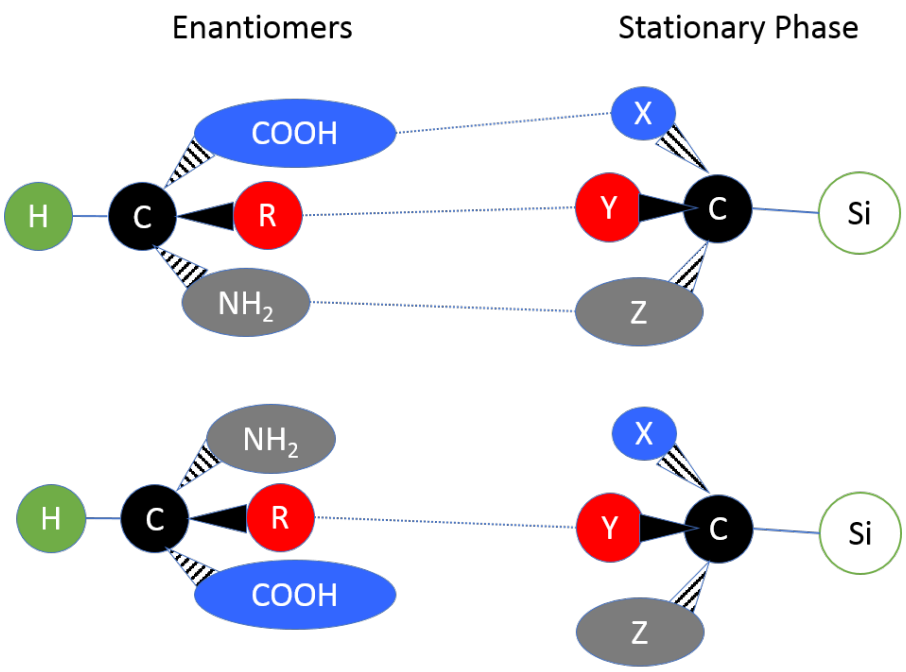
HPLC

chiral columns



www.HPLC.eu

ChiralTek http://hplc.eu/chiraltek.htm

ChiralCE, ChiralCD

ChromTech http://hplc.eu/ct.htm#ChromTech

AGP, HSA, CBH

Cosmosil http://hplc.eu/cosmosil.htm#chiral

Chiral A, B, C (Amylose, Cellulose)

Daicel http://hplc.eu/ct.htm

Chiralpak, Chiralcel, Crownpak

ES Industries http://hplc.eu/es.htm#ChromegaChiral

ChromegaChiral

HiChrom http://hplc.eu/hichrom.htm#chiral

CHIRA-chrom: Phenylglycine, Leucine, Dinitrophenyltartramide

Kromasil http://hplc.eu/kromasil.htm#chiral

AmyCoat, CelluCoat

Macherey-Nagel http://hplc.eu/Downloads/MN_Chiral.pdf

Nucleodex, Nucleocel, Resolvosil

Merck http://hplc.eu/Downloads/Merck_chiradex.pdf

ChiraDex

Regis http://hplc.eu/regis.htm

Whelk-O1, Reflect-Amylose, Reflect-Cellulose

RStech http://hplc.eu/Downloads/RStech_Chirosil.pdf

ChiroSil

Shinwa http://hplc.eu/ultron.htm#chiral

Ultron ES OVM, Pepsin, CD, BSA

Shiseido http://hplc.eu/Downloads/Shiseido_chiral_columns.pdf

Ceramospher, Chiral CD-Ph

ChiralTek

Solutions for Chiral Separations & Sample Preparations

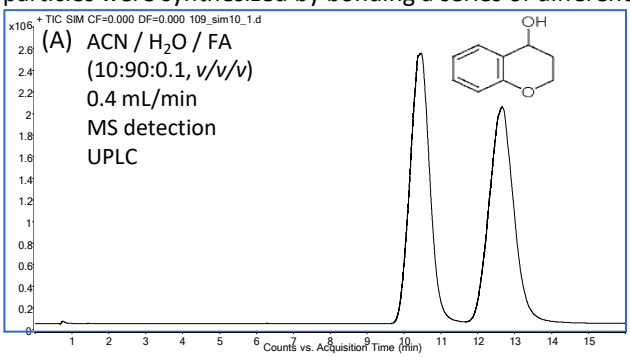
ChiralCE and ChiralCD Columns

Please visit English website http://chiraltek-column.com for downloading the full product manual and application notes .

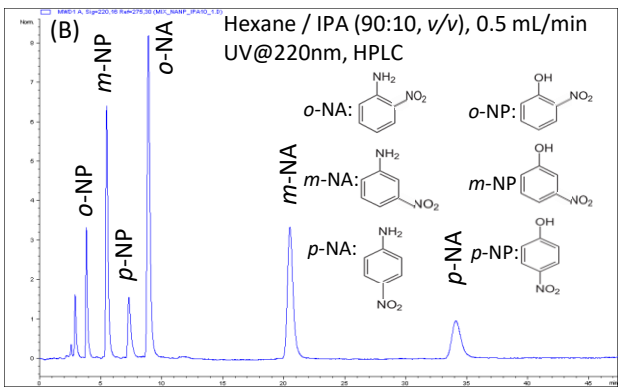
ChiralTek focuses on providing solutions for high-efficient chiral separations and automatic sample preparations. At present, ChiralTek manufactures novel types of cellulose-immobilized ChiralCE and cyclodextrin-immobilized ChiralCD chiral columns for analytical HPLC & UPLC and preparative HPLC. ChiralTek also manufactures a new type of HLE and UPE extraction cartridges and novel automated sample analyzers for automatic sample preparation and automatic sampling or automatic delivery of reagents to chemical & biological reactors at different time points.

1. Novel Cellulose-immobilized ChiralCE and Cyclodextrin-immobilized ChiralCD Columns

ChiralCE columns are a new type of cellulose-immobilized chiral columns. By using a specially-designed procedure, the ChiralCE particles were prepared by bonding the chemically-modified celluloses containing both ChiralTek proprietary group and other common functional groups onto high-quality porous silica particles. The ChiralCD particles were synthesized by bonding a series of different functional groups-substituted α-, β-, or γ-cyclodextrins onto the porous silica by linking ChiralTek proprietary spacer arms at the wider torus rims of the cyclodextrins. These novel ChiralCE and ChiralCD particles-packed columns can be used in UPLC(Fig A) and HPLC (Fig B).

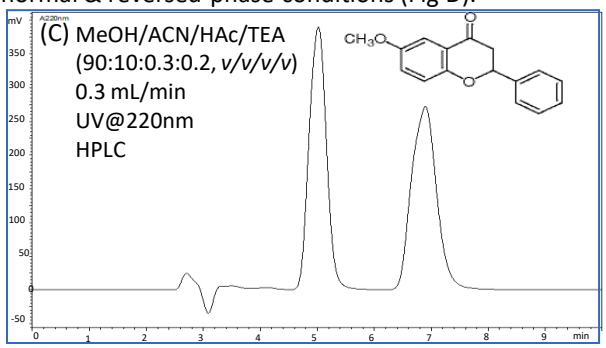


Fig(A). Chiral separation of 4-Chromanol on ChiralCD-1 column (3µm, 150 x 2mm) under reversed-phase condition in UPLC.

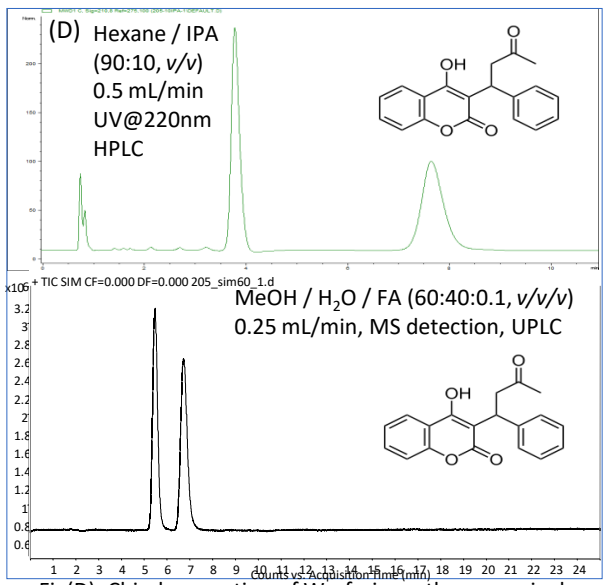


Fig(B). Separation of positional isomers *o-*, *m-*, *p*-Nitrophenols (NP) and *o-*, *m-*, *p*-Nitroanilines (NA) on ChiralCE-2 column (3µm, 150 x 2mm) under normal-phase condition in HPLC.

Since the chemical structure and bonding procedure are different from other suppliers' columns, ChiralCE and ChiralCD columns can provide different and usually better chiral separations than other suppliers' columns. Moreover, the single ChiralCE or ChiralCD column can be used under both polar organic condition (Fig C) and normal & reversed-phase conditions (Fig D).



Fig(C). Chiral separation of 6-Methoxyflavanone on ChiralCD-5 column (3µm, 150 x 2mm) under polar organic mode in HPLC.



Fig(D). Chiral separation of Warfarin on the same single ChiralCE-2 column (3µm, 150 x 2mm) under both normal and reversed-phase conditions in HPLC and UPLC.

2. ChiralTek columns with special chiral selectors for excellent performance and durability

Due to the contribution of special chiral selectors and unique bonding procedure, the ChiralCE and ChiralCD columns exhibited excellent column capacity, versatility, and durability under polar organic, normal, and reversed-phase conditions for separation of up to 80% chiral chemicals and almost all types of non-chiral organic compounds. When your existing chiral columns are not able to solve your problem, you may have a perfect solution with one of the ChiralCE or ChiralCD column from ChiralTek.

Fast screening on CHIRAL-AGP, CHIRAL-CBH and CHIRAL-HSA

By applying our screening methods it is possible to develop methods very fast for an extremely broad range of compounds. Two different approaches can be choosen:

I. With sample characterization
II. Without sample characterization

I. Screening with sample characterization

This is the recommended screening method. The advantage of the method is that by classifying the sample using the six groups in the table below, it is possible to choose the starting columns and the starting mobile phase. The time to reach an optimized method will be shorter with this approach.

In the table below six different groups of compounds are listed. It is also indicated which columns should be tested for each compound group.

Group	Type of compound	AGP	CBH	HSA
1.	Hydrophobic amine	X	X	
2.	Hydrophilic amine	X	X	
3.	Nonprotolyte	X		X
4.	Ampholyte	X		X
5.	Weak acid	X		X
6.	Strong acid	X		X

When the sample has been characterized according to the table, the appropriate columns are tested using the mobile phases outlined below.

Mobile phases

In the next table is a list of suggested starting mobile phases for the different groups of compounds. As can be seen, there are only a few mobile phases that cover the extremely broad range of compounds on all three columns.

Need more literature? Please order from support@chromtech.co.uk

Starting mobile phase Compound group 1:
CHIRAL-AGP: 10 mM amm. or sod. acetate pH 4.5
CHIRAL-CBH: 5% 2-propanol in 10 mm sod.ph.b. pH 6.0

Starting mobile phase Compound groups 2, 3 and 5:
All columns: 5% 2-propanol in 10 mM sod.ph.b. pH 7.0

Starting mobile phase Compound groups 4 and 6:
All columns: 10 mM sod.ph.b. pH 7.0

The results obtained using the starting mobile phase can then be developed further using the Method Development Schemes supplied with each column.

II. Screening without sample characterization

This is a screening method where characterization of the sample is not needed. All types of compounds are tested on all three columns using three different mobile phases:

- 5% 2-propanol in 10 mM sod.ph.b. pH 7.0
- 5% 2-propanol in 10 mM sod.ph.b. pH 6.0
- 2% 2-propanol in 10 mM amm.ac.b. pH 5.0

Depending on the results obtained when using these three mobile phases, the most suitable column is choosen for method development. The Method Development Scheme for that particular column is used for optimization.

Although this method might seem tempting compared to the first approach, as it is not necessary to determine the character of the sample, there is a possibility to miss out on a separation. **CHIRAL-AGP**, **CHIRAL-CBH** and **CHIRAL-HSA** all have the extra dimension that enantioselectivity can be induced by changes in the mobile phase (i.e. pH, modifier etc.).

With the use of the first approach above, **screening with sample characterization**, a very large amount of compounds are tested and resolved every year in the Free Screening Service provided by ChromTech.

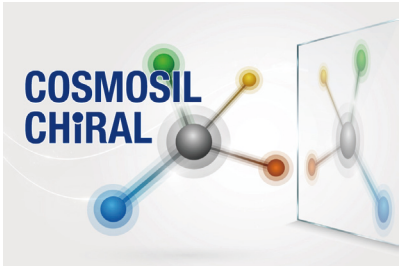
ChromTech Ltd., Congleton, U.K. Tel: +44 1260 270153 Fax: +44 1260 274394 E-mail: support@chromtech.co.uk

COSMOSIL

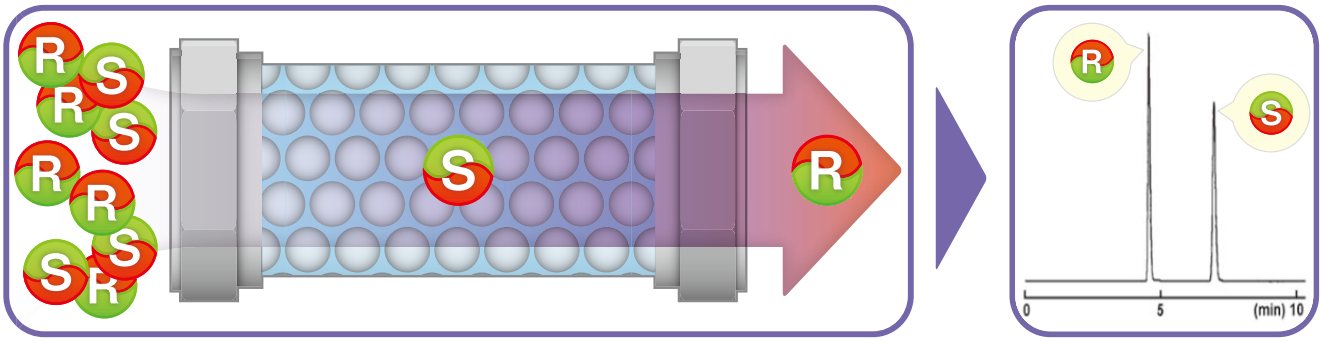
Immobilized Polysaccharide Derivative-Based Chiral Columns

COSMOSIL CHiRAL Series

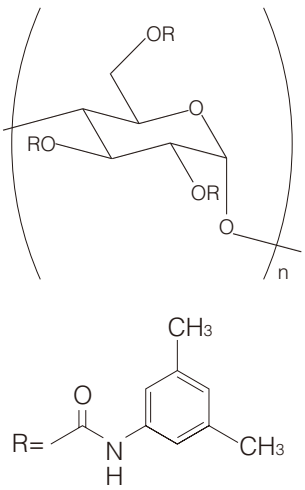
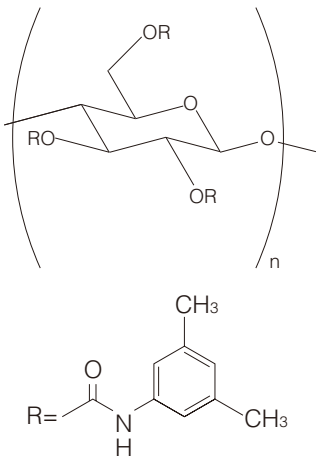
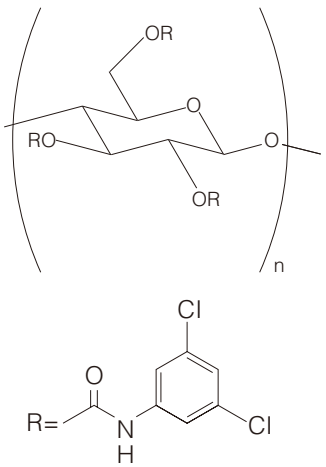
- *Immobilized chiral selectors can withstand many different solvents*
- *Sharpen peaks with 3 µm particles*
- *Preparative separations with 5 µm particles*
- *Equivalent performance to columns currently on the market*
- *Competitive price*



Conceptual Model

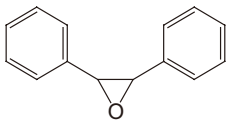
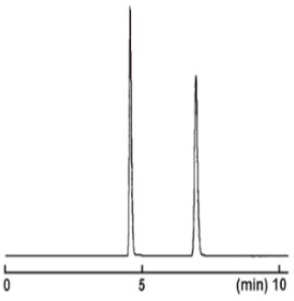
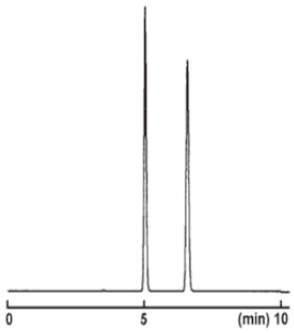
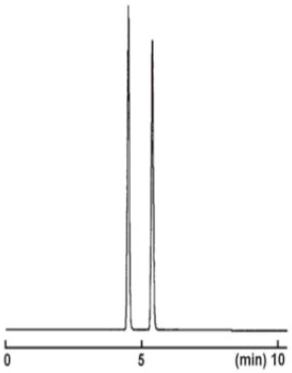
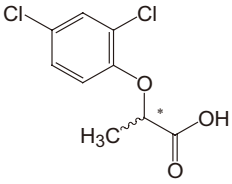
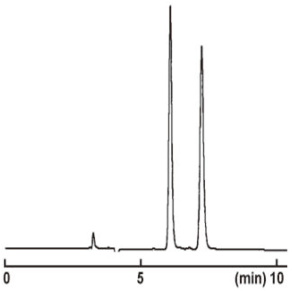
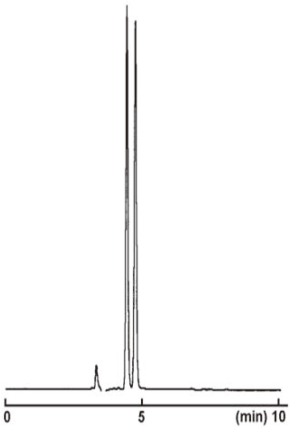
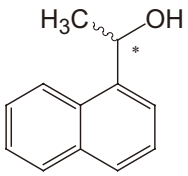
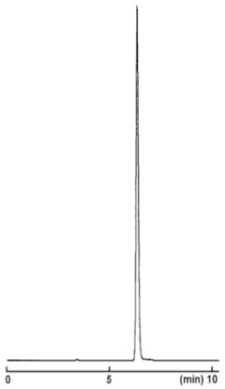
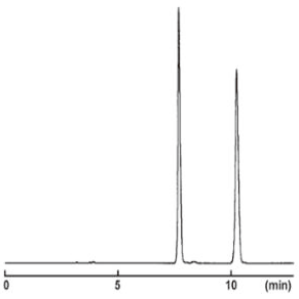
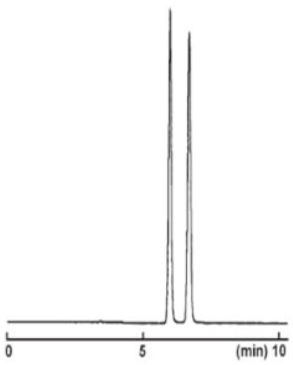
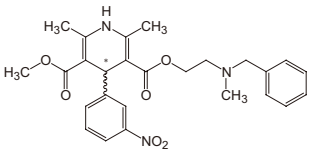
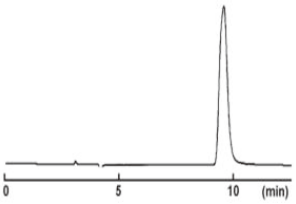
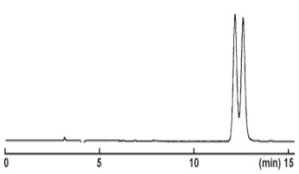
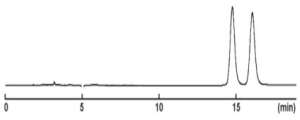


COSMOSIL CHiRAL Series

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

Column Selection

COSMOSIL CHiRAL offers 3 different chiral selectors that, together, have a high probability of separating your sample. Of 28 samples in our test, 27 pairs of enantiomers were fully separated. For samples that do not separate easily with any column, please adjust the type and concentration of solvents in your mobile phase.

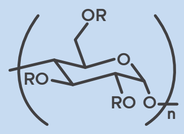
Sample, mobile phase	COSMOSIL CHiRAL A	COSMOSIL CHiRAL B	COSMOSIL CHiRAL C
trans-Stillbene oxide  Hexane / *2*-Propanol = 90 / 10	Complete Separation 	Complete Separation 	Complete Separation 
2-(2,4-Dichlorophenoxy) propionic acid  Hexane / 2-Propanol / TFA = 95 / 5 / 0.1	Complete Separation 		Complete Separation 
1-(1-Naphthyl)ethanol  Hexane / *2*-Propanol = 90 / 10		Complete Separation 	Complete Separation 
Nicardipine  Hexane / *2*-Propanol / Diethylamine = 90 / 10 / 0.1			Complete Separation 
Chiral selector hit rate*(n = 28)	**60.7%**	**67.9%**	**71.4%**

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

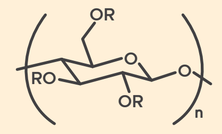
CHIRAL SELECTORS NAMES & STRUCTURES

STRUCTURES OF COMMERCIALLY AVAILABLE DAICEL CHIRAL STATIONARY PHASES

AMYLOSE DERIVATIVES



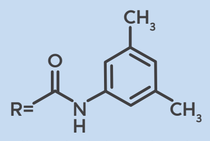
CELLULOSE DERIVATIVES



IMMOBILIZED POLYSACCHARIDE SELECTORS

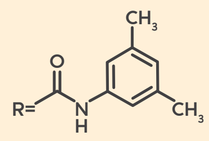
PRIMARY SCREENING SET

CHIRALPAK® IA



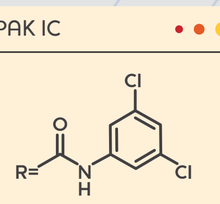
tris (3,5-dimethylphenylcarbamate)

CHIRALPAK IB (-N)



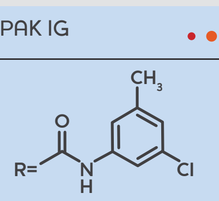
tris (3,5-dimethylphenylcarbamate)

CHIRALPAK IC



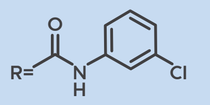
tris (3,5-dichlorophenylcarbamate)

CHIRALPAK IG



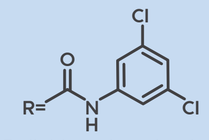
tris (3-chloro-5-methylphenylcarbamate)

CHIRALPAK ID



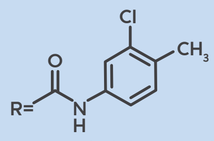
tris (3-chlorophenylcarbamate)

CHIRALPAK IE



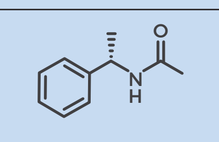
tris (3,5-dichlorophenylcarbamate)

CHIRALPAK IF



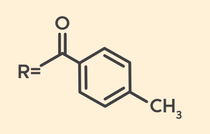
tris (3-chloro-4-methylphenylcarbamate)

CHIRALPAK IH



tris (S)-α-methylbenzylcarbamate

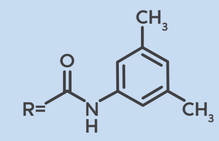
CHIRALKPAK IJ



tris (4-methylbenzoate)

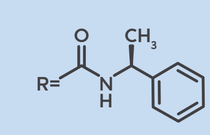
COATED POLYSACCHARIDE SELECTORS

CHIRALPAK AD



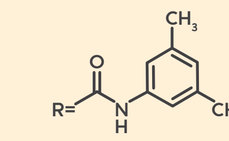
tris (3,5-dimethylphenylcarbamate)

CHIRALPAK AS



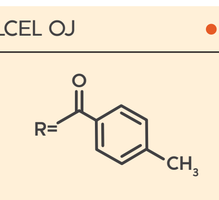
tris (S)-α-methylbenzylcarbamate

CHIRALCEL® OD



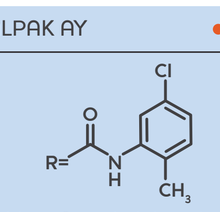
tris (3,5-dimethylphenylcarbamate)

CHIRALCEL OJ



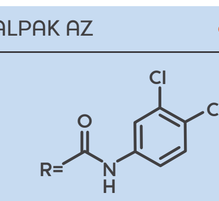
tris (4-methylbenzoate)

CHIRALPAK AY



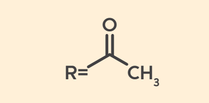
tris (5-chloro-2-methylphenylcarbamate)

CHIRALPAK AZ



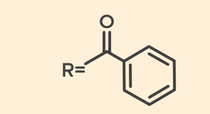
tris (3-chloro-4-methylphenylcarbamate)

CHIRALCEL® OA



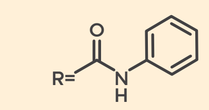
Triacetate

CHIRALCEL OB



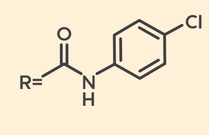
Tribenzoate

CHIRALCEL OC



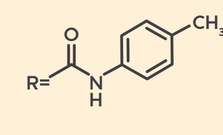
tris (phenylcarbamate)

CHIRALCEL OF



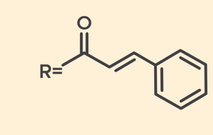
tris (4-chlorophenylcarbamate)

CHIRALCEL OG



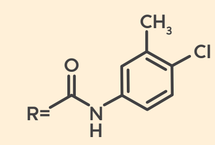
tris (4-methylphenylcarbamate)

CHIRALCEL OK



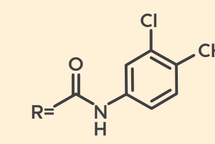
Tricinnamate

CHIRALCEL OX



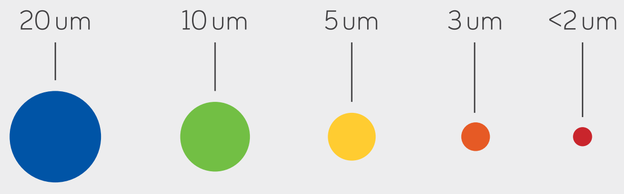
tris (4-chloro-3-methylphenylcarbamate)

CHIRALCEL OZ



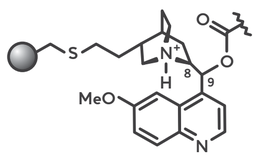
tris (3-chloro-4-methylphenylcarbamate)

LEGEND

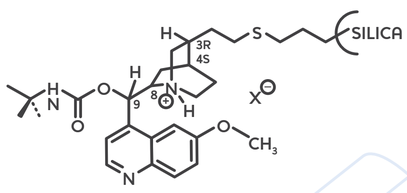


SELECTORS FOR SPECIAL APPLICATIONS

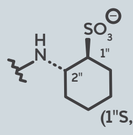
ZWITTERION EXCHANGER



ANION EXCHANGER



CHIRALPAK ZWIX(+)



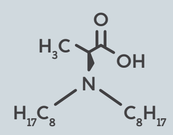
Quinine-derived (8S, 9R)

CHIRALPAK QN-AX

O-9-(*tert*-butylcarbamoyl) quinine

LIGAND EXCHANGER

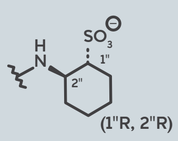
CHIRALPAK MA(+)



CROWN ETHER AND IMMOBILIZED CROWN ETHER

CROWNPAK® CR(+) CROWNPAK CR-I(+)

CHIRALPAK ZWIX(-)

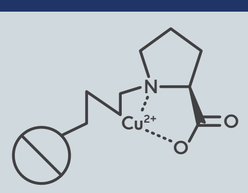


Quinidine-derived (8R, 9S)

CHIRALPAK QD-AX

O-9-(*tert*-butylcarbamoyl) quinidine

CHIRALPAK WH



CROWNPAK CR(-) CROWNPAK CR-I(-)

PROTEIN-BASED SELECTORS

- CHIRALPAK AGP — α_1-acid glycoprotein
- CHIRALPAK BSA — bovine serum albumin
- CHIRALPAK CBH — cellobiohydrolase (stable enzyme)
- CHIRALPAK DSA — dog serum albumin
- CHIRALPAK HSA — human serum albumin
- CHIRALPAK MSA — mouse serum albumin
- CHIRALPAK PSA — pig serum albumin
- CHIRALPAK RSA — rat serum albumin

USP CODE DESIGNATIONS

L32	L40	L41	L51	L66	L70	L75	L79	L80	L90
CHIRALPAK WH	CHIRALCEL OD CHIRALCEL OD-H CHIRALCEL OD-3	CHIRALPAK AGP	CHIRALPAK AD CHIRALPAK AD-H CHIRALPAK AD-3	CROWNPAK CR(+)	CHIRALCEL OC-H	CHIRALPAK BSA	CHIRALPAK HSA	CHIRALCEL OJ CHIRALCEL OJ-H CHIRALCEL OJ-3	CHIRALPAK AS CHIRALPAK AS-H CHIRALPAK AS-3
L93	**L99**	**L107**	**L108**	**L117**	**L119**				
CHIRALCEL OD-RH CHIRALCEL OD-3R	CHIRALPAK IA CHIRALPAK IA-3	CHIRALCEL OJ-RH	CHIRALPAK CBH	CROWNPAK CR(-)	CHIRALPAK IC CHIRALPAK IC-3				

CHIRAL TECHNOLOGIES / DAICEL GROUP – LOCATIONS

NORTH/LATIN AMERICA

Chiral Technologies, Inc.
800 North Five Points Road
West Chester, PA 19380
Tel: +1-610-594-2100
Fax: +1-610-594-2325
Email: chiral@cti.daicel.com
www.chiraltech.com

EUROPE

Chiral Technologies Europe SAS
Parc d'Innovation -
160, Bd Gonthier d'Andernach - CS 80140
67404 Illkirch Cedex FRANCE
Tel: +33 (0) 3 88 79 52 00
Fax: +33 (0) 3 88 66 71 66
Email: cte@cte.daicel.com
www.chiraltech.com

INDIA

Daicel Chiral Technologies (India) Pvt. Ltd.
Survey No.542/2, IKP Knowledge Park,
Turkapally, Shamirpet Mandal,
Medchal-Malkajgiri District,
Hyderabad-500101. Telangana, India
Tel : +91 84 1866 0700 or +91 84 1866 0703
Fax : +91 84 1866 0730
Email: chiral@chiral.daicel.com
www.chiraltech.com

CHINA

Daicel Chiral Technologies (China) Co., Ltd
No. 32, HeXiang Road
Waigaoqiao FreeTradeZone, Post code: 200131
Shanghai, China
Tel: +86 21 504 60086
Fax: +86 21 504 62321
Email: chiral@dctc.daicel.com
www.daicelchiraltech.cn

ASIA

Daicel Corporation
CPI Company
JR Shinagawa East Building
2-18-1, Konan, Minato-ku
Tokyo 108-8230 JAPAN
Tel: +81 (0) 3 6711 8221
Fax: +81 (0) 3 6711 8228
Email: chiral@jp.daicel.com
www.daicelchiral.com

DAICEL

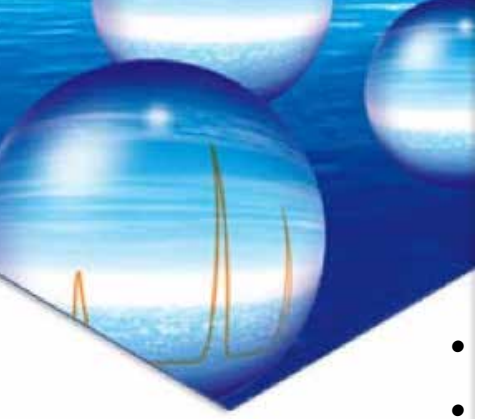
WWW.CHIRALTECH.COM

CHIRAL TECHNOLOGIES
DAICEL GROUP

ChromegaChiral™
CSP Media and Columns

pharmaceutical • environmental • chemical • biochemical
separation & purification

ES Industries • 701 S. Route 73 • West Berlin, NJ 08091 USA
856-753-8400 • 800-356-6140 • Fax 856-753-8484
Visit our web site at www.esind.com or call 1-800-356-6140
Email: info@esind.com



ChromegaChiral
Innovative Chiral Stationary Phases Designed to be your Chiral Solution

- *A Recognized Supplier of Quality CSP Media and Columns*
- *Available in 3, 5, 10 and 20 micron for Analytical and Preparative*
- *Comprehensive Technical and Method Development Assistance*
- *A Premium Chiral Column Manufacturer Producing Highly Efficient Columns with Superior Reproducibility*
- *Extensive Capabilities to Produce State-of-the-Art CSP Chemistries*
- *The Experience to Provide Chromatographers with the Best in Chiral Column Technology*

Chiral Stationary Phases (CSP) and Chirality

Chirality has become critically important in the pharmaceutical, chemical, and agricultural industries. The subtle differences that make compounds chiral can produce dramatically different pharmacological effects in biological systems. As a result, the demand for stereoselective separation techniques and analytical assays to evaluate the enantiomeric purity of chiral compounds, has increased. Chiral chromatography in the forms of HPLC and SFC has become a necessary tool - not only for the analytical determination of enantiomeric purity, but also for the isolation and purification of enantiomers.

As a leader in chiral separations we are able to offer you a broad range of Chiral Stationary Phases (CSPs) for your analytical and preparative chromatography needs. Existing chiral stationary phases can separate a wide variety of chiral mixtures, however there are still enantiomeric mixtures that are difficult to separate limiting their characterization. This provides our drive to develop new CSP's with differing chiral selectivities.

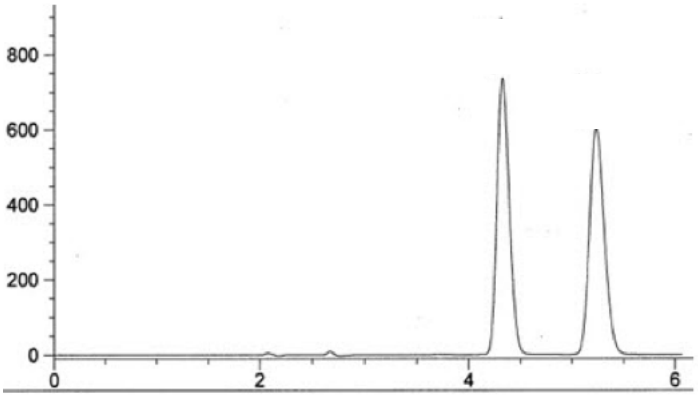
Product Features Include:

- Excellent Selectivity Range
- Wide Range of Applications
- Superior Resolution and Efficiency
- High Pressure Limit
- Fast Optimization
- One column for both SFC and HPLC use

ChromegaChiral CCO

A polysaccharide coated chiral stationary phase and columns which are produced using a unique production process of coating the proven chiral selector, tris-(3,5-dimethylphenyl) carbamoyl cellulose on high purity, high performance silica. ChromegaChiral CCO columns are available in 3, 5, 10, and 20 micron particle sizes enabling easy scale up from analytical to preparative scale using HPLC or SFC conditions. Similar in selectivity to ChiralPak® OD.

ChromegaChiral CCO 250 X 4.6 mm 5 µm Catalog # 155251-CCO



ChromegaChiral CCO Separation of Flavanone
Mobile Phase: Hexane:IPA (90:10 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 254nm

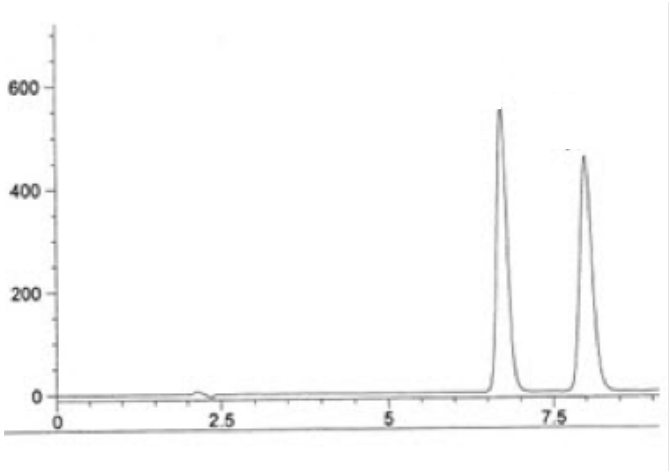
Available ChromegaChiral Phases:

ChromegaChiral CCA	ChromegaChiral CCO-F2	ChromegaChiral CCX
ChromegaChiral CCA-F4	ChromegaChiral CCO-F4	ChromegaChiral CC2
ChromegaChiral CCC	ChromegaChiral CCO-F4 T3	ChromegaChiral CC3
ChromegaChiral CCJ	ChromegaChiral CCS	ChromegaChiral CC4
ChromegaChiral CCO	ChromegaChiral CCU	

ChromegaChiral CCA

A polysaccharide coated chiral stationary phase and columns which are produced using a unique production process of coating the proven chiral selector, tris-(3,5-dimethylphenyl) carbamoyl amylose on high purity silica gel. ChromegaChiral CCA columns, similar in selectivity to ChiralPak® AD, are available in 3, 5, 10, and 20 micron particle sizes enabling easy scale up from analytical to preparative scale using HPLC or SFC conditions.

ChromegaChiral CCA 250 X 4.6 mm 5 µm Catalog # 155251-CCA

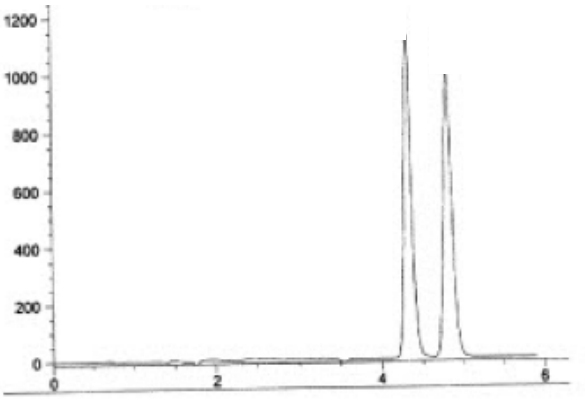


ChromegaChiral CCA Separation of Ketoprofen
Mobile Phase: Hexane:Ethanol (90:10 v/v) + 0.1% TFA
Temperature: 25°C
Flow Rate: 1.5 mL/min
Detection: UV @ 254 nm

ChromegaChiral CC2

A modified cellulose including 3-chloro-4 methylphenylcarbamate bonding groups coated on high purity, high performance spherical silica particles. This combination of bonded groups stabilizes the solubility of coated phase making for a durable phase similar to other widely used coated phases and provides for similar separation behavior to Phenomenex Lux® Cellulose-2

ChromegaChiral CC2 250 X 4.6 mm 5 µm Catalog # 155251-CC2

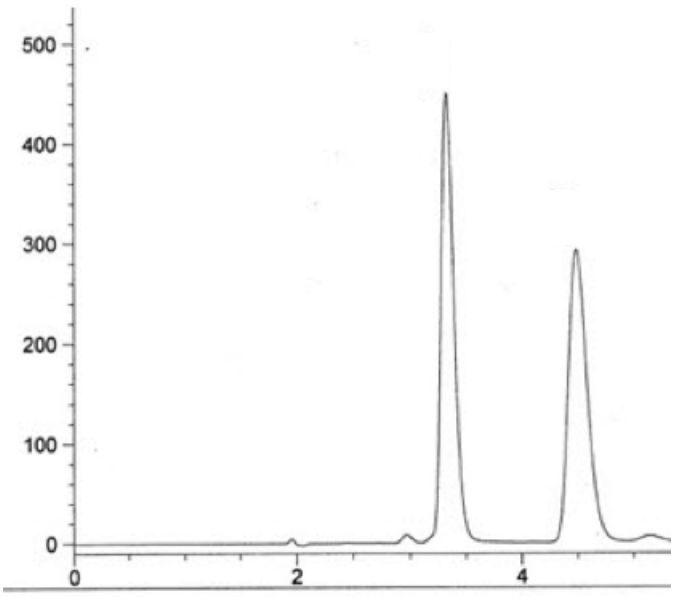


ChromegaChiral CC2 Separation of Metoprolol
Mobile Phase: Hexane:Ethanol (80:20 v/v) + 0.1% DEA
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 220nm

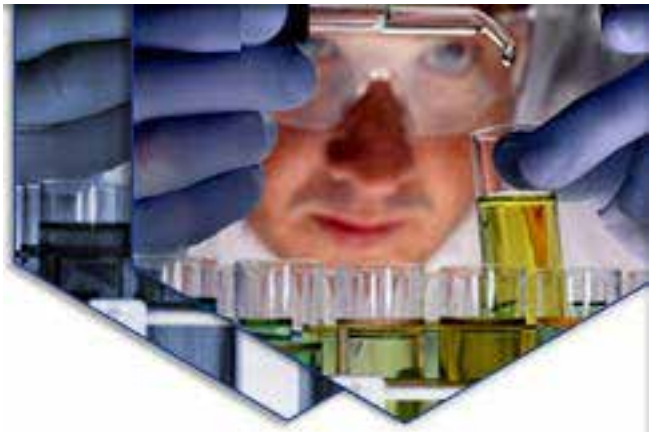
ChromegaChiral CCC

A modified cellulose including the combination of 3-chloro-4 methylphenylcarbamate and 3,5-dichlorophenylcarbamate bonding groups coated on high purity, high performance spherical silica particles. This combination of bonded groups stabilizes the solubility of coated phase making for a durable phase similar to other widely used coated phases. The use of cellulose modified with chlorinated phenyl groups provides for the separation for many previously unresolved/poorly resolved chiral mixtures by providing unique separation characteristics.

ChromegaChiral CCC 250 X 4.6 mm 5 µm Catalog # 155251-CCC

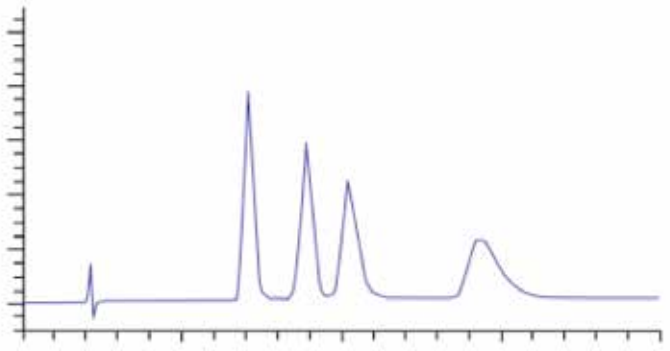


ChromegaChiral CCC Separation of Warfarin
Mobile Phase: Hexane:Ethanol (70:30 v/v) + 0.1% Acetic Acid
Temperature: 25°C
Flow Rate: 1mL/min
Detection: UV @ 254 nm



ChromegaChiral CC3

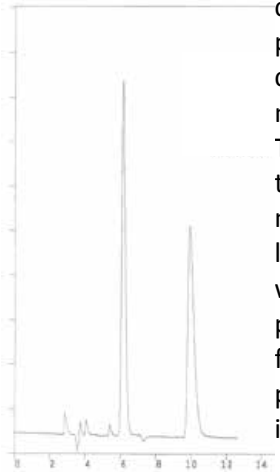
ChromegaChiral CC3 (amylose tris(5-chloro-2-methylphenylcarbamate) is a new product for high resolution chiral separations based on a new halogenated carbohydrate based chiral stationary phase. Similar in selectivity to ChiralPak® AY-H.



ChromegaChiral CC3 Separation of Cyclandelate
Mobile Phase: Hexane:Ethanol (95:5 v/v)
Temperature: 25°C
Flow Rate: 1.5 mL/min
Detection: UV @ 220nm

ChromegaChiral CC4

ChromegaChiral CC4 (cellulose tris(4-chloro-3-methylphenylcarbamate) is another new product for high resolution chiral separations based on a new halogenated carbohydrate based chiral stationary phase. It is a modified cellulose coated on high purity, high performance spherical silica particles. The chemical modification includes the chemical bonding of 4-chloro-3 methylphenylcarbamate to cellulose. The use of cellulose modified with chlorinated phenyl groups provides a separation opportunity for many previously unresolved and poorly resolved chiral mixtures. Similar in selectivity to ChiralPak® OZ-H.



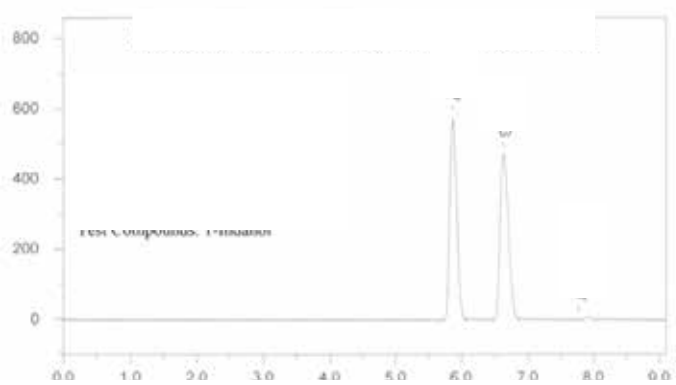
ChromegaChiral CC4 Separation of Hydrobenzoin
Mobile Phase: Ethanol:Hexane (15:85 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 220nm

ChromegaChiral CC4 250 X 4.6 mm 5 µm Catalog # 155251-CC4

ChromegaChiral CCS

ChromegaChiral CCS (amylose tris [(S)-α-methylbenzylcarbamate]) permits the enantiomeric separation of 1-Indanol without the addition of DEA (Diethyl amine). Historically DEA has been commonly used to improve peak shape for chiral separations of compounds such as 1-Indanol. ChromegaChiral CCS separates the 1-Indanol enantiomers with sharp peaks without DEA, providing superior chiral separations, sample loading and peak shape performance. Similar in selectivity to ChiralPak® AS-H.

ChromegaChiral CCS 250 X 4.6 mm 5 µm Catalog # 155251-CCS

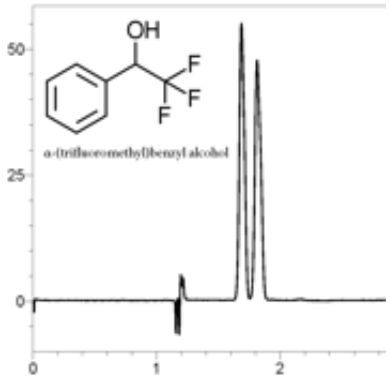


ChromegaChiral CCS Separation of 1-Indanol without DEA additive
Mobile Phase: Hexane:IPA (90:10 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 254nm

ChromegaChiral CCA F4

ChromegaChiral CCA F4 is a 4-Fluoro 3-methylphenyl amylose phase which can be used in SFC or HPLC. The addition of a fluorine atom into a phenyl carbamate amylose structure can be useful in promoting a fluorophilic retention mechanism which can provide improved retention for fluorinated compounds.

ChromegaChiral CCA-F4 250 X 4.6 mm 5 µm Catalog # 155251-CCA-F4

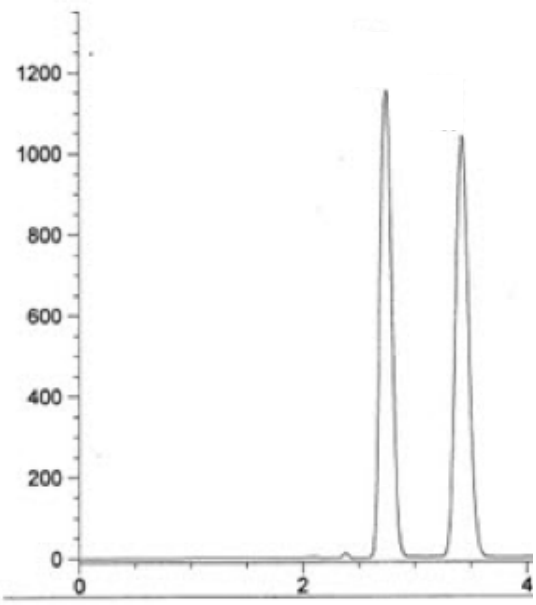


ChromegaChiral CCA-F4
Mobile Phase: 5% Methanol/CO2
Temperature: 40°C
Flow Rate: 3 mL/min
BPR: 100 Bar
Detection: UV @ 254nm

ChromegaChiral CCO F2

ChromegaChiral CCO F2 is a 2-Fluoro 5-methylphenyl cellulose phase which can be used in SFC or HPLC. The addition of a fluorine atom into a phenyl carbamate cellulose structure can be useful in promoting a fluorophilic retention mechanism which can provide improved retention for fluorinated compounds. A fluorophilic retention mechanism can be particularly useful in medicinal chemistry and drug discovery, where more than a third of newly approved small molecule drugs contain fluorine.

ChromegaChiral CCO F2 250 X 4.6 mm 5 µm Catalog # 155251-CCO-F2



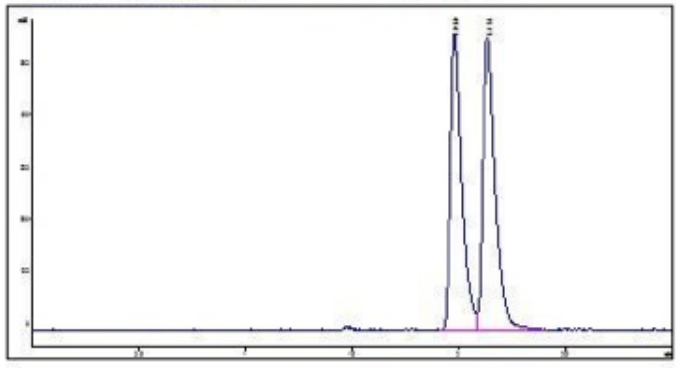
ChromegaChiral CCO F2 HPLC Separation of Cyclandelate
Mobile Phase: Hexane:IPA (80:20 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 220nm

ChromegaChiral CCO F2 SFC Separation of Warfarin
Mobile Phase: CO_2:Methanol (80:20 v/v)
Temperature: 10°C
Flow Rate: 4 mL/min
Pressure: 350 Bar

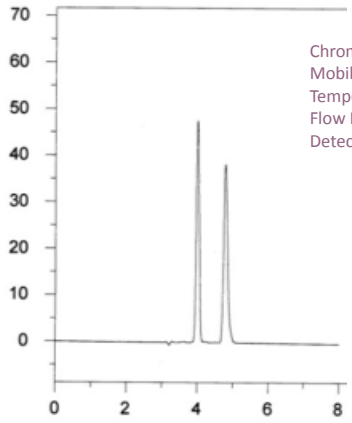
ChromegaChiral CCO F4

ChromegaChiral CCO F4 is a 4-Fluoro 3-methylphenyl cellulose phase which can be used in SFC or HPLC. The addition of a fluorine atom into a phenyl carbamate cellulose structure is useful in promoting a fluorophilic retention mechanism which provides improved retention for fluorinated compounds. A fluorophilic retention mechanism is particularly useful in medicinal chemistry and drug discovery, where more than a third of newly approved small molecule drugs contain fluorine.

ChromegaChiral CCO F4 250 X 4.6 mm 5 µm Catalog # 155251-CCO-F4

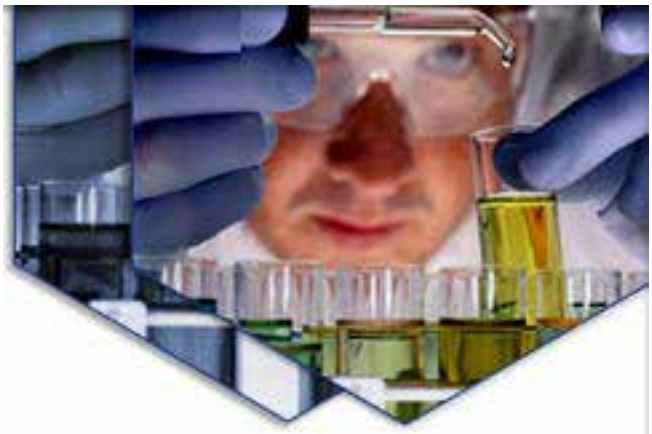


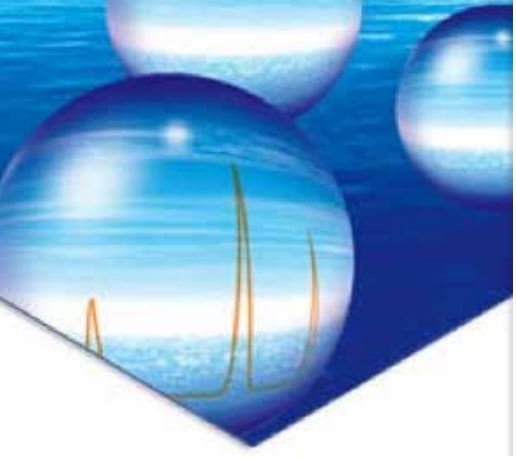
ChromegaChiral CCO F4 SFC Separation of Difluoro-R-Benzoate in 3 minutes
Mobile Phase: CO_2 100%
Temperature: 10°C
Flow Rate: 4 mL/min
Pressure: 350 Bar



ChromegaChiral CCO F4 HPLC Separation of TSO
Mobile Phase: Hexane:IPA (90:10 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 254nm

For ordering information please see Page 7.

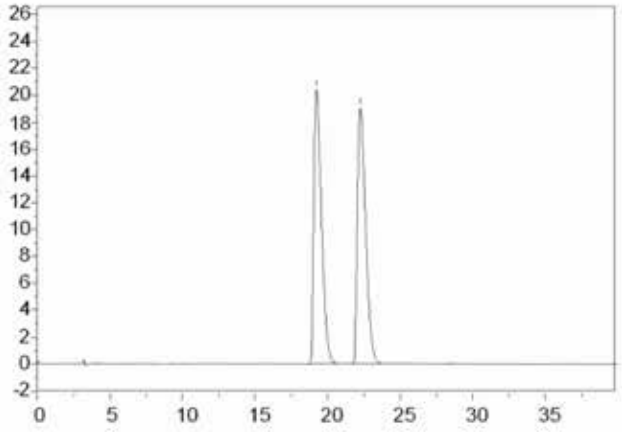




ChromegaChiral CCJ

ChromegaChiral CCJ (cellulose 4-methylbenzoate) is a new product for high resolution chiral separations based on a new halogenated carbohydrate based chiral stationary phase. Similar in selectivity to ChiralPak® OJ-H.

ChromegaChiral CCJ 250 X 4.6 mm 5 µm Catalog # 155251-CCJ

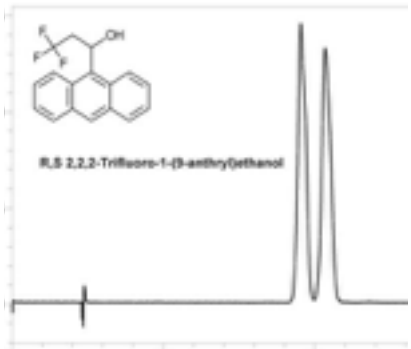


ChromegaChiral CCJ Separation of Flavanone
Mobile Phase: Hexane:IPA (90:10 v/v)
Temperature: 25°C
Flow Rate: 1 mL/min
Detection: UV @ 254nm

ChromegaChiral CCO-F4T3

ChromegaChiral CCO-F4T3 (4-Fluoro-3-(trifluoromethyl) phenyl cellulose) incorporates fluoro groups into its structure. The addition of a fluorine atom into a phenyl cellulose structure is useful in providing improved retention for fluorinated compounds.

ChromegaChiral CCO-F4T3 250 X 4.6 mm 5 µm Catalog # 155251-CCO-F4T3

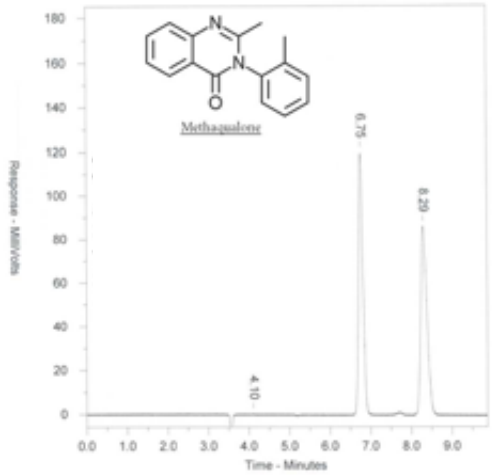


ChromegaChiral CCO-F4T3
Mobile Phase: 5% Methanol/CO2
Temperature: 40°C
Flow Rate: 3 mL/min
BPR: 100 bar
Detection: UV @ 254nm

ChromegaChiral CCX

ChromegaChiral CCX a modified amylose includes the combination of methylbenzylcarbamate and 3,5-dimethey-lphenylcarbamate groups. This combination stabilizes the solubility of coated phase making for a durable phase similar to other widely used coated phases.

ChromegaChiral CCX 250 X 4.6 mm 5 µm Catalog # 155251-CCX

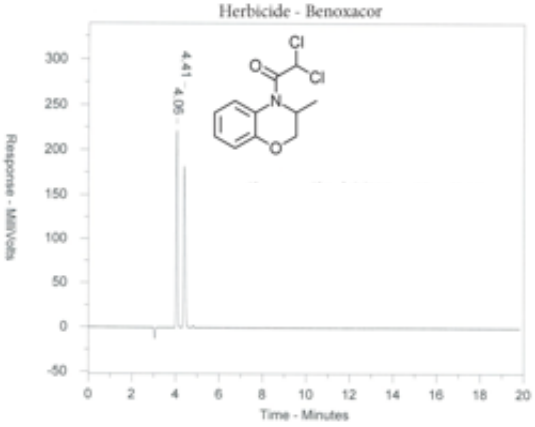


ChromegaChiral CCX
Mobile Phase: Methanol/CO2 (20:80)
Temperature: 35°C
Flow Rate: 4 mL/min
BPR: 150 bar
Detection: UV @ 254nm

ChromegaChiral CCU

ChromegaChiral CCU a modified amylose includes the combination of methylbenzylcarbamate and 3-chloro-4 methylphenylcarbamate groups. This combination stabilizes the solubility of coated phase making for a durable phase similar to other widely used coated phases.

ChromegaChiral CCU 250 X 4.6 mm 5 µm Catalog # 155251-CCU



ChromegaChiral CCX
Mobile Phase: Methanol/CO2 (10:90)
Temperature: 35°C
Flow Rate: 4 mL/min
BPR: 150 bar
Detection: UV @ 254nm

HICHROM CHIRAL COLUMNS

- Chiral 'Pirkle-type'
- Unique covalent bonding
- Enantiomer elution order inversion
- Competitively priced
- Hichrom high efficiency

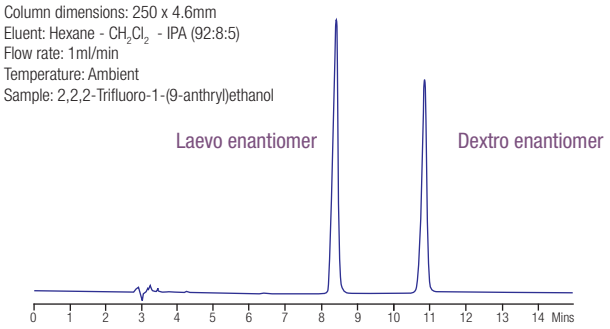
Hichrom manufactures two ranges of 'Pirkle-type' columns for the analysis of a wide range of enantiomers of pharmaceutical or agrochemical origin. CHIRA-chrom 1 type columns contain a stationary phase in which the hydroxyl groups on the silica surface have been modified by a nitrobenzoyl derivative of an optically active amino acid. In the CHIRA-chrom 2 type columns a chiral dinitrophenyltartramide moiety is bonded to the silica surface through a propyl spacer group.

Pirkle Chiral Phases

Phase	Type	Endcapped	Particle Size (µm)
D-Phenylglycine	CHIRA-chrom-1	No	5
L-Phenylglycine	CHIRA-chrom-1	No	5
DL-Phenylglycine	CHIRA-chrom-1	No	5
L-Leucine	CHIRA-chrom-1	No	5
Dinitrophenyltartramide	CHIRA-chrom-2	No	5

Inversion of enantiomer elution order

By substituting L-phenylglycine for D-phenylglycine, the order of elution of the chiral peaks can be reversed. Such a procedure can be useful in assigning peak identity or ensuring prior elution of the minor enantiomer, thus allowing its more accurate determination. The availability of the DL-phenylglycine further aids peak assignment by removing chiral separations whilst maintaining background peak retention profile.



D-Phenylglycine column evaluation using 2,2,2-Trifluoro-1-(9-anthryl)ethanol

Ordering Information

Please contact Hichrom for details of additional column dimensions not listed.

Chiral Phase	Column Dimensions (mm)			Guard Cartridge[1] (For 3.2-4.6mm i.d. Columns)	Guard Cartridge[3] (For 7.75mm i.d. Columns)
	250 x 3.2	250 x 4.6	250 x 7.75		
D-Phenylglycine	CHI-D-PGC-250AS **£596**	CHI-D-PGC-250A **£596**	CHI-D-PGC-250SP **£905**	CHI-D-PGC-10C5 **£110 (5/pk)[2]**	CHI-D-PGC-10CP3 **£180 (3/pk)**
L-Phenylglycine	CHI-L-PGC-250AS **£651**	CHI-L-PGC-250A **£651**	CHI-L-PGC-250SP **£1,125**	CHI-L-PGC-10C5 **£110 (5/pk)[2]**	CHI-L-PGC-10CP3 **£180 (3/pk)**
DL-Phenylglycine	CHI-DL-PGC-250AS **£621**	CHI-DL-PGC-250A **£621**	CHI-DL-PGC-250SP **£1,015**	CHI-DL-PGC-10C5 **£110 (5/pk)[2]**	CHI-DL-PGC-10CP3 **£180 (3/pk)**
L-Leucine	CHI-L-LEUC-250AS **£596**	CHI-L-LEUC-250A **£596**	CHI-L-LEUC-250SP **£905**	CHI-L-LEU-10C5 **£110 (5/pk)[2]**	CHI-L-LEU-10CP3 **£180 (3/pk)**
Phenyltartramide	CHI-TA-250AS **£596**	CHI-TA-250A **£596**	CHI-TA-250SP **£905**	CHI-TA-10C5 **£110 (5/pk)[2]**	CHI-TA-10CP3 **£180 (3/pk)**

[1] Use with free-standing holder HI-161 (£45) and column coupler HI-081 (£26) – see p. 24
[2] Starter kits (£145) also available – see p. 25
[3] Use with free-standing holder HI-150 (£129) and column coupler HI-081 (£26)

Kromasil® Chiral™

Kromasil Chiral

AmyCoat and CelluCoat

High performance super wide pore spherical silica for analytical to process scale liquid chromatography. Kromasil Chiral is manufactured using adsorbed polysaccharide phases for high chiral selectivity.

Product characteristics

Chiral selector

AmyCoat:	tris-(3,5-dimethylphenyl) Carbamoyl amylose
CelluCoat:	tris-(3,5-dimethylphenyl) carbamoyl cellulose

Particle sizes

	Particle size [µm]			
Phase	3	5	10	25
AmyCoat	•	•	•	•
CelluCoat	•	•	•	•

Spec surface area

Proprietary data

Pore size

Proprietary data

Mechanical stability

Allows packing at up to 700 bar (10 000 psi)

Packed density

AmyCoat:	0.58 g/ml
CelluCoat:	0.58 g/ml

Chemical stability

Compatible mobile phases for AmyCoat and/or CelluCoat in volume/volume.

Kromasil AmyCoat and CelluCoat	
alkane/2-propanol	100/0 to 0/100
alkane/ethanol	100/0 to 0/100
alkane/methanol[2]	100/0 to 0/100
alkane/MTBE	100/0 to 50/50
ethanol/methanol	100/0 to 0/100
(SFC) CO_2/alcohol	100/0 to 50/50

Kromasil AmyCoat only	
acetonitrile/methanol	0/100 to 15/85 85/15 to 100/0
acetonitrile/2-propanol	100/0 to 0/100
ethanol/MTBE	100/0 to 70/30

Kromasil CelluCoat only	
acetonitrile/methanol	85/15 to 100/0
ethanol/MTBE	100/0 to 50/50

Delivery

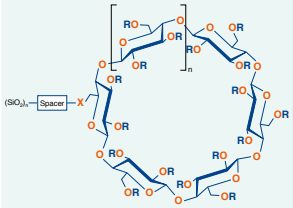
Kromasil bulk is delivered in polyethylene bottles or in polyethylene bags packed in plastic drums.

Kromasil, patented by Nouryon, is manufactured in multi-kilogram batches with high reproducibility.

The management system for the development, production and marketing of Kromasil is ISO 9001 certified.
The Kromasil production site is ISO 14 001 certified.

MN columns for enantiomer separations

NUCLEODEX columns enantiomer separation based on cyclodextrins



NUCLEODEX β-OH β-cyclodextrin (R = H; n = 2) · USP L45

Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 100 Å modified cyclodextrins as chiral selectors
- Separation based on hydrogen bonds and dipole interactions between functional groups of the analyte and hydroxyl groups of the cyclodextrin
- Examples for successful enantiomer separations: chlorthalidone and other compounds, which require free hydroxyl groups for enantioselective interactions
- Eluent in column CH_3OH – 0.1 % TEAA pH 4 (55:45)

NUCLEODEX α-PM permethylated α-cyclodextrin (R = CH_3; n = 1)

Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 100 Å modified cyclodextrins as chiral selectors
- Examples for successful enantiomer separations: mecoprop and dichlorprop as free carboxylic acids, trans-stilbene oxide, styrene oxide
- Eluent in column CH_3OH – 50 mmol/L phosphate pH 3 (70:30)

NUCLEODEX β-PM permethylated β-cyclodextrin (R = CH_3; n = 2) · USP L45

Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 100 Å modified cyclodextrins as chiral selectors
- Examples for successful enantiomer separations: mephobarbital (prominal), pesticide derivatives mecoprop methyl and dichlorprop methyl
- Eluent in column CH_3OH – 0.1 % TEAA pH 4 (65:35)

NUCLEODEX γ-PM permethylated γ-cyclodextrin (R = CH_3; n = 3)

Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 100 Å modified cyclodextrins as chiral selectors
- Examples for successful enantiomer separations: steroids or other larger molecules
- Eluent in column CH_3OH – 0.1 % TEAA pH 4 (55:45)

Recommended application

- NUCLEODEX phases are especially suited for the control of optical purity, but also for semipreparative separations and for the analysis of positional and cis-trans isomers.
- For numerous separations on NUCLEODEX phases please visit our website: *www.mn-net.com/apps*

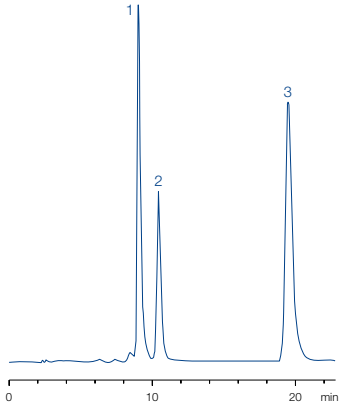
HPLC columns for enantiomer separations

Separation of the positional isomers of nitroaniline

MN Appl. No. 101420

Column:	200 x 4 mm NUCLEODEX β-OH
Eluent:	methanol – 0.1 % triethylammonium acetate pH 4.0 (50:50, v/v)
Flow rate:	0.7 mL/min
Pressure:	180 bar
Detection:	UV, 254 nm
Injection:	1 µL

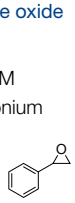
Peaks:
1. *m*-Nitroaniline
2. *o*-Nitroaniline
3. *p*-Nitroaniline



Enantiomer separation of styrene oxide

MN Appl. No. 106160

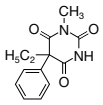
Column:	200 x 4 mm NUCLEODEX α-PM
Eluent:	methanol – 0.1 % triethylammonium acetate pH 4.0 (60:40, v/v)
Flow rate:	0.7 mL/min
Pressure:	160 bar
Detection:	UV, 230 nm
Injection:	2 µL



Enantiomer separation of mephobarbital

MN Appl. No. 105800

Column:	200 x 4 mm NUCLEODEX β-PM
Eluent:	methanol – 0.1 % triethylammonium acetate pH 4.0 (55:45, v/v)
Flow rate:	0.7 mL/min
Pressure:	180 bar
Detection:	UV, 254 nm
Injection:	1 µL



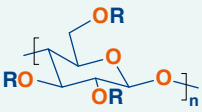
Ordering information

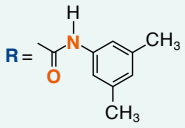
ID	Length → 200 mm	EC guard columns*
NUCLEODEX β-OH eluent methanol – 0.1 % TEAA pH 4 (55:45)		
Analytical EC columns		
4 mm	720124.40	721171.30
NUCLEODEX α-PM eluent methanol – 50 mmol/L phosphate pH 3 (70:30)		
Analytical EC columns		
4 mm	720127.40	721469.30
NUCLEODEX β-PM eluent methanol – 0.1 % TEAA pH 4 (65:35)		
Analytical EC columns		
4 mm	720125.40	721176.30
NUCLEODEX γ-PM eluent methanol – 0.1 % TEAA pH 4 (55:45)		
Analytical EC columns		
4 mm	720752.40	721178.30
NUCLEODEX CC screening kit		
contains one CC 30/4 each with NUCLEODEX β-OH, α-PM, β-PM and γ-PM as well as one CC column holder 30 mm	721920	

* EC 4/3 guard columns for EC columns with 4 mm ID require the Column Protection System guard column holder (REF 718966, see page 251). Columns and guard columns in packs of 1.

HPLC columns for enantiomer separations

NUCLEOCEL *DELTA* enantiomer separation based on a cellulose derivative · USP L40





Technical data

- Base material silica, chiral selector cellulose tris-(3,5-dimethylphenylcarbamate)
  High resolution type (S) with 5 µm particle size, allows use of shorter columns (150 mm) for faster separations, pressure stability up to ~150 bar (2000 psi), pH stability 1–9

NUCLEOCEL *DELTA* for normal phase applications: eluent in column *n*-heptane – 2-propanol (90:10, v/v) typical eluents are heptane – propanol mixtures

NUCLEOCEL *DELTA*-RP for reversed phase applications: eluent in column acetonitrile – water (40:60, v/v) designed for use either in polar organic mode or with eluents containing high concentrations of chaotropic salts such as perchlorate

Recommended application

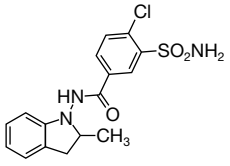
- Pharmaceutically active compounds, chiral pollutants (e.g., herbicides, PCB), chiral compounds in food (dyes, preservatives), chiral catalysts and bioorganic compounds

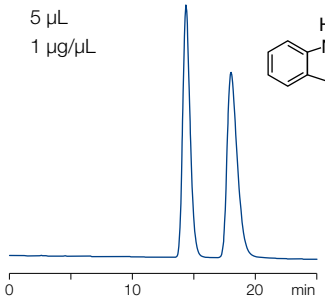
Similar phases: Chiralcel® OD, Kromasil® CelluCoat™, Eurocel® 01, Lux™ Cellulose-1

Enantiomer separation of indapamide

MN Appl. No. 121230

Column:	250 x 4,6 mm NUCLEOCEL *DELTA-RP S*
Eluent:	acetonitrile – water (40:60, v/v)
Flow rate:	0.5 mL/min
Temperature:	40 °C
Detection:	UV, 254 nm
Injection:	5 µL
Concentration:	1 µg/µL
α = 1.3	
R_s = 2.6	

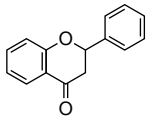


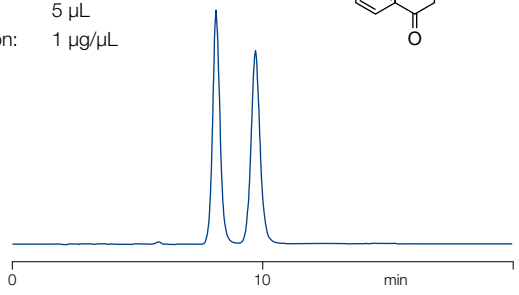


Enantiomer separation of flavanone

MN Appl. No. 121260

Column:	250 x 4,6 mm NUCLEOCEL *DELTA S*
Eluent:	*n*-heptane – 2-propanol (90:10, v/v)
Flow rate:	1 mL/min
Temperature:	25 °C
Detection:	UV, 254 nm
Injection:	5 µL
Concentration:	1 µg/µL
α = 1.29	
R_s = 2.6	





Ordering information

ID	Length → 150 mm	250 mm	EC guard columns*
NUCLEOCEL *DELTA S*, 5 µm eluent n-heptane – 2-propanol (90:10, v/v)			
Analytical EC columns			
4.6 mm		720445.46	721185.30
NUCLEOCEL *DELTA-RP S*, 5 µm eluent acetonitrile – water (40:60, v/v)			
Analytical EC columns			
4.6 mm	720451.46	720450.46	721186.30

* EC 4/3 guard column cartridges are used for EC columns of 4.6 mm ID with the Column Protection System guard column holder (REF 718966, see page 251). Columns and guard columns in packs of 1.

HPLC columns for enantiomer separations

RESOLVOSIL BSA-7 protein phase for enantiomer separation · USP L75

Technical data

- Base material NUCLEOSIL® silica, particle size 7 µm, pore size 300 Å chiral selector bovine serum albumin (BSA)
- Separation based on selective interaction of proteins with low molecular compounds, i.e. principles of bioaffinity, including hydrophobic interactions (similar to a true reversed phase), interactions of polar groups and steric effects

Recommended application

- Amino acid derivatives, aromatic amino acids, aromatic sulfoxides, barbiturates, benzodiazepinones, benzoin and benzoin derivatives, β-blockers, coumarin derivatives, and for monitoring stereoselective microbial and enzymatic conversions

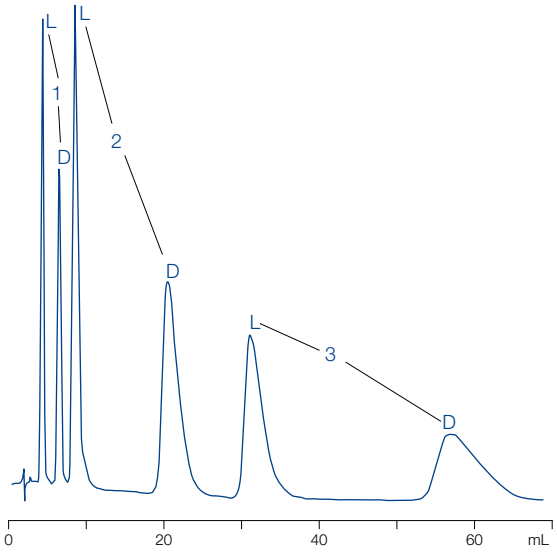
Enantiomer separation of *N*-benzoyl-*D*,*L*-amino acids

MN Appl. No. 105450

S. Allenmark et al. in "Affinity chromatography and biological recognition" (I. Chaiken, M. Wilchek, and I. Parikh. Eds.), Academic Press, New York, 1983, 259–260

Column:	150 x 4 mm RESOLVOSIL BSA-7
Eluent:	50 mmol/L phosphate buffer pH 6.5 + 1 % 1-propanol
Flow rate:	0.70 mL/min
Detection:	UV, 225 nm

Peaks:
1. Serine
2. Alanine
3. Phenylalanine



Ordering information

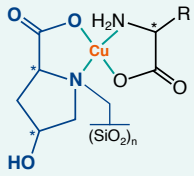
Eluent in column 0.1 mol/L phosphate buffer pH 7.5, 2 % 1-propanol

ID	Length → 150 mm	EC guard columns*
RESOLVOSIL BSA-7		
Analytical EC columns		
4 mm	720046.40	721402.30

* EC 4/3 guard columns for EC columns with 4 mm ID require the Column Protection System guard column holder (REF 718966, see page 251). Columns and guard columns in packs of 1.

HPLC columns for enantiomer separations

NUCLEOSIL® CHIRAL-1 enantiomer separation based on ligand exchange · USP L32



Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 120 Å chiral selector L-hydroxyproline – Cu^{2+} complexes
- Principal interaction mode:
- formation of ternary mixed-ligand complexes with Cu(II) ions; differences in the stability of the diastereomeric complexes cause chromatographic separation

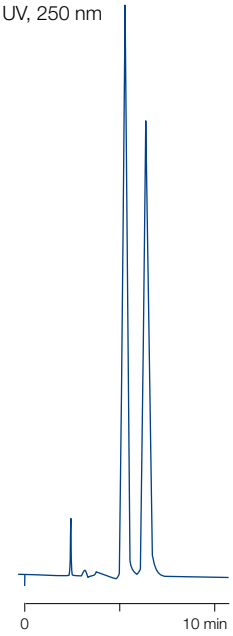
Recommended application

- Enantiomers with two polar functional groups with the correct spacing such as α-amino acids, α-hydroxycarboxylic acids (e.g., lactic acid), *N*-alkyl-α-amino acids etc.

D,L-alanine enantiomers

MN Appl. No. 105410

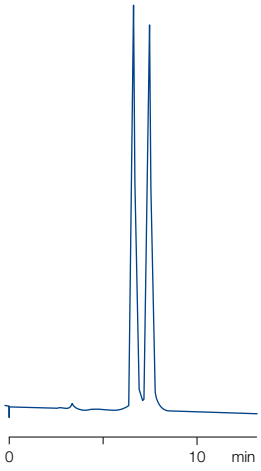
Column:	250 x 4 mm NUCLEOSIL® CHIRAL-1
Eluent:	0.5 mmol/L $CuSO_4$
Flow rate:	1 mL/min
Pressure:	60 bar
Temperature:	60 °C
Detection:	UV, 250 nm



D,L-threonine enantiomers

MN Appl. No. 105410

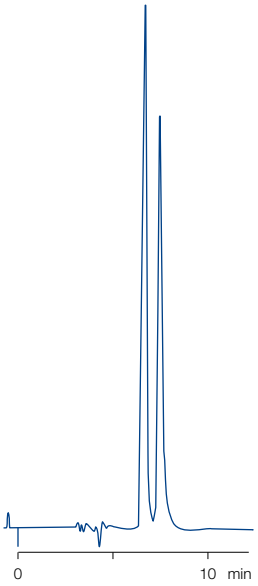
Column:	250 x 4 mm NUCLEOSIL® CHIRAL-1
Eluent:	0.25 mmol/L $CuSO_4$
Flow rate:	0.8 mL/min
Pressure:	65 bar
Temperature:	60 °C
Detection:	UV, 240 nm



Lactic acid enantiomers

MN Appl. No. 105560

Column:	250 x 4 mm NUCLEOSIL® CHIRAL-1
Eluent:	0.5 mmol/L $CuSO_4$
Flow rate:	0.8 mL/min
Temperature:	60 °C
Detection:	UV, 240 nm
Injection:	1 µL



Ordering information

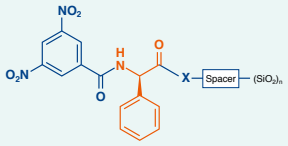
Eluent in column 0.5 mmol/L copper sulfate solution

ID	Length → 250 mm	EC guard columns*
NUCLEOSIL® CHIRAL-1		
Analytical EC columns		
4 mm	720081.40	721188.30

* EC 4/3 guard columns for EC columns with 4 mm ID require the Column Protection System guard column holder (REF 718966, see page 251). Columns and guard columns in packs of 1.

HPLC columns for enantiomer separations

NUCLEOSIL® CHIRAL-2 · CHIRAL-3 enantiomer separation in organic eluent systems · USP L36



Technical data

- Base material NUCLEOSIL® silica, particle size 5 µm, pore size 100 Å chiral selector for NUCLEOSIL® CHIRAL-2 is *N*-(3,5-dinitrobenzoyl)-D-phenylglycine, for CHIRAL-3 the optical antipode is used, “brush type” phases
- Principle interaction modes: charge-transfer interactions, hydrogen bonds, dipole-dipole interactions and steric effects

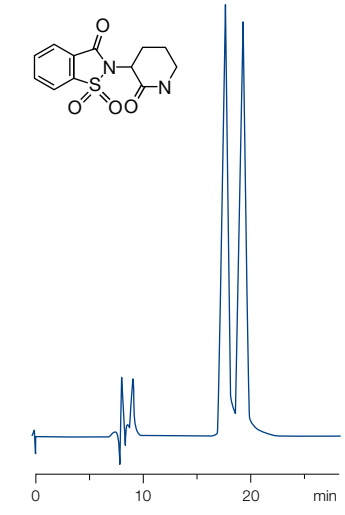
Recommended application

- analysis of stereoisomers such as separation of enantiomers and diastereomers, control of optical purity of plant protectives (pesticides, e.g., propionic acid derived herbicides) pharmaceuticals etc. and for product control in chiral organic syntheses
- For control of optical purity of a substance, the columns NUCLEOSIL® CHIRAL-2 and NUCLEOSIL® CHIRAL-3 allow to select conditions such that the minor enantiomer, present as an impurity, is eluted before the main peak. Overlapping peaks are avoided. This makes an exact quantification of the impurity much easier.

Enantiomer separation of *D*,*L*-supidimide

MN Appl. No. 105690

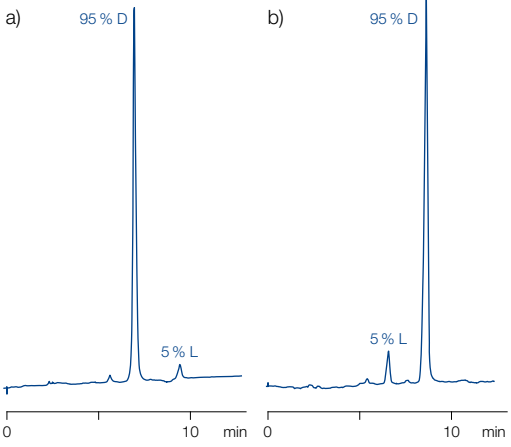
Column: 250 x 4 mm NUCLEOSIL® CHIRAL-2
Eluent: tetrahydrofuran – *n*-heptane (10:3, v/v)
Flow rate: 1.0 mL/min
Detection: UV, 220 nm



Control of optical purity of mecoprop methyl

MN Appl. No. 111360

Columns: a) 250 x 4 mm NUCLEOSIL® CHIRAL-2
b) 250 x 4 mm NUCLEOSIL® CHIRAL-3
Eluent: *n*-heptane – 2-propanol – TFA (100:0.05:0.05, v/v/v)
Flow rate: 1 mL/min, ambient temperature
Detection: UV, 230 nm, Injection 1 µL (sample with 90 % ee)



Ordering information

Eluent in column *n*-heptane – 2-propanol – TFAA (100:0.05:0.05, v/v/v)

ID	Length → 250 mm	EC guard columns*
NUCLEOSIL® CHIRAL-2		
Analytical EC columns		
4 mm	720088.40	721190.30
NUCLEOSIL® CHIRAL-3		
Analytical EC columns		
4 mm	720350.40	721190.30

Guard columns for NUCLEOSIL® CHIRAL-2 and CHIRAL-3 are identical.
* EC 4/3 guard columns for EC columns with 4 mm ID require the Column Protection System guard column holder (REF 718966, see page 251). EC columns and EC guard columns in packs of 1.

MERCK ChiraDex®

Specially for the separation of enantiomers

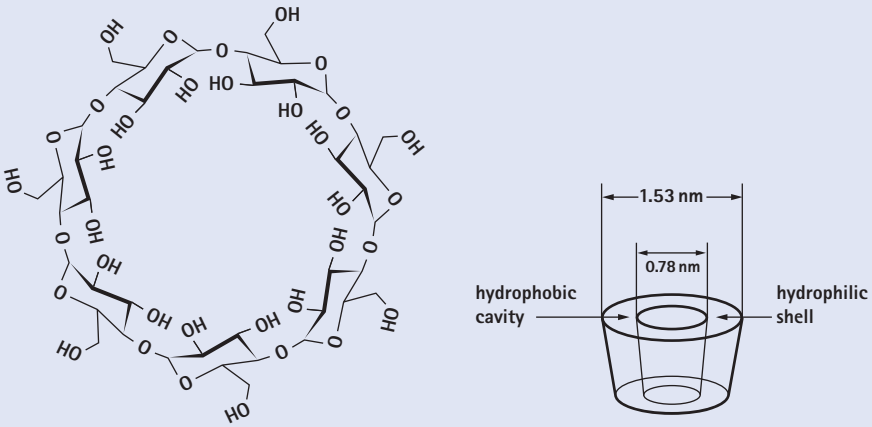
ChiraDex® is a versatile HPLC column characterized by broad enantioselectivity and can be used for the separation of enantiomers of numerous different classes of substances. ChiraDex® is based on beta-cyclodextrin covalently linked to spherical particles of silica and is well suited for the chiral separation of hydrocarbons, steroids, phenol esters and derivatives, aromatic amines, heterocycles with 5-membered ring to 7-membered ring. Simply composed RP-eluents can be used in most separations.

Characterization of ChiraDex®

ChiraDex® is characterized by broad enantioselectivity and can be used for the separation of enantiomers of numerous different classes of substances. Cyclodextrins are cyclic oligosaccharins consisting of α-1,4-glycosidically linked D-glucose units. β-cyclodextrin consist of 7 glucose units, respectively. Geometrically seen, cyclodextrins may be described as truncated cones, where all the secondary hydroxy groups are directed towards the larger opening, whereas the smaller opening at the other end is formed by primary hydroxy groups.

Thus, a hydrophobic inner cavity results, contrasting with the two hydrophilic openings. Since cyclodextrins are made up of chiral D-glucose units, its structure may be regarded as a chiral selector. The enantiomers of a racemic substance mixture, due to their opposite configurations, can now be associated – to different degrees – with the cyclodextrin molecule. Thus, diastereomeric "inclusion complexes" are formed, based on hydrophobic interaction (between cavity and guest molecule) and stereo selective hydrogen bonds (between the C2 and C3 hydrogen groups of glucose molecules and the guest molecule).

β-cyclodextrin



Specifications of ChiraDex®

Sorbent characteristics	Spherical silica particles with covalently bonded beta-cyclodextrin particles
Particle shape	spherical
Particle size	5 µm
Efficiency	>25 000 N/m
HighResolution	>37 000 N/m
Pore size	10 nm (100 Å)
Spec. surface area	300 – 360 m^2/g
Chiral selector	Beta-cyclodextrin
pH range	pH 3 – 7.5
Shipping eluent	Methanol/Water

Accessories for particulate HPLC columns:

- **manu-CART® cartridge holder** for LiChroCART® cartridges
  page 370
- **LiChroCART® cartridge** Different lengths, different internal diameter
  page 373

Ordering information – ChiraDex®, stainless steel columns Hibar®

Product	Ordering No.	Particle size	Dimension length	Dimension i.d.	Contents of one package
ChiraDex®	1.50013.7004	5 µm	100 mm	4.6 mm	1 piece

The Hibar® columns are complete with endfittings. When using a guard column with a Hibar® column, we recommend part number 1.51487.0001 guard column cartridge holder for 4–4 mm guard column cartridges LiChroCART®. Additional dimensions available as customized packings see page 366.

Ordering information – ChiraDex®, stainless steel cartridges LiChroCART®

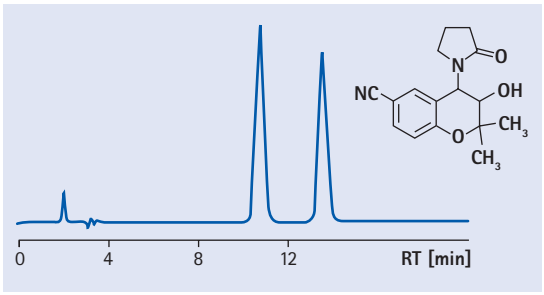
Product	Ordering No.	Particle size	Dimension length	Dimension i.d.	Contents of one package
ChiraDex®	1.50117.0001	5 µm	4 mm	4 mm	10 pieces
ChiraDex®	1.51333.0001	5 µm	250 mm	4 mm	1 piece
ChiraDex® HighResolution	1.51000.0001	5 µm	250 mm	4 mm	1 piece

The LiChroCART® columns in the list above require part number 1.51486.0001 manu-CART® cartridge column holder, which can be used to hold one cartridge column with or without a 4–4 mm guard column.

Separation examples of chiral pharmaceutical active ingredients on ChiraDex®

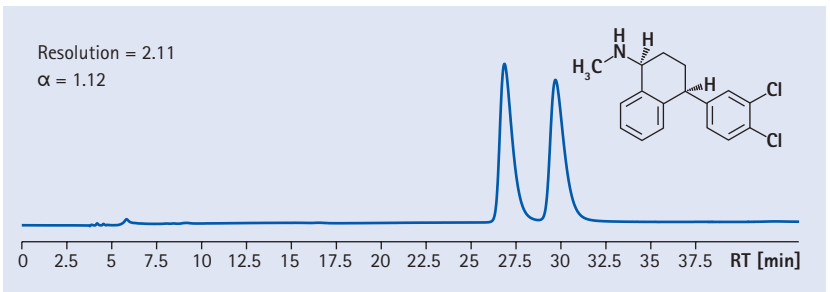
Cromakalim

Column	LiChroCART® 250-4 ChiraDex®
Mobile phase	Water/Methanol 80/20 (v/v)
Flow rate	0.8 mL/min
Detection	UV 254 nm



Selevtivity with Sertralin

Column	LiChroCART® 250-4 ChiraDex® HighResolution
Mobile phase	Acetonitril/10 mM Phosphat buffer adjusted with Triethylamin to pH=7.0 30/70 v/v
Flow rate	0.6 mL/min
Detection	UV 220 nm
Injection volume	5 µL
Sample	1 mg/mL Sertralin



CHIRAL
Stationary Phases

Depend on innovative columns from the experts in chiral chromatography.

PACKED COLUMNS AND BULK MEDIA

Compatible with SFC & HPLC

Scale from Analytical to Prep

Robust Phases for Long Life

REGIS® TECHNOLOGIES, INC.

REFLECT™

NEW *Polysaccharide Chiral Stationary Phases*

Polysaccharide chiral columns are the most widely used type of chiral stationary phases (CSPs) to separate enantiomers. Reflect™ chiral columns are rugged polysaccharide phases suitable for a wide range of chiral compounds. Unique, proprietary, phase coverage provides excellent peak shape and improved resolution versus leading chiral phases. High resolution greatly improves preparative loading, leading to greater productivity and higher purity separations. Combined with attractive pricing and rapid delivery, Reflect chiral columns deliver the performance and productivity you expect. Reflect columns are available packed with immobilized and coated CSPs.

IMMOBILIZED

I-Amylose A
Amylose tris(3,5-dimethylphenylcarbamate)

I-Cellulose B
Cellulose tris(3,5-dimethylphenylcarbamate)

I-Cellulose C
Cellulose tris(3,5-dichlorophenylcarbamate)

I-Cellulose J
Cellulose tris(4-methylbenzoate)

Choose Reflect™ immobilized phases for long column lifetimes and compatibility with a broad range of solvents and separation modes (NP, RP, Polar Organic, SFC).

COATED

C-Amylose A
Amylose tris(3,5-dimethylphenylcarbamate)

C-Cellulose B
Cellulose tris(3,5-dimethylphenylcarbamate)

Choose Reflect™ coated phases for excellent peak shape, resolution, and high loading capacity.

REFLECT™ PHASE CHARACTERISTICS

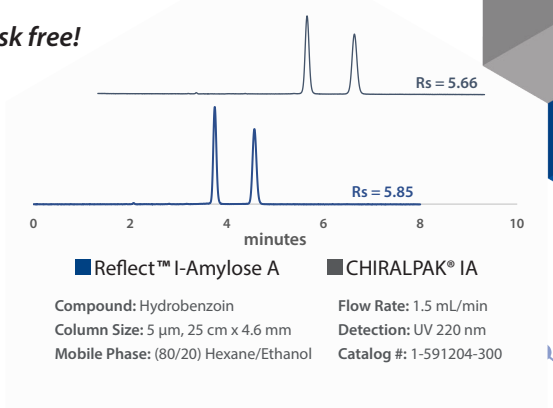
PRODUCT NAME	SELECTOR	EQUIVALENT COMPETITIVE PRODUCTS*	USP	PARTICLE SIZES	pH RANGE	MAXIMUM PRESSURE
Reflect I-Amylose A	Amylose tris(3,5-dimethylphenylcarbamate)	CHIRALPAK® IA, IA-3; Lux® i-Amylose 1	L99	3, 5, 10, 20 µm	2 - 9	6,000 psi
Reflect I-Cellulose B	Cellulose tris(3,5-dimethylphenylcarbamate)	CHIRALPAK® IB, IB-3	N/A			
Reflect I-Cellulose C	Cellulose tris(3,5-dichlorophenylcarbamate)	CHIRALPAK® IC, IC-3; Lux® i-Cellulose 5	N/A			
Reflect I-Cellulose J	Cellulose tris(4-methylbenzoate)	No Equivalent Similar to Coated CHIRALPAK® OJ	N/A	3 & 5 µm		
Reflect C-Amylose A	Amylose tris(3,5-dimethylphenylcarbamate)	CHIRALPAK® AD®, AD-H®, AD-3; Lux® Amylose-1	L51	3, 5, 10, 20 µm		
Reflect C-Cellulose B	Cellulose tris(3,5-dimethylphenylcarbamate)	CHIRALCEL® OD®, OD-H®, OD-3; Lux® Cellulose-1	L40			

THE REFLECT™ GUARANTEE

Rely on guaranteed performance -try Reflect chiral columns risk free!

If an analytical column (≤4.6mm ID) does not provide at least equivalent or better separation as compared to a competing column of the same particle size, phase type, and dimensions, return the column within 45 days for a full refund.

Reflect I-Amylose A provides equivalent separation of Hydrobenzoin



WHELK-O® 1

1-(3,5-dinitrobenzamido)-1,2,3,4-tetrahydrophenanthrene

The Original Immobilized Phase

- Excellent method development column with applicability to a wide range of compound classes
- Alternate selectivity to polysaccharide chiral stationary phases
- Covalently bonded for long term performance and broad mobile phase compatibility
- Broad range of particle sizes and dimensions for analytical to preparative scale separations
- High loading capacity for excellent scalability in preparative applications
- Choice of enantiomeric phases allows inversion of peak elution order

Whelk-O 1 is available in 1.8 µm columns!

- Increase throughput and resolution—Great for rapid chiral screening
- 1.8µm fully porous particles for high efficiency separations in both UHPLC & UHPSFC

CHIROSIL® & CHIROSIL ME

(+) or (-)–(18-Crown-6)–tetracarboxylic acid

- Best choice for the separation of amino acids and compounds containing primary amines
- Exhibits excellent durability due to covalent bonding
- Columns available in both enantiomeric forms, which allows for the inversion of peak elution order
- Most robust crown ether column for HPLC

Visit chiral.com for technical resources, including hundreds of applications on all Regis phases.

FREE
CHIRAL SCREENINGS

Let us find the best column for your compound. Start with a free chiral screening conducted by Regis' experts in chiral separations. Contact us to get started today and receive results in as little as three days!

3 STEPS + 3 DAYS = RESULTS

1 *Execute a CDA (optional).*

2 *Complete a submission form.*

3 *Send us a small sample of your racemate.*

Not sure where to start?

Regis recommends building a small library that have complementary selectivities to guarantee the most hits and durability for high volume screening. Ask our technical experts to recommend a selection of columns based on your needs and receive a discount on your personalized chiral screening kit!

4. ChiroSil

4-1. Introduction

Application Range

ChiroSil columns are very effective for enantiomer separation of various natural and unnatural α-amino acids and primary amines.

Other racemic compounds, such as amino alcohols (β-blockers), secondary amines, drugs containing primary amines and secondary amines are also expected to be resolved on ChiroSil columns.

The structure of ChiroSil Stationary phase

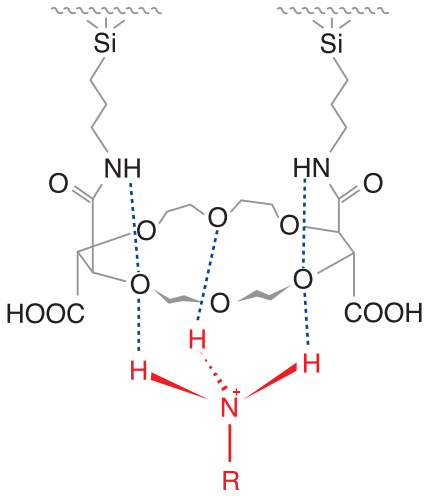
The chiral stationary phase for ChiroSil RCA(+) and SCA(-) is prepared by a covalent trifunctional bonding of (+) or (-)-(18-Crown-6)-tetracarboxylic acid as the chiral selector to aminopropyl silica gel.

Separation Mechanism

The mechanism of ChiroSil based on chiral crown ether might originate from two different mechanisms.

One mechanism is the complexation of the primary ammonium group (R-NH3+) formed by protonation α-amino acids and primary amines under acidic condition inside the cavity of the 18-crown-6 ring of the ChiroSil CSP.

The other mechanism is the side two carboxylic acid groups of ChiroSil CSP can act as steric barrier groups or as hydrogen bonding donor or accepter groups.



Product List

	Particle size (μm)	Length (mm)	2.1 mm ID	3.0 mm ID	3.9 mm ID	4.6 mm ID	7.8 mm ID	10.0 mm ID	21.2 mm ID
RCA	3	50	RCA-51000521	RCA-51000530	RCA-51000539	RCA-51000546	-	-	-
		70	RCA-51000721	RCA-51000730	RCA-51000739	RCA-51000746	-	-	-
		100	RCA-51001021	RCA-51001030	RCA-51001039	RCA-51001046	-	-	-
		150	RCA-51001521	RCA-51001530	RCA-51001539	RCA-51001546	RCA-51001578	-	RCA-510015200
		250	RCA-51002521	RCA-51002530	RCA-51002539	RCA-51002546	RCA-51002578	RCA-510025100	RCA-510025200
SCA	5	50	SCA-51000521	SCA-51000530	SCA-51000539	SCA-51000546	-	-	-
		70	SCA-51000721	SCA-51000730	SCA-51000739	SCA-51000746	-	-	-
		100	SCA-51001021	SCA-51001030	SCA-51001039	SCA-51001046	-	-	-
		150	SCA-51001521	SCA-51001530	SCA-51001539	SCA-51001546	SCA-51001578	-	SCA-510015200
		250	SCA-51002521	SCA-51002530	SCA-51002539	SCA-51002546	SCA-51002578	SCA-510025100	SCA-510025200

4-2. Advantages of ChiroSil

Universal Solvent Capability

An important advantage of ChiroSil over other commercial crown ether-based columns is that it can be used with various mobile phases, without any deterioration in its chiral recognition ability, because the chiral selector of ChiroSil is bonded to silica gel covalently.

ChiroSil Chiral Stationary Phases can be used in both normal and reversed-phased solvent. For example, even 100 % methanol can be used as a mobile phase for the resolution of racemic compound on ChiroSil.

Ability to Invert Elution Order

ChiroSil has an ability to invert the elution order of enantiomers by switching columns. In case of amino acid, most L-enantiomers elute first on the ChiroSil RCA(+) and D-enantiomers elute first on the ChiroSil SCA(-) column.

Excellent Column Durabiltiy

ChiroSil stability was tested under highly acidic condition. After 300 ours of continuous operatioin, there was no observable change in α and k'.

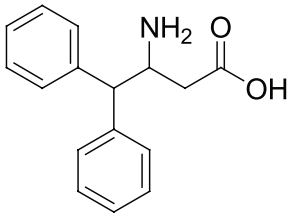
4-3. Method Development

ChiroSil® should be operated under an aqueous acidic condition for the separation

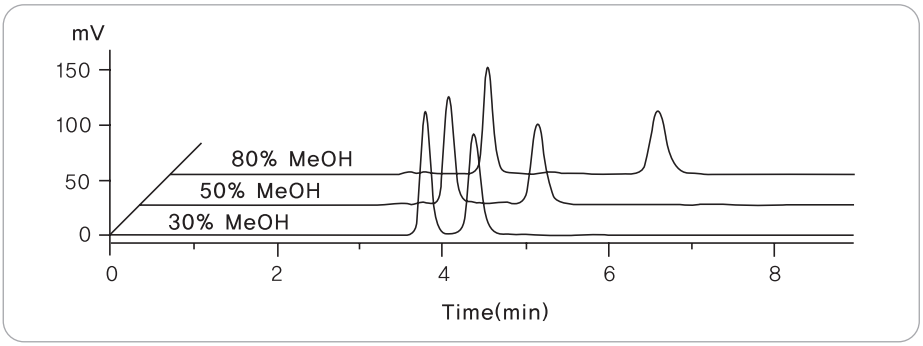
Effect of organic modifier

As the content of organic modifier increases, the aqueous mobile phase becomes less polar and more hydrophobic. In this instance, the hydrophilic interaction between polar-protonated analytes and the mobile phase decreases and consequently, the retention is expected to increase as the content of organic modifier in aqueous mobile phase increases.

The capacity factors (k') generally increase as the content of organic modifier increases and the separation factors (α)and the resolution factors (Rs), in general, increase as the content of organic modifier in the aqueous mobile phase increases.



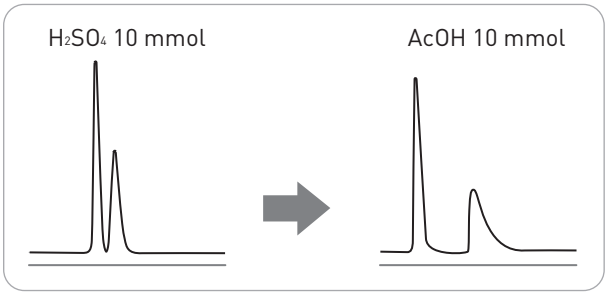
Mobile phase: Methanol in H_2O+ sulfuric acid (10mM)
Column: ChiroSil RCA type
Flow rate: 0.5ml/min
Detector: UV 210nm
Sample: 3-amino-4, 4-diphenylbutyric acid

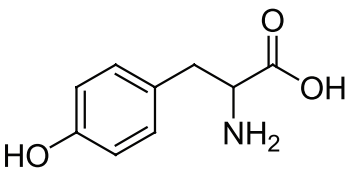


Effect of acidic modifier and acid concentration

***Acidic modifier**
Various kinds of acids such as acetic acid, perchloric acid, sulfuric acid, phosphoric acid and trifluoroacetic acid can be used in ChiroSil®

As the enatioselectivity of each acid is different so it is recommended that you find the proper acid for getting a good resolution by the trial and error method.

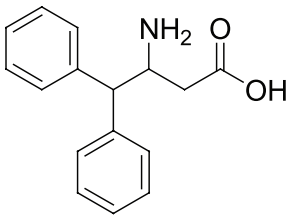




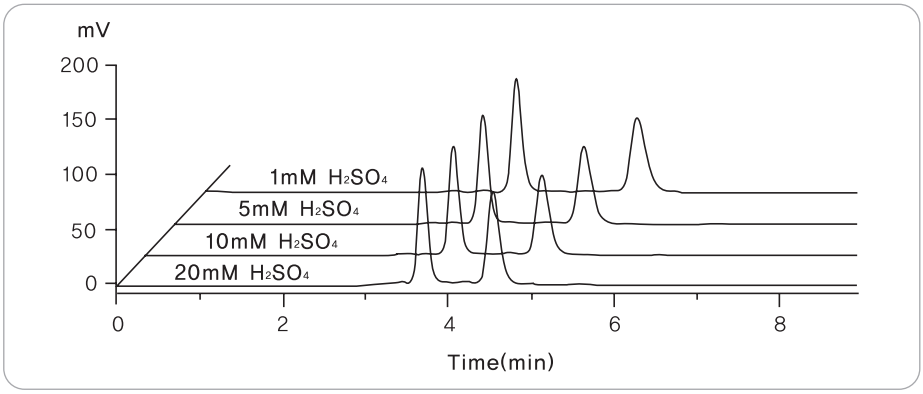
Column : ChiroSil SCA(-) 150x4.6mm
Flow rate: 1.0ml/min
Detector : UV 210nm
Sample: Tyrosine

***Acid Concentration**
As the content of acidic modifier in aqueous mobile phase increases, the ionic strength of mobile phase increases and consequently, the hydration or the dissolution of polar-protonated analytes by mobile phase is expected to increase. In this instance, polar-protonated analytes are eluted faster and faster as the content of acidic modifier increases.

Generally the capacity factors (k') decease as the concentration of acidic modifier in the mobile phase increases but we recommend trying an analysis for new analytes under low acid concentration because higher acid concentration is not always performing better resolutions.

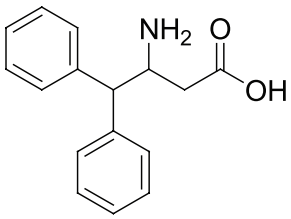


Mobile phase: 50% Methanol in H_2O+ sulfuric acid (10mM)
Column: ChiroSil RCA type
Flow rate: 0.5ml/min
Detector: UV 210nm
Sample: 3-amino-4, 4-diphenylbutyric acid

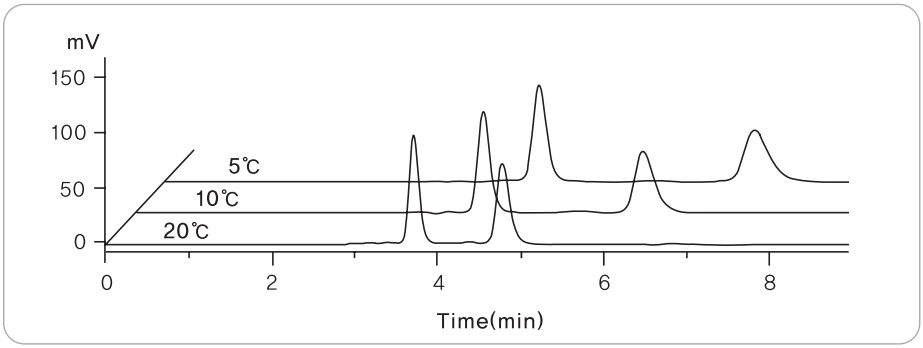


Effect of temperature

At lower temperature, the formation of the two diastereomeric complexes formed by the two enantiomers of racemic compounds inside the cavity of the crown ether ring of CSP is expected to be much more favorable than that of the less stable diastereomeric complex. The difference in the stability of the two diastereomeric complexes increases as the temperature of the column is lowered.
The capacity factors (k'), the separation factors (α) and the resolution factors (Rs) are improved as the temperature is lowered.



Mobile phase: 50% Methanol in H_2O+ sulfuric acid (10mM)
Column: ChiroSil RCA type
Flow rate: 0.5ml/min
Detector: UV 210nm
Sample: 3-amino-4, 4-diphenylbutyric acid



4-4. General Operation Conditions

Storage

ChiroSil columns are shipped in methanol only.

Temperature

The temperature that can be safely employed is from -5˚C to 50˚C in all solvent modes.
In many cases, lower temperature shows better resolution of analytes.

pH rage

ChiroSil can used in the pH range 1.5 ~ 7.5.

Pressure

Operating pressure for ChiroSil columns is generally in range of 1000 psi of 5000psi

Cleaning of the Column

After using ChiroSil under acidic conditions, never store with acidic components

When analysis is complete, wash the column with 20mL of distilled water - first at a flow rate of 1mL/min then gradually increasing the amount of methanol

Finally, wash it with 20mL of methanol at a flow-rate of 1.0L/min.

ChiroSil is recommended to be filled with methanol 100% after washing

Equilibration Time

ChiroSil needs enough equilibration time to develop stable retention factors. (See the below table)

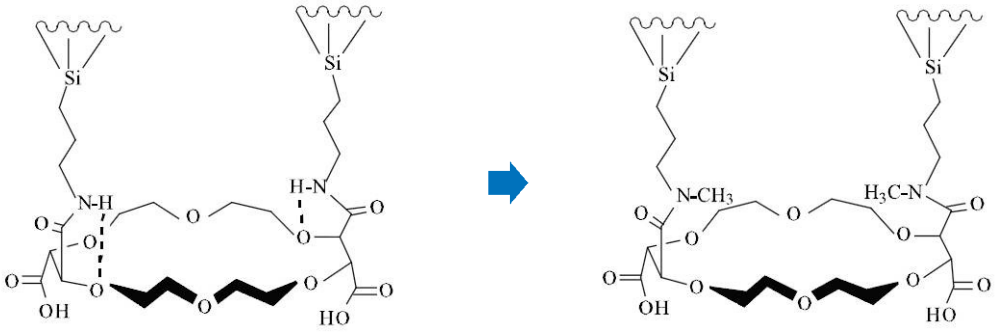
During mobile phase equilibration, enantioselective separations are obtained for all analytes, but retention factors are slowly decreased until stable retention factors are obtained

Mode	Before condition	After condition	Flow rate (mL/min)	Temp. (˚C)	Equilibration Time(min)
RP	100% MeOH	Organic solvent in water + x mM Acid	1.0mL/min	20˚C	7hr
	Organic solvent in water + x mM Acid	Organic solvent in water + x mM Acid	1.0mL/min	20˚C	2hr
NP	100% MeOH	EtOH or IPA 30min → Organic solvent in EtOH + x mM Acid	1.0mL/min	20˚C	7hr
	Organic solvent in EtOH + x mM Acid	Organic solvent in EtOH + x mM Acid	1.0mL/min	20˚C	2hr

5. ChiroSil ME

5-1. Introduction

In general, the separation factors and resolution factors for these analytes on ChiroSil were greater than on ChiroSil ME, while these capacity factors on ChiroSil ME were quite greater than on Chirosil. Except for leucine methyl ester and phenylalanine methyl ester, the elution orders of all analytes including alpha-amino alpha-alkyl acids and phenylglycin alkyl esters on Chirosil are identical to those on ChiroSil ME.



High selectivity
- β-Amino acids
- β-Amino amide and esters
- Amines
- Amino alcohols
- β-Blockers

Product List

	Particle size (μm)	Length (mm)	2.1 mm ID	3.0 mm ID	3.9 mm ID	4.6 mm ID	7.8 mm ID	10.0 mm ID	21.2 mm ID
RCA	3	50	NF-RCA-51000521	NF-RCA-51000530	NF-RCA-51000539	NF-RCA-51000546	-	-	-
		70	NF-RCA-51000721	NF-RCA-51000730	NF-RCA-51000739	NF-RCA-51000746	-	-	-
		100	NF-RCA-51001021	NF-RCA-51001030	NF-RCA-51001039	NF-RCA-51001046	-	-	-
		150	NF-RCA-51001521	NF-RCA-51001530	NF-RCA-51001539	NF-RCA-51001546	NF-RCA-51001578	-	NF-RCA-510015200
		250	NF-RCA-51002521	NF-RCA-51002530	NF-RCA-51002539	NF-RCA-51002546	NF-RCA-51002578	NF-RCA-510025100	NF-RCA-510025200
SCA	5	50	NF-SCA-51000521	NF-SCA-51000530	NF-SCA-51000539	NF-SCA-51000546	-	-	-
		70	NF-SCA-51000721	NF-SCA-51000730	NF-SCA-51000739	NF-SCA-51000746	-	-	-
		100	NF-SCA-51001021	NF-SCA-51001030	NF-SCA-51001039	NF-SCA-51001046	-	-	-
		150	NF-SCA-51001521	NF-SCA-51001530	NF-SCA-51001539	NF-SCA-51001546	NF-SCA-51001578	-	NF-SCA-510015200
		250	NF-SCA-51002521	NF-SCA-51002530	NF-SCA-51002539	NF-SCA-51002546	NF-SCA-51002578	NF-SCA-510025100	NF-SCA-510025200

5-2. General Operation Conditions

Storage

ChiroSil ME columns are shipped in methanol only.

Temperature

The temperature that can be safely employed is from -5˚C to 50˚C in all solvent modes.
In many cases, lower temperature shows better resolution of analytes.

pH rage

ChiroSil ME can used in the pH range 1.5 ~ 7.5.

Pressure

Operating pressure for ChiroSil ME column is generally in range of 1000 psi of 5000psi

Cleaning of the Column

After using ChiroSil ME under acidic conditions, never store with acidic components

When analysis is complete, wash the column with 20mL of distilled water - first at a flow rate of 1mL/min then gradually increasing the amount of methanol

Finally, wash it with 20mL of methanol at a flow-rate of 1.0L/min.

ChiroSil ME is recommended to be filled with methanol 100% after washing

Equilibration Time

ChiroSil ME needs enough equilibration time to develop stable retention factors. (See the below table)

During mobile phase equilibration, enantioselective separations are obtained for all analytes, but retention factors are slowly decreased until stable retention factors are obtained

Mode	Before condition	After condition	Flow rate (mL/min)	Temp. (˚C)	Equilibration Time(min)
RP	100% MeOH	Organic solvent in water + x mM Acid	1.0mL/min	20˚C	7hr
	Organic solvent in water + x mM Acid	Organic solvent in water + x mM Acid	1.0mL/min	20˚C	2hr
NP	100% MeOH	EtOH or IPA 30min → Organic solvent in EtOH + x mM Acid	1.0mL/min	20˚C	7hr
	Organic solvent in EtOH + x mM Acid	Organic solvent in EtOH + x mM Acid	1.0mL/min	20˚C	2hr

Shinwa HPLC Columns For Enantiomer Separation

The **ULTRON ES** series are columns for enantiomer separation.
Columns which are packed with protein immobilized silica (**ULTRON ES-OVM**, **ULTRON ES-PEPSIN**, **ULTRON ES-BSA**) and chemically bonded cyclodextrin (**ULTRON ES-CD**, **ULTRON ES-PhCD**).

ULTRON ES-OVM

■ Characteristics

① Ultron ES-OVM is a chiral separation column immobilized with ovomucoid which is strong protein for denaturation. (US PATENT 6027648 Eisai Co., LTD.)
② A wide range of chiral recognition.
③ No sample preparation for optical separation.
④ Aqueous mobile phase can be used in the separation .
⑤ A trace analysis can be performed (ng level) .

■ Applications

・Pharmaceutical Compounds, Pesticides and Organic Compounds

Column	Particle Size (μm)	Column Size Length ✕ Inner Diameter (mm)
ULTRON ES-OVM (Narrow Bore)	5	150✕2.0
ULTRON ES-OVM (for Analytical)		150✕4.6
ULTRON ES-OVM (for Analytical)		150✕6.0
ULTRON ES-OVM.G (Guard Column)		10✕4.0
ULTRON ES-OVM (for Analytical)	10	250✕4.6
ULTRON ES-OVM Prep (for Preparative)		250✕20.0
ULTRON ES-OVM Prep.G (Guard Column for Preparative)		15✕8.0
ULTRON ES-OVM (Two Guard Cartridges)	5	5✕2.0
ULTRON ES-OVM (Two Guard Cartridges)		10✕4.6
Holder for Guard Cartridge (with Adaptor)	For 5✕2.0 mm column	
Holder for Guard Cartridge (with Adaptor)	For 10✕4.6 mm column	

ULTRON ES-PEPSIN

■ Characteristics

① ULTRON ES-PEPSIN is an enantiomer separation column immobilized with pepsin which is the polypeptide dialytic enzyme of the pig stomach mucous membrane origin.
② ULTRON ES-PEPSIN is effective for the enantiomer separation of amino alcohols such as β-blocker medicines.
③ The sample preparation for optical isomer separation is not necessary.
④ Aqueous mobile phase can be used in the separation.
⑤ A trace analysis can be performed (ng level).

■ Applications

・Pharmaceutical Compounds, Pesticides and Organic Compounds

Column	Particle Size (μm)	Column Size Length ✕ Inner Diameter (mm)
ULTRON ES-PEPSIN (for Analytical)	5	150✕4.6
ULTRON ES-PEPSIN.G (Guard Column)		10✕4.0

Shinwa HPLC Columns For Enantiomer Separation

ULTRON ES-BSA

■ Characteristics

① ULTRON ES-BSA is bovine serum albumin immobilized column for enantiomer separation.

② ULTRON ES-BSA is performed an excellent enantiomer separation for acidic compounds such as arylpropionic acid drugs.

③ The sample preparation for optical isomer separation is not necessary.

④ Aqueous mobile phase can be used in the separation.

⑤ A trace analysis can be performed (ng level) .

■ Applications

・Pharmaceutical compounds, Pesticides and Organic compounds

Column	Particle Size (μm)	Column Size Length ✕ Inner Diameter (mm)
ULTRON ES-BSA (for Analytical)	7	150✕4.6
ULTRON ES-BSA.G (Guard Column)		10✕4.0

ULTRON ES-CD

ULTRON ES-PhCD

ULTRON ES-CD and ULTRON ES-PhCD are enantiomeric separation columns chemically bonded with β-cyclodextrin (**CD**) and phenylcarbamated β-cyclodextrin (**PhCD**), respectively.

■ Characteristics

① ULTRON ES-CD and ULTRON ES-PhCD are effective for the enantiomeric separation of hydrophobic cyclic compounds.

② Mobile phase of both reverse-phase and normal-phase modes can be used for the separation.

③ A wide range of enantiomeric compounds can be separated with ULTRON ES-CD or ULTRON ES-PhCD.

④ The columns show excellent stability and durability.

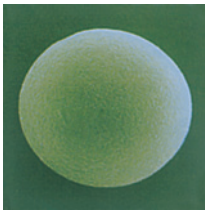
■ Applications

・Pharmaceutical compounds, Pesticides and Organic compounds

Column	Particle Size (μm)	Column Size Length ✕ Inner Diameter (mm)
ULTRON ES-CD (Narrow Bore)	5	150✕2.0
ULTRON ES-CD (for Analytical)		150✕6.0
ULTRON ES-CD.G (Guard Column)		10✕4.0
ULTRON ES-CD (Two Guard Cartridges)		5✕2.0
ULTRON ES-CD (Two Guard Cartridges)		10✕4.6
Holder for Guard Cartridge (with Adaptor)	For 5✕2.0 mm column	
Holder for Guard Cartridge (with Adaptor)	For 10✕4.6 mm column	
ULTRON ES-PhCD (Narrow Bore)	5	150✕2.0
ULTRON ES-PhCD (for Analytical)		150✕6.0
ULTRON ES-PhCD.G (Guard Column)		10✕4.0
ULTRON ES-PhCD (Two Guard Cartridges)		5✕2.0
ULTRON ES-PhCD (Two Guard Cartridges)		10✕4.6
Holder for Guard Cartridge (with Adaptor)	For 5✕2.0 mm column	
Holder for Guard Cartridge (with Adaptor)	For 10✕4.6 mm column	

SHISEIDO CHIRAL COLUMNS

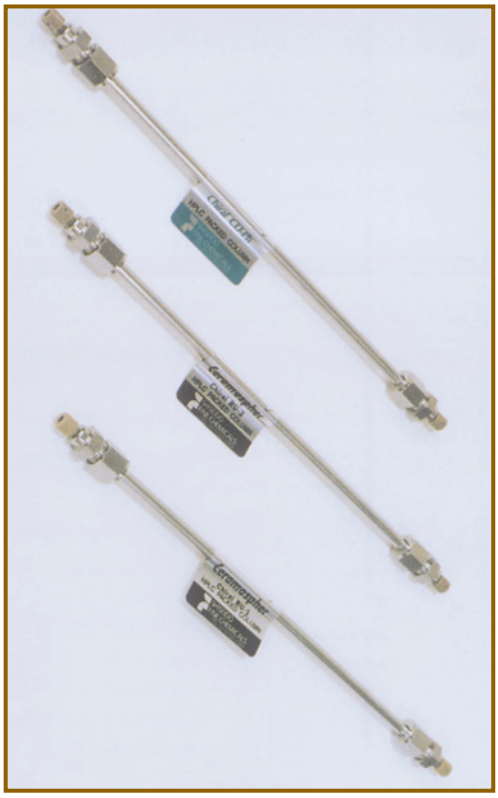
- High efficiency and stability against pressure
- Choice of normal or aqueous mobile phase condition
- Exceptional enantioselectivity for acidic, basic and neutral chiral compounds
- Stable under a wide temperature range
- High loadability combined with long column lifetime

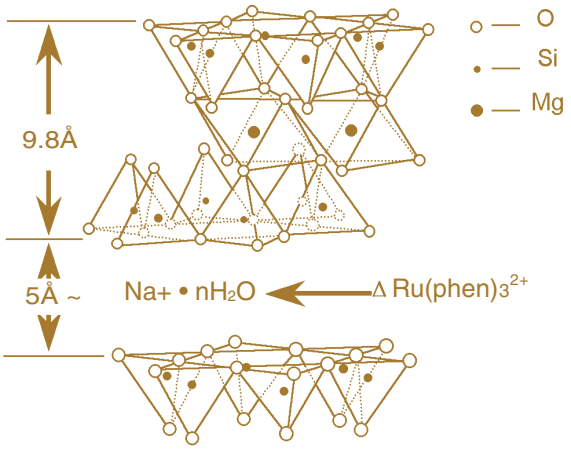


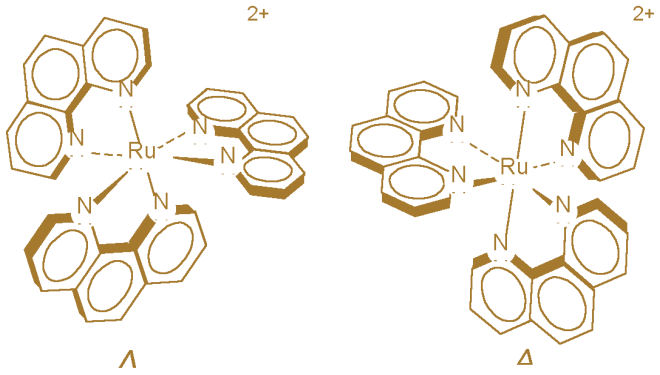
Ceramospher

Chiral RU-1, RU-2

Based on 5-µm spherical sodium magnesium silicate particles, Ceramospher phases RU-1 and RU-2 are novel materials for chiral HPLC separations. Chiral separation is accomplished by an optically-active ruthenium complex that has been ion exchanged with sodium ions in the original clay material. Ceramospher phases show excellent selectivity for a wide variety of chiral samples.
Ceramospher has the remarkable loadability due to its large specific surface area (pore size 4 nm, 300m^2/g). The advantage is more pronounced when applied at preparative scales. Both phases utilize simple eluents.RU-1 is used under non-aqueous mobile phases, whereas RU·2 is compatible also with aqueous mobile phases.



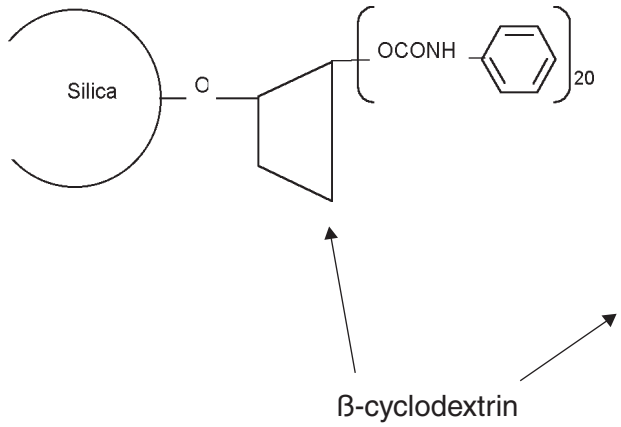


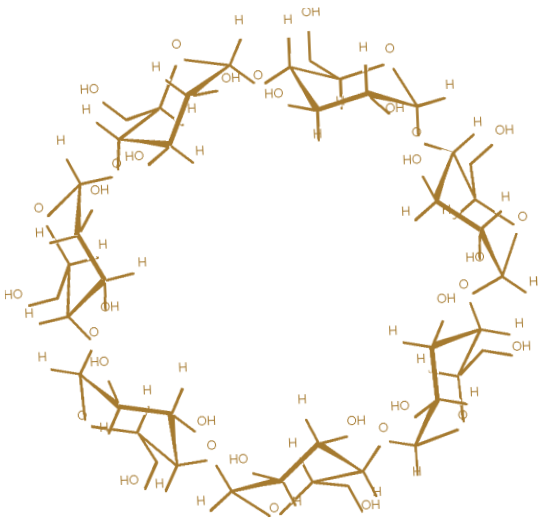


Structure of RU(phen)$_3^{2+}$

CHIRAL CD-Ph

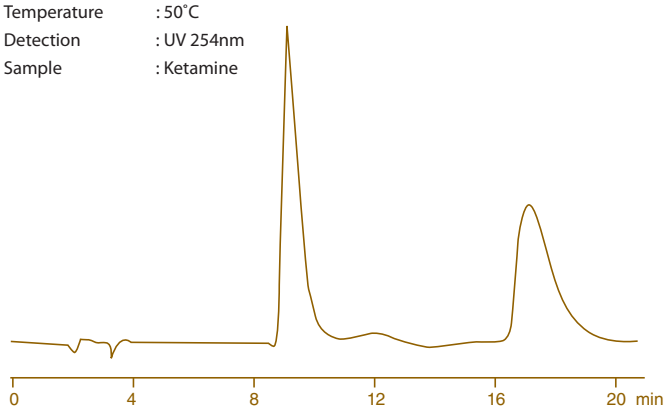
The Chiral CD-Ph utilizes precisely classifi ed high-purity silica as its support, to which phenylcarbamated ß-cyclodectrin is chemically bonded. A large number of theoretical plates is usually achieved. The combined use with the Ceramosphers, covers a wide variety of chiral compounds.





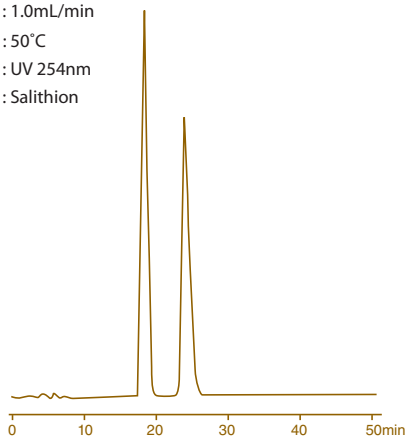
Ketamine

Column : Ceramospher Chiral RU-1
4.6 mm i.d. x 250 mm
Mobile Phase : 1vol% Isopropylamine / CH_3OH
Flow Rate : 1.0mL/min
Temperature : 50˚C
Detection : UV 254nm
Sample : Ketamine



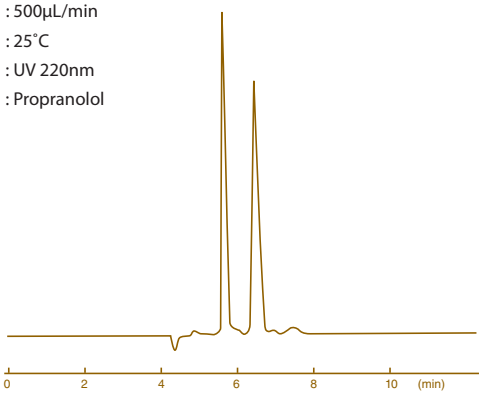
Salithion

Column : Ceramospher Chiral RU-2
4.6 mm i.d. x 250 mm
Mobile Phase : CH_3OH
Flow Rate : 1.0mL/min
Temperature : 50˚C
Detection : UV 254nm
Sample : Salithion



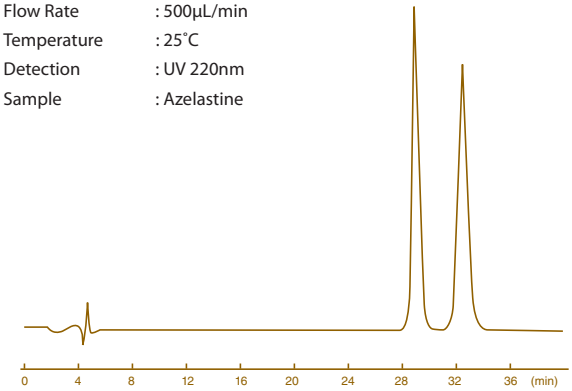
Propranolol

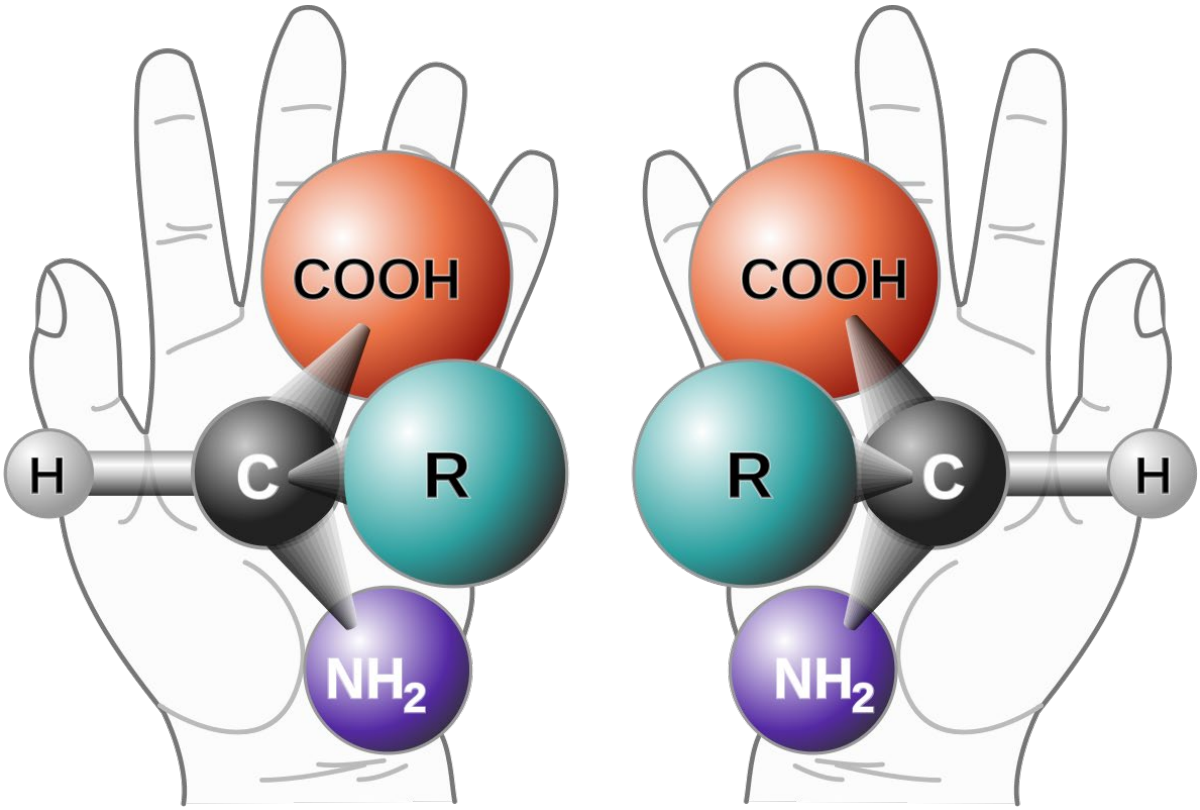
Column : Chiral CD-Ph
4.6 mm i.d. x 250 mm
Mobile Phase : 0.5mol/L $NaClO_4$ / CH_3CN = 20 / 80
Flow Rate : 500µL/min
Temperature : 25˚C
Detection : UV 220nm
Sample : Propranolol



Azelastine

Column : Chiral CD-Ph
4.6 mm i.d.x 250 mm
Mobile Phase : 0.5mol/L $NaClO_4$ / CH_3CN = 50 / 50
Flow Rate : 500µL/min
Temperature : 25˚C
Detection : UV 220nm
Sample : Azelastine




COOH
H
C
R
NH2
COOH
R
C
H
NH2