

- Excellent resolution of racemates
- Well established immobilized and coated polysaccharide phases
- HPLC and SFC columns
- Wide range of applications

Daicel chiral HPLC columns are the most widely referenced chiral columns. Chiral Technologies, a subsidiary of Daicel Corporation, offers the complete range of Daicel chiral columns and has the largest portfolio of chiral stationary phases for the separation of racemic mixtures. This includes the CHIRALPAK®, CHIRALCEL® and CROWNPAK® trademarks. Columns from microbore to preparative dimensions can be supplied, allowing smooth transition from laboratory to development, to pilot plant and production. In addition to the well established traditional CHIRALPAK and CHIRALCEL polysaccharide coated silica columns, Daicel manufacture the immobilized polysaccharide CHIRALPAK phases. Also see page 5 for new CHIRALPAK ZWIX zwitterionic chiral phases.

CHIRALPAK® IA, IB, IC, ID, IE and IF Immobilized Phases

- Immobilized chiral selector
- Broad application range
- Universal solvent compatibility – phases suitable for both NP and RP applications
- Higher screening success rate
- Robustness and extended durability

CHIRALPAK IA, IB, IC, ID, IE and IF HPLC and SFC columns are a newer generation of chiral stationary phases (CSPs), in which the polysaccharide chiral selector has been immobilized on to a wide pore silica matrix. This confers universal solvent compatibility on these highly selective chiral stationary phases, without compromising phase stability. The broader range of solvents used as eluents, introduces new selectivity profiles, improved productivity and additional robustness compared with traditional coated polysaccharide phases.

Chiral Selectors

CHIRALPAK IA - based on amylose *tris*(3,5-dimethylphenyl)carbamate (as in CHIRALPAK AD)

CHIRALPAK IB - based on cellulose *tris*(3,5-dimethylphenyl)carbamate (as in CHIRALCEL OD)

CHIRALPAK IC - based on cellulose *tris*(3,5-dichlorophenyl)carbamate

CHIRALPAK ID - based on amylose *tris*(3-chlorophenyl)carbamate

CHIRALPAK IE – based on amylose *tris*(3,5-dichlorophenyl)carbamate

CHIRALPAK IF – based on amylose *tris*(3-chloro, 4-methylphenyl)carbamate

Figures 1, 2 and 3 show examples of separations achieved on CHIRALPAK IA, IB and IC respectively. Figure 4 shows the baseline resolution of enantiomers and conformers of diastereomeric tofisopam on CHIRALPAK ID.

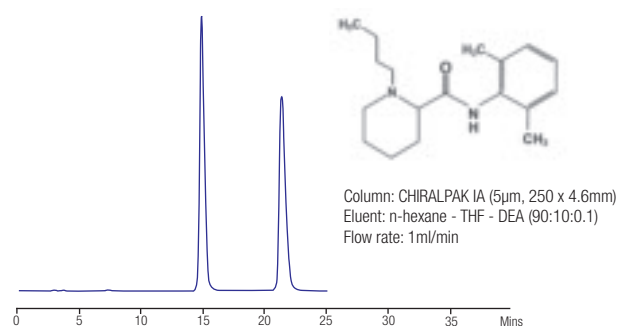


Figure 1. Analysis of bupivacaine on CHIRALPAK IA

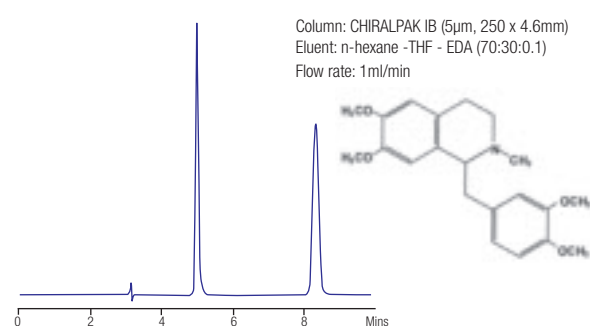


Figure 2. Analysis of laudanosine on CHIRALPAK IB

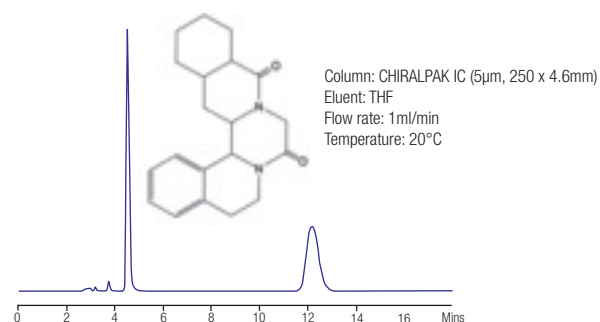


Figure 3. Analysis of praziquantel on CHIRALPAK IC

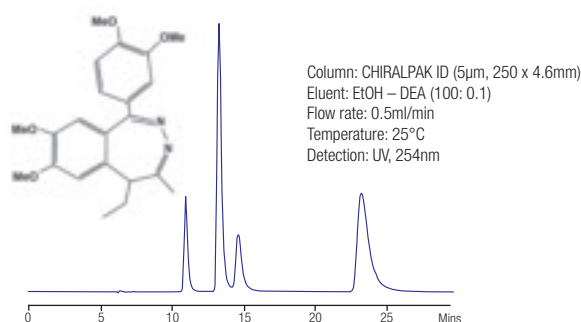


Figure 4. Analysis of tofisopam on CHIRALPAK ID

CHIRALPAK® Immobilized Phases (continued)

3µm Fast Analysis Immobilized Phase Columns

The immobilized product line has been extended by the introduction of 3µm versions of the CHIRALPAK IA, IB, IC, ID, IE and IF phases (CHIRALPAK IA-3, IB-3, IC-3, ID-3, IE-3 and IF-3). These columns are intended for high speed, high efficiency separations of enantiomers and offer the same selectivity and stability characteristics as their 5µm immobilized counterparts. Methods can be transferred directly from 5µm to 3µm particle size columns. Figure 5 shows the fast separation of ornidazole on CHIRALPAK IA-3 in less than one minute.

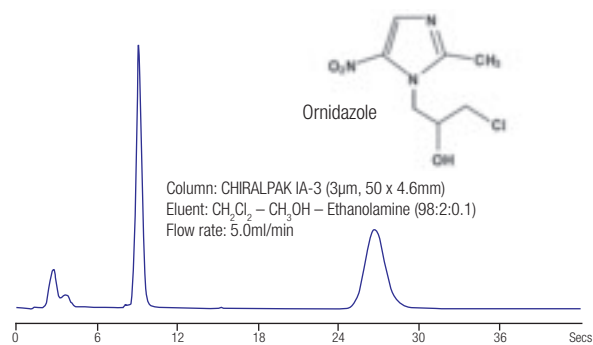


Figure 5. Fast separation on CHIRALPAK IA-3

Features of Immobilized Phases

1) Wide Solvent Compatibility – The immobilization of the selector confers a wide solvent compatibility to these highly selective chiral stationary phases, without compromising phase stability. This is in contrast to traditional, coated polysaccharide phases which have restricted solvent compatibility due to solubility of the polymer coating in certain solvents, including chloroform, methylene chloride, ethyl acetate, acetone, THF and DMF. Immobilized phases can be used in all chromatographic modes: normal- and reversed-phase HPLC, SFC, analytical and preparative, and the same column can be used with all eluent combinations. Figure 6 shows the use of CHIRALPAK IC in different chromatographic modes.

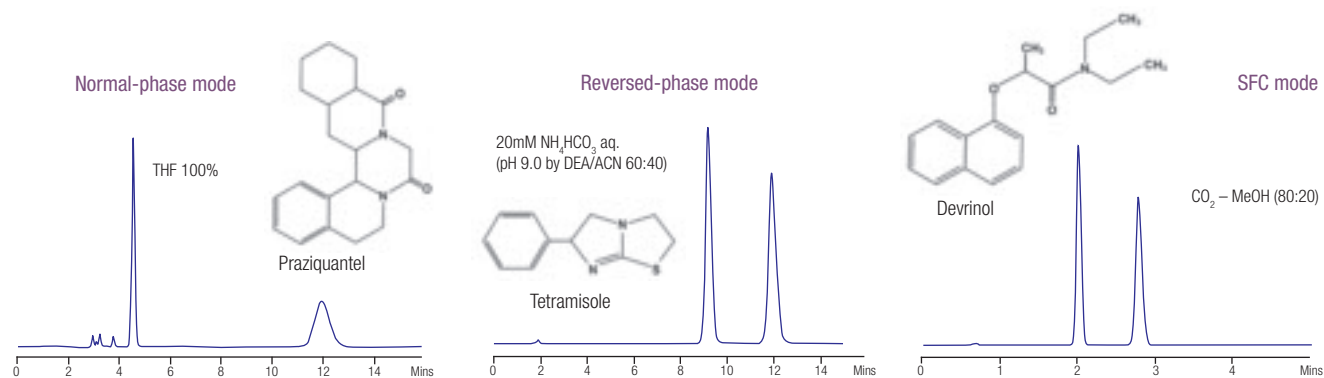


Figure 6. Different chromatographic modes with CHIRALPAK IC

2) Column Regeneration – CHIRALPAK immobilized columns are more robust than their coated analogues. If columns have been used with additives or with multiple solvent changes, a regeneration procedure may be implemented to eliminate any change in chiral recognition. Please contact Hichrom for further details.

3) Screening Strategies – Column screening is simpler, faster and more successful using the four main Daicel immobilized phases (IA, IB, IC and ID). The recommended eluent combinations and typical starting conditions for screening these phases are shown in Table 1.

Table 1. Immobilized primary screening solvents

| Primary screening mixtures | Alkane-2-PrOH | Alkane/EtOH | Alkane/MtBE/EtOH | Alkane/DCM/EtOH |
|-----------------------------|---------------|---------------|--------------------|--------------------|
| Typical starting conditions | 80:20 | 80:20 | 0:98:2 | 50:50:2 |
| Advised optimization range | 99:1 to 50:50 | 99:1 to 50:50 | 80:20:0 to 0:40:60 | 85:15:0 to 0:100:0 |

When used in alkane/alcohol solvents, the immobilized columns can separate a significant number of small molecules, combined with the advantage of speed and ease of injecting in any suitable solvent. Figure 7 shows the increased success rate due to the introduction of the newer CHIRALPAK ID phase into a column screen of 123 compounds using a single eluent combination of hexane – 2-PrOH. When these immobilized phase columns are used with the set of four primary screening solvents, the separation success rate can approach 99%. If the desired chiral separation is not achieved, then an extended secondary screen can be applied.

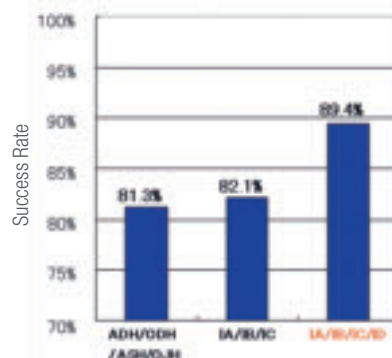


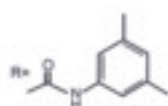
Figure 7. Screening success rates with single eluent

Please see page 86 for ordering information for CHIRALPAK immobilized phases.

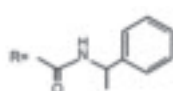
Daicel Polysaccharide Coated Phase Columns

- Original coated polysaccharide phases
- Fast easy method development
- Traditional 10 μ m, high resolution 5 μ m and ultra fast 3 μ m phases

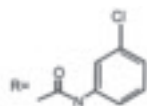
AMYLOSE-O-R



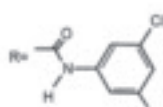
CHIRALPAK® 3A
CHIRALPAK® 3A-3
CHIRALPAK® AD-H
CHIRALPAK® AD
CHIRALPAK® AD-3
CHIRALPAK® AD-3R



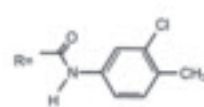
CHIRALPAK® AS-H
CHIRALPAK® AS
CHIRALPAK® AS-3
CHIRALPAK® AS-3R



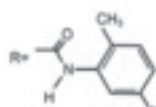
CHIRALPAK® ID
CHIRALPAK® ID-3



CHIRALPAK® IE
CHIRALPAK® IE-3

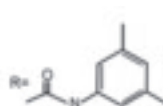


CHIRALPAK® AZ-H
CHIRALPAK® AZ
CHIRALPAK® AZ-3
CHIRALPAK® AZ-3R

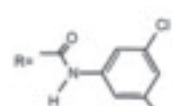


CHIRALPAK® AY-H
CHIRALPAK® AY
CHIRALPAK® AY-3
CHIRALPAK® AY-3R

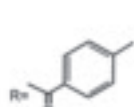
CELLULOSE-O-R



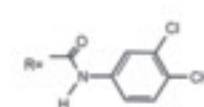
CHIRALPAK® IB
CHIRALPAK® IB-3
CHIRALCEL® OD-H
CHIRALCEL® OD
CHIRALCEL® OD-3
CHIRALCEL® OD-3R
CHIRALCEL® OD-I



CHIRALPAK® IC
CHIRALPAK® IC-3



CHIRALCEL® OJ-H
CHIRALCEL® OJ



CHIRALCEL® OZ-H
CHIRALCEL® OZ
CHIRALCEL® OZ-3
CHIRALCEL® OZ-3R

Figure 8. Structures of polysaccharide CSPs

Traditional Normal-Phase Columns (10 μ m)

The predecessors to the newer generation of immobilized columns, traditional CHIRALPAK® and CHIRALCEL® coated polysaccharide chiral stationary phases are based on a spherical high quality silica support on to which the polymeric chiral selector is physically coated. Due to the coated nature of these chiral supports, solvents should be carefully selected. CHIRALPAK AD and AS (amylose derivative coated on silica) and CHIRALCEL OD and OJ (cellulose derivative coated on silica) are the most widely used of the traditional 10 μ m phases.

High Resolution Reversed-Phase Columns (5 μ m)

Reversed-phase versions of the most popular normal-phase columns have been designed for high efficiency reversed-phase applications. These include CHIRALPAK AD-RH and AS-RH together with CHIRALCEL OD-RH and OJ-RH. These phases have the same coated chiral selector as the normal-phase columns but are coated to a hydrophobic high quality silica support. These reversed-phase columns were developed specifically for aqueous-organic eluents. They are suited for applications where the sample is in aqueous media (eg. biological samples) or for samples that require flexibility in terms of pH range. Figure 9 shows the separation of flurbiprofen enantiomers on CHIRALPAK AD-RH.

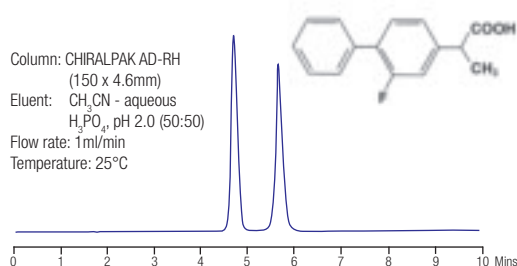


Figure 9. Analysis of flurbiprofen on CHIRALPAK AD-RH.

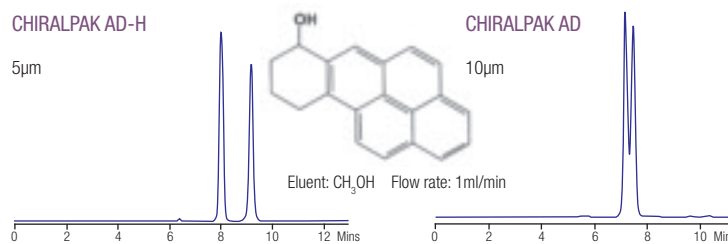


Figure 10. Analysis of 7, 8, 9, 10-tetrahydrobenzo[a]pyren-7-ol

High Resolution Normal-Phase Columns (5 μ m)

CHIRALPAK AD-H and AS-H together with CHIRALCEL OD-H and OJ-H are higher efficiency 5 μ m particle size normal-phase columns, used to resolve compounds requiring greater resolution than the traditional 10 μ m phases. Figure 10 shows the improved resolution obtained using a CHIRALPAK AD-H (5 μ m) compared to a CHIRALPAK AD (10 μ m) column.

Daicel Polysaccharide Coated Phase Columns (continued)

Ultra Fast NP and RP Columns (3 μ m)

More recently, 3 μ m particle size NP and RP phases have been introduced for higher resolution, fast analyses (CHIRALPAK AD-3, AD-3R, AS-3, AS-3R and CHIRALCEL OD-3, OD-3R, OJ-3, OJ-3R). These phases enable enhanced chromatographic separations to be achieved using conventional HPLC systems, without experiencing excessive pressure problems. Figure 11 demonstrates that enantiomer separation can be achieved in less than 30 seconds.

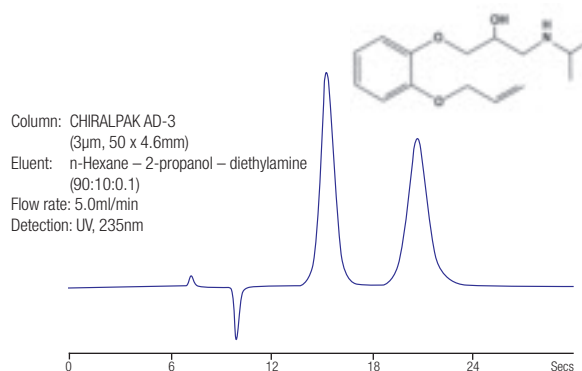


Figure 11. Fast analysis of oxprenolol on CHIRALPAK AD-3

Complementary Cellulose Chiral Phases

In addition to the four main phase types (AD, AS, OD and OJ), a complementary range of derivatized cellulose speciality phases is available. These phases were designed to resolve compounds that are not separated on these more versatile four key phases and include CHIRALCEL OA, OB, OC, OF, OG and OK.

New Polysaccharide Coated Phases

CHIRALPAK AY-H, AZ-H and CHIRALCEL OZ-H, OX-H 5 μ m and CHIRALPAK AY-3, AZ-3 and CHIRALCEL OZ-3, OX-3 3 μ m HPLC and SFC columns contain significantly different chiral selectors to the traditional phases discussed above. They show new recognition profiles, allowing effective method development for compounds not fully resolved on other Daicel columns. They are an excellent complement to the primary screen systems of CHIRALPAK IA, IB, IC and ID or the alternative CHIRALPAK AD, AS and CHIRALCEL OD, OJ.

Figure 12 shows the enhanced separation of the enantiomers of methyl-1-benzyl-5-oxo-3-pyrrolidinecarboxylate using CHIRALCEL OZ-H over that using CHIRALCEL OD-H.

The herbicide metolachlor has two chiral elements due to steric hindrance, which gives rise to four diastereomers. Figure 13 shows a comparison of the separation of these diastereomers using CHIRALPAK AY-H and CHIRALCEL OD-3.

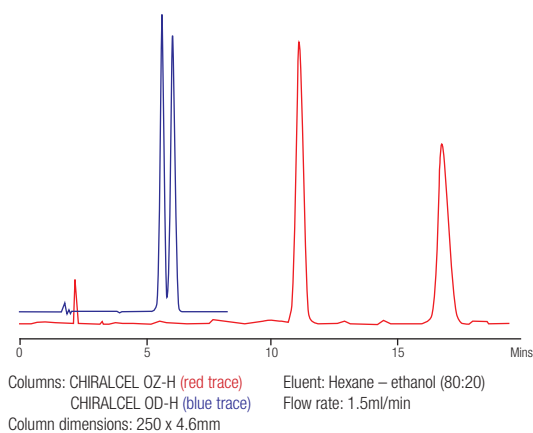


Figure 12. Separation of methyl-1-benzyl-5-oxo-3-pyrrolidinecarboxylate enantiomers

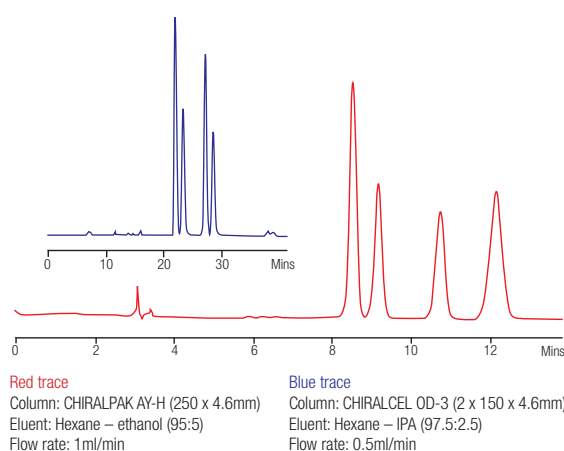


Figure 13. Separation of metolachlor diastereomers

Please see page 86 and 87 for ordering information for CHIRALPAK and CHIRALCEL coated phase columns.

Chiral Screening Service

Chiral Technologies Europe offers a chiral screening service in both HPLC and SFC, for customer supplied samples. A range of their chiral columns are screened under a variety of eluent compositions, in order to identify the most appropriate column. For further details of this service and to obtain a sample submission form, please contact Hichrom. Confidentiality agreements can be set up if required.

Application Guide

Chiral Technologies Europe have produced a fully searchable Application Guide on CD. This contains over 1,100 chiral applications, including new applications on the immobilized CSPs. Please contact Hichrom to obtain a free copy.



Daicel Columns for SFC

Daicel polysaccharide columns are well established for use in SFC separations. In addition to the benefits of speed of separation, speed of method development and improved column efficiency, green SFC technology reduces the use of organic solvents. Although the standard Daicel analytical HPLC columns (see pages 81- 84) can be used in SFC, semi-preparative CHIRALPAK and CHIRALCEL SFC columns are packed specifically to withstand the higher pressures of SFC.

Screening is recommended on the four main immobilized phases (IA, IB, IC and ID) and the four main coated columns (AD, OD, AS and OJ) with varying concentrations of organic modifier. Figures 14 and 15 illustrate the fast and efficient analyses possible using Daicel SFC columns.

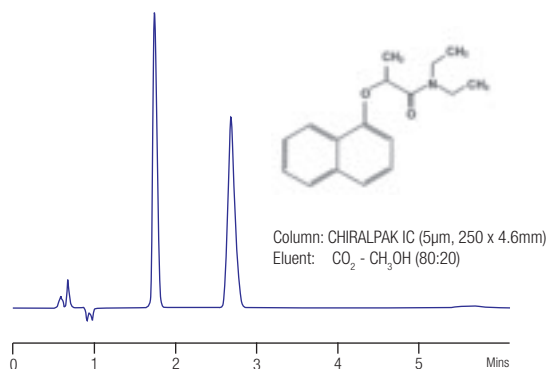


Figure 14. SFC separation of devrinol

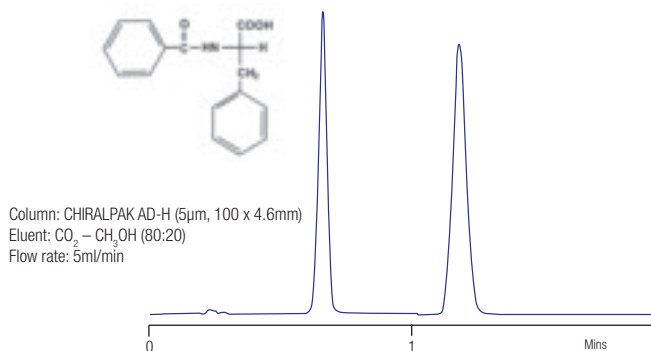


Figure 15. SFC separation of 1-naphthylethanol

Please see page 87 for ordering information for CHIRALPAK and CHIRALCEL SFC columns.

CHIRALPAK® QN-AX and QD-AX (Lindner Phase Columns)

- Reversed-phase or polar organic modes
- Wide solvent compatibility
- pH range 2 – 8

CHIRALPAK QN-AX and QD-AX are enantioselective weak anion-exchange (AX) columns. They are based on complementary stereoisomeric quinine (QN) and quinidine (QD) derivatives. Due to their pseudo enantiomeric character they usually reveal reversed elution order for opposite enantiomers.

These phases are designed specifically for enantioselective HPLC of chiral acids and show exceptional separation capabilities for acidic chiral compounds containing carboxylic, phosphonic, phosphinic, phosphoric or sulphonic acid groups. In some cases, weakly acidic compounds such as phenols can also be separated.

These two columns can be used in reversed-phase or polar organic modes. The separation of chiral basic and neutral compounds may also be possible, but usually under normal-phase conditions, when the phases behave like standard Pirkle type phases.

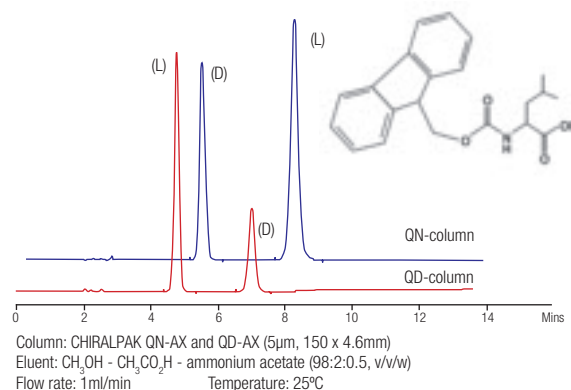
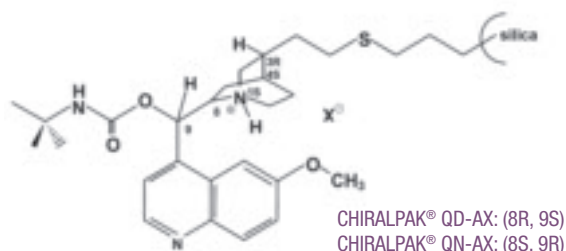


Figure 16. Analysis of Fmoc-Leu on CHIRALPAK QN-AX and QD-AX

Ordering Information

| CHIRALPAK 5 μ m Phase | Column Dimensions (mm) | | | Analytical Guard Cartridges ¹ (3/pk) (For 4.6mm i.d. Columns) |
|---------------------------|------------------------|-----------|----------|---|
| | 150 x 2.1 | 150 x 4.6 | 150 x 20 | |
| QD-AX | 31394 | 31324 | 31344 | 31311 |
| QD-AX SFC | - | - | 31444 | - |
| QN-AX | 32394 | 32324 | 32344 | 32311 |
| QN-AX SFC | - | - | 32444 | - |

¹ Use with holder 00011 (€120) and column coupler 000D1 (€47)

Ordering Information - Immobilized Phases

| CHIRALPAK 5µm Phase | Column Dimensions (mm) | | | | | Analytical Guard Cartridge ¹ (For 4.6mm i.d. Columns) | Semi-prep Guard Column ² (For 10 and 20mm i.d. Columns) |
|------------------------|------------------------|-----------|-----------|----------|----------|--|--|
| | 150 x 2.1 | 150 x 4.6 | 250 x 4.6 | 250 x 10 | 250 x 20 | | |
| IA | 80394 | 80324 | 80325 | 80335 | 80345 | 80311 | 80337 |
| IB | 81394 | 81324 | 81325 | 81335 | 81345 | 81311 | 81337 |
| IC | 83394 | 83324 | 83325 | 83335 | 83345 | 83311 | 83337 |
| ID | 84394 | 84324 | 84325 | 84335 | 84345 | 84311 | 84337 |
| IE | 85394 | 85324 | 85325 | 85335 | 85345 | 85311 | 85337 |
| IF | 86394 | 86324 | 86325 | 86335 | 86345 | 86311 | 86337 |

| CHIRALPAK 3µm Phase | Column Dimensions (mm) | | | | | Analytical Guard Cartridge ¹ 3/pk (For 4.6mm i.d. Columns) |
|------------------------|------------------------|----------|-----------|-----------|-----------|---|
| | 150 x 2.1 | 50 x 4.6 | 100 x 4.6 | 150 x 4.6 | 250 x 4.6 | |
| IA-3 | 80594 | 80522 | 80523 | 80524 | 80525 | 80511 |
| IB-3 | 81594 | 81522 | 81523 | 81524 | 81525 | 81511 |
| IC-3 | 83594 | 83522 | 83523 | 83524 | 83525 | 83511 |
| ID-3 | 84594 | 84522 | 84523 | 84524 | 84525 | 84511 |
| IE-3 | 85594 | 85522 | 85523 | 85524 | 85525 | 85511 |
| IF-3 | 86594 | 86522 | 86523 | 86524 | 86525 | 86511 |

¹ Use with holder 00011 and column coupler 000D1² No holder required

Ordering Information - Traditional Phases

| 10µm Phase ¹ | Column Dimensions (mm) | | | | Analytical Guard Cartridge ² (For 4.6mm i.d. Columns) | Semi-prep Guard Column ³ (For 10mm i.d. Columns) |
|-------------------------|------------------------|-----------|----------|----------|--|---|
| | 150 x 2.1 | 250 x 4.6 | 250 x 10 | 250 x 20 | | |
| Normal-phase | | | | | | |
| CHIRALPAK AD | 19094 | 19025 | 19035 | 19045 | 19311 ⁴ | 19032 |
| CHIRALPAK AS | 20094 | 20025 | 20035 | 20045 | 20311 ⁴ | 20032 |
| CHIRALCEL OD | - | 14025 | 14035 | 14045 | 14311 ⁴ | 14032 |
| CHIRALCEL OJ | - | 17025 | 17035 | 17045 | 17311 ⁴ | 17032 |
| Reversed-phase | | | | | | |
| CHIRALCEL OD-R | - | 14625 | - | - | 14611 | - |

| 5µm Phase | Column Dimensions (mm) | | | | | Analytical Guard Cartridge ² 3/pk (For 4.6mm i.d. Columns) |
|-----------------------|------------------------|-----------|-----------|-----------------------|----------|---|
| | 150 x 2.1 | 150 x 4.6 | 250 x 4.6 | 250 x 10 ⁵ | 250 x 20 | |
| Normal-phase | | | | | | |
| CHIRALPAK AD-H | 19394 | 19324 | 19325 | 19335 | 19345 | 19311 |
| CHIRALPAK AS-H | 20394 | 20324 | 20325 | 20335 | 20345 | 20311 |
| CHIRALCEL OD-H | 14394 | 14324 | 14325 | 14335 | 14345 | 14311 |
| CHIRALCEL OJ-H | 17394 | 17324 | 17325 | 17335 | 17345 | 17311 |
| CHIRALPAK AZ-H | 61394 | 61324 | 61325 | 61335 | 61345 | 61311 |
| CHIRALPAK AY-H | 47394 | 47324 | 47325 | 47335 | 47345 | 47311 |
| CHIRALCEL OZ-H | 42394 | 42324 | 42325 | 42335 | 42345 | 42311 |
| CHIRALCEL OX-H | 63394 | 63324 | 63325 | 63335 | 63345 | 63311 |
| Reversed-phase | | | | | | |
| CHIRALPAK AD-RH | 19794 | 19724 | - | - | - | 19711 |
| CHIRALPAK AS-RH | 20794 | 20724 | - | - | - | 20711 |
| CHIRALCEL OD-RH | 14794 | 14724 | - | - | - | 14711 |
| CHIRALCEL OJ-RH | 17794 | 17724 | - | - | - | 17711 |
| CHIRALPAK AZ-RH | 61794 | 61724 | - | - | - | 61711 |
| CHIRALPAK AY-RH | 47794 | 47724 | - | - | - | 47711 |
| CHIRALCEL OZ-RH | 42794 | 42724 | - | - | - | 42711 |
| CHIRALCEL OX-RH | 63794 | 63724 | - | - | - | 63711 |

¹ Other phases and column dimensions available² Use with holder 00011 and column coupler 000D1³ No holder required⁴ 5µm material⁵ Semi-prep guard column available – please enquire

Ordering Information - Traditional Phases (continued)

| 3µm Phase | Column Dimensions (mm) | | | | | Analytical Guard Cartridge ¹ 3/µk (For 4.6mm i.d. Columns) |
|-----------------------|------------------------|----------|-----------|-----------|-----------|--|
| | 150 x 2.1 | 50 x 4.6 | 100 x 4.6 | 150 x 4.6 | 250 x 4.6 | |
| Normal-phase | | | | | | |
| CHIRALPAK AD-3 | 19594 | 19522 | 19523 | 19524 | 19525 | 19511 |
| CHIRALPAK AS-3 | - | 20522 | 20523 | 20524 | 20525 | 20511 |
| CHIRALCEL OD-3 | 14594 | 14522 | 14523 | 14524 | 14525 | 14511 |
| CHIRALCEL OJ-3 | - | 17522 | 17523 | 17524 | 17525 | 17511 |
| CHIRALPAK AZ-3 | - | 61522 | 61523 | 61524 | 61525 | 61511 |
| CHIRALPAK AY-3 | - | 47522 | 47523 | 47524 | 47525 | 47511 |
| CHIRALCEL OZ-3 | - | 42522 | 42523 | 42524 | 42525 | 42511 |
| CHIRALCEL OX-3 | 63594 | 63522 | 63523 | 63524 | 63525 | 63511 |
| Reversed-phase | | | | | | |
| CHIRALPAK AD-3R | 19894 | 19822 | 19823 | 19824 | - | 19811 |
| CHIRALPAK AS-3R | - | 20822 | 20823 | 20824 | - | 20811 |
| CHIRALCEL OD-3R | 14894 | 14822 | 14823 | 14824 | - | 14811 |
| CHIRALCEL OJ-3R | - | 17822 | 17823 | 17824 | - | 17811 |
| CHIRALPAK AY-3R | - | 47822 | 47823 | 47824 | - | 47811 |
| CHIRALPAK AZ-3R | - | 61822 | 61823 | 61824 | - | 61811 |
| CHIRALCEL OZ-3R | - | 42822 | 42823 | 42824 | - | 42811 |
| CHIRALCEL OX-3R | 63894 | 63822 | 63823 | 63824 | - | 63811 |

¹ Use with holder 00011 and column coupler 000D1

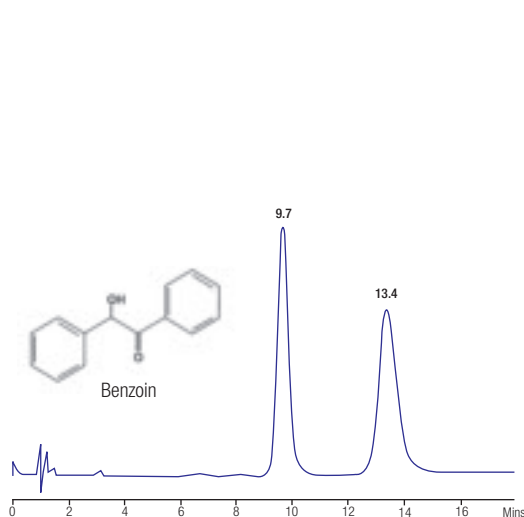
Ordering Information - SFC Phases

| 5µm Phase | Column Dimensions ¹ (mm) | | |
|--------------------|-------------------------------------|----------|----------|
| | 100 x 4.6 | 250 x 10 | 250 x 20 |
| CHIRALPAK IA SFC | 80423 | 80435 | 80445 |
| CHIRALPAK IB SFC | 81423 | 81435 | 81445 |
| CHIRALPAK IC SFC | 83423 | 83435 | 83445 |
| CHIRALPAK ID SFC | 84423 | 84435 | 84445 |
| CHIRALPAK IE SFC | 85423 | 85435 | 85445 |
| CHIRALPAK IF SFC | 86423 | 86435 | 86445 |
| | | | |
| CHIRALPAK AD-H SFC | 19423 | 19435 | 19445 |
| CHIRALPAK AS-H SFC | 20423 | 20435 | 20445 |
| CHIRALCEL OD-H SFC | 14423 | 14435 | 14445 |
| CHIRALCEL OJ-H SFC | 17423 | 17435 | 17445 |
| CHIRALPAK AZ-H SFC | 61423 | 61435 | 61445 |
| CHIRALPAK AY-H SFC | 47423 | 47435 | 47445 |
| CHIRALCEL OZ-H SFC | 42423 | 42435 | 42445 |
| CHIRALCEL OX-H SFC | 63423 | 63435 | 63445 |

¹ Please enquire regarding larger i.d. prep columns

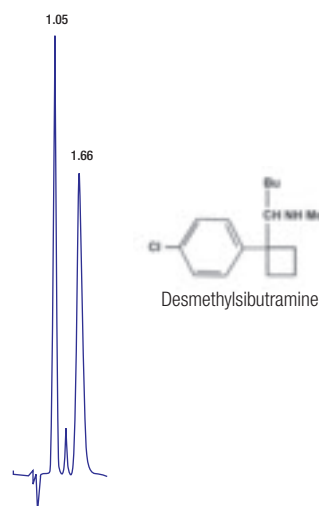


CHIRALPAK Protein Phase Columns (continued)



Column: CHIRALPAK HSA (100 x 4.0mm)
 Eluent: 2% CH₃CN in 100mM Na phosphate pH 7.0
 Flow rate: 0.9ml/min

Figure 19. Benzoin



Column: CHIRALPAK AGP (50 x 4.0mm)
 Eluent: 5% CH₃CN in 10mM ammonium acetate buffer, pH 4.1
 Flow rate: 0.9ml/min

Figure 20. Fast chiral separation suitable for MS detection

Columns for LC-MS

Shorter CHIRALPAK protein phase columns are available for rapid analysis and LC-MS applications. In order to convert from a UV to LC-MS method, in addition to decreasing column dimensions, phosphate buffers are replaced with ammonium acetate and the concentration of buffer and organic modifier reduced. Figure 20 shows the rapid separation of desmethyisbutramine using a short CHIRALPAK AGP column.

Drug – Plasma Protein Binding Studies

Another application of these protein-based columns is their use in drug-plasma protein binding studies. As the degree of drug-protein binding directly affects pharmacokinetic and pharmacodynamic characteristics of a pharmaceutical compound, a drug's potency may be dependent on the degree to which it binds to the plasma proteins and other blood constituents. HPLC analysis using CHIRALPAK AGP and CHIRALPAK HSA columns has been shown to be useful in drug binding studies.

Ordering Information

| CHIRALPAK Phase | Column Dimensions (mm) | | | | | | Guard Cartridges ¹ (2/pk) | |
|-----------------|------------------------|-----------|-----------|----------|-----------|-----------|--------------------------------------|-----------------------|
| | 50 x 2.0 | 100 x 2.0 | 150 x 2.0 | 50 x 3.0 | 100 x 3.0 | 150 x 3.0 | 10 x 2.0 ² | 10 x 3.0 ³ |
| AGP | 30792 | 30793 | 30794 | 30782 | 30783 | 30784 | 30791 | 30781 |
| CBH | 33792 | 33793 | 33794 | 33782 | 33783 | 33784 | 33791 | 33781 |
| HSA | 34792 | 34793 | 34794 | 34782 | 34783 | 34784 | 34791 | 34781 |

| CHIRALPAK Phase | Column Dimensions (mm) | | | | | Guard Cartridges ¹ (2/pk) |
|-----------------|------------------------|-----------|-----------|------------|------------|--------------------------------------|
| | 50 x 4.0 | 100 x 4.0 | 150 x 4.0 | 100 x 10.0 | 150 x 10.0 | 10 x 4.0 ⁴ |
| AGP | 30712 | 30713 | 30714 | 30733 | 30734 | 30711 |
| CBH | 33712 | 33713 | 33714 | 33733 | 33734 | 33711 |
| HSA | 34712 | 34713 | 34714 | 34733 | 34734 | 34711 |

¹ Use with free-standing holder 00081² For use with 2.0mm i.d. columns and column coupler 000D2³ For use with 3.0mm i.d. columns and column coupler 000D2⁴ For use with 4.0mm i.d. columns and column coupler 000D1

Crown Ether Chiral Columns

The CROWNPAK® CR(+) and CR(-) phases contain a chiral crown ether as chiral selector, which is coated on to a 5µm silica support. They can be used for the enantiomeric separation of amino acids and other small molecules containing a primary amino group near the chiral centre. The CR(-) column gives the reversed elution order compared to the CR(+) column. Acidic eluents such as perchloric acid at pH 1 to 2 are used as standard with these columns. Figure 21 shows the separation of arginine on CROWNPAK CR.

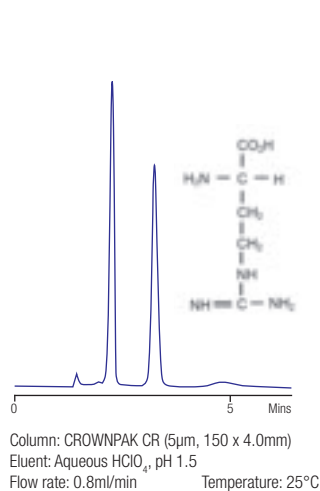


Figure 21. Analysis of arginine on CROWNPAK CR

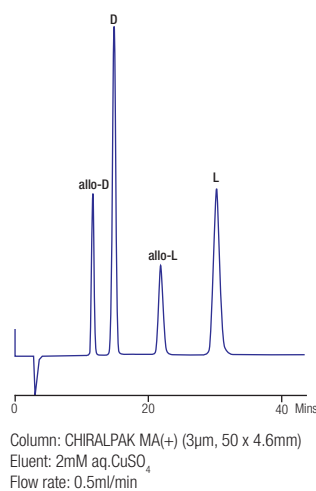




Figure 22. Analysis of isoleucine on CHIRALPAK MA(+)

Ligand Exchange Chiral Columns

The ligand exchange phases, CHIRALPAK MA(+) and CHIRALPAK WH (see Table 2) consist of amino acids and their derivatives coated on to silica supports. They are used in conjunction with an aqueous CuSO₄ eluent (0.1 to 2mM) and are useful for the separation of amino acids and their derivatives (see Figure 22).

Table 2. Crown Ether and Ligand Exchange Chiral Phases

| Phase | Particle Size (µm) | Adsorbent | Applications |
|----------------|--------------------|---|--|
| CROWNPAK CR(+) | 5 |  | Amino acids and compounds with a primary amino group near an asymmetric centre |
| CROWNPAK CR(-) | 5 | | |
| CROWNPAK MA(+) | 3 | N,N-Dioctyl-L-alanine ligand | α-Hydroxycarboxylic acids, α-amino acids |
| CROWNPAK WH | 10 |  | Amino acids and their derivatives |

Ordering Information

Crown Ether phases

| CROWNPAK Phase | Column Dimensions (mm) | |
|----------------|------------------------|--------------------------------------|
| | 150 x 4.0 | CROWNPAK CR Guard Column 10 x 4.0 |
| CROWNPAK CR(+) | 27714 | 27711 |
| CROWNPAK CR(-) | 28714 | 27711 |

Ligand Exchange Phases

| CHIRALPAK Phase | Column Dimensions (mm) | | |
|-----------------|------------------------|------------------|----------|
| | 250 x 4.6 | 50 x 4.6 (guard) | 50 x 4.6 |
| CHIRALPAK WH | 25625 | 25622 | - |
| CHIRALPAK MA(+) | - | - | 21822 |