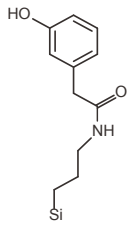
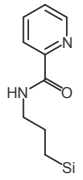
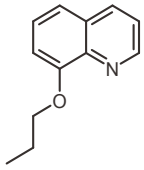
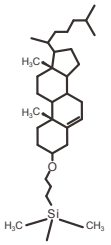
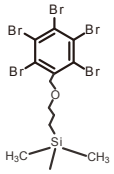
COSMOSIL SFC Columns

Supercritical Fluid Chromatography (SFC) has become more attractive because it offers some advantages over HPLC, such as high speed, unique selectivity and environmentally friendly separations. Many conventional normal-phase stationary phases, such as diol, amino and cyano, have been used for SFC applications. However, these phases present limitations for separations. COSMOSIL SFC Columns have been developed to enhance the capability of SFC separations.

COSMOSIL SFC Columns

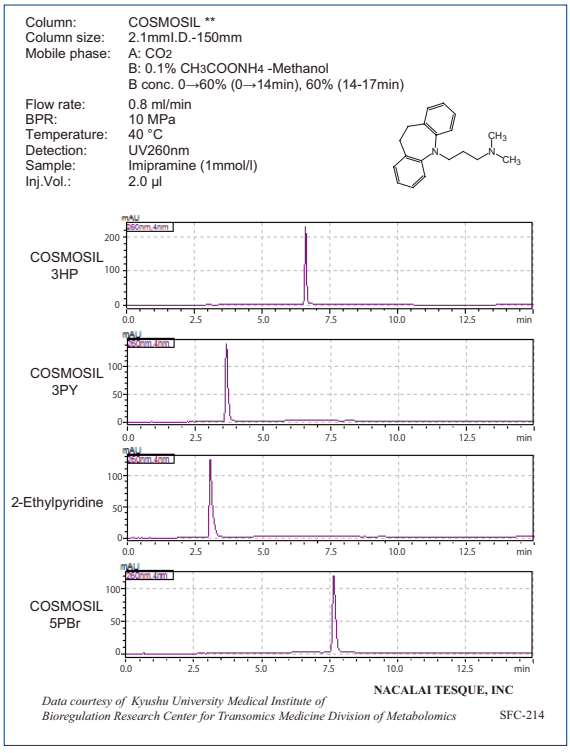
Nacalai Tesque has developed columns specially designed for SFC in collaboration with Nacalai USA and Pfizer, Inc. Global R&D: COSMOSIL HP, PY (equivalent to 2-ethylpyridine) and Quinoline. In addition to these, our HPLC columns Cholester and PBr have been tested for use with SFC.

Packing Material	HP	PY	Quinoline		Cholester		PBr
Particle Sizes	3, 5 µm		2.5 µm	5 µm	2.5 µm	5 µm	5 µm
Pore Sizes	120 Å		130 Å	120 Å	130 Å	120 Å	120 Å
Surface Area	300 m^2/g		330 m^2/g	300 m^2/g	330 m^2/g	300 m^2/g	300 m^2/g
Structure							
Stationary Phase	3-Hydroxyphenyl group	Pyridinyl group	Quinoline group		Cholesteryl group		Pentabromobenzyl group

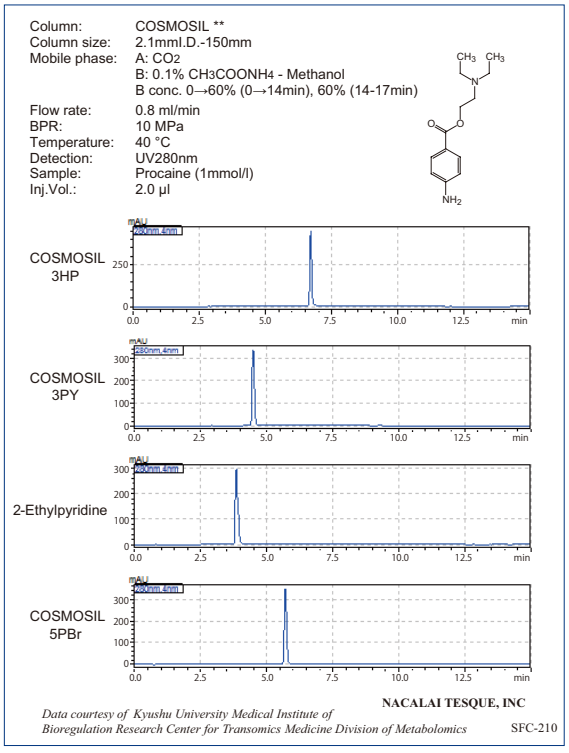
Pharmaceutical Analysis

Each phase has different retention properties.

Imipramine



Procaine

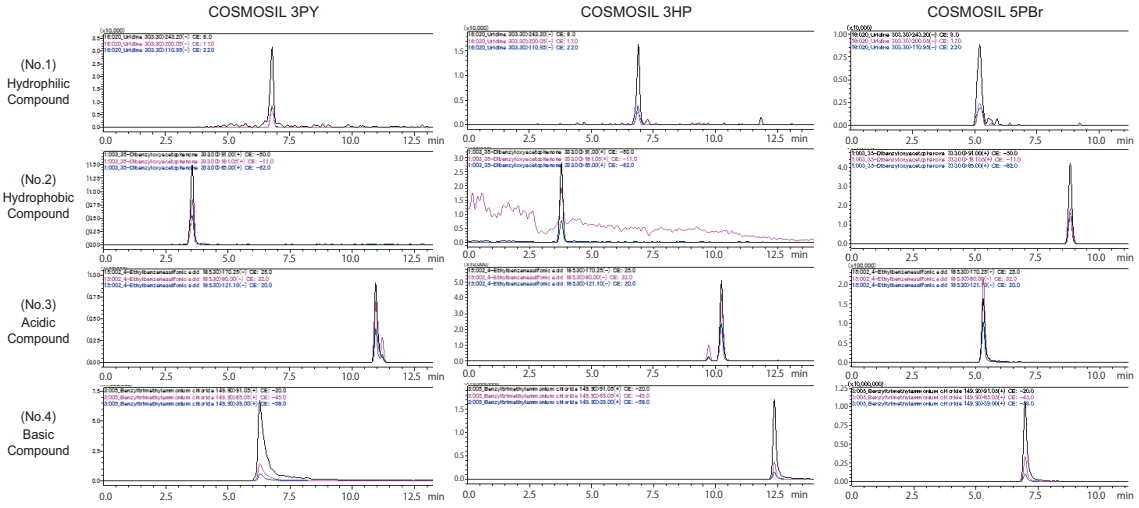


Comparison of Retention Behavior

The following three stationary phases were evaluated for their retention of hydrophilic, hydrophobic, acidic and basic compounds. COSMOSIL HP and PY elute hydrophobic compounds first and retain hydrophilic compounds longer, whereas PBr elutes in the reverse order, exhibiting high retention for hydrophobic compounds. HP had the longest retention for basic compounds.

Column: COSMOSIL **
Column size: 2.1mmI.D.-150mm
Mobile phase: A: CO_2
B: 0.1% CH_3COONH_4-Methanol
B conc. 0→50% (0→14min), 50% (14-17min)
Flow rate: 0.8 ml/min
BPR: 10 MPa
Temperature: 40 °C
Detection: ESI-MS/MS, MRM
Sample conc. 8 μmol/l
Inj.Vol.: 2.0 μl

Sample: No.1 Uridine; No.2 2; 3' ,5' - Dibenzyloxyacetophenone; No.3 3; 4-Ethylbenzenesulfonic Acid; No.4 Benzyltrimethyl ammonium

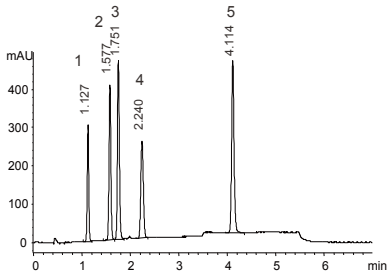


Data courtesy of Kyushu University Medical Institute of Bioregulation Research Center for Transomics Medicine Division of Metabolomics

NACALAI TESQUE, INC

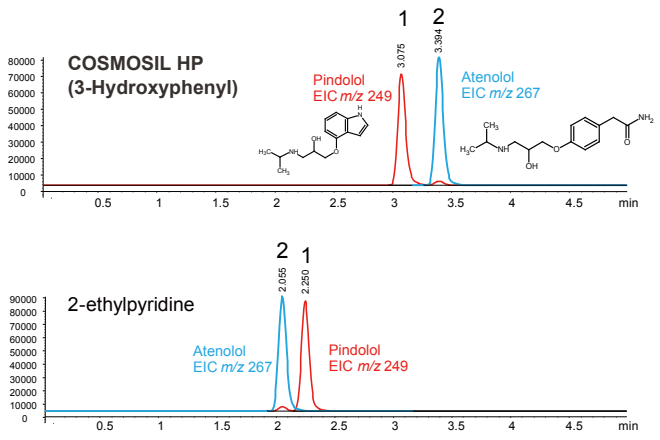
COSMOSIL HP(3-Hydroxyphenyl)

Application Data: Non-steroidal anti-inflammatory drugs



Column size: 4.6 mm I.D. x 150 mm
Mobile phase: Carbon Dioxide : Methanol
Gradient: 95:5 to 65:35 over 6 minutes
Flow rate: 5.0 ml/min
Temperature: 30°C
Detection: UV 230 nm
Sample: 1. Ibuprofen
2. Fenoprofen
3. Flurbiprofen
4. Ketoprofen
5. Indoprofen

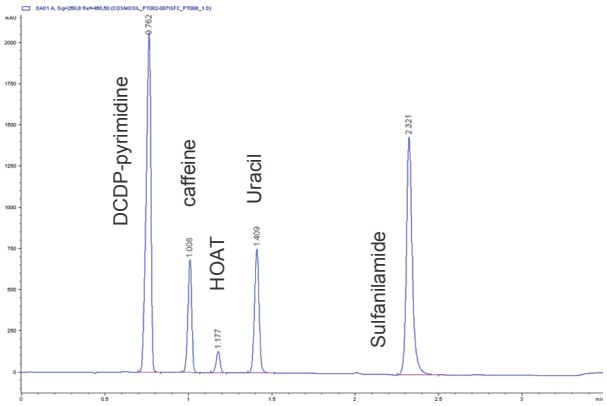
Application Data: Beta Blockers (Peak elution order reversal under identical conditions)



Column size: 4.6 mm I.D. x 150 mm
Mobile phase : Carbon Dioxide : Methanol w/20mM ammonium formate
Gradient: 95:5 to 50:50 over 4 minutes
Flow rate: 5.0 ml/min
Temperature: 30°C
Detection: APCI(+)
Sample: 1. Pindolol
2. Atenolol

COSMOSIL PY (Pyridinyl)

Application Data: Hydrophilic organics



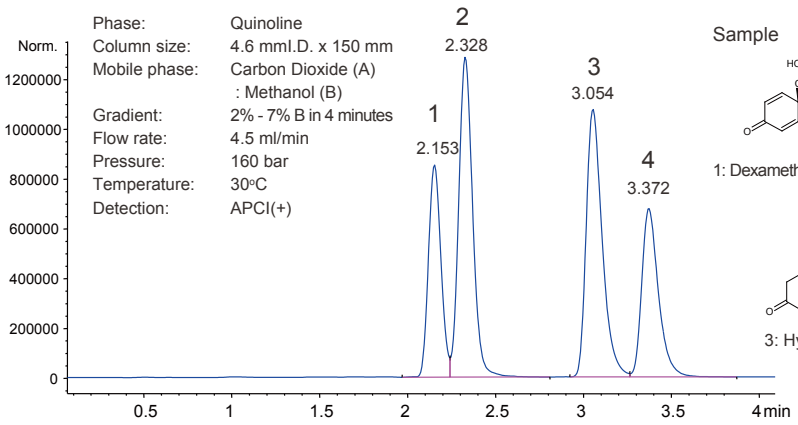
Phase:	Pyridinyl
Column size:	4.6 mm I.D. x 150 mm
Flow rate:	5.6 mL/min
Pressure	140 bar
Temperature:	Ambient
Mobile phase :	Methanol gradient 5-50% @18%/minute; hold @ 50% 0.1 min; return to 5% @99%/min

COSMOSIL Quinoline

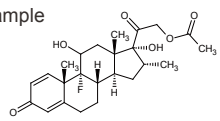
The structural similarities between polar lipids, such as cholesterol and related analogs, have posed chromatographic and spectrometric challenges to analysts interested in quantifying these potential biomarkers. COSMOSIL Quinoline has been developed to improve the separation of these structural isomers utilizing the π-π interactions and structural rigidity of the naphthylethyl phase and the hydrogen bonding of the pyridine phase.

Application Data: Steroids

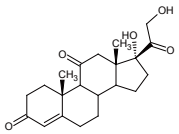
Phase:	Quinoline
Column size:	4.6 mmI.D. x 150 mm
Mobile phase:	Carbon Dioxide (A) : Methanol (B)
Gradient:	2% - 7% B in 4 minutes
Flow rate:	4.5 ml/min
Pressure:	160 bar
Temperature:	30°C
Detection:	APCI(+)



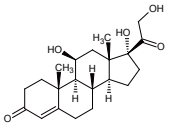
Sample



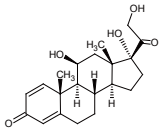
1: Dexamethasone-21-acetate



2: Cortisone

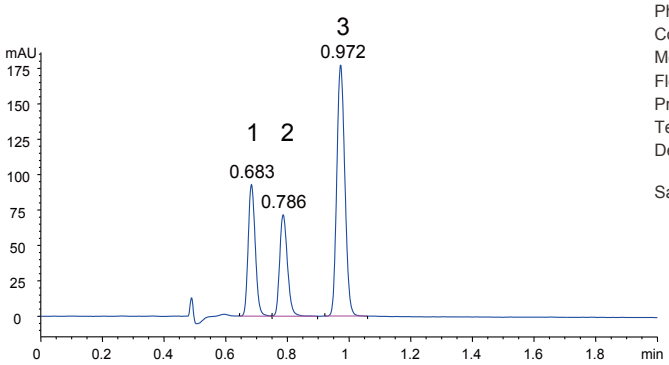


3: Hydrocortisone



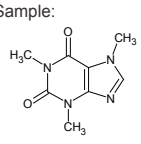
4: Prednisolone

Application Data: Caffeine analogs

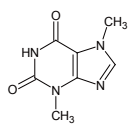


Phase:	Quinoline
Column size:	4.6 mmI.D. x 150 mm
Mobile phase:	Carbon Dioxide:Methanol = 95:5
Flow rate:	4.5 ml/min
Pressure:	160 bar
Temperature:	30°C
Detection:	UV 260 nm

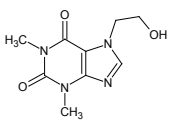
Sample:



1: Caffeine



2: Theobromine

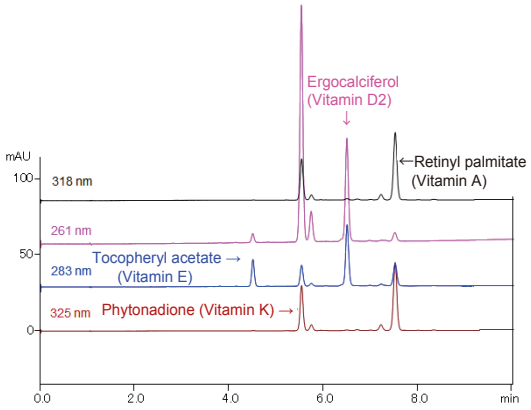


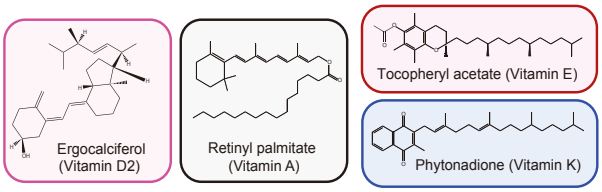
3: Etofylline

COSMOSIL Cholester

Fat-Soluble Vitamin Analysis

When used with SFC, COSMOSIL Cholester can separate fat-soluble vitamins and their impurities.





Column:	COSMOSIL 5Cholester
Column size:	4.6 mm I.D. x 250 mm
Mobile phase:	IPA in CO2
	IPA conc. 0→10%(0→10min),10%(10→12min)
Flow rate:	3.0 ml/min
BPR:	15 MPa
Temperature:	40ºC
Detection:	UV-VIS
Sample conc:	2.0 mg/ml
Inj. Vol:	1.0 µl

Data courtesy of Shimadzu Corporation

COSMOSIL Cholester exhibits strong retention for fat-soluble vitamins and is suitable for on-line SFE-SFC using Shimadzu's Nexera UC. The on-line extraction from food also produced triglyceride impurities, which were successfully separated from the vitamins.

Ordering Information

COSMOSIL HP (3-Hydroxyphenyl)

Product Name	Column Size (mm I.D. x mm)	Product No.
Packed Column (5 µm)	2.0 x 150	13787-91
	4.6 x 250	13788-81
	10.0 x 250	13789-71
	20.0 x 250	13790-31
Guard Column (5 µm)	10.0 x 20	13791-21
Packed Column (3 µm)	2.0 x 150	13792-11
	4.6 x 250	13793-01

COSMOSIL PY (Pyridinyl)

Product Name	Column Size (mm I.D. x mm)	Product No.
Packed Column (5 µm)	2.0 x 150	13818-81
	4.6 x 250	13827-61
	10.0 x 250	13828-51
	20.0 x 250	13829-41
Guard Column (5 µm)	10.0 x 20	13830-01
Packed Column (3 µm)	2.0 x 150	13831-91
	4.6 x 250	13832-81

COSMOSIL Quinoline

Product Name	Column Size (mm I.D. x mm)	Product No.
Packed Column (5 µm)	2.0 x 150	Inquire
	4.6 x 100	Inquire
	4.6 x 150	Inquire
	10.0 x 150	Inquire
	20.0 x 150	Inquire
Packed Column (2.5 µm)	3.0 x 50	Inquire
	3.0 x 100	Inquire
	3.0 x 150	Inquire

COSMOSIL Cholester

Product Name	Column Size (mm I.D. x mm)	Product No.
Packed Column (5 µm)	4.6 x 150	05976-61
	4.6 x 250	05977-51
	10.0 x 250	05979-31
	20.0 x 250	05982-71

COSMOSIL PBr

Product Name	Column Size (mm I.D. x mm)	Product No.
Packed Column (5 µm)	4.6 x 150	12394-61
	4.6 x 250	12395-51
	10.0 x 250	12397-31
	20.0 x 250	12398-21

Other sizes may be available. Please inquire.

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