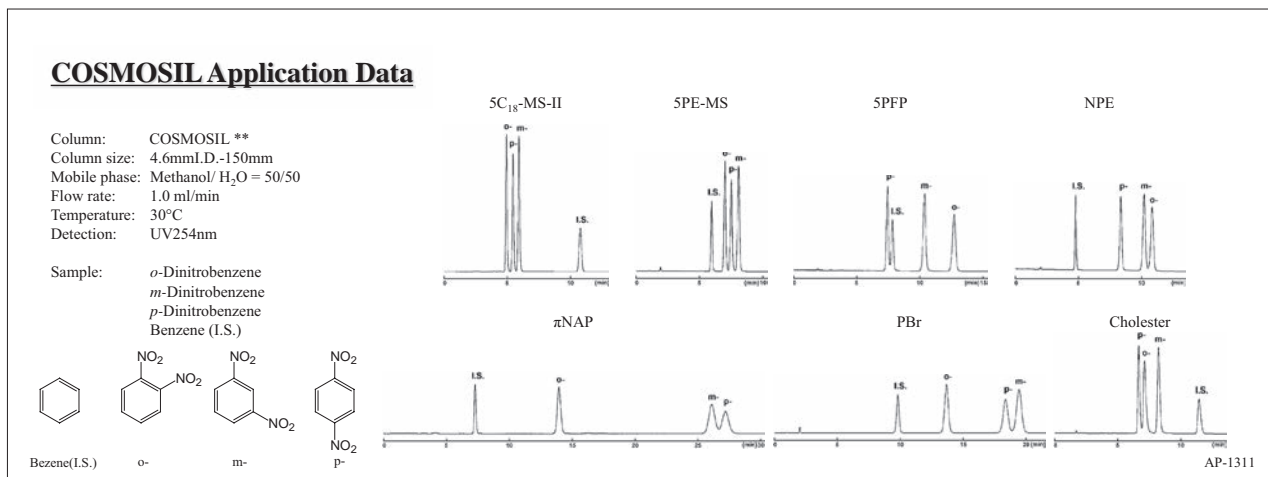
Specifications

Packing Material	Cholester			PBr			PFP	π NAP			PYE	NPE	
	Fully-Porous	Core-Shell	Core-Shell	Fully-Porous	Core-Shell	Core-Shell	Fully-Porous	Fully-Porous	Fully-Porous	Fully-Porous	Fully-Porous		
Average Particle Size (μm)	2.5	3	5	2.6	3	5	2.6	5	2.5	3	5	5	5
Average Pore Size (\AA)	130	120	90	120	120	90	120	120	130	120	120	120	120
Specific Surface Area (m^2/g)	330	300	150	300	300	150	300	300	330	300	300	300	300
Bonded Phase Structure													
Bonded Phase	Cholesteryl group			Pentabromobenzyl group			Pentafluorophenyl group	Naphthylethyl 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%	18%	9%	
Usable pH Range	2 ~ 7.5												
Features	<ul style="list-style-type: none"> Usable under the same conditions as C_{18} High molecular shape selectivity 			<ul style="list-style-type: none"> Separate hydrophilic compounds under reversed-phase conditions Separate using dispersion force 			<ul style="list-style-type: none"> Weak dipole-dipole interaction 	<ul style="list-style-type: none"> Stronger π-π interaction than phenyl column 	<ul style="list-style-type: none"> Very strong π-π interaction 	<ul style="list-style-type: none"> Strong dipole-dipole interaction 			

* Silica Gel : Fully-Porous...High purity porous spherical silica Core-Shell...Core-Shell silica gel

Selectivity for positional isomers of dinitrobenzene

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



COSMOSIL Cholester / COSMOCORE Cholester



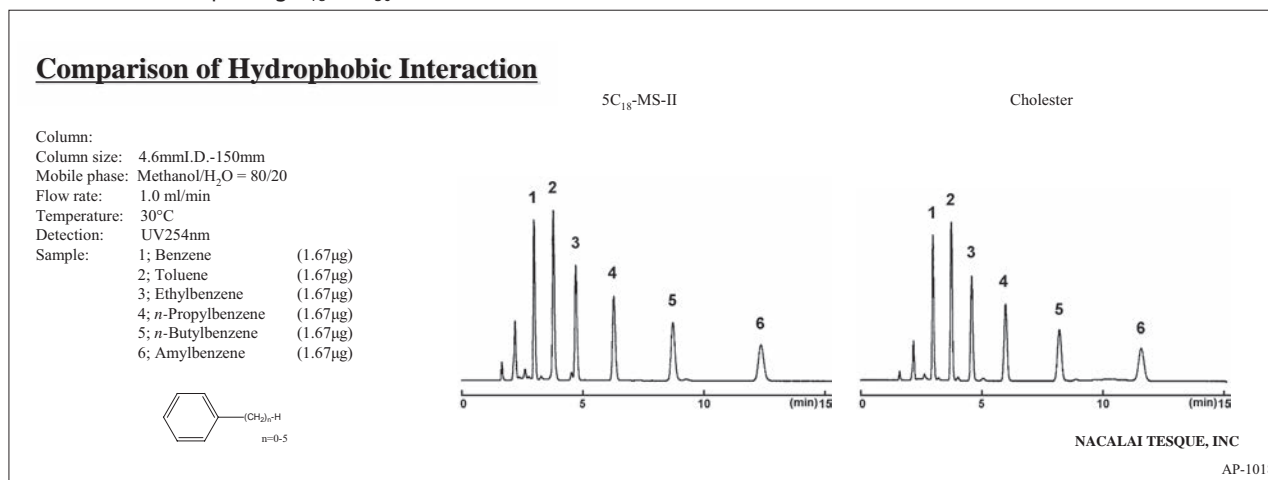
- Cholesterol-bonded stationary phase
- Increased stereoselectivity and improved resolution for geometric isomers
- Usable under the same conditions as C₁₈

Suitable Samples

- Natural compounds
- Structurally 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.

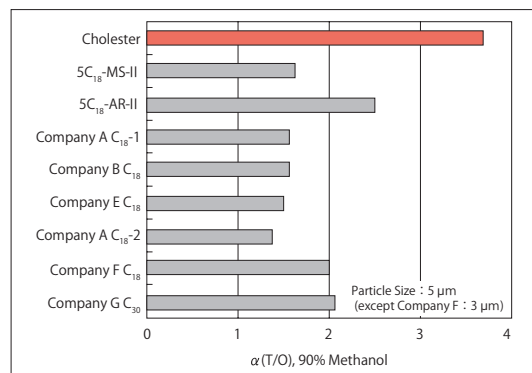
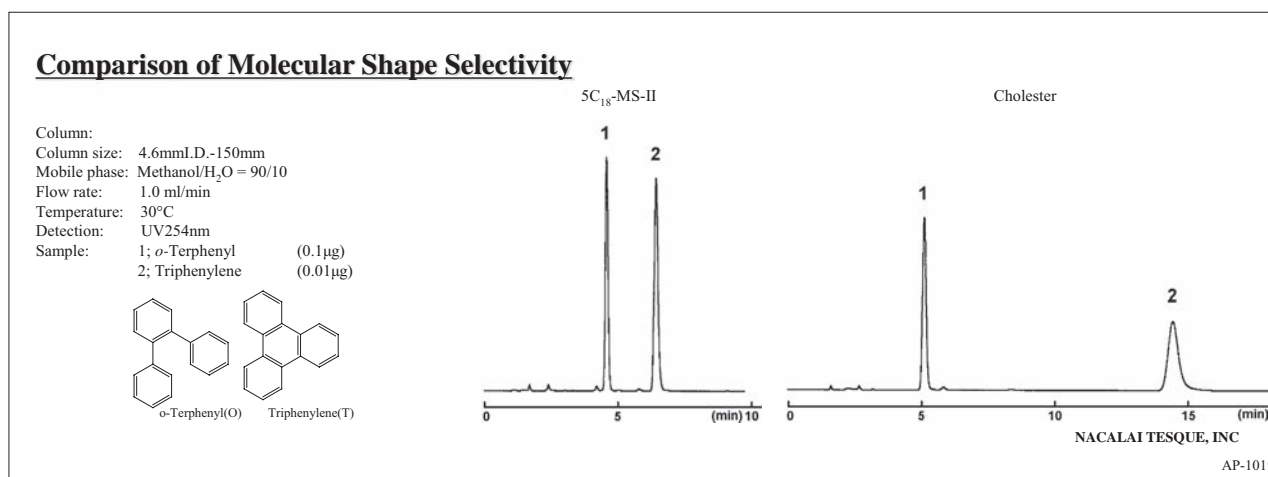


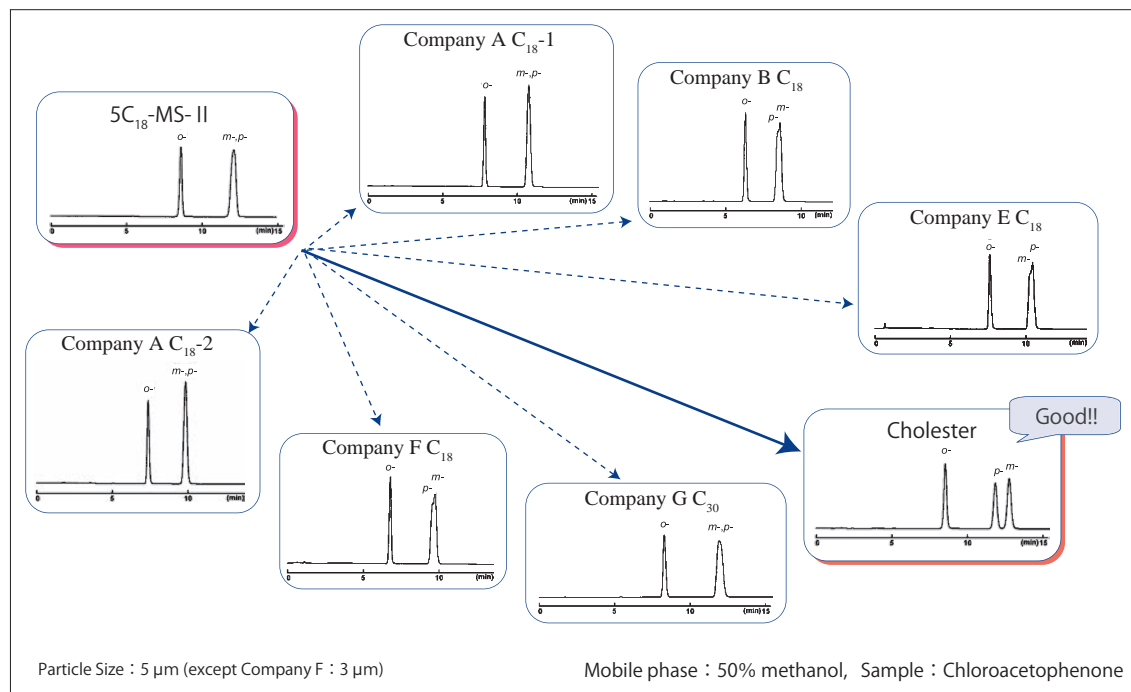
Figure. Comparison of molecular shape selectivity



Improvement in Separation

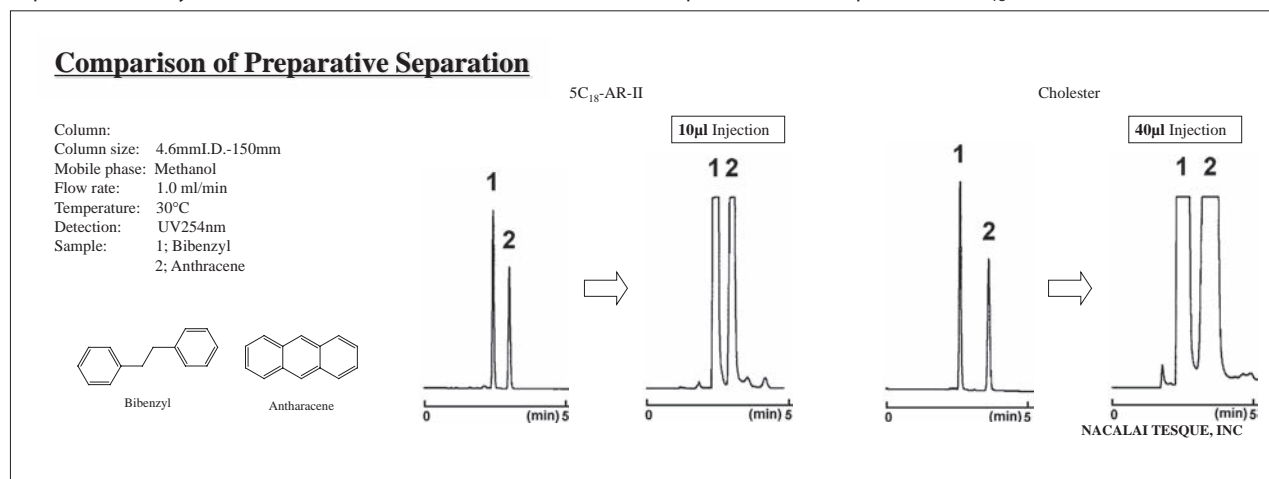
COSMOSIL Cholester provides enhanced selectivity over traditional C₁₈ columns and offers greater performance in separating isomers or other closely related compounds. COSMOSIL Cholester is ideal for method development and serves as an excellent alternative to traditional C₁₈ columns. The figure below 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

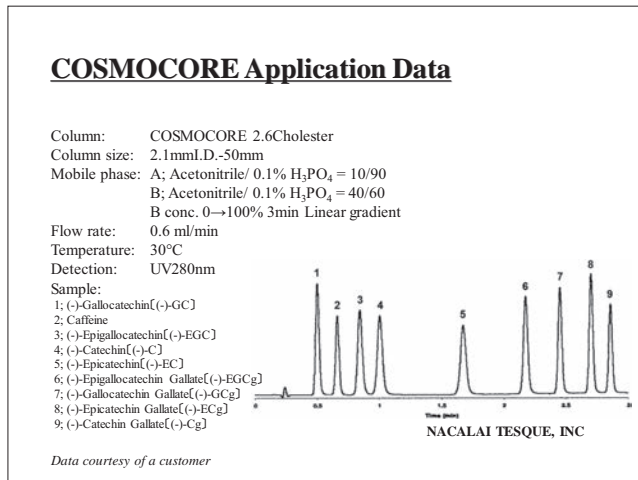
The figure below shows the comparison of efficiency of preparative separation with a C₁₈ column. Both columns show good separation. However, sample loading capacity for preparative separations can be affected by a slight difference in separation ability. COSMOSIL Cholester can load 4 times the sample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



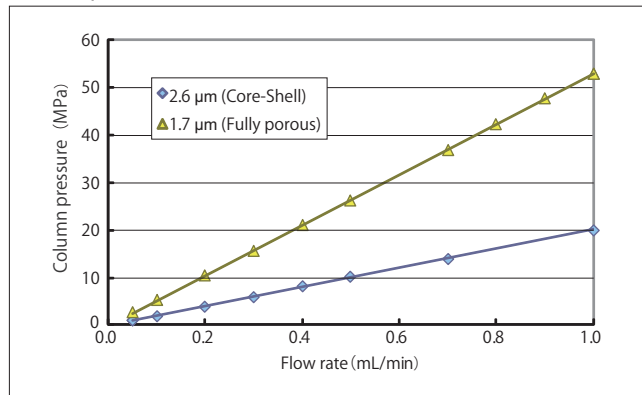
About Core-Shell 2.6Cholester Particles

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)



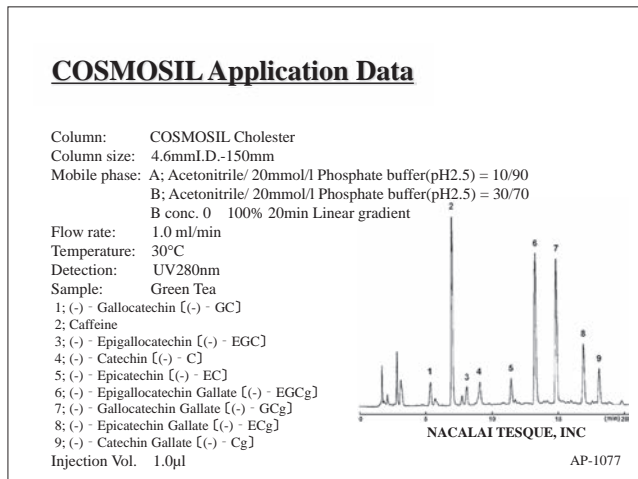
● Comparison of Column Pressure



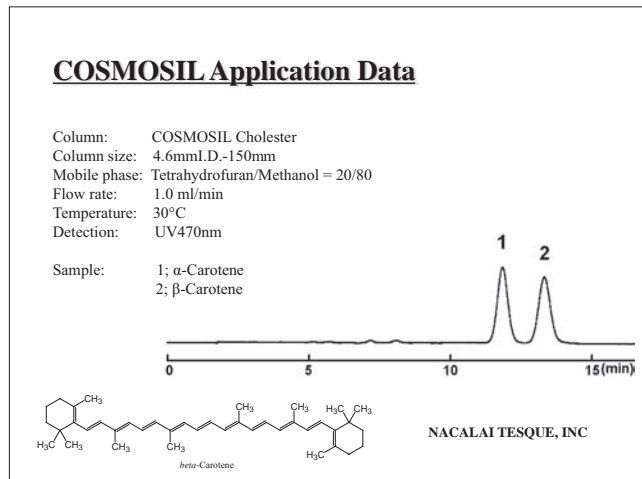
Column Size : 2.1 mmI.D. x 100 mm
 Mobile Phase : Acetonitrile/Water = 70/30
 Temperature : 40°C

Applications

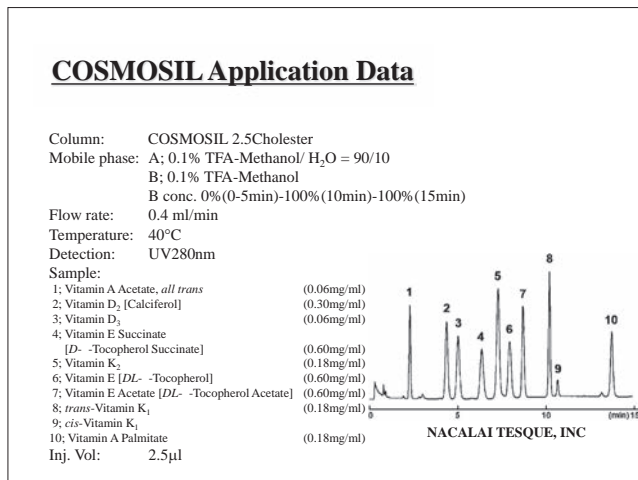
● Catechins (Commercial Green Tea)



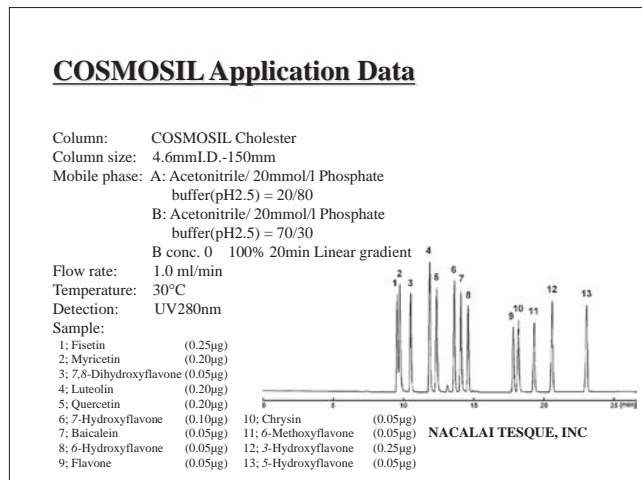
● Carotene



● Fat-Soluble Vitamins

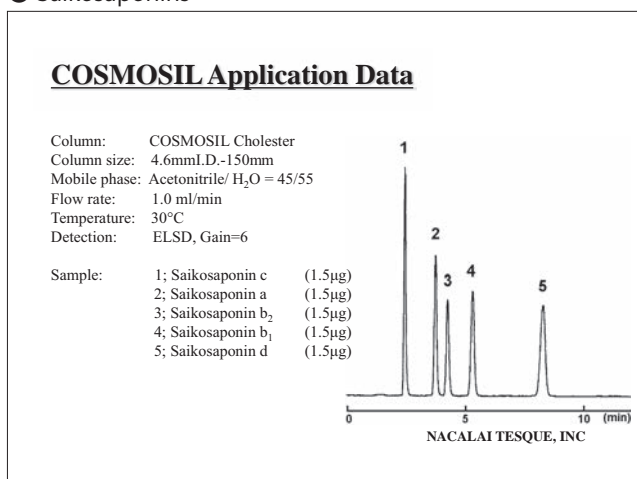


● Flavone

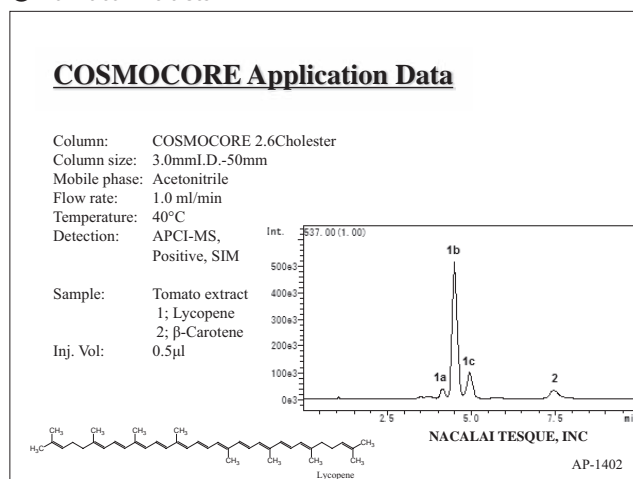


Applications

● 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	I.D. x Length (mm)	Product Number
1.0 × 150	05968-71	4.6 × 150*	05976-61	28 × 100	16592-41
1.0 × 250	05969-61	4.6 × 150 3 lots set*	07970-03	28 × 150	16593-31
2.0 × 30	08565-51	4.6 × 250*	05977-51	28 × 250	05985-41
2.0 × 50	06352-91	10 × 50	16590-61	Guard Column / Guard Cartridge	
2.0 × 100	06948-01	10 × 100	16591-51	I.D. x Length (mm)	Product Number
2.0 × 150	05971-11	10 × 150	08011-91	4.6 × 10	05975-71
2.0 × 250	05972-01	10 × 250	05979-31	4.6 × 10 Cartridge †	19183-24
3.0 × 150	05973-91	20 × 50	05981-81	10 × 20	05978-41
3.0 × 250	05974-81	20 × 100	15995-01	20 × 20	05980-91
4.6 × 50	06359-21	20 × 150	06088-71	28 × 50	05983-61
4.6 × 100	06591-61	20 × 250	05982-71	* Columns for validation † 2 cartridges included. Guard cartridge holder required; refer to page 78	

● COSMOSIL 3Cholester Fast LC Columns (Particle Size: 3 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	19188-61	3.0 × 100	19196-51	Guard Cartridge	
2.0 × 75	19189-51	3.0 × 150	19197-41	I.D. x Length (mm)	Product Number
2.0 × 100	19190-11	3.0 × 250	19198-31	2.0 × 10 Cartridge*	19325-64
2.0 × 150	19191-01	4.6 × 50	19199-21	4.6 × 10 Cartridge*	19344-14
2.0 × 250	19192-91	4.6 × 75	19200-71	* 2 cartridges included. Guard cartridge holder required; refer to page 78.	
3.0 × 50	19194-71	4.6 × 100	19300-61		
3.0 × 75	19195-61	4.6 × 150	19151-21		
		4.6 × 250	19316-71		

● COSMOSIL 2.5Cholester Fast LC 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 UHPLC 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



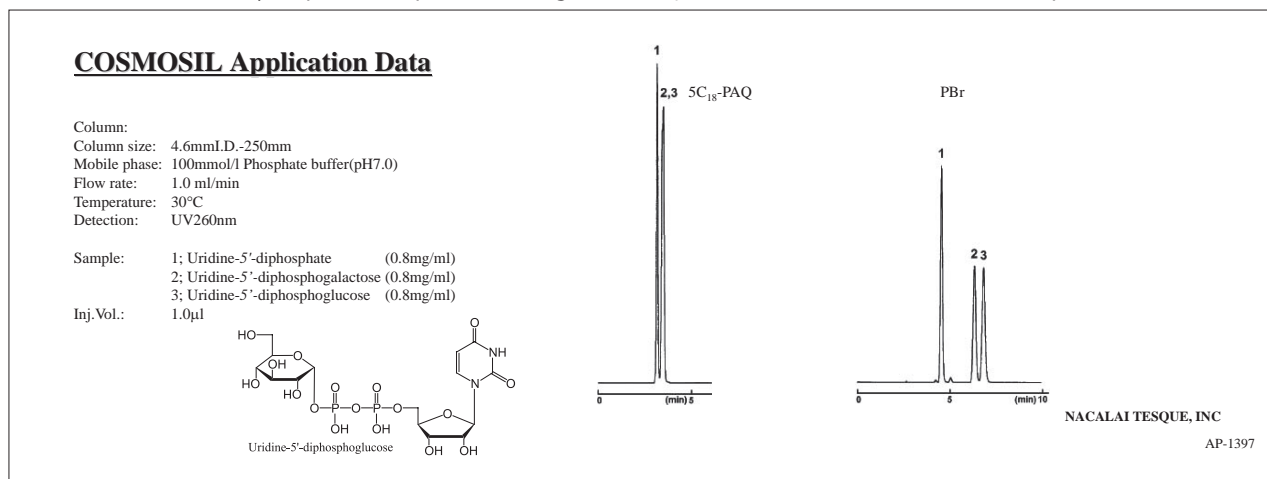
- Pentabromobenzyl-bonded stationary phase
- Separate hydrophilic and hydrophobic compounds in reversed-phase conditions

Suitable Samples

- Hydrophilic compounds
- Nucleotides, peptides, catecholamines and oligosaccharides

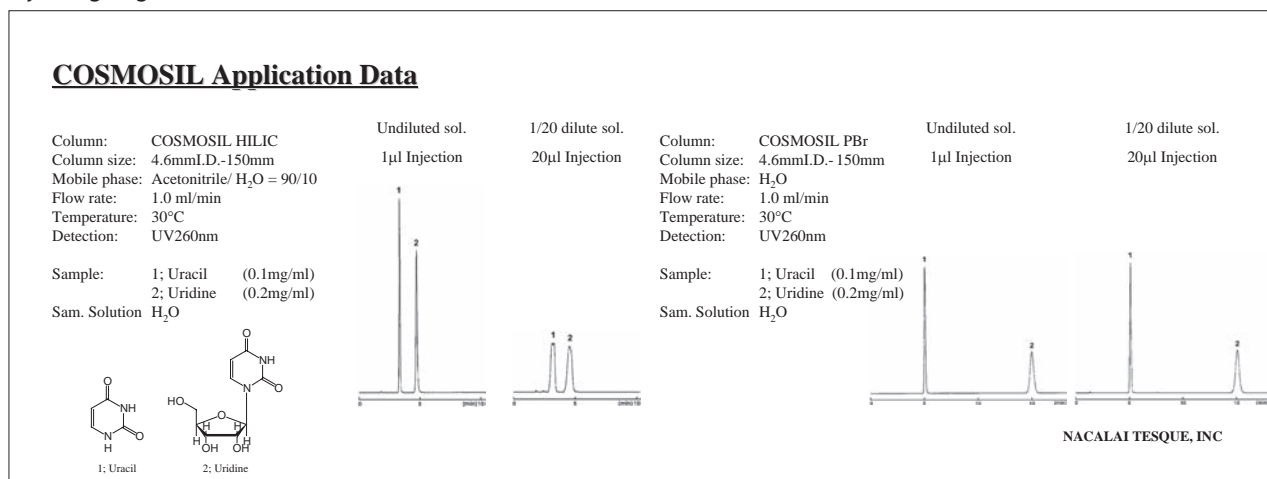
Comparison with C₁₈

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



Comparison with HILIC

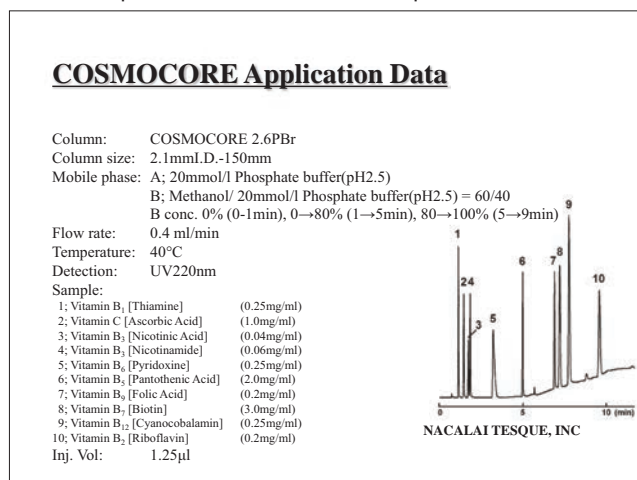
HILIC is widely recognized as a method for separating hydrophilic compounds. However, because it differs from the commonly used reversed-phase mode, setting mobile phase conditions can be difficult. In addition, the use of acetonitrile in high concentration can cause problems with peak shape when using 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.



COSMOCORE 2.6PBr core-shell column

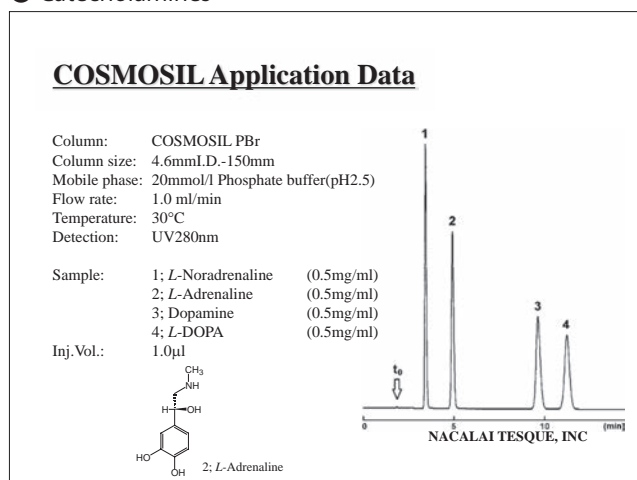
- High-performance separation of water-soluble compounds in reversed-phase mode

Water-soluble compounds can be difficult to separate under reversed-phase conditions, even using C_{18} columns designed for aqueous conditions, due to very low retention. PBr can retain many of these compounds enough to achieve separation, as in the below separation of ten water-soluble vitamins.

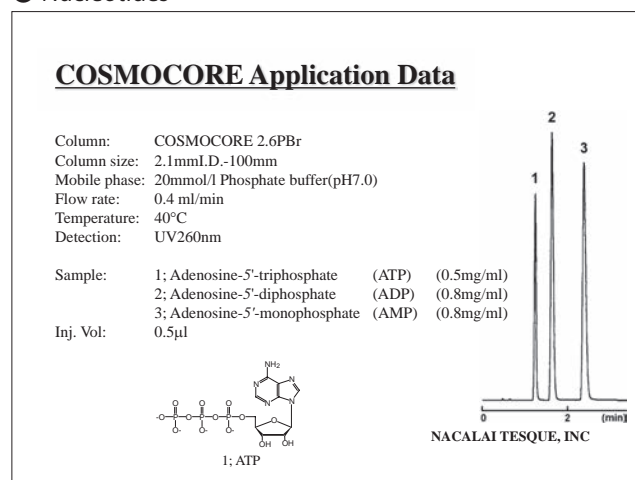


Applications

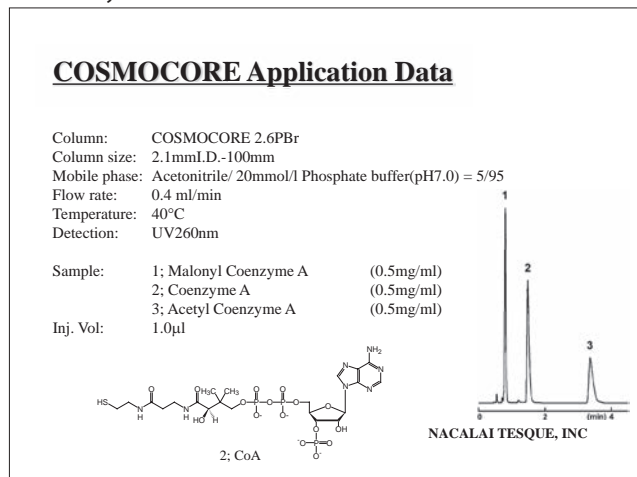
- Catecholamines



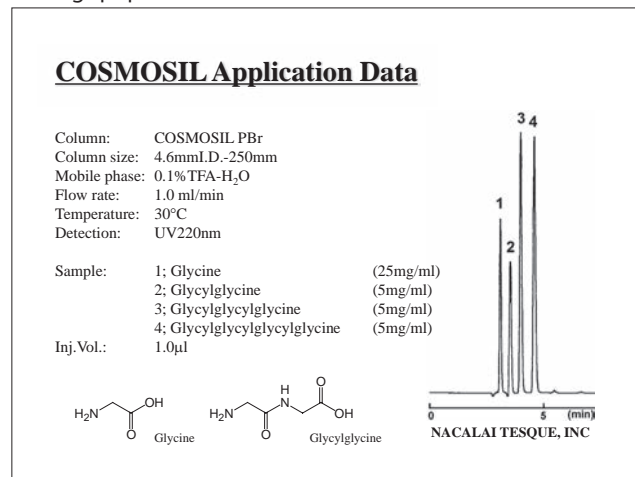
- Nucleotides



- Coenzyme A

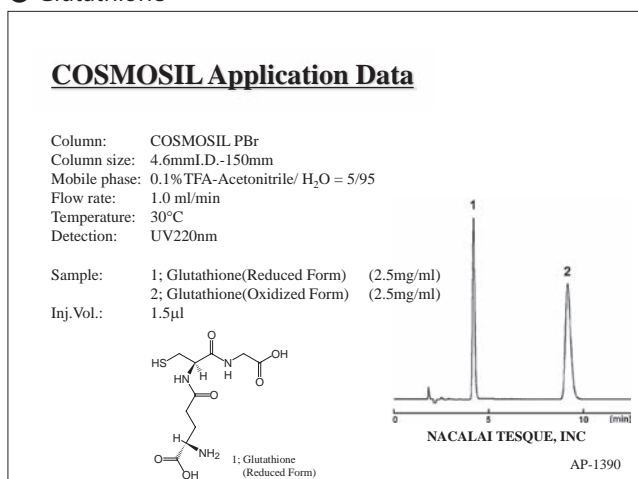


- Oligopeptides

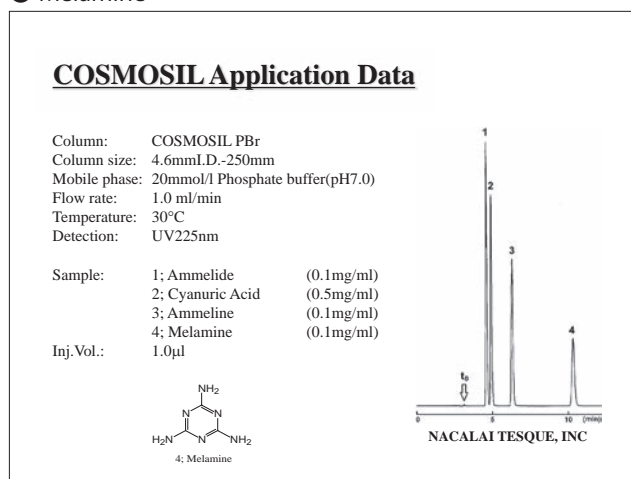


Applications

● Glutathione



● Melamine



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	2.0× 10 Cartridge*	18196-94
3.0× 150	13250-01	20× 50	13257-31	4.6× 10 Cartridge*	12444-14
3.0× 250	13251-91	20× 100	13258-21	10× 20	12396-41
4.6× 50	13252-81	20× 150	13259-11	20× 20	13256-41
4.6× 100	12594-41	20× 250	12398-21	28× 50	12653-61

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

● COSMOSIL PBr Fast LC Columns (Particle Size: 3 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	19345-91	3.0× 100	19351-01	4.6× 150	19357-41
2.0× 75	19346-81	3.0× 150	19352-91	4.6× 250	19358-31
2.0× 100	19347-71	3.0× 250	19353-81	Guard Cartridge	
2.0× 150	19078-01	4.6× 50	19354-71	I.D. x Length (mm)	Product Number
2.0× 250	19348-61	4.6× 75	19355-61	2.0× 10 Cartridge*	19359-34
3.0× 50	19349-51	4.6× 100	19356-51	4.6× 10 Cartridge*	19360-94
3.0× 75	19350-11			* 2 cartridges included. Guard cartridge holder required; refer to page 78.	

● COSMOCORE 2.6PBr UHPLC 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



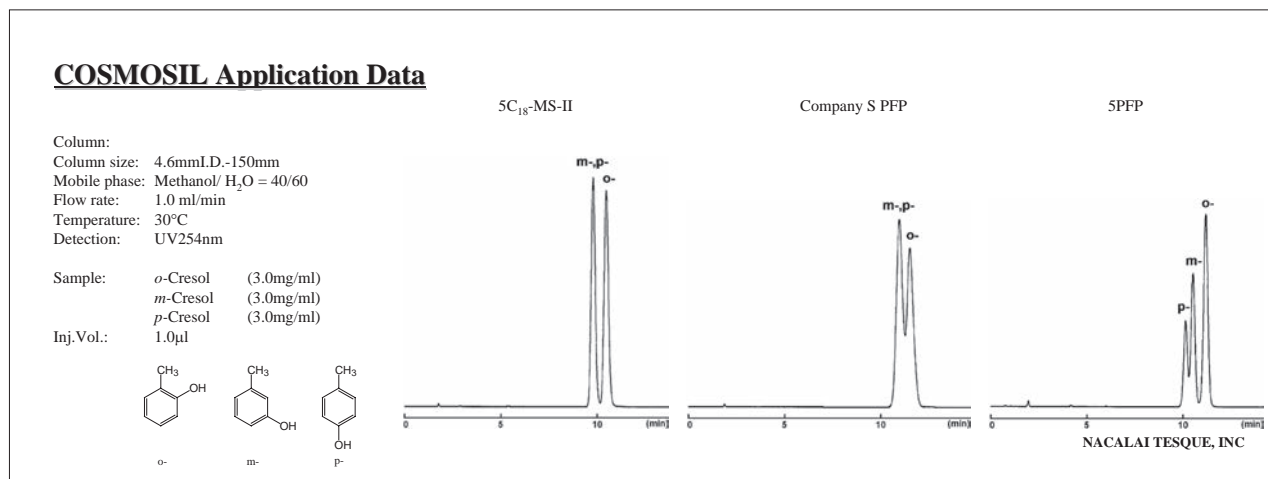
- Pentafluorophenyl-bonded stationary phase
- Alternative selectivity to C₁₈ columns

Suitable Samples

- Vitamin E
- Structural isomers and fluorides

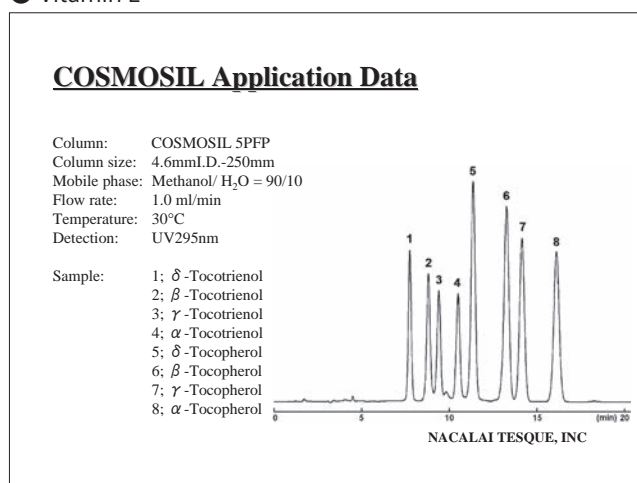
Alternative Selectivity to C₁₈ Columns

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

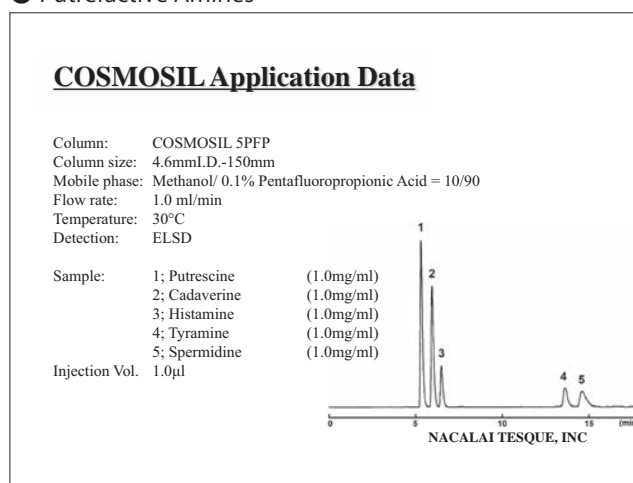


Applications

● 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 78.	

COSMOSIL π NAP

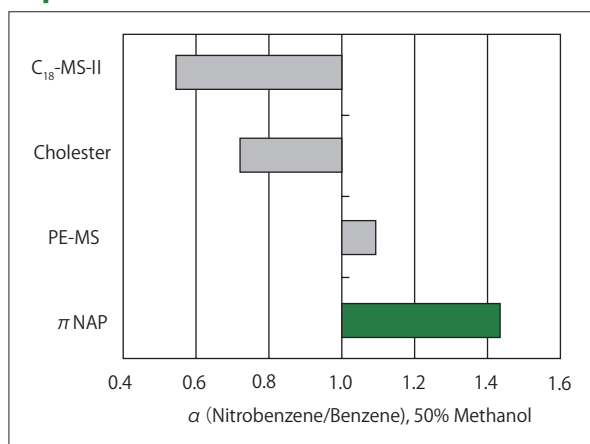


- Naphthalene-bonded stationary phase
- Enhanced π - π interactions

Suitable Samples

- Aromatic compounds and positional isomers

Comparison of π - π Interactions

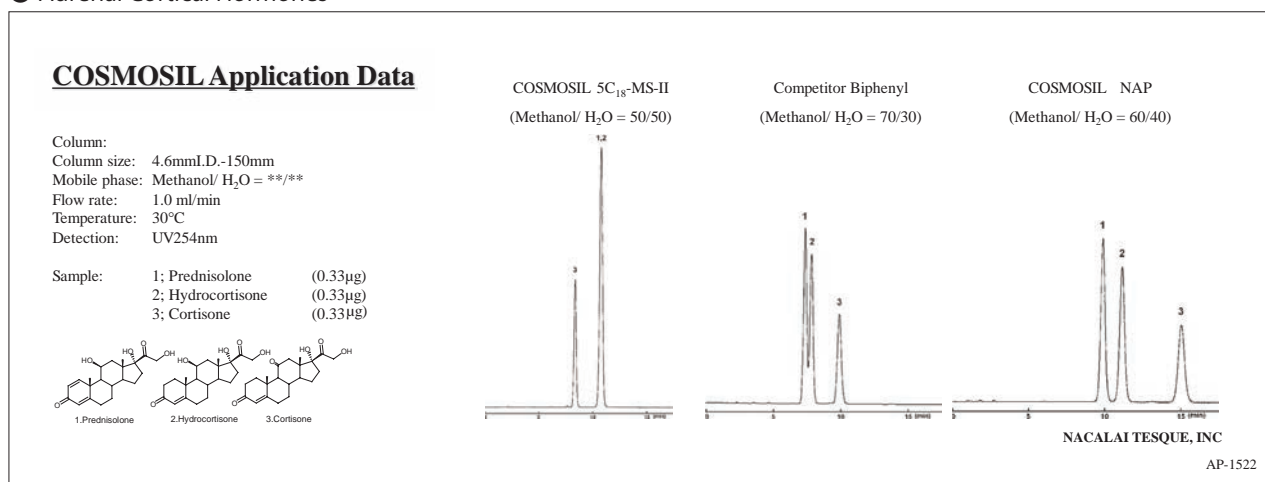


COSMOSIL π NAP shows stronger π - π interactions than phenyl columns. Its two fused aromatic rings retain nitrobenzene with more π electrons stronger than phenyl columns.

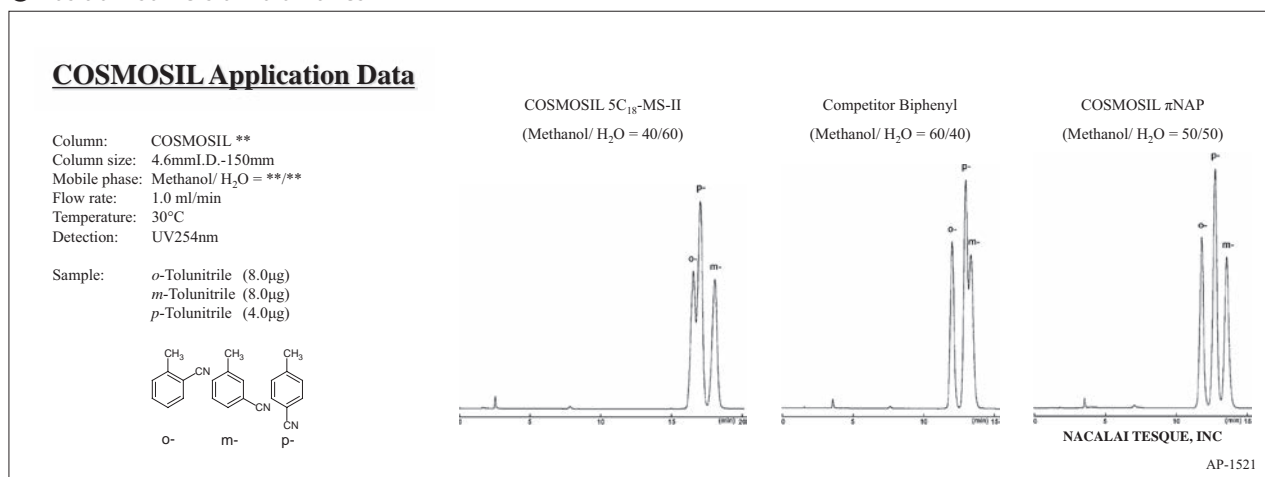
Figure. Comparison of π - π Interactions

Comparison with C₁₈ and Phenyl Columns

- Adrenal Cortical Hormones

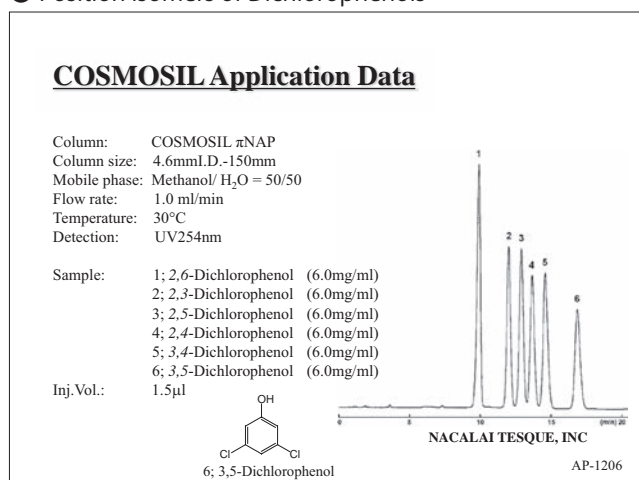


- Position Isomers of Tolunitriles

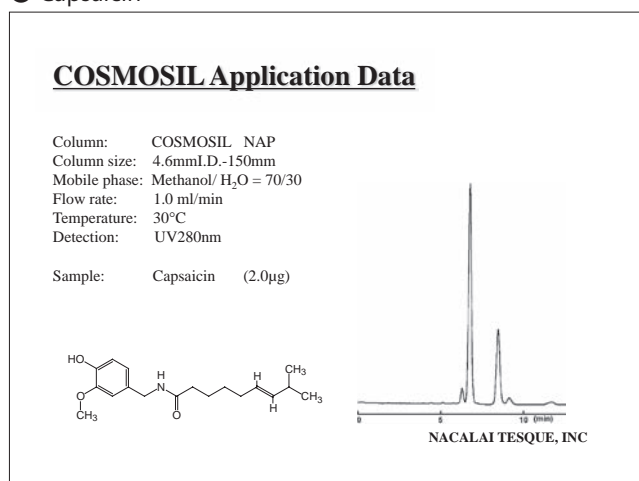


Applications

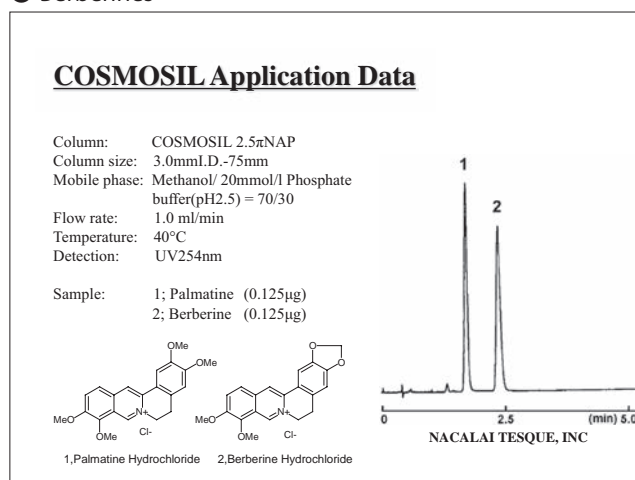
● Position Isomers of Dichlorophenols



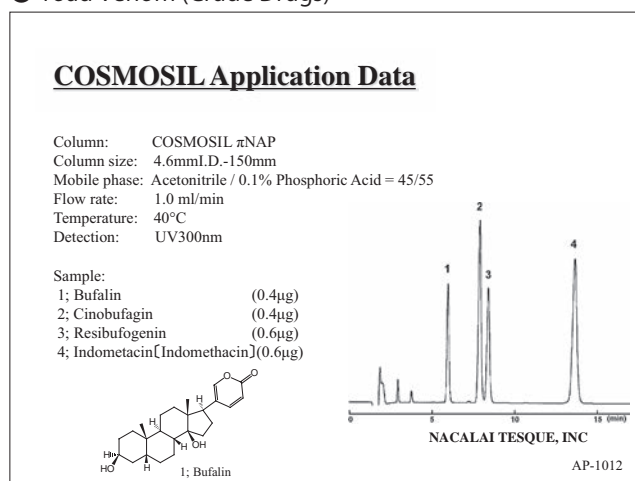
● Capsaicin



● Berberines



● 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
1.0 x 150	08076-61
1.0 x 250	08077-51
2.0 x 30	08566-41
2.0 x 50	08567-31
2.0 x 100	08299-51
2.0 x 150	08078-41
2.0 x 250	08079-31
3.0 x 150	08080-91
3.0 x 250	08081-81
4.6 x 50	08083-61

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

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

Guard Column

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

● COSMOSIL π NAP Fast LC Columns (Particle Size: 3 μ m)

Packed Column

I.D. x Length (mm)	Product Number
2.0 x 50	21495-61
2.0 x 75	21496-51
2.0 x 100	21497-41
2.0 x 150	21499-21
2.0 x 250	21500-71
3.0 x 50	21509-81

I.D. x Length (mm)	Product Number
3.0 x 75	21513-11
3.0 x 100	21514-01
3.0 x 150	21520-11
3.0 x 250	21521-01
4.6 x 50	21522-91
4.6 x 75	21523-81

I.D. x Length (mm)	Product Number
4.6 x 100	21524-71
4.6 x 150	21525-61
4.6 x 250	21526-51

Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 x 10 Cartridge*	21527-54

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

● COSMOSIL 2.5 π NAP Fast LC columns (Particle Size: 2.5 μ m)

Packed Column

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

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

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

COSMOSIL PYE

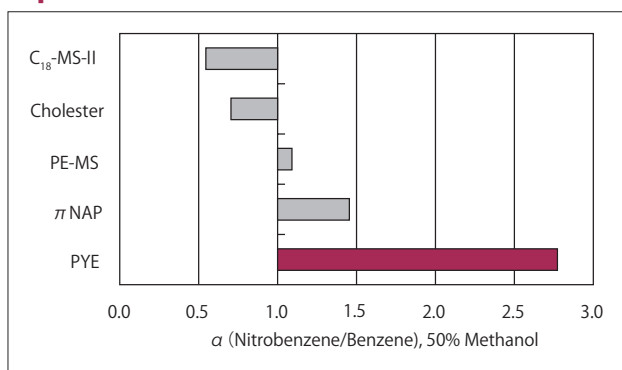


- Pyrenylethyl-bonded stationary phase
- Stronger π - π interactions

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.

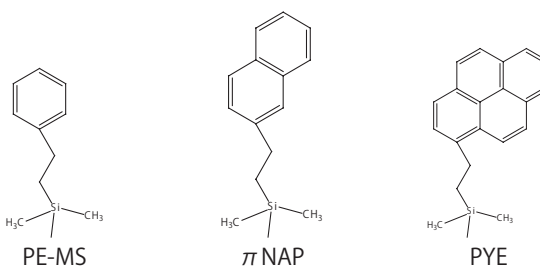


Figure. Comparison π - π Interactions

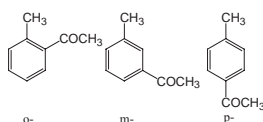
Comparison with C₁₈ and Phenyl Columns

- 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

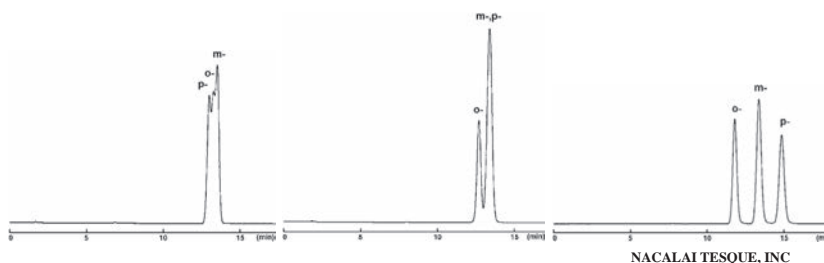
Sample: *o*-Methylacetophenone (0.15mg/ml)
m-Methylacetophenone (0.125mg/ml)
p-Methylacetophenone (0.075mg/ml)
 Inj. Vol: 1.0 μ l



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

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

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

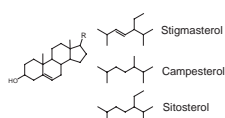


- Sterols

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

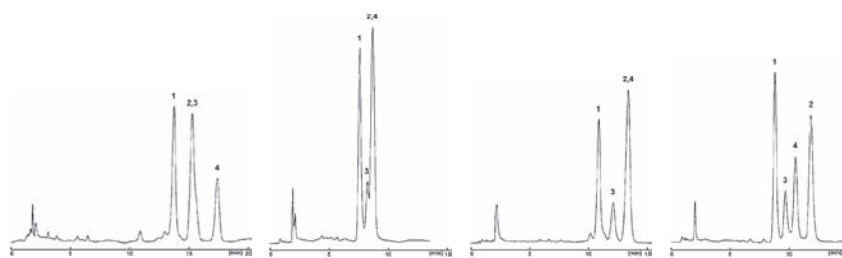


COSMOSIL 5C₁₈-MS-II
 (Methanol/ H₂O = 98/2)

Competitor Biphenyl
 (Methanol/ H₂O = 95/5)

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

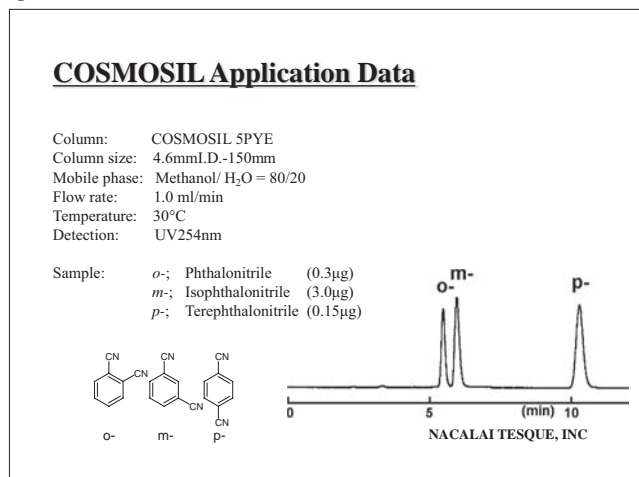
COSMOSIL 5PYE
 (Methanol/ H₂O = 95/5)



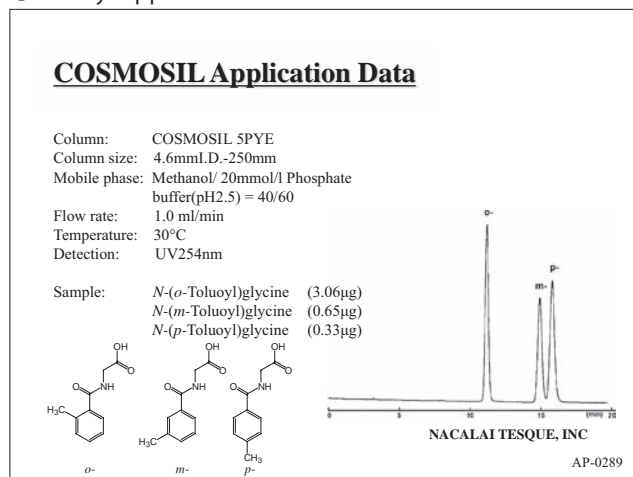
AP-1524

Applications

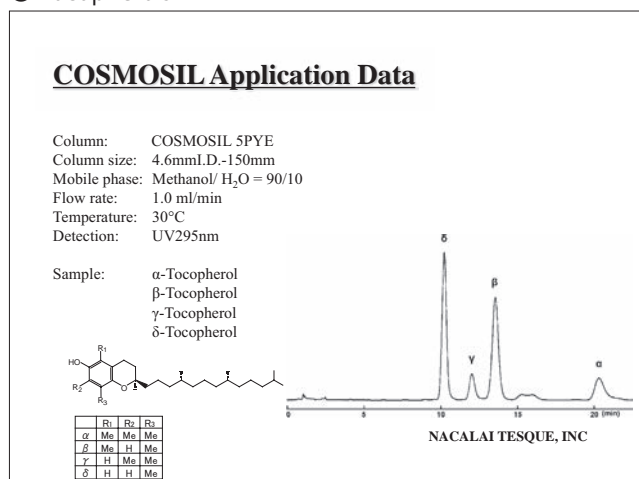
● Phthalonitrile Isomers



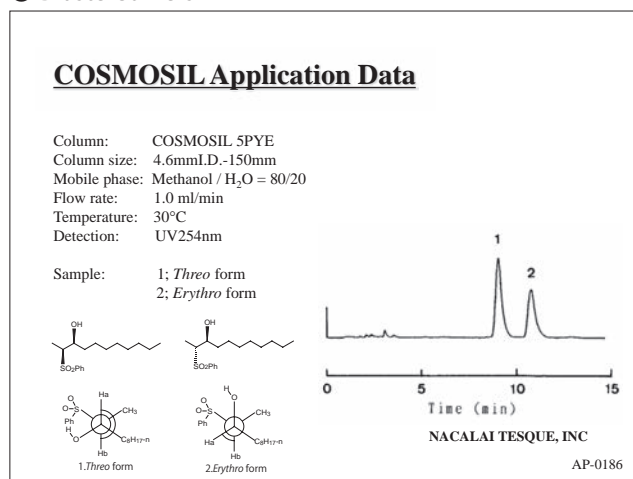
● Methylhippuric Acids



● Tocopherols



● Diastereomers



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



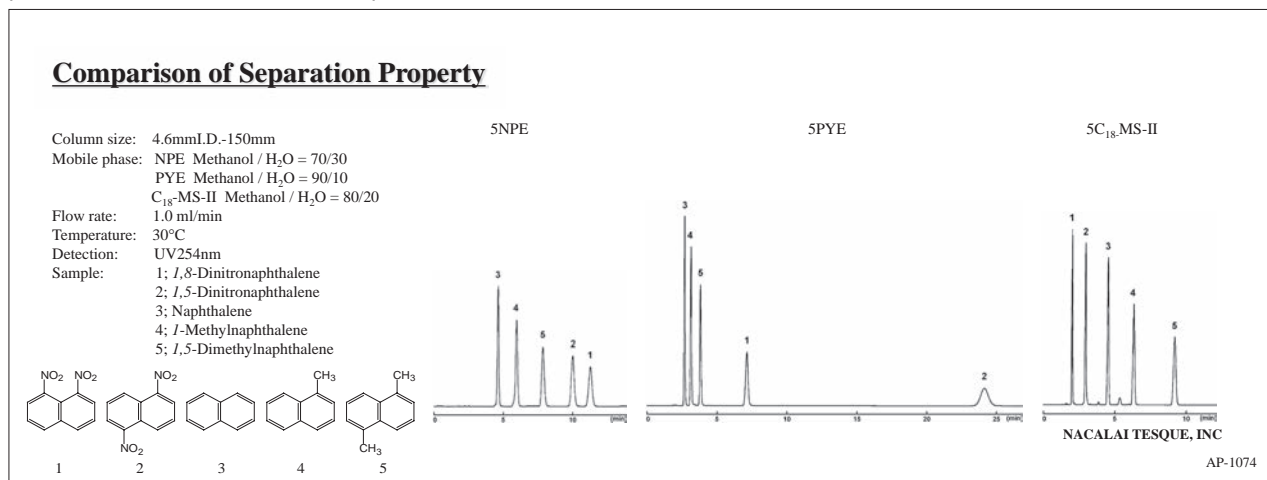
- Nitrophenylethyl-bonded stationary phase
- Separation with dipole-dipole and $\pi-\pi$ interactions

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 $\pi-\pi$ electrons and interferes with $\pi-\pi$ 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

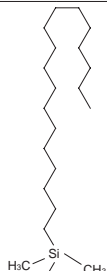

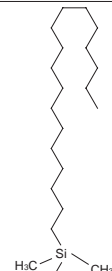

I.D. x Length (mm)	Product Number
4.6 x 150	37902-21
4.6 x 250	37990-71
10 x 250	05469-11
20 x 250	38046-21

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

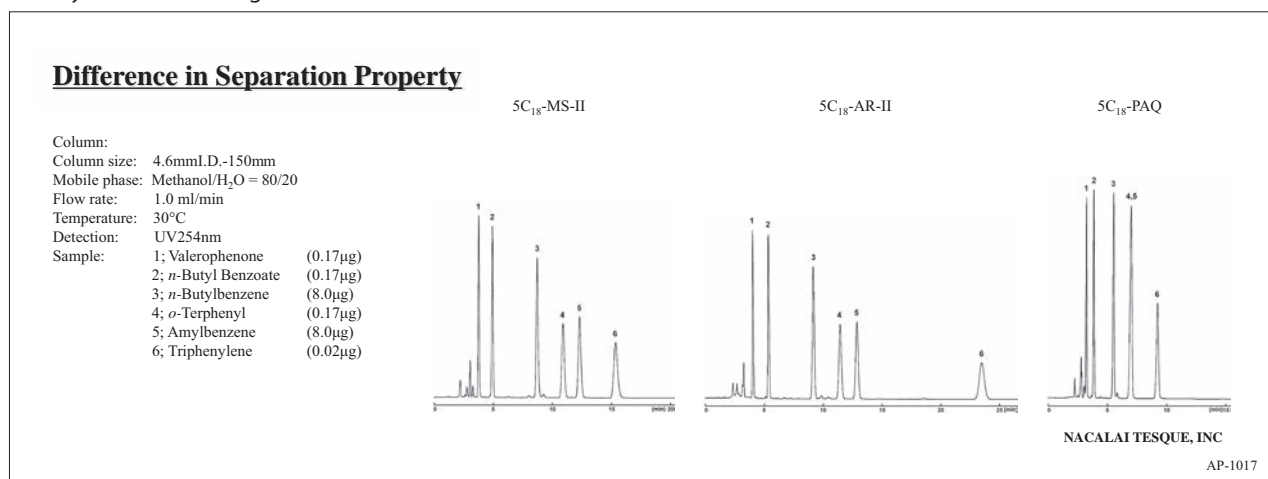
Specifications

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 (μm)	2.5	3	5	15	3	5	15	3	5	15	3 μm	2.6 μm		
Average Pore Size (Å)	130	120										90		
Specific Surface Area (m ² /g)	330	300			300			300			300	150		
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	18%	16%			17%			11%			14.5%	7%		
Usable pH Range	2 ~ 10*				1.5 ~ 7.5*			2 ~ 7.5			2 ~ 10*	1.5 ~ 10		
Features	<ul style="list-style-type: none"> Multi-purpose C₁₈ Column 				<ul style="list-style-type: none"> Features strong acid resistance. Good for acidic compounds and peptides 			<ul style="list-style-type: none"> Good for hydrophilic compounds Stable performance under 100% aqueous conditions 			<ul style="list-style-type: none"> Good for basic compounds 		<ul style="list-style-type: none"> 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)

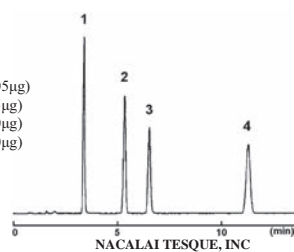


Table. Comparison of hydrophobic interaction, analytical pressure and theoretical plate number.

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

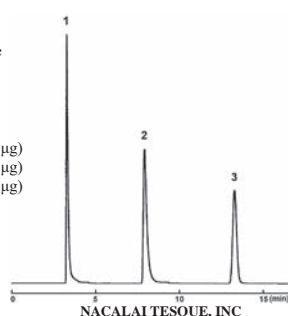
Analysis of Basic Compounds and Metal Coordination Compounds

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

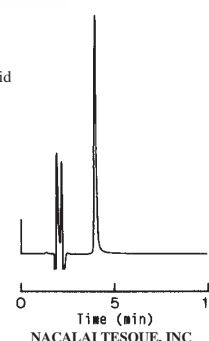
Sample: 1; Procainamide (0.38μg)
2; N-Acetylprocainamide (0.25μg)
3; Benzylalcohol (5.63μg)



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

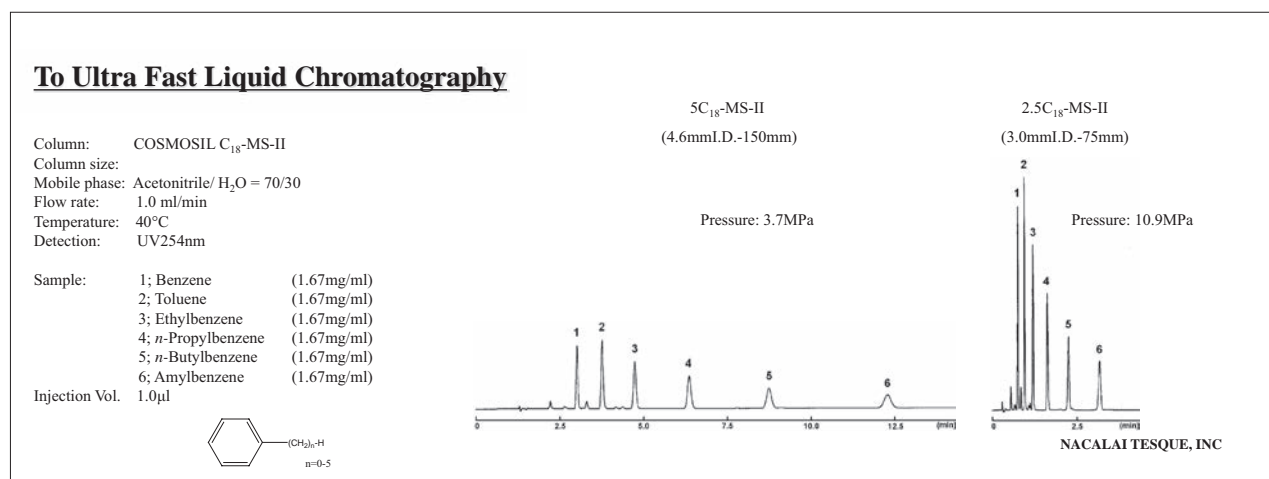


High Reproducibility

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).

Fast LC 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*	38019-81

I.D. x Length (mm)	Product Number
4.6 × 250*	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 Cartridge†	38015-89
10 × 20	38016-11
20 × 20	05790-81
28 × 50	34347-01

* Validated columns

† 3 cartridges included. Guard cartridge holder required; refer to page 78.

● 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
2.0 × 150	08723-71
2.0 × 250	09995-91

I.D. x Length (mm)	Product Number
3.0 × 100	34366-51
3.0 × 150	07267-91
4.6 × 50	38066-61
4.6 × 75	08758-31
4.6 × 100	38067-51
4.6 × 150	04785-91

Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 × 10 Cartridge*	21234-84

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

● COSMOSIL 2.5C₁₈-MS-II Fast LC column (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



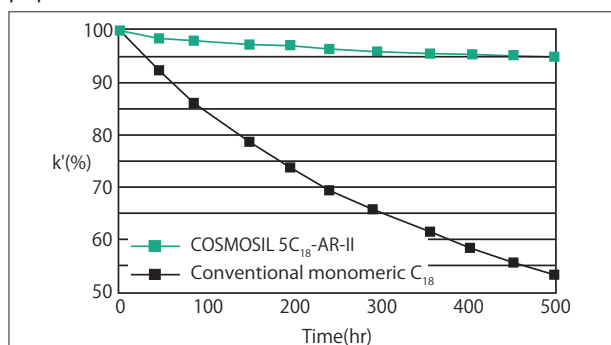
- Features strong acid resistance

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 with acidic mobile phases commonly used to separate acidic compounds and peptides.



Acid resistance test

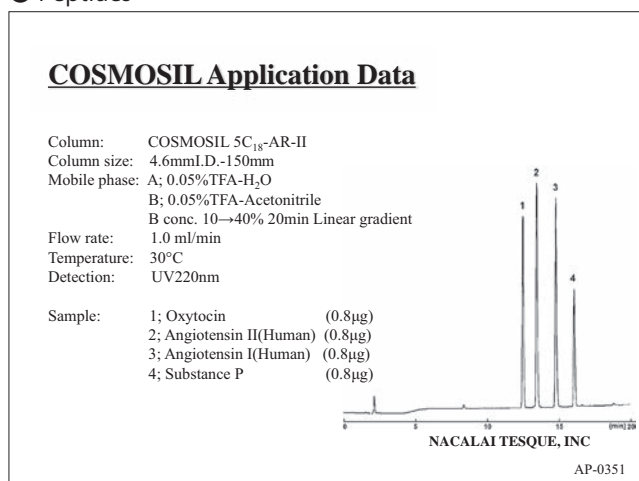
Columns were filled with 0.1% trifluoroacetic acid solution and left at 60°C.

Retention factor (k) for naphthalene

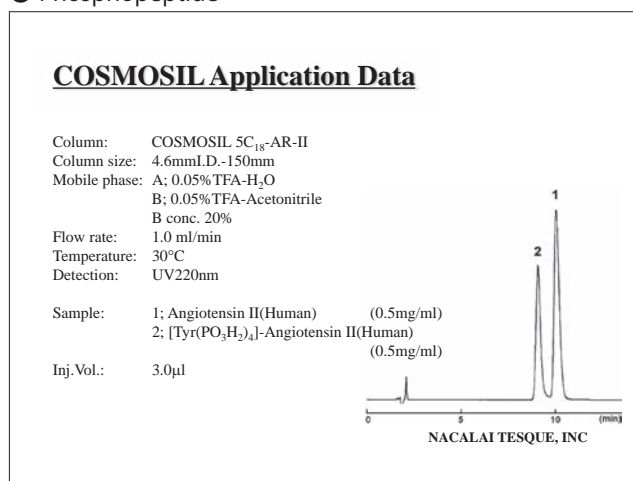
Mobile phase: 70% methanol

Applications

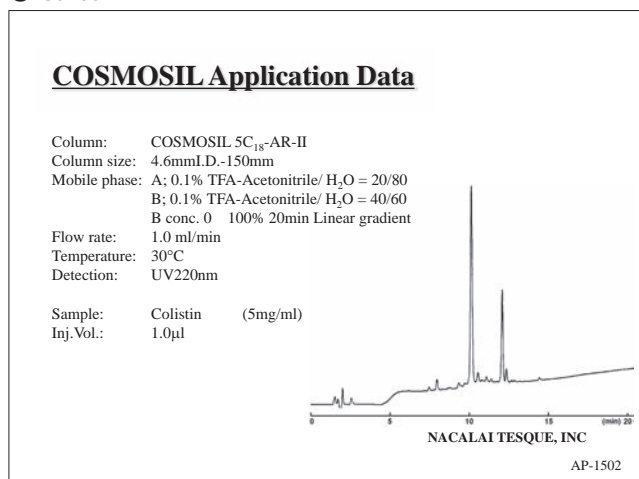
- Peptides



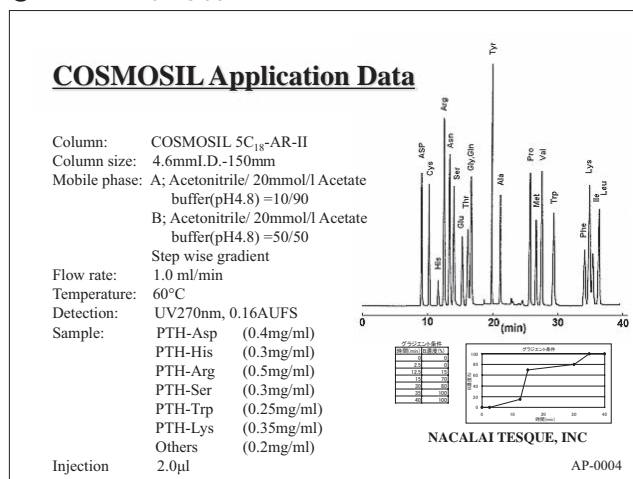
- Phosphopeptide



- Colistin

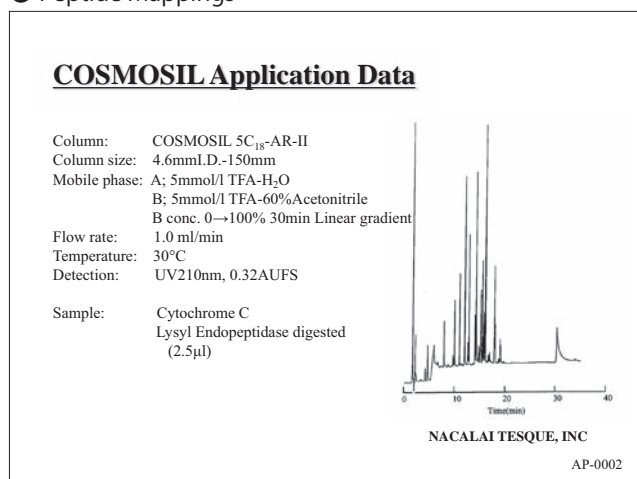


- PTH-Amino Acids

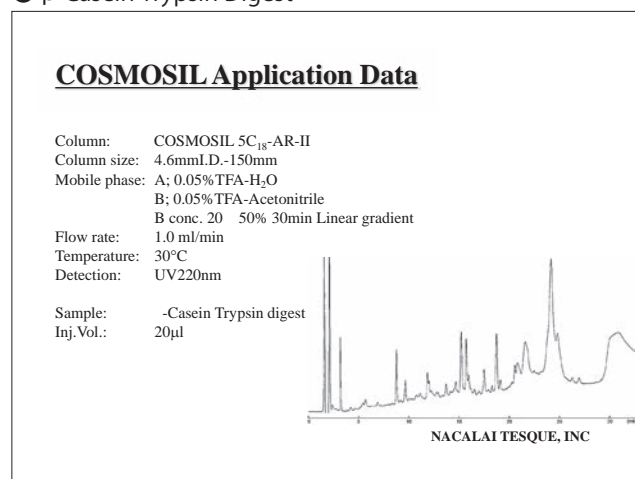


Applications

● 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*	38144-31
4.6 × 150 3 Lots Set*	09396-83

I.D. x Length (mm)	Product Number
4.6 × 250*	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 Cartridge †	38008-89
10 × 20	38148-91
20 × 20	34458-51
28 × 50	34363-81

* Columns for validation
 † 3 cartridges included. Guard cartridge holder required; refer to page 78.

● COSMOSIL 15C₁₈-AR-II Preparative Columns (Particle Size: 15 µm)

Packed Column

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

I.D. x Length (mm)	Product Number
50 × 250	38058-71
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
2.0 × 150	07583-41
3.0 × 250	16864-81

I.D. x Length (mm)	Product Number
4.6 × 50	38069-31
4.6 × 75	13362-41
4.6 × 100	38070-91
4.6 × 150	06887-01
4.6 × 250	19391-81

Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 × 10 Cartridge*	21231-14

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

COSMOSIL C₁₈-PAQ



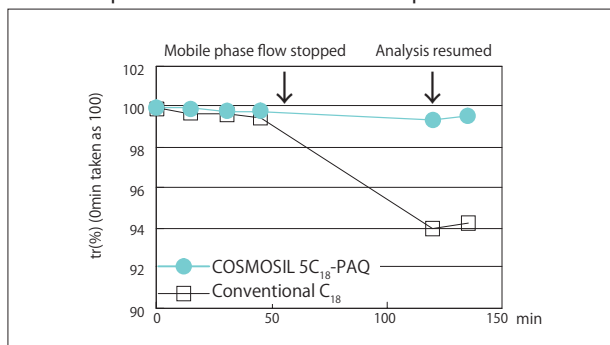
- Compatible with 100% water based mobile phase

Suitable Samples

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

Stable Performance

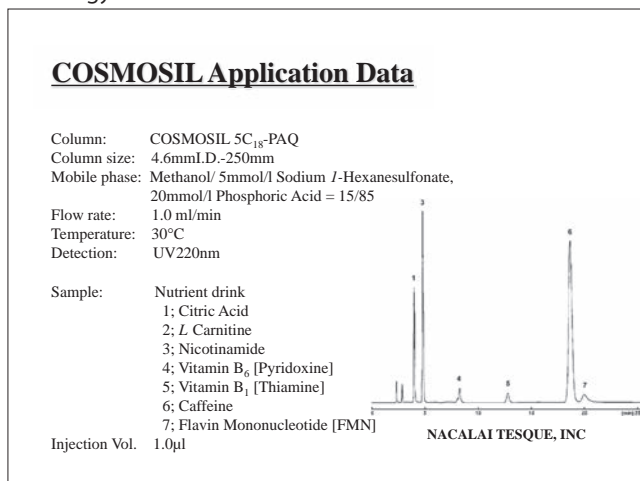
- Stable performance under 100% aqueous conditions



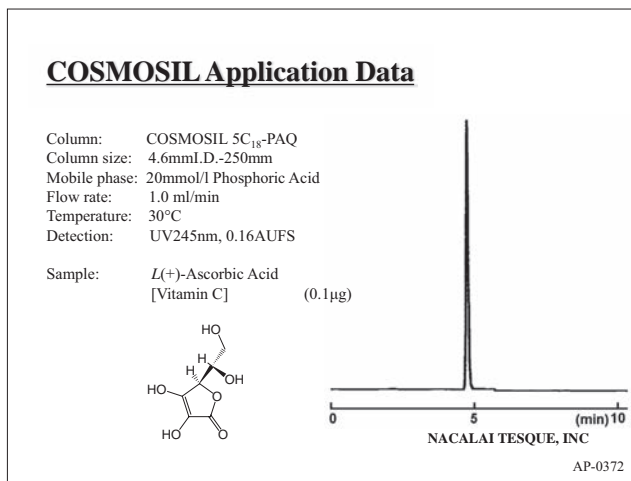
The figure shows the change of retention time for thymine with 100% aqueous mobile phase (20 mmol/l phosphate buffer, pH 7). The sample was analyzed 4 times (1 hour). Flow of mobile phase was then stopped for 1 hour. The sample was analyzed under the same condition again after 1 hour. The conventional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

Applications

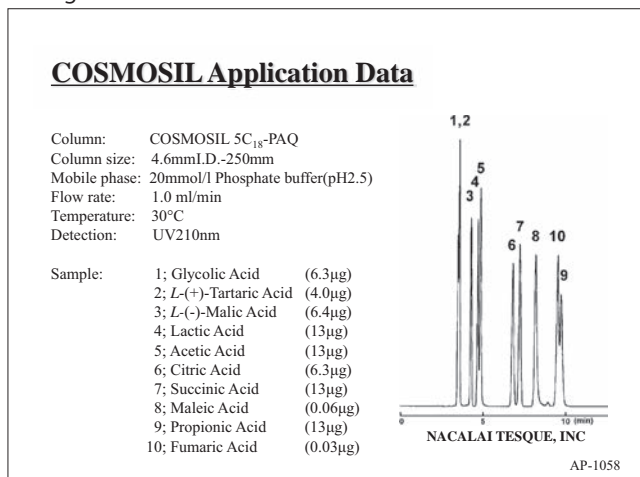
- Energy Drink



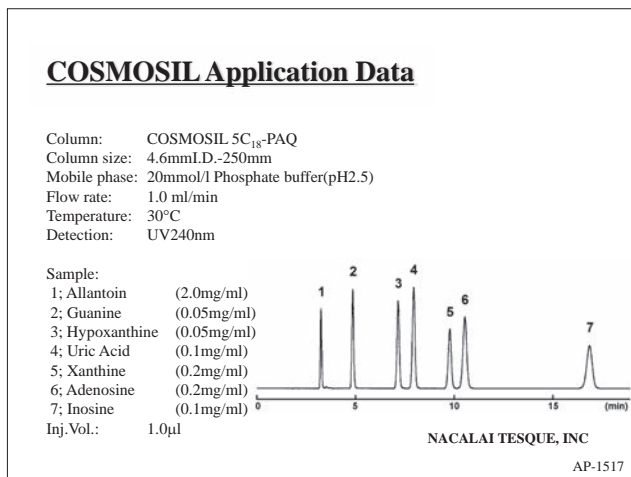
- Vitamin C



- Organic Acids

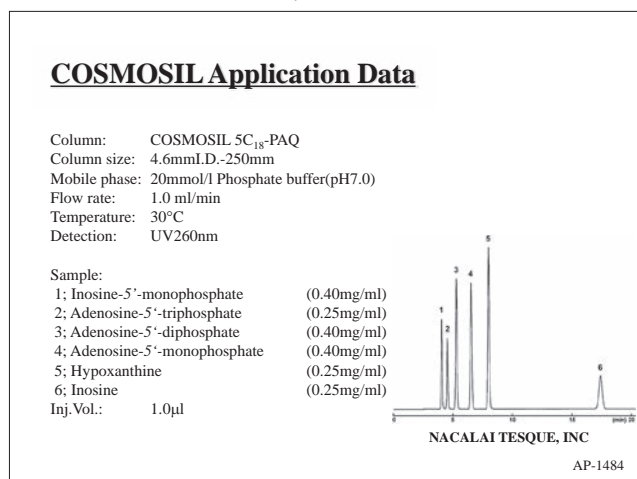


- Nucleic Acid Metabolites

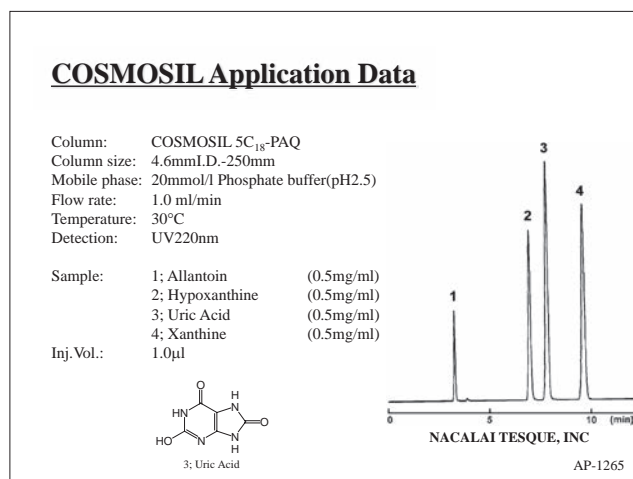


Applications

● Fish Freshness Indicator, K value



● 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
4.6 × 10 Cartridge*	19181-44
10 × 20	34457-61
20 × 20	05803-11
28 × 50	34455-81

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

● 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-PAQ Fast LC Columns (Particle Size: 3 µm)

Packed Column

I.D. x Length (mm)	Product Number
2.0 × 50	19773-81
2.0 × 75	19774-71
2.0 × 100	19779-21
2.0 × 150	19780-81
2.0 × 250	19781-71
3.0 × 50	19784-41
3.0 × 75	19786-21
3.0 × 100	19787-11

Guard Cartridge

I.D. x Length (mm)	Product Number
3.0 × 150	19788-01
3.0 × 250	19789-91
4.6 × 50	19869-41
4.6 × 75	19870-01
4.6 × 100	19871-91
4.6 × 150	19872-81
4.6 × 250	19873-71

Guard Cartridge

I.D. x Length (mm)	Product Number
2.0 × 10 Cartridge*	19874-74
4.6 × 10 Cartridge*	19875-64

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

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

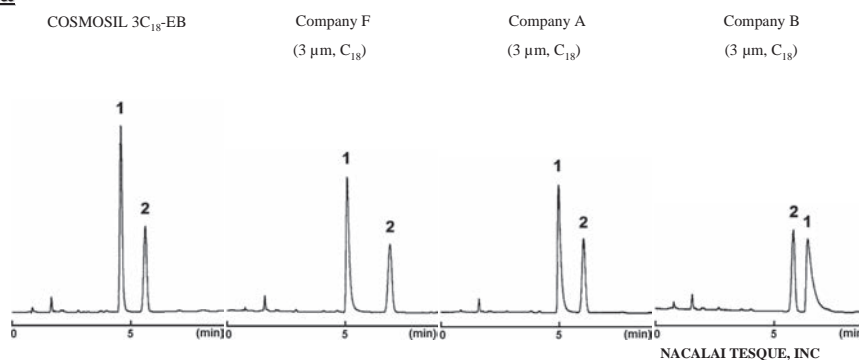
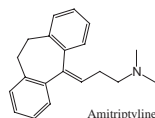
Analysis of Basic Compounds

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



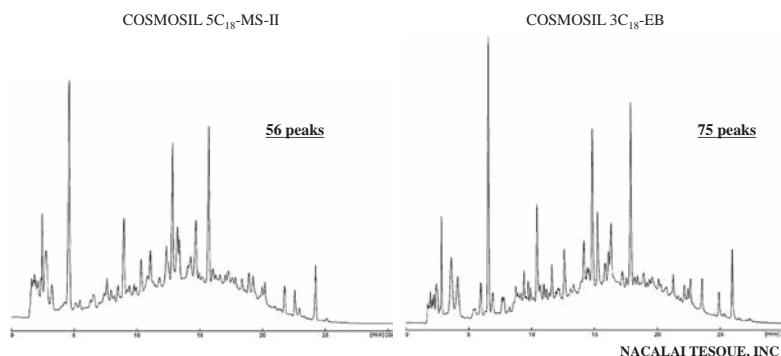
Advanced / Precise Separation of Multicompounds

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

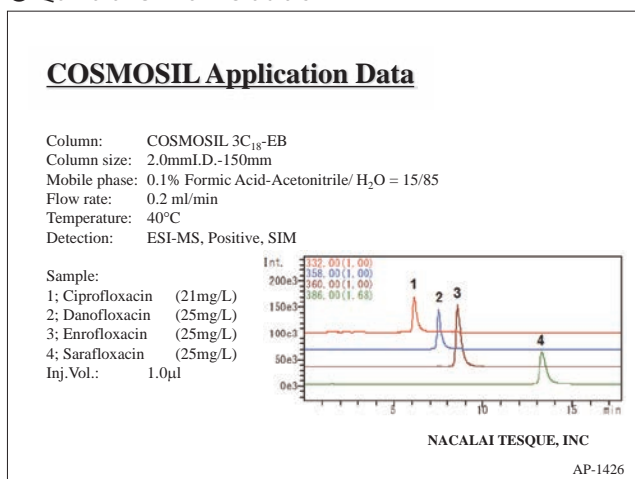
Sample: Red Wine (Cabernet Sauvignon)
Inj. Vol: 10μl



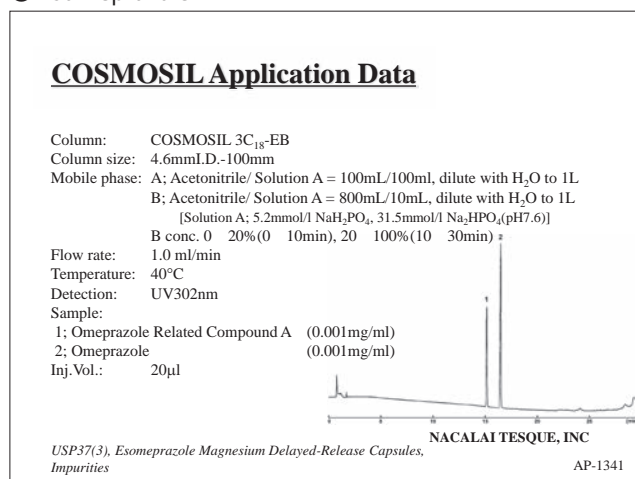
AP-1268

Applications

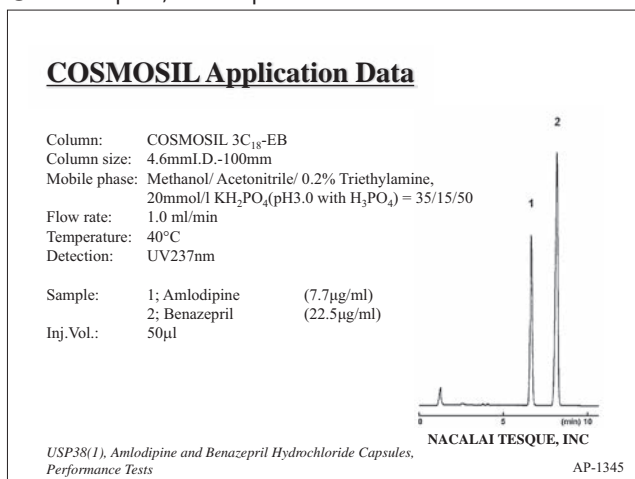
● Quinolone Antimicrobials



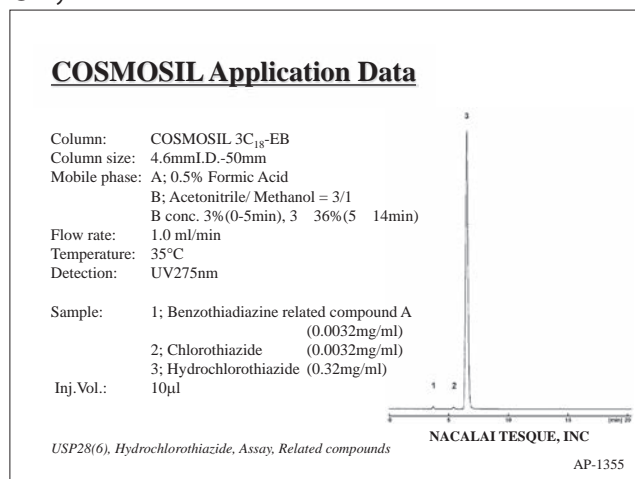
● Esomeprazole



● 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*	09841-91
4.6 × 100*	09842-81
4.6 × 150*	09843-71
4.6 × 250	09844-61

Guard Column / Guard Cartridge

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

* Columns for validation
 † 2 cartridges included. Guard cartridge holder required; refer to page 78.

COSMOCORE 2.6C₁₈



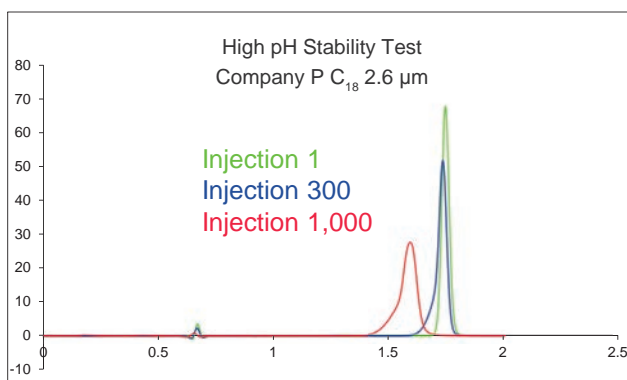
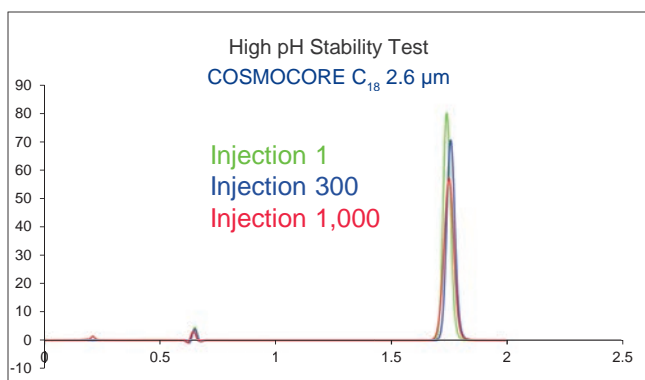
- Core-shell particles
- Ultra-high performance LC results with conventional HPLC equipment
- Same number of theoretical plates as sub-2 μm columns with half the back pressure

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.

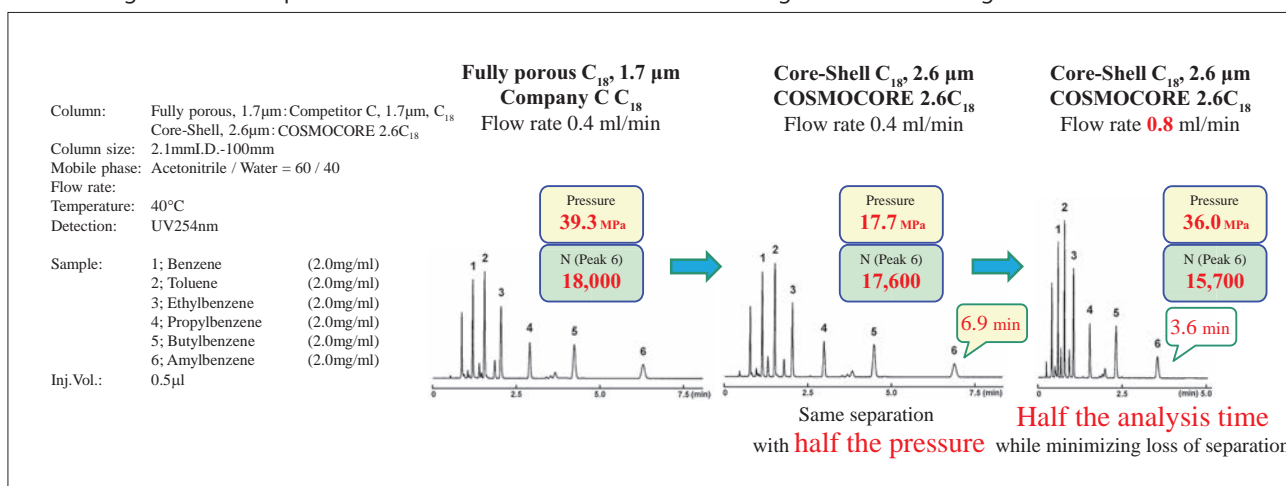


Column size: 2.1 mm x 100mm
Sample: Caffeine (0.05 mg/ml)
Flow rate: 0.4 ml/min

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

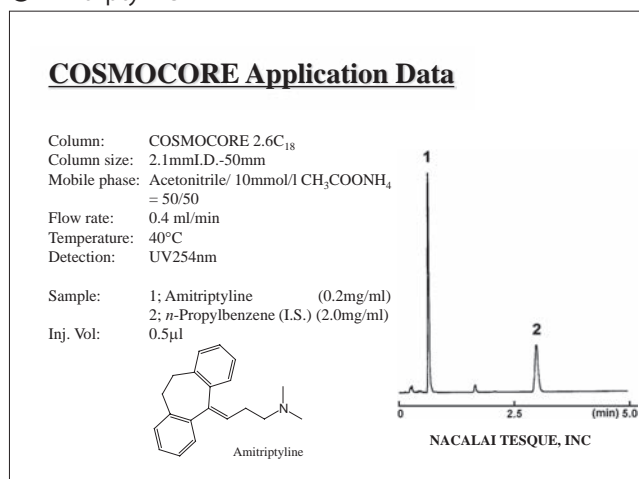
Reduced Back Pressure and Faster Analyses

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.

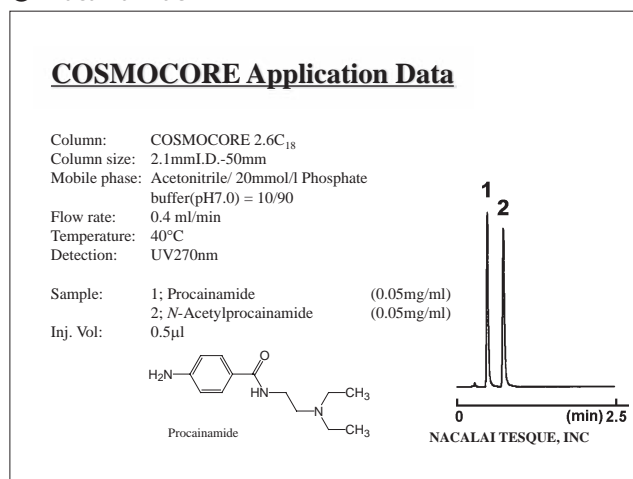


Applications

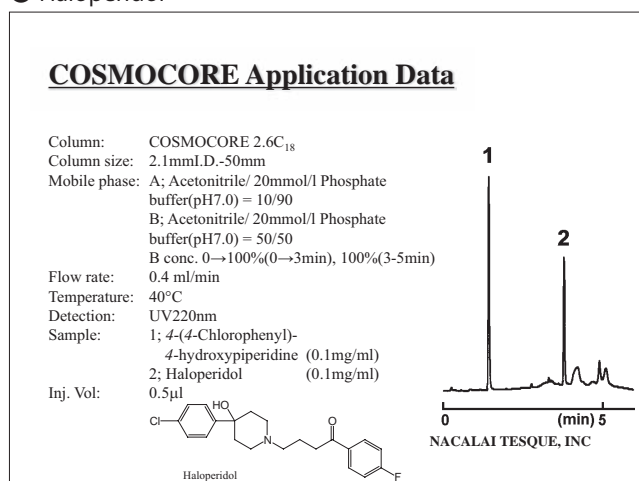
● Amitriptyline



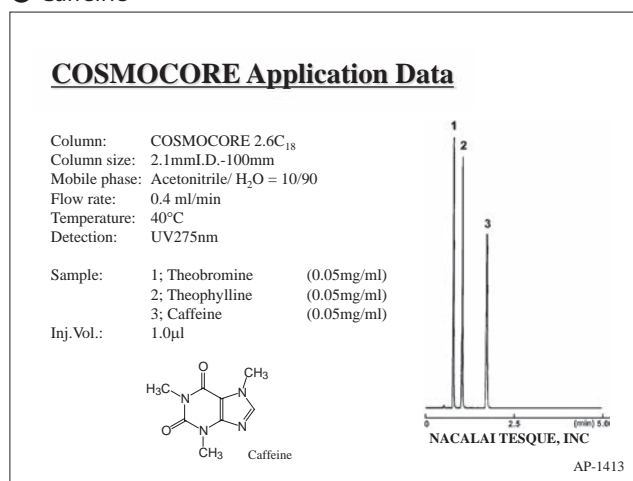
● Procainamide



● 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

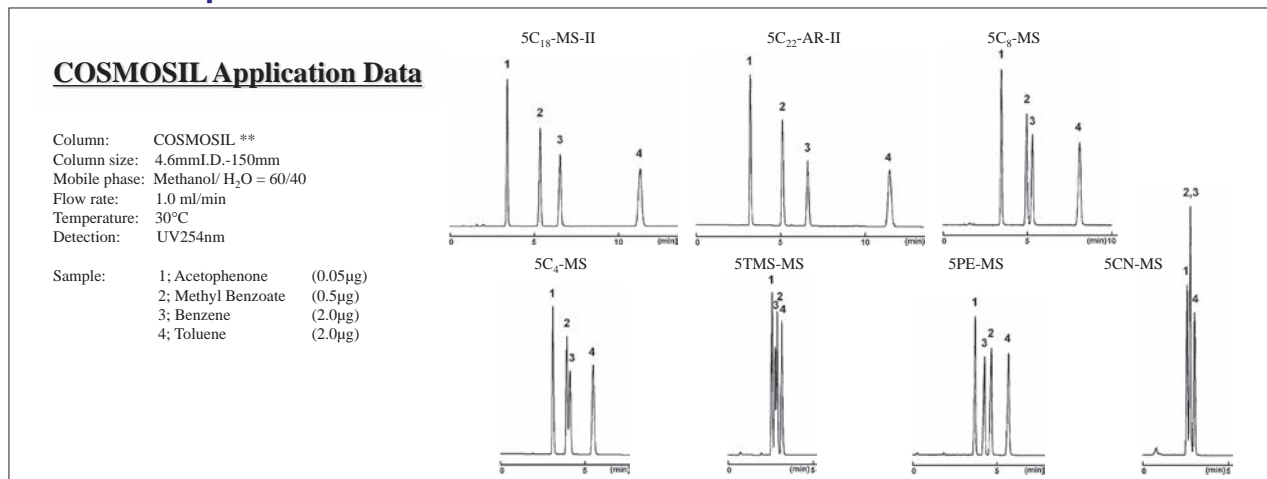
COSMOCORE's connector is the same type as Waters UPLC® columns.

3. Other Reversed Phase Columns

Specifications

Packing Material	CN-MS	C ₂₂ -AR-II	C ₈ -MS	C ₄ -MS	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	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%	10%
Usable pH Range	2 ~ 7.5				

Difference in Separation Characteristics



COSMOSIL CN-MS



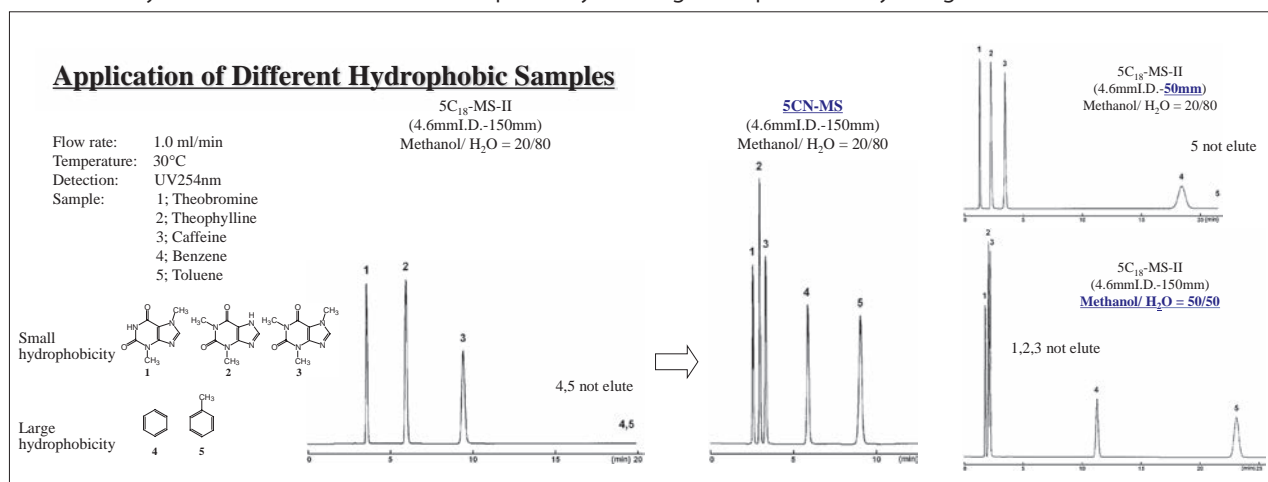
- Cyanopropyl-bonded stationary phase
- Enables separation of different hydrophobic samples without using gradient

Suitable Samples

- Mixtures of natural compounds

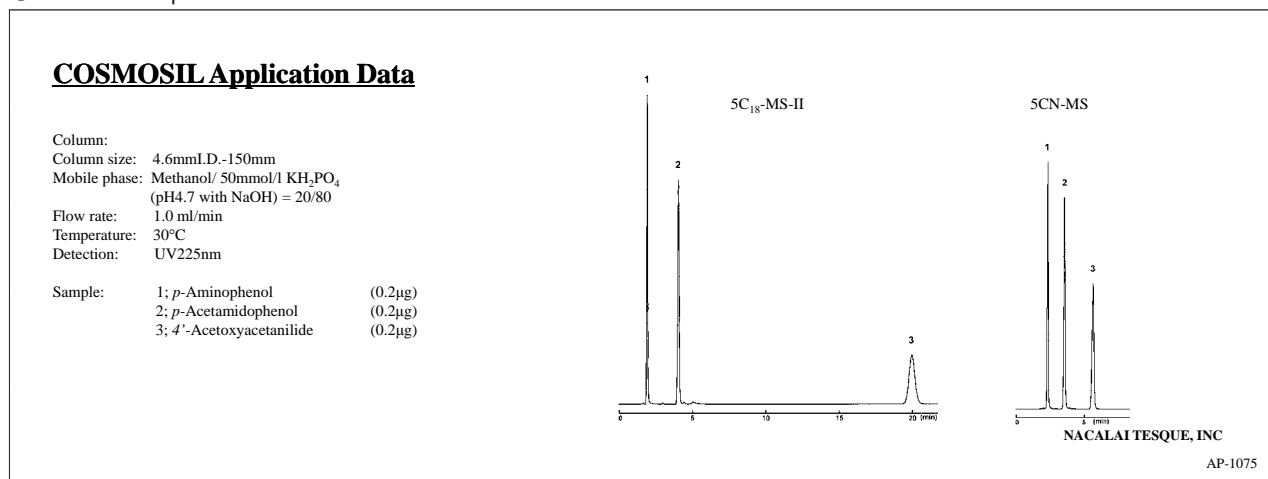
Rapid Analysis

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



Other Reversed Phase Columns

1

2

3

4

5

6

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9

10

11

12

13

14

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

Packed Column

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

Guard Column

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

4. Chiral Separation Columns

COSMOSIL CHiRAL Series



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

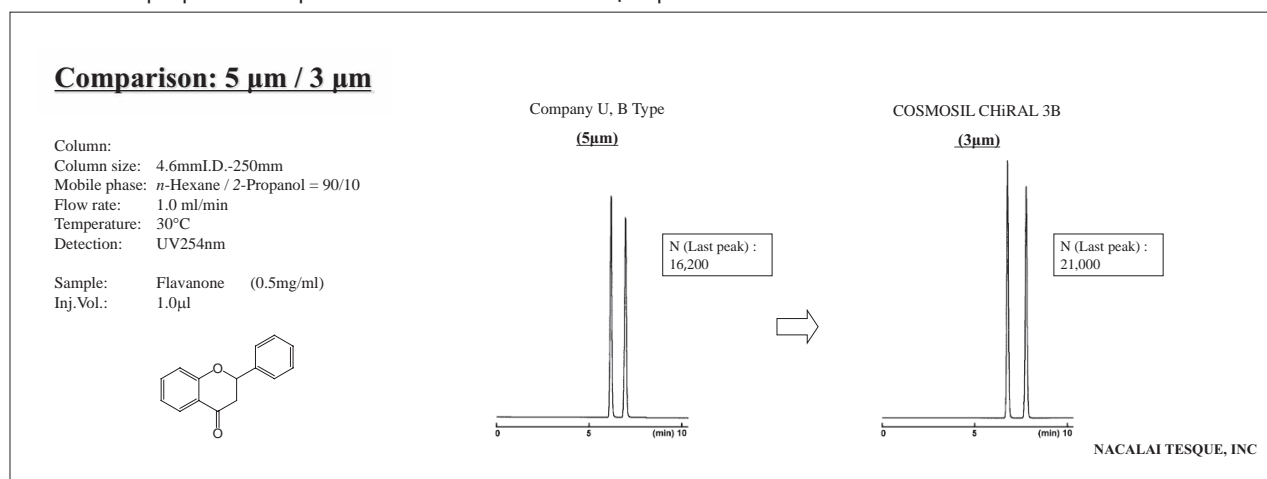
Specifications

Packing Material	COSMOSIL CHiRAL 3A, 5A	COSMOSIL CHiRAL 3B, 5B	COSMOSIL CHiRAL 3C, 5C
Based Material	Silica Gel		
Average Particle Size (μm)	3, 5		
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

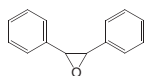
High Resistance to Solvents

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.

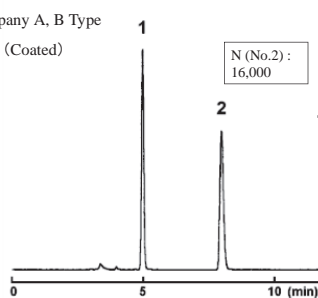
Comparison: Coated and Immobilized Selectors

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



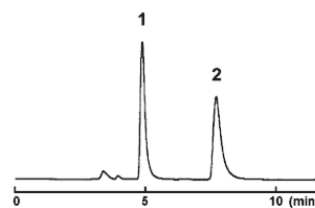
Company A, B Type
(Coated)



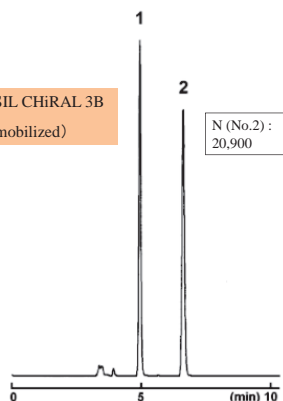
THF 100µl × 5 injections



N (No.2) :
2,900



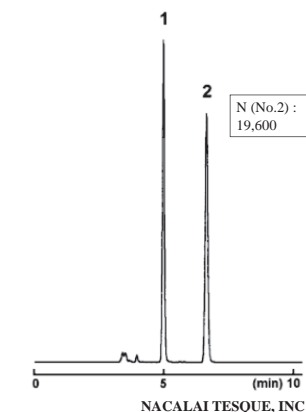
COSMOSIL CHiRAL 3B
(Immobilized)



THF 100µl × 5 injections



N (No.2) :
19,600



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

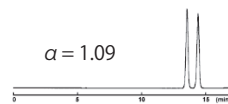
* Methanol / acetonitrile and *n*-hexane are not miscible with each other, so they should not be mixed for LC.

Selectivity Depends on the Solvent

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

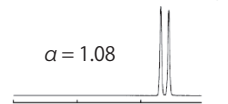
Hexane / Ethanol
= 97 / 3

$\alpha = 1.09$



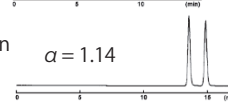
Hexane / 2-Propanol
= 95 / 5

$\alpha = 1.08$



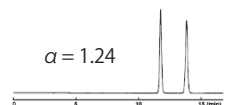
Hexane / Tetrahydrofuran
= 90 / 10

$\alpha = 1.14$



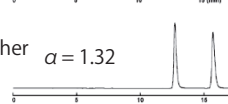
Hexane / Chloroform
= 65 / 35

$\alpha = 1.24$



Hexane / *t*-Butylmethylether
= 60 / 40

$\alpha = 1.32$

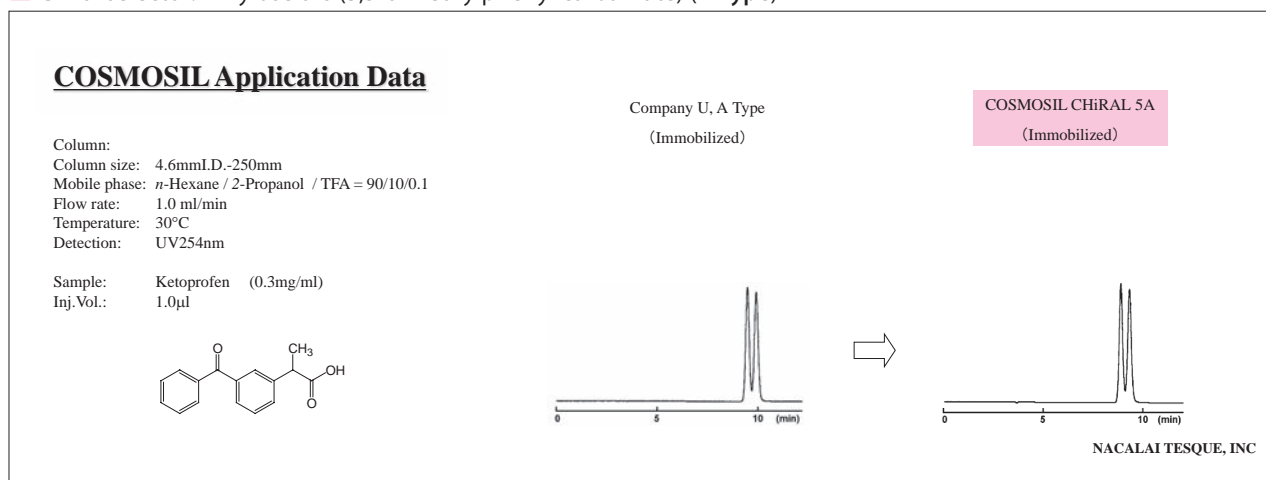


Elution strength: alcohols, THF >> chloroform > *t*-butyl methyl ether >> alkanes

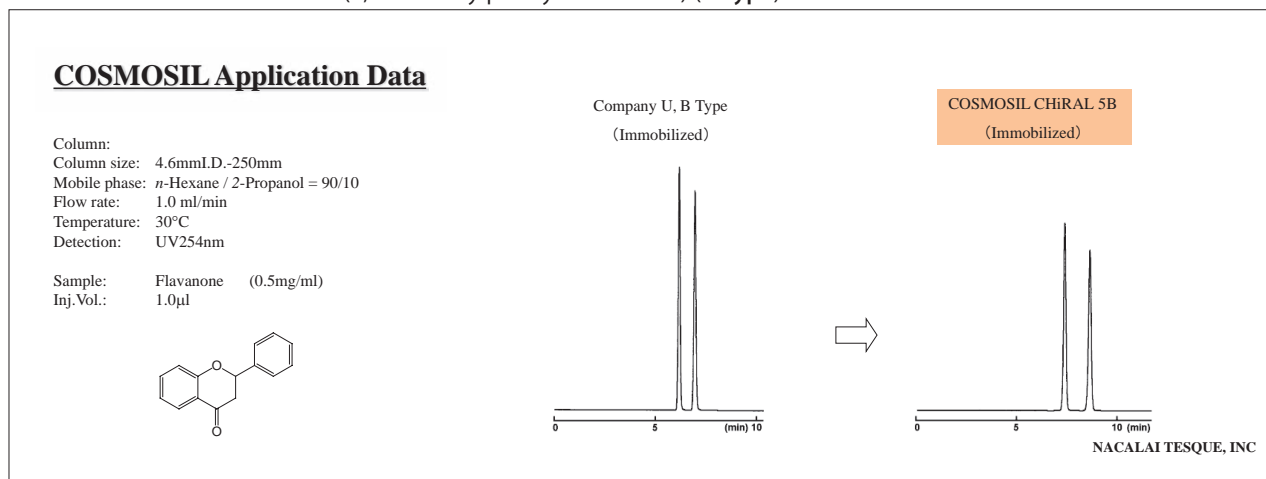
Equivalent Separation to Competitors' Columns

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

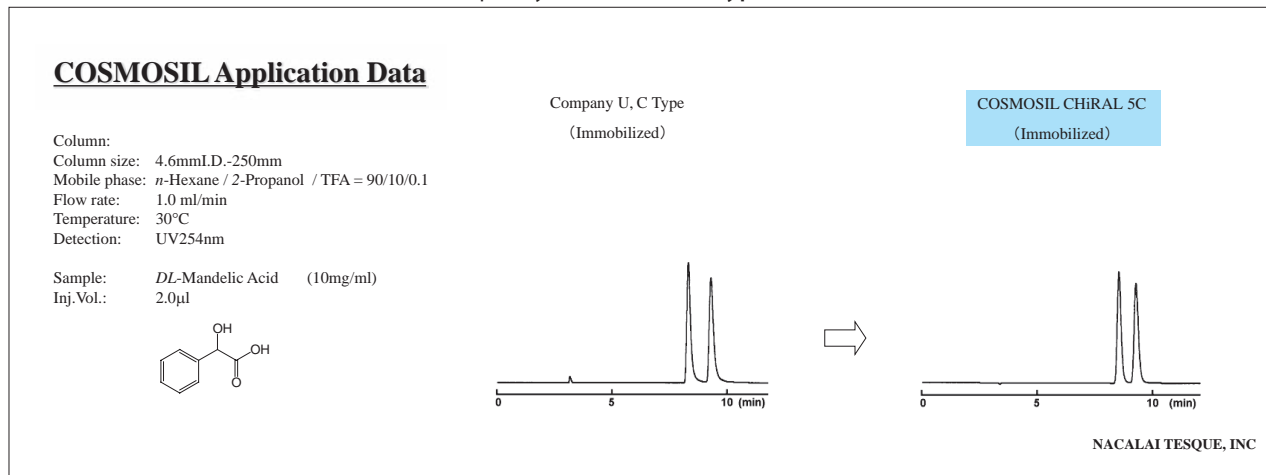
Chiral selector: Amylose tris (3,5-dimethylphenyl carbamate) (A Type)



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

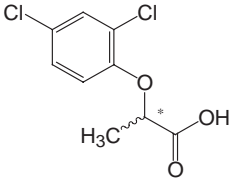

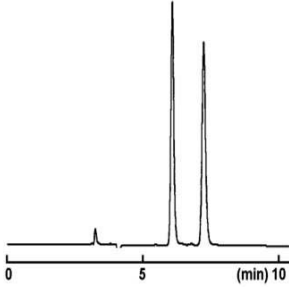
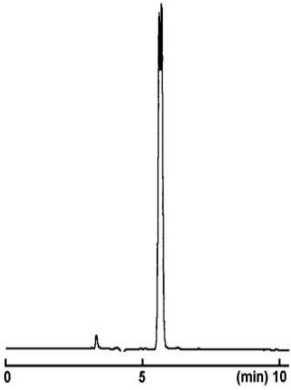
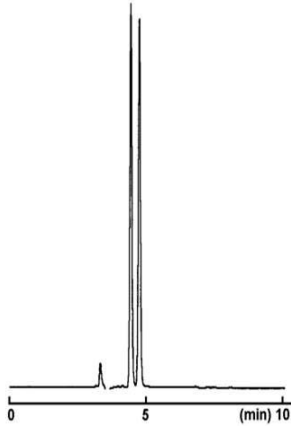
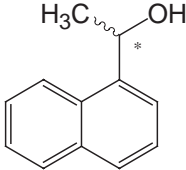
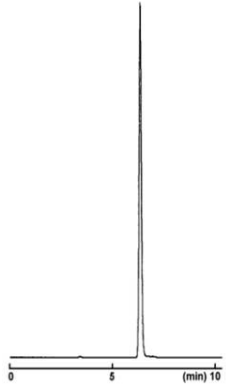

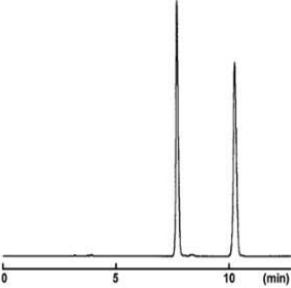
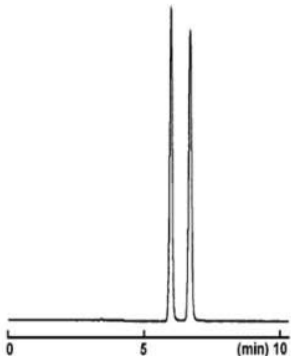
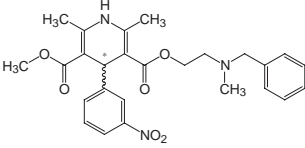

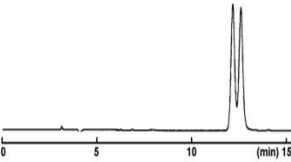

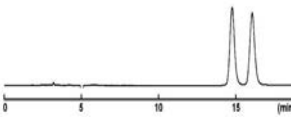


Chiral selector: Cellulose tris (3,5-dichlorophenyl carbamate) (C Type)



Column Selection

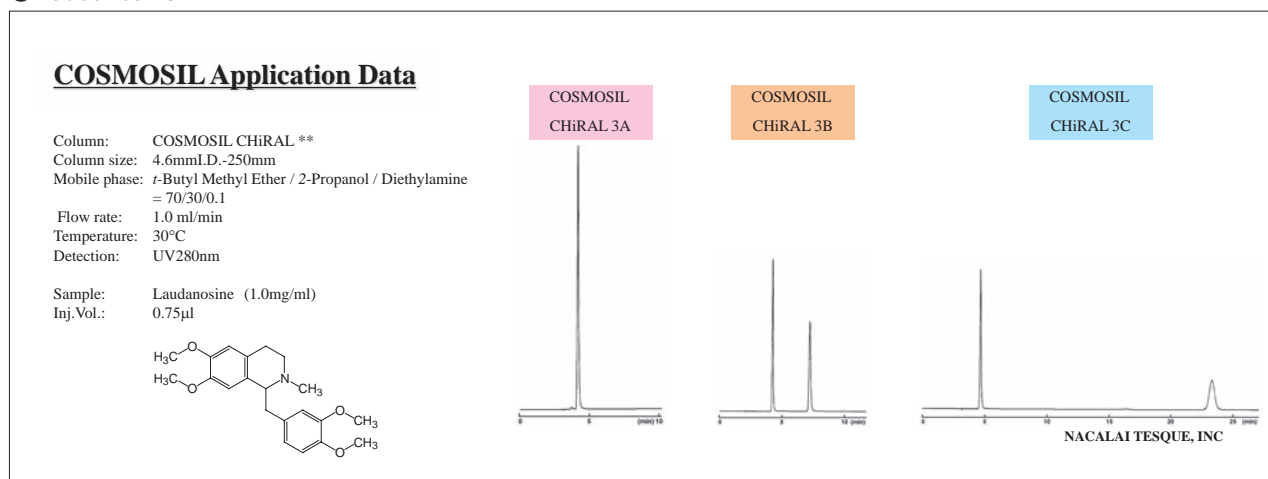
COSMOSIL CHiRAL offers 3 different chiral selectors that, together, have a high probability of separating your sample. Of 54 samples in our test, 53 pairs of enantiomers were fully separated. For samples that do not separate easily with any column, please adjust the type and concentration of solvents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

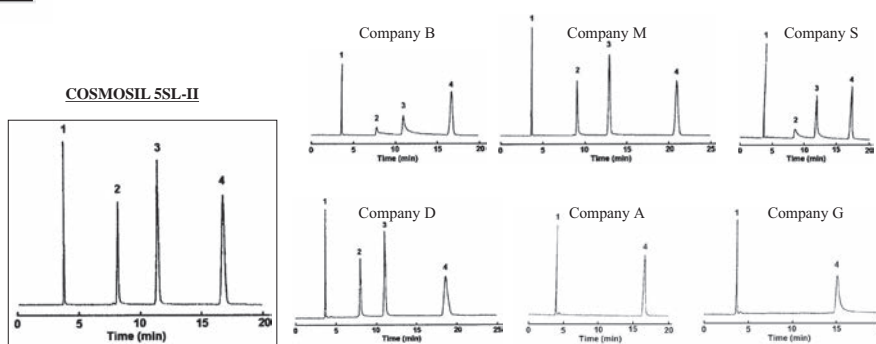
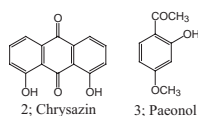
Comparison with Competitors' Columns in Separation of Phenols

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; Chrysin (0.2 μg)
 3; Paeonol (0.4 μg)
 4; *p*-Cresol (0.004 μl)



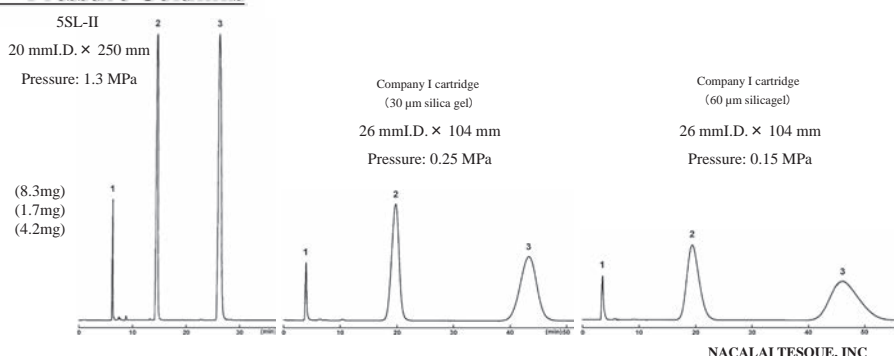
Comparison with Medium-Pressure Columns

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

Comparison with Medium-Pressure Columns

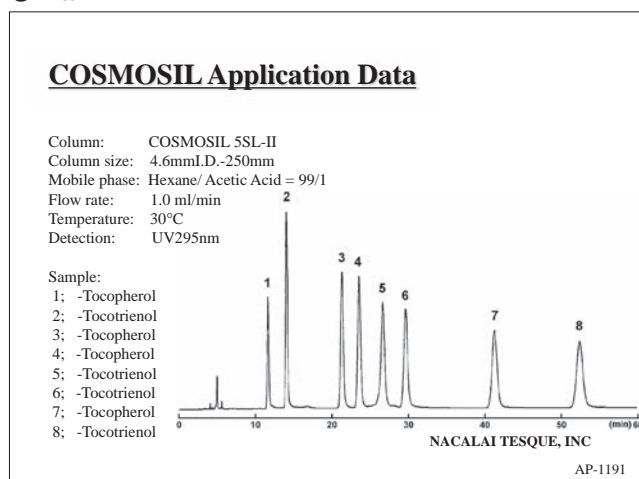
Column: 20 mm I.D. × 250 mm
 Column size: 20 mm I.D. × 250 mm
 Mobile phase: Ethanol/Hexane = 5/95
 Flow rate: 10 ml/min
 Temperature: room temperature
 Detection: UV254nm

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

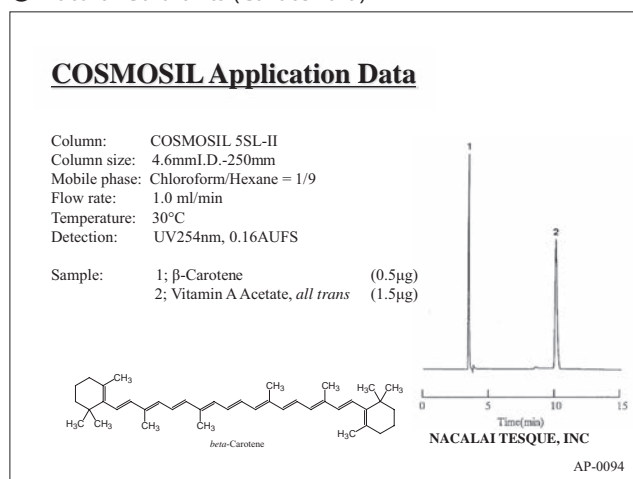


Applications

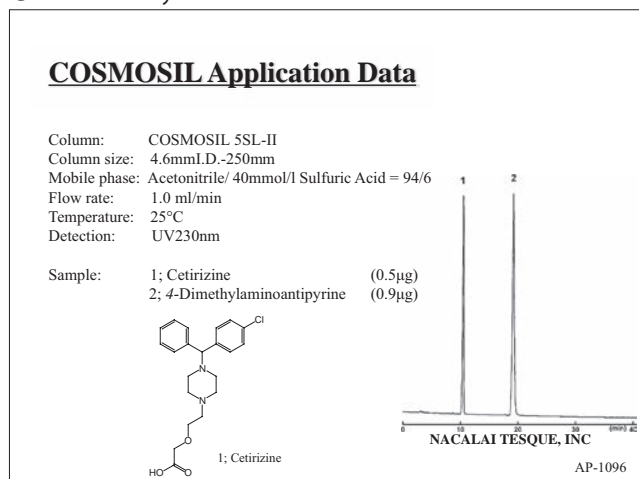
● Vitamin E



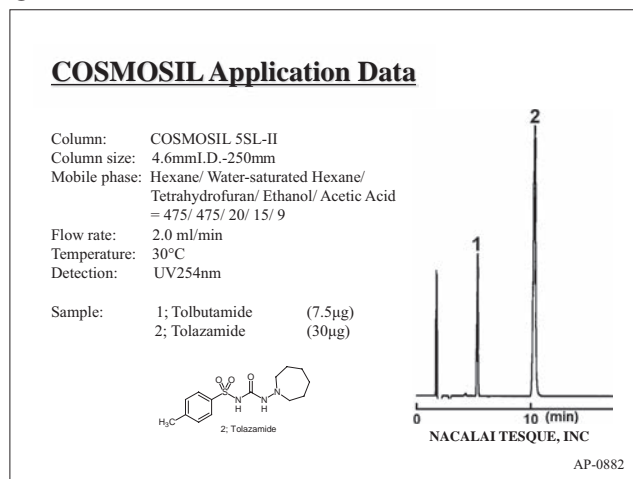
● Natural Colorants (Carotenoid)



● 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 \times 50	37999-81
4.6 \times 100	38000-01
4.6 \times 150	38001-91
4.6 \times 250	38002-81

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

Guard Column

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

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

Packed Column

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

Guard Column

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

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

Packed Column

I.D. x Length (mm)	Product Number
2.0 \times 150	18282-41
4.6 \times 10	38059-61
4.6 \times 50	38060-21

I.D. x Length (mm)	Product Number
4.6 \times 100	38061-11
4.6 \times 150	02266-51
4.6 \times 250	19400-51

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}	

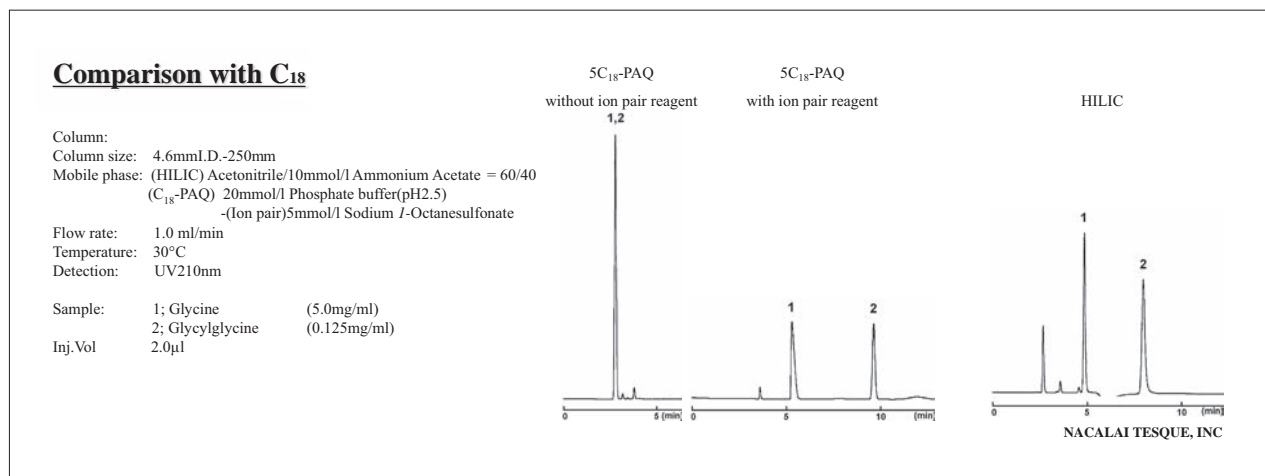
COSMOSIL HILIC Application Data

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.



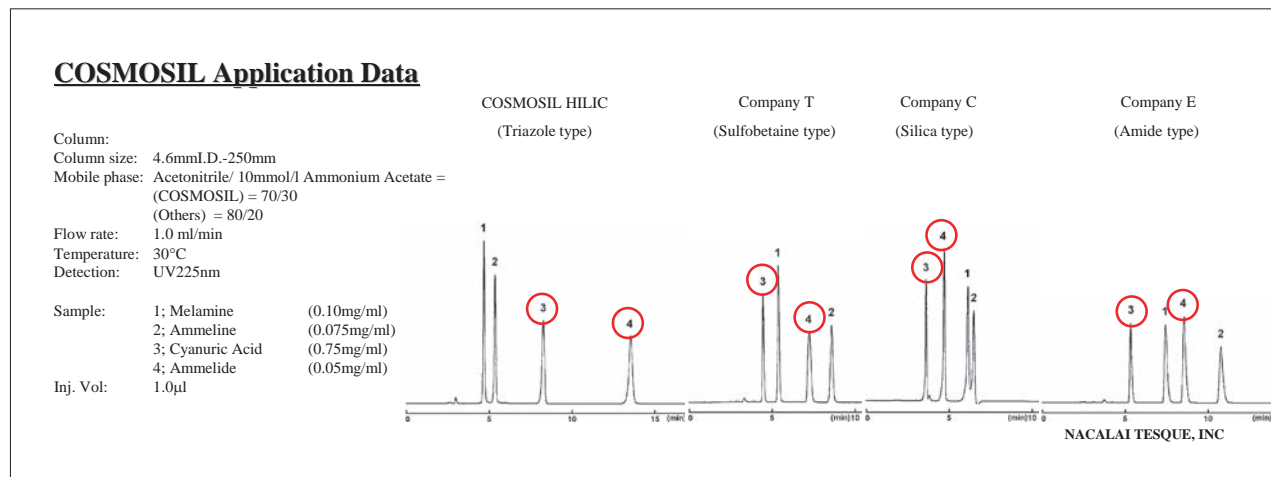
Comparison with Reversed Phase (C_{18}) Columns

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.



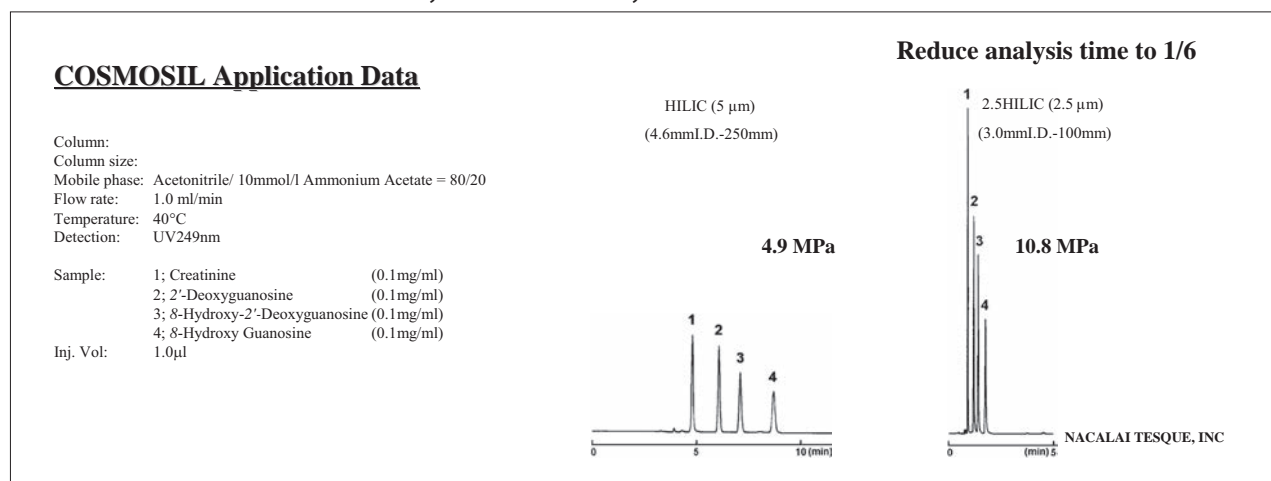
Alternative Selectivity

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



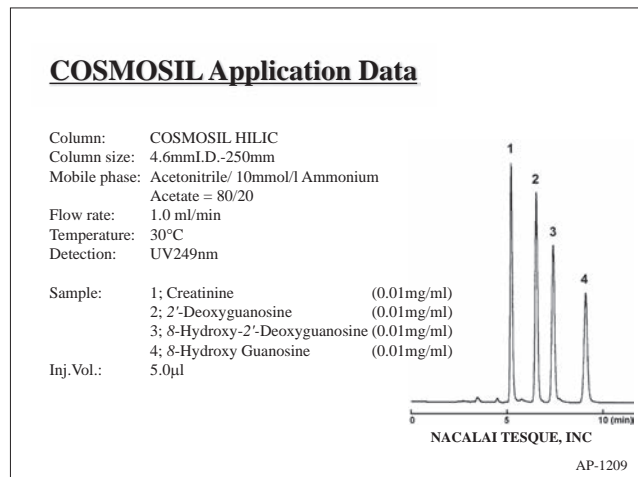
Fast LC Analysis (COSMOSIL 2.5HILIC)

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

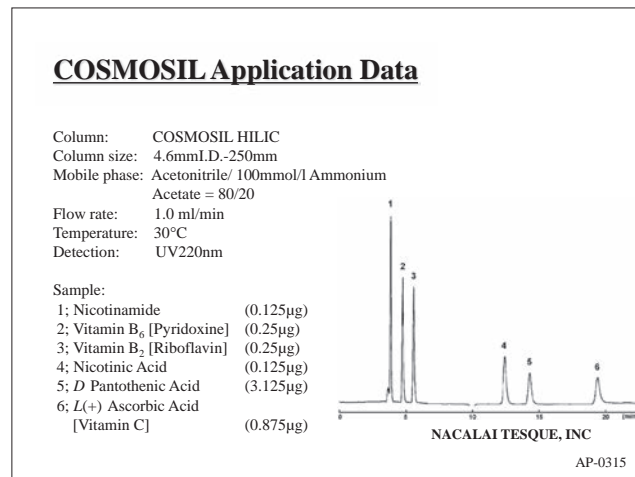


Applications

● Oxidative Stress Markers



● Water-Soluble Vitamins



Applications

Hydrophilic Interaction Columns

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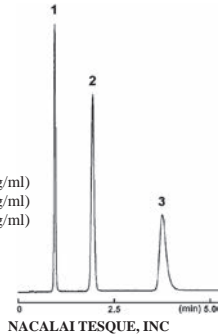
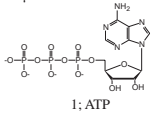
14

● 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



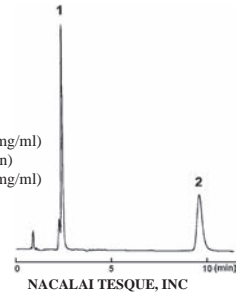
NACALAI TESQUE, INC
AP-1275

● 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



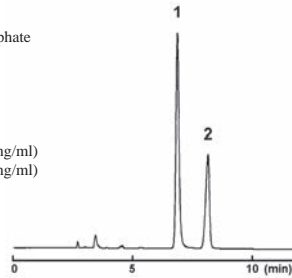
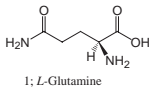
NACALAI TESQUE, INC
AP-1280

● 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



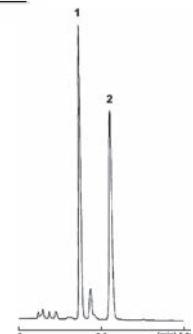
NACALAI TESQUE, INC
AP-1596

● 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*	07056-51
4.6×150 3 Lots Set*	09385-23
4.6×250*	07057-41
10×150	05564-51
10×250	07059-21
20×250	07060-81
28×250	07875-21

* Columns for validation

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
2.0×10	07569-41
4.6×10	07055-61
4.6×10 Cartridge†	19184-14
10×20	07058-31
20×20	07854-91
20×50	07873-41
28×50	07874-31

† 2 cartridges included. Guard cartridge holder required; refer to page 78.

● COSMOSIL 2.5HILIC Fast LC 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

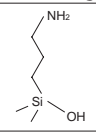
I.D. x Length (mm)	Product Number
2.0×150	11770-51
3.0× 50	11771-41
3.0× 75	11772-31

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

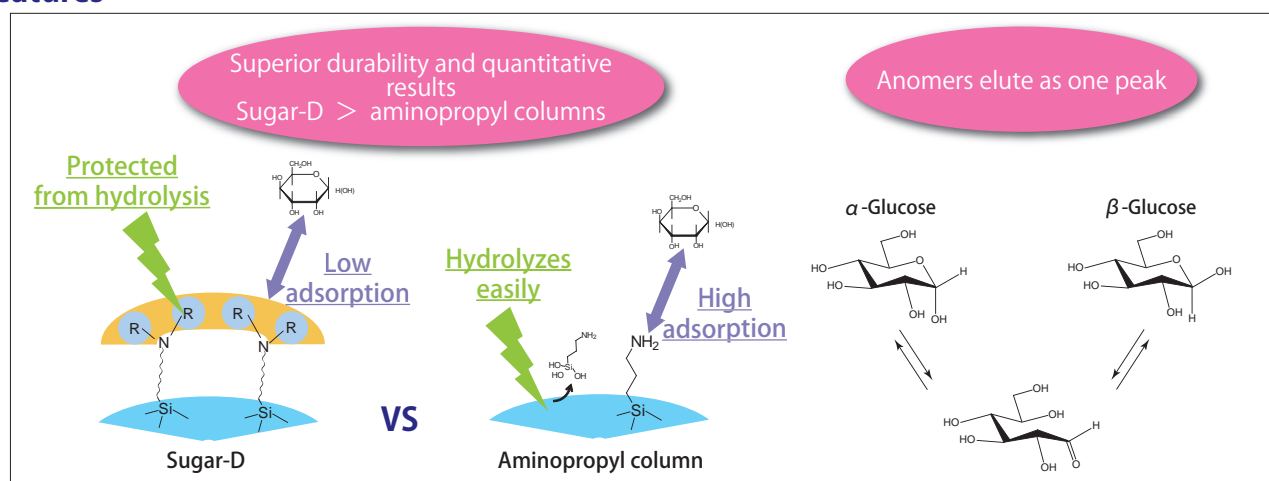
7. Mono- and Oligosaccharide Analysis Columns

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

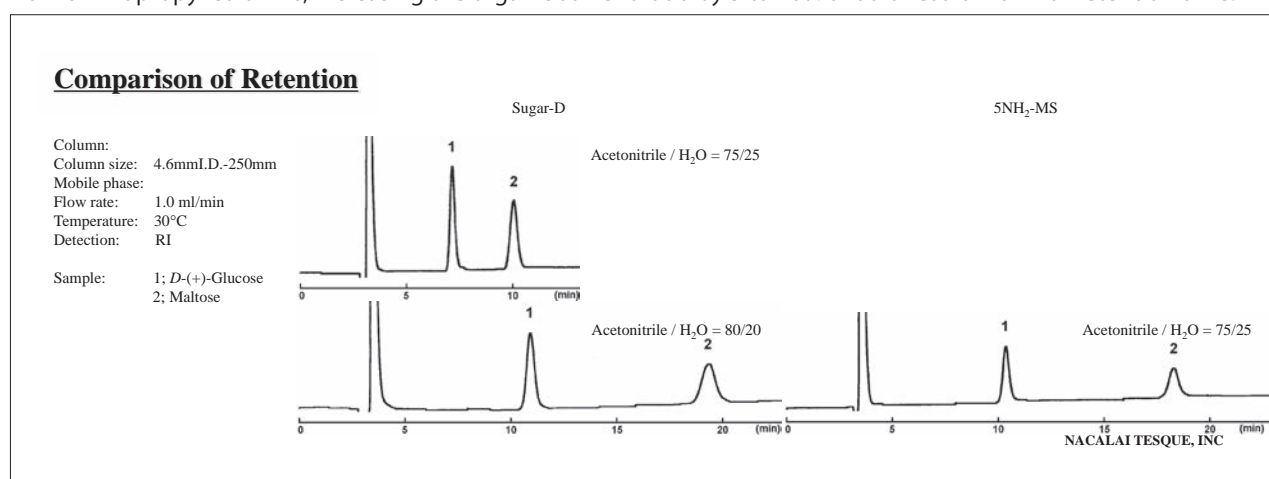
Packing Material	Sugar-D	NH ₂ -MS
Silica Gel	High purity porous spherical silica	
Average Particle Size	5 μm	
Average Pore Size	—	120 Å
Specific Surface Area	—	300 m ² /g
Bonded Phase Structure	—	
Bonded Phase	Polyamine	Aminopropyl group
Main Interaction	Hydrophilic interaction	
Features	<ul style="list-style-type: 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.



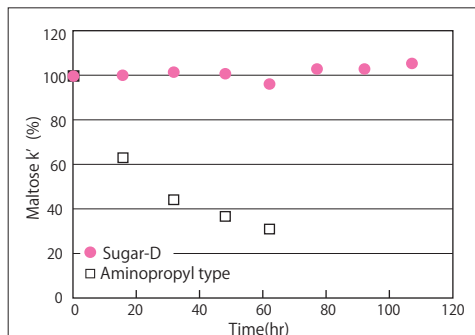
COSMOSIL Sugar-D



- 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 retention factor of Sugar-D did not decrease.

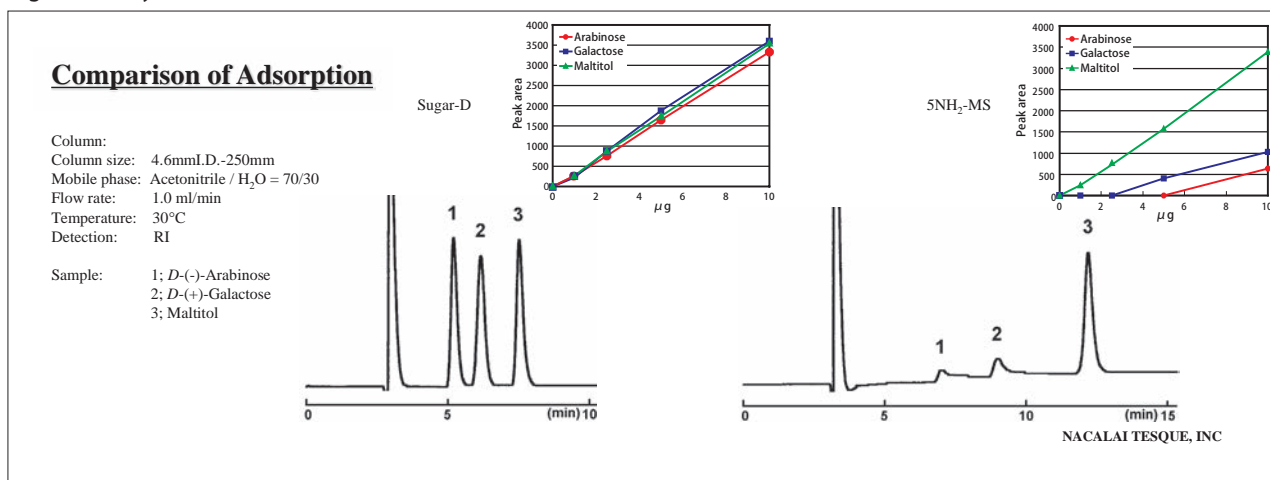


Decomposition Condition
 Solution Water
 Flow Rate 1.0 mL/min
 Temperature Room Temperature

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

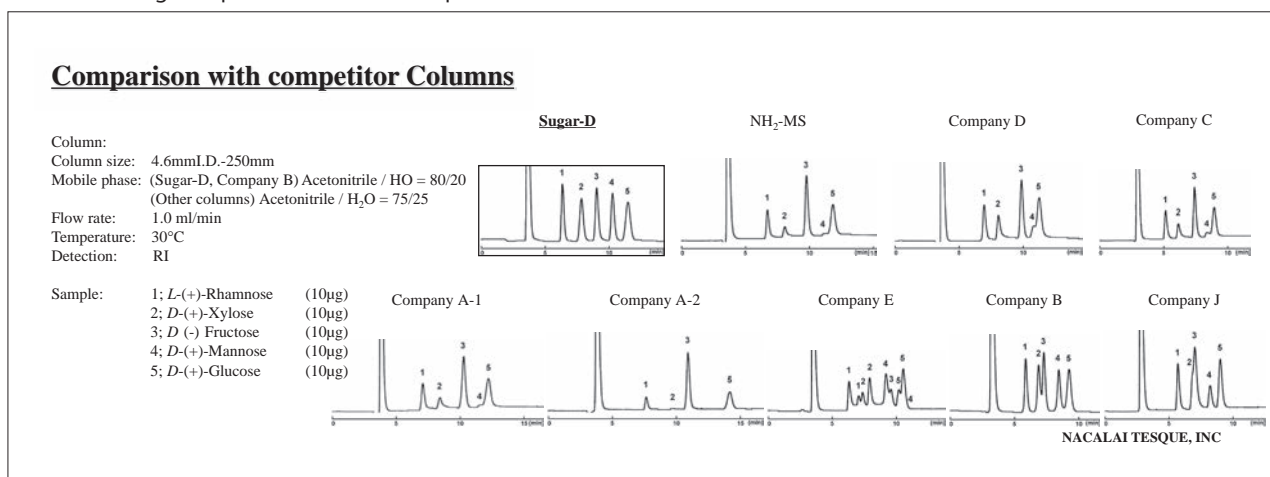
Comparison of Adsorption

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.



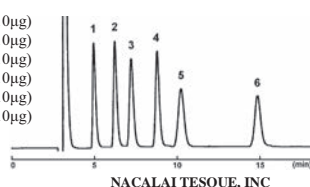
Applications

● Mono- and Oligosaccharides

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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)



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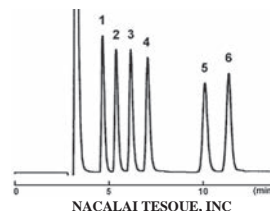
AP-0329

● Polyols

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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)



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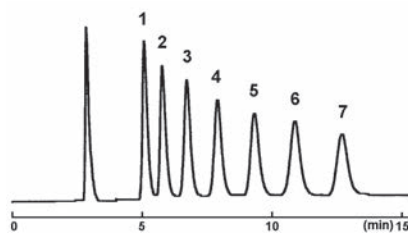
AP-0330

● Oligomaltoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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)



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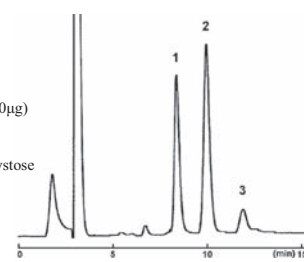
AP-0331

● Oligofructoses

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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



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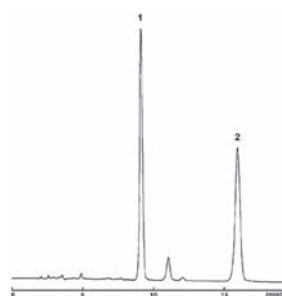
AP-0320

● Sweeteners

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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



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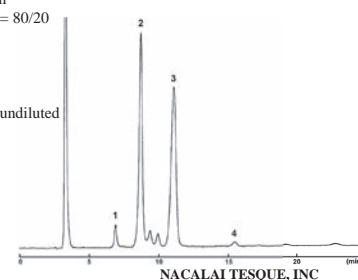
AP-1194

● Rare Sugar Soda

COSMOSIL Application Data

Column: COSMOSIL Sugar-D
 Column size: 4.6mmI.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	I.D. x Length (mm)	Product Number
2.0 × 150	05688-41	4.6 × 150	05395-71
2.0 × 250	05689-31	4.6 × 250	05397-51
3.0 × 150	05690-91	10 × 250	05692-71
3.0 × 250	05691-81	20 × 250	05693-61

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 × 10	05394-81
4.6 × 10 Cartridge*	19185-04
10 × 20	05696-31
20 × 50	05694-51

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

COSMOSIL NH₂-MS



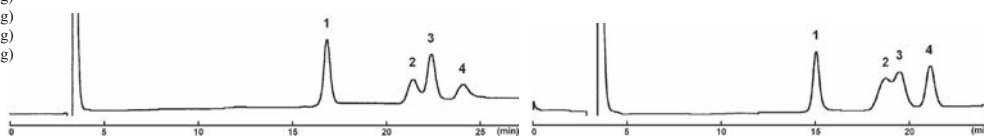
- Aminopropyl-bonded stationary phase
- Different selectivity from Sugar-D

Comparison of Adsorption

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

COSMOSIL Application Data

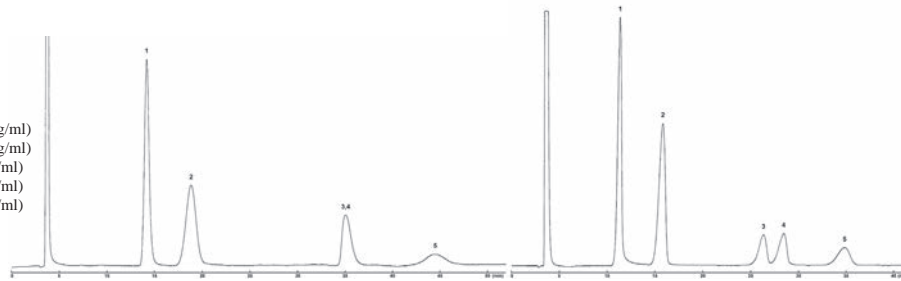
	COSMOSIL 5NH ₂ -MS (Acetonitrile/ H ₂ O = 75/25)	COSMOSIL Sugar-D (Acetonitrile/ H ₂ O = 80/20)
Column:	COSMOSIL **	COSMOSIL **
Column size:	4.6mm I.D.-250mm	4.6mm I.D.-250mm
Mobile phase:	Acetonitrile / H ₂ O = **/**	Acetonitrile / H ₂ O = 80/20
Flow rate:	1.0 ml/min	1.0 ml/min
Temperature:	30°C	30°C
Detection:	RI	RI
Sample:	1; Sucrose (10µg) 2; Maltose (10µg) 3; Lactose (10µg) 4; Trehalose (10µg)	1; Sucrose (10µg) 2; Maltose (10µg) 3; Lactose (10µg) 4; Trehalose (10µg)



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COSMOSIL Application Data

	COSMOSIL 5NH ₂ -MS (Acetonitrile/ H ₂ O = 80/20)	COSMOSIL Sugar-D (Acetonitrile/ H ₂ O = 85/15)
Column:	COSMOSIL **	COSMOSIL **
Column size:	4.6mm I.D.-250mm	4.6mm I.D.-250mm
Mobile phase:	Acetonitrile/ H ₂ O = **/**	Acetonitrile/ H ₂ O = 85/15
Flow rate:	1.0 ml/min	1.0 ml/min
Temperature:	30°C	30°C
Detection:	RI	RI
Sample:	1; D-(-)-Fructose (26.5mg/ml) 2; D-(+)-Glucose (21.2mg/ml) 3; Sucrose (5.3mg/ml) 4; D-(+)-Turannose (5.9mg/ml) 5; Maltose (5.3mg/ml)	1; D-(-)-Fructose (26.5mg/ml) 2; D-(+)-Glucose (21.2mg/ml) 3; Sucrose (5.3mg/ml) 4; D-(+)-Turannose (5.9mg/ml) 5; Maltose (5.3mg/ml)
Inj. Vol.:	17µl	17µl



NACALAI TESQUE, INC

AP-1532

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 / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 × 10	38241-51
4.6 × 10 Cartridge*	19182-34
10 × 20	38242-41
20 × 50	06093-91

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

8. mRNA and Oligonucleotide Purification Columns

RNA-based therapeutics represent a powerful new tool for gene therapy. In RNA production, impurities such as nucleotide triphosphates, abortive transcripts, and DNA templates can affect downstream applications by triggering immune responses. Gel-based methods of purification, such as preparative denaturing polyacrylamide gel electrophoresis (PAGE) and agarose gels, are limited by poor resolution of RNA size and potential chemical modifications from reagents such as formaldehyde. To date, high performance liquid chromatography (HPLC) remains a staple method for purification of messenger RNA (mRNA) and RNA oligonucleotides. Presented here are two HPLC methods: a size exclusion-based method for the purification of long mRNA, and a reversed-phase method for the purification of oligonucleotides.

Specifications

Packing Material	RNA-SEC-1000	RNA-SEC-2000	RNA-RP1
Silica Gel	Silica Gel		
Average Particle Size	5 μm		
Average Pore Size	1,000 \AA	2,000 \AA	-
Bonded Phase	Hydrophilic group		Octadecyl group
Features	For analysis of nucleic acids longer than 100 nt		

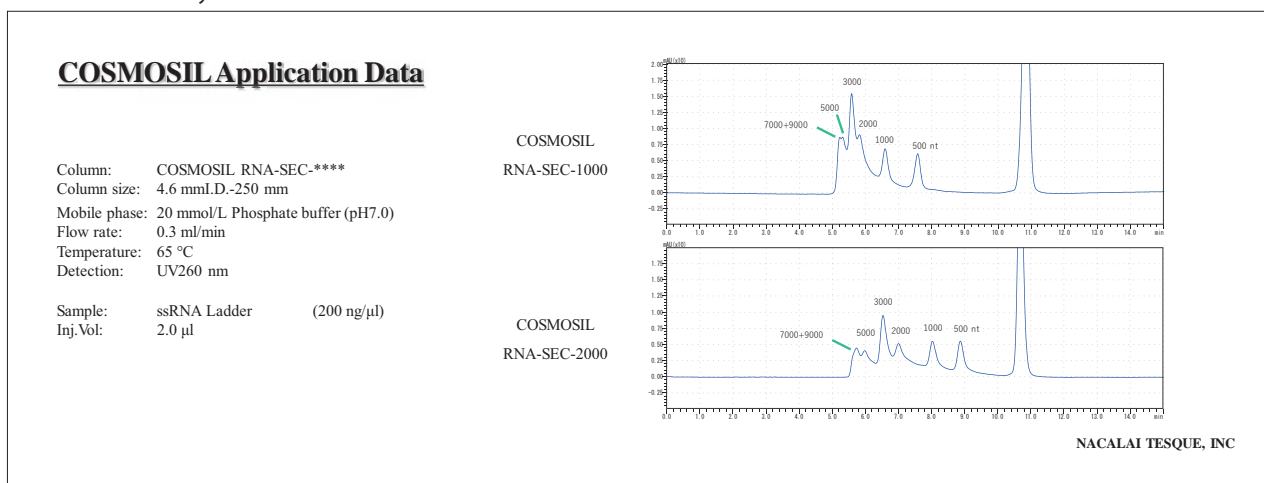
COSMOSIL RNA-SEC-1000, RNA-SEC-2000



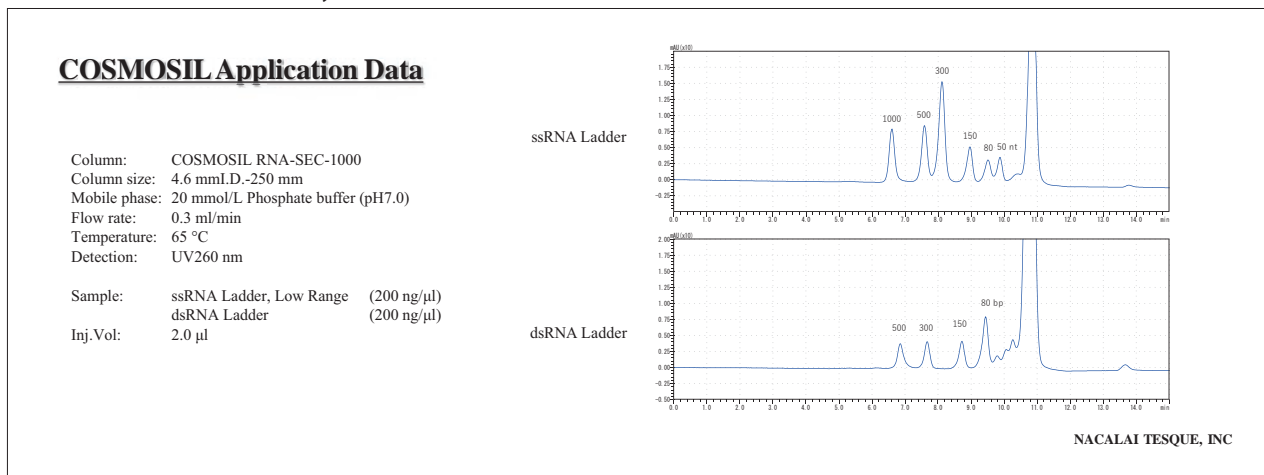
- Analyze a wide range of molecular weights
- Two pore sizes available for different samples

Applications

- ssRNA ladder by SEC-1000 and SEC-2000

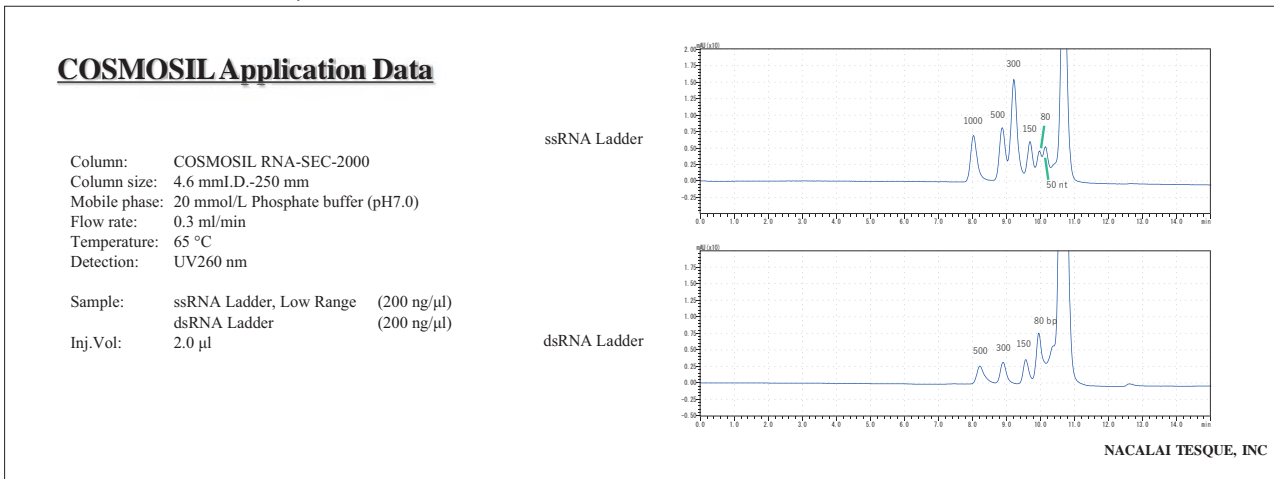


- ssRNA and dsRNA ladder by SEC-1000

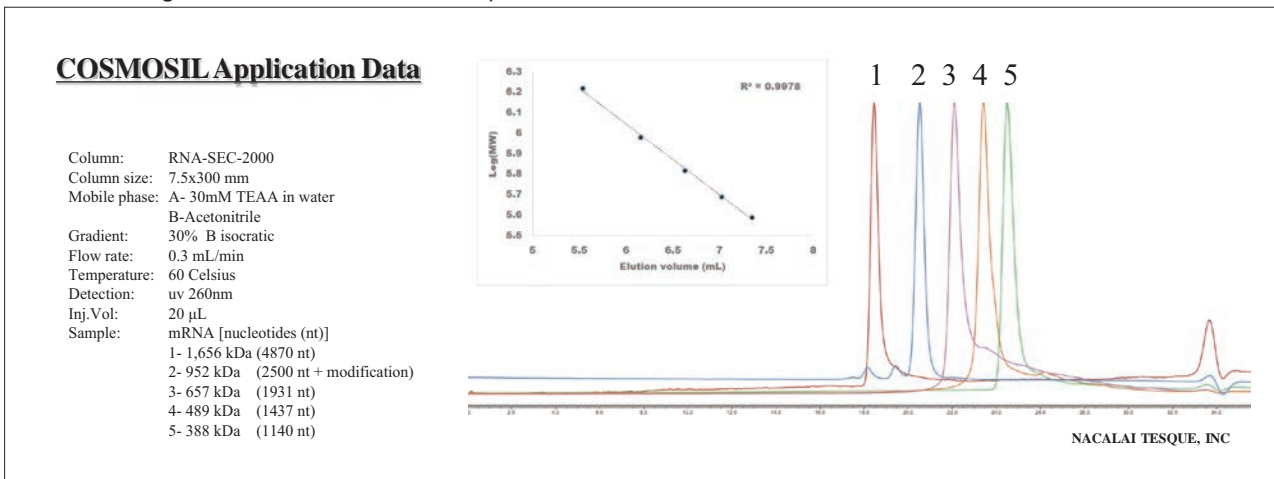


Applications

- ssRNA and dsRNA ladder by SEC-2000



- Molecular weight determination for mRNA up to 5,000 bases

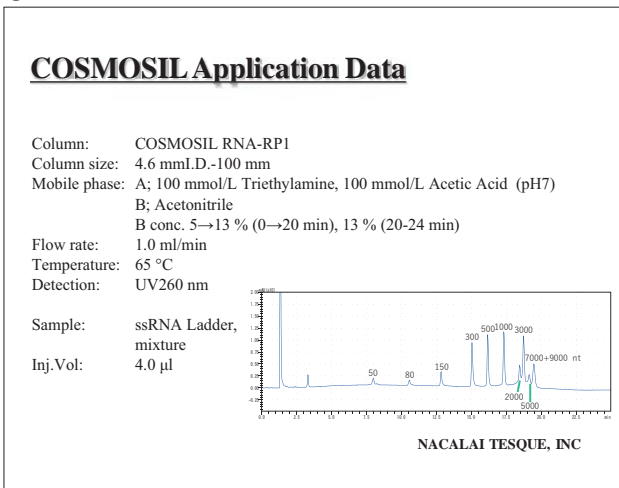


COSMOSIL RNA-RP1

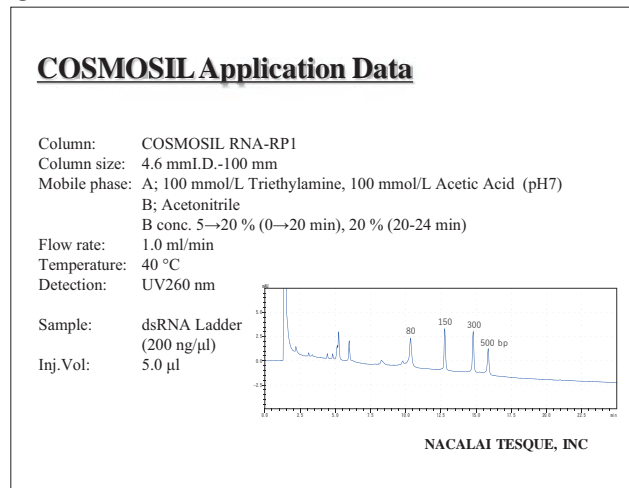


- High resolution for oligonucleotides

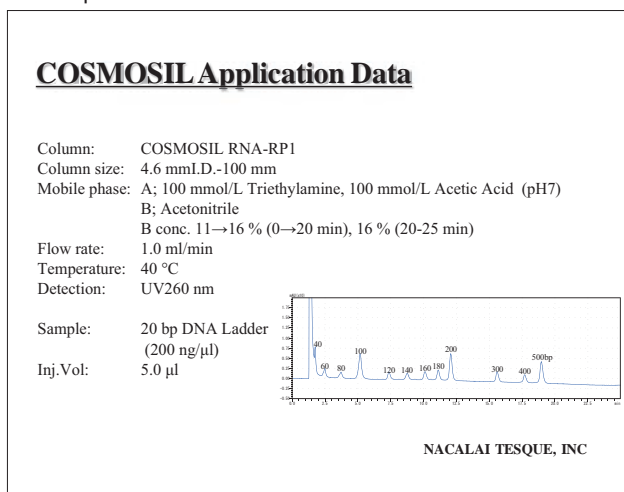
- ssRNA ladder



- dsRNA ladder



● 20 bp DNA ladder



Ordering Information

● COSMOSIL RNA-SEC-1000 Analytical Columns

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6 × 250	21088-01	7.5 × 300	19380-21
7.5 × 50	20785-91		

● COSMOSIL RNA-SEC-2000 Analytical Columns

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
4.6 × 250	21095-01	7.5 × 300	19381-11
7.5 × 50	21096-91		

● COSMOSIL RNA-RP1 Analytical Columns

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0 × 100	21078-31	10 × 100	21080-81
4.6 × 100	21079-21		

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9. Protein Separation Columns

Protein Separation with HPLC

Protein Separation Columns

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Analysis / purification method of proteins

< Separation Mode >

Reversed Phase

[Separation mechanism] Difference in hydrophobicity

[Main applications] Protein analysis
Purification of peptides
*Proteins may become denatured.

Gel Filtration

[Separation mechanism] Size-based separation

[Main applications] Purification of proteins
Elimination of low-M.W. compounds

Hydrophobic Chromatography

[Separation mechanism] Difference in hydrophobicity

[Main applications] Purification of proteins
*Unlike reversed-phase, proteins are not likely to become denatured.

< Packing Materials >

COSMOSIL Protein-R

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

COSMOSIL Diol Series

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

COSMOSIL HIC

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

Arginine Mobile Phase / Arginine Buffer for Protein Purification

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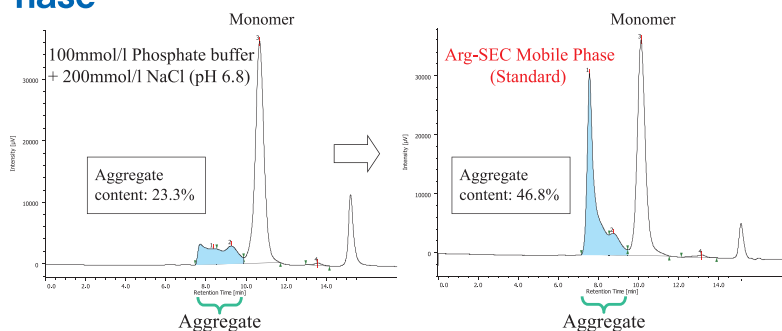
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Mobile Phase for Size-Exclusion Chromatography Arg-SEC Mobile Phase

- 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

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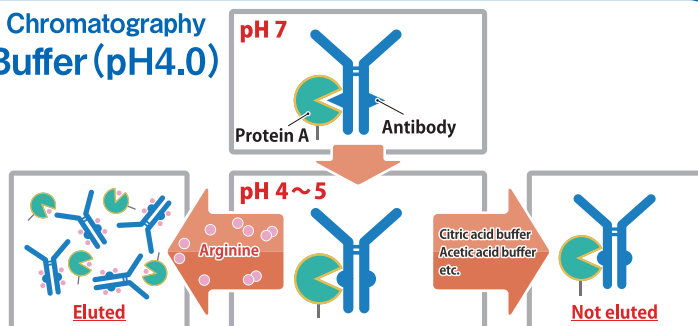
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Elution Buffer for Protein Affinity Chromatography Arg-Antibody Elution Buffer (pH4.0)

- 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 77.

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Reversed Phase Columns

COSMOSIL Protein-R



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

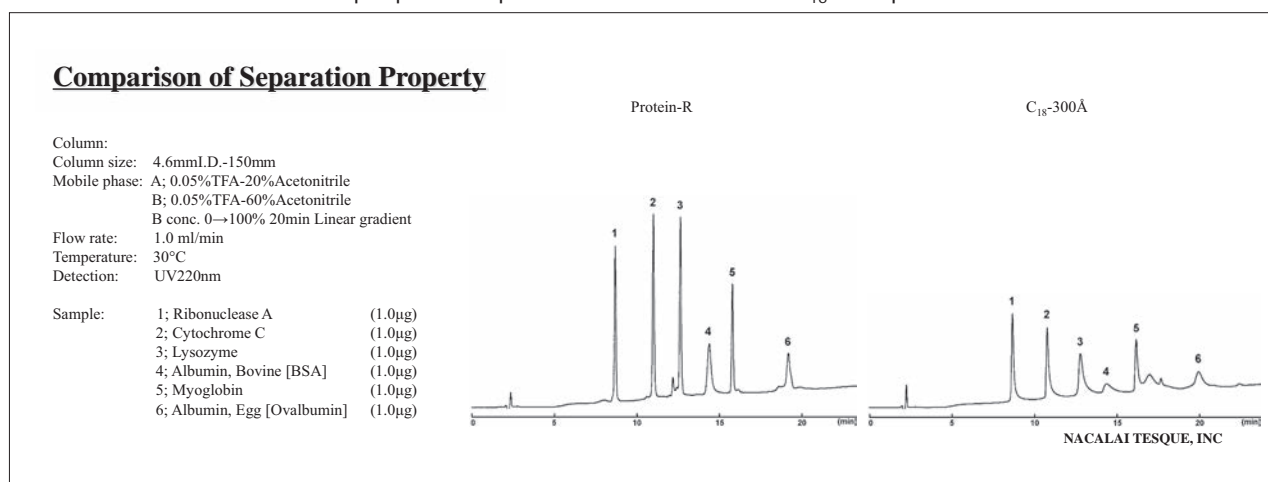
Specifications

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

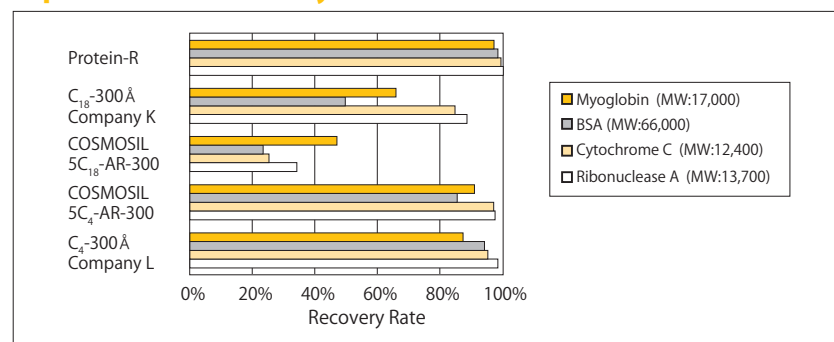
*Optimal pH range of silica-based columns is between 2 and 7.5. Extreme pH may significantly decrease column lifetime.

Comparison of Separation

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



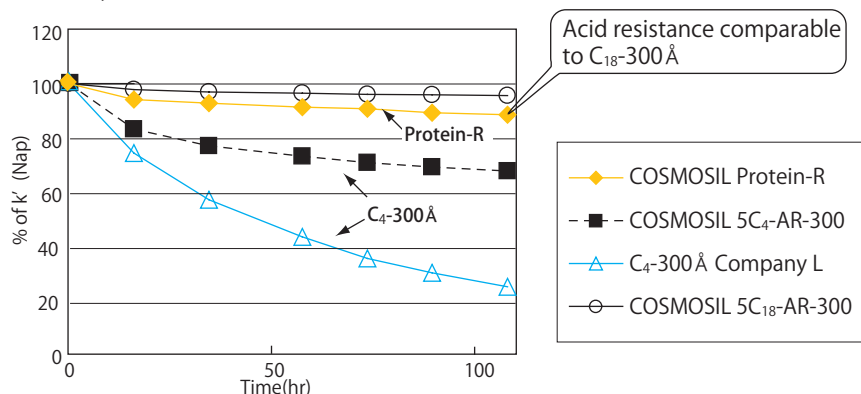
Comparison of Recovery Rate



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

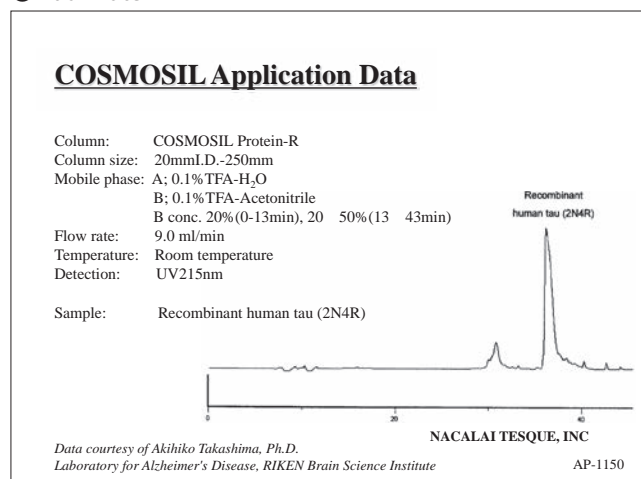
The figure below shows durability against acidic mobile phase of various columns. Protein-R shows a higher acid durability than C₄-300.



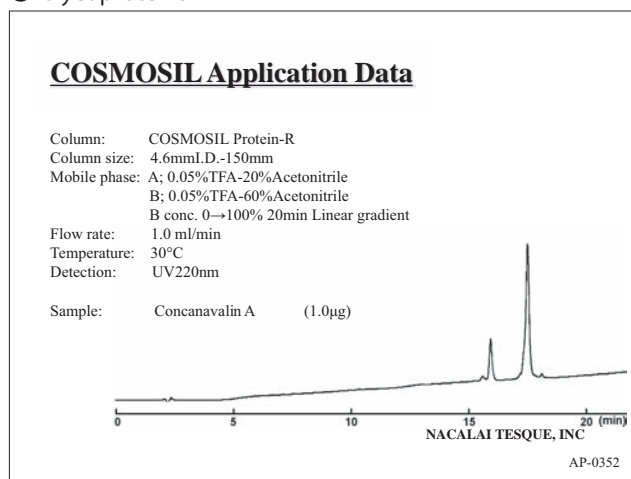
Degradation test with 0.1% Trifluoroacetic Acid at 60°C
(k) : Naphthalene in the mobile phase (methanol : water = 50 : 50)

Applications

● Tau Protein



● Glycoproteins



Ordering Information

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

Packed Column

I.D. x Length (mm)	Product Number	I.D. x Length (mm)	Product Number
2.0 × 150	06514-71	10 × 150	06529-91
4.6 × 50	06525-31	10 × 250	06530-51
4.6 × 150	06526-21	20 × 150	06531-41
4.6 × 250	06527-11	20 × 250	06532-31

Guard Column / Guard Cartridge

I.D. x Length (mm)	Product Number
4.6 × 10	06518-31
4.6 × 10 Cartridge*	21249-04
10 × 20	06528-01
20 × 20	08692-81





* 2 cartridges included. Guard cartridge holder required; refer to page 78.

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)

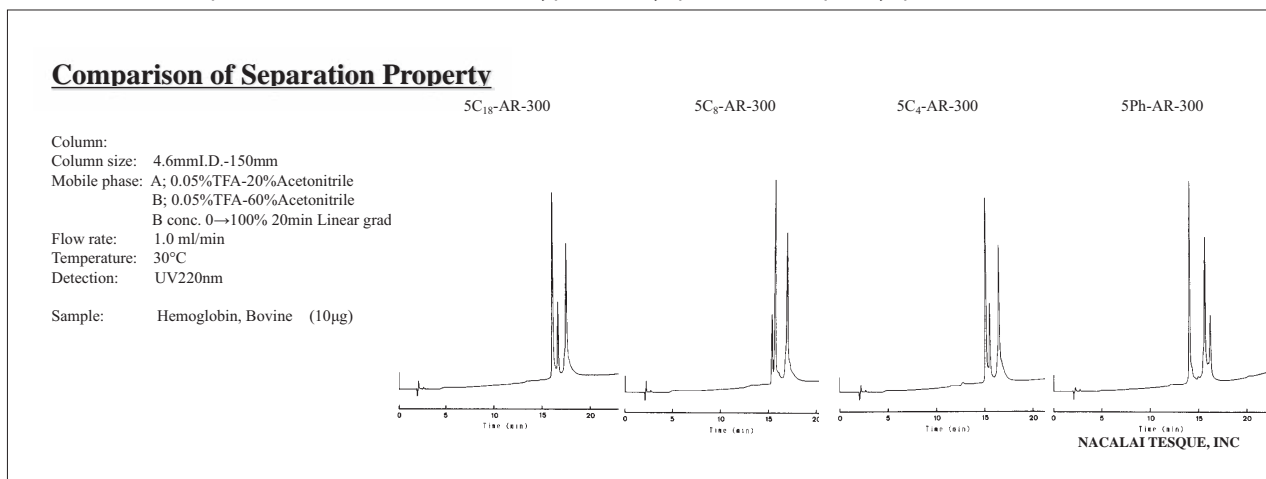
Specifications

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	I.D. x Length (mm)	Product Number
4.6 × 50	37911-01	10 × 150	37917-41
4.6 × 150	37913-81	10 × 250	37918-31
4.6 × 250	37914-71	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	I.D. x Length (mm)	Product Number
4.6 × 50	37951-81	10 × 150	34345-21
4.6 × 150	37953-61	10 × 250	34247-11
4.6 × 250	37954-51	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	I.D. x Length (mm)	Product Number
4.6 × 50	37956-31	10 × 150	34249-91
4.6 × 150	37958-11	10 × 250	38047-11
4.6 × 250	37959-01	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	I.D. x Length (mm)	Product Number
4.6 × 50	37961-51	10 × 150	05865-11
4.6 × 150	37963-31	10 × 250	34267-51
4.6 × 250	37964-21	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

Protein Separation Columns

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Gel Filtration Columns (Aqueous)

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



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

Specifications

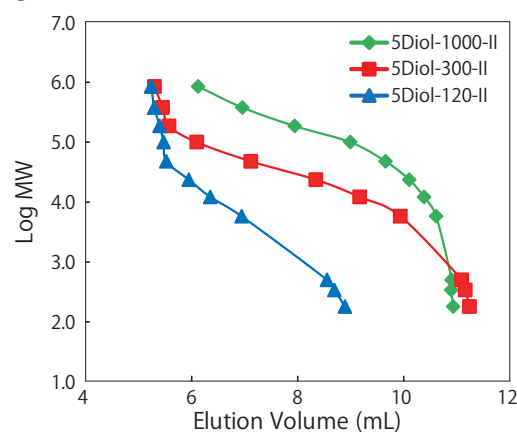
Packing Material	Diol-120-II	Diol-300-II	Diol-1000-II
Silica Gel	High purity porous spherical silica ⁽¹⁾		
Average Particle Size	5 μm		
Average Pore Size	120 Å	300 Å	1,000 Å ⁽²⁾
Bonded Phase	Diol group		
Flow Rate (mL/min)	0.5 ~ 1.0		
Pressure	20 MPa or less		15 MPa or less
Sample MW (Protein)	5,000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

(1) With the silica-based gel, organic solvents, including methanol and acetonitrile, can be used.

(2) If you require pore sizes greater than 1000 Å, please contact us.

Calibration Curve

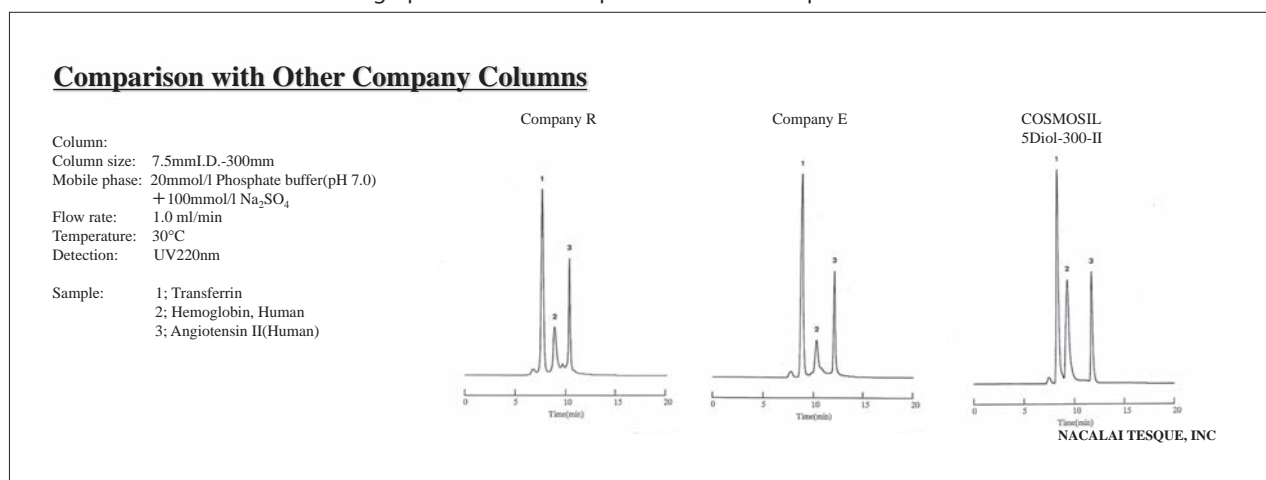
● Linear Pullulan Calibration Curve



Column	COSMOSIL 5Diol-II (7.5 mmI.D. × 300 mm)
Mobile Phase	Water
Flow Rate	1.0 mL/min
Temperature	30°C
Detection	RI
Sample	Linear Pullulan
Sample	M.W.
1; P-800	853,000
2; P-400	380,000
3; P-200	186,000
4; P-100	100,000
5; P-50	48,000
6; P-20	23,700
7; P-10	12,200
8; P-5	5,800
9; Maltotriose	504
10; Maltose	342
11; Glucose	180

Comparison with Other Companies' Columns

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



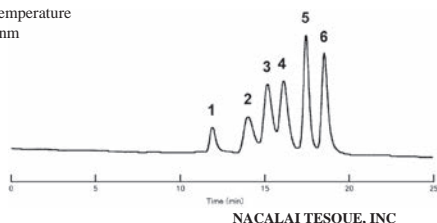
Applications

● Proteins

COSMOSIL Application Data

Column: COSMOSIL 5Diol-300-II
 Column size: 7.5mmI.D.-600mm
 Mobile phase: 20mmol/l Phosphate buffer(pH 7.0)
 + 100mmol/l 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



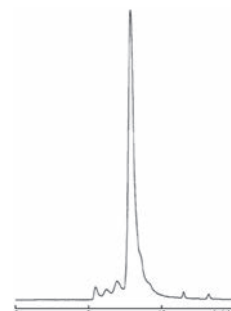
NACALAI TESQUE, INC
 AP-0391

● 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



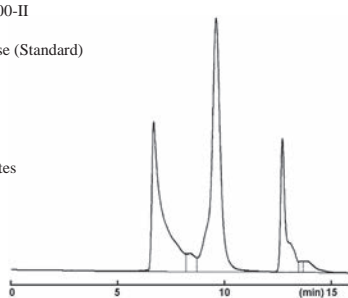
NACALAI TESQUE, INC
 AP-1477

● 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



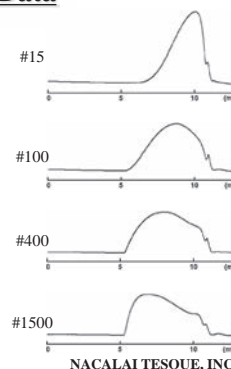
NACALAI TESQUE, INC

● 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

Guard Cartridge

I.D. x Length (mm)	Product Number
4.6×10 Cartridge*	19180-54

* 2 cartridges included. Guard cartridge holder required; refer to page 78.

● 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

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

Packed Column

I.D. x Length (mm)	Product Number
7.5×300	19976-31

Hydrophobic Interaction Columns

COSMOSIL HIC



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

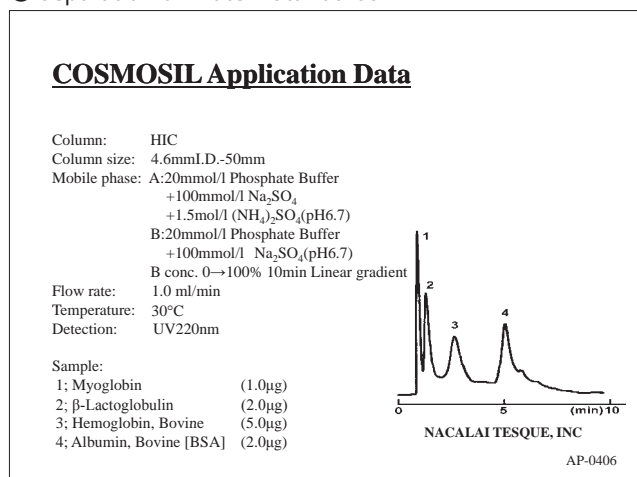
Specifications

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

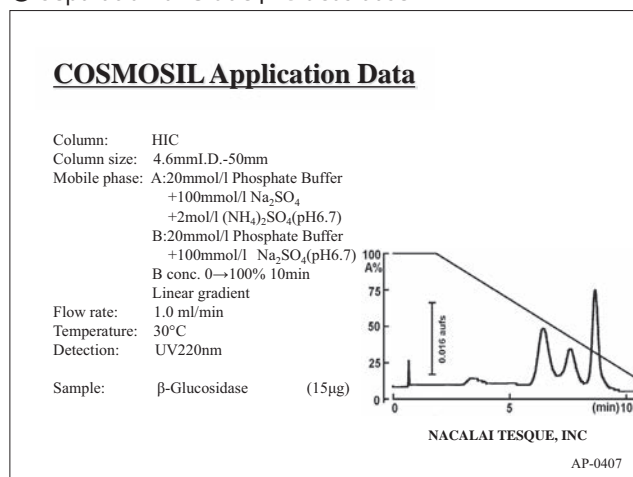
Applications

A buffer with high salt concentration, usually 1-2 mol/L of (NH₄)₂SO₄, 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

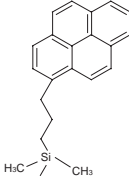
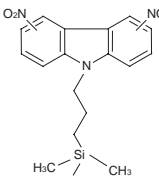
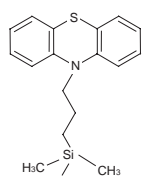
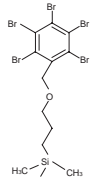
- COSMOSIL 5HIC Analytical Columns (Particle Size: 5 μm) Packed Column

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

10. Fullerene Separation Columns

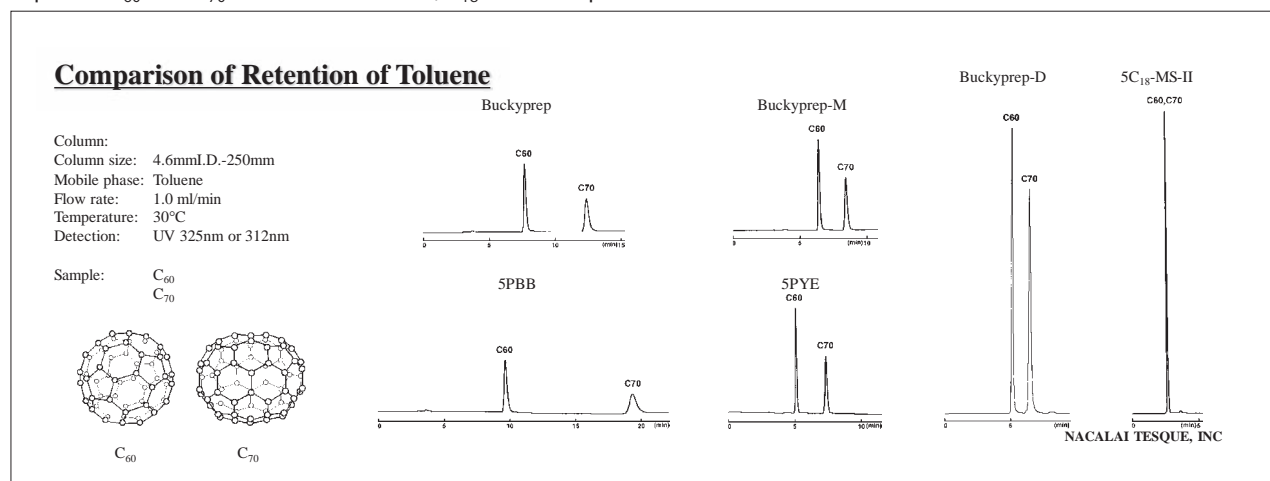
Separation of fullerenes, especially preparative scale separation, on conventional HPLC columns are always problematic due to the low solubility and low recovery rate of fullerenes. COSMOSIL offers a variety of columns designed for preparative scale separation of fullerenes including higher fullerenes,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

Specifications

Packing Material	Buckyprep	Buckyprep-D	Buckyprep-M	PBB
Silica Gel	High purity porous spherical silica			
Average Particle Size	5 μm			
Average Pore Size	120 \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 fullerene separation	• Separation of fullerene derivatives	• Designed to separate metallofullerenes	• Designed for preparative separation of C_{60} , C_{70} .

Comparison of Retention

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



Suggested Solvents for Fullerene Separation

Solvent	Features	Solubility of C_{60} (mg/mL)	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 Buckyprep-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		—			

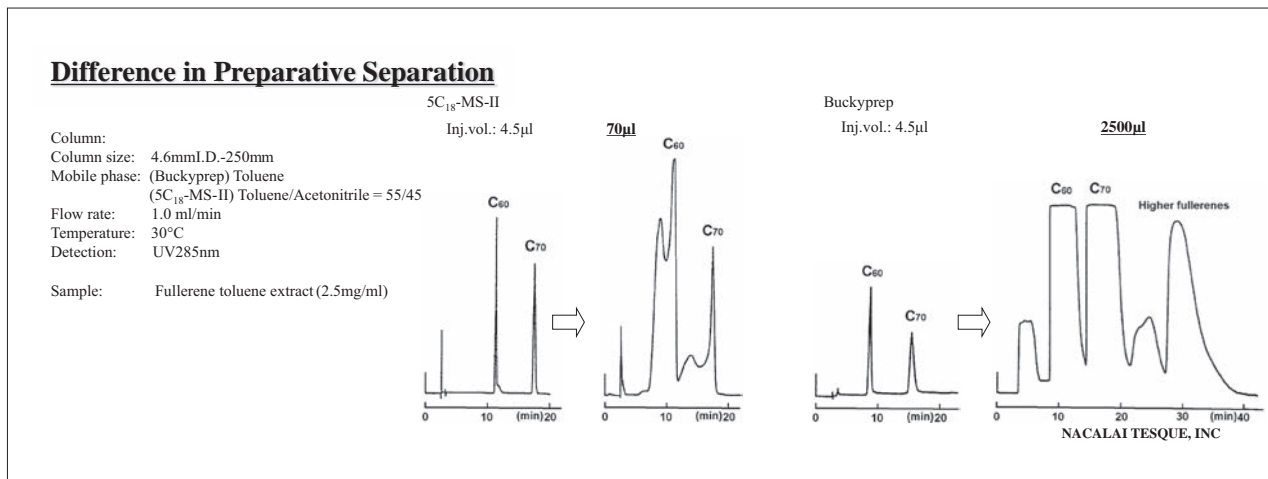
COSMOSIL Buckyprep



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

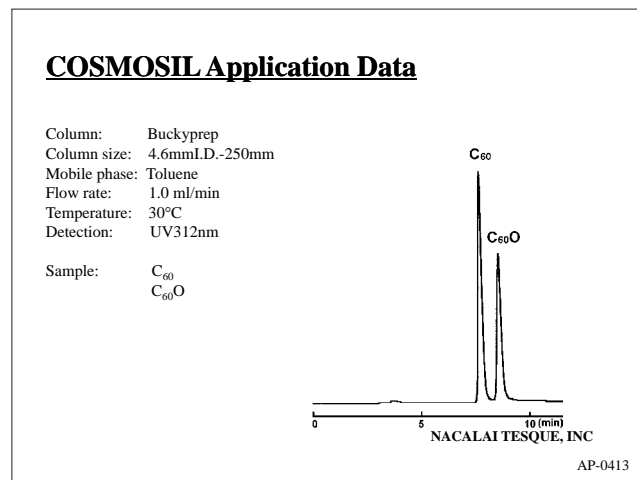
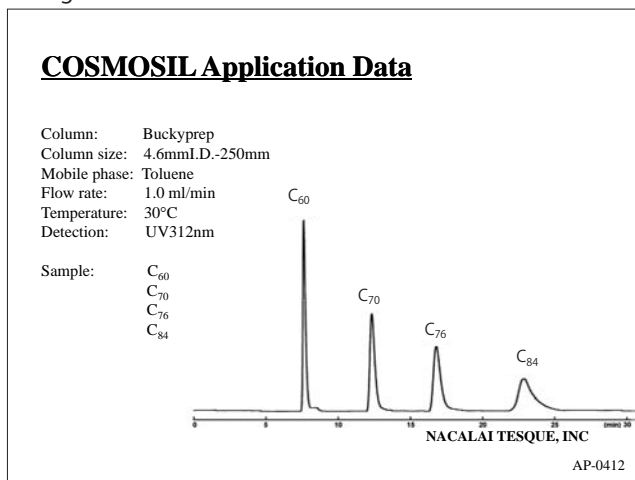
Difference in Preparative Separation

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

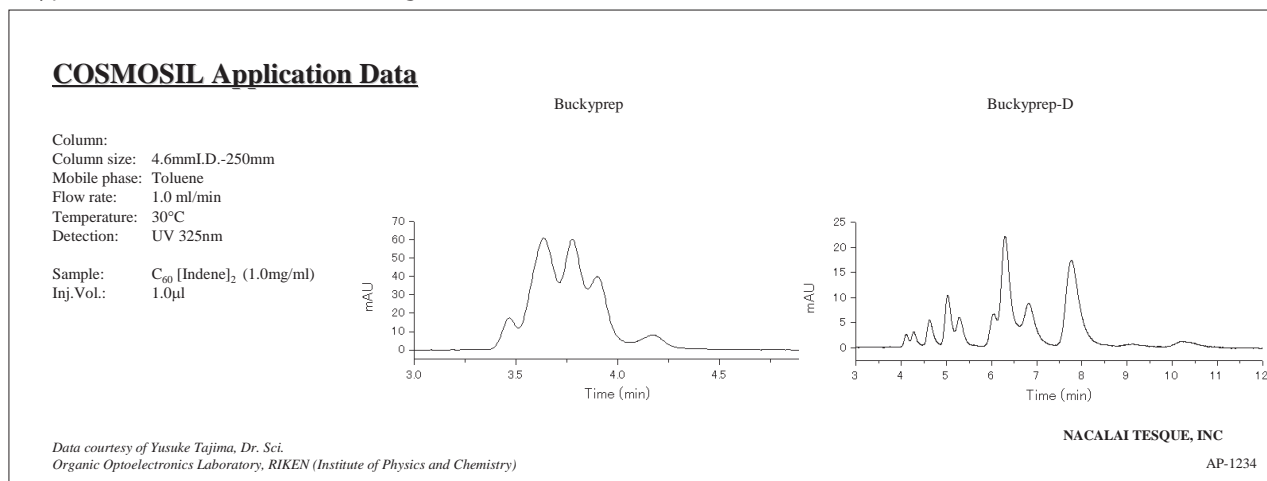
COSMOSIL Buckyprep-D



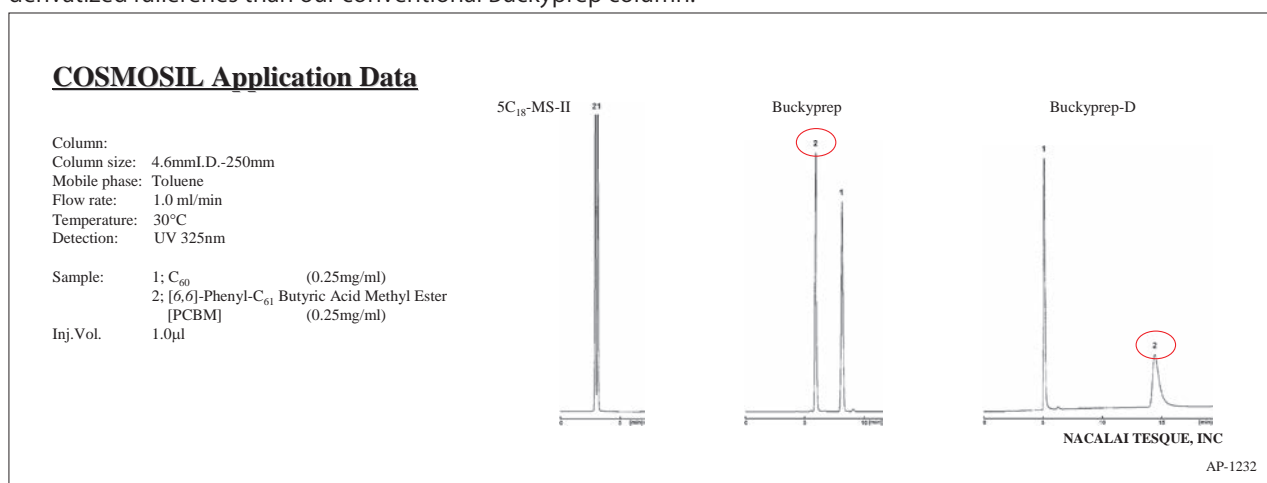
- For preparative separation of derivatized fullerenes
- For separation of derivatized fullerenes such as C₆₀ indene used for organic thin-film solar cell

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 Buckyrep-M

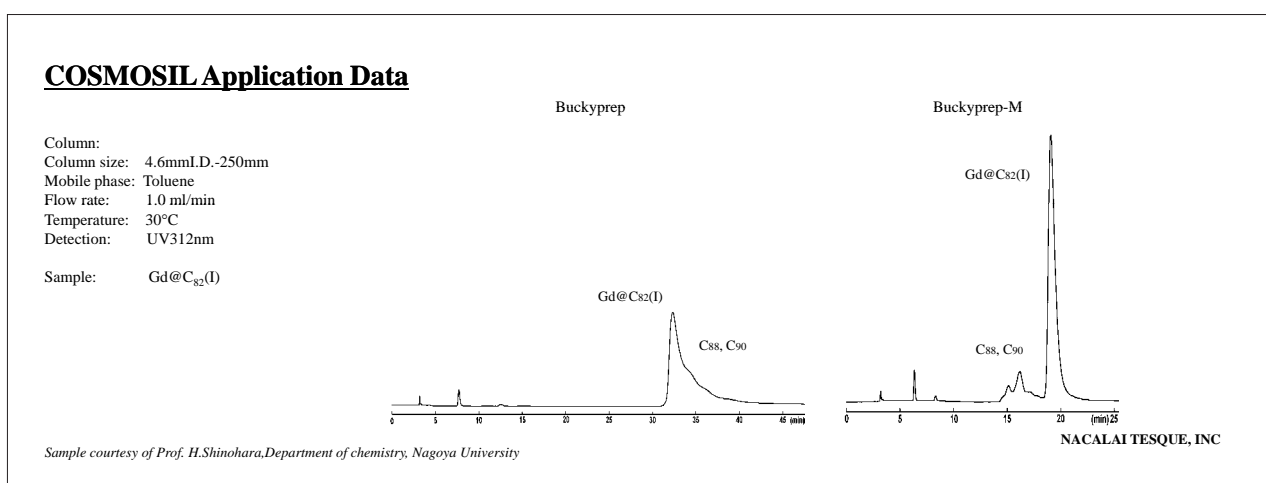
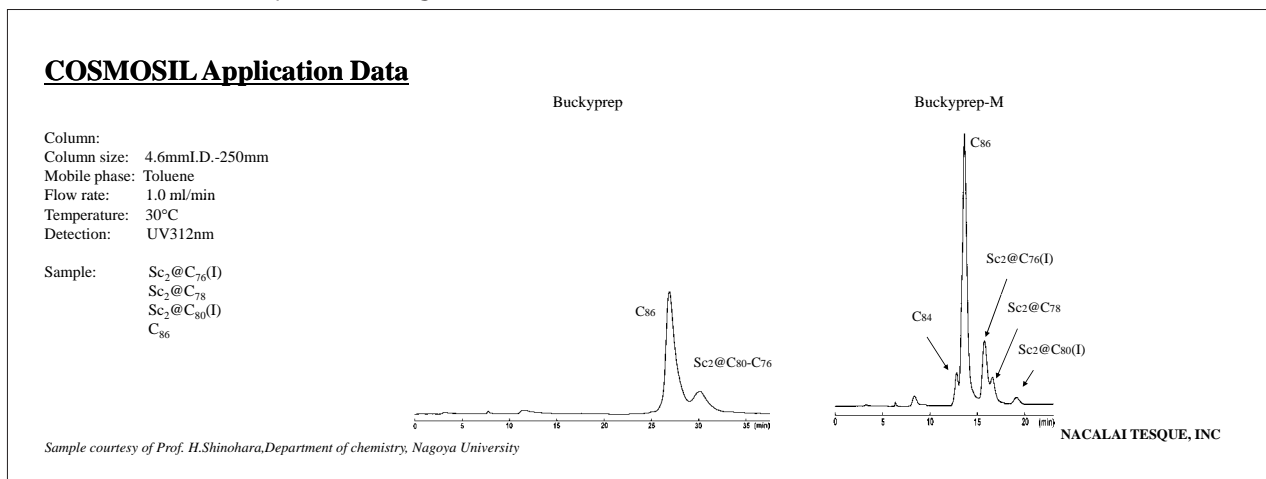


- Different selectivity from Buckyrep
- Excellent separation for metallofullerenes

Applications

● Metallofullerenes

COSMOSIL Buckyrep-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 Buckyrep-M is also effective for the separation of higher fullerenes and fullerene derivatives.



Ordering Information

● COSMOSIL Buckyrep-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



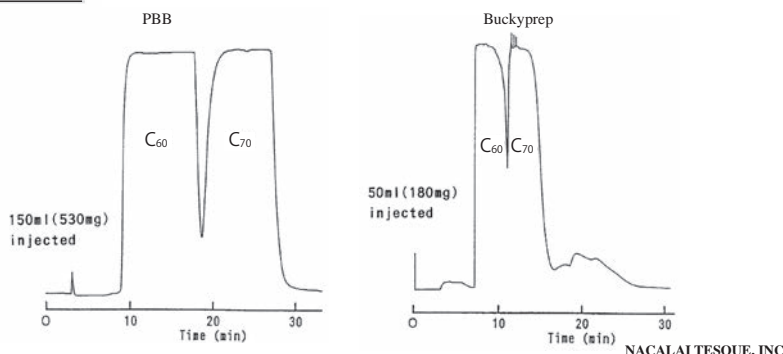
- Can be used with *o*-dichlorobenzene or carbon disulfide
- Suitable for preparative scale separation

Applications

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

Comparison of Preparative Separation

Column: 20mm I.D. - 250mm
 Mobile phase: Toluene
 Flow rate: 18 ml/min
 Temperature: Room temperature
 Detection: UV285nm
 Sample: Crude fullerenes (3.5mg/ml)



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

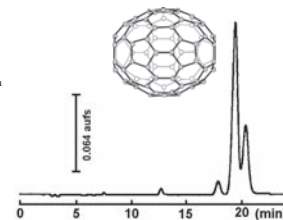
Fullerene Chromatogram Index

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

Fullerene Chromatogram Index

Sample: C78
 CAS No.: 136316-32-0
 Molecular formula: C78
 Column: Buckyrep
 Column size: 4.6 mm I.D. - 250 mm
 Mobile phase: Toluene
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV 285 nm
 Attenuation: 0.64 au/fs
 Sample conc.: 0.20 mg/ml
 Injection volume: 10.0 μl



Data courtesy of
 NACALAI TESQUE, INC

11. Soluble Carbon Nanotube Separation Columns

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



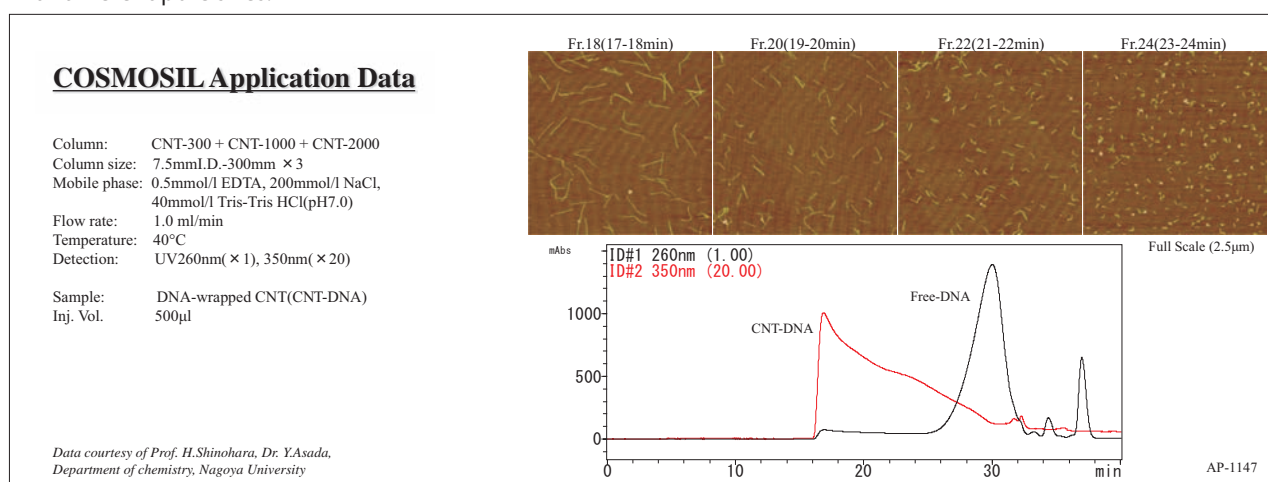
- Size-based separation of soluble carbon nanotubes
- 3 pore sizes (300 Å, 1,000 Å, 2,000 Å)
- High durability

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

12. 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.

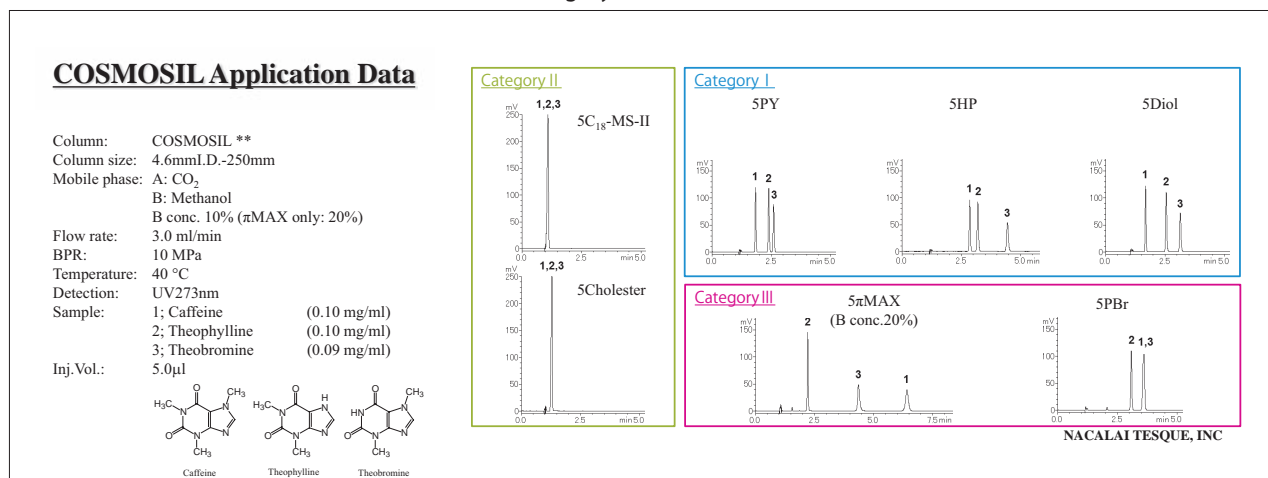
Specifications

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

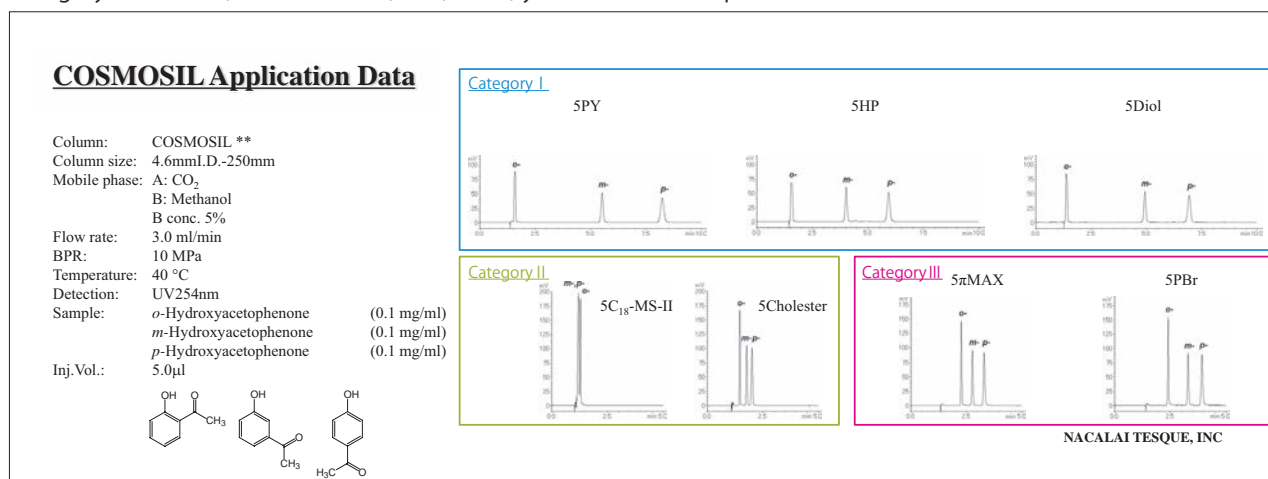
- Derivatives of xanthine (high-polarity compounds); XLogP3: -0.8 ~ 0.0

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.



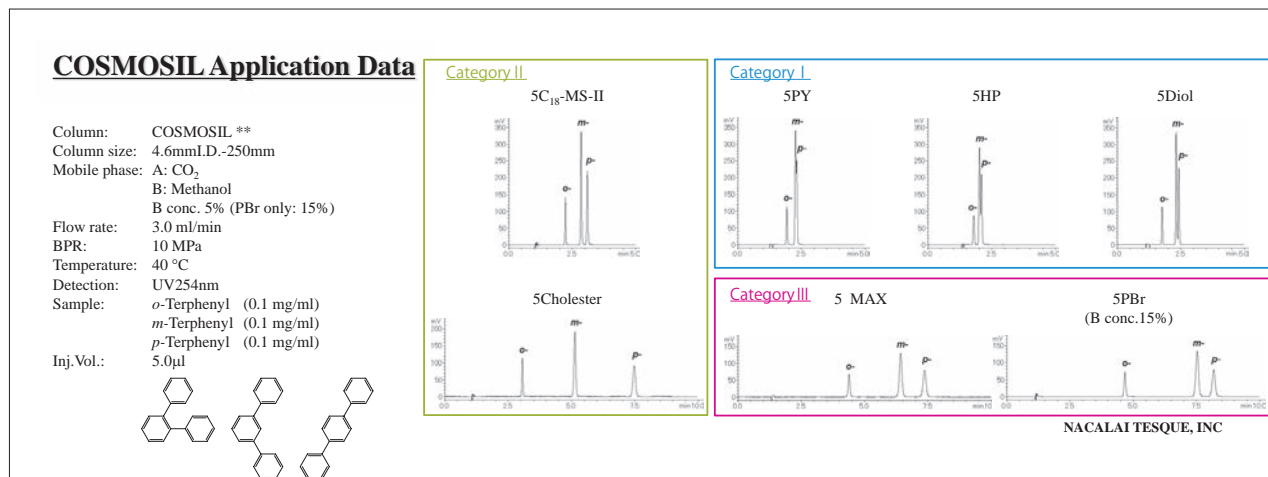
- Positional isomers (mid-polarity compounds); XLogP3: 1.4 ~ 1.9

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

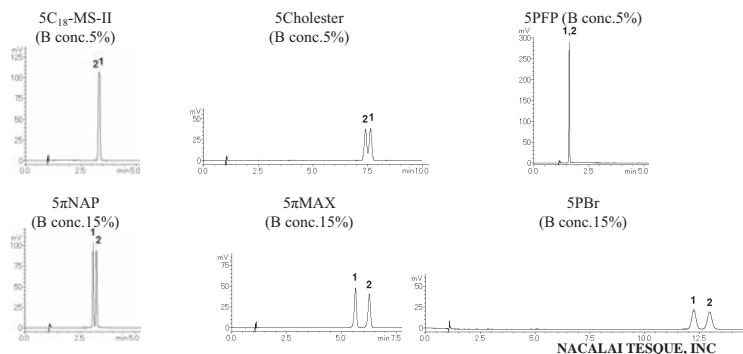
● Vitamin D

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.

COSMOSIL Application Data

Column: COSMOSIL **
 Column size: 4.6mm I.D.-250mm
 Mobile phase: A: CO₂
 B: Methanol
 B conc. **%
 Flow rate: 3.0 ml/min
 BPR: 10 MPa
 Temperature: 40 °C
 Detection: UV265nm

Sample: 1; Vitamin D₃ (0.6 mg/ml)
 2; Vitamin D₂ (0.6 mg/ml)
 Inj. Vol.: 3.0 μ l



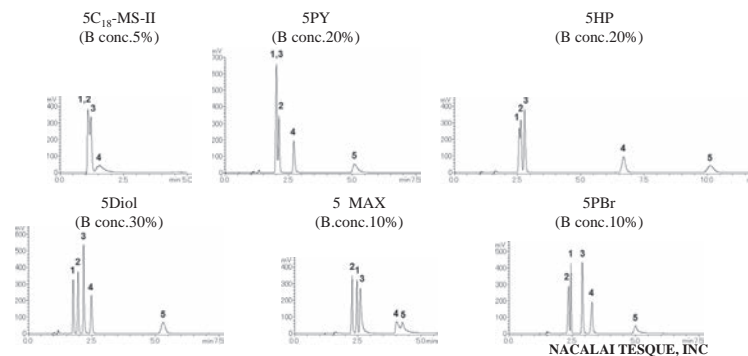
● Nucleobases

COSMOSIL 5Diol separated 5 nucleic acid bases.

COSMOSIL Application Data

Column: COSMOSIL **
 Column size: 4.6mm I.D.-250mm
 Mobile phase: A: CO₂
 B: 100mmol/l Ammonium Acetate - Methanol
 B conc. **%
 Flow rate: 3.0 ml/min
 BPR: 10 MPa
 Temperature: 40 °C
 Detection: UV260nm

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



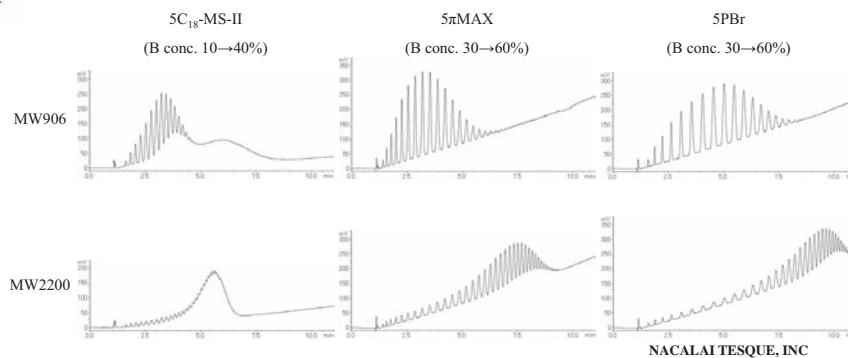
● Polystyrene

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

COSMOSIL Application Data

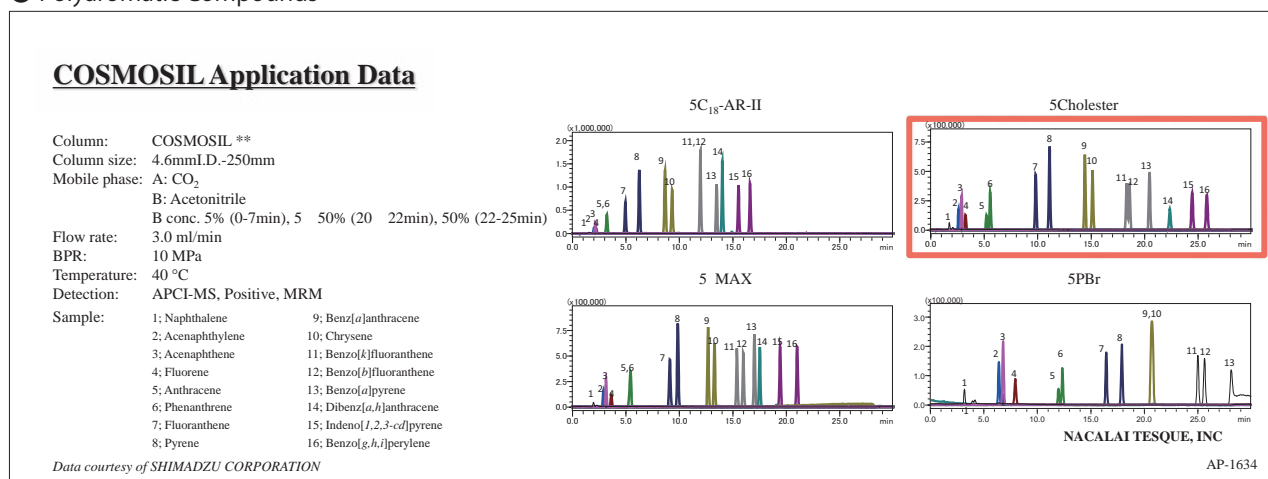
Column: COSMOSIL **
 Column size: 4.6mm I.D.-250mm
 Mobile phase: A: CO₂
 B: Tetrahydrofuran
 B conc. * \rightarrow **% 10min Linear gradient
 Flow rate: 3.0 ml/min
 BPR: 10 MPa
 Temperature: 40 °C
 Detection: UV220nm

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

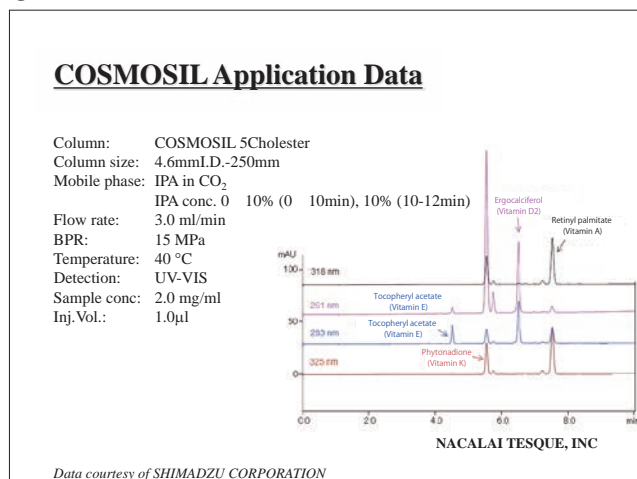


Applications

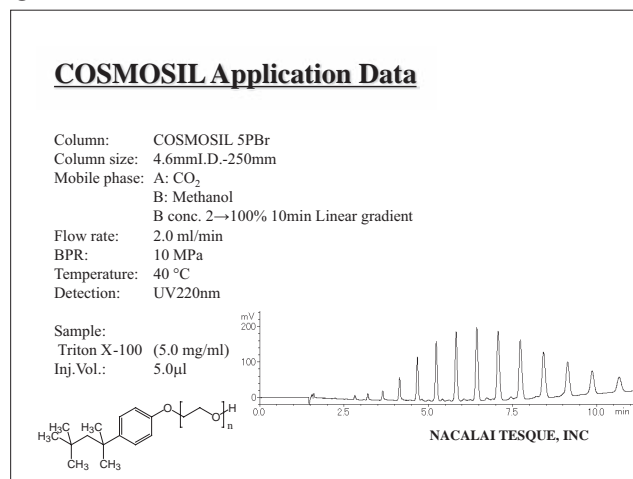
● Polyaromatic Compounds



● Fat-Soluble Vitamins



● Surfactant



Ordering Information

Bonded Phase	Packing Material											
	PY		HP		Diol		Cholester *		π MAX		PBr †	
Particle Size (mm I.D. × mm)	3 μm	5 μm	3 μm	5 μm	3 μm	5 μm	3 μm	5 μm	3 μm	5 μm	3 μm	5 μm
2.1 × 150	13557-01	13844-31	13559-81	13845-21	21567-21	18253-21	18556-61	13785-11	19596-11	18696-31	18875-81	13561-31
4.6 × 250	13558-91	13846-11	13560-41	13854-01	/	18252-31	/	13784-21	/	18372-61	/	13783-31
10 × 250	/	13780-61	/	13776-31	/	18678-71	/	13848-91	/	18679-61	/	13849-81
20 × 250	/	13782-41	/	13778-11	/	18869-71	/	13852-21	/	19587-31	/	13853-11
Guard Column 10 × 20	/	13781-51	/	13777-21	/	/	/	13850-41	/	18867-91	/	13851-31

Other packing material and column size are available, please contact us.

* For ordering information for COSMOSIL Cholester, refer to page 10.

† For ordering information for COSMOSIL PBr, refer to page 14.

(Pressure Limit)

- 2.1 mm I.D., 4.6 mm I.D., 10.0 mm I.D. : 30 MPa
- 20.0 mm I.D. : 23 MPa

13. Preparative Packing Materials for Column Chromatography



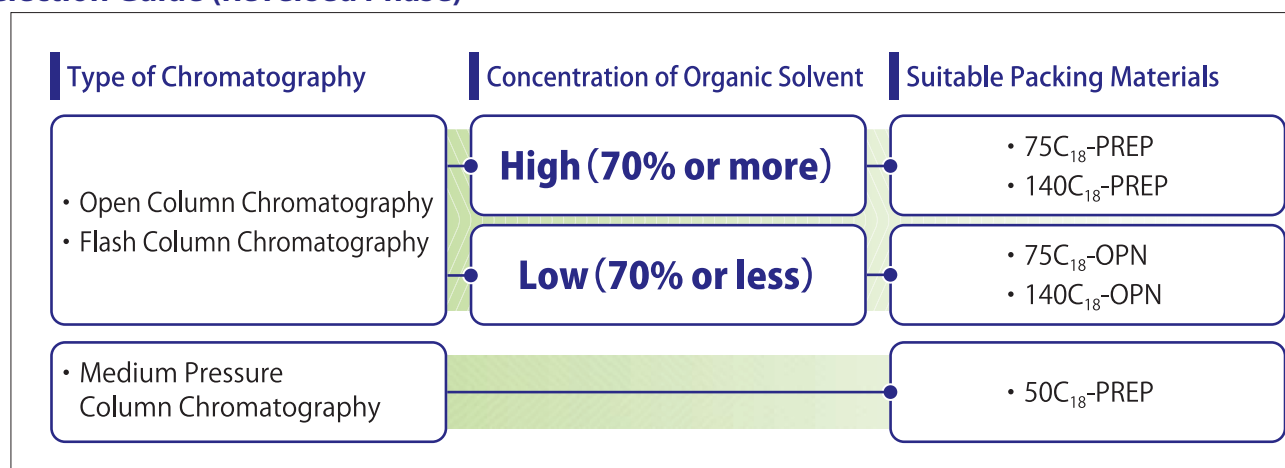
Introduction

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.

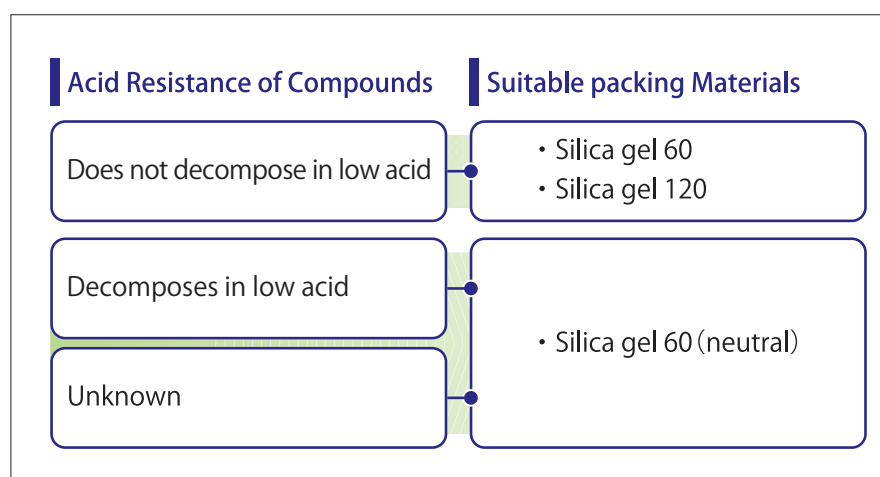
Specifications

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	30518-65	500 g
			30518-81	1 kg

Silica Gel (for Column Chromatography)

Product Name	Average 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
	approx. 230 ~ 400 mesh	SP	30721-85	500 g
			30721-01	1 kg
			30721-14	5 kg

Alumina Activated (for Column Chromatography)

Product Name	Average 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

14. Related Products

DL-Amino Acid Labeling Kit



This product is an amino acid labeling kit for HPLC analysis. Due to their high polarity and insufficient UV absorbance, amino acids need to be labeled prior to HPLC. In addition, research on D-amino acids has recently been gaining prominence. With conventional labeling reagents, such as phenyl isothiocyanate and dansyl chloride, costly chiral columns are required. This product is designed to label amino acids without intensive labor and achieve chiral separation with achiral columns, such as C₁₈.

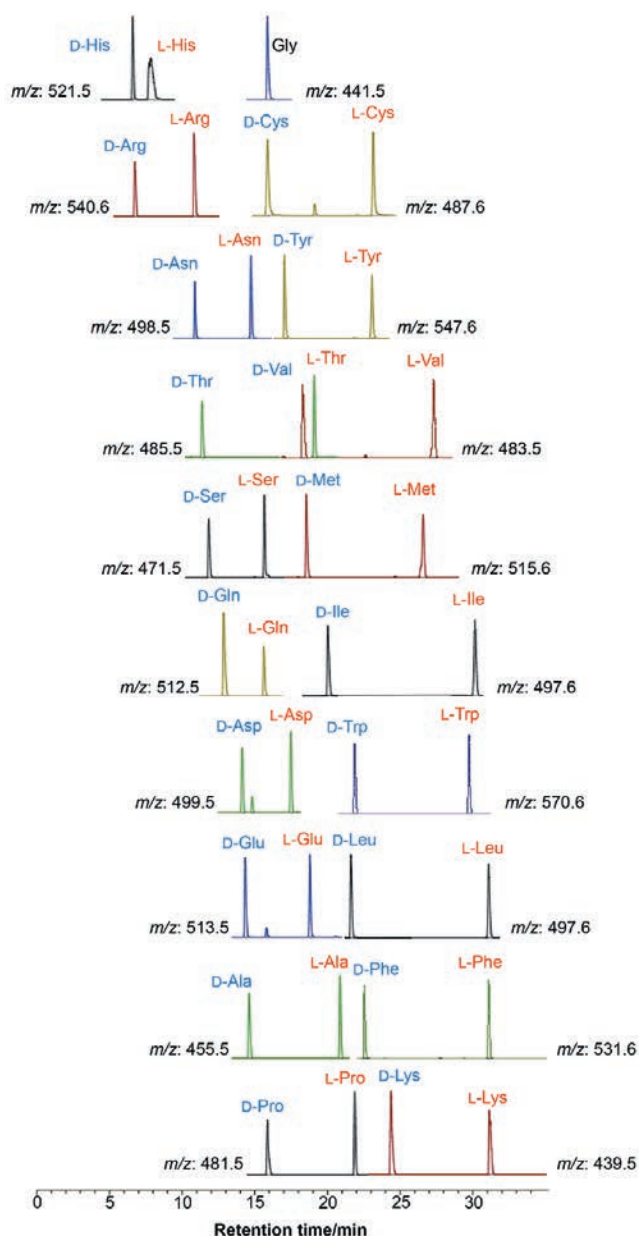
- Simple protocol
- Chiral separation with C₁₈ column
- Compatible with high-sensitivity MS analysis
- Labeled amino acids are highly stable

Our research paper using this product is available:

Ozaki, M., Kuwayama, T., Hirose, T. *et al.* Separation and identification of the DL-forms of short-chain peptides using a new chiral resolution labeling reagent. *Anal Bioanal Chem* **414**, 4039–4046 (2022). <https://doi.org/10.1007/s00216-022-04048-w>

HPLC Application: DL-Amino Acid Separation (Protocol 1)

Separation is achieved for 19 DL-amino acids (glycine is achiral). Alternative selectivity is available with our Cholesterol column.



<Conditions>

Column: COSMOCORE 2.6C₁₈
2.1 mm I.D. × 100 mm

Mobile phase:

A: 0.1% Formic Acid - Acetonitrile / H₂O = 10 / 90

B: 0.1% Formic Acid - Acetonitrile / H₂O = 50 / 50

B conc. 0 → 10 → 60 → 100% (0 → 5 → 30 → 35 min)

Flow rate: 0.4 mL/min

Temperature: 40°C

Detection: ESI(+)-MS

Kit Components

	Name	PKG size	Required volume /assay
1	Sample* ¹	User-supplied	100 μL
2	Labeling solution* ²	10 mL	100 μL
3	Initiator solution	10 mL	100 μL
4	Delabeling solution (for side chain)* ³	10 mL	100 μL
5	Stop solution	User-supplied	100 μL
6	Methanol or acetonitrile	User-supplied	500 μL or 600 μL

*¹ Total amount of functional groups to be reacted should be less than 1.0 μmol. If higher, dilute or reduce sample amount.

*² Uses D-FDLDA as the labeling reagent.

*³ Contains 6-mercapto-1-hexanol [M.W.: 134.24 (C₆H₁₄OS)]

Protocols

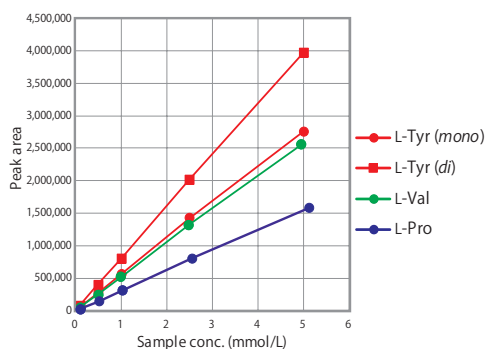
The labeling reagent reacts with amino groups. In addition, some side chains, such as the phenolic hydroxyl group of tyrosine and the thiol group of cysteine, are also labeled. Protocol 1 (step 2) achieves removal of labeling agents on side chains (except for Lys). Protocol 2 is a simplified procedure which leaves the additional side chains on, but histidine is left as a mixture of *mono* and *di* forms.

Detailed protocols are available in the product manual.

Quantitative Performance

● Calibration Curve

Different concentrations of amino acids labeled with this kit were analyzed by HPLC. The calibration curve shows high linearity over the tested concentrations.

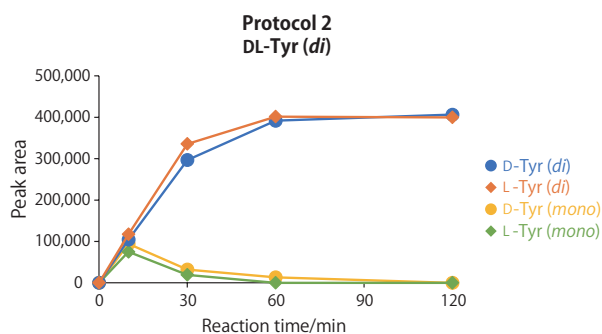
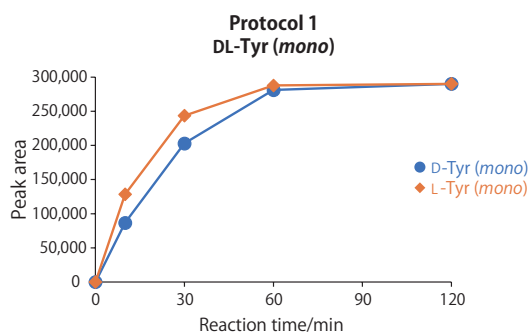


Labeling reaction

- Protocol 1 1 : L-Tyr (*mono*)
- Protocol 1 2 : L-Tyr (*di*), L-Val, L-Pro

● Labeling Reaction Progression

Tyrosine has different numbers of labeling reagents depending on the protocol used. Upon observing the labeling reaction, it was found that the amino acid was completely labeled 2 hours after starting the reaction.



Ordering Information

Product Name	Grade	Product Number	PKG Size
DL-Amino Acid Labeling Kit	SP	19942-74	100 tests

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
<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	17814-72	25 g
		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

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
1,1,1,3,3,3-Hexafluoro-2-propanol	SP	17814-72	25 g
		17814-14	100 g
		17814-85	500 g
Phosphoric Acid, Ortho	SP	08964-92	25 mL
Trifluoroacetic Acid	SP	34840-21	5×1 mL
		34840-76	5×1.5 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	31332-84	5×10 mL
Sodium 1-Decanesulfonate	SP	31429-34	5 g
		31429-92	25 g
Sodium 1-Dodecanesulfonate	SP	31426-64	5 g
Sodium 1-Heptanesulfonate	SP	31528-34	5 g
		31528-92	25 g
Sodium 1-Hexanesulfonate	SP	31529-24	5 g
		31529-82	25 g
Sodium Lauryl Sulfate [Sodium Dodecyl Sulfate;SDS]	SP	31623-32	25 g
		31623-45	500 g
Sodium 1-Octanesulfonate	SP	31729-04	5 g
		31729-62	25 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
		32926-84	5×10 mL

Labeling Reagents

Visible labeling Reagent

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

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 Direct Cartridge Holder 4.6mmI.D.	19989-71	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

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.

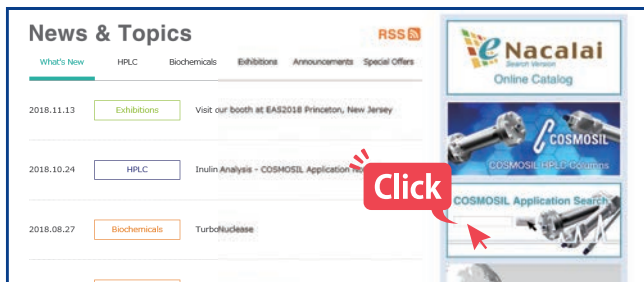
COSMOSIL Applications



COSMOSIL Applications has more than **8,000 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 **8,000** applications
- Easy to search



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

Search for Only show applications added since July 2018
 Only show applications using SFC columns

Sample Name contains (Keyword search)

CAS RN (ex:498-02-2)

Category (If no checkbox is clicked, the search will be performed in all categories.)

- Amino acids & derivatives
- Peptides & Proteins
- Nucleic acids & relative compounds
- Drugs & related compounds
- Antibiotics
- Vitamins
- Steroids
- Indoles

Column name (If no checkbox is clicked, the search will be performed in all columns.)

- C18-EB
- C18-PAQ
- PFP
- NPE
- C8-MS
- PE-MS
- Sugar-D
- AR-300
- Ph-AR-300
- Diol-1000
- Buckyprep
- PBB
- C18-MS-II
- COSMOCORE C18
- nNap
- PBr
- C4-MS
- SL-II
- NH2-MS
- C8-AR-300
- Diol-120
- IEX
- Buckyprep-D
- CNT
- C18-AR-II
- Cholesterol
- PYE
- CN-MS
- TMS-MS
- HILIC
- Protein-R
- C4-AR-300
- Diol-300
- HIC
- Buckyprep-M
- CHIRAL

SFC columns

- HP
- nMAX
- PY
- Diol

Particle Size ALL

Application No. (ex:AP-1206)

Result/Page 20

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

Search Result

Column PBr

[TOP] [Next]

Results 97 (1-20)

Data	Data Name	Particle Size	Column
	Sample		CAS RN
AP-1664	Isonicotinic Acid	5	PBr
	Isonicotinamide		1453-82-3
	Isonicotinic Acid (Pyridine-4-carboxylic Acid)		55-22-1
	Nicotinamide		98-92-0
	Nicotinic Acid		59-67-6
AP-1654	PFP x Fluorine ion-pairing reagent	5	C18-MS-II
			PBr
			PFP
	Benzyl Alcohol		100-51-6

COSMOSIL Applications

Image

COSMOSIL Application Data

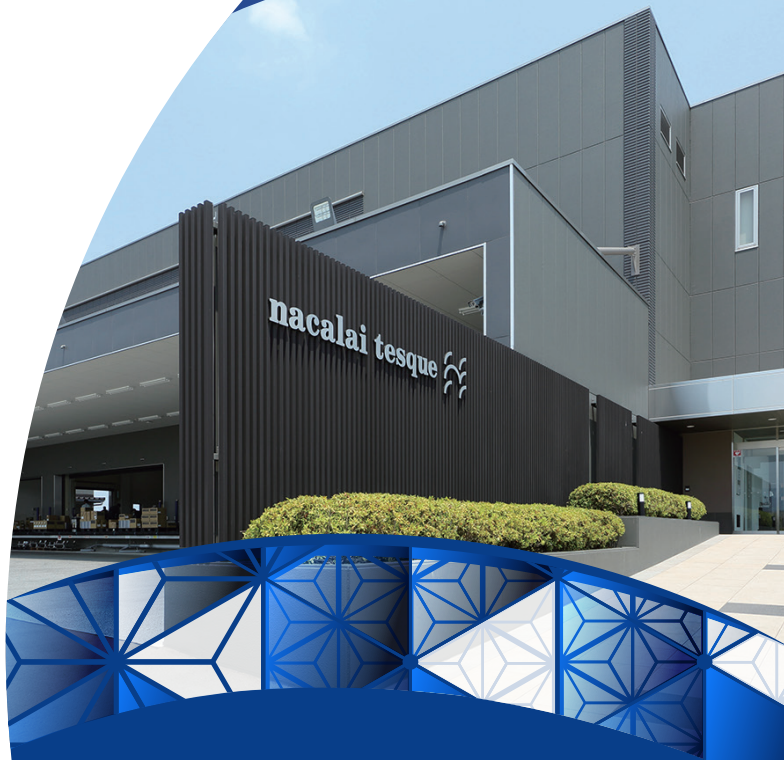
Column: COSMOSIL PBr
 Column size: 4.6mm I.D.-150mm
 Mobile phase: Methanol/ 10mmol/l Phosphate buffer(pH2.5)
 - 5/95
 Flow rate: 1.0 ml/min
 Temperature: 30°C
 Detection: UV254nm

Sample: 1: Isonicotinic Acid (Pyridine-4-carboxylic Acid) (0.5 mg/ml)
 2: Isonicotinamide (0.5 mg/ml)
 3: Nicotinic Acid (0.4 mg/ml)
 4: Nicotinamide (0.4 mg/ml)

Inj.Vol.: 1.0µl

click to enlarge

Data No. AP-1664



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

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