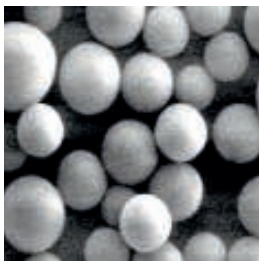
Chiral stationary phases

Always the proper column for enantiomer analysis

Chiral stationary phases



Chirality has become vitally important in the pharmaceutical, chemical, and agricultural industries. The differences which make compounds chiral can produce critically different pharmacological effects in biological systems. As a result, demand for stereoselective separation techniques and analytical assays to evaluate the enantiomeric purity of chiral compounds has increased. Chiral chromatography has become a necessary tool – not only for the analytical determination of enantiomeric purity, but also for the isolation of pure enantiomers. The chromatographic enantiomer separation by chiral stationary phase is an efficient and rapid method in the control of chiral pharmaceuticals or flavour ingredients.

Characterization of chiral HPLC columns

The separation of enantiomers by chiral HPLC has proven to be a most useful method for the analysis of numerous different chiral substances. Of greatest importance is the separation of chiral drugs. Many drugs are administered as racemates. For some chiral drugs, the desired pharmacological effect is almost entirely due to one enantiomer while its other optical isomer may be responsible for significant undesirable side effects. The administration of only optical highly purified drugs is the major goal of pharmaceutical industry, to protect the patient against side-effects, caused by too high drug concentration or against toxic side effects. Chiral HPLC is a very efficient method for the separation of racemic drugs, to control the optical purity and is also a method for the preparation of optical pure drugs. Chiral HPLC is also a valuable tool for the enantioseparation of agrochemicals or flavour compounds.

Enantiomers may confer benefits over racemates for therapeutic uses

Properties of racemate	Potential benefits of enantiomers
One enantiomer is exclusively active	Reduced dose and load on metabolism
The other enantiomer is toxic	Increased latitude in dose and broader use of the drug
Enantiomers have different pharmacokinetics	Better control of kinetics and dose
Enantiomers metabolize at different rates in the same person	Wider latitude in setting the dose Reduction in variability of patient´s responses
Enantiomers metabolize at different rates in the population	Reduction in variability of patient´s responses Greater confidence in setting a single dose
One enantiomer prone to interaction with key detoxification pathways	Reduced interactions with other common drugs
One enantiomer is agonist, the other antagonist	Enhanced activity and reduction of dose
Enantiomers vary in spectra of pharmacological action and tissue specificity	Increased specificity and reduced side effects for one enantiomer, use of other enantiomer for different indication

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Accessories for particulate HPLC columns:

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ChiraDex®

Specially for the separation of enantiomers

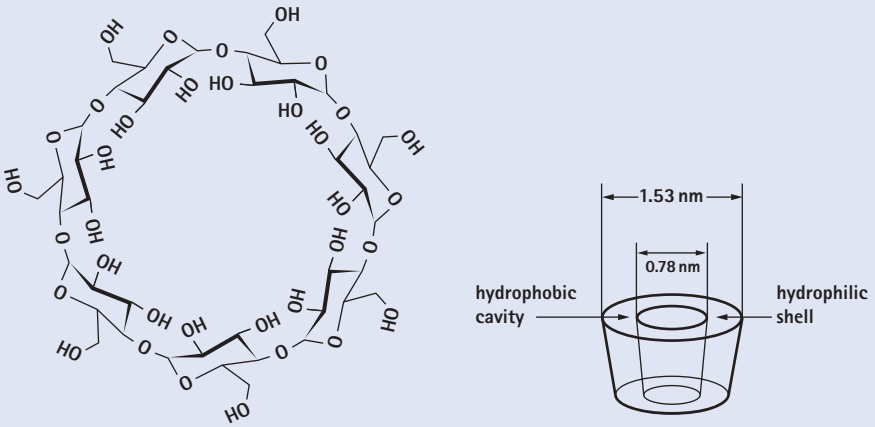
ChiraDex® is a versatile HPLC column characterized by broad enantioselectivity and can be used for the separation of enantiomers of numerous different classes of substances. ChiraDex® is based on beta-cyclodextrin covalently linked to spherical particles of silica and is well suited for the chiral separation 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®

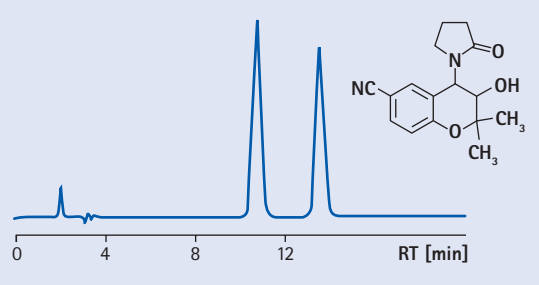
Product	Ordering No.	Particle size	Dimension length	Dimension i.d.	Contents of one package
ChiraDex®	1.50117.0001	5 µm	4 mm	4 mm	10 pieces
ChiraDex®	1.51333.0001	5 µm	250 mm	4 mm	1 piece
ChiraDex® HighResolution	1.51000.0001	5 µm	250 mm	4 mm	1 piece

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®

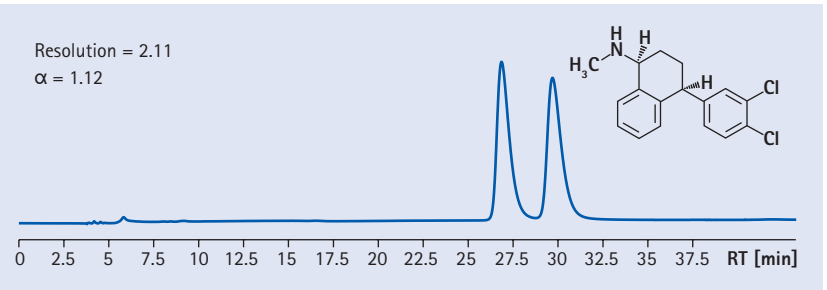
Cromakalim

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



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