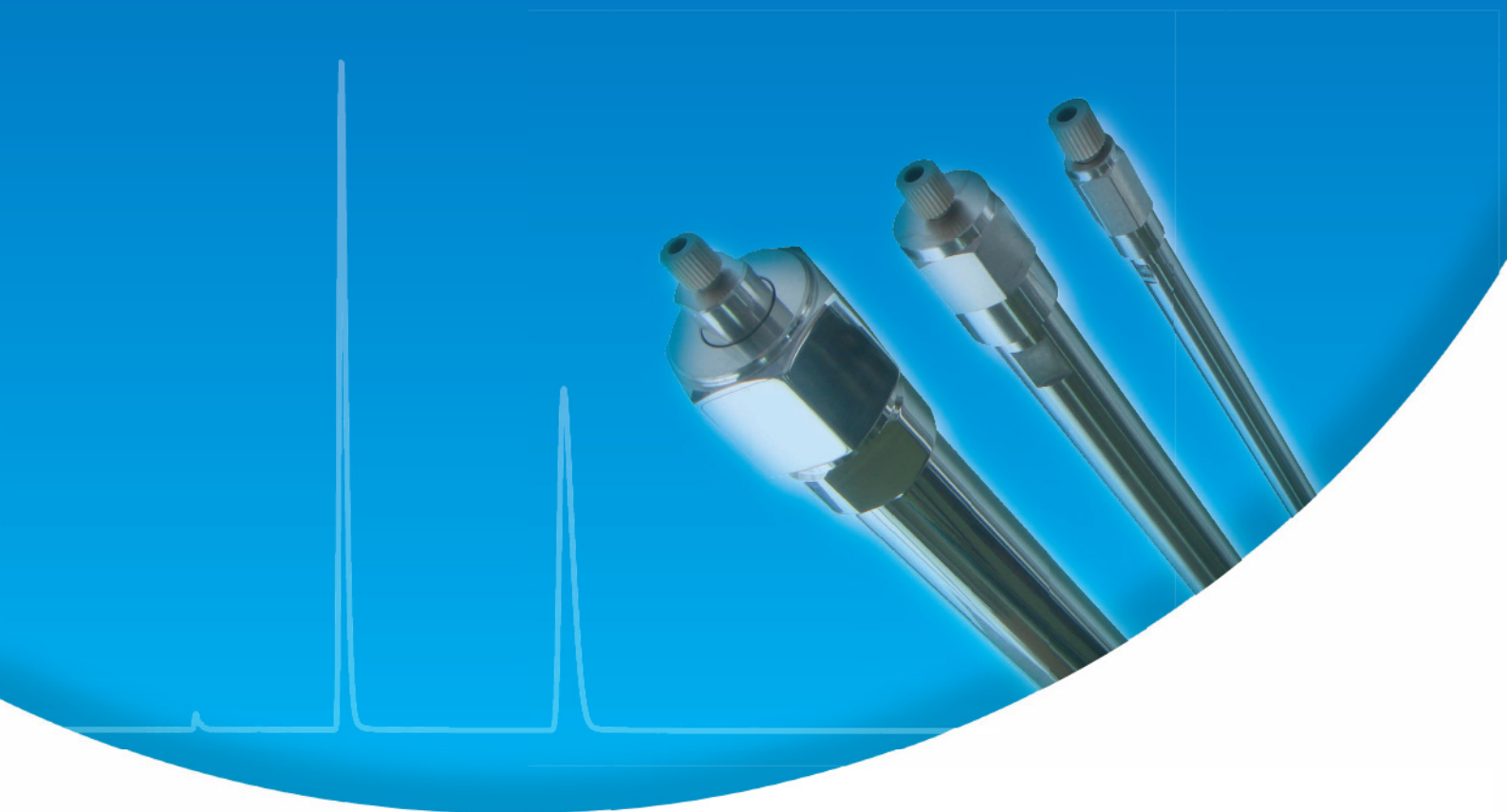




HPLC Columns



Chiral
Columns

Mixed-Mode
Columns

ODS
Columns

Guard
Columns

Other
Columns

Orders can be placed with your local TCI office or distributor:

You can find the list of our distributors and local offices, who can handle your inquiries and orders. Please consult your local TCI office or distributor for the details of our terms and conditions of sales.

If you can't find a distributor in your country, please contact TCI Global Business Department directly.

○ **TOKYO CHEMICAL INDUSTRY CO., LTD.**

Global Business Department

4-10-2, Nihonbashi-Honcho, Chuo-ku, Tokyo 103-0023, Japan

Tel : +81-3-5640-8878

Fax : +81-3-5640-8902

E-mail : globalbusiness@tokyokasei.co.jp

○ **TCI distributors / TCI local offices**

The business names and contact details are listed on page 56 to 57.

Please provide the following information:

● **Product Number**

The product number consists of one letter and four digits.

● **Quantity**

Please specify the number of columns required.

Please consult us if you cannot find the column you require in this catalog.

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Chiral Columns TCI Chiral

New type of chiral separation with synthetic organic polymer phase systems – “TCI Chiral”

1. A unique new stationary phase

Polymaleimide helical polymer bearing chiral side groups coated on silica gel

2. Suitable for separation of a wide range of compounds

Carbonyls (Ketones, Esters, Carboxylic acids, *N*-Protected amino acids), Alcohols and others

3. Applicable to both normal and reversed phase modes

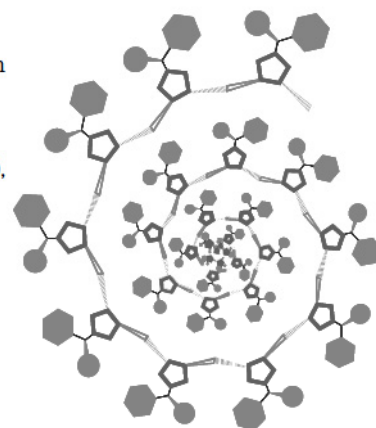
4. High column load capacity

5. Superior column longevity

Maximum pressure: 2900 psi (20 MPa)

6. High throughput analysis

7. Affordable prices



■ Product Line

Column	TCI Chiral MB-S	TCI Chiral BP-S	TCI Chiral CH-S
Structure of chiral phase			
Retention Power (Normal Phase)	High	Medium	Weak
Analytes	Low Polarity	Moderate Polarity	High Polarity
	Carbonyls (Amides, Esters, Ketones, Lactones, Carboxylic acids, <i>N</i> -Protected amino acids), Alcohols, Diols, Sulfonyls and others *Please refer to page 8 “TCI Chiral Applications”.		
Page	5	6	7

■ Mobile Phase Protocol

Our chiral columns can be used for both normal phase and reversed phase chromatography. In most cases, reversed phase is rarely the first choice, normal phase is generally the best choice to start with. Reversed phase is suitable for LC-MS applications or aqueous conditions.

<Normal Phase>

n-Hexane / 2-Propanol = 90 / 10 (initial condition)

- Elution time is long ⇒ Increase 2-Propanol ratio (ex. 30%)
- Elution time is short ⇒ Decrease 2-Propanol ratio (ex. 1%)
- Acidic compound ⇒ Add 0.1% of Trifluoroacetic Acid
- Basic compound ⇒ Add 0.1% of Diethylamine

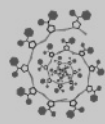
<Reversed Phase>

Acetonitrile / Water = 20 / 80 (initial condition)

- Elution time is long ⇒ Increase acetonitrile ratio (ex. 40%)
- Elution time is short ⇒ Decrease acetonitrile ratio (ex. 10%)
- Acidic compound ⇒ Add 0.1% of Trifluoroacetic acid
- Basic compound ⇒ Add buffer solution

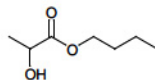
*Unusable solvents

- Tetrahydrofuran, Toluene, and halogenated solvents (Chloroform, etc.)



Normal and Reversed Phase Applications

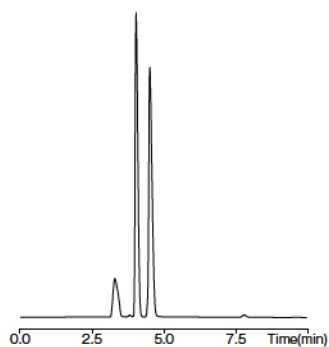
Column Size : 4.6 mm I.D. × 250 mm Sample : Butyl Lactate
Detection : UV 210 nm
Flow Rate : 1.0 mL/min
Temperature : 40 °C



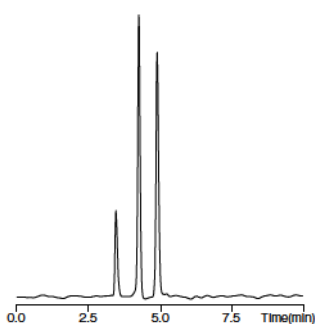
<Normal Phase>

n-Hexane / 2-Propanol = 70 / 30 (TCI Chiral MB-S), 90 / 10 (TCI Chiral BP-S and TCI Chiral CH-S)

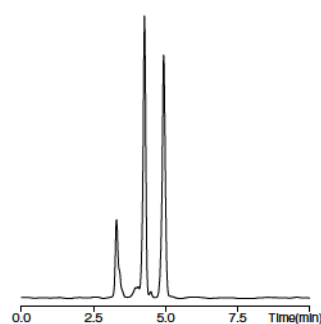
TCI Chiral MB-S (3 μm)



TCI Chiral BP-S (3 μm)



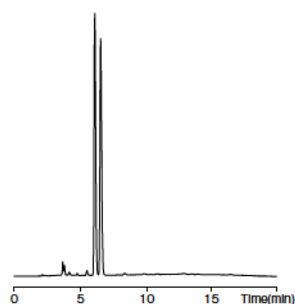
TCI Chiral CH-S (3 μm)



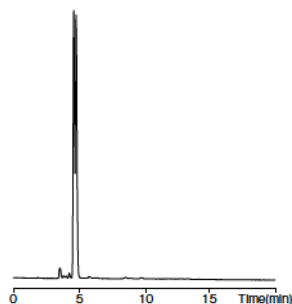
<Reversed Phase>

Acetonitrile / Water = 10 / 90

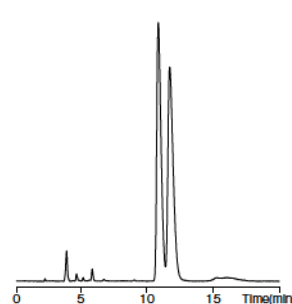
TCI Chiral MB-S (5 μm)



TCI Chiral BP-S (5 μm)



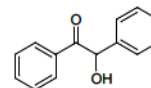
TCI Chiral CH-S (5 μm)



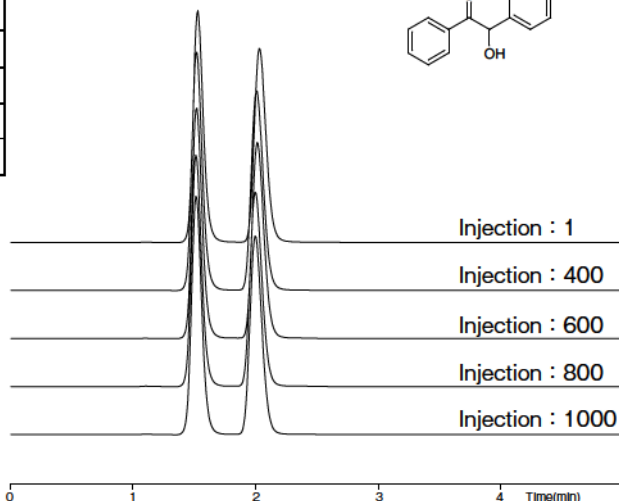
Stability Test

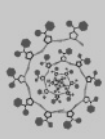
Injection	α	R_s
1	2.13	2.41
400	2.14	2.35
600	2.13	2.32
800	2.12	2.30
1000	2.12	2.29

Sample : Benzoin



Column : TCI Chiral BP-S (3 μm)
Column Size : 4.6 mm I.D. × 50 mm
Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
Detection : UV 254 nm
Flow Rate : 0.7 mL/min
Temperature : 40 °C



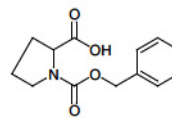


Loading Tests

A wide chiral-recognition region in the polymer stationary phase provides high loading capacity.

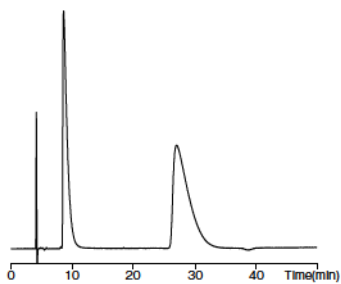
Column : TCI Chiral MB-S (5 μm)
 Mobile Phase : *n*-Hexane / 2-Propanol / TFA = 90 / 10 / 0.1
 Detection : UV 254 nm
 Temperature : 40 °C

Sample : *N*-Cbz-proline



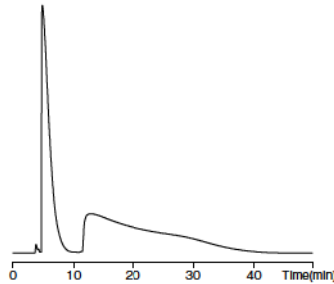
<Analysis>

Column Size : 4.6 mm I.D. × 250 mm
 Flow Rate : 1.0 mL/min
 Sample Load : 0.05 mg



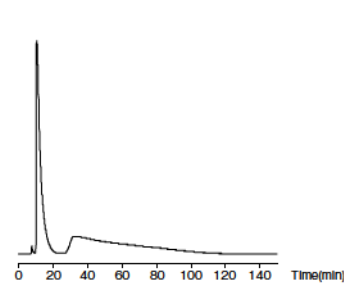
<Loading test by Analytical column>

Column Size : 4.6 mm I.D. × 250 mm
 Flow Rate : 1.0 mL/min
 Sample Load : 20 mg



<Loading test by Prep column>

Column Size : 20.0 mm I.D. × 250 mm
 Flow Rate : 9.0 mL/min
 Sample Load : 400 mg

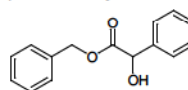


High Throughput Screening

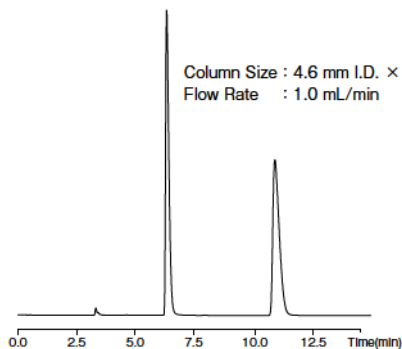
Rapid screening within one minute can be achieved by a combination of short column length and high flow rate.

Column : TCI Chiral MB-S (3 μm)
 Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
 Detection : UV 254 nm
 Temperature : 40 °C

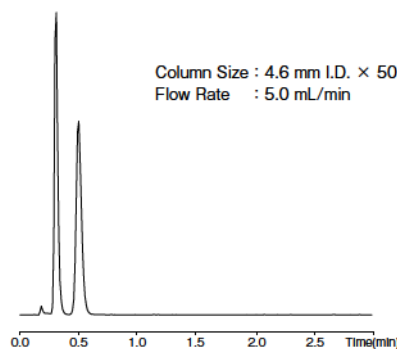
Sample : Benzyl *DL*-Mandelate



Column Size : 4.6 mm I.D. × 250 mm
 Flow Rate : 1.0 mL/min



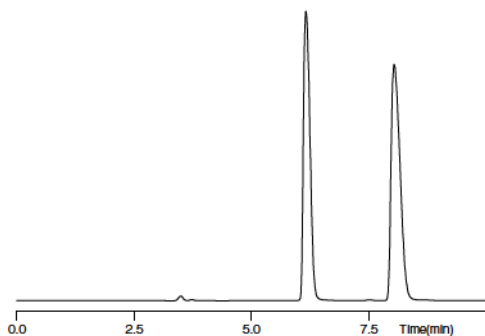
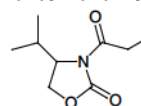
Column Size : 4.6 mm I.D. × 50 mm
 Flow Rate : 5.0 mL/min



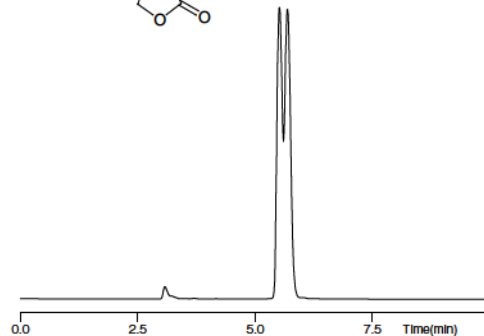
Application Comparison of TCI Chiral and Amylose-based (Natural Polymer) Columns

Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

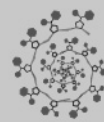
Sample : 4-Isopropyl-3-propionyl-2-oxazolidinone



TCI Chiral CH-S
(Synthetic Polymer Phase)



Amylose Type Column
(Natural Polymer Phase)



TCI Chiral MB-S

TCI Chiral MB-S covers the widest range of application and could be your first choice among three series of TCI Chiral. This series is suitable for separation of low polarity compounds.

- Retention Power (Normal Phase) : **TCI Chiral MB-S** > TCI Chiral BP-S > TCI Chiral CH-S
- Analytes : Carbonyls (Ketones, Esters, Lactones, Carboxylic acids, Amides, Lactams, Amino acid derivatives), mono-Alcohols, Diols, Ethers, Epoxides, Heterocycles and Sulfoxides

Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
3 μm	2.0 × 50	S3816
	2.0 × 150	S3812
	2.0 × 250	S3813
	4.6 × 50	S3815
	4.6 × 150	S3810
	4.6 × 250	S3811

Guard column information: Please see page 49.

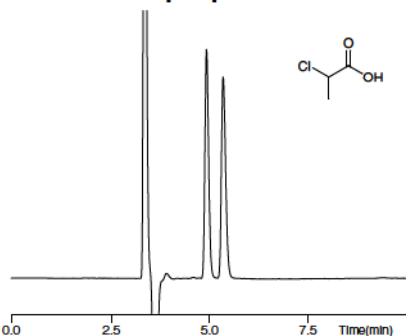
Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
5 μm	2.0 × 50	S3846
	2.0 × 150	S3842
	2.0 × 250	S3843
	4.6 × 50	S3845
	4.6 × 150	S3840
	4.6 × 250	S3841
	10.0 × 35	S3872
	10.0 × 250	S3870
	20.0 × 250	S3871

Guard column information: Please see page 49.

Applications

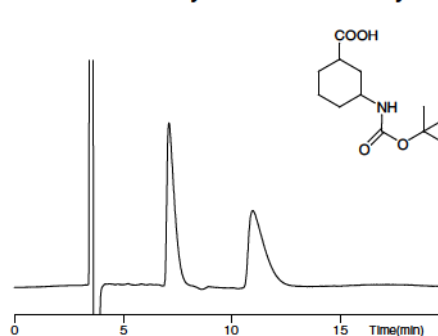
More applications: please see pages 8 ~ 22.

2-Chloropropionic Acid



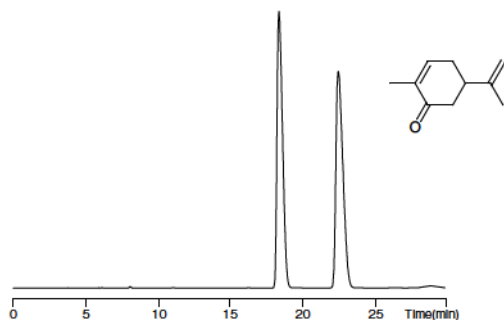
Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

cis-*N*-Boc-3-Aminocyclohexanecarboxylic Acid



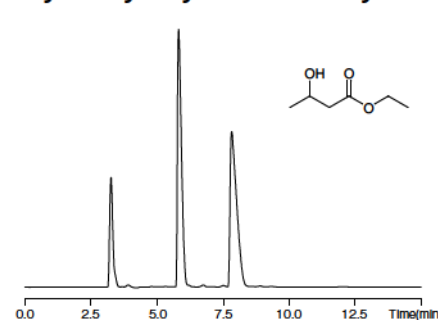
Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 5 μL (10 mg/mL)

Carvone



Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : Acetonitrile / Water = 20 / 80
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

3-Hydroxybutyric Acid Ethyl Ester



Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 5 μL (10 mg/mL)



TCI Chiral BP-S

Compared with MB-S, BP-S columns produce narrow peaks in many cases and are suitable for moderate polarity compounds.

- Retention Power (Normal Phase) : TCI Chiral MB-S > TCI Chiral BP-S > TCI Chiral CH-S
- Analytes : Carbonyls (Ketones, Esters, Lactones, Carboxylic acids, Amides, Lactams), mono-Alcohols, Diols, Ethers, Epoxides and Sulfoxides

Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
3 μm	2.0 × 50	S3826
	2.0 × 150	S3822
	2.0 × 250	S3823
	4.6 × 50	S3825
	4.6 × 150	S3820
	4.6 × 250	S3821

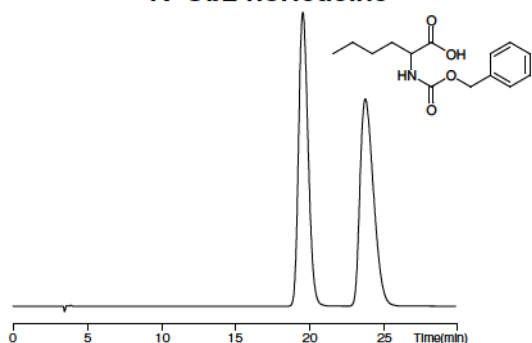
Guard column information: Please see page 49.

Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
5 μm	2.0 × 50	S3856
	2.0 × 150	S3852
	2.0 × 250	S3853
	4.6 × 50	S3855
	4.6 × 150	S3850
	4.6 × 250	S3851
	10.0 × 35	S3882
	10.0 × 250	S3880
	20.0 × 250	S3881

Guard column information: Please see page 49.

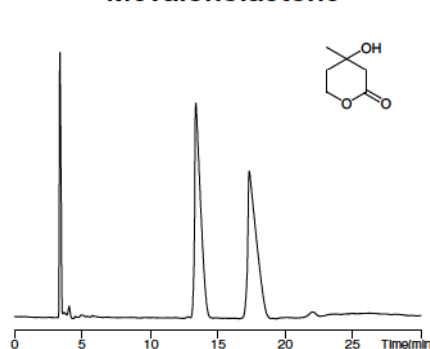
Applications

N-Cbz-norleucine



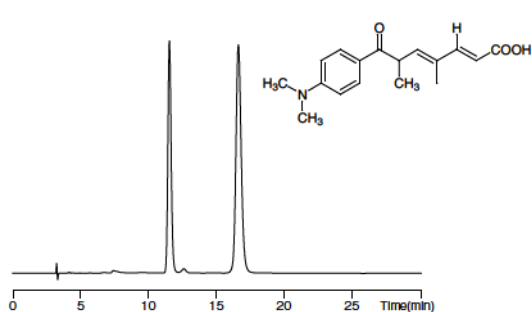
Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : Acetonitrile / Water / TFA = 10 / 90 / 0.1
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

Mevalonolactone



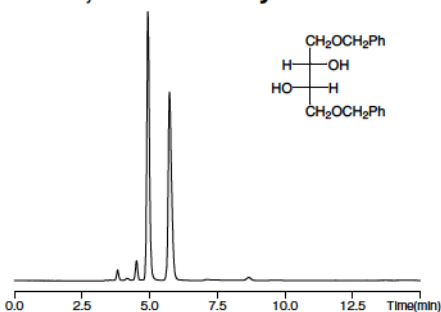
Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 5 μL (10 mg/mL)

Trichostatic Acid



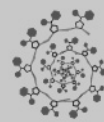
Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol / TFA = 90 / 10 / 0.1
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (1 mg/mL)

1,4-Di-O-benzylthreitol



Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol = 90 / 10
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

More applications: please see pages 8 ~ 22.



TCI Chiral CH-S

Compared with MB-S, CH-S columns produce narrow peaks in many cases and are suitable for high polarity compounds.

- Retention Power (Normal Phase) : TCI Chiral MB-S > TCI Chiral BP-S > **TCI Chiral CH-S**
- Analytes : Carbonyls (Ketones, Esters, Lactones, Carboxylic Acids, Amides, Lactams, Amino Acid Derivatives), Diols and Heterocycles

Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
3 μm	2.0 × 50	S3836
	2.0 × 150	S3832
	2.0 × 250	S3833
	4.6 × 50	S3835
	4.6 × 150	S3830
	4.6 × 250	S3831

Guard column information: Please see page 49.

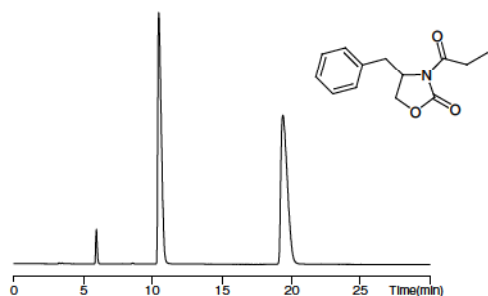
Particle Size	Inside Diameter(mm)×Length(mm)	Product No.
5 μm	2.0 × 50	S3866
	2.0 × 150	S3862
	2.0 × 250	S3863
	4.6 × 50	S3865
	4.6 × 150	S3860
	4.6 × 250	S3861
	10.0 × 35	S3892
	10.0 × 250	S3890
	20.0 × 250	S3891

Guard column information: Please see page 49.

Applications

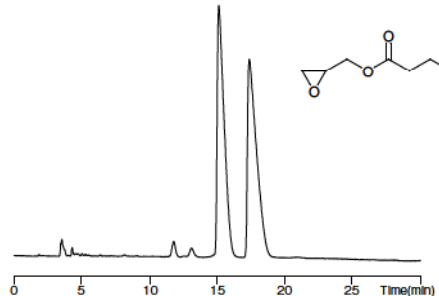
More applications: please see pages 8 ~ 22.

4-Benzyl-3-propionyl-2-oxazolidinone



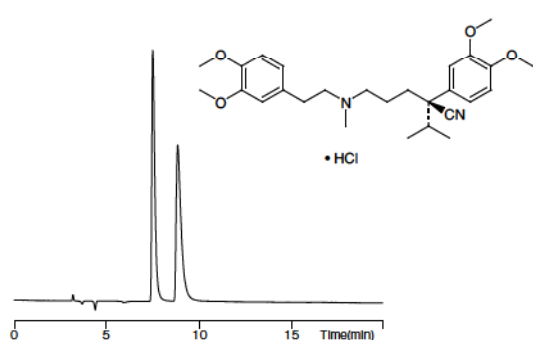
Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol = 70 / 30
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

Glycidyl Butyrate



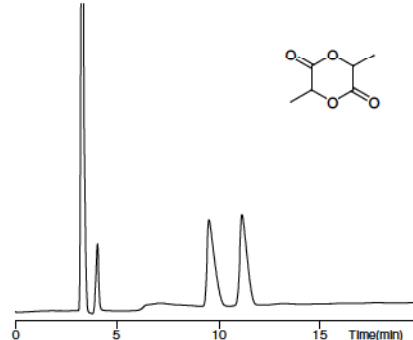
Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : Acetonitrile / Water = 10 / 90
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

Verapamil Hydrochloride



Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol / Diethylamine = 90 / 10 / 0.1
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 1 μL (10 mg/mL)

DL-Lactide



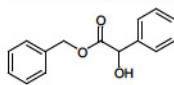
Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm
 Mobile Phase : *n*-Hexane / 2-Propanol = 80 / 20
 Detection : RI
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C
 Sample Size : 10 μL (10 mg/mL)

TCl Chiral Applications

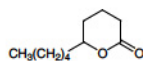
<Index of Functional Groups>

Esters & Lactones

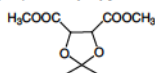
Benzyl Mandelate



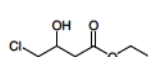
δ -Decanolactone



Dimethyl 2,3-*O*-isopropylidene Tartrate



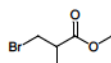
Ethyl 4-Chloro-3-hydroxybutyrate



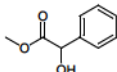
δ -Hexanolactone



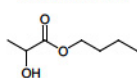
Methyl 3-Bromo-2-methylpropionate



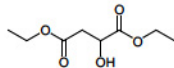
Methyl Mandelate



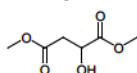
Butyl Lactate



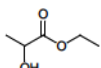
Diethyl Malate



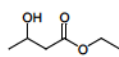
Dimethyl Malate



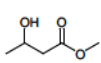
Ethyl Lactate



3-Hydroxybutyric Acid Ethyl Ester



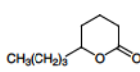
Methyl 3-Hydroxybutyrate



Mevalonolactone



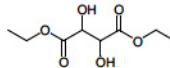
δ -Nonanolactone



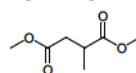
2-Chloropropionic Acid Ethyl Ester



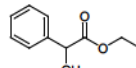
Diethyl Tartrate



Dimethyl Methylsuccinate



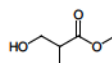
Ethyl Mandelate



α -Hydroxy- γ -butyrolactone



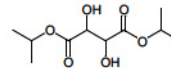
Methyl 3-Hydroxyisobutyrate



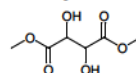
2-Chloropropionic Acid Methyl Ester



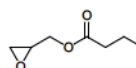
Diisopropyl Tartrate



Dimethyl Tartrate



Glycidyl Butyrate



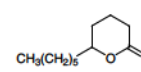
DL-Lactide



Methyl Lactate

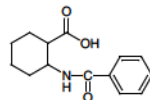


δ -Undecanolactone

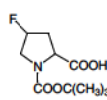


Carboxylic Acids

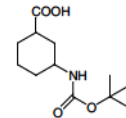
cis-2-Benzamidocyclohexanecarboxylic Acid



1-Boc-4-fluoro-2-pyrrolidinecarboxylic Acid



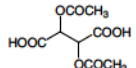
cis-*N*-Boc-3-Aminocyclohexanecarboxylic Acid



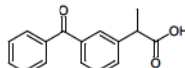
2-Chloropropionic Acid



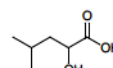
Diacetyltartaric Acid



Ketoprofen



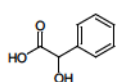
Leucic Acid



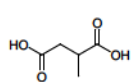
2-Bromopropionic Acid



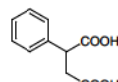
Mandelic Acid



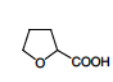
Methylsuccinic Acid



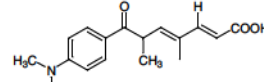
Phenylsuccinic Acid



Tetrahydrofuran-2-carboxylic Acid

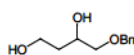


Trichostatic Acid

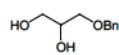


Alcohols & Phenols

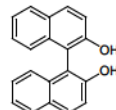
4-Benzyloxy-1,3-butanediol



3-Benzyloxy-1,2-propanediol



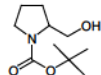
1,1'-Bi-2-naphthol



1-Boc-2-azetidinemethanol



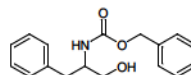
N-Boc-prolinol



3-Butyn-2-ol



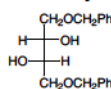
N-Cbz-phenylalaninol



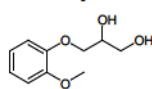
1,2-Cyclohexanediol



1,4-Di-*O*-benzylthreitol



Guaiacol Glycerol Ether



Phenylethylene Glycol

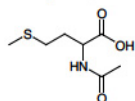
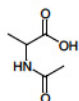
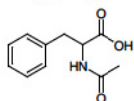
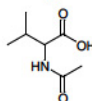
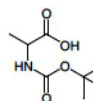
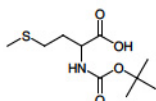
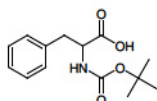
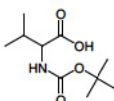
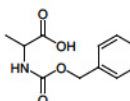
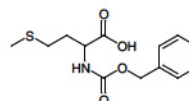
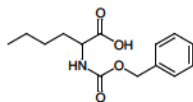
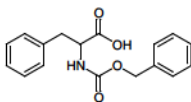
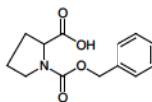
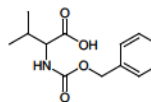
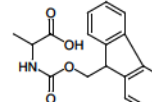
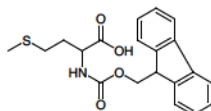
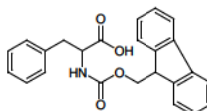
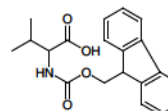


1-Phenyl-2-propyn-1-ol

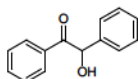
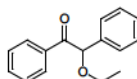
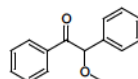
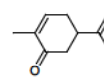
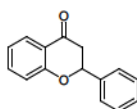
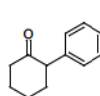
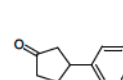




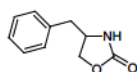
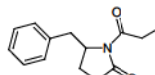
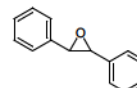
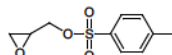
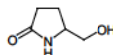
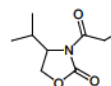
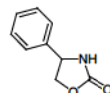
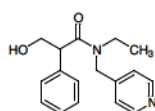
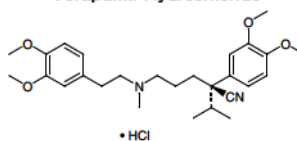
N-Protected Amino Acids

N-Acetylmethionine**N-Acetylalanine****N-Acetylphenylalanine****N-Acetylvaline****N-Boc-alanine****N-Boc-methionine****N-Boc-phenylalanine****N-Boc-valine****N-Cbz-alanine****N-Cbz-methionine****N-Cbz-norleucine****N-Cbz-phenylalanine****N-Cbz-proline****N-Cbz-valine****N-Fmoc-alanine****N-Fmoc-methionine****N-Fmoc-phenylalanine****N-Fmoc-valine**

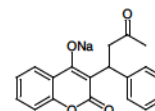
Ketones

Benzoin**Benzoin Ethyl Ether****Benzoin Methyl Ether****Carvone****Flavanone****2-Phenylcyclohexanone****3-Phenylcyclopentanone**

Others

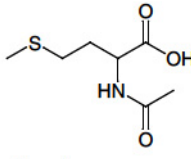
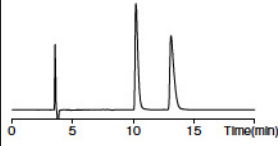
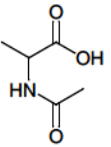
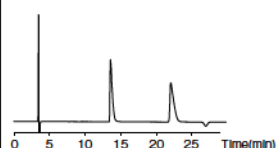
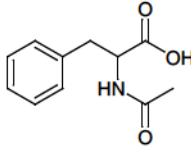
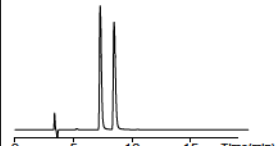
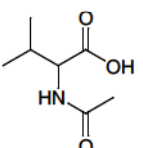
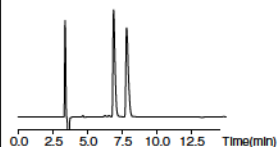
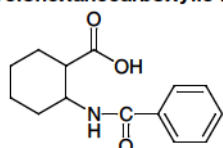
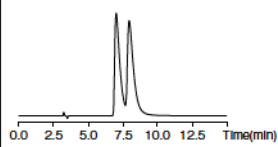
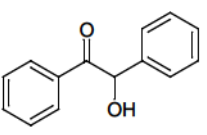
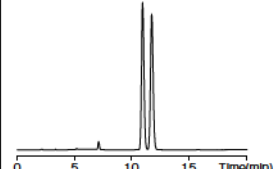
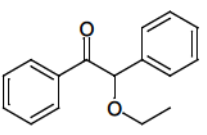
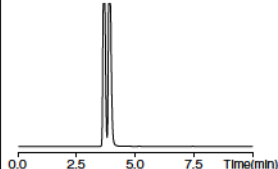
4-Benzyl-2-oxazolidinone**4-Benzyl-3-propionyl-2-oxazolidinone****trans-Stilbene Oxide****Glycidyl p-Toluenesulfonate****5-(Hydroxymethyl)-2-pyrrolidinone****4-Isopropyl-3-propionyl-2-oxazolidinone****Methyl Phenyl Sulfoxide****4-Phenyl-2-oxazolidinone****Phenyl Vinyl Sulfoxide****Tropicamide****Verapamil Hydrochloride**

• HCl

Warfarin Sodium

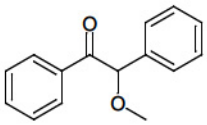
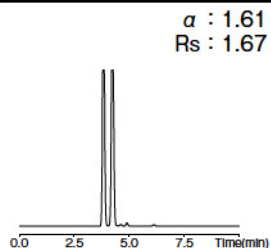
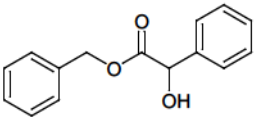
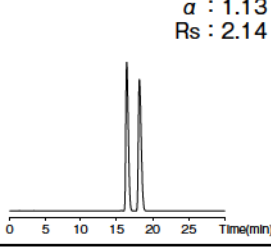
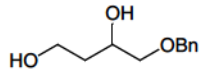
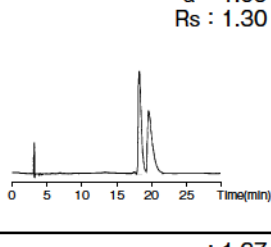
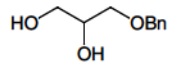
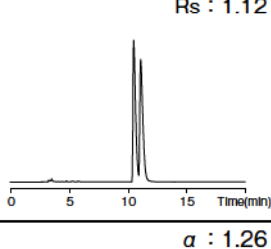
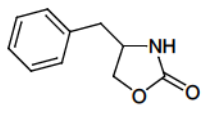
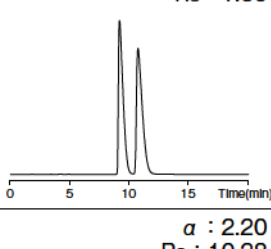
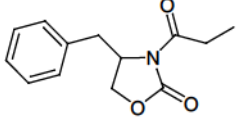
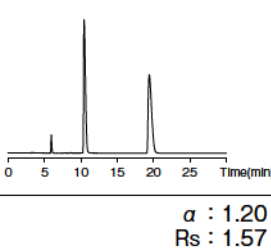
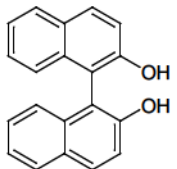
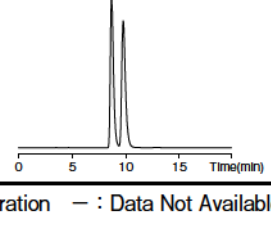


< A – B > Compounds are listed in alphabetical order.

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
N-Acetylmethionine  Functional group : N-Protected Amino Acids	N P R P	○ –	– –	○ –	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.43 Rs : 4.69
N-Acetylalanine  Functional group : N-Protected Amino Acids	N P R P	○ –	○ –	○ –	Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.88 Rs : 8.88
N-Acetylphenylalanine  Functional group : N-Protected Amino Acids	N P R P	○ –	○ –	○ –	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.29 Rs : 3.19
N-Acetylvaline  Functional group : N-Protected Amino Acids	N P R P	○ –	○ –	○ –	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.26 Rs : 2.56
cis-2-Benzamido-cyclohexanecarboxylic Acid  Functional group : Carboxylic Acids	N P R P	○ –	× –	× –	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.24 Rs : 1.10
Benzoin  Functional group : Ketones	N P R P	○ ○	○ ○	○ ×	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.10 Rs : 1.60
Benzoin Ethyl Ether  Functional group : Ketones	N P R P	○ –	○ –	× –	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	 α : 1.42 Rs : 0.93

NP : Normal Phase RP : Reversed Phase ○ : Baseline Separation ○ : Separation × : No Separation – : Data Not Available

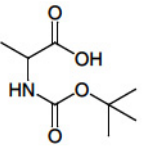
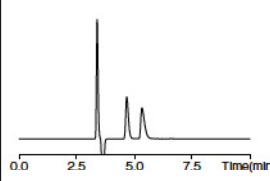
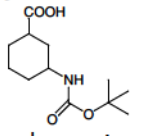
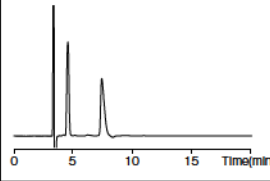
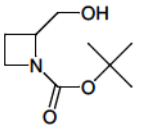
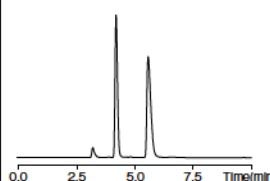
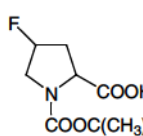
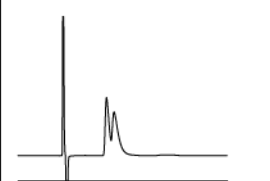
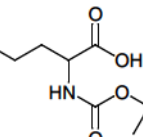
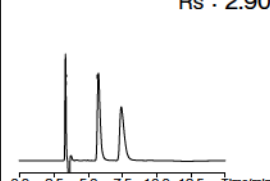
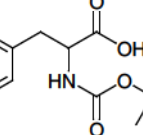
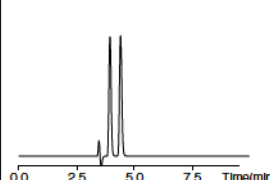
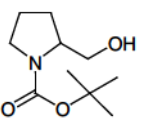
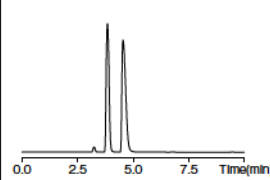

< B >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
Benzoin Methyl Ether  Functional group : Ketones	NP RP	● ○	● ○	× ×	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.61 Rs : 1.67 
Benzyl Mandelate  Functional group : Esters and Lactones	NP RP	● ●	● ○	● ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.13 Rs : 2.14 
4-Benzyloxy-1,3-butanediol  Functional group : Alcohols	NP RP	● -	- -	- -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 97.5 / 2.5 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.09 Rs : 1.30 
3-Benzyloxy-1,2-propanediol  Functional group : Alcohols	NP RP	○ -	- -	- -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 95 / 5 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.27 Rs : 1.12 
4-Benzyl-2-oxazolidinone  Functional group : Others	NP RP	● ●	× ×	× ×	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.26 Rs : 1.60 
4-Benzyl-3-propionyl-2-oxazolidinone  Functional group : Others	NP RP	● ●	○ ●	● ×	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 70 / 30 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 2.20 Rs : 10.28 
1,1'-Bi-2-naphthol  Functional group : Phenols	NP RP	○ -	● -	× -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 100 / 1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.20 Rs : 1.57 

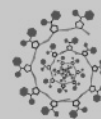
NP : Normal Phase RP : Reversed Phase ● : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

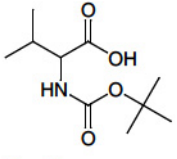
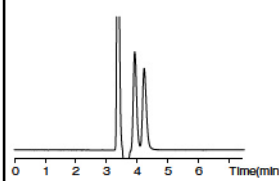
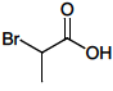
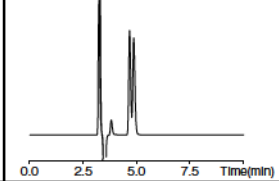
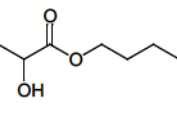
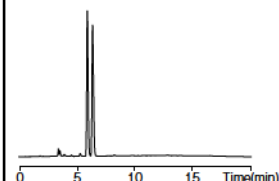
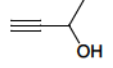
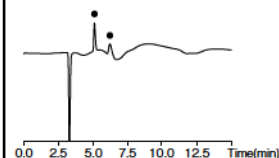
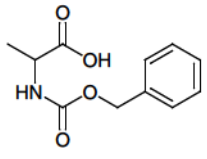
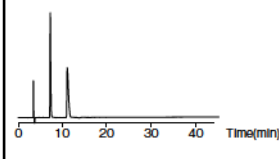
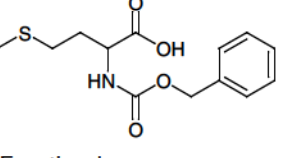
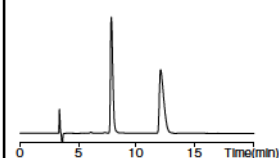
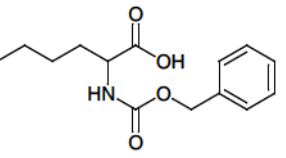
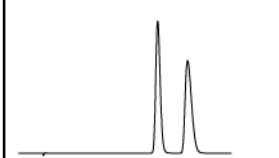


< B >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
<i>N</i>-Boc-alanine  Functional group : <i>N</i> -Protected Amino Acids	NP RP	⊙ -	⊙ -	× -	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.47 R_s : 2.07 
<i>cis</i>-<i>N</i>-Boc-3-aminocyclohexane carboxylic Acid  Functional group : Carboxylic Acids	NP RP	⊙ -	⊙ -	○ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 3.15 R_s : 5.33 
1-Boc-2-azetidinemethanol  Functional group : Alcohols	NP RP	⊙ -	○ -	○ -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 3 μL (10 mg/mL)	α : 2.31 R_s : 2.81 
1-Boc-4-fluoro-2-pyrrolidinecarboxylic Acid  Functional group : Carboxylic Acids	NP RP	○ -	× -	○ -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.17 R_s : 0.69 
<i>N</i>-Boc-methionine  Functional group : <i>N</i> -Protected Amino Acids	NP RP	⊙ -	- -	⊙ -	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.64 R_s : 2.90 
<i>N</i>-Boc-phenylalanine  Functional group : <i>N</i> -Protected Amino Acids	NP RP	⊙ -	⊙ -	○ -	Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.78 R_s : 2.07 
<i>N</i>-Boc-prolinol  Functional group : Alcohols	NP RP	⊙ -	○ -	× -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 2.13 R_s : 1.65 

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available


< B - C >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
N-Boc-valine  Functional group : N-Protected Amino Acids	NP RP	○ -	○ -	- -	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.40 Rs : 1.13 
2-Bromopropionic Acid  Functional group : Carboxylic Acids	NP RP	○ -	○ -	× -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.12 Rs : 0.82 
Butyl Lactate  Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ○	⊙ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.17 Rs : 1.56 
3-Butyn-2-ol  Functional group : Alcohols	NP RP	⊙ -	- -	- -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 95 / 5 Detection : RI Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 1.57 Rs : 2.96 
N-Cbz-alanine  Functional group : N-Protected Amino Acids	NP RP	⊙ ○	⊙ ○	⊙ ×	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.95 Rs : 6.29 
N-Cbz-methionine  Functional group : N-Protected Amino Acids	NP RP	⊙ -	- -	⊙ -	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.92 Rs : 6.56 
N-Cbz-norleucine  Functional group : N-Protected Amino Acids	NP RP	⊙ ○	⊙ ⊙	⊙ ×	Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water / TFA = 10 / 90 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.26 Rs : 2.57 

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

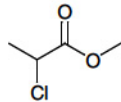
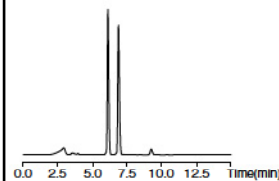
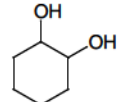
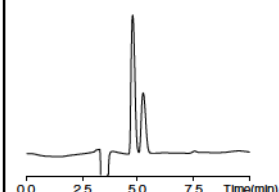
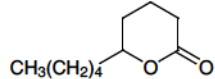
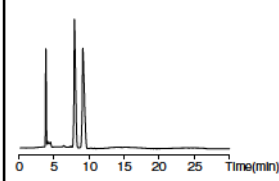
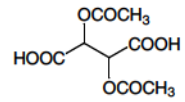
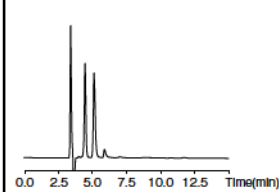
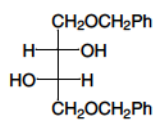
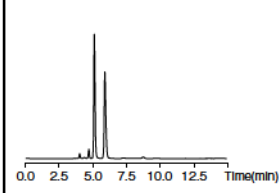
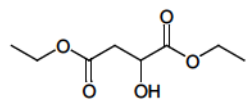
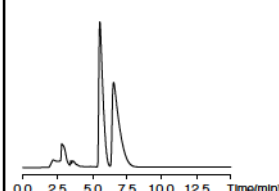
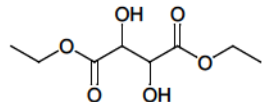
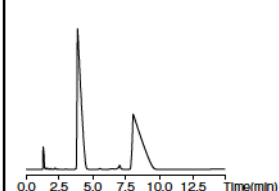


< C >

Compound	TCI Chiral			Application	
	MB-S	BP-S	CH-S		
N-Cbz-phenylalanine Functional group : N-Protected Amino Acids	N P	⊙	⊙	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water / TFA = 20 / 80 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.19 Rs : 2.29
	R P	⊙	⊙		
N-Cbz-phenylalaninol Functional group : Alcohols	N P	⊙	○	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.27 Rs : 1.67
	R P	—	—		
N-Cbz-proline Functional group : N-Protected Amino Acids	N P	⊙	⊙	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 80 / 20 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	 α : 2.58 Rs : 3.40
	R P	—	—		
N-Cbz-valine Functional group : N-Protected Amino Acids	N P	⊙	⊙	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.53 Rs : 2.83
	R P	—	—		
Carvone Functional group : Ketones	N P	⊙	⊙	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.36 Rs : 1.22
	R P	⊙	⊙		
2-Chloropropionic Acid Functional group : Carboxylic Acids	N P	⊙	○	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.25 Rs : 1.76
	R P	—	—		
2-Chloropropionic Acid Ethyl Ester Functional group : Esters and Lactones	N P	⊙	○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	 α : 1.26 Rs : 3.48
	R P	⊙	○		

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation — : Data Not Available


< C - D >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
2-Chloropropionic Acid Methyl Ester  Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ×	⊙ ×	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.28 Rs : 3.00 
1,2-Cyclohexanediol  Functional group : Alcohols	NP RP	⊙ -	- -	- -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol = 90 / 10 Detection : RI Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 1.32 Rs : 1.19 
δ-Decanolactone  Functional group : Esters and Lactones	NP RP	⊙ -	⊙ -	⊙ -	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.29 Rs : 2.84 
Diacyltartaric Acid  Functional group : Carboxylic Acids	NP RP	⊙ -	⊙ -	⊙ -	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.57 Rs : 2.30 
1,4-Di-O-benzylthreitol  Functional group : Alcohols	NP RP	⊙ -	⊙ -	⊙ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.40 Rs : 2.50 
Diethyl Malate  Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ⊙	⊙ ⊙	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 5 / 95 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.45 Rs : 1.15 
Diethyl Tartrate  Functional group : Esters and Lactones	NP RP	⊙ -	⊙ -	⊙ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 2.49 Rs : 7.53 

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

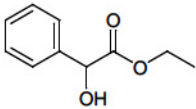
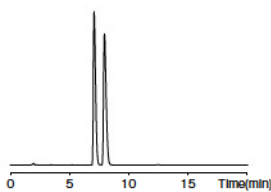
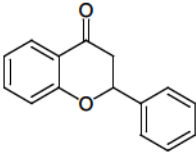
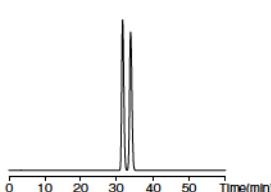
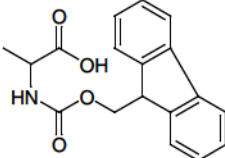
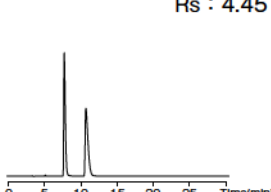
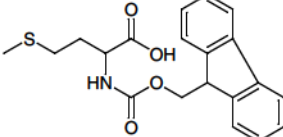
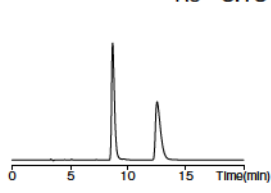
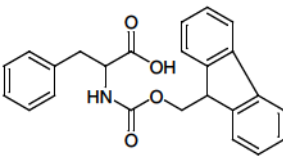
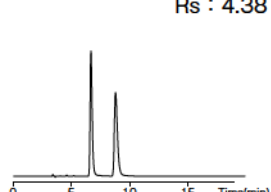
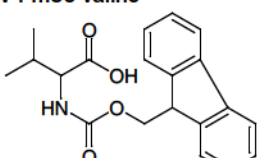
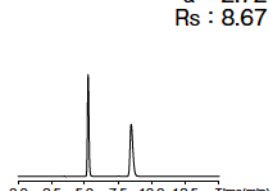
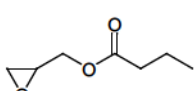
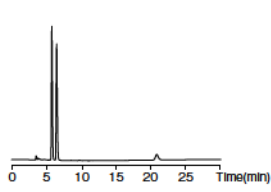


< D – E >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
Diisopropyl Tartrate Functional group : Esters and Lactones	NP RP	○ —	⊙ —	○ —	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 2.29 R_s : 6.30
Dimethyl 2,3-O-Isopropylidene Tartrate Functional group : Esters and Lactones	NP RP	○ —	⊙ —	○ —	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.16 R_s : 1.53
Dimethyl Malate Functional group : Esters and Lactones	NP RP	⊙ —	⊙ —	⊙ —	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.60 R_s : 3.08
Dimethyl Methylsuccinate Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ○	⊙ —	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.21 R_s : 2.06
Dimethyl Tartrate Functional group : Esters and Lactones	NP RP	⊙ —	⊙ —	○ —	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.51 R_s : 5.21
Ethyl 4-Chloro-3-hydroxybutyrate Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ○	⊙ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 5 / 95 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.27 R_s : 1.48
Ethyl Lactate Functional group : Esters and Lactones	NP RP	⊙ —	⊙ —	⊙ —	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.56 R_s : 2.44

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation — : Data Not Available

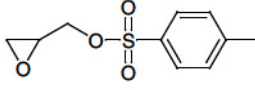
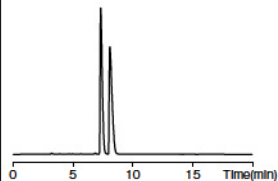


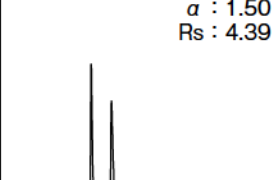


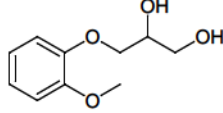
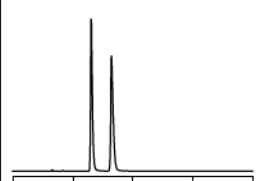


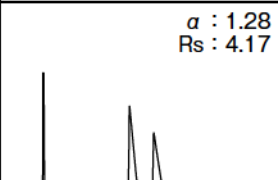


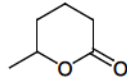
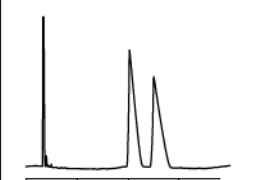


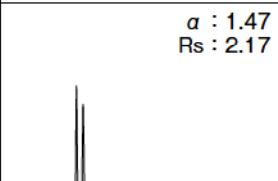


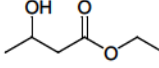
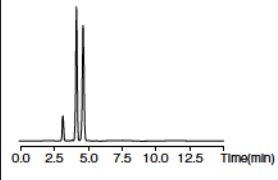


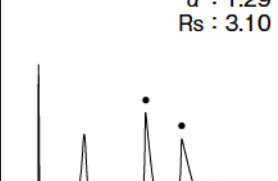



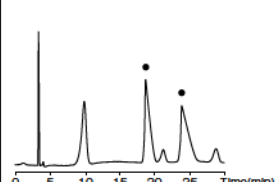


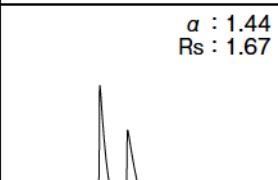


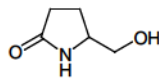
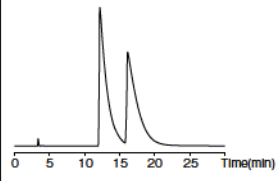


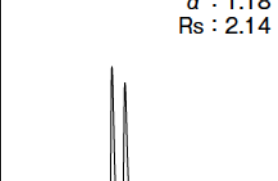


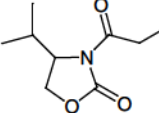
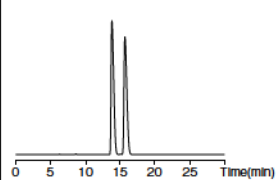


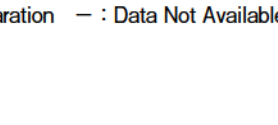



< E - G >

Compound	TCI Chiral			Application	
	MB-S	BP-S	CH-S		
Ethyl Mandelate  Functional group : Esters and Lactones	NP RP	⊙ ○	⊙ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.22 Rs : 1.89 
Flavanone  Functional group : Ketones	NP RP	× ⊙	○ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 30 / 70 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.08 Rs : 1.61 
N-Fmoc-alanine  Functional group : N-Protected Amino Acids	NP RP	⊙ -	⊙ -	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.64 Rs : 4.45 
N-Fmoc-methionine  Functional group : N-Protected Amino Acids	NP RP	⊙ -	⊙ -	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.70 Rs : 5.15 
N-Fmoc-phenylalanine  Functional group : N-Protected Amino Acids	NP RP	⊙ -	⊙ -	Column : TCI Chiral CH-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.62 Rs : 4.38 
N-Fmoc-valine  Functional group : N-Protected Amino Acids	NP RP	⊙ -	⊙ -	Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : n-Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 2.72 Rs : 8.67 
Glycidyl Butyrate  Functional group : Esters and Lactones	NP RP	⊙ ⊙	⊙ ⊙	Column : TCI Chiral BP-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.27 Rs : 2.04 

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

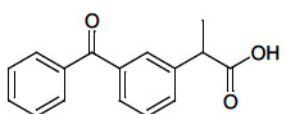
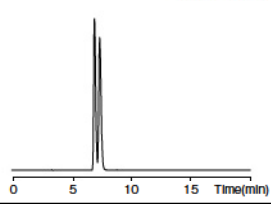
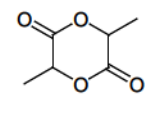
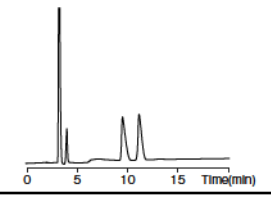
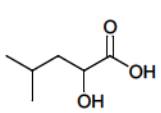
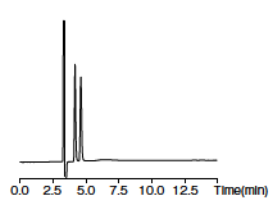
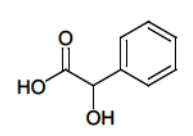
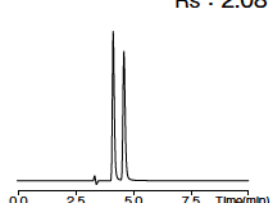
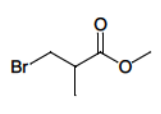
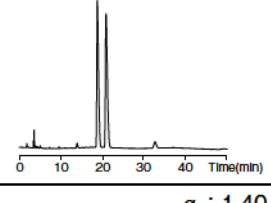
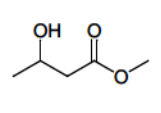
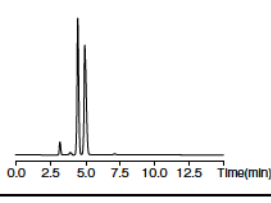
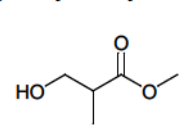
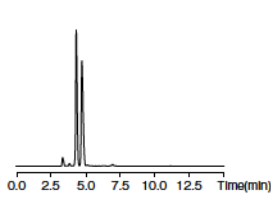


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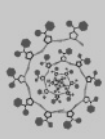
Compound	TCI Chiral			Application	
	MB-S	BP-S	CH-S		
Glycidyl <i>p</i>-Toluenesulfonate  Functional group : Others	NP 			Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.18 R_s : 1.61
	RP 				
Guaiacol Glycerol Ether  Functional group : Alcohols	NP 			Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.50 R_s : 4.39
	RP 				
δ-Hexanolactone  Functional group : Esters and Lactones	NP 			Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 1.28 R_s : 4.17
	RP 				
3-Hydroxybutyric Acid Ethyl Ester  Functional group : Esters and Lactones	NP 			Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.47 R_s : 2.17
	RP 				
α-Hydroxy-γ-butyrolactone  Functional group : Esters and Lactones	NP 			Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.29 R_s : 3.10
	RP 				
5-(Hydroxymethyl)-2-pyrrolidinone  Functional group : Others	NP 			Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.44 R_s : 1.67
	RP 				
4-Isopropyl-3-propionyl-2-oxazolidinone  Functional group : Others	NP 			Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.18 R_s : 2.14
	RP 				

NP : Normal Phase RP : Reversed Phase ● : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

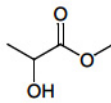
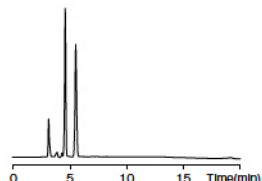
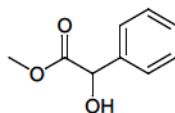
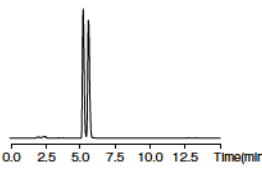
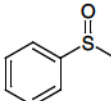
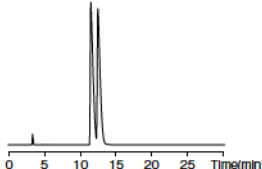
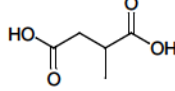
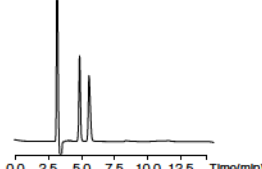
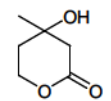
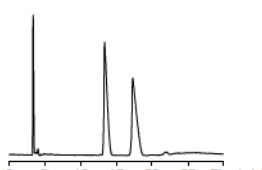
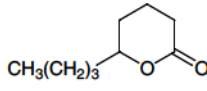
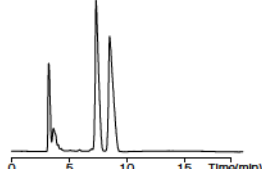
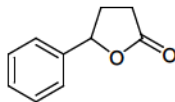
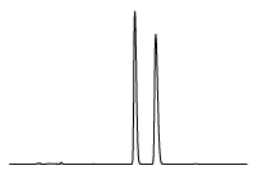

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Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
Ketoprofen  Functional group : Carboxylic Acids	NP RP	○ –	○ –	× –	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 90 / 10 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.21 Rs : 1.08 
DL-Lactide  Functional group : Esters and Lactones	NP RP	– –	– –	◎ –	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 80 / 20 Detection : RI Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 1.25 Rs : 1.98 
Leucic Acid  Functional group : Carboxylic Acids	NP RP	◎ –	◎ –	◎ –	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.45 Rs : 1.91 
Mandelic Acid  Functional group : Carboxylic Acids	NP RP	◎ –	◎ –	◎ –	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 90 / 10 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.48 Rs : 2.08 
Methyl 3-Bromo-2-methylpropionate  Functional group : Esters and Lactones	NP RP	○ ◎	× ×	○ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.13 Rs : 2.12 
Methyl 3-Hydroxybutyrate  Functional group : Esters and Lactones	NP RP	◎ –	◎ –	◎ –	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.40 Rs : 2.05 
Methyl 3-Hydroxyisobutyrate  Functional group : Esters and Lactones	NP RP	◎ –	◎ –	○ –	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.45 Rs : 2.28 

NP : Normal Phase RP : Reversed Phase ◎ : Baseline Separation ○ : Separation × : No Separation – : Data Not Available



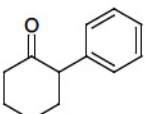
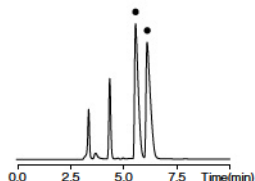
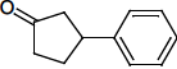
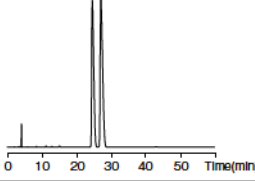
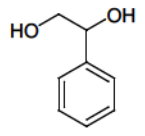
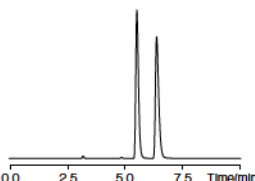
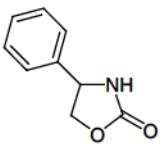
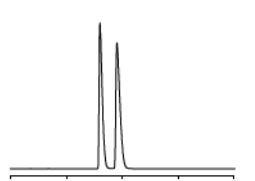
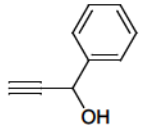
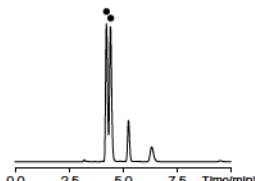
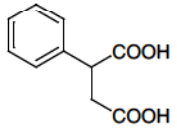
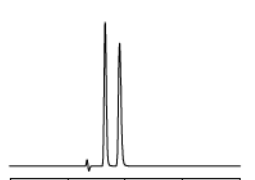
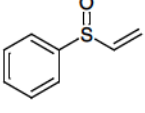
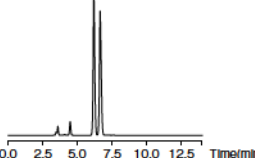
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Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
Methyl Lactate  Functional group : Esters and Lactones	NP RP	○ -	○ -	○ -	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.63 R_s : 3.28 
Methyl Mandelate  Functional group : Esters and Lactones	NP RP	○ ○	○ ○	- -	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.18 R_s : 1.27 
Methyl Phenyl Sulfoxide  Functional group : Others	NP RP	○ -	× -	× -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.12 R_s : 1.10 
Methylsuccinic Acid  Functional group : Carboxylic Acids	NP RP	○ -	○ -	○ -	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 95 / 5 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.40 R_s : 2.30 
Mevalonolactone  Functional group : Esters and Lactones	NP RP	○ -	○ -	○ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.34 R_s : 3.94 
δ-Nonanolactone  Functional group : Esters and Lactones	NP RP	○ ○	○ ○	○ ○	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	α : 1.27 R_s : 2.75 
γ-Phenyl-γ-butyrolactone  Functional group : Esters and Lactones	NP RP	○ ○	○ ○	○ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.24 R_s : 3.27 

NP : Normal Phase RP : Reversed Phase ○ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available



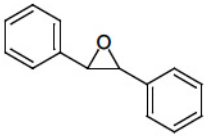
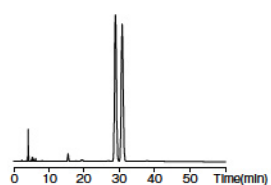
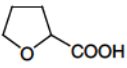
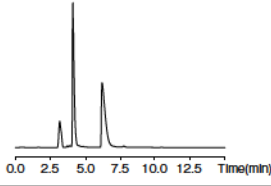
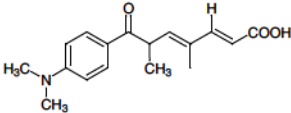
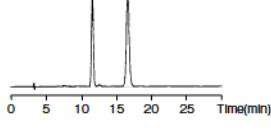
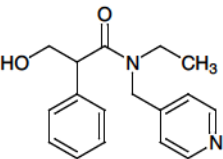
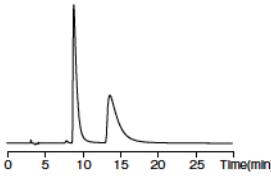
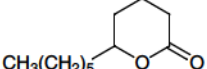
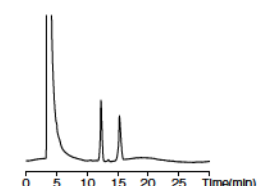
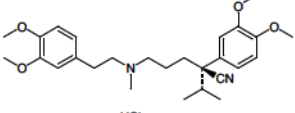
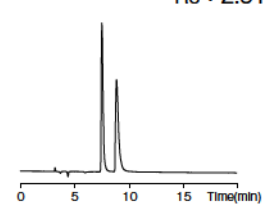
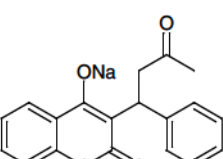
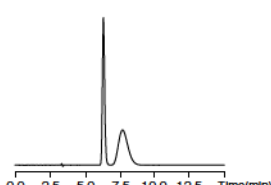
< P >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
2-Phenylcyclohexanone  Functional group : Ketones	NP RP	⊙ ○	× -	○ ○	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 5 μL (10 mg/mL)	α : 1.22 R_s : 1.23 
3-Phenylcyclopentanone  Functional group : Ketones	NP RP	⊙ ⊙	○ ○	○ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 20 / 80 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.12 R_s : 1.69 
Phenylethylene Glycol  Functional group : Alcohols	NP RP	⊙ -	○ -	○ -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.36 R_s : 2.87 
4-Phenyl-2-oxazolidinone  Functional group : Others	NP RP	⊙ ⊙	× ×	⊙ ○	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 10 / 90 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.31 R_s : 2.13 
1-Phenyl-2-propyn-1-ol  Functional group : Alcohols	NP RP	○ -	× -	× -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.17 R_s : 0.80 
Phenylsuccinic Acid  Functional group : Carboxylic Acids	NP RP	⊙ -	⊙ -	○ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 90 / 10 / 0.1 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	α : 1.67 R_s : 2.60 
Phenyl Vinyl Sulfoxide  Functional group : Others	NP RP	× ○	⊙ ○	× ×	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	α : 1.15 R_s : 1.60 

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

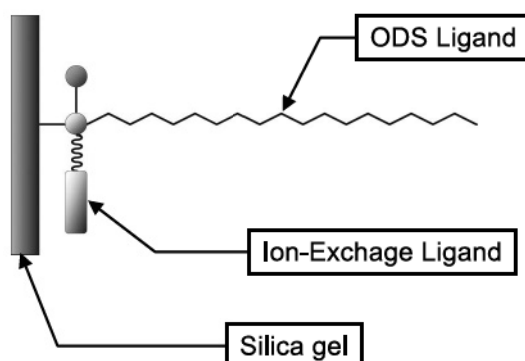
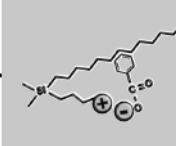


< S - W >

Compound	TCI Chiral			Application		
	MB-S	BP-S	CH-S			
trans-Stilbene Oxide  Functional group : Others	NP RP	○ ⊙	× ○	× -	Column : TCI Chiral MB-S (5 μm) 4.6 mm I.D. × 250 mm Mobile Phase : Acetonitrile / Water = 30 / 70 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.07 R_s : 1.64
Tetrahydrofuran-2-carboxylic Acid  Functional group : Carboxylic Acids	NP RP	⊙ -	× -	○ -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 70 / 30 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	 α : 3.13 R_s : 4.83
Trichostatic Acid  Functional group : Carboxylic Acids	NP RP	- -	⊙ -	- -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 90 / 10 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (1 mg/mL)	 α : 1.61 R_s : 7.52
Tropicamide  Functional group : Others	NP RP	⊙ -	○ -	○ -	Column : TCI Chiral MB-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / Diethylamine = 90 / 10 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 2 μL (10 mg/mL)	 α : 1.84 R_s : 2.40
δ-Undecanolactone  Functional group : Esters and Lactones	NP RP	⊙ -	⊙ -	⊙ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol = 90 / 10 Detection : UV 210 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 10 μL (10 mg/mL)	 α : 1.40 R_s : 6.90
Verapamil Hydrochloride  Functional group : Others	NP RP	× -	× -	⊙ -	Column : TCI Chiral CH-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / Diethylamine = 90 / 10 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.30 R_s : 2.91
Warfarin Sodium  Functional group : Others	NP RP	○ -	⊙ -	○ -	Column : TCI Chiral BP-S (3 μm) 4.6 mm I.D. × 250 mm Mobile Phase : <i>n</i> -Hexane / 2-Propanol / TFA = 90 / 10 / 0.1 Detection : UV 254 nm Flow Rate : 1.0 mL/min Temperature : 40 °C Sample Size : 1 μL (10 mg/mL)	 α : 1.44 R_s : 1.49

NP : Normal Phase RP : Reversed Phase ⊙ : Baseline Separation ○ : Separation × : No Separation - : Data Not Available

ODS + Ion-Exchange Mixed-Mode Columns TCI Dual / Kaseisorb LC



ODS columns are the most popular HPLC columns and used for separations of hydrophobic compounds. The use of ion-pair reagents allows retention and separation of acidic or basic compounds on ODS columns. However, there are several problems associated with ion-pair reagents, for example, the lack of influence of ion-pair reagents on retention, the removal of ion-pair reagents retained on the column, the use of LC-MS, etc. Hence, TCI developed and commercialized packing materials bearing both ODS ligands capable of firmly retaining hydrophobic compounds and ion-exchange ligands capable of retaining acidic or basic compounds in 1996.

1. Target compound is basic → Choose ODS + Cation-Exchange Type
Target compound is acidic → Choose ODS + Anion-Exchange Type
2. Hydrophobic compounds can be retained on mixed-mode columns.
3. No ion-pair reagent is required.
4. The packing material has both ion-exchange and ODS phases.
(Not a mixture of packing materials of an ion-exchange and ODS)
5. High NTP values close to ODS' s

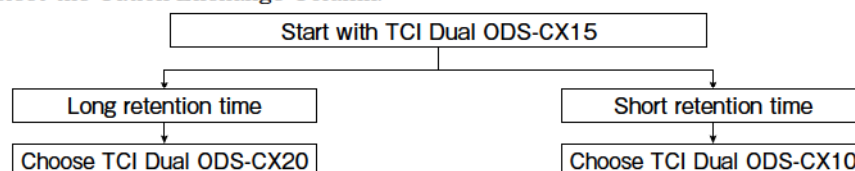
Product Line

Column	Ion-Exchange Type	Analytes	Usable Mobile phase pH range	Ion-Exchange pH Range	Pore Diameter (nm)	Particle Size (μm)	Page
TCI Dual ODS-CX10	ODS + Strong Cation-Exchange	Basic compounds	2.5~7.5	2.5~7.5	12	5	26
TCI Dual ODS-CX15	ODS + Medium Cation-Exchange	Basic compounds	2.5~7.5	2.5~7.5	12	5	27
TCI Dual ODS-CX20	ODS + Weak Cation-Exchange	Basic compounds	2.5~7.5	4.5~7.5	12	5	28
Kaseisorb LC ODS-SAX Super	ODS + Strong Anion-Exchange	Acidic compounds	2.5~7.5	2.5~7.5	12	5	30
TCI Dual ODS-AX10	ODS + Strong Anion-Exchange	Acidic compounds	2.5~7.5	2.5~7.5	12	5	33
TCI Dual ODS-AX20	ODS + Weak Anion-Exchange	Acidic compounds	2.5~7.5	2.5~7.5	12	5	34

Mixed-Mode Column Selection

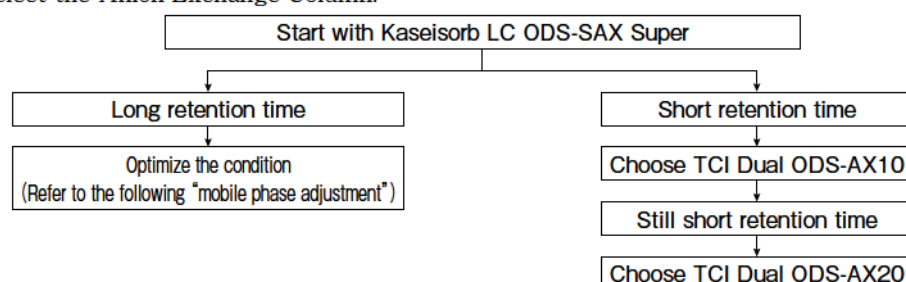
<For basic compounds>

Select the Cation-Exchange Column.



<For acidic compounds>

Select the Anion-Exchange Column.



Mobile Phase Adjustment

Consider the following three factors for adjusting elution power.

1. Changing the Organic Solvent Ratio

- The retention of both ionic and hydrophobic compounds is changed. Generally the changes are more significant for hydrophobic than ionic compounds.
- Organic solvent ratio UP \Rightarrow Elution power UP (like ODS columns)

2. Changing the Buffer Concentration

- Only the retention of ionic compounds changes. The retention of hydrophobic compounds remains the same.
- Buffer concentration UP \Rightarrow Elution power of ionic compounds UP
- Recommended buffer concentration: 10 ~ 50 mmol/L

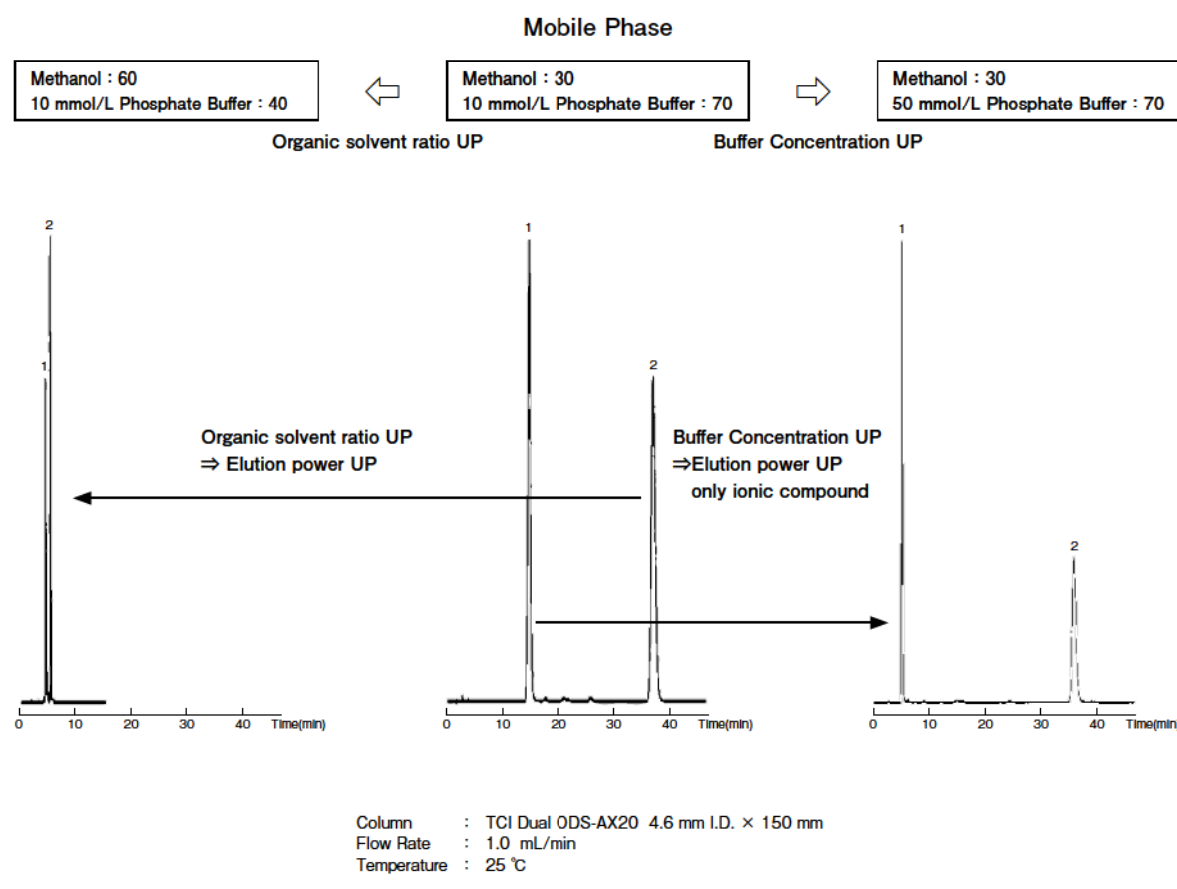
3. Changing the pH

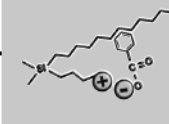
- Adjust dissociate of ionic compounds.
- Dissociate pH of ionic compounds \Rightarrow Ionic interaction UP

※ TCI Dual ODS-CX20 has carboxylic phase as ion-exchange phase and it does not work under acidic pH conditions.

Example of Mobile Phase Adjustment for A Mixture of Hydrophobic and Acidic Compounds

Samples : 1) 5'-Adenylic Acid (Acidic Compound)
2) Methyl Benzoate (Hydrophobic Compound)





Chiral
Columns

Mixed-Mode
Columns

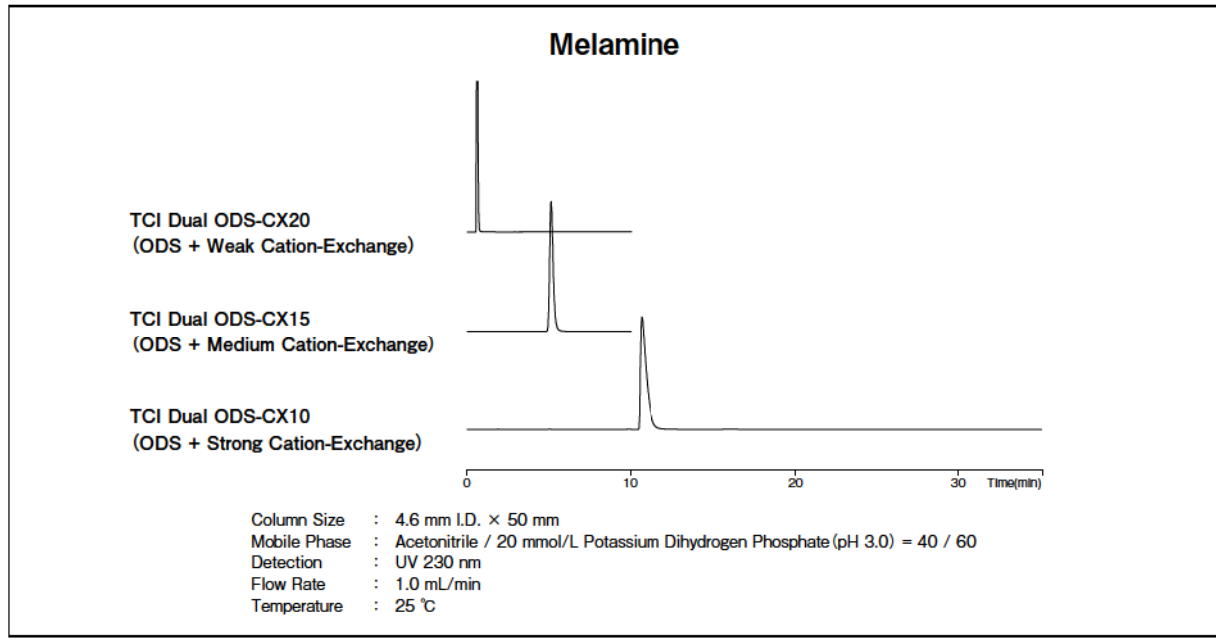
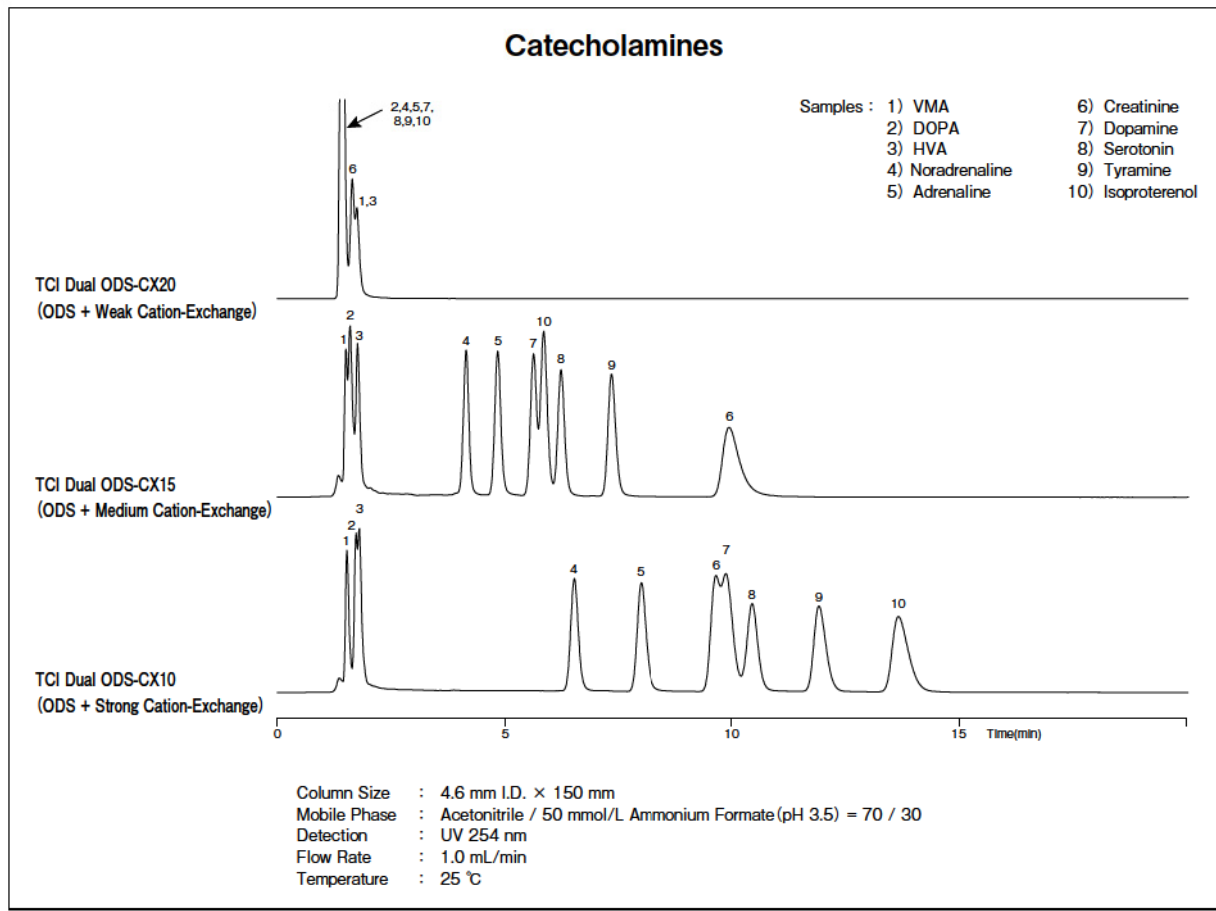
ODS
Columns

Other
Columns

Guard
Columns

ODS + Cation-Exchange Columns (TCI Dual ODS-CX Series)

TCI Dual ODS-CX10, TCI Dual ODS-CX15 and TCI Dual ODS-CX20 are ODS + Cation-Exchange Type mixed-mode columns. This column series is suitable for basic compound and hydrophobic compound analysis.



ODS + Ion-Exchange Mixed-Mode Columns TCI Dual / Kaseisorb LC

TCI Dual ODS-CX10

TCI Dual ODS-CX10 has ODS and sulfonic acid phase.

○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Basic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S3705
2.0 × 100	S3707
2.0 × 150	S3702
2.0 × 250	S3703

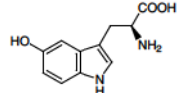
Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 50	S3704
4.6 × 100	S3709
4.6 × 150	S3700
4.6 × 250	S3701
10.0 × 150	S3706
10.0 × 250	S3708

Applications

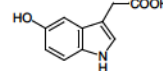
Serotonin and Metabolites

Samples :

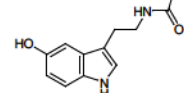
1) 5-Hydroxy-L-tryptophan



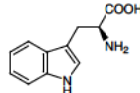
2) 5-Hydroxy-3-acetic Acid (5-HIAA)



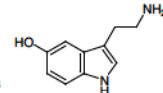
3) Acetylserotonin



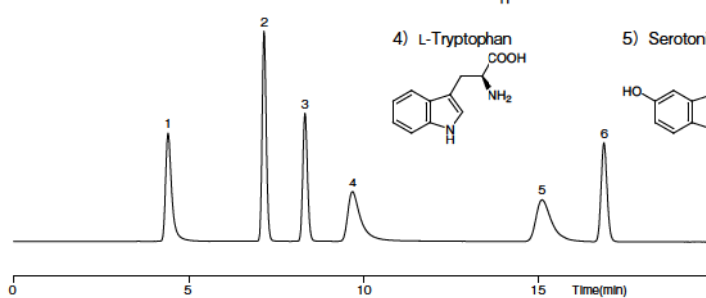
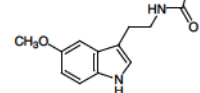
4) L-Tryptophan



5) Serotonin



6) Melatonin



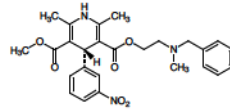
Column : TCI Dual ODS-CX10 4.6 mm I.D. × 150 mm
 Mobile Phase : A) Acetonitrile / 50 mmol/L Ammonium Formate (pH 3.5) = 10 / 90
 B) Acetonitrile / 50 mmol/L Ammonium Formate (pH 3.5) = 70 / 30
 0-50% B(0-30min)

Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C

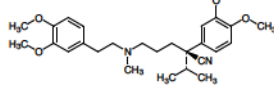
Basic Drugs

Samples :

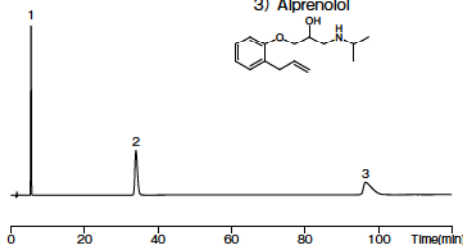
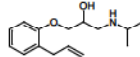
1) Nicardipine



2) Verapamil



3) Alprenolol

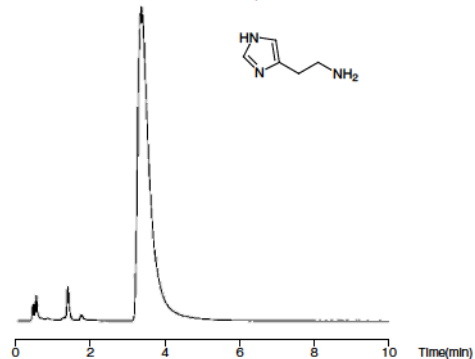
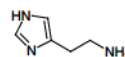


Column : TCI Dual ODS-CX10 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 50 mmol/L Ammonium Acetate (pH 5.0) = 80 / 20

Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

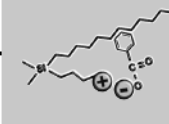
Histamine

Sample : Histamine



Column : TCI Dual ODS-CX10 4.6 mm I.D. × 50 mm
 Mobile Phase : Acetonitrile / 100 mmol/L Ammonium Acetate = 50 / 50

Detection : UV 230 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C



TCI Dual ODS-CX15

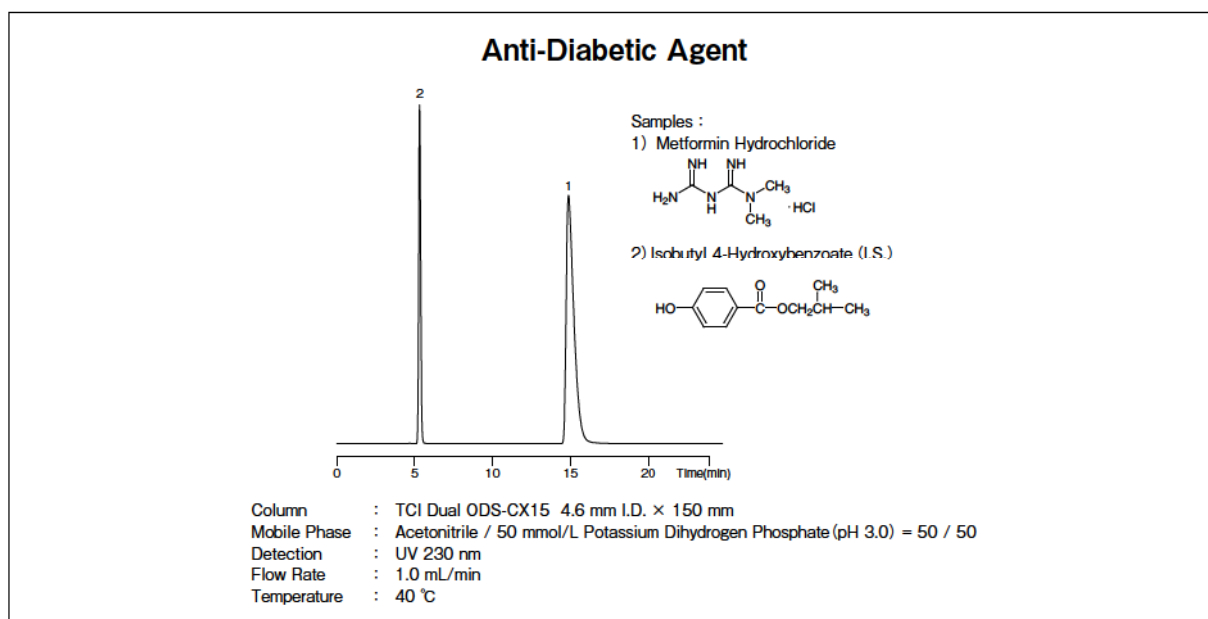
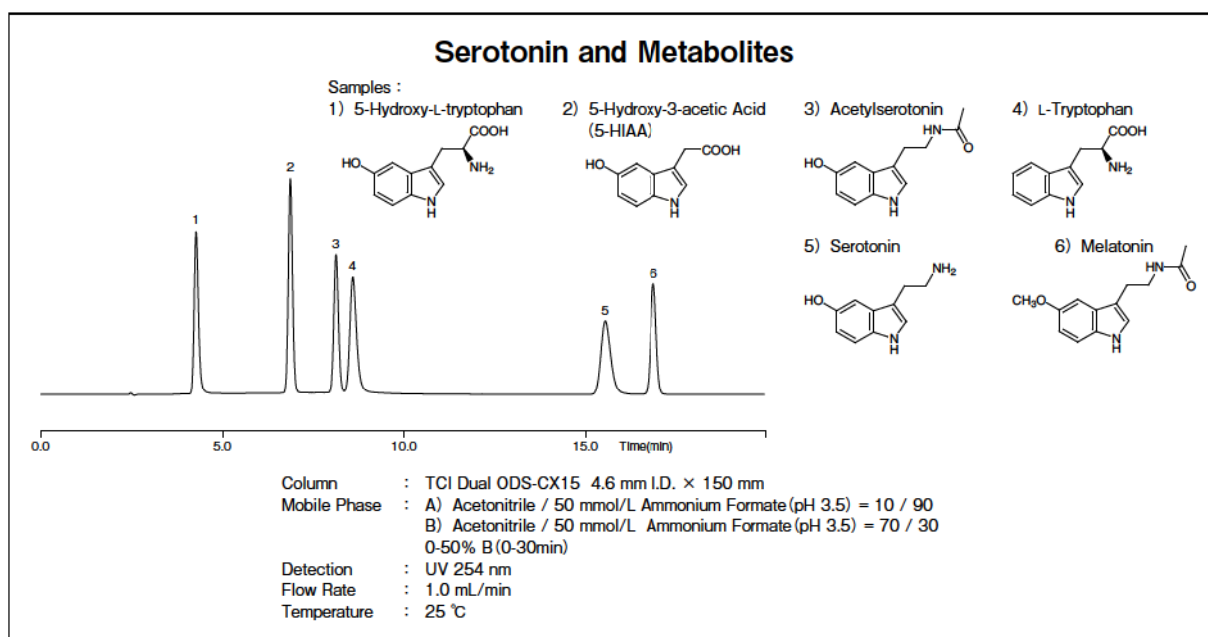
TCI Dual ODS-CX15 has ODS and a new type of cation-exchange phase.

○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Basic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S3765
2.0 × 100	S3767
2.0 × 150	S3762
2.0 × 250	S3763

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 50	S3764
4.6 × 100	S3769
4.6 × 150	S3760
4.6 × 250	S3761
10.0 × 150	S3766
10.0 × 250	S3768

Applications



TCI Dual ODS-CX20

TCI Dual ODS-CX20 has ODS and carboxylic acid phase.

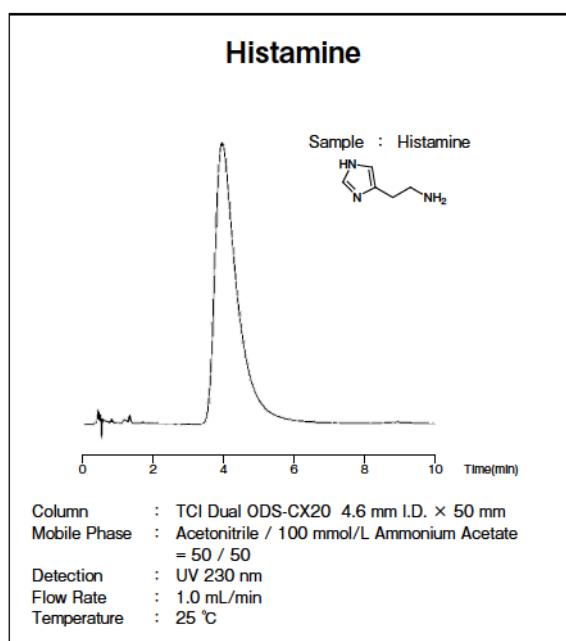
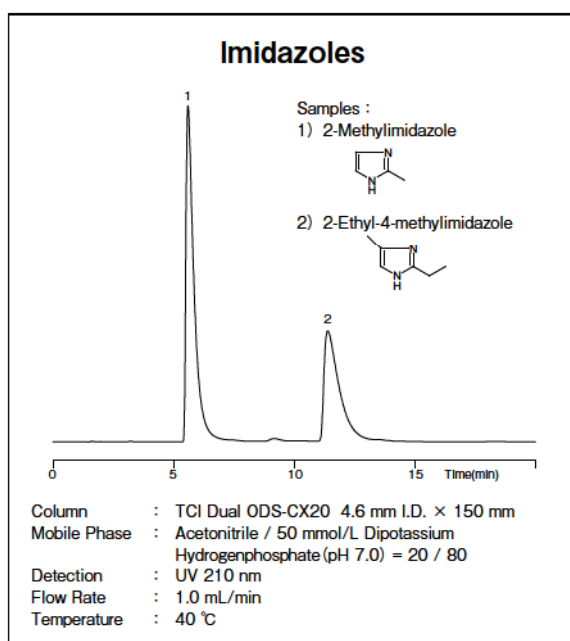
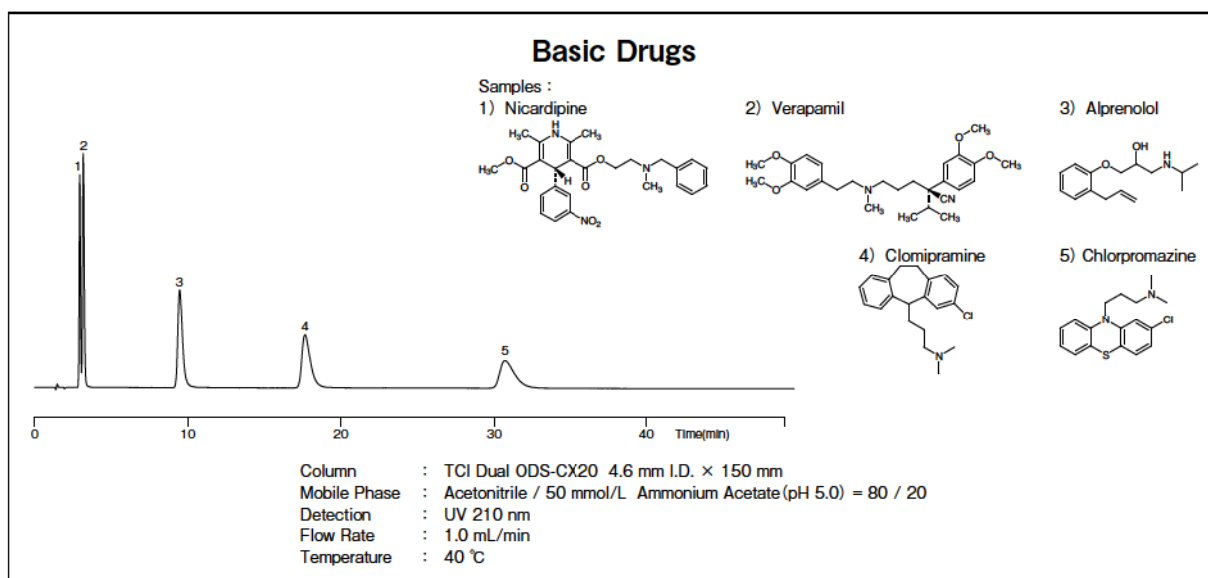
The carboxylic acid phase does not work under acidic pH conditions. Hence, neutral pH conditions are preferred.

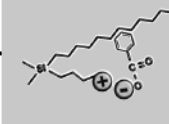
○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Basic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S3715
2.0 × 100	S3717
2.0 × 150	S3712
2.0 × 250	S3713

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 50	S3714
4.6 × 100	S3719
4.6 × 150	S3710
4.6 × 250	S3711
10.0 × 150	S3716
10.0 × 250	S3718

Applications



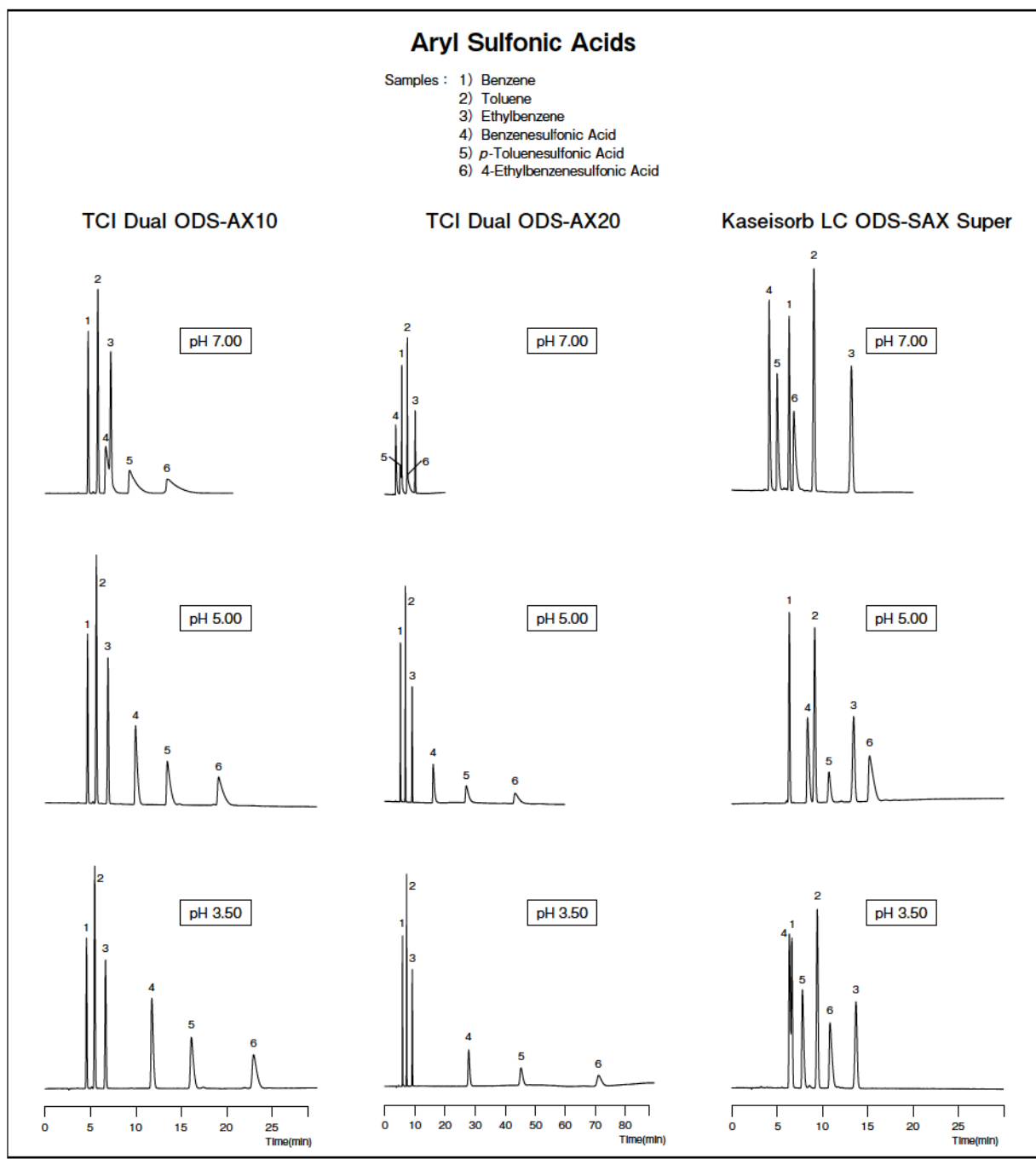


ODS + Anion-Exchange Columns (Kaseisorb LC ODS-SAX Super / TCI Dual ODS-AX Series)

Kaseisorb LC ODS-SAX Super, TCI Dual ODS-AX10 and TCI Dual ODS-AX20 are ODS + anion-exchange mixed-mode columns. This column series is suitable for acidic compound and hydrophobic compound analysis.

The following chromatographic charts of several aromatic compounds show pH dependency of those three types of columns. Benzene, Toluene and Ethylbenzene have no effect of pH on retention times.

Benzenesulfonic Acid, *p*-Toluenesulfonic Acid and 4-Ethylbenzenesulfonic Acid are acidic and changes in pH alter retention times.



Kaseisorb LC ODS-SAX Super

Kaseisorb LC ODS-SAX Super has ODS and quaternary ammonium phase.

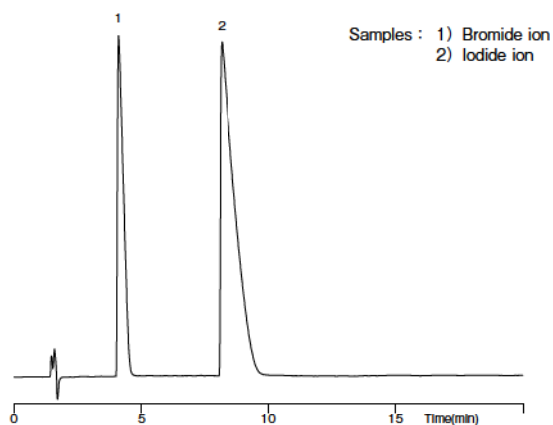
○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 150	S1298
2.0 × 250	S1299

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1292
4.6 × 250	S1293

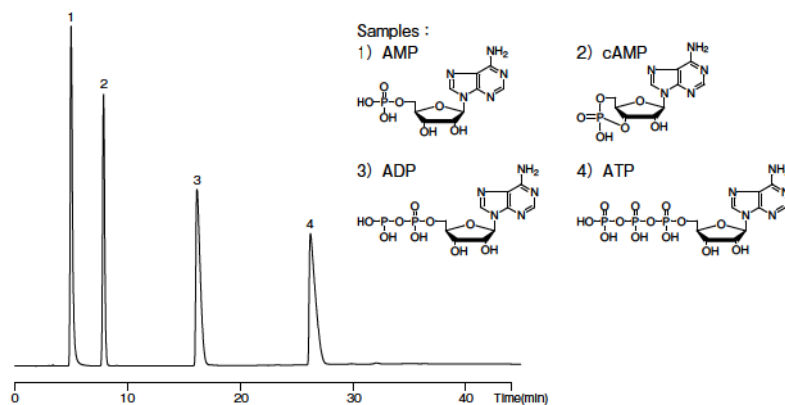
Applications

Bromide Ion, Iodide Ion

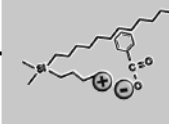


Column : Kaseisorb LC ODS-SAX Super 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 50 mmol/L Ammonium Acetate (pH 5.0) = 50 / 50
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Adenosine Phosphates



Column : Kaseisorb LC ODS-SAX Super 4.6 mm I.D. × 150 mm
 Mobile Phase : A : Methanol / 10 mmol/L Dipotassium Hydrogenphosphate (pH 7.0) = 20 / 80
 B : Methanol / 50 mmol/L Dipotassium Hydrogenphosphate (pH 7.0) = 20 / 80
 0-100% B (10-30min)
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C



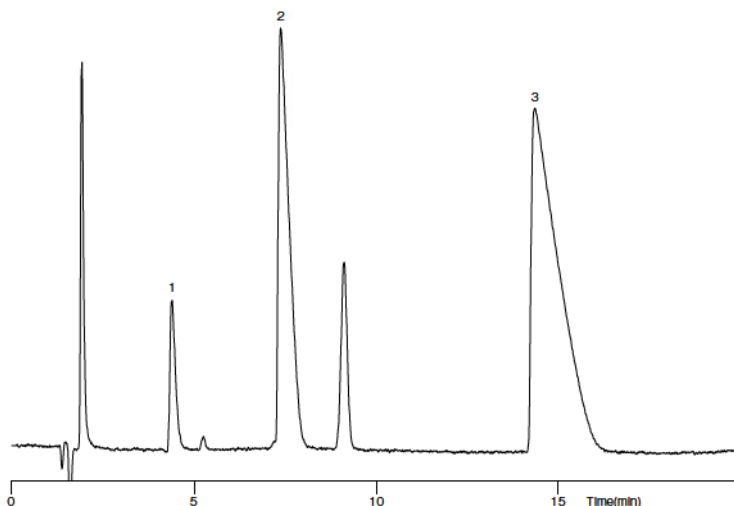
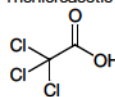
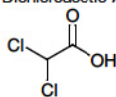
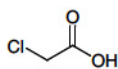
Halogenated Acetic Acids

Samples :

1) Monochloroacetic Acid

2) Dichloroacetic Acid

3) Trichloroacetic Acid



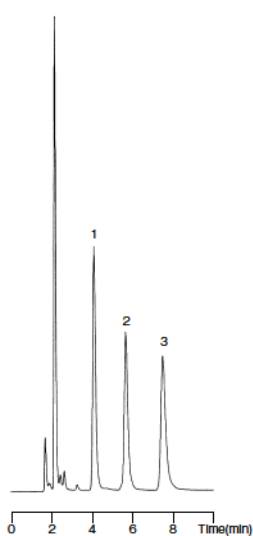
Column : Kaseisorb LC ODS-SAX Super 4.6 mm I.D. × 150 mm
Mobile Phase : Acetonitrile / 25 mmol/L Ammonium Formate (pH 3.5) = 50 / 50
Detection : UV 210 nm
Flow Rate : 1.0 mL/min
Temperature : 30 °C

Nucleotides

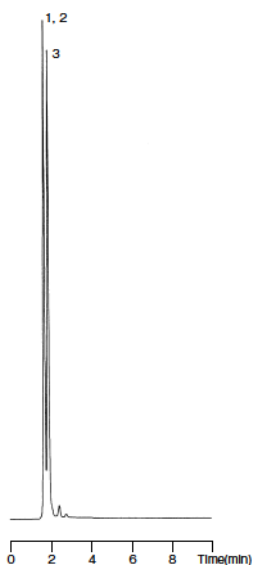
Column Size : 4.6 mm I.D. × 150 mm
Mobile Phase : Methanol / 5 mmol/L Potassium Dihydrogen Phosphate (pH 3.0) = 20 / 80
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : 25 °C

Samples : 1) IMP
2) AMP
3) dTMP

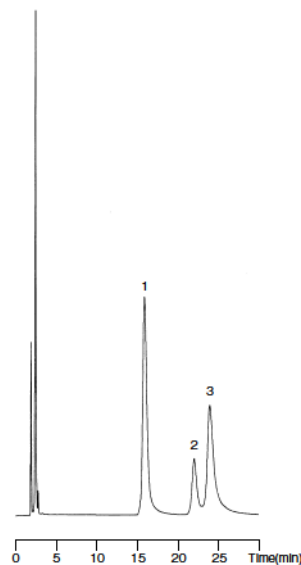
Kaseisorb LC ODS-SAX Super

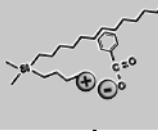


Kaseisorb LC ODS Super



Kaseisorb LC SAX-120-5





Chiral Columns

Mixed-Mode Columns

ODS Columns

Other Columns

Guard Columns

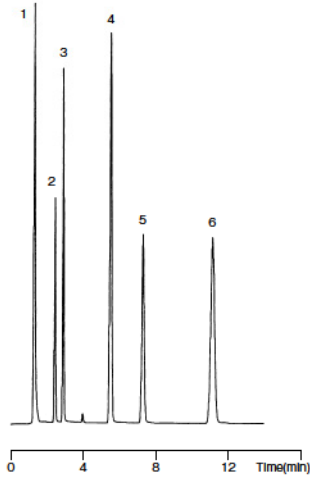
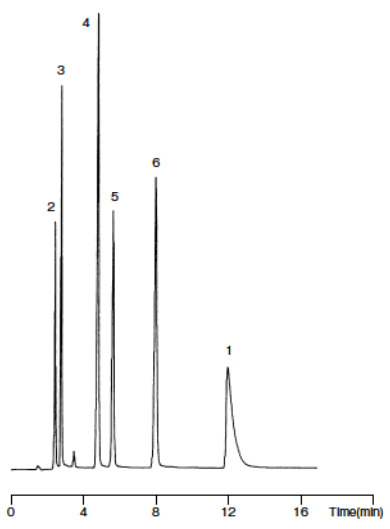
ODS + Ion-Exchange Mixed-Mode Columns TCI Dual / Kaseisorb LC

Aromatic Compounds

Kaseisorb LC ODS-SAX Super

Kaseisorb LC ODS Super

- Samples : 1) Benzenesulfonic Acid
 2) Benzyl Alcohol
 3) Aniline
 4) Nitrobenzene
 5) Benzene
 6) Toluene



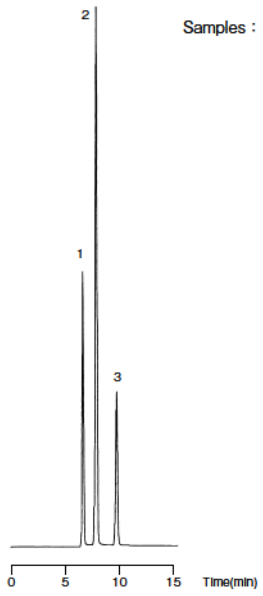
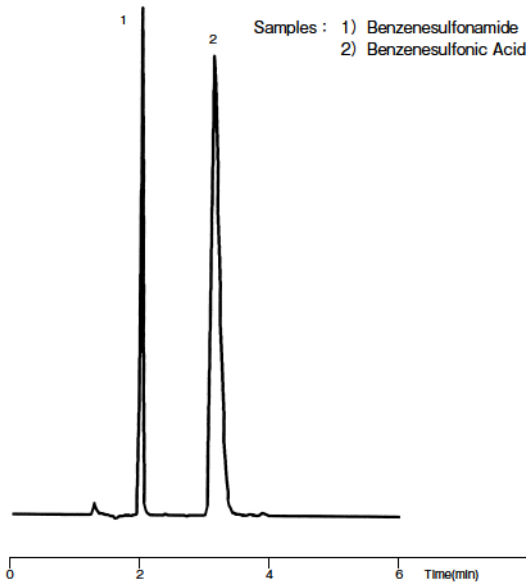
Column Size : 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 50 mmol/L Dipotassium Hydrogenphosphate = 50 / 50 (pH 6.3)
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min

Benzenesulfonic Acid

o-, *m*-, *p*-Nitroaniline

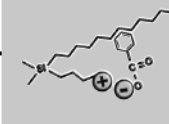
- Samples : 1) Benzenesulfonamide
 2) Benzenesulfonic Acid

- Samples : 1) *p*-Nitroaniline
 2) *m*-Nitroaniline
 3) *o*-Nitroaniline



Column : Kaseisorb LC ODS-SAX Super
 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / Water / Triethylamine / Acetic Acid = 60 / 40 / 1 / 1
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min

Column : Kaseisorb LC ODS-SAX Super
 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / Water = 30 / 70
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : Ambient



TCI Dual ODS-AX10

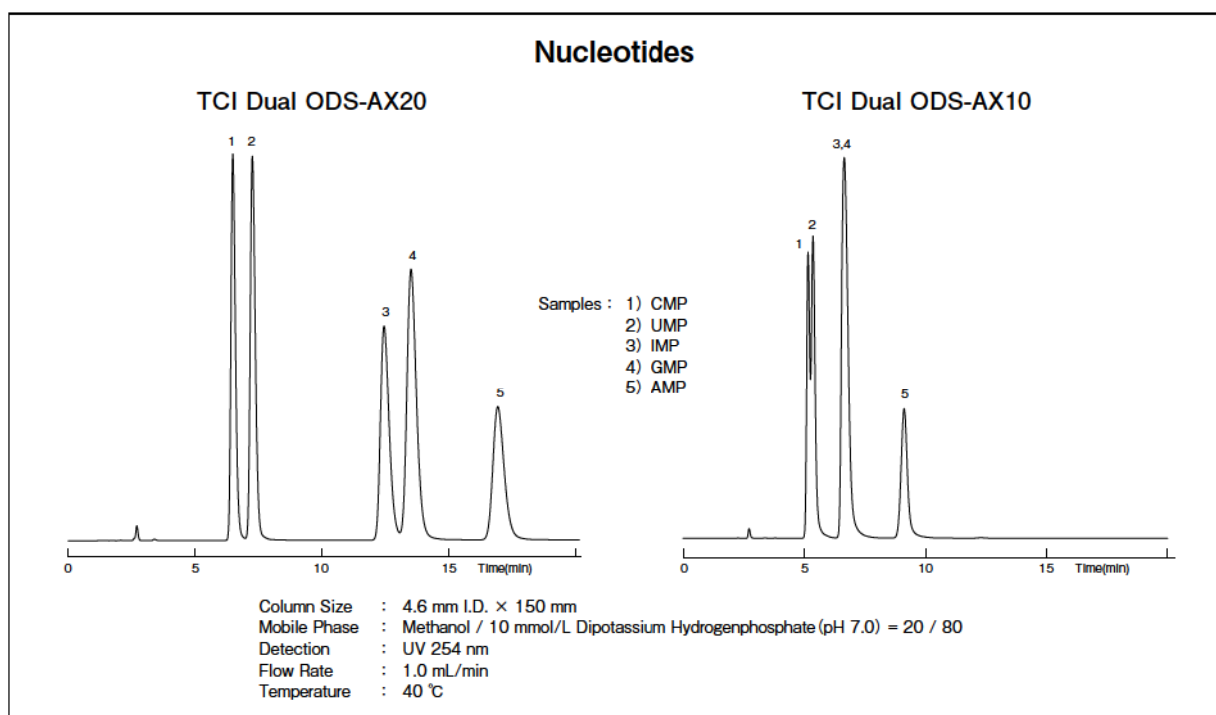
TCI Dual ODS-AX10 has ODS and quaternary ammonium phase.

○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S3725
2.0 × 100	S3727
2.0 × 150	S3722
2.0 × 250	S3723

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 50	S3724
4.6 × 100	S3729
4.6 × 150	S3720
4.6 × 250	S3721
10.0 × 150	S3726
10.0 × 250	S3728

Applications



TCI Dual ODS-AX20

TCI Dual ODS-AX20 has ODS and secondary amine phase.

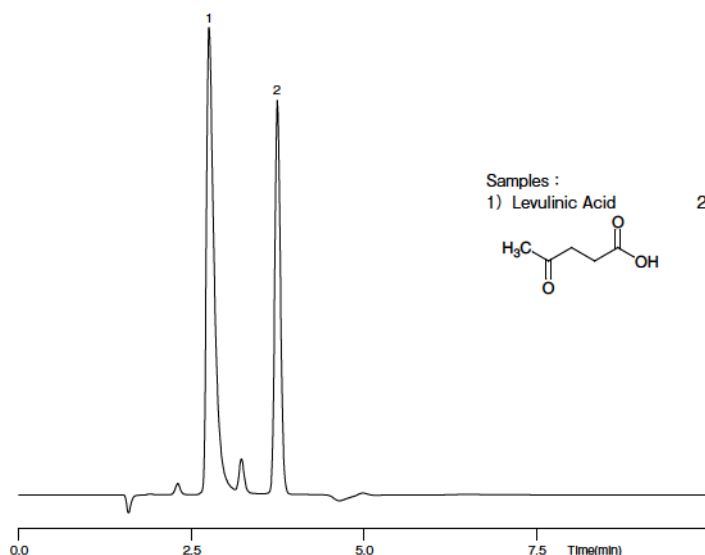
○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Analytes : Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S3735
2.0 × 100	S3737
2.0 × 150	S3732
2.0 × 250	S3733

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 50	S3734
4.6 × 100	S3739
4.6 × 150	S3730
4.6 × 250	S3731
10.0 × 150	S3736
10.0 × 250	S3738

Applications

Levulinic Acid, Methyl Levulinate



Column : TCI Dual ODS-AX20 4.6 mm I.D. × 150 mm
Mobile phase : Acetonitrile / 20 mmol/L Dipotassium Hydrogenphosphate (pH 7.0) = 20 / 80
Detection : UV 210 nm
Flow Rate : 1.0 mL/min
Temperature : 25 °C



Chiral Columns

Mixed-Mode Columns

ODS Columns

Other Columns

Guard Columns

ODS Columns Kaseisorb LC / TCI Pack

ODS Columns Kaseisorb LC / TCI Pack

The Kaseisorb LC and TCI Pack ODS series employ silica gel packing materials developed at TCI. The packing materials are made of high purity spherical silica gel monofunctionalized by our unique surface modification technology. There are six different types of ODS columns available in this series.

Product Line

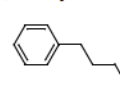
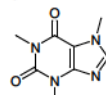
Column	Analytes	Feature	Carbon Content (%)	Pore Diameter (nm)	Particle Size (μm)	Page
Kaseisorb LC ODS 2000	Basic compounds Acidic compounds Hydrophobic compounds	<ul style="list-style-type: none"> High-performance column using a packing material with particle-size of $5\mu\text{m}$. High number of theoretical plates Excellent batch-to-batch reproducibility Validation kit available at cost 	17	12	5	36
Kaseisorb LC ODS 2000-3	Basic compounds Acidic compounds Hydrophobic compounds	<ul style="list-style-type: none"> High-performance column using a packing material with particle-size of $3\mu\text{m}$ High number of theoretical plates Applications to high throughput analysis Excellent batch-to-batch reproducibility Validation kit available at cost 	17	12	3	41
TCI Pack ODS Tough	Basic compounds Acidic compounds Hydrophobic compounds	<ul style="list-style-type: none"> Applicable to a wide range of pH (30°C: pH2.0~12) Applicable to high temperature conditions (60°C: pH3.0~8.0) 	15	12	5	44
Kaseisorb LC ODS-PH Super	Hydrophobic compounds, Structurally similar compounds Steroids	<ul style="list-style-type: none"> Separations by means of dual effects of ODS ligands (hydrophobic interactions) and phenyl groups ($\pi-\pi$ interactions) 	15	12	5	45
Kaseisorb LC ODS Super	Basic compounds Acidic compounds Hydrophobic compounds	<ul style="list-style-type: none"> Excellent batch-to-batch reproducibility 	15	12	5	47
Kaseisorb LC ODS-300-5	Proteins and Peptides	<ul style="list-style-type: none"> Larger pore-size packing material suitable for large molecules 	5	30	5	47

Comparison of Applications of TCI Reversed Phase Columns

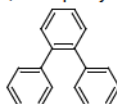
Column Size : 4.6 mm I.D. \times 150 mm
 Mobile Phase : Methanol / Water = 80 / 20
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Samples :

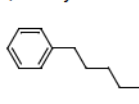
- 1) Uracil 2) Caffeine 3) Phenol 4) *n*-Butylbenzene



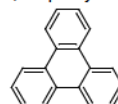
- 5) *o*-Terphenyl



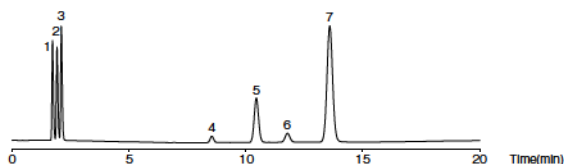
- 6) *n*-Amylbenzene



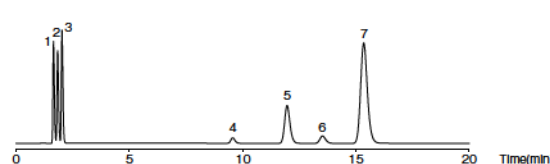
- 7) Triphenylene



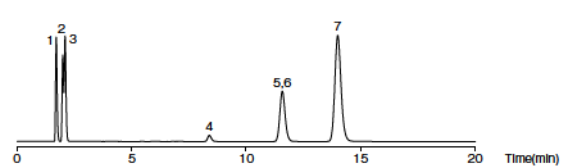
Kaseisorb LC ODS 2000



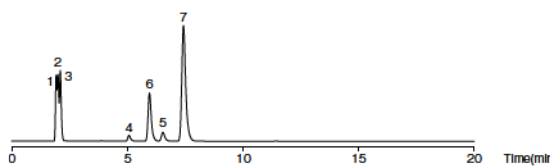
Kaseisorb LC ODS Super



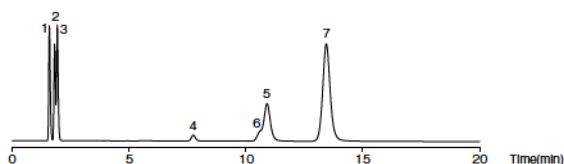
Kaseisorb LC ODS-PH Super



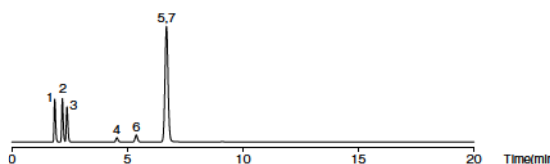
Kaseisorb LC ODS-300-5



TCI Pack ODS Tough



Kaseisorb LC PH Super





Kaseisorb LC ODS 2000

Kaseisorb LC ODS 2000 is a high performance ODS column using a packing material with 5 μ m particle-size.

1. Improved separation by higher resolution capability

Kaseisorb LC ODS 2000 is a column with a high number of theoretical plates and demonstrates superior performance.

2. Excellent batch-to-batch reproducibility

Each product is subjected to strict manufacturing control measures.

3. Validation

Each column comes with a certificate of packing material.

A validation kit is available at cost, which includes three analytical columns packed with packing materials from three different batches.

4. Affordable prices

Pore Diameter : 12 nm Particle Size : 5 μ m Carbon Content : 17 % End Cap : Yes

Phase : Monofunctional silylation

Analytes : Hydrophobic compounds, Basic compounds, Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S1465
2.0 × 100	S1820
2.0 × 150	S1486
2.0 × 250	S1487
3.0 × 150	S1484
3.0 × 250	S1485
4.6 × 50	S1493
4.6 × 100	S1478
4.6 × 150	S1480
4.6 × 250	S1482

Inside Diameter(mm)×Length(mm)	Product No.
7.5 × 250	S1490
10.0 × 250	S1491
20.0 × 50	S1466
20.0 × 250	S1492

Validation Kit*

4.6 × 150 (3-batch set)	S1481
4.6 × 250 (3-batch set)	S1483

*The kit contains three columns packed with packing materials from three different batches.

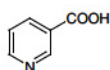


Applications

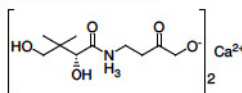
Water-Soluble Vitamins

Samples :

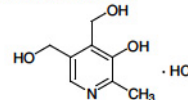
1) Nicotinic Acid



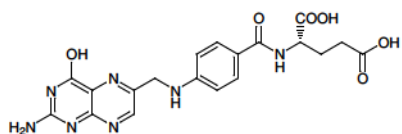
2) Calcium D-Pantothenate



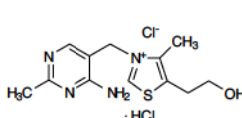
3) Pyridoxine Hydrochloride



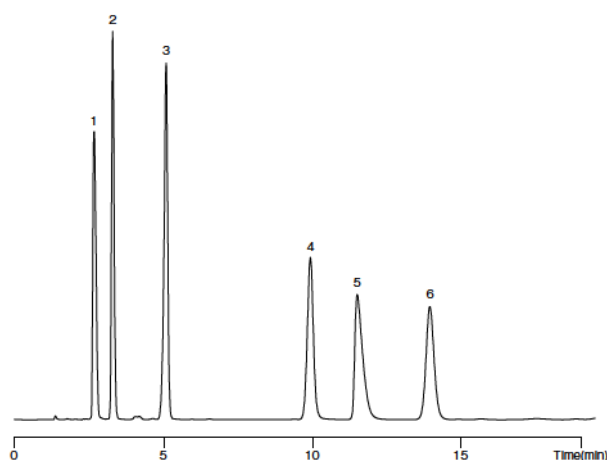
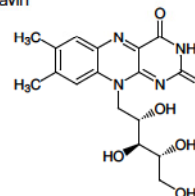
4) Folic Acid



5) Thiamine Hydrochloride



6) Riboflavin

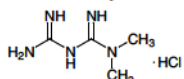


Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 0.1% Phosphoric Acid (pH 2.08) = 10 / 90 in 5 mmol/L Sodium 1-Hexanesulfonate
 Detection : UV 210 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

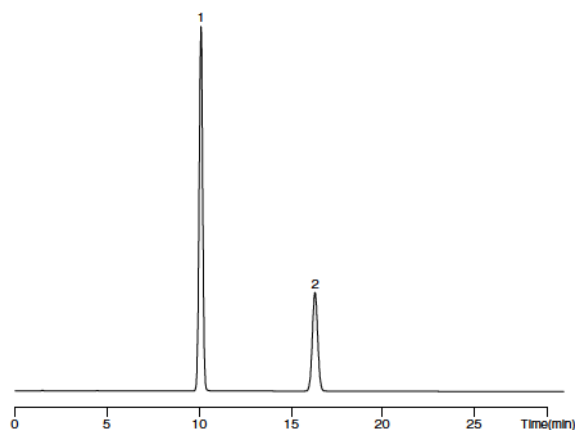
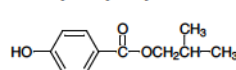
Anti-Diabetic Agent

Samples :

1) Metformin Hydrochloride



2) Isobutyl 4-Hydroxybenzoate (I.S.)

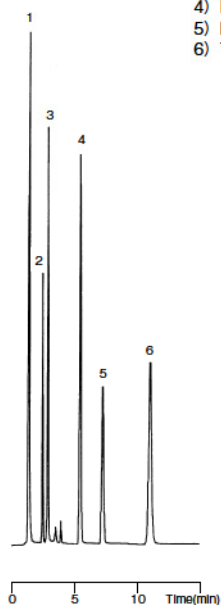


Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 4.5 mmol/L Sodium Dodecyl Sulfate, 0.04% Phosphoric Acid = 38 / 62
 Detection : UV 235 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C



Aromatic Compounds

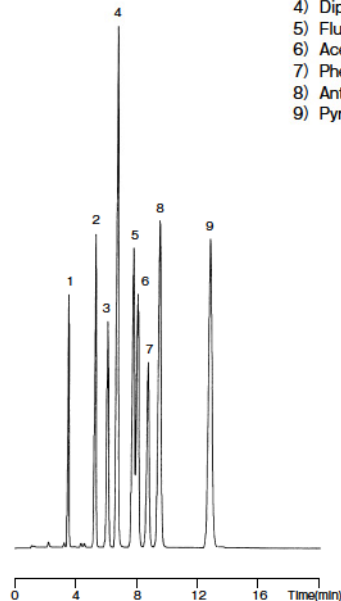
- Samples : 1) Benzenesulfonic Acid
2) Benzylalcohol
3) Aniline
4) Nitrobenzene
5) Benzene
6) Toluene



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Acetonitrile / 50 mmol/L Dipotassium Hydrogenphosphate (pH 6.3) = 50 / 50
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : Ambient

Polycyclic Compounds

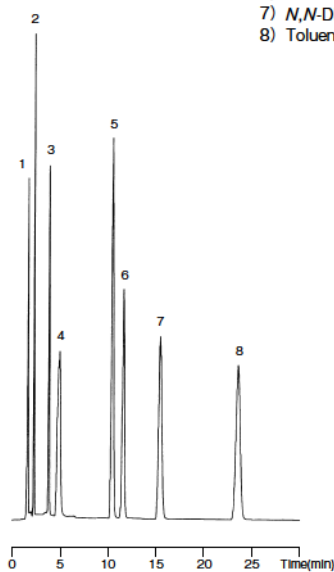
- Samples : 1) Benzene
2) Naphthalene
3) Acenaphthylene
4) Diphenyl
5) Fluorene
6) Acenaphthene
7) Phenanthrene
8) Anthrathene
9) Pyrene



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Acetonitrile / Water = 70 / 30
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : Ambient

Standard Materials

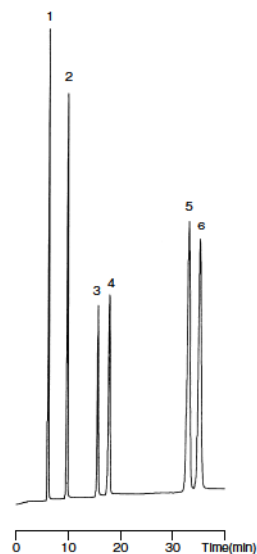
- Samples : 1) Uracil
2) Caffeine
3) Phenol
4) 2-Ethylpyridine
5) Methyl Benzoate
6) Benzene
7) *N,N*-Dimethylaniline
8) Toluene



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Methanol / Water = 50 / 50
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : Ambient

p-Hydroxybenzoic Acid Esters

- Samples : 1) Methyl *p*-Hydroxybenzoate
2) Ethyl *p*-Hydroxybenzoate
3) Isopropyl *p*-Hydroxybenzoate
4) Propyl *p*-Hydroxybenzoate
5) Isobutyl *p*-Hydroxybenzoate
6) Butyl *p*-Hydroxybenzoate

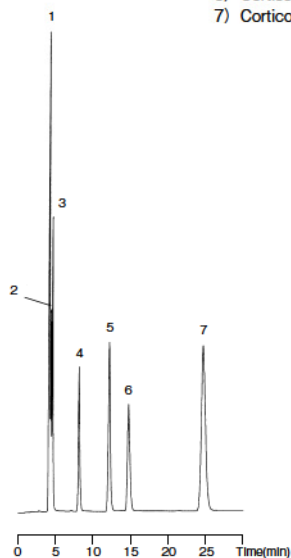


Column : Kaseisorb LC ODS 2000 3.0 mm I.D. × 250 mm
Mobile Phase : Methanol / Water = 50 / 50
Detection : UV 270 nm
Flow Rate : 0.5 mL/min
Temperature : 40 °C



Adrenocorticosteroids

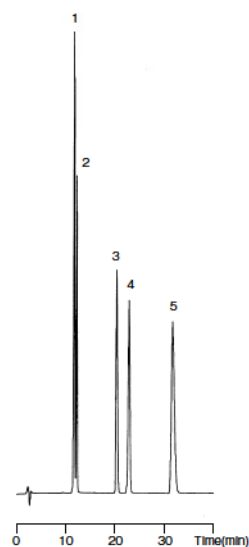
- Samples : 1) Prednisolone
2) Hydrocortisone
3) Cortisone
4) Corticosterone
5) Hydrocortisone Acetate
6) Cortisone Acetate
7) Corticosterone Acetate



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Acetonitrile / Water = 35 / 65
Detection : UV 260 nm
Flow Rate : 1.0 mL/min
Temperature : 35 °C

Non-steroidal Anti-inflammatory Drugs

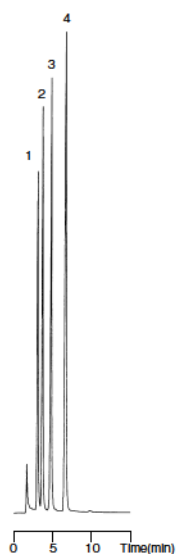
- Samples : 1) Ketoprofen
2) Naproxen
3) Fenoprofen Ca
4) Flurbiprofen
5) Ibuprofen



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 250 mm
Mobile Phase : Acetonitrile / Water / Acetic Acid = 45 / 55 / 1
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : Ambient

Fatty Acids Labeled with DBD-ED

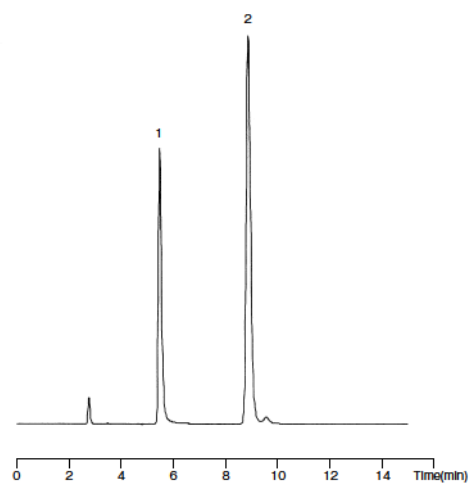
- Samples : 1) Linolenic Acid
2) Linolic Acid
3) Oleic Acid
4) Stearic Acid



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Acetonitrile / Water = 95 / 5
Detection : FL λ ex 450 nm λ em 560 nm
Temperature : 40 °C
Labeling Reagent : DBD-ED [4-*N,N*-Dimethylaminosulfonyl-7-*N*-(2-aminoethyl) amino-2,1,3-benzoxadiazole]

Procainamides

- Samples : 1) Procainamide
2) Acetylprocainamide



Column : Kaseisorb LC ODS 2000 4.6 mm I.D. × 150 mm
Mobile Phase : Methanol / 20 mmol/L Dipotassium Hydrogenphosphate (pH 7.5) = 40 / 60
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : 40 °C

Chiral
Columns

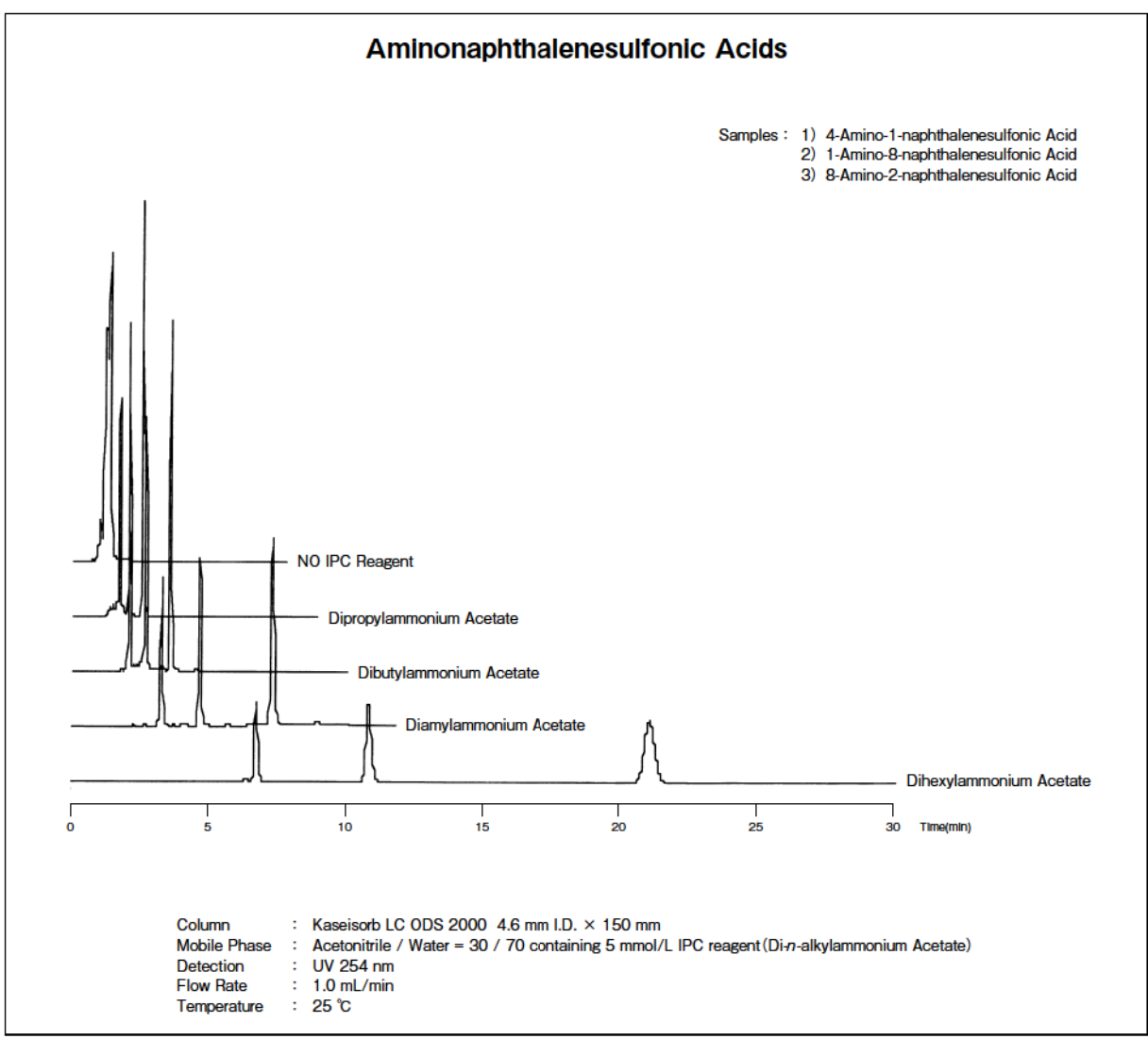
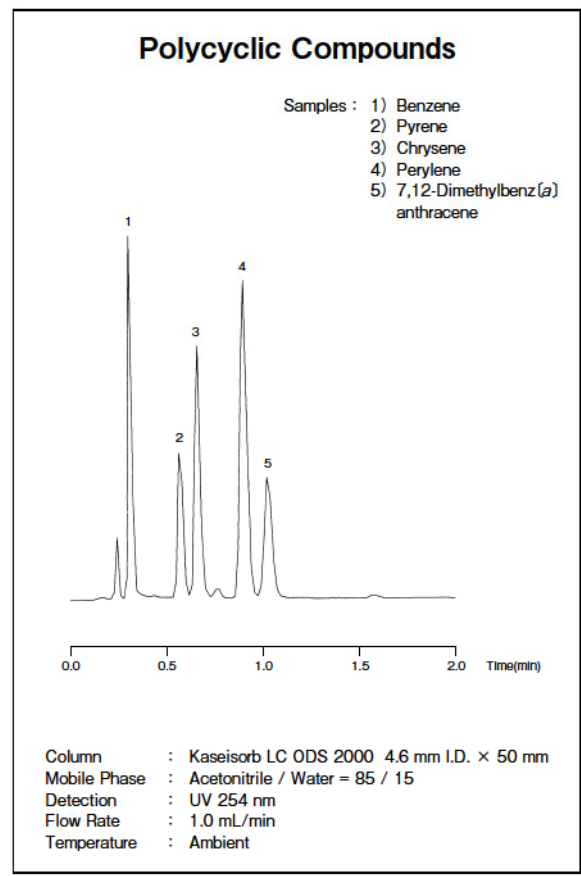
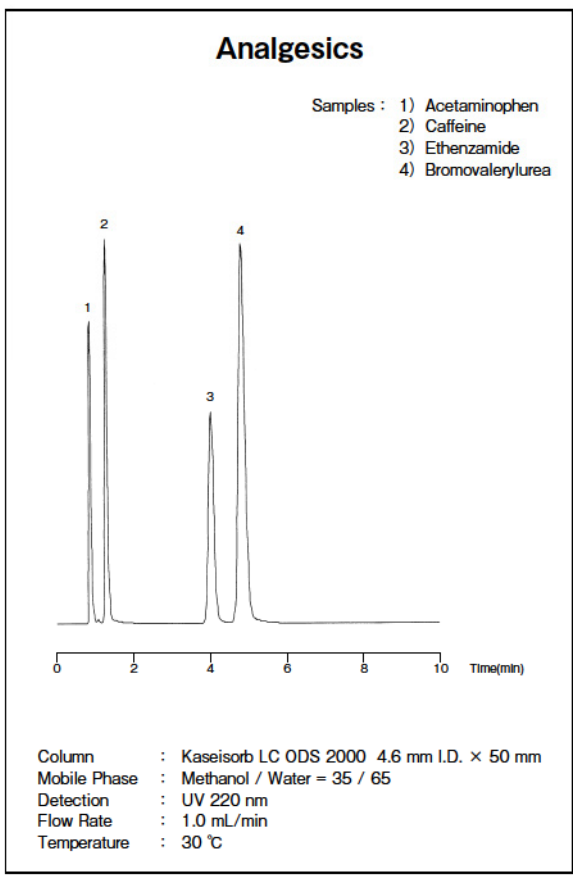
Mixed-Mode
Columns

ODS
Columns

Other
Columns

Guard
Columns

ODS Columns Kaseisorb LC / TCI Pack





Chiral Columns

Mixed-Mode Columns

ODS Columns

Other Columns

Guard Columns

ODS Columns Kaseisorb LC / TCI Pack

Kaseisorb LC ODS 2000-3

Kaseisorb LC ODS 2000-3 is a high performance ODS column using a packing material with 3 μm particle-size.

1. Improved separation by higher resolution capability

Kaseisorb LC ODS 2000-3 is a column with a high number of theoretical plates and demonstrates superior performance.

2. Excellent batch-to-batch reproducibility

Each product is subjected to strict manufacturing control measures.

3. Validation

Each column comes with a certificate of packing material.

A validation kit is available at cost, which includes three analytical columns packed with packing materials from three different batches.

4. Affordable prices

○Pore Diameter : 12 nm ○Particle Size : 3 μm ○Carbon Content : 17 %

○End Cap : Yes ○Phase : Monofunctional silylation on pure silica gel

○Analytes : Hydrophobic compounds, Basic compounds, Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 50	S1499
2.0 × 100	S1498
2.0 × 150	S1497
4.6 × 50	S1496
4.6 × 100	S1495
4.6 × 150	S1494
4.6 × 250	S1479

Inside Diameter(mm)×Length(mm)	Product No.
7.5 × 250	S1817
20.0 × 250	S1816

Validation Kit*

4.6 × 100 (3-batch set)	S1468
4.6 × 150 (3-batch set)	S1467
4.6 × 250 (3-batch set)	S1477

*The kit contains three columns packed with packing materials from three different batches.

Applications

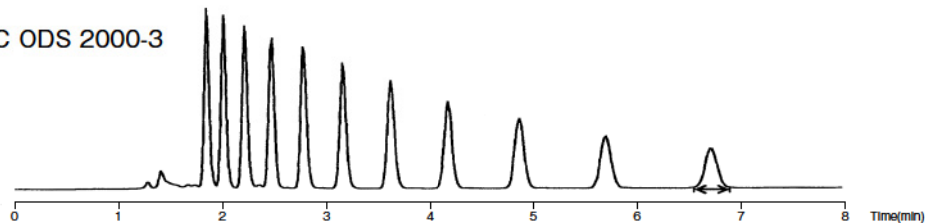
Comparison of separations of alkyl benzenes on Kaseisorb LC ODS 2000-3 and another manufacture's

Column Size : 4.6 mm I.D. × 100 mm
 Mobile Phase : Methanol
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C

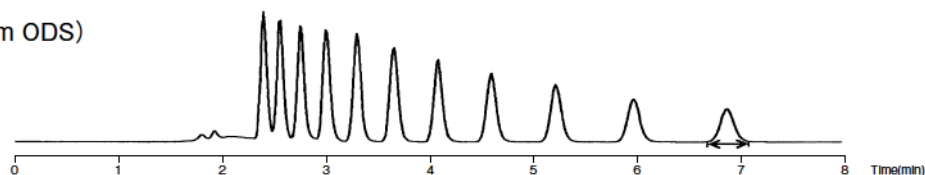
Samples : 1) *n*-Butylbenzene 5) *n*-Octylbenzene 9) *n*-Dodecylbenzene
 2) *n*-Amylbenzene 6) *n*-Nonylbenzene 10) *n*-Tridecylbenzene
 3) *n*-Hexylbenzene 7) *n*-Decylbenzene 11) *n*-Tetradecylbenzene
 4) *n*-Heptylbenzene 8) *n*-Undecylbenzene

Kaseisorb LC ODS 2000-3 gives sharper peaks and better separations than the other column.

Kaseisorb LC ODS 2000-3



Brand A(3μm ODS)





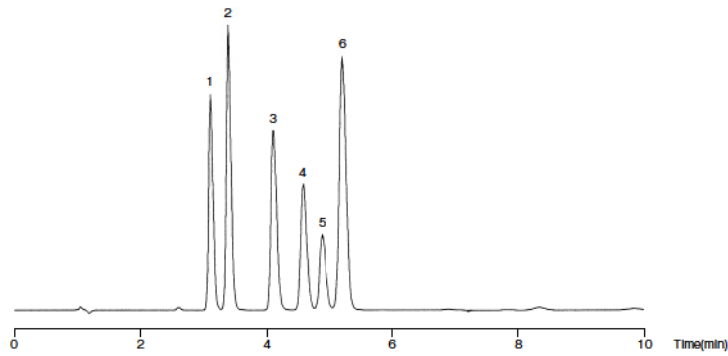
Phenol Derivatives

Comparison of separations of phenol derivatives on Kaseisorb LC ODS 2000-3 and another manufacturer's 3 μ m ODS column

Samples : 1) *p*-Nitrophenol 2) *m*-Nitrophenol 3) *o*-Chlorophenol 4) *p*-Chlorophenol 5) *m*-Chlorophenol 6) *o*-Nitrophenol

<Kaseisorb LC ODS 2000-3>

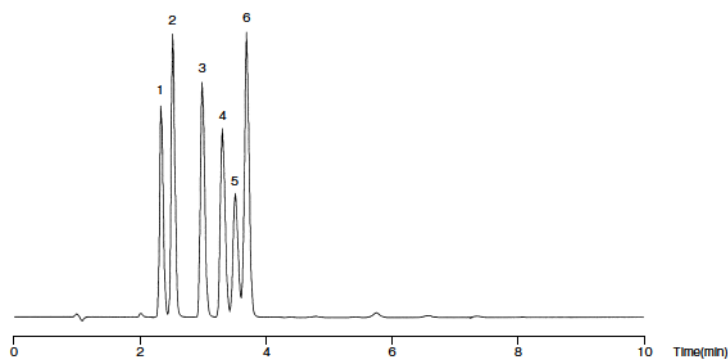
The six compounds are separated.



Column : Kaseisorb LC ODS 2000-3 4.6 mm I.D. \times 100 mm
Mobile Phase : Acetonitrile / Water / Acetic Acid = 40 / 60 / 1
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : 25 $^{\circ}$ C

<Brand A ODS 3 μ m (Under the same condition as the above)>

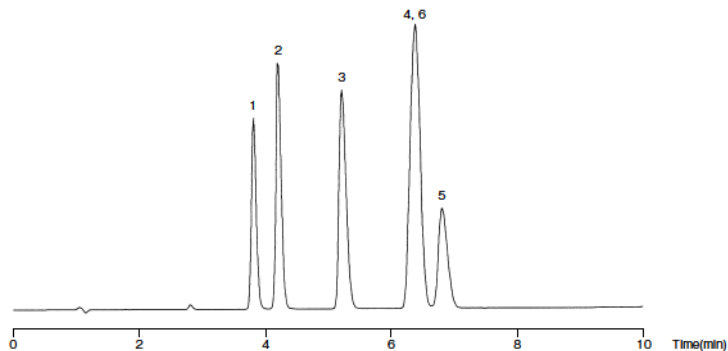
Peak 4, 5 and 6 are not separated.



Column : Brand A ODS 3 μ m 4.6 mm I.D. \times 100 mm
Mobile Phase : Acetonitrile / Water / Acetic Acid = 40 / 60 / 1
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : 25 $^{\circ}$ C

<Brand A ODS 3 μ m (The mobile phase condition is changed.)>

Peak 4 and 6 are still not separated.

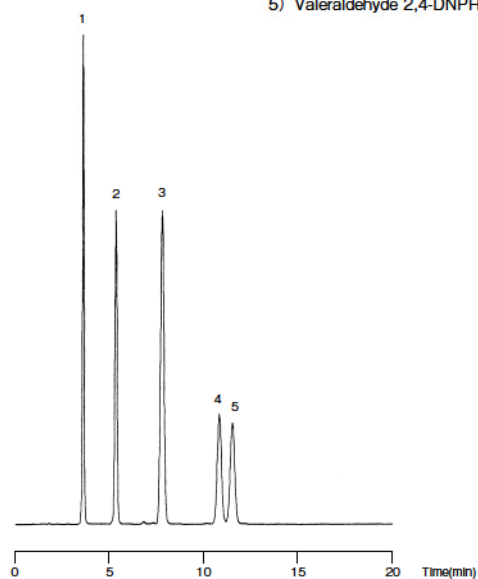


Column : Brand A ODS 3 μ m 4.6 mm I.D. \times 100 mm
Mobile Phase : Acetonitrile / Water / Acetic Acid = 30 / 70 / 1
Detection : UV 254 nm
Flow Rate : 1.0 mL/min
Temperature : 25 $^{\circ}$ C



Aldehydes (2,4-DNPH Derivatives)

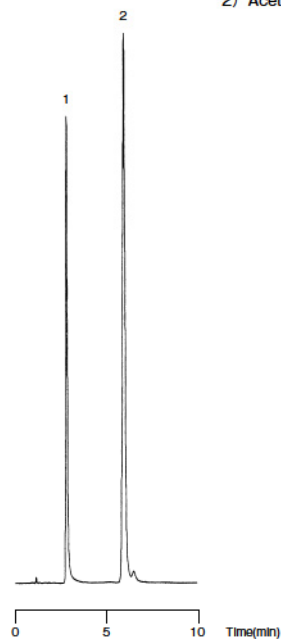
- Samples : 1) Diphenylamine
 2) Acetaldehyde 2,4-DNPH
 3) Propionaldehyde 2,4-DNPH
 4) Butyraldehyde 2,4-DNPH
 5) Valeraldehyde 2,4-DNPH



Column : Kaseisorb LC ODS 2000-3 4.6 mm I.D. × 100 mm
 Mobile Phase : Tetrahydrofuran / Acetonitrile / Water = 10 / 45 / 45
 Detection : UV 360 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Procainamides

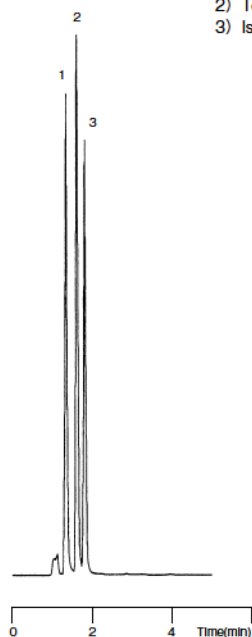
- Samples : 1) Procainamide
 2) Acetylprocainamide



Column : Kaseisorb LC ODS 2000-3 4.6 mm I.D. × 100 mm
 Mobile Phase : Methanol / 20 mmol/L Dipotassium Hydrogenphosphate (pH 7.5) = 30 / 70
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Phthalic Acids

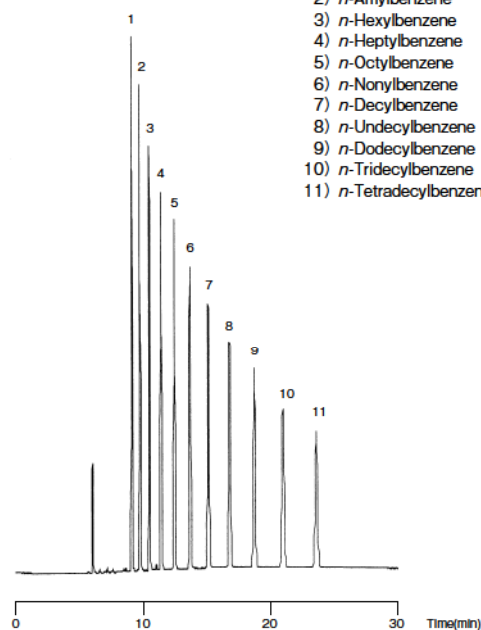
- Samples : 1) Phthalic Acid
 2) Terephthalic Acid
 3) Isophthalic Acid



Column : Kaseisorb LC ODS 2000-3 4.6 mm I.D. × 100 mm
 Mobile Phase : Acetonitrile / Water / Acetic Acid = 30 / 70 / 0.1
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C

Alkylbenzenes

- Samples : 1) *n*-Butylbenzene
 2) *n*-Amylbenzene
 3) *n*-Hexylbenzene
 4) *n*-Heptylbenzene
 5) *n*-Octylbenzene
 6) *n*-Nonylbenzene
 7) *n*-Decylbenzene
 8) *n*-Undecylbenzene
 9) *n*-Dodecylbenzene
 10) *n*-Tridecylbenzene
 11) *n*-Tetradecylbenzene



Column : Kaseisorb LC ODS 2000-3 4.6 mm I.D. × 250 mm × 2
 Mobile Phase : Methanol
 Detection : UV 254 nm
 Flow Rate : 0.9 mL/min
 Temperature : 60 °C
 NTP : 71000

Chiral Columns

Mixed-Mode Columns

ODS Columns

Other Columns

Guard Columns

ODS Columns Kaseisorb LC / TCI Pack

TCI Pack ODS Tough

New type of ODS columns with high stability

1. Mobile phase temperature up to 60 °C at pH 3.0 to 8.0

- a) For less column pressure with viscous solvents such as isopropanol
- b) For high throughput analysis with reduced run time

2. Highly compatible to acidic/basic mobile phase over a wide pH range: 2.0 to 12.0 at 30 °C.

- a) For weak acidic analyte and acidic ion suppression mode
- b) For weak basic analyte and basic ion suppression mode
- c) For better separation with extended pH change

○Pore Diameter : 12 nm ○Particle Size : 5 μm ○Carbon Content : 15 %

○End Cap : Yes ○Phase : Monofunctional silylation on pure silica gel

○Analytes : Hydrophobic compounds, Acidic compounds, Basic compounds

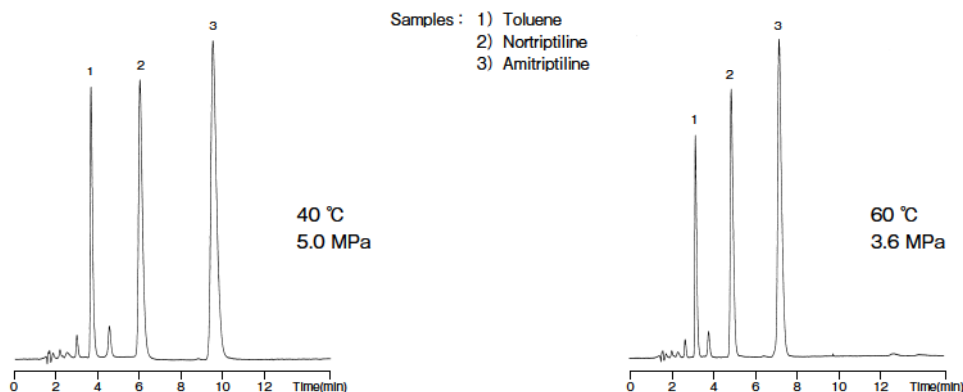
Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 150	S3742
2.0 × 250	S3743

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S3740
4.6 × 250	S3741

Applications

Tricyclic Antidepressant Compounds

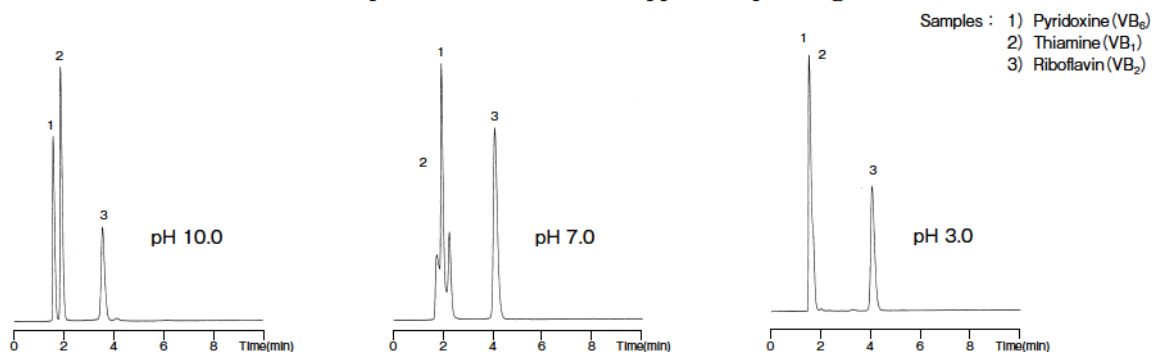
Sharper peaks with the temperature increase



Column : TCI Pack ODS Tough 4.6 mm I.D. × 150 mm
Mobile Phase : Methanol / 20 mmol/L Dipotassium Hydrogenphosphate (pH 7.5) = 80 / 20
Flow Rate : 1.0 mL/min

Vitamine B

Easier optimization in the wide applicable pH range



Column : TCI Pack ODS Tough 4.6 mm I.D. × 150 mm
Mobile Phase : Methanol / 10 mmol/L Phosphate Buffer = 40 / 60
Flow Rate : 1.0 mL/min
Temperature : 25 °C



Kaseisorb LC ODS-PH Super

Kaseisorb LC ODS-PH Super features a unique packing material with characteristics of both ODS and phenyl ligands, providing excellent separations based on hydrophobic and $\pi-\pi$ interactions.

- ODS(C18) : Hydrophobic interactions \longrightarrow Separation based on differences in hydrophobicity
- PH(Phenyl) : $\pi-\pi$ interactions \longrightarrow Separation based on differences in aromaticity/polarity
- ODS-PH : Hydrophobic and $\pi-\pi$ interactions \longrightarrow Separation performance enhanced by both hydrophobic and $\pi-\pi$ interactions

- Pore Diameter : 12 nm Particle Size : 5 μ m Carbon Content : 15 % End Cap : Yes
- Analytes : Hydrophobic compounds, Structurally similar compounds, Steroids

Inside Diameter(mm) × Length(mm)	Product No.
2.0 × 150	S1347
2.0 × 250	S1348
4.6 × 150	S1343
4.6 × 250	S1344

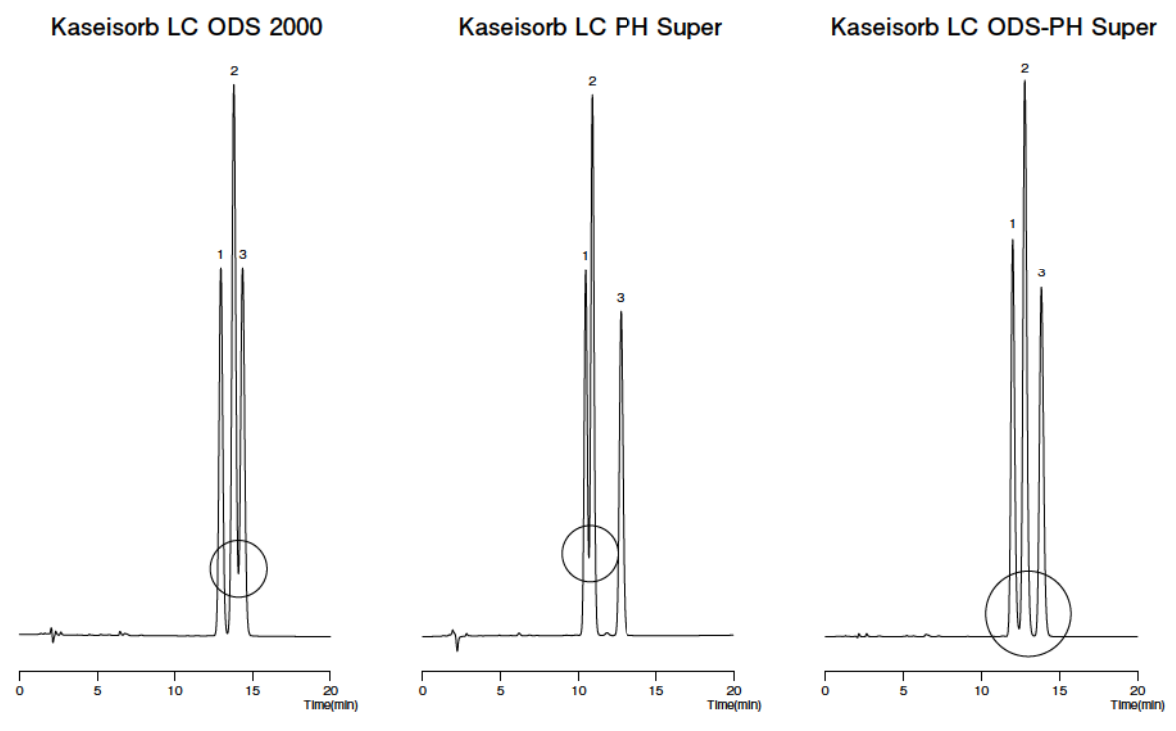
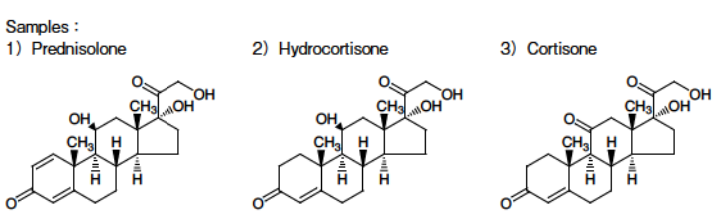
Inside Diameter(mm) × Length(mm)	Product No.
10.0 × 35	S1807
10.0 × 150	S1808
10.0 × 250	S1809
20.0 × 250	S1815

Applications

Comparison of separations of steroids

The following chromatograms for steroid analysis are obtained using ODS Column (Kaseisorb LC ODS 2000), Phenyl Column (Kaseisorb LC PH Super) and ODS-Phenyl Column (Kaseisorb LC ODS-PH Super).

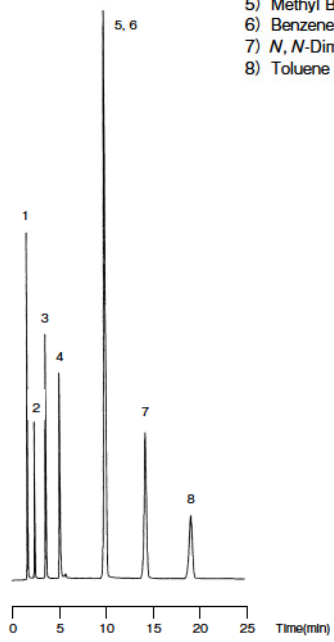
Column Size : 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / Water = 25 / 75
 Detection : UV 260 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C





Standard Materials

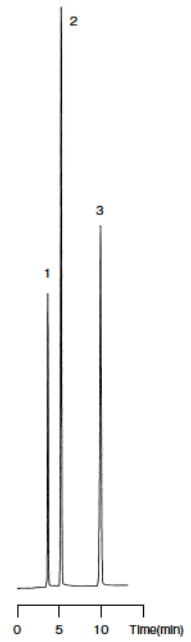
- Samples : 1) Uracil
 2) Caffeine
 3) Phenol
 4) 2-Ethylpyridine
 5) Methyl Benzoate
 6) Benzene
 7) *N,N*-Dimethylaniline
 8) Toluene



Column : Kaseisorb LC ODS-PH Super 4.6 mm I.D. × 150 mm
 Mobile Phase : Methanol / Water = 50 / 50
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Polar Compounds

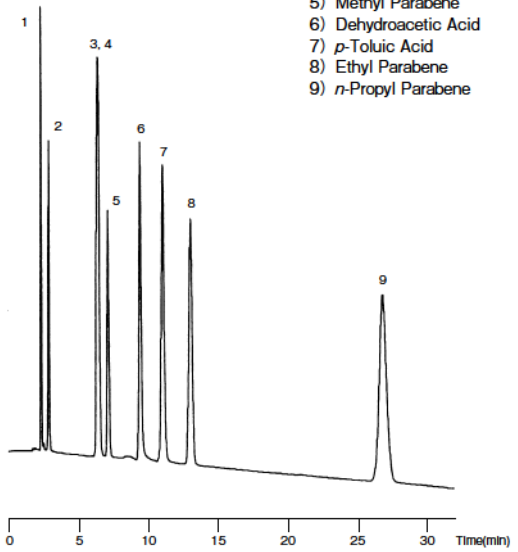
- Samples : 1) Theobromine
 2) Theophylline
 3) Caffeine



Column : Kaseisorb LC ODS-PH Super 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / Water = 10 / 90
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C

Food Additives

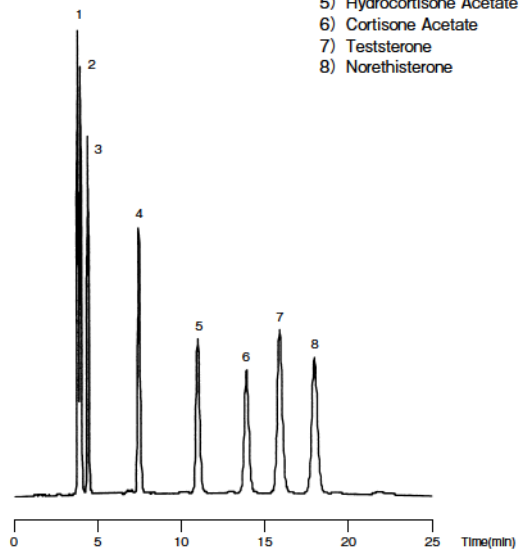
- Samples : 1) Sodium Saccharin
 2) *p*-Hydroxybenzoic Acid
 3) Sorbic Acid
 4) Benzoic Acid
 5) Methyl Parabene
 6) Dehydroacetic Acid
 7) *p*-Toluic Acid
 8) Ethyl Parabene
 9) *n*-Propyl Parabene



Column : Kaseisorb LC ODS-PH Super 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / 50 mmol/L Potassium Dihydrogen Phosphate + 0.1% Phosphoric Acid = 25 / 75
 Detection : UV 230 nm
 Flow Rate : 1.0 mL/min
 Temperature : 40 °C

Steroids

- Samples : 1) Prednisolone
 2) Hydrocortisone
 3) Cortisone
 4) Corticosterone
 5) Hydrocortisone Acetate
 6) Cortisone Acetate
 7) Testosterone
 8) Norethisterone



Column : Kaseisorb LC ODS-PH Super 4.6 mm I.D. × 150 mm
 Mobile Phase : Acetonitrile / Water = 35 / 65
 Detection : UV 254 nm
 Flow Rate : 1.0 mL/min
 Temperature : 25 °C

Chiral
ColumnsMixed-Mode
ColumnsODS
ColumnsOther
ColumnsGuard
Columns

Kaseisorb LC ODS Super

- Pore Diameter : 12 nm ○Particle Size : 5 μm ○Carbon Content : 15 % ○End Cap : Yes
- Phase : Monofunctional silylation on pure silica gel
- Analytes : Hydrophobic compounds, Basic compounds, Acidic compounds

Inside Diameter(mm)×Length(mm)	Product No.
2.0 × 150	S1375
2.0 × 250	S1376

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 30	S1339
4.6 × 150	S1335
4.6 × 250	S1337

Kaseisorb LC ODS-300-5

- Pore Diameter : 30 nm ○Particle Size : 5 μm ○Carbon Content : 5 % ○End Cap : Yes
- Phase : Monofunctional silylation on pure silica gel
- Analytes : ·Proteins, Peptides

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1179
4.6 × 250	S1195

Inside Diameter(mm)×Length(mm)	Product No.
7.5 × 250	S1270

ODS Columns Kaseisorb LC / TCI Pack

Other Columns

Packing materials for all columns are made of high purity silica gel.

Column	Analytes	Feature	Pore Diameter (nm)	Particle Size (μm)	Page
Kaseisorb LC PH Super	Aromatic compounds	Phenyl-bonded type π - π interactions	12	5	48
Kaseisorb LC NH2-60-5	Sugars, VC, etc.	Amino propyl-bonded type	6	5	48
Kaseisorb LC SIL-120-5	Polar compounds	High pure silicagel for normal phase conditions	12	5	48
Kaseisorb LC CN-60-5	Moderate polarity compounds	Cyanopropyl-bonded type	6	5	48

Kaseisorb LC PH Super

- Pore Diameter : 12 nm
- Particle Size : 5 μm
- Carbon Content : 7 %
- End Cap : Yes
- Phase : Monofunctional silylation on pure silica gel
- Analytes : Aromatic Compounds

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1345
4.6 × 250	S1346

Kaseisorb LC SIL-120-5

- Pore Diameter : 12 nm
- Particle Size : 5 μm
- Analytes : Polar compounds

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1007
4.6 × 250	S1107

Kaseisorb LC NH2-60-5

- Pore Diameter : 6 nm
- Particle Size : 5 μm
- Analytes : Sugars, VC

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1099
4.6 × 250	S1119

Kaseisorb LC CN-60-5

- Pore Diameter : 6 nm
- Particle Size : 5 μm
- Carbon Content : 10 %
- Analytes : Moderate polarity compounds

Inside Diameter(mm)×Length(mm)	Product No.
4.6 × 150	S1097
4.6 × 250	S1079

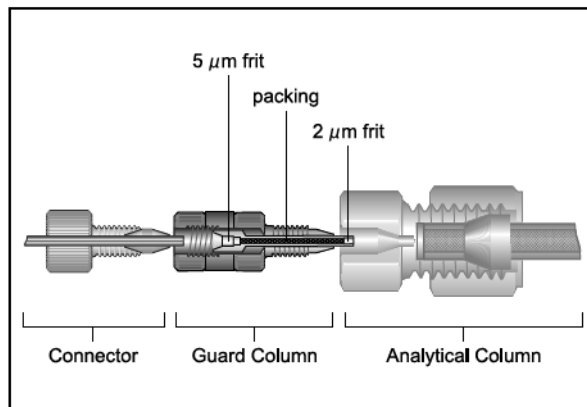
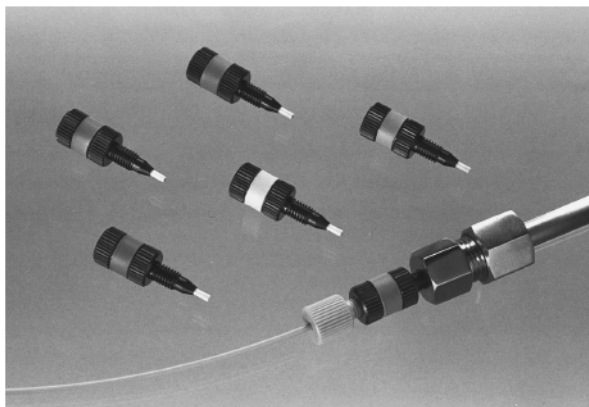
Fitting Type Guard Columns TCI OPTI-GUARD™

The TCI OPTI-GUARD series are compact, high-performance and easy-to-use HPLC guard columns.

1. Hand-tight connection to a main column
2. Universal filling for most columns and zero dead-volume connection without any effect on column performance
3. Compact and space-saving design

TCI OPTI-GUARD™ Fit

The TCI OPTI-GUARD Fit series are very compact guard columns. The column size is 1 mm I.D. × 15 mm. This series is recommended for the further purification of relatively clean samples using either 4.6 mm I.D. or 2.0 mm I.D. HPLC columns.



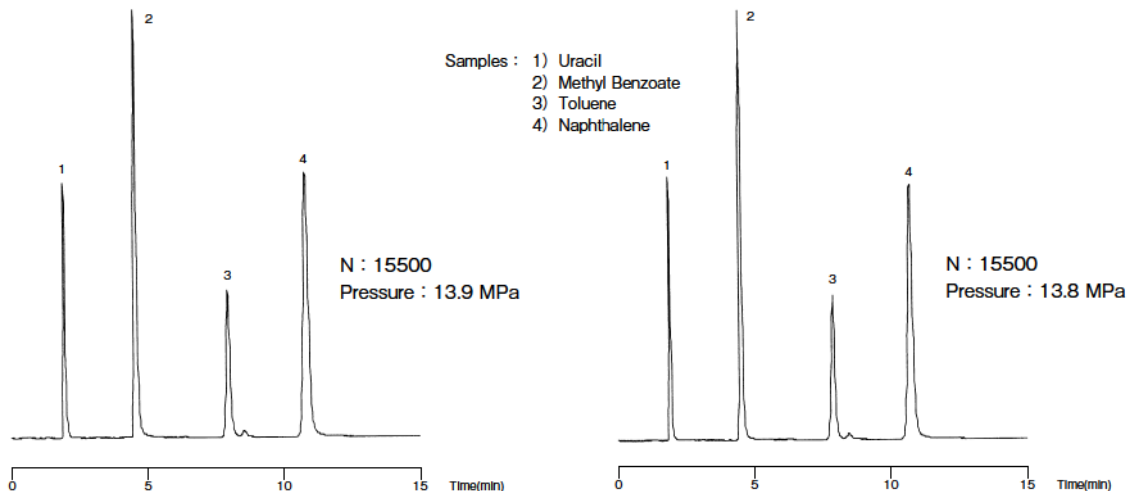
Applications

Comparison of applications (With or without a guard column)

The guard columns do not affect column efficiency.

<With TCI OPTI-GUARD>

<Without TCI OPTI-GUARD>



Column : Kaseisorb LC ODS 2000-3 2.0 mm I.D. × 150 mm
Mobile Phase : Methanol / Water=70 / 30
Detection : UV 254 nm
Flow Rate : 0.2 mL/min
Temperature : Ambient

Chiral
Columns

Mixed-Mode
Columns

ODS
Columns

Other
Columns

Guard
Columns

Fitting Type Guard Columns TCI OPTI-GUARD™



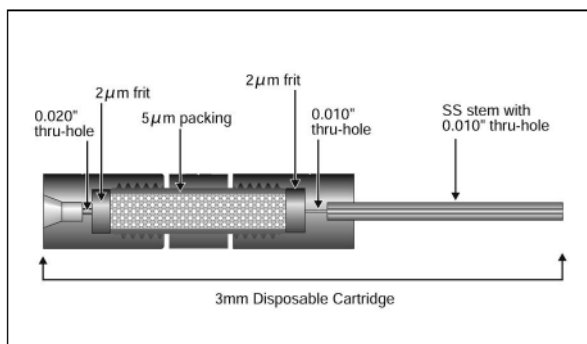
Product Name	Packing material	Product No.
TCI OPTI-GUARD Fit ODS (3 PK)	ODS	S1440
TCI OPTI-GUARD Fit C8 (3 PK)	C8	S1453
TCI OPTI-GUARD Fit PH (3 PK)	Phenyl	S1441
TCI OPTI-GUARD Fit PO (3 PK)	ODS-Phenyl	S1442
TCI OPTI-GUARD Fit SIL (3 PK)	Silica gel	S1443
TCI OPTI-GUARD Fit CN (3 PK)	Cyano	S1444
TCI OPTI-GUARD Fit NH2 (3 PK)	Amino	S1445
TCI OPTI-GUARD Fit SCX (3 PK)	Strong Cation-Exchange	S1446
TCI OPTI-GUARD Fit SAX (3 PK)	Strong Anion-Exchange	S1447
TCI OPTI-GUARD Fit ODS-SCX (3 PK)	ODS + Strong Cation-Exchange	S1448
TCI OPTI-GUARD Fit ODS-SAX (3 PK)	ODS + Strong Anion-Exchange	S1449
TCI OPTI-GUARD Fit MB-S (3 PK)	TCI Chiral MB-S	S3819
TCI OPTI-GUARD Fit BP-S (3 PK)	TCI Chiral BP-S	S3829
TCI OPTI-GUARD Fit CH-S (3 PK)	TCI Chiral CH-S	S3839

TCI OPTI-GUARD™-3

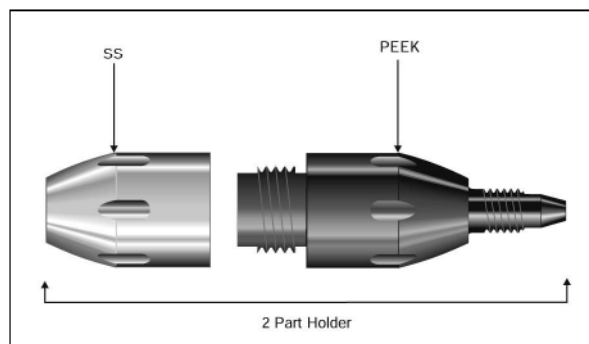
The TCI OPTI-GUARD-3 series are guard column cartridges. The cartridges need to be mounted in a holder. The column size is 3 mmID × 15 mm.

This series is recommended for purifications using 4.6 mmI.D. HPLC columns.

Guard Column



Holder



Product Name	Packing material	Product No.
TCI OPTI-GUARD-3 Cartridge ODS (3 PK)	ODS	S1451
TCI OPTI-GUARD-3 Cartridge SIL (3 PK)	Silicagel	S1452
TCI OPTI-GUARD-3 Cartridge MB-S (1 PK)	TCI Chiral MB-S	S3849
TCI OPTI-GUARD-3 Cartridge BP-S (1 PK)	TCI Chiral BP-S	S3859
TCI OPTI-GUARD-3 Cartridge CH-S (1 PK)	TCI Chiral CH-S	S3869
TCI OPTI-GUARD-3 Holder	—	S1450

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Keyword

Product Number

Keyword Index

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