



# ***DAICEL CHIRAL COLUMNS***

vol.6

DAICEL CORPORATION

# PRODUCT LIST

DAICEL chiral HPLC columns are the most referenced chiral HPLC columns. Used for their high quality, broad selectivity and high loading capacities, they separate > 99% of all racemic compounds.

| Column name   | Compounds functionality  | Mobile phases  | Page   |
|---|--|--|--------|
| <b>Immobilized type</b><br>CHIRALPAK® IA-3/IA CHIRALPAK® ID-3/ID<br>CHIRALPAK® IB-3/IB CHIRALPAK® IE-3/IE<br>CHIRALPAK® IC-3/IC CHIRALPAK® IF-3/IF  | Amide group<br>Aromatic compounds<br>Carbonyl group<br>Nitro group<br>Sulfonyl group<br>Cyano group<br>Hydroxyl group<br>Amino group<br>Carbonic acids<br>Amino acid derivatives | Hexane, IPA, EtOH, THF, MtBE, DCM, EA, CHCl <sub>3</sub> , etc<br>Water or Buffer / Acetonitrile<br>Water or Buffer / Methanol | p1-4   |
| <b>Normal Phase</b><br>CHIRALPAK® AD-3/AD-H/AD<br>CHIRALPAK® AS-3/AS-H/AS<br>CHIRALPAK® AY-3/AY-H<br>CHIRALPAK® AZ-3/AZ-H<br>CHIRALCEL® OD-3/OD-H/OD<br>CHIRALCEL® OJ-3/OJ-H/OJ<br>CHIRALCEL® OX-3/OX-H<br>CHIRALCEL® OZ-3/OZ-H<br>CHIRALCEL® OB-H/OB<br>CHIRALCEL® OC-H/OC<br>CHIRALCEL® OA<br>CHIRALCEL® OF<br>CHIRALCEL® OG<br>CHIRALCEL® OK |  | Hexane/IPA<br>Hexane/EtOH etc.   | p6-16  |
| <b>Reverse Phase</b><br>CHIRALPAK® AD-3R/AD-RH<br>CHIRALPAK® AS-3R/AS-RH<br>CHIRALPAK® AY-3R/AY-RH<br>CHIRALPAK® AZ-3R/AZ-RH<br>CHIRALCEL® OD-3R/OD-RH/OD-R<br>CHIRALCEL® OJ-3R/OJ-RH<br>CHIRALCEL® OX-3R/OX-RH<br>CHIRALCEL® OZ-3R/OZ-RH   |  | Water or Buffer / Acetonitrile<br>Water or Buffer / Methanol   | p18-22 |
| <b>Protein-based Chiral HPLC column</b><br>CHIRALPAK AGP®<br>CHIRALPAK CBH<br>CHIRALPAK HSA   |  | Aq buffer based  | p23-25 |
| <b>Crown ether type</b><br>CROWNPAK® CR(+)<br>CROWNPAK® CR(-)<br>CROWNPAK® CR-I (+)<br>CROWNPAK® CR-I (-)   | Amino acids<br>Primary amino group<br>N-Protected Amino acids  | Aq. Perchloric acid solution   | p26-28 |
| <b>Anion-exchange type</b><br>CHIRALPAK® QN-AX<br>CHIRALPAK® QD-AX  | Compounds with acidic functions  | Methanol<br>Acetonitrile   |        |
| <b>Ligand-exchange type</b><br>CHIRALPAK® WH<br>CHIRALPAK® MA(+)  | Amino acids or amino acid derivatives<br>Hydroxycarbonic acids   | Cupric sulfate solution  |        |
| <b>Polymethacrylate type</b><br>CHIRALPAK® OP(+)<br>CHIRALPAK® OT(+)  | Aromatic compounds   | Hexane/IPA<br>Methanol   |        |

## CAUTION

Please follow the below points for maximum column life.

- (1) Please use carefully to avoid any shock. Flow rate direction is indicated on the column label.
- (2) Operating a column in accordance with the instruction manual will result in a long column life.  
The instruction sheet is not applicable to any other DAICEL columns.
- (3) The use of guard cartridge or guard column is highly recommended.

# CONTENTS

## DAICEL CHIRAL COLUMNS PRODUCT LIST

### CHIRAL HPLC COLUMNS

#### Immobilized type Chiral HPLC Columns

CHIRALPAK® IA-3/IA CHIRALPAK® ID-3/ID  
CHIRALPAK® IB-3/IB CHIRALPAK® IE-3/IE  
CHIRALPAK® IC-3/IC CHIRALPAK® IF-3/IF

#### Normal Phase HPLC Columns

CHIRALPAK® AD-3/AD-H/AD  
CHIRALPAK® AS-3/AS-H/AS  
CHIRALPAK® AY-3/AY-H  
CHIRALPAK® AZ-3/AZ-H  
CHIRALCEL® OD-3/OD-H/OD  
CHIRALCEL® OJ-3/OJ-H/OJ  
CHIRALCEL® OX-3/OX-H  
CHIRALCEL® OZ-3/OZ-H  
Others

#### Reverse Phase HPLC Columns

CHIRALPAK® AD-3R/AD-RH  
CHIRALPAK® AS-3R/AS-RH  
CHIRALPAK® AY-3R/AY-RH  
CHIRALPAK® AZ-3R/AZ-RH  
CHIRALCEL® OD-3R/OD-RH/OD-R  
CHIRALCEL® OJ-3R/OJ-RH  
CHIRALCEL® OX-3R/OX-RH  
CHIRALCEL® OZ-3R/OZ-RH

#### Protein-based Chiral HPLC Columns

CHIRALPAK AGP®  
CHIRALPAK CBH®  
CHIRALPAK HSA®

#### DAICEL Chiral HPLC Columns for Special Applications

**CROWNPAK® CR(+)/CR(-)**  
Crown ether HPLC columns for separation in acidic mobile phase

**CROWNPAK® CR-I(+)/CR-I(-)**  
Immobilized Crown ether HPLC columns for separation in acidic mobile phase

**CHIRALPAK® QN-AX/QD-AX**  
Anion-exchange HPLC columns for separation of chiral acids

**CHIRALPAK® ZWIX (+) / ZWIX (-)**  
Zwitterionic HPLC columns for underivatized Amino acids and Zwitterionic compounds

**CHIRALPAK® WH/CHIRALPAK MA(+)**  
Ligand-exchange HPLC columns designed for amino-acids separations

**CHIRALPAK® OP(+)/OT(+)**  
Polymethacrylate HPLC columns

#### Analytical Chromatography Accessories

Guard Cartridge Holder  
Column Jacket

#### SFC Chiral Columns

#### Chiral Flash Columns

CHIRAL FLASH / MPLC Columns  
Chiral TLC Plates

Immobilized type Chiral  
HPLC Columns

Normal Phase  
HPLC Columns

Reverse Phase  
HPLC Columns

Protein-based Chiral  
HPLC Columns

DAICEL Chiral  
HPLC Columns for  
Special Applications

Analytical  
Chromatography  
Accessories

SFC  
Chiral Columns

Chiral  
Flash/MPLC  
Columns



# Immobilized type Chiral HPLC Columns

## Feature

Immobilized columns are designed for solvent flexibility for the resolution of compounds with limited solubility, outstanding solvent tolerance and excellent separations of enantiomers.

- High success rate and Broad application domain
- Highly durable and can be regenerated
- Compatible with all miscible solvents
- Rugged phases hence carefree operation
- High Preparative potential
- Compatibility with RP, NP and Polar mode

## Mobile Phase

All kinds of solvents usable for general chromatography can be used on Immobilized type chiral HPLC columns.

|                   |                                 |
|-------------------|---------------------------------|
| Hexane            | Acetone                         |
| IPA               | MTBE                            |
| EtOH              | Ethyl acetate                   |
| MeOH              | CH <sub>2</sub> Cl <sub>2</sub> |
| THF               | Acetonitrile                    |
| CHCl <sub>3</sub> | DMSO                            |
| 1,4-Dioxane       | Water                           |

etc.

## Reference

### CHIRALPAK® IA

Solvent versatility of immobilized 3,5-dimethylphenylcarbamate of amylose in enantiomeric separations by HPLC  
Journal of Chromatography A, 1075 (2005) 65-75

### CHIRALPAK® IB

Cellulose 3,5-dimethylphenylcarbamate immobilized on silica:  
A new chiral stationary phase for the analysis of enantiomers  
Analytica Chimica Acta 557 (2006) 221-228

### CHIRALPAK® IC

Cellulose tris(3,5-dichlorophenylcarbamate) immobilised on silica:  
A novel chiral stationary phase for resolution of enantiomers  
Journal of Pharmaceutical and Biomedical Analysis 46 (2008) 882-891

### Screening with immobilized type columns.

Common approaches for efficient method development with immobilised polysaccharide-derived chiral stationary phases  
Journal of Chromatography B, 875 (2008) 48-56

Enantiomer resolution screening strategy using multiple immobilised polysaccharide-based chiral stationary phases  
Journal of Chromatography A, 1191 (2008) 214-222

Complementary enantiorecognition patterns and specific method optimization aspects on immobilized polysaccharide derived chiral stationary phases  
Journal of Chromatography A, 1269 (2012) 178-188



# CHIRALPAK® IA-3

## Immobilized type column of CHIRALPAK® AD-3

|                 |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IA-3 | Analytical                     | 2.1                    | 150                | 3                  | 80594     |
| CHIRALPAK® IA-3 | Analytical                     | 2.1                    | 250                | 3                  | 80595     |
| CHIRALPAK® IA-3 | Analytical                     | 4.6                    | 50                 | 3                  | 80522     |
| CHIRALPAK® IA-3 | Analytical                     | 4.6                    | 100                | 3                  | 80523     |
| CHIRALPAK® IA-3 | Analytical                     | 4.6                    | 150                | 3                  | 80524     |
| CHIRALPAK® IA-3 | Analytical                     | 4.6                    | 250                | 3                  | 80525     |
| CHIRALPAK® IA-3 | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 3                  | 80511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® IA

## Immobilized type column of CHIRALPAK® AD-H

|               |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IA | Analytical                     | 2.1                    | 150                | 5                  | 80394     |
| CHIRALPAK® IA | Analytical                     | 2.1                    | 250                | 5                  | 80395     |
| CHIRALPAK® IA | Analytical                     | 4.6                    | 150                | 5                  | 80324     |
| CHIRALPAK® IA | Analytical                     | 4.6                    | 250                | 5                  | 80325     |
| CHIRALPAK® IA | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 80311     |
| CHIRALPAK® IA | Semi-prep                      | 10                     | 250                | 5                  | 80335     |
| CHIRALPAK® IA | Semi-prep                      | 20                     | 250                | 5                  | 80345     |
| CHIRALPAK® IA | Guard column for Semi-prep     | 10                     | 20                 | 5                  | 80337     |
| CHIRALPAK® IA | Prep                           | 50                     | 500                | 20                 | 80256     |
| CHIRALPAK® IA | Guard column for Prep          | 50                     | 100                | 20                 | 80253     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® IB-3

## Immobilized type column of CHIRALCEL® OD-3

|                 |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IB-3 | Analytical                     | 2.1                    | 150                | 3                  | 81594     |
| CHIRALPAK® IB-3 | Analytical                     | 2.1                    | 250                | 3                  | 81595     |
| CHIRALPAK® IB-3 | Analytical                     | 4.6                    | 50                 | 3                  | 81522     |
| CHIRALPAK® IB-3 | Analytical                     | 4.6                    | 100                | 3                  | 81523     |
| CHIRALPAK® IB-3 | Analytical                     | 4.6                    | 150                | 3                  | 81524     |
| CHIRALPAK® IB-3 | Analytical                     | 4.6                    | 250                | 3                  | 81525     |
| CHIRALPAK® IB-3 | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 3                  | 81511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® IB

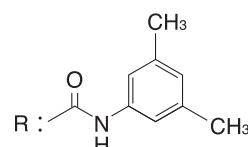
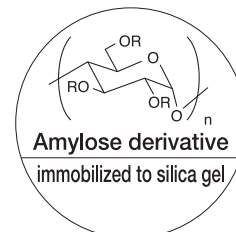
## Immobilized type column of CHIRALCEL® OD-H

|               |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IB | Analytical                     | 2.1                    | 150                | 5                  | 81394     |
| CHIRALPAK® IB | Analytical                     | 2.1                    | 250                | 5                  | 81395     |
| CHIRALPAK® IB | Analytical                     | 4.6                    | 150                | 5                  | 81324     |
| CHIRALPAK® IB | Analytical                     | 4.6                    | 250                | 5                  | 81325     |
| CHIRALPAK® IB | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 81311     |
| CHIRALPAK® IB | Semi-prep                      | 10                     | 250                | 5                  | 81335     |
| CHIRALPAK® IB | Semi-prep                      | 20                     | 250                | 5                  | 81345     |
| CHIRALPAK® IB | Guard column for Semi-prep     | 10                     | 20                 | 5                  | 81337     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

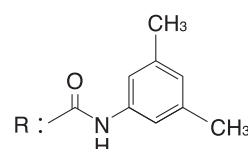
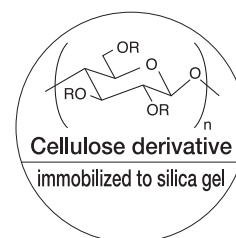
### CSP

Amylose tris  
(3,5-dimethylphenylcarbamate)  
immobilized to silica gel



### CSP

Cellulose tris  
(3,5-dimethylphenylcarbamate)  
immobilized to silica gel



# Immobilized type Chiral HPLC Columns

## CHIRALPAK® IC-3

Immobilized type column of new chiral selector

|                 |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® IC-3 | Analytical                     | 2.1                   | 150               | 3                 | 83594     |
| CHIRALPAK® IC-3 | Analytical                     | 2.1                   | 250               | 3                 | 83595     |
| CHIRALPAK® IC-3 | Analytical                     | 4.6                   | 50                | 3                 | 83522     |
| CHIRALPAK® IC-3 | Analytical                     | 4.6                   | 100               | 3                 | 83523     |
| CHIRALPAK® IC-3 | Analytical                     | 4.6                   | 150               | 3                 | 83524     |
| CHIRALPAK® IC-3 | Analytical                     | 4.6                   | 250               | 3                 | 83525     |
| CHIRALPAK® IC-3 | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 3                 | 83511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® IC

Immobilized type column of new chiral selector

|               |                               | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|---------------|-------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® IC | Analytical                    | 2.1                   | 150               | 5                 | 83394     |
| CHIRALPAK® IC | Analytical                    | 2.1                   | 250               | 5                 | 83395     |
| CHIRALPAK® IC | Analytical                    | 4.6                   | 150               | 5                 | 83324     |
| CHIRALPAK® IC | Analytical                    | 4.6                   | 250               | 5                 | 83325     |
| CHIRALPAK® IC | Guard Cartridge <sup>※1</sup> | 4                     | 10                | 5                 | 83311     |
| CHIRALPAK® IC | Semi-prep                     | 10                    | 250               | 5                 | 83335     |
| CHIRALPAK® IC | Semi-prep                     | 20                    | 250               | 5                 | 83345     |
| CHIRALPAK® IC | Guard column for Semi-prep    | 10                    | 20                | 5                 | 83337     |
| CHIRALPAK® IC | Prep                          | 50                    | 500               | 20                | 83256     |
| CHIRALPAK® IC | Guard column for Prep         | 50                    | 100               | 20                | 83253     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® ID-3

Immobilized type column of new chiral selector

|                 |                       | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|-----------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® ID-3 | Analytical            | 2.1                   | 250               | 3                 | 84595     |
| CHIRALPAK® ID-3 | Analytical            | 2.1                   | 150               | 3                 | 84594     |
| CHIRALPAK® ID-3 | Analytical            | 4.6                   | 250               | 3                 | 84525     |
| CHIRALPAK® ID-3 | Analytical            | 4.6                   | 150               | 3                 | 84524     |
| CHIRALPAK® ID-3 | Analytical            | 4.6                   | 100               | 3                 | 84523     |
| CHIRALPAK® ID-3 | Analytical            | 4.6                   | 50                | 3                 | 84522     |
| CHIRALPAK® ID-3 | Guard Cartridge ×3pcs | 4                     | 10                | 3                 | 84511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

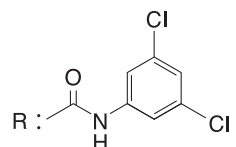
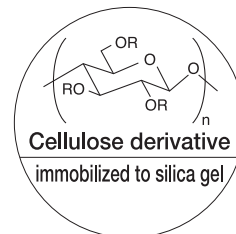
## CHIRALPAK® ID

Immobilized type column of new chiral selector

|               |                       | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|---------------|-----------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® ID | Analytical            | 2.1                   | 250               | 5                 | 84395     |
| CHIRALPAK® ID | Analytical            | 2.1                   | 150               | 5                 | 84394     |
| CHIRALPAK® ID | Semi-preparative      | 20                    | 250               | 5                 | 84345     |
| CHIRALPAK® ID | Semi-preparative      | 10                    | 250               | 5                 | 84335     |
| CHIRALPAK® ID | Guard/semi prep       | 10                    | 20                | 5                 | 84337     |
| CHIRALPAK® ID | Analytical            | 4.6                   | 250               | 5                 | 84325     |
| CHIRALPAK® ID | Analytical            | 4.6                   | 150               | 5                 | 84324     |
| CHIRALPAK® ID | Guard Cartridge ×3pcs | 4                     | 10                | 5                 | 84311     |

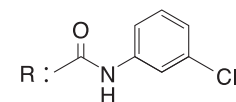
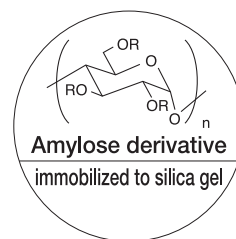
※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

Cellulose tris  
(3,5-dichlorophenylcarbamate)  
immobilized to silica gel



CSP

Amylose tris  
(3-chlorophenylcarbamate)  
immobilized to silica gel



# CHIRALPAK® IE-3

## Immobilized type column of new chiral selector

|                 |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IE-3 | Analytical            | 2.1                    | 250                | 3                  | 85595     |
| CHIRALPAK® IE-3 | Analytical            | 2.1                    | 150                | 3                  | 85594     |
| CHIRALPAK® IE-3 | Analytical            | 4.6                    | 250                | 3                  | 85525     |
| CHIRALPAK® IE-3 | Analytical            | 4.6                    | 150                | 3                  | 85524     |
| CHIRALPAK® IE-3 | Analytical            | 4.6                    | 100                | 3                  | 85523     |
| CHIRALPAK® IE-3 | Analytical            | 4.6                    | 50                 | 3                  | 85522     |
| CHIRALPAK® IE-3 | Guard Cartridge ×3pcs | 4                      | 10                 |                    | 85511     |

※ 1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® IE

## Immobilized type column of new chiral selector

|               |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IE | Analytical            | 2.1                    | 250                | 5                  | 85395     |
| CHIRALPAK® IE | Analytical            | 2.1                    | 150                | 5                  | 85394     |
| CHIRALPAK® IE | Semi-preparative      | 20                     | 250                | 5                  | 85345     |
| CHIRALPAK® IE | Semi-preparative      | 10                     | 250                | 5                  | 85335     |
| CHIRALPAK® IE | Guard/semi prep       | 10                     | 20                 | 5                  | 85337     |
| CHIRALPAK® IE | Analytical            | 4.6                    | 250                | 5                  | 85325     |
| CHIRALPAK® IE | Analytical            | 4.6                    | 150                | 5                  | 85324     |
| CHIRALPAK® IE | Guard Cartridge ×3pcs | 4                      | 10                 | 5                  | 85311     |

# CHIRALPAK® IF-3

## Immobilized type column of new chiral selector

|                 |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IF-3 | Analytical            | 2.1                    | 250                | 3                  | 86595     |
| CHIRALPAK® IF-3 | Analytical            | 2.1                    | 150                | 3                  | 86594     |
| CHIRALPAK® IF-3 | Analytical            | 4.6                    | 250                | 3                  | 86525     |
| CHIRALPAK® IF-3 | Analytical            | 4.6                    | 150                | 3                  | 86524     |
| CHIRALPAK® IF-3 | Analytical            | 4.6                    | 100                | 3                  | 86523     |
| CHIRALPAK® IF-3 | Analytical            | 4.6                    | 50                 | 3                  | 86522     |
| CHIRALPAK® IF-3 | Guard Cartridge ×3pcs | 4                      | 10                 | 3                  | 86511     |

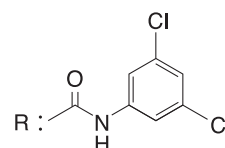
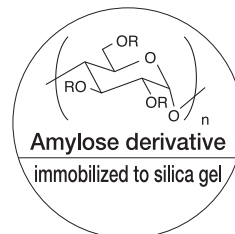
# CHIRALPAK® IF

## Immobilized type column of new chiral selector

|               |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IF | Analytical            | 2.1                    | 250                | 5                  | 86395     |
| CHIRALPAK® IF | Analytical            | 2.1                    | 150                | 5                  | 86394     |
| CHIRALPAK® IF | Semi-preparative      | 20                     | 250                | 5                  | 86345     |
| CHIRALPAK® IF | Semi-preparative      | 10                     | 250                | 5                  | 86335     |
| CHIRALPAK® IF | Guard/semi prep       | 10                     | 20                 | 5                  | 86337     |
| CHIRALPAK® IF | Analytical            | 4.6                    | 250                | 5                  | 86325     |
| CHIRALPAK® IF | Analytical            | 4.6                    | 150                | 5                  | 86324     |
| CHIRALPAK® IF | Guard Cartridge ×3pcs | 4                      | 10                 | 5                  | 86311     |

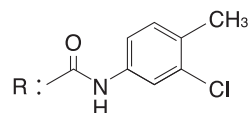
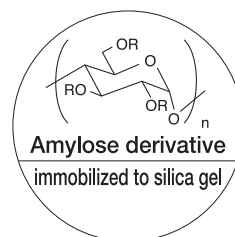
### CSP

Amylose tris  
(3,5-dichlorophenylcarbamate)  
immobilized to silica gel



### CSP

Amylose tris  
(3-chloro-4-methylphenylcarbamate)  
immobilized to silica gel



# *i*CHIRAL-6

CHIRALPAK® IA-3/IA

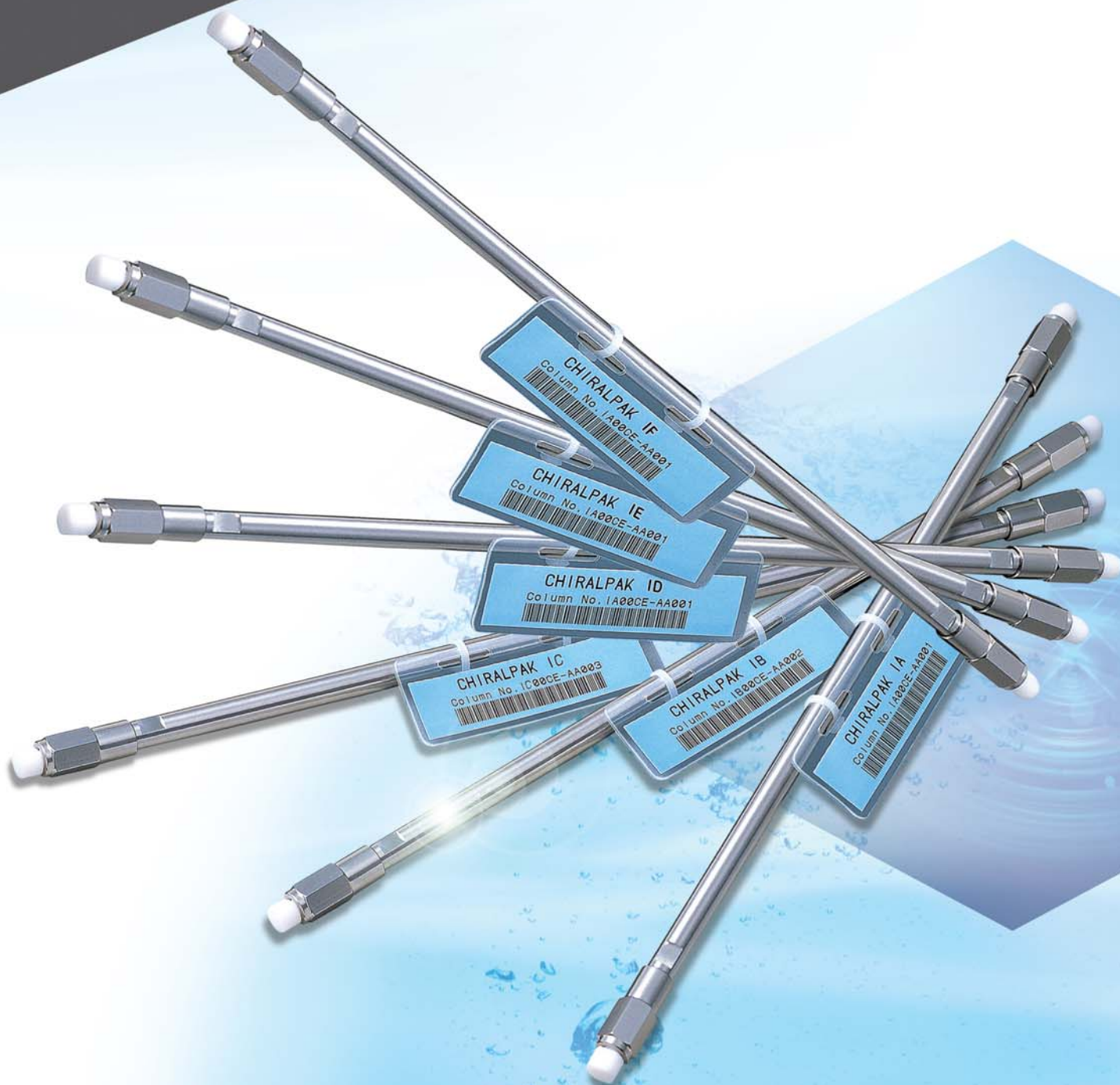
CHIRALPAK® IB-3/IB

CHIRALPAK® IC-3/IC

CHIRALPAK® ID-3/ID

CHIRALPAK® IE-3/IE

CHIRALPAK® IF-3/IF





# Normal Phase HPLC Columns

## Feature

- Daicel's Polysaccharide based chiral columns are the most widely used in the world with >95% success rate.
- Available in various sizes from Semi micro to Preparative type.
- Available in 3 micron series for faster chiral analysis.
- Compatible with Normal Phase and Polar Organic mode

## Mobile Phase

### ① Standard solvent mixtures

|   | Hexane / 2-propanol | Hexane / EtOH    |
|---|---------------------|------------------|
| <b>CHIRALPAK® AD-3 / AD-H / AD</b> ※1<br><b>CHIRALPAK® AS-3 / AS-H / AS</b><br><b>CHIRALPAK® AY-3 / AY-H</b><br><b>CHIRALPAK® AZ-3 / AZ-H</b><br><b>CHIRALCEL® OD-3 / OD-H / OD</b><br><b>CHIRALCEL® OJ-3 / OJ-H / OJ</b><br><b>CHIRALCEL® OX-3 / OX-H</b><br><b>CHIRALCEL® OZ-3 / OZ-H</b> | 100/0 ~ 0/100       | 100/0 ~ 0/100 ※1 |

※1 : In case of AD, the range Hexane/EtOH 85/15~40/60 may adversely affect baseline stability due to polymer leakage.

To safely transfer the column from 15%EtOH to 60%EtOH, it is strongly recommended to use 100% 2-propanol as a transition mobile phase at a low flow rate (high viscosity of 2-propanol).

- The retention is generally shorter with Ethanol than with 2-propanol.
  - The retention is generally shorter with a higher alcohol content.
  - The use of other alcohols such as 1-propanol, 1-BuOH, 2-BuOH etc... is possible, but effectiveness cannot be guaranteed.
- Do not use mobile phases containing more than 15% of these alcohols.

### ② Polar solvents

|   | MeOH | EtOH | 2-propanol | Acetonitrile |
|---|------|------|------------|--------------|
| <b>CHIRALPAK® AD-3 / AD-H / AD</b> ※1<br><b>CHIRALPAK® AS-3 / AS-H / AS</b><br><b>CHIRALPAK® AY-3 / AY-H</b><br><b>CHIRALCEL® OD-3 / OD-H / OD</b><br><b>CHIRALCEL® OJ-3 / OJ-H / OJ</b><br><b>CHIRALCEL® OZ-3 / OZ-H</b> |      |      |            |              |

※1 : The use of polar solvents as 100% methanol or 100% acetonitrile is possible with CHIRALPAK® AD column. Nevertheless once the column is transferred to a polar mode it should be dedicated to this specific application.

Please read carefully the column instruction manual specific to each stationary phase for mobile additives and solvent compatibility.

## Notice

DAICEL coated polysaccharide chiral stationary phases are made with a spherical high quality silica support onto which the polymeric chiral selector (amylosic derivatives, cellulosic derivatives,) is physically coated. Due to the coated nature of these chiral support, solvents should be carefully selected. Please read carefully the column instruction manual specific to each column for mobile phase additives and solvent compatibility.

The following solvents should never be used.

DMF, DMSO, Dioxane, Toluene, THF, Chloroform, Methylene Chloride, Acetone, Ethyl acetate.

# Normal Phase HPLC Columns

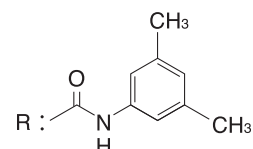
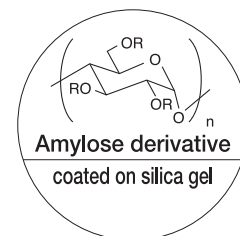
## CHIRALPAK® AD-3

|                 |                     | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|---------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® AD-3 | Analytical          | 2.1                   | 150               | 3                 | 19594     |
| CHIRALPAK® AD-3 | Analytical          | 2.1                   | 250               | 3                 | 19595     |
| CHIRALPAK® AD-3 | Analytical          | 4.6                   | 50                | 3                 | 19522     |
| CHIRALPAK® AD-3 | Analytical          | 4.6                   | 100               | 3                 | 19523     |
| CHIRALPAK® AD-3 | Analytical          | 4.6                   | 150               | 3                 | 19524     |
| CHIRALPAK® AD-3 | Analytical          | 4.6                   | 250               | 3                 | 19525     |
| CHIRALPAK® AD-3 | Guard Cartridges ※1 | 4                     | 10                | 3                 | 19511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

### CSP

Amylose tris  
(3,5-dimethylphenylcarbamate)  
coated on silica gel



## CHIRALPAK® AD-H

|                 |                            | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|----------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® AD-H | Analytical                 | 2.1                   | 150               | 5                 | 19394     |
| CHIRALPAK® AD-H | Analytical                 | 2.1                   | 250               | 5                 | 19395     |
| CHIRALPAK® AD-H | Analytical                 | 4.6                   | 150               | 5                 | 19324     |
| CHIRALPAK® AD-H | Analytical                 | 4.6                   | 250               | 5                 | 19325     |
| CHIRALPAK® AD-H | Guard Cartridges ※1        | 4                     | 10                | 5                 | 19311     |
| CHIRALPAK® AD-H | Semi-prep                  | 10                    | 250               | 5                 | 19335     |
| CHIRALPAK® AD-H | Semi-prep                  | 20                    | 250               | 5                 | 19345     |
| CHIRALPAK® AD-H | Guard column for Semi-prep | 10                    | 20                | 5                 | 19337     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® AD

|               |                             | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|---------------|-----------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® AD | Analytical                  | 4.6                   | 250               | 10                | 19025     |
| CHIRALPAK® AD | Guard column for Analytical | 4.6                   | 50                | 10                | 19022     |
| CHIRALPAK® AD | Semi-prep                   | 10                    | 250               | 10                | 19035     |
| CHIRALPAK® AD | Guard column for Semi-prep  | 10                    | 50                | 10                | 19032     |
| CHIRALPAK® AD | Semi-prep                   | 20                    | 250               | 10                | 19045     |
| CHIRALPAK® AD | Guard column for Semi-prep  | 20                    | 50                | 10                | 19042     |
| CHIRALPAK® AD | Prep                        | 50                    | 500               | 20                | 19256     |
| CHIRALPAK® AD | Guard column for Prep       | 50                    | 100               | 20                | 19253     |

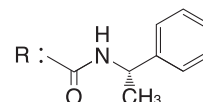
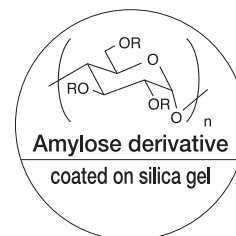
# CHIRALPAK® AS-3

|                 |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS-3 | Analytical          | 2.1                    | 150                | 3                  | 20594     |
| CHIRALPAK® AS-3 | Analytical          | 2.1                    | 250                | 3                  | 20595     |
| CHIRALPAK® AS-3 | Analytical          | 4.6                    | 50                 | 3                  | 20522     |
| CHIRALPAK® AS-3 | Analytical          | 4.6                    | 100                | 3                  | 20523     |
| CHIRALPAK® AS-3 | Analytical          | 4.6                    | 150                | 3                  | 20524     |
| CHIRALPAK® AS-3 | Analytical          | 4.6                    | 250                | 3                  | 20525     |
| CHIRALPAK® AS-3 | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 20511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CSP

Amylose tris  
{ (S)-α-methylbenzylcarbamate }  
coated on silica gel



# CHIRALPAK® AS-H

|                 |                            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS-H | Analytical                 | 2.1                    | 150                | 5                  | 20394     |
| CHIRALPAK® AS-H | Analytical                 | 2.1                    | 250                | 5                  | 20395     |
| CHIRALPAK® AS-H | Analytical                 | 4.6                    | 150                | 5                  | 20324     |
| CHIRALPAK® AS-H | Analytical                 | 4.6                    | 250                | 5                  | 20325     |
| CHIRALPAK® AS-H | Guard cartridges ※1        | 4                      | 10                 | 5                  | 20311     |
| CHIRALPAK® AS-H | Semi-prep                  | 10                     | 250                | 5                  | 20335     |
| CHIRALPAK® AS-H | Semi-prep                  | 20                     | 250                | 5                  | 20345     |
| CHIRALPAK® AS-H | Guard column for Semi-prep | 10                     | 20                 | 5                  | 20337     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® AS

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS | Analytical                  | 4.6                    | 250                | 10                 | 20025     |
| CHIRALPAK® AS | Guard column for Analytical | 4.6                    | 50                 | 10                 | 20022     |
| CHIRALPAK® AS | Semi-prep                   | 10                     | 250                | 10                 | 20035     |
| CHIRALPAK® AS | Guard column for Semi-prep  | 10                     | 50                 | 10                 | 20032     |
| CHIRALPAK® AS | Semi-prep                   | 20                     | 250                | 10                 | 20045     |
| CHIRALPAK® AS | Guard column for Semi-prep  | 20                     | 50                 | 10                 | 20042     |
| CHIRALPAK® AS | Prep                        | 50                     | 500                | 20                 | 20256     |
| CHIRALPAK® AS | Guard column for Prep       | 50                     | 100                | 20                 | 20253     |

# Normal Phase HPLC Columns

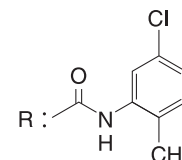
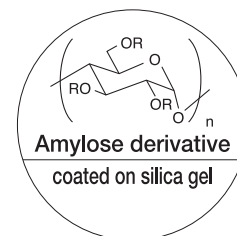
## CHIRALPAK® AY-3

|                 |                     | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|---------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® AY-3 | Analytical          | 2.1                   | 150               | 3                 | 47594     |
| CHIRALPAK® AY-3 | Analytical          | 2.1                   | 250               | 3                 | 47595     |
| CHIRALPAK® AY-3 | Analytical          | 4.6                   | 50                | 3                 | 47522     |
| CHIRALPAK® AY-3 | Analytical          | 4.6                   | 100               | 3                 | 47523     |
| CHIRALPAK® AY-3 | Analytical          | 4.6                   | 150               | 3                 | 47524     |
| CHIRALPAK® AY-3 | Analytical          | 4.6                   | 250               | 3                 | 47525     |
| CHIRALPAK® AY-3 | Guard Cartridges ※1 | 4                     | 10                | 3                 | 47511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

### CSP

Amylose tris  
(5-chloro-2-methylphenylcarbamate)  
coated on silica gel



## CHIRALPAK® AY-H

|                 |                            | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|----------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALPAK® AY-H | Analytical                 | 2.1                   | 150               | 5                 | 47394     |
| CHIRALPAK® AY-H | Analytical                 | 2.1                   | 250               | 5                 | 47395     |
| CHIRALPAK® AY-H | Analytical                 | 4.6                   | 150               | 5                 | 47324     |
| CHIRALPAK® AY-H | Analytical                 | 4.6                   | 250               | 5                 | 47325     |
| CHIRALPAK® AY-H | Guard Cartridges ※1        | 4                     | 10                | 5                 | 47311     |
| CHIRALPAK® AY-H | Semi-prep                  | 10                    | 250               | 5                 | 47335     |
| CHIRALPAK® AY-H | Semi-prep                  | 20                    | 250               | 5                 | 47345     |
| CHIRALPAK® AY-H | Guard column for Semi-prep | 10                    | 20                | 5                 | 47337     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

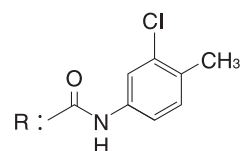
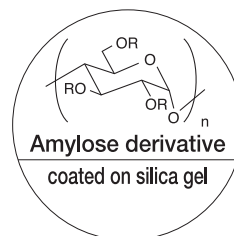


# CHIRALPAK® AZ-3

|                 |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AZ-3 | Analytical            | 2.1                    | 250                | 3                  | 61595     |
| CHIRALPAK® AZ-3 | Analytical            | 2.1                    | 150                | 3                  | 61594     |
| CHIRALPAK® AZ-3 | Analytical            | 4.6                    | 250                | 3                  | 61525     |
| CHIRALPAK® AZ-3 | Analytical            | 4.6                    | 150                | 3                  | 61524     |
| CHIRALPAK® AZ-3 | Analytical            | 4.6                    | 100                | 3                  | 61523     |
| CHIRALPAK® AZ-3 | Analytical            | 4.6                    | 50                 | 3                  | 61522     |
| CHIRALPAK® AZ-3 | Guard Cartridge ×3pcs | 4                      | 10                 | 3                  | 61511     |

## CSP

Amylose tris  
(3-chloro-4-methylphenylcarbamate)  
coated on silica gel



# CHIRALPAK® AZ-H

|                 |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AZ-H | Analytical            | 2.1                    | 250                | 5                  | 61395     |
| CHIRALPAK® AZ-H | Analytical            | 2.1                    | 150                | 5                  | 61394     |
| CHIRALPAK® AZ-H | Semi-preparative      | 20                     | 250                | 5                  | 61345     |
| CHIRALPAK® AZ-H | Semi-preparative      | 10                     | 250                | 5                  | 61335     |
| CHIRALPAK® AZ-H | Guard/semi prep       | 10                     | 20                 | 5                  | 61337     |
| CHIRALPAK® AZ-H | Analytical            | 4.6                    | 250                | 5                  | 61325     |
| CHIRALPAK® AZ-H | Analytical            | 4.6                    | 150                | 5                  | 61324     |
| CHIRALPAK® AZ-H | Guard Cartridge ×3pcs | 4                      | 10                 | 5                  | 61311     |

# Normal Phase HPLC Columns

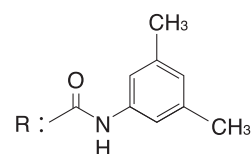
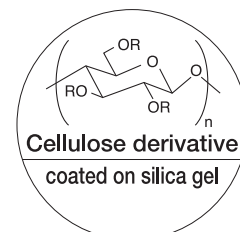
## CHIRALCEL® OD-3

|                 |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OD-3 | Analytical          | 2.1                    | 150                | 3                  | 14594     |
| CHIRALCEL® OD-3 | Analytical          | 2.1                    | 250                | 3                  | 14595     |
| CHIRALCEL® OD-3 | Analytical          | 4.6                    | 50                 | 3                  | 14522     |
| CHIRALCEL® OD-3 | Analytical          | 4.6                    | 100                | 3                  | 14523     |
| CHIRALCEL® OD-3 | Analytical          | 4.6                    | 150                | 3                  | 14524     |
| CHIRALCEL® OD-3 | Analytical          | 4.6                    | 250                | 3                  | 14525     |
| CHIRALCEL® OD-3 | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 14511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

### CSP

Cellulose tris  
(3,5-dimethylphenylcarbamate)  
coated on silica gel



## CHIRALCEL® OD-H

|                 |                            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OD-H | Analytical                 | 2.1                    | 150                | 5                  | 14394     |
| CHIRALCEL® OD-H | Analytical                 | 2.1                    | 250                | 5                  | 14395     |
| CHIRALCEL® OD-H | Analytical                 | 4.6                    | 150                | 5                  | 14324     |
| CHIRALCEL® OD-H | Analytical                 | 4.6                    | 250                | 5                  | 14325     |
| CHIRALCEL® OD-H | Guard Cartridges ※1        | 4                      | 10                 | 5                  | 14311     |
| CHIRALCEL® OD-H | Semi-prep                  | 10                     | 250                | 5                  | 14335     |
| CHIRALCEL® OD-H | Semi-prep                  | 20                     | 250                | 5                  | 14345     |
| CHIRALCEL® OD-H | Guard column for Semi-prep | 10                     | 20                 | 5                  | 14337     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OD

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OD | Analytical                  | 4.6                    | 250                | 10                 | 14025     |
| CHIRALCEL® OD | Guard column for Analytical | 4.6                    | 50                 | 10                 | 14022     |
| CHIRALCEL® OD | Semi-prep                   | 10                     | 250                | 10                 | 14035     |
| CHIRALCEL® OD | Guard column for Semi-prep  | 10                     | 50                 | 10                 | 14032     |
| CHIRALCEL® OD | Semi-prep                   | 20                     | 250                | 10                 | 14045     |
| CHIRALCEL® OD | Guard column for Semi-prep  | 20                     | 50                 | 10                 | 14042     |
| CHIRALCEL® OD | Prep                        | 50                     | 500                | 20                 | 14256     |
| CHIRALCEL® OD | Guard column for Prep       | 50                     | 100                | 20                 | 14253     |

# CHIRALCEL® OJ-3

|                 |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OJ-3 | Analytical          | 2.1                    | 150                | 3                  | 17594     |
| CHIRALCEL® OJ-3 | Analytical          | 2.1                    | 250                | 3                  | 17595     |
| CHIRALCEL® OJ-3 | Analytical          | 4.6                    | 50                 | 3                  | 17522     |
| CHIRALCEL® OJ-3 | Analytical          | 4.6                    | 100                | 3                  | 17523     |
| CHIRALCEL® OJ-3 | Analytical          | 4.6                    | 150                | 3                  | 17524     |
| CHIRALCEL® OJ-3 | Analytical          | 4.6                    | 250                | 3                  | 17525     |
| CHIRALCEL® OJ-3 | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 17511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALCEL® OJ-H

|                 |                            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OJ-H | Analytical                 | 2.1                    | 150                | 5                  | 17394     |
| CHIRALCEL® OJ-H | Analytical                 | 2.1                    | 250                | 5                  | 17395     |
| CHIRALCEL® OJ-H | Analytical                 | 4.6                    | 150                | 5                  | 17324     |
| CHIRALCEL® OJ-H | Analytical                 | 4.6                    | 250                | 5                  | 17325     |
| CHIRALCEL® OJ-H | Guard Cartridges ※1        | 4                      | 10                 | 5                  | 17311     |
| CHIRALCEL® OJ-H | Semi-prep                  | 10                     | 250                | 5                  | 17335     |
| CHIRALCEL® OJ-H | Semi-prep                  | 20                     | 250                | 5                  | 17345     |
| CHIRALCEL® OJ-H | Guard column for Semi-prep | 10                     | 20                 | 5                  | 17337     |

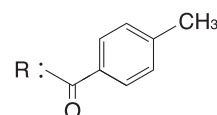
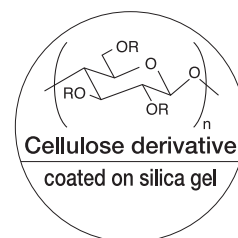
※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALCEL® OJ

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OJ | Analytical                  | 4.6                    | 250                | 10                 | 17025     |
| CHIRALCEL® OJ | Guard column for Analytical | 4.6                    | 50                 | 10                 | 17022     |
| CHIRALCEL® OJ | Semi-prep                   | 10                     | 250                | 10                 | 17035     |
| CHIRALCEL® OJ | Guard column for Semi-prep  | 10                     | 50                 | 10                 | 17032     |
| CHIRALCEL® OJ | Semi-prep                   | 20                     | 250                | 10                 | 17045     |
| CHIRALCEL® OJ | Guard column for Semi-prep  | 20                     | 50                 | 10                 | 17042     |
| CHIRALCEL® OJ | Prep                        | 50                     | 500                | 20                 | 17256     |
| CHIRALCEL® OJ | Guard column for Prep       | 50                     | 100                | 20                 | 17253     |

## CSP

Cellulose tris  
(4-methylbenzoate)  
coated on silica gel



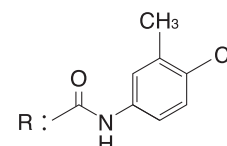
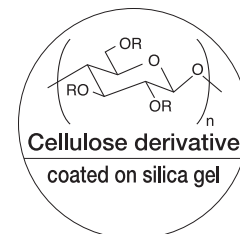
# Normal Phase HPLC Columns

## CHIRALCEL® OX-3

|                 |                       | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|-----------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OX-3 | Analytical            | 2.1                   | 250               | 3                 | 63595     |
| CHIRALCEL® OX-3 | Analytical            | 2.1                   | 150               | 3                 | 63594     |
| CHIRALCEL® OX-3 | Analytical            | 4.6                   | 250               | 3                 | 63525     |
| CHIRALCEL® OX-3 | Analytical            | 4.6                   | 150               | 3                 | 63524     |
| CHIRALCEL® OX-3 | Analytical            | 4.6                   | 100               | 3                 | 63523     |
| CHIRALCEL® OX-3 | Analytical            | 4.6                   | 50                | 3                 | 63522     |
| CHIRALCEL® OX-3 | Guard Cartridge ×3pcs | 4                     | 10                | 3                 | 63511     |

### CSP

Cellulose tris  
(4-chloro-3-methylphenylcarbamate)  
coated on silica gel



## CHIRALCEL® OX-H

|                 |                       | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|-----------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OX-H | Analytical            | 2.1                   | 250               | 5                 | 63395     |
| CHIRALCEL® OX-H | Analytical            | 2.1                   | 150               | 5                 | 63394     |
| CHIRALCEL® OX-H | Semi-preparative      | 20                    | 250               | 5                 | 63345     |
| CHIRALCEL® OX-H | Semi-preparative      | 10                    | 250               | 5                 | 63335     |
| CHIRALCEL® OX-H | Guard/semi prep       | 10                    | 20                | 5                 | 63337     |
| CHIRALCEL® OX-H | Analytical            | 4.6                   | 250               | 5                 | 63325     |
| CHIRALCEL® OX-H | Analytical            | 4.6                   | 150               | 5                 | 63324     |
| CHIRALCEL® OX-H | Guard Cartridge ×3pcs | 4                     | 10                | 5                 | 63311     |



# CHIRALCEL® OZ-3

|                 |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OZ-3 | Analytical          | 2.1                    | 150                | 3                  | 42594     |
| CHIRALCEL® OZ-3 | Analytical          | 2.1                    | 250                | 3                  | 42595     |
| CHIRALCEL® OZ-3 | Analytical          | 4.6                    | 50                 | 3                  | 42522     |
| CHIRALCEL® OZ-3 | Analytical          | 4.6                    | 100                | 3                  | 42523     |
| CHIRALCEL® OZ-3 | Analytical          | 4.6                    | 150                | 3                  | 42524     |
| CHIRALCEL® OZ-3 | Analytical          | 4.6                    | 250                | 3                  | 42525     |
| CHIRALCEL® OZ-3 | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 42511     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALCEL® OZ-H

|                 |                            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OZ-H | Analytical                 | 2.1                    | 150                | 5                  | 42394     |
| CHIRALCEL® OZ-H | Analytical                 | 2.1                    | 250                | 5                  | 42395     |
| CHIRALCEL® OZ-H | Analytical                 | 4.6                    | 150                | 5                  | 42324     |
| CHIRALCEL® OZ-H | Analytical                 | 4.6                    | 250                | 5                  | 42325     |
| CHIRALCEL® OZ-H | Guard Cartridges ※1        | 4                      | 10                 | 5                  | 42311     |
| CHIRALCEL® OZ-H | Semi-prep                  | 10                     | 250                | 5                  | 42335     |
| CHIRALCEL® OZ-H | Semi-prep                  | 20                     | 250                | 5                  | 42345     |
| CHIRALCEL® OZ-H | Guard column for Semi-prep | 10                     | 20                 | 5                  | 42337     |

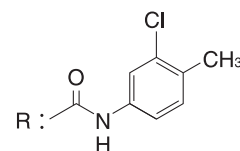
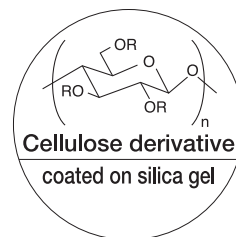
※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALCEL® OA

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OA | Analytical                  | 4.6                    | 250                | 10                 | 11025     |
| CHIRALCEL® OA | Guard column for Analytical | 4.6                    | 50                 | 10                 | 11022     |

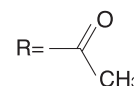
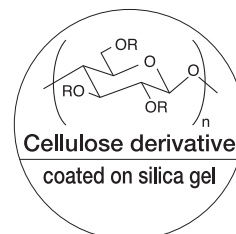
## CSP

Cellulose tris  
(3-chloro-4-methylphenylcarbamate)  
coated on silica gel



## CSP

Cellulose triacetate  
coated on silica gel



# Normal Phase HPLC Columns

## CHIRALCEL® OB-H

|                 |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OB-H | Analytical                     | 2.1                    | 150                | 5                  | 12394     |
| CHIRALCEL® OB-H | Analytical                     | 2.1                    | 250                | 5                  | 12395     |
| CHIRALCEL® OB-H | Analytical                     | 4.6                    | 150                | 5                  | 12324     |
| CHIRALCEL® OB-H | Analytical                     | 4.6                    | 250                | 5                  | 12325     |
| CHIRALCEL® OB-H | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 12311     |

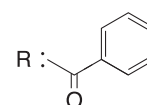
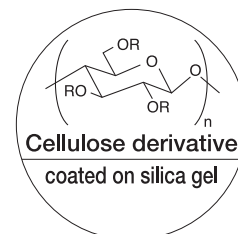
※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OB

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OB | Analytical                  | 4.6                    | 250                | 10                 | 12025     |
| CHIRALCEL® OB | Guard column for Analytical | 4.6                    | 50                 | 10                 | 12022     |

### CSP

Cellulose tribenzoate  
coated on silica gel



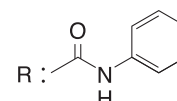
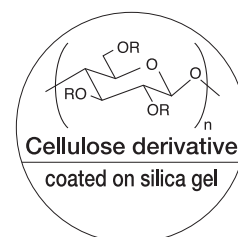
## CHIRALCEL® OC-H

|                 |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OC-H | Analytical                     | 2.1                    | 150                | 5                  | 13394     |
| CHIRALCEL® OC-H | Analytical                     | 2.1                    | 250                | 5                  | 13395     |
| CHIRALCEL® OC-H | Analytical                     | 4.6                    | 150                | 5                  | 13324     |
| CHIRALCEL® OC-H | Analytical                     | 4.6                    | 250                | 5                  | 13325     |
| CHIRALCEL® OC-H | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 13311     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

### CSP

Cellulose tris  
(phenylcarbamate)  
coated on silica gel



## CHIRALCEL® OC

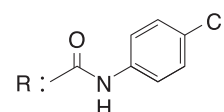
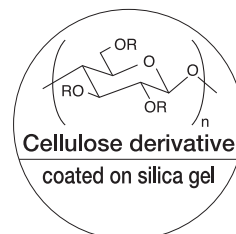
|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OC | Analytical                  | 4.6                    | 250                | 10                 | 13025     |
| CHIRALCEL® OC | Guard column for Analytical | 4.6                    | 50                 | 10                 | 13022     |

# CHIRALCEL® OF

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OF | Analytical                  | 4.6                    | 250                | 10                 | 15025     |
| CHIRALCEL® OF | Guard column for Analytical | 4.6                    | 50                 | 10                 | 15022     |
| CHIRALCEL® OF | Semi-prep                   | 10                     | 250                | 10                 | 15035     |
| CHIRALCEL® OF | Guard column for Semi-prep  | 10                     | 50                 | 10                 | 15032     |
| CHIRALCEL® OF | Semi-prep                   | 20                     | 250                | 10                 | 15045     |
| CHIRALCEL® OF | Guard column for Semi-prep  | 20                     | 50                 | 10                 | 15042     |

## CSP

Cellulose tris  
(4-chlorophenylcarbamate)  
coated on silica gel

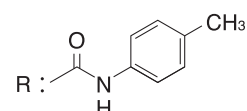
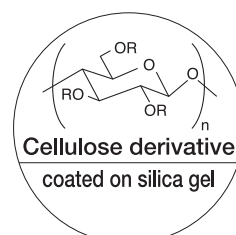


# CHIRALCEL® OG

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OG | Analytical                  | 4.6                    | 250                | 10                 | 16025     |
| CHIRALCEL® OG | Guard column for Analytical | 4.6                    | 50                 | 10                 | 16022     |

## CSP

Cellulose tris  
(4-methylphenylcarbamate)  
coated on silica gel

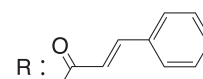
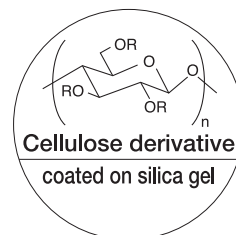


# CHIRALCEL® OK

|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OK | Analytical                  | 4.6                    | 250                | 10                 | 18025     |
| CHIRALCEL® OK | Guard column for Analytical | 4.6                    | 50                 | 10                 | 18022     |

## CSP

Cellulose tricinnamate  
coated on silica gel



# Semi-Preparative Columns

Suitable for few mg to multi gram scale chiral separations

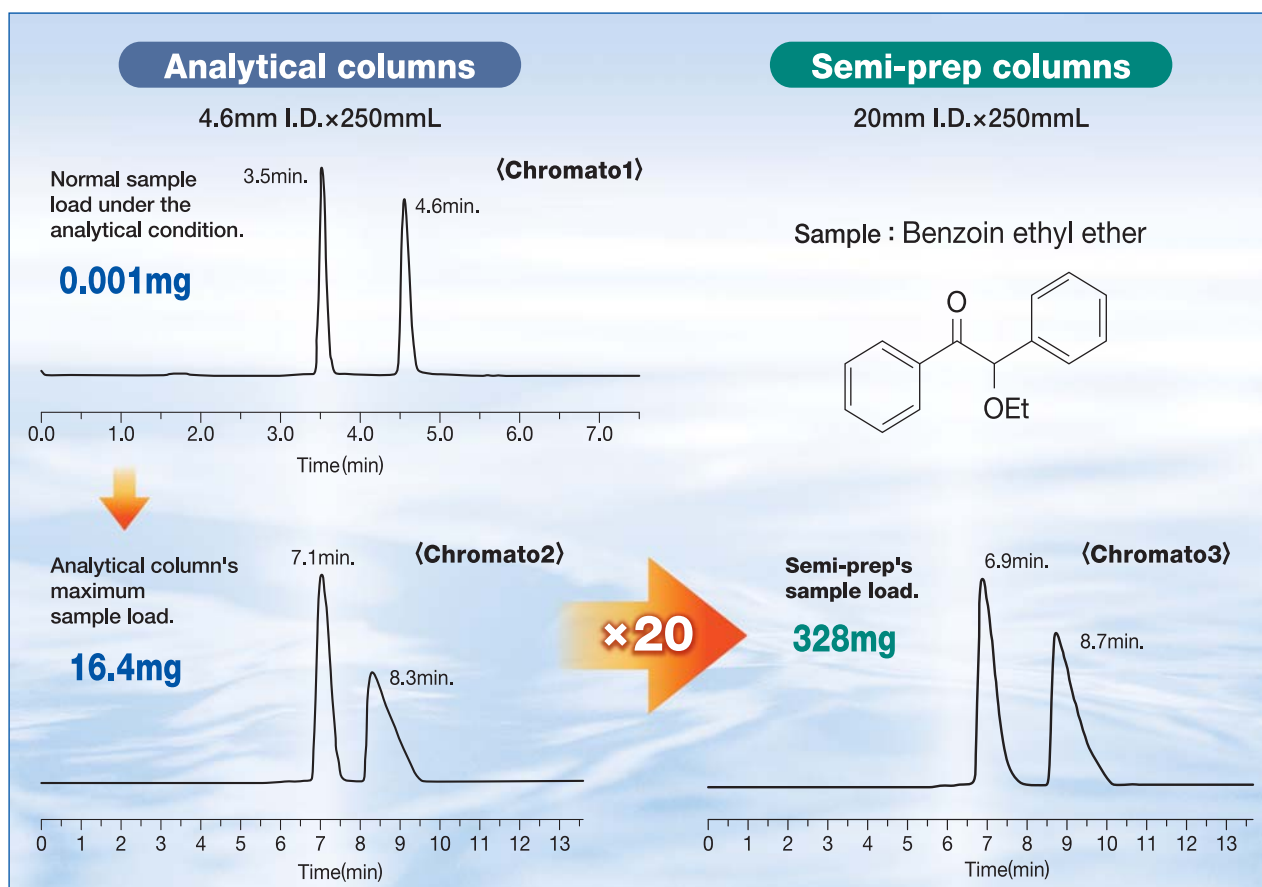
Easy to scale up from analytical to semi-preparative columns.

In case of the same length, the flow rate and injection volume are increased in proportion to the cross section area.

For example, in case of 20mm ID Semi-prep columns, you can inject twenty times of analytical column's maximum sample load.

$$X(\text{mg}) \times \left( \frac{10^2 \times \pi}{(2.3)^2 \times \pi} \right) \div X(\text{mg}) \times 20$$

$X$  : Analytical column's maximum sample load.



|           | Product       | Size              | Particle size | Mobile phase                      | Flow rate | Temp. | Detection wavelength | Sample temp.            | Inj.  | Sample load |
|-----------|---------------|-------------------|---------------|-----------------------------------|-----------|-------|----------------------|-------------------------|-------|-------------|
| Chromato1 | CHIRALPAK® IA | 4.6mm I.D.×250mmL | 5μm           | Hexane/Ethyl acetate =40/60 (v/v) | 1.0ml/min | 40°C  | 254nm (UV)           | 1.0mg/ml (Mobile phase) | 1.0μl | 0.001mg     |
| Chromato2 | CHIRALPAK® IA | 4.6mm I.D.×250mmL | 5μm           | Hexane/Ethyl acetate =40/60 (v/v) | 0.5ml/min | 40°C  | 310nm (UV)           | 656mg/ml (Mobile phase) | 25μl  | 16.4mg      |
| Chromato3 | CHIRALPAK® IA | 20mm I.D.×250mmL  | 5μm           | Hexane/Ethyl acetate =40/60 (v/v) | 9.4ml/min | 40°C  | 310nm (UV)           | 656mg/ml (Mobile phase) | 500μl | 328mg       |



# Reverse Phase HPLC Columns

## Feature

- Suitable for Bio-analytical applications and drug product chiral analysis
- LC-MS/MS compatible
- Available in 2, 2.1, 4.6 and 20mm id
- Available in 3 and 5 micron
- pH range: 2 to 9

## Mobile Phase

|                | Cellulose type   | Amylose type  |
|----------------|--|---|
|                | <b>CHIRALCEL® OD-3R/OD-RH/OD-R</b><br><b>CHIRALCEL® OJ-3R/OJ-RH</b><br><b>CHIRALCEL® OZ-3R/OZ-RH</b>   | <b>CHIRALPAK® AD-3R/AD-RH</b><br><b>CHIRALPAK® AS-3R/AS-RH</b><br><b>CHIRALPAK® AY-3R/AY-RH</b>                       |
| <b>Neutral</b> | Water / Acetonitrile = 60 / 40 (v/v)   |   |
| <b>Acidic</b>  | HCOOH aqueous solution (pH 2) / Acetonitrile = 60 / 40 (v/v)<br>H <sub>3</sub> PO <sub>4</sub> aqueous solution (pH 2) / Acetonitrile = 60 / 40 (v/v)<br>0.1M phosphate buffer (pH 2) / Acetonitrile = 60 / 40 (v/v) |   |
| <b>Basic</b>   | 20mM NH <sub>4</sub> HCO <sub>3</sub> aq. Soln. (pH9) <sup>※1</sup> / Acetonitrile = 60 / 40 (v/v)   |   |
|                | 0.1M KPF <sub>6</sub> aq./Acetonitrile = 60/40, (v/v)<br>0.1M NaPF <sub>6</sub> aq./Acetonitrile = 60/40, (v/v)  | 20mM borate buffer (pH 9) /<br>Acetonitrile=60/40 (v/v)<br>20mM phosphate buffer (pH 8) /<br>Acetonitrile=60/40 (v/v) |

※1 : Please adjust the pH of solution to the value of 9 with Diethylamine.

Immobilized type chiral HPLC columns are COMPATIBLE to the above mobile phases.

## Notice

The use of strong basic conditions (> pH 9) must be avoided, as they are known to damage the silica gel support of the stationary phase.

# Reverse Phase HPLC Columns

## CHIRALPAK® AD-3R

### Reverse phase mode of CHIRALPAK® AD-3

|                  |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AD-3R | Analytical                     | 2.1                    | 150                | 3                  | 19894     |
| CHIRALPAK® AD-3R | Analytical                     | 4.6                    | 50                 | 3                  | 19822     |
| CHIRALPAK® AD-3R | Analytical                     | 4.6                    | 100                | 3                  | 19823     |
| CHIRALPAK® AD-3R | Analytical                     | 4.6                    | 150                | 3                  | 19824     |
| CHIRALPAK® AD-3R | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 3                  | 19811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® AD-RH

### Reverse phase mode of CHIRALPAK® AD-H

|                  |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AD-RH | Analytical                     | 2.1                    | 150                | 5                  | 19794     |
| CHIRALPAK® AD-RH | Analytical                     | 4.6                    | 150                | 5                  | 19724     |
| CHIRALPAK® AD-RH | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 19711     |
| CHIRALPAK® AD-RH | Semi-prep                      | 20                     | 150                | 5                  | 19744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® AS-3R

### Reverse phase mode of CHIRALPAK® AS-3

|                  |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS-3R | Analytical                     | 2.1                    | 150                | 3                  | 20894     |
| CHIRALPAK® AS-3R | Analytical                     | 4.6                    | 50                 | 3                  | 20822     |
| CHIRALPAK® AS-3R | Analytical                     | 4.6                    | 100                | 3                  | 20823     |
| CHIRALPAK® AS-3R | Analytical                     | 4.6                    | 150                | 3                  | 20824     |
| CHIRALPAK® AS-3R | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 3                  | 20811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALPAK® AS-RH

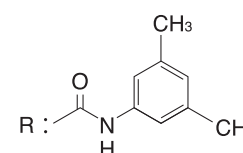
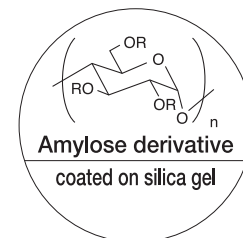
### Reverse phase mode of CHIRALPAK® AS-H

|                  |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS-RH | Analytical                     | 2.1                    | 150                | 5                  | 20794     |
| CHIRALPAK® AS-RH | Analytical                     | 4.6                    | 150                | 5                  | 20724     |
| CHIRALPAK® AS-RH | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 20711     |
| CHIRALPAK® AS-RH | Semi-prep                      | 20                     | 150                | 5                  | 20744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

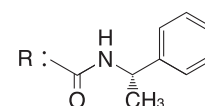
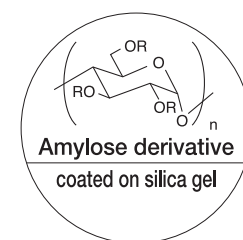
#### CSP

Amylose tris  
(3,5-dimethylphenylcarbamate)  
coated on silica gel



#### CSP

Amylose tris  
{ (S)-α-methylbenzylcarbamate }  
coated on silica gel



# CHIRALPAK® AY-3R

## Reverse phase mode of CHIRALPAK® AY-3

|                  |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AY-3R | Analytical          | 2.1                    | 150                | 3                  | 47894     |
| CHIRALPAK® AY-3R | Analytical          | 4.6                    | 50                 | 3                  | 47822     |
| CHIRALPAK® AY-3R | Analytical          | 4.6                    | 100                | 3                  | 47823     |
| CHIRALPAK® AY-3R | Analytical          | 4.6                    | 150                | 3                  | 47824     |
| CHIRALPAK® AY-3R | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 47811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® AY-RH

## Reverse phase mode of CHIRALPAK® AY-H

|                  |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AY-RH | Analytical          | 2.1                    | 150                | 5                  | 47794     |
| CHIRALPAK® AY-RH | Analytical          | 4.6                    | 150                | 5                  | 47724     |
| CHIRALPAK® AY-RH | Guard Cartridges ※1 | 4                      | 10                 | 5                  | 47711     |
| CHIRALPAK® AY-RH | Semi-prep           | 20                     | 150                | 5                  | 47744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALPAK® AZ-3R

## Reverse phase mode of CHIRALPAK® AZ-3

|                  |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AZ-3R | Analytical            | 4.6                    | 150                | 3                  | 61824     |
| CHIRALPAK® AZ-3R | Analytical            | 4.6                    | 100                | 3                  | 61823     |
| CHIRALPAK® AZ-3R | Analytical            | 4.6                    | 50                 | 3                  | 61822     |
| CHIRALPAK® AZ-3R | Analytical            | 2.1                    | 150                | 3                  | 61894     |
| CHIRALPAK® AZ-3R | Guard cartridge ×3pcs | 4                      | 10                 | 3                  | 61811     |

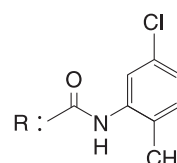
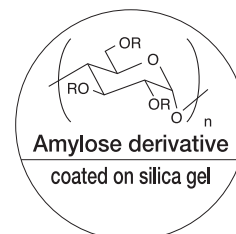
# CHIRALPAK® AZ-RH

## Reverse phase mode of CHIRALPAK® AZ-H

|                  |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AZ-RH | Semi-preparative      | 20                     | 150                | 5                  | 61744     |
| CHIRALPAK® AZ-RH | Analytical            | 2.1                    | 150                | 5                  | 61794     |
| CHIRALPAK® AZ-RH | Analytical            | 4.6                    | 150                | 5                  | 61724     |
| CHIRALPAK® AZ-RH | Guard Cartridge ×3pcs | 4                      | 10                 | 5                  | 61711     |

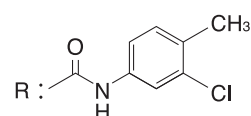
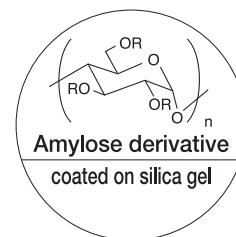
### CSP

Amylose tris  
(5-chloro-2-methylphenylcarbamate)  
coated on silica gel



### CSP

Amylose tris  
(3-chloro-4-methylphenylcarbamate)  
coated on silica gel



# Reverse Phase HPLC Columns

## CHIRALCEL® OD-3R

### Reverse phase mode of CHIRALCEL® OD-3

|                  |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|------------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OD-3R | Analytical                     | 2.1                   | 150               | 3                 | 14894     |
| CHIRALCEL® OD-3R | Analytical                     | 4.6                   | 50                | 3                 | 14822     |
| CHIRALCEL® OD-3R | Analytical                     | 4.6                   | 100               | 3                 | 14823     |
| CHIRALCEL® OD-3R | Analytical                     | 4.6                   | 150               | 3                 | 14824     |
| CHIRALCEL® OD-3R | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 3                 | 14811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OD-RH

### Reverse phase mode of CHIRALCEL® OD-H

|                  |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|------------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OD-RH | Analytical                     | 2.1                   | 150               | 5                 | 14794     |
| CHIRALCEL® OD-RH | Analytical                     | 4.6                   | 150               | 5                 | 14724     |
| CHIRALCEL® OD-RH | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 5                 | 14711     |
| CHIRALCEL® OD-RH | Semi-prep                      | 20                    | 150               | 5                 | 14744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OD-R

### Reverse phase mode of CHIRALCEL® OD

|                 |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|-----------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OD-R | Analytical                     | 4.6                   | 250               | 10                | 14625     |
| CHIRALCEL® OD-R | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 10                | 14611     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OJ-3R

### Reverse phase mode of CHIRALCEL® OJ-3

|                  |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|------------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OJ-3R | Analytical                     | 2.1                   | 150               | 3                 | 17894     |
| CHIRALCEL® OJ-3R | Analytical                     | 4.6                   | 50                | 3                 | 17822     |
| CHIRALCEL® OJ-3R | Analytical                     | 4.6                   | 100               | 3                 | 17823     |
| CHIRALCEL® OJ-3R | Analytical                     | 4.6                   | 150               | 3                 | 17824     |
| CHIRALCEL® OJ-3R | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 3                 | 17811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## CHIRALCEL® OJ-RH

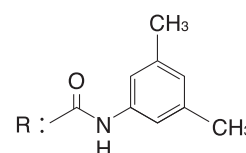
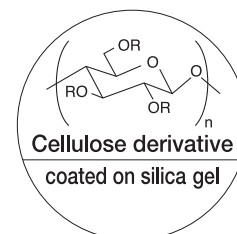
### Reverse phase mode of CHIRALCEL® OJ-H

|                  |                                | Internal Diameter(mm) | Column Length(mm) | Particle Size(μm) | Reference |
|------------------|--------------------------------|-----------------------|-------------------|-------------------|-----------|
| CHIRALCEL® OJ-RH | Analytical                     | 2.1                   | 150               | 5                 | 17794     |
| CHIRALCEL® OJ-RH | Analytical                     | 4.6                   | 150               | 5                 | 17724     |
| CHIRALCEL® OJ-RH | Guard Cartridges <sup>※1</sup> | 4                     | 10                | 5                 | 17711     |
| CHIRALCEL® OJ-RH | Semi-prep                      | 20                    | 150               | 5                 | 17744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

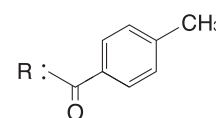
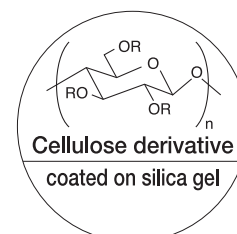
#### CSP

Cellulose tris  
(3,5-dimethylphenylcarbamate)  
coated on silica gel



#### CSP

Cellulose tris  
(4-methylbenzoate)  
coated on silica gel





# CHIRALCEL® OX-3R

## Reverse phase mode of CHIRALCEL® OX-3

|                  |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OX-3R | Analytical            | 4.6                    | 150                | 3                  | 63824     |
| CHIRALCEL® OX-3R | Analytical            | 4.6                    | 100                | 3                  | 63823     |
| CHIRALCEL® OX-3R | Analytical            | 4.6                    | 50                 | 3                  | 63822     |
| CHIRALCEL® OX-3R | Analytical            | 2.1                    | 150                | 3                  | 63894     |
| CHIRALCEL® OX-3R | Guard cartridge ×3pcs | 4                      | 10                 | 3                  | 63811     |

# CHIRALCEL® OX-RH

## Reverse phase mode of CHIRALCEL® OX-H

|                  |                       | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|-----------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OX-RH | Semi-preparative      | 20                     | 150                | 5                  | 63744     |
| CHIRALCEL® OX-RH | Analytical            | 2.1                    | 150                | 5                  | 63794     |
| CHIRALCEL® OX-RH | Analytical            | 4.6                    | 150                | 5                  | 63724     |
| CHIRALCEL® OX-RH | Guard Cartridge ×3pcs | 4                      | 10                 | 5                  | 63711     |

# CHIRALCEL® OZ-3R

## Reverse phase mode of CHIRALCEL® OZ-3

|                  |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OZ-3R | Analytical          | 2.1                    | 150                | 3                  | 42894     |
| CHIRALCEL® OZ-3R | Analytical          | 4.6                    | 50                 | 3                  | 42822     |
| CHIRALCEL® OZ-3R | Analytical          | 4.6                    | 100                | 3                  | 42823     |
| CHIRALCEL® OZ-3R | Analytical          | 4.6                    | 150                | 3                  | 42824     |
| CHIRALCEL® OZ-3R | Guard Cartridges ※1 | 4                      | 10                 | 3                  | 42811     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

# CHIRALCEL® OZ-RH

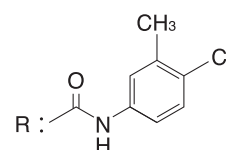
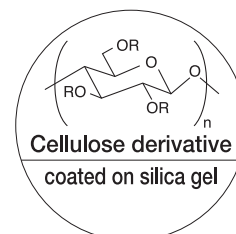
## Reverse phase mode of CHIRALCEL® OZ-H

|                  |                     | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|---------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OZ-RH | Analytical          | 2.1                    | 150                | 5                  | 42794     |
| CHIRALCEL® OZ-RH | Analytical          | 4.6                    | 150                | 5                  | 42724     |
| CHIRALCEL® OZ-RH | Guard Cartridges ※1 | 4                      | 10                 | 5                  | 42711     |
| CHIRALCEL® OZ-RH | Semi-prep           | 20                     | 150                | 5                  | 42744     |

※1 : 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

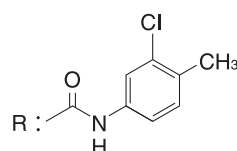
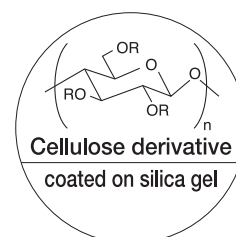
### CSP

Cellulose tris  
(4-chloro-3-methylphenylcarbamate)  
coated on silica gel



### CSP

Cellulose tris  
(3-chloro-4-methylphenylcarbamate)  
coated on silica gel



# Protein-based Chiral HPLC Columns

## Feature

**CHIRALPAK AGP®** has extremely broad applicability for the separation of chiral drugs.

**Basic compounds** : CHIRALPAK AGP®, CHIRALPAK CBH®

**Acids, Non-protolytic compounds** : CHIRALPAK AGP®, CHIRALPAK HSA®

- CHIRALPAK AGP® has extremely broad applicability for the separation of chiral drugs.
- The protein-based columns function entirely in the reversed-phase chromatographic mode, using buffers with low organic modifier content and at moderate pH values.
- Possibility to dynamically improve enantioseparation.

### CHIRALPAK AGP®

- The chiral selector is alpha1-acid glycoprotein (AGP). This very stable protein is immobilized onto spherical 5 micrometer silica particles. The CHIRALPAK AGP® column separates enantiomers of an extremely broad range of drug compounds.
  - Amines (primary, secondary, and tertiary)
  - Acids (strong and weak)
  - Nonprotolytes (amides, esters, alcohols, sulfoxides, etc.)

### CHIRALPAK CBH®

- The chiral selector is Cellobiohydrolase (CBH). This is a stable enzyme, which has been immobilized onto 5 micrometer spherical silica particles.
- CHIRALPAK CBH is used for the separation of enantiomers of basic drugs from many compound classes. CHIRALPAK CBH separates preferentially compounds containing one or more basic nitrogen's together with one or more hydrogen accepting or hydrogen donating groups (alcohol, phenol, carbonyl, amide, ether, sulphoxide, ester etc.)

### CHIRALPAK HSA®

- The chiral selector is human serum albumin (HSA). The protein has been immobilized onto spherical 5 micrometer particles.
- CHIRALPAK HSA is especially suited for the separation of weak and strong acids, zwitterionic and nonprotolytic compounds.

## Application

|                | ACIDS | NON-PROTOLYTES | BASIC |
|----------------|-------|----------------|-------|
| CHIRALPAK AGP® | ←     |                | →     |
| CHIRALPAK CBH  |       |                | ←     |
| CHIRALPAK HSA  | ←     | →              |       |

# CHIRALPAK AGP®

|                |                                | Internal Diameter(mm) | Column Length (mm) | Particle Size (μm) | Reference |
|----------------|--------------------------------|-----------------------|--------------------|--------------------|-----------|
| CHIRALPAK AGP® | Analytical                     | 2                     | 50                 | 5                  | 30792     |
| CHIRALPAK AGP® | Analytical                     | 2                     | 100                | 5                  | 30793     |
| CHIRALPAK AGP® | Analytical                     | 2                     | 150                | 5                  | 30794     |
| CHIRALPAK AGP® | Guard Cartridges <sup>※1</sup> | 2                     | 10                 | 5                  | 30791     |
| CHIRALPAK AGP® | Analytical                     | 3                     | 50                 | 5                  | 30782     |
| CHIRALPAK AGP® | Analytical                     | 3                     | 100                | 5                  | 30783     |
| CHIRALPAK AGP® | Analytical                     | 3                     | 150                | 5                  | 30784     |
| CHIRALPAK AGP® | Guard Cartridges <sup>※1</sup> | 3                     | 10                 | 5                  | 30781     |
| CHIRALPAK AGP® | Analytical                     | 4                     | 50                 | 5                  | 30712     |
| CHIRALPAK AGP® | Analytical                     | 4                     | 100                | 5                  | 30713     |
| CHIRALPAK AGP® | Analytical                     | 4                     | 150                | 5                  | 30714     |
| CHIRALPAK AGP® | Guard Cartridges <sup>※1</sup> | 4                     | 10                 | 5                  | 30711     |
| CHIRALPAK AGP® | Semi-prep                      | 10                    | 100                | 5                  | 30733     |
| CHIRALPAK AGP® | Semi-prep                      | 10                    | 150                | 5                  | 30734     |

※1 : 2pc/set (You need the Guard Cartridge Holder especially for CHROMTECH type, when using the guard cartridge.)

## Accessory

|                                       |                                | Reference |
|---------------------------------------|--------------------------------|-----------|
| CHIRALPAK AGP® Guard cartridge holder | Guard cartridge holder for AGP | 00081     |

※This guard cartridge holder for AGP is applicable to all of ID (2mm, 3mm, and 4mm) .



# Protein-based Chiral HPLC Columns

## CHIRALPAK CBH<sup>®</sup>

|                            |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|----------------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 2                      | 50                 | 5                  | 33792     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 2                      | 100                | 5                  | 33793     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 2                      | 150                | 5                  | 33794     |
| CHIRALPAK CBH <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 2                      | 10                 | 5                  | 33791     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 3                      | 50                 | 5                  | 33782     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 3                      | 100                | 5                  | 33783     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 3                      | 150                | 5                  | 33784     |
| CHIRALPAK CBH <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 3                      | 10                 | 5                  | 33781     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 4                      | 50                 | 5                  | 33712     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 4                      | 100                | 5                  | 33713     |
| CHIRALPAK CBH <sup>®</sup> | Analytical                     | 4                      | 150                | 5                  | 33714     |
| CHIRALPAK CBH <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 33711     |
| CHIRALPAK CBH <sup>®</sup> | Semi-prep                      | 10                     | 100                | 5                  | 33733     |
| CHIRALPAK CBH <sup>®</sup> | Semi-prep                      | 10                     | 150                | 5                  | 33734     |

※1 : 2pc/set (You need the Guard Cartridge Holder especially for CHROMTECH type, when using the guard cartridge.)

## CHIRALPAK HSA<sup>®</sup>

|                            |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|----------------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 2                      | 50                 | 5                  | 34792     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 2                      | 100                | 5                  | 34793     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 2                      | 150                | 5                  | 34794     |
| CHIRALPAK HSA <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 2                      | 10                 | 5                  | 34791     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 3                      | 50                 | 5                  | 34782     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 3                      | 100                | 5                  | 34783     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 3                      | 150                | 5                  | 34784     |
| CHIRALPAK HSA <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 3                      | 10                 | 5                  | 34781     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 4                      | 50                 | 5                  | 34712     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 4                      | 100                | 5                  | 34713     |
| CHIRALPAK HSA <sup>®</sup> | Analytical                     | 4                      | 150                | 5                  | 34714     |
| CHIRALPAK HSA <sup>®</sup> | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 34711     |
| CHIRALPAK HSA <sup>®</sup> | Semi-prep                      | 10                     | 100                | 5                  | 34733     |
| CHIRALPAK HSA <sup>®</sup> | Semi-prep                      | 10                     | 150                | 5                  | 34734     |

※1 : 2pc/set (You need the Guard Cartridge Holder especially for CHROMTECH type, when using the guard cartridge.)

# DAICEL Chiral HPLC Columns for Special Applications

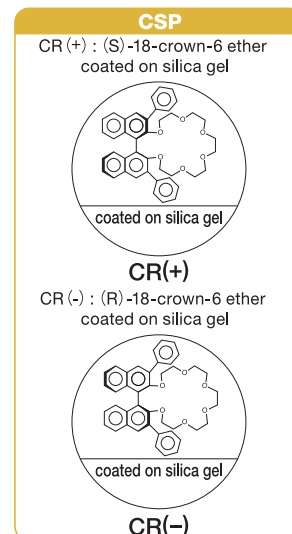
## Crown Ether Chiral Stationary Phases CROWNPAK CR(+)/CR(-) columns

These columns contain a chiral crown ether as a chiral selector which is coated onto 5µm silica support. Acidic mobile phase such as Prechloric acid pH 1 to 2, are used to operate these columns under standard conditions. Note that to shorten the retention time of hydrophobic samples, the addition of Methanol (15% maximum v/v) has been shown to be effective. These columns are the reference columns for achieving amino acid separations, with advantage that elution order of the enantiomers can be reversed when necessary (CR (-) column gives the reversed elution order compared to CR (+) column)

### Crown Ether Coted Chiral Stationary Phase Analytical and Semi-prep columns for HPLC

|                 |   | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|-----------------|---|------------------------|--------------------|--------------------|-----------|
| CROWNPAK® CR(+) | Analytical                                | 4                      | 150                | 5                  | 27714     |
| CROWNPAK® CR(+) | Semi-prep                                 | 10                     | 150                | 5                  | 27734     |
| CROWNPAK® CR(-) | Analytical                                | 4                      | 150                | 5                  | 28714     |
| CROWNPAK® CR(-) | Semi-prep                                 | 10                     | 150                | 5                  | 28734     |
| CROWNPAK® CR    | Guard column for Analytical <sup>※1</sup> | 4                      | 10                 | 5                  | 27711     |

※1 : Guard column is applicable for both CROWNPAK CR(+) and CR(-).



## CROWNPAK® CR-I(+)/CR-I(-) columns

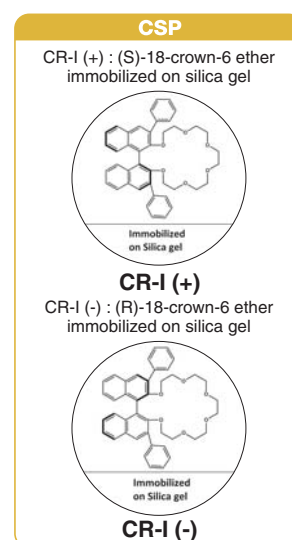
These columns contain a chiral crown ether as a chiral selector which is immobilized onto a 5µm silica support. Acidic mobile phase such as Prechloric acid pH 1 to 2, are used to operate these columns under standard conditions. These columns are mainly used for the chiral HPLC analysis of free amino acids and other small molecules with primary amine groups. Immobilization extends the full range of solvents used for reversed phase mode and normal phase mode, thereby enhancing enantioselective resolution of chiral compounds with short run time. Apart from the solvent compatibility, immobilized CROWNPAK CR-I (+) & CR (-) selectors also provides longer columns life time. These columns having the advantage of reversal elution order of the enantiomers between CR-I (+) to CR-I(-) when necessary.

### Separation compounds

|            |       |
|------------|-------|
| Amino acid | Amine |
|------------|-------|

### Crown Ether Immobilized Chiral stationary Phase Analytical columns for HPLC

|                    |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|--------------------|------------|------------------------|--------------------|--------------------|-----------|
| CROWNPAK® CR-I (+) | Analytical | 3.0                    | 150                | 5                  | 53784     |
| CROWNPAK® CR-I (-) | Analytical | 3.0                    | 150                | 5                  | 54784     |



# DAICEL Chiral HPLC Columns for Special Applications

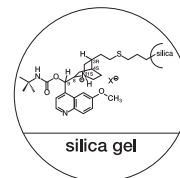
## Anion Exchange Chiral Stationary Phases

### CHIRALPAK® QN-AX/QD-AX columns

These columns are enantioselective weak anion-exchange (AX) HPLC columns. They were developed by Prof. W. Lindner's group in Vienna and are designed specifically for enantioselective HPLC of chiral acids and possess exceptional enantiomer separation capabilities for acidic chiral compounds containing carboxylic, phosphoric, phosphonic or sulfonic acid groups. In some cases, weakly acidic compounds such as phenols can also be separated.

#### CSP

CHIRALPAK QN-AX: (8S,9R)  
CHIRALPAK QD-AX: (8R,9S)



#### Separation compounds

|                           |                         |
|---------------------------|-------------------------|
| N-derivatised amino acids | Aryloxycarboxylic acids |
| Aminosulfonic acids       | N-derivatised peptides  |
| Aminophosphonic acids     |                         |

## Anion Exchange Chiral Stationary Phases Analytical and Semi-prep columns for HPLC

|                  |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® QN-AX | Analytical                     | 4.6                    | 150                | 5                  | 32324     |
| CHIRALPAK® QN-AX | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 32311     |
| CHIRALPAK® QN-AX | Analytical                     | 2.1                    | 150                | 5                  | 32394     |
| CHIRALPAK® QN-AX | Semi-prep                      | 20                     | 150                | 5                  | 32344     |

|                 |                                | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-----------------|--------------------------------|------------------------|--------------------|--------------------|-----------|
| HIRALPAK® QD-AX | Analytical                     | 4.6                    | 150                | 5                  | 31324     |
| HIRALPAK® QD-AX | Guard Cartridges <sup>※1</sup> | 4                      | 10                 | 5                  | 31311     |
| HIRALPAK® QD-AX | Analytical                     | 2.1                    | 150                | 5                  | 31394     |
| HIRALPAK® QD-AX | Semi-prep                      | 20                     | 150                | 5                  | 31344     |

: 3pc/set (You need Cartridge Holder when using Guard Cartridge.)

## Immobilized Zwitterionic Stationary Phases

### CHIRALPAK® ZWIX(+)/CHIRALPAK® ZWIX(-) columns

These CSPs are synthesized by the fusion of the cinchona alkaloids with trans-2-aminocyclohexanesulfonic acid (ACHSA) at the C-9 position via carbamate linkage.

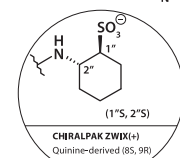
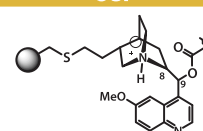
#### Separation compounds

|   |
|---|
| underivatized amino acids                                     |
| zwitterionic compounds of diverse structural functionalities. |

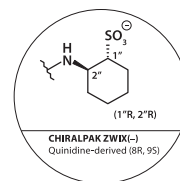
## Immobilized Zwitterionic Chiral Stationary Phases for HPLC

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® ZWIX (+) | Analytical | 4.0                    | 150                | 3                  | 51514     |
| CHIRALPAK® ZWIX (+) | Analytical | 4.0                    | 250                | 3                  | 51515     |
| CHIRALPAK® ZWIX (+) | Analytical | 3.0                    | 150                | 3                  | 51584     |
| CHIRALPAK® ZWIX (+) | Analytical | 3.0                    | 250                | 3                  | 51585     |
| CHIRALPAK® ZWIX (-) | Analytical | 4.0                    | 150                | 3                  | 52514     |
| CHIRALPAK® ZWIX (-) | Analytical | 4.0                    | 250                | 3                  | 52515     |
| CHIRALPAK® ZWIX (-) | Analytical | 3.0                    | 150                | 3                  | 52584     |
| CHIRALPAK® ZWIX (-) | Analytical | 3.0                    | 250                | 3                  | 52585     |

#### CSP



CHIRALPAK ZWIX(+)  
Quinine-derived (8S, 9R)



CHIRALPAK ZWIX(-)  
Quinine-derived (8R, 9S)

# DAICEL Chiral HPLC Columns for Special Applications

## Ligand Exchange Chiral Stationary Phases

### CHIRALPAK® WH/ CHIRALPAK® MA(+) columns

These chiral stationary phase in these columns are made of amino acids and its derivative coated or bonded to silica supports (with a particle size of 10µm for WH 3µm for MA (+)). Since these columns are ligand-exchange type columns, the standard mobile phase to use is an aqueous solution of CuSO<sub>4</sub> (0.1 to 2mM). These columns can tolerate organic modifiers such as Methanol and Acetonitrile according to the specifications in the instruction manual.

#### Separation compounds

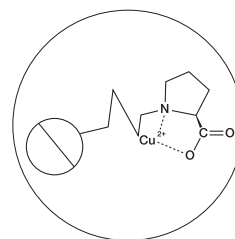
|  |
|--|
| Amino acids and amino acid derivatives |
| Hydroxycarbonic acids                  |

#### Ligand Exchange Chiral Stationary Phases

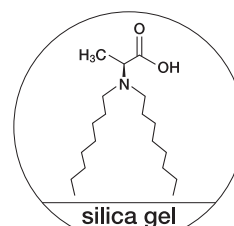
|               |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|---------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® WH | Analytical                  | 4.6                    | 250                | 10                 | 25625     |
| CHIRALPAK® WH | Guard column for Analytical | 4.6                    | 50                 | 10                 | 25622     |

|                  |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® MA(+) | Analytical | 4.6                    | 50                 | 3                  | 21822     |

CSP



CSP



## Polymethacrylate Chiral Stationary Phases

### CHIRALPAK® OP(+)/ CHIRALPAK® OT(+) columns

These chiral selector is a chiral synthetic methacrylate polymer coated onto a 10µm silica support. The best chromatographic results are obtained using 100% Methanol as mobile phase. The polymer used for CHIRALPAK OT (+) columns is very delicate and is slowly degraded by alcohols. To avoid this phenomenon, we recommend to run the analyses at low temperatures (0~5).

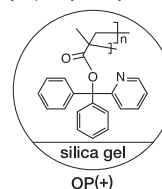
#### Polymethacrylate Chiral Stationary Phases

|                  |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|------------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® OP(+) | Analytical                  | 4.6                    | 250                | 10                 | 22025     |
| CHIRALPAK® OP(+) | Guard column for Analytical | 4.6                    | 50                 | 10                 | 22022     |

|                  |                             | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|------------------|-----------------------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® OT(+) | Analytical                  | 4.6                    | 250                | 10                 | 23025     |
| CHIRALPAK® OT(+) | Guard column for Analytical | 4.6                    | 50                 | 10                 | 23022     |

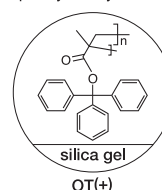
CSP

poly  
(2-pyridyldiphenylmethyl methacrylate)



OP(+)

poly (triphenylmethyl methacrylate)



OT(+)



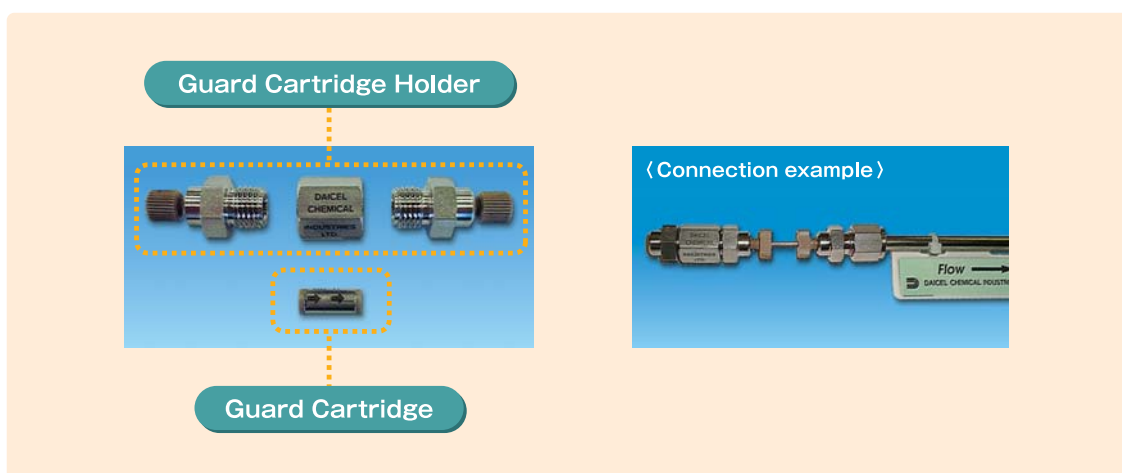
# Analytical Chromatography Accessories

## Guard Cartridge Holder

The HPLC analytical guard cartridges need to be mounted in a cartridge holder to be connected to the analytical column.

For maximum lifetime, analytical columns should be used in series with an appropriate guard cartridge or column.

Both formats are available with the packing material to match the protected column.



- Also available Guard columns (Analytical & Semi-prep) for CHIRALPAK® AD/AS/OP(+)/OT(+), CHIRALCEL® OA/OB/OC/OD/OF/OG/OJ/OK.

|                        | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|------------------------|------------------------|--------------------|--------------------|-----------|
| Guard Cartridge Holder | 4                      | 10                 | -                  | 00011     |

## Column Jacket

Column jackets allow operating temperatures of analytical columns to be controlled with a circulating water bath.

|               | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|------------------------|--------------------|--------------------|-----------|
| Column Jacket | -                      | 150                | -                  | 00024     |
| Column Jacket | -                      | 250                | -                  | 00025     |

# SFC Chiral Columns

## Feature

### Supercritical Fluid Chromatography (SFC) :

When a material is in a state that the temperature and the pressure exceed the critical point, it becomes a supercritical fluid. In this phase, the density of gas and liquid becomes same. Super critical fluid is a special phase which has either gas and liquid character but different from these.

- **Low viscosity : Quick separation with low pressure drop.**
- **High diffusivity : High unit productivity.**
- **Low solvent consumption : Environmental friendly. CO<sub>2</sub> can be recycled.**
- **Acidic behavior of CO<sub>2</sub> : No additive such as TFA is required.**

## CHIRALPAK® IA/IA-3

|                   |            | Internal Diameter(mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|-----------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IA/SFC | Analytical | 4.6                   | 250                | 5                  | 80425     |
| CHIRALPAK® IA/SFC | Semi-prep  | 10                    | 250                | 5                  | 80435     |
| CHIRALPAK® IA/SFC | Semi-prep  | 20                    | 250                | 5                  | 80445     |
| CHIRALPAK® IA-3   | Analytical | 3                     | 50                 | 3                  | 80S82     |
| CHIRALPAK® IA-3   | Analytical | 3                     | 100                | 3                  | 80S83     |
| CHIRALPAK® IA-3   | Analytical | 3                     | 100                | 3                  | 80S84     |

## CHIRALPAK® IB/IB-3

|                   |            | Internal Diameter(mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|-----------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IB/SFC | Analytical | 4.6                   | 250                | 5                  | 81425     |
| CHIRALPAK® IB/SFC | Semi-prep  | 10                    | 250                | 5                  | 81435     |
| CHIRALPAK® IB/SFC | Semi-prep  | 20                    | 250                | 5                  | 81445     |
| CHIRALPAK® IB-3   | Analytical | 3                     | 50                 | 3                  | 81S82     |
| CHIRALPAK® IB-3   | Analytical | 3                     | 100                | 3                  | 81S83     |
| CHIRALPAK® IB-3   | Analytical | 3                     | 100                | 3                  | 81S84     |

Note:- Prep SFC Columns are available in (30 X 250 ) & (50 X 250) mm sizes

# SFC Chiral Columns

## CHIRALPAK® IC/IC-3

|                   |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IC/SFC | Analytical | 4.6                    | 250                | 5                  | 83425     |
| CHIRALPAK® IC/SFC | Semi-prep  | 10                     | 250                | 5                  | 83435     |
| CHIRALPAK® IC/SFC | Semi-prep  | 20                     | 250                | 5                  | 83445     |
| CHIRALPAK® IC-3   | Analytical | 3                      | 50                 | 3                  | 83S82     |
| CHIRALPAK® IC-3   | Analytical | 3                      | 100                | 3                  | 83S83     |
| CHIRALPAK® IC-3   | Analytical | 3                      | 100                | 3                  | 83S84     |

## CHIRALPAK® ID/ID-3

|                   |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® ID/SFC | Semi-prep  | 10                     | 250                | 5                  | 84435     |
| CHIRALPAK® ID/SFC | Semi-prep  | 20                     | 250                | 5                  | 84445     |
| CHIRALPAK® ID-3   | Analytical | 3                      | 50                 | 3                  | 84S82     |
| CHIRALPAK® ID-3   | Analytical | 3                      | 100                | 3                  | 84S83     |
| CHIRALPAK® ID-3   | Analytical | 3                      | 100                | 3                  | 84S84     |

## CHIRALPAK® IE/IE-3

|                   |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IE/SFC | Semi-prep  | 10                     | 250                | 5                  | 85435     |
| CHIRALPAK® IE/SFC | Semi-prep  | 20                     | 250                | 5                  | 85445     |
| CHIRALPAK® IE-3   | Analytical | 3                      | 50                 | 3                  | 85S82     |
| CHIRALPAK® IE-3   | Analytical | 3                      | 100                | 3                  | 85S83     |
| CHIRALPAK® IE-3   | Analytical | 3                      | 100                | 3                  | 85S84     |

## CHIRALPAK® IF/IF-3

|                   |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|-------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IF/SFC | Semi-prep  | 10                     | 250                | 5                  | 86435     |
| CHIRALPAK® IF/SFC | Semi-prep  | 20                     | 250                | 5                  | 86445     |
| CHIRALPAK® IF-3   | Analytical | 3                      | 50                 | 3                  | 86S82     |
| CHIRALPAK® IF-3   | Analytical | 3                      | 100                | 3                  | 86S83     |
| CHIRALPAK® IF-3   | Analytical | 3                      | 150                | 3                  | 86S84     |

# SFC Chiral Columns

## CHIRALPAK® AZ-H/AZ-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AZ-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 61435     |
| CHIRALPAK® AZ-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 61445     |
| CHIRALPAK® AZ-3     | Analytical | 3                      | 50                 | 3                  | 61S82     |
| CHIRALPAK® AZ-3     | Analytical | 3                      | 100                | 3                  | 61S83     |
| CHIRALPAK® AZ-3     | Analytical | 3                      | 150                | 3                  | 61S84     |

## CHIRALCEL® OX-H/OX-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OX-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 63435     |
| CHIRALCEL® OX-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 63445     |
| CHIRALCEL® OX-3     | Analytical | 3                      | 50                 | 3                  | 63S82     |
| CHIRALCEL® OX-3     | Analytical | 3                      | 100                | 3                  | 63S83     |
| CHIRALCEL® OX-3     | Analytical | 3                      | 150                | 3                  | 63S84     |

# SFC Chiral Columns

## CHIRALPAK® AD-H/AD-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AD-H/SFC | Analytical | 4.6                    | 250                | 5                  | 19425     |
| CHIRALPAK® AD-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 19435     |
| CHIRALPAK® AD-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 19445     |
| CHIRALPAK® AD-3     | Analytical | 3                      | 50                 | 3                  | 19S82     |
| CHIRALPAK® AD-3     | Analytical | 3                      | 100                | 3                  | 19S83     |
| CHIRALPAK® AD-3     | Analytical | 3                      | 150                | 3                  | 19S84     |

## CHIRALPAK® AS-H/AS-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AS-H/SFC | Analytical | 4.6                    | 250                | 5                  | 20425     |
| CHIRALPAK® AS-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 20435     |
| CHIRALPAK® AS-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 20445     |
| CHIRALPAK® AS-3     | Analytical | 3                      | 50                 | 3                  | 20S82     |
| CHIRALPAK® AS-3     | Analytical | 3                      | 100                | 3                  | 20S83     |
| CHIRALPAK® AS-3     | Analytical | 3                      | 150                | 3                  | 20S84     |

## CHIRALPAK® AY-H/AY-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® AY-H/SFC | Analytical | 4.6                    | 250                | 5                  | 47425     |
| CHIRALPAK® AY-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 47435     |
| CHIRALPAK® AY-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 47445     |
| CHIRALPAK® AY-3     | Analytical | 3                      | 50                 | 3                  | 47S82     |
| CHIRALPAK® AY-3     | Analytical | 3                      | 100                | 3                  | 47S83     |
| CHIRALPAK® AY-3     | Analytical | 3                      | 150                | 3                  | 47S84     |

# SFC Chiral Columns

## CHIRALCEL® OD-H/OD-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OD-H/SFC | Analytical | 4.6                    | 250                | 5                  | 14425     |
| CHIRALCEL® OD-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 14435     |
| CHIRALCEL® OD-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 14445     |
| CHIRALCEL® OD-3     | Analytical | 3                      | 50                 | 3                  | 14S82     |
| CHIRALCEL® OD-3     | Analytical | 3                      | 100                | 3                  | 14S83     |
| CHIRALCEL® OD-3     | Analytical | 3                      | 150                | 3                  | 14S84     |

## CHIRALCEL® OJ-H/OJ-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OJ-H/SFC | Analytical | 4.6                    | 250                | 5                  | 17425     |
| CHIRALCEL® OJ-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 17435     |
| CHIRALCEL® OJ-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 17445     |
| CHIRALCEL® OJ-3     | Analytical | 3                      | 50                 | 3                  | 17S82     |
| CHIRALCEL® OJ-3     | Analytical | 3                      | 100                | 3                  | 17S83     |
| CHIRALCEL® OJ-3     | Analytical | 3                      | 150                | 3                  | 17S84     |

## CHIRALCEL® OZ-H/OZ-3

|                     |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALCEL® OZ-H/SFC | Analytical | 4.6                    | 250                | 5                  | 42425     |
| CHIRALCEL® OZ-H/SFC | Semi-prep  | 10                     | 250                | 5                  | 42435     |
| CHIRALCEL® OZ-H/SFC | Semi-prep  | 20                     | 250                | 5                  | 42445     |
| CHIRALCEL® OZ-3     | Analytical | 3                      | 50                 | 3                  | 42S82     |
| CHIRALCEL® OZ-3     | Analytical | 3                      | 100                | 3                  | 42S83     |
| CHIRALCEL® OZ-3     | Analytical | 3                      | 150                | 3                  | 42S84     |

# Chiral Flash Columns

## Feature

Flash chromatography, also known as medium pressure liquid chromatography is useful for rapid preparative separations with enhanced resolution. In terms of speed, efficiency & productivity, flash chromatography will stand in between column chromatography and modern prep HPLC. Traditionally, Flash chromatography is performed with silica gel and then with bonded phases. CHIRALFLASH cartridges are packed with highly successful and versatile “immobilized” type polysaccharide derived chiral stationary phases (CSPs), popularly known as New Generation CSPs.

## Immobilized Columns for MPLC Method Development

|               |            | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|------------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IA | Analytical | 4.6                    | 100                | 20                 | 80223     |
| CHIRALPAK® IC | Analytical | 4.6                    | 100                | 20                 | 83223     |
| CHIRALPAK® ID | Analytical | 4.6                    | 100                | 20                 | 84223     |
| CHIRALPAK® IE | Analytical | 4.6                    | 100                | 20                 | 85223     |
| CHIRALPAK® IF | Analytical | 4.6                    | 100                | 20                 | 86223     |

## Immobilized Columns for MPLC

|               |           | Internal Diameter (mm) | Column Length (mm) | Particle Size (μm) | Reference |
|---------------|-----------|------------------------|--------------------|--------------------|-----------|
| CHIRALPAK® IA | Semi Prep | 30                     | 100                | 20                 | 80M73     |
| CHIRALPAK® IC | Semi Prep | 30                     | 100                | 20                 | 83M73     |
| CHIRALPAK® ID | Semi Prep | 30                     | 100                | 20                 | 84M73     |
| CHIRALPAK® IE | Semi Prep | 30                     | 100                | 20                 | 85M73     |
| CHIRALPAK® IF | Semi Prep | 30                     | 100                | 20                 | 86M73     |

## Accessories

| Part Number | Product name                        |
|-------------|-------------------------------------|
| 00M01       | Injection cartridge S               |
| 00M02       | Injection cartridge M               |
| 00M03       | Injection cartridge L               |
| 00M04       | Column rack adapter                 |
| 00M05       | Injection adapter                   |
| 00M06       | Lure lock adapter (male)            |
| 00M07       | Syringe union                       |
| 00M08       | LL adapter (INTRM Connector-female) |

| Part Number | Product name                      |
|-------------|-----------------------------------|
| 00M09       | LL adapter (INTRM Connector-male) |
| 00M10       | Column adapter S                  |
| 00M11       | Column adapter M                  |
| 00M12       | Column adapter L                  |
| 00M13       | Column holder S                   |
| 00M14       | Column holder M                   |
| 00M15       | Column holder L                   |
|             |                                   |



# Chiral TLC Plates

## Feature

Immobilized Chiral Thin layer Chromatography is a chromatographic technique used to separate isomers. Immobilized Chiral Thin-layer Chromatography is performed on a sheet of aluminium foil, which is coated with a thin layer of adsorbent material, silica gel which is immobilized by CSP. After the sample has been applied on the plate, a solvent or solvent mixture (known as the mobile phase) is drawn up the plate via capillary action. Because different analytes ascend the TLC plate at different rates, separation is achieved.

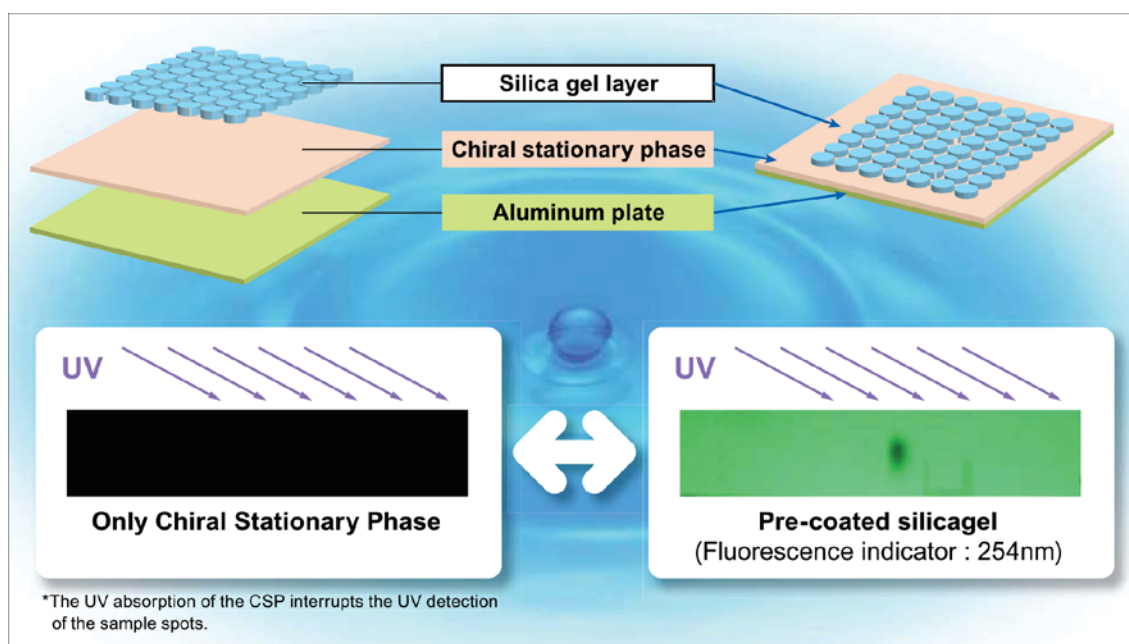
## Immobilized Chiral TLC Plates

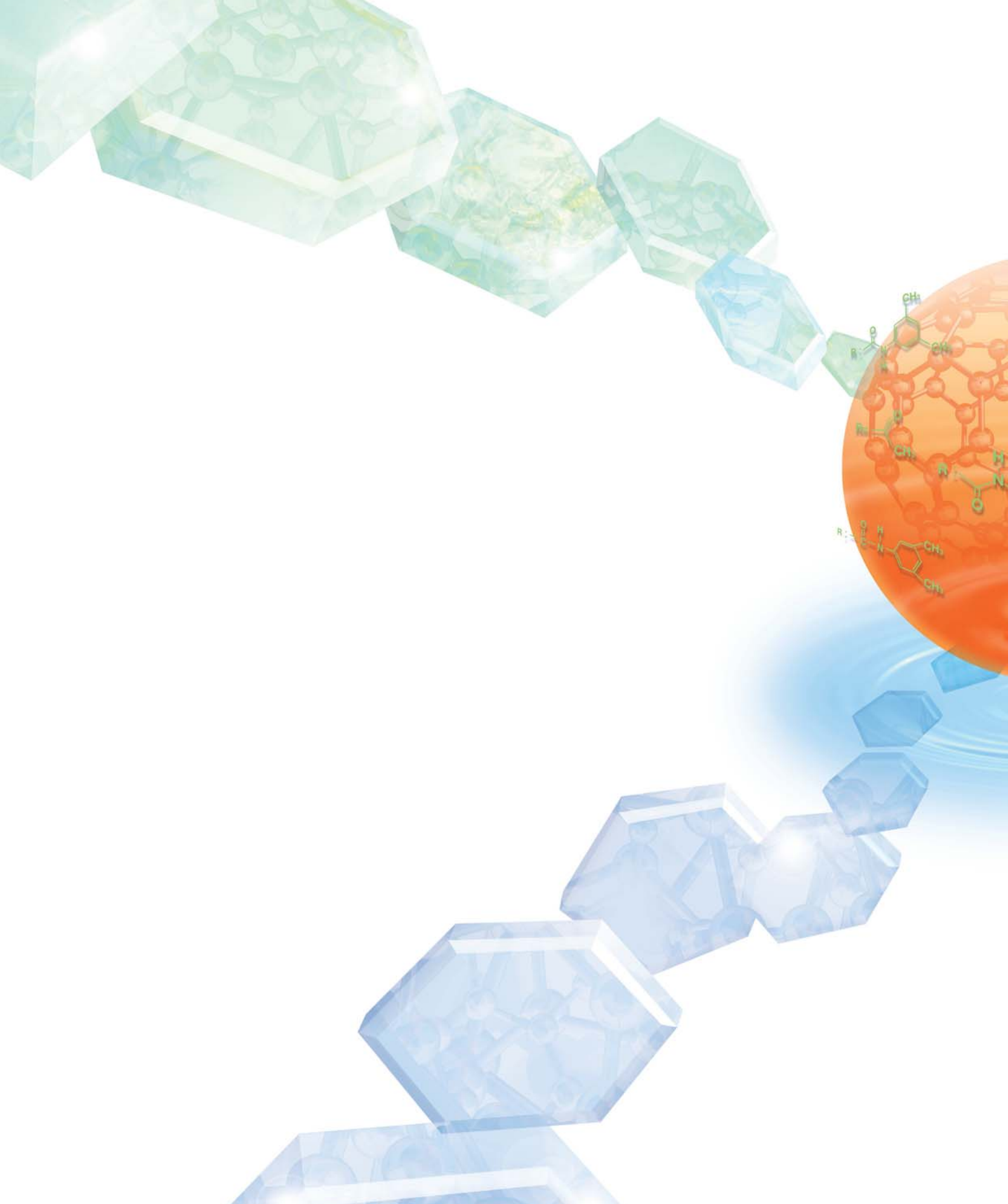
### 2L Chiral TLC

2L-ChiralTLC has been developed by coating the immobilized type CSP and silica gel along with fluorescence indicator (254 nm) in the form of bilayer on a aluminium plate.

2L-ChiralTLC has 20µm particle size which is the same as CHIRALFLASH. Therefore the eluent used on 2L-ChiralTLC is directly applicable to CHIRALFLASH.

|                              |       | Internal Diameter (mm) | Column Length (mm) | Particle Size (µm) | Reference |
|------------------------------|-------|------------------------|--------------------|--------------------|-----------|
| 2L Chiral TLC 5 (5pkg/1each) | 2 TLC | 200                    | 100                | 20                 | 5ST5A     |
| 2L Chiral TLC IA (2pkg)      | 2 TLC | 200                    | 100                | 20                 | 802TA     |
| 2L Chiral TLC IC (2pkg)      | 2 TLC | 200                    | 100                | 20                 | 832TA     |
| 2L Chiral TLC ID (2pkg)      | 2 TLC | 200                    | 100                | 20                 | 842TA     |
| 2L Chiral TLC IE (2pkg)      | 2 TLC | 200                    | 100                | 20                 | 852TA     |
| 2L Chiral TLC IF (2pkg)      | 2 TLC | 200                    | 100                | 20                 | 862TA     |





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