

Chiral Columns

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Introduction

HPLC Columns for Optical Isomer Separation

Chirality has become vitally important in the production of pharmaceuticals, agrochemicals, food and related products due to the different pharmacological or taste/odour effects which the different optical isomers can present. The pharmacological effects can range from no activity through undesirable effects to having potentially life threatening adverse effects. This has led to the development of highly efficient chiral stationary phases (CSP) for analytical and preparative scale separations.

If the CSP is available in two enantiomeric configurations the elution order of enantiomeric pairs can be reversed.

This is particularly useful when the two isomers are not present in equal quantities; a later eluting minor component can often be hidden by the tail of a major peak but on reversal of elution order can be totally resolved from the major component.

YMC Chiral NEA(R)(S)



- normal and reversed phase mode
- reversal of elution order
- nonpolar to medium polar compounds
- available in bulk quantities



YMC Chiral NEA(R)(S)	Specification
Particle Size / μm	5
Pore Size / nm	30
Surface area / m^2g^{-1}	proprietary
Carbon content / %	proprietary
Recommended pH range	2.0 - 6.5 (reversed phase)

General

Normal Phase

YMC Chiral NEA consists of polymeric 1-naphthylethylamine bonded to a wide pore spherical silica. The R and S columns differ in the optical rotation of the CSP; the R column being formed from R-(+)-1-naphthylethylamine and the S column from S-(-)-1-naphthylethylamine. This results in the two column types having the effect of reversing the elution order of enantiomeric pairs of compounds.

Reversed Phase

YMC-Chiral NEA columns are as well suitable for reversed phase separation of polar, water soluble compounds particularly pharmaceutical compounds.

Recommended eluents include aqueous eluents containing organic modifiers in the range 0-100% or aqueous buffers with pH 2.0-6.5. At the pH limits the minimum organic modifier concentration should be not less than 10%. Typical organic modifiers include acetonitrile, methanol and ethanol. Buffer concentrations should be less than 1 mol/l and must be rinsed from the column with water/modifier solutions (80-100% water) before storage of the column. The columns should be stored in salt-free water/modifier solutions with a minimum 40% modifier. Used under these conditions excellent column stability will be achieved.

Properties

Although separation modes are chosen according to the purpose of separation, it is recommended to use one column dedicated for one separation mode in order to maximise the lifetime of the column into account.

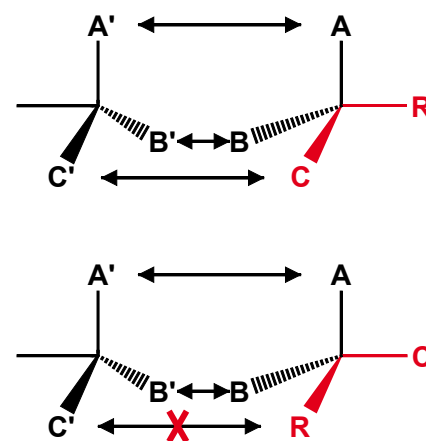
In normal phase mode YMC-Chiral NEA allows the separation of a wide range of non-polar to moderately polar compounds.

The separation mechanisms involve a combination of:

- f-f interactions
- hydrogen bonding
- dipole interactions
- steric effects

and for a successful separation at least three points of interaction between the CSP and the target compound must exist. Occasionally, for analytical separations, there may be a need to derivatise the sample with, for example f-donating groups such as dinitrobenzoyl, dinitrophenylurea or dinitrophenylcarbamate groups. In some cases, the increase in detectability can offset the disadvantages of derivatisation.

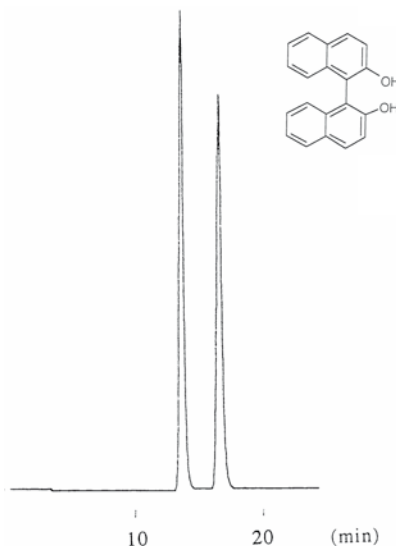
Chiral Separation Mechanism*



YMC Chiral NEA(R)(S)

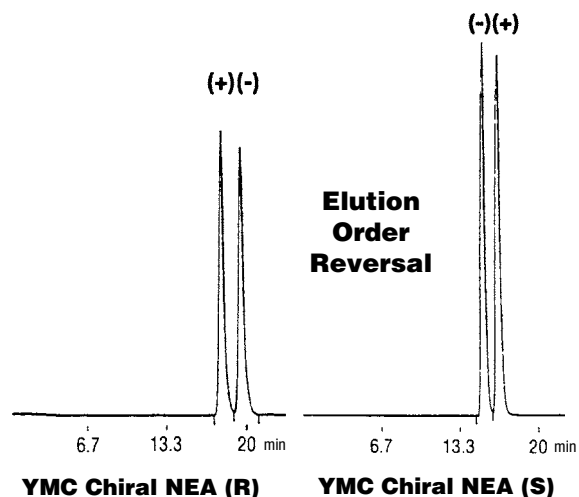
Applications used in normal-phase mode

1,1'-Bi-2-Naphthol*



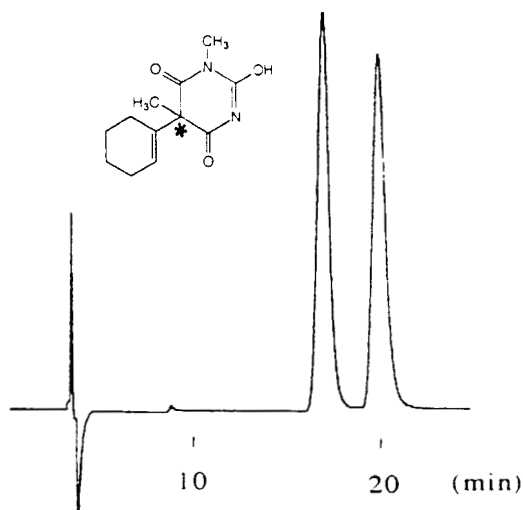
Column: YMC Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: CR30S05-2546WT
 Eluent: hexane / dichloromethane / ethanol (70/30/2)
 Flow rate: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm

2,2,2-Trifluoro-1-(9-anthryl) ethanol*



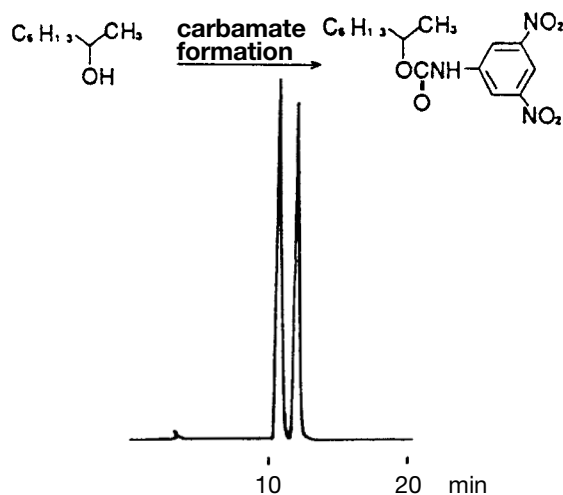
Column: YMC Chiral NEA (R) and YMC Chiral NEA (S) 250 x 4.6 mm ID
 Part No.: CR30S05-2546WT and CS30S05-2546WT
 Eluent: hexane / dichloromethane / ethanol (70/30/1)
 Flow rate: 0.5 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm

Hexobarbital*



Column: YMC Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: CR30S05-2546WT
 Eluent: hexane / CH₂Cl₂ / ethanol (90/10/2)
 Flow rate: 1.0 ml/min
 Temperature: ambient
 Detection: UV at 220 nm

1-Phenylethanol*

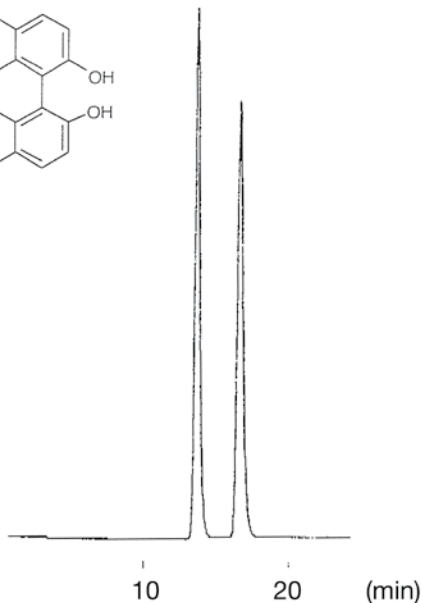
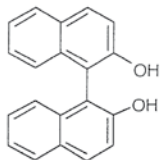


Column: YMC Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: CR30S05-2546WT
 Eluent: hexane / CH₂Cl₂ / ethanol (90/10/5)
 Flow rate: 1.0 ml/min
 Temperature: 35°C
 Detection: UV at 254 nm

YMC Chiral NEA(R)(S)

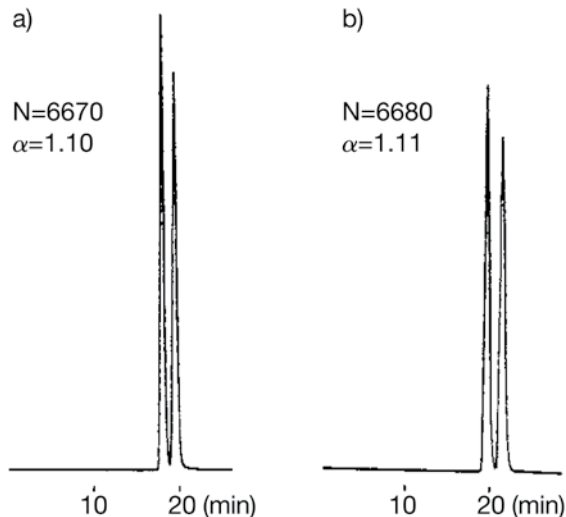
Applications used in reversed-phase mode

1,1'-Bi-2-Naphthol*



Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: acetonitrile / water (50/50)
 Flow: 1.0 ml/min
 Pressure: 80 bar
 Detection: UV at 235 nm
 Injection: 1.0 μ l (2.8 mg/ml)
 Temperature: ambient

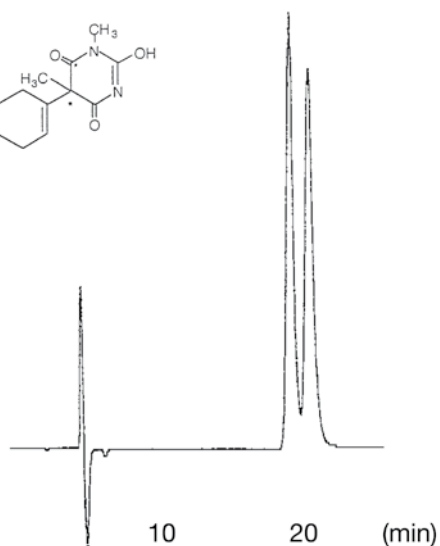
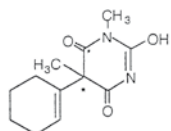
Propranolol · HCl*



a)
 Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: acetonitrile / 0.5M NaClO₄ (40/60)
 Flow: 1.0 ml/min
 Temperature: ambient
 Time: 100 hours

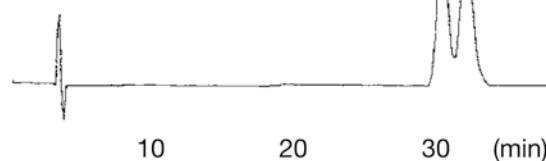
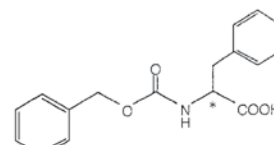
b)
 Eluent: acetonitrile / 0.5M NaClO₄ (40/60)
 Flow: 1.0 ml/min
 Temperature: ambient
 Detection: UV at 254 nm

Hexobarbital*



Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: acetonitrile / water (30/70)
 Flow: 0.7 ml/min
 Detection: UV at 210 nm
 Injection: 1.0 μ l (1.2 mg/ml)
 Temperature: ambient

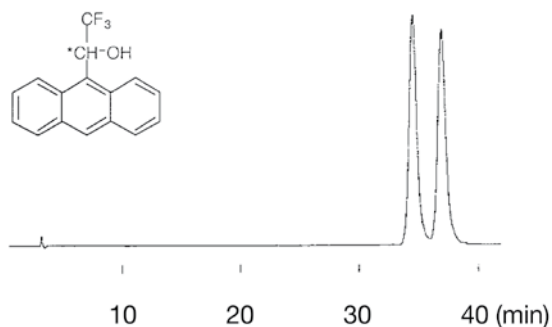
CBZ-Phenylalanine (Z-Phe-OH)*



Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: 0.5M NaClO₄-HClO₄ (pH 2.0) / acetonitrile (70/30)
 Flow: 1.0 ml/min
 Detection: UV at 254 nm
 Injection: 10 μ l (1.5 mg/ml)
 Temperature: ambient

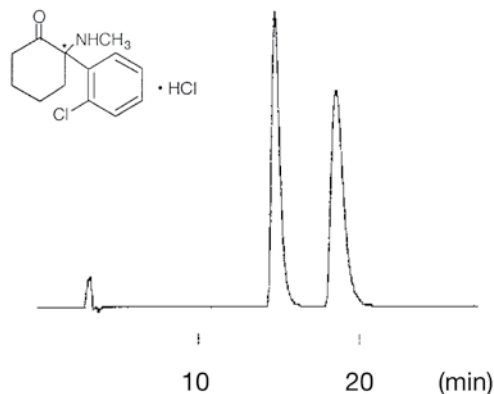
YMC Chiral NEA(R)(S)

2,2,2-Trifluoro-1-(9-anthryl)-ethanol*



Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: acetonitrile / water (40/60)
 Flow: 1.0 ml/min
 Detection: UV at 254 nm
 Injection: 1.0 μ l (0.14 mg/ml)
 Temperature: ambient

Ketamin · HCl*



Column: YMC-Chiral NEA (R) 250 x 4.6 mm ID
 Part No.: NR30S05-2546WT
 Eluent: acetonitrile / 0.5M NaClO₄ (40/60)
 Flow: 1.0 ml/min
 Detection: UV at 268 nm
 Injection: 10 μ l (1.4 mg/ml)
 Temperature: ambient

Column Care

The recommended pH range for using YMC Chiral NEA(R)(S) columns is 2.0-6.5. Remove acid and buffer salts before storage. Store the column in methanol/water = 50/50. If columns are affected by undesired contaminants or clogged inlet frits which cause back pressure increases, flush the column with THF in the opposite flow direction.

For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

YMC Chiral CD BR



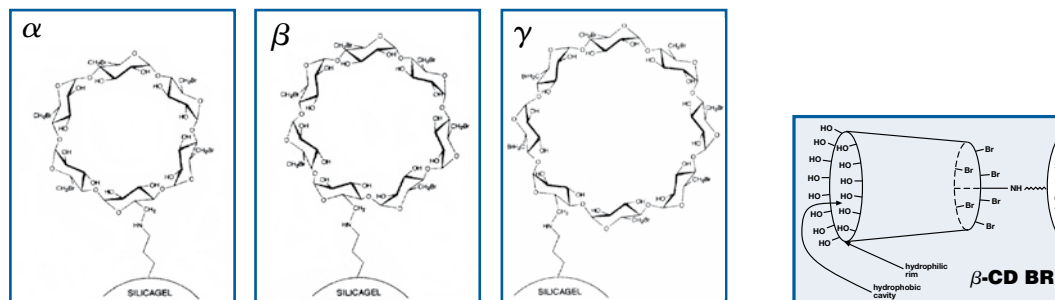
- reversed phase
- polar pharmaceuticals
- positional isomers
- water-soluble compounds



YMC Chiral CD BR	Specification
Particle Size / μm	5
Pore Size / nm	12
Surface area / m^2g^{-1}	proprietary
Carbon content / %	proprietary
Recommended pH range	3.5 - 6.5

General

The family of commercially available cyclic malto-ogliosaccharides known as cyclodextrins consist of three members; α -cyclodextrin consists of six (1 \rightarrow 4)-linked α -D-glucopyranose residues in a ring, whereas β -, and γ -cyclodextrins consist of seven and eight residues in the ring. The resulting cone-shaped cylindrical molecules have a hydrophobic cavity and a hydrophilic rim. The latter is due to the hydroxyl groups of the carbohydrate; the secondary hydroxyl groups on carbon atoms 2 and 3 of the glucose residues being on the larger diameter rim whilst the primary hydroxyl groups on carbon atom 6 are on the smaller diameter rim. The diameters of the cavities are such that a single phenyl ring can be accommodated within α -cyclodextrin, whilst the cavities of α -cyclodextrin and α -cyclodextrin can accommodate substituted single phenyl rings and multiple ring systems.



Properties

YMC-Chiral CD BR columns offer an alternative approach to enantioseparation. Covalent bonding of a bromide derivative of a cyclodextrin to YMC silica provides a novel CSP. The bromide derivative, in which the primary hydroxyl groups at carbon 6 are substituted for bromine, provides a different chiral selectivity to the 'normal' cyclodextrins. These cyclodextrin bromide derivatives are used in reversed phase mode to separate a wide range of polar, water-soluble compounds. In addition they will separate, under similar conditions, positional isomers of substituted aromatic compounds.

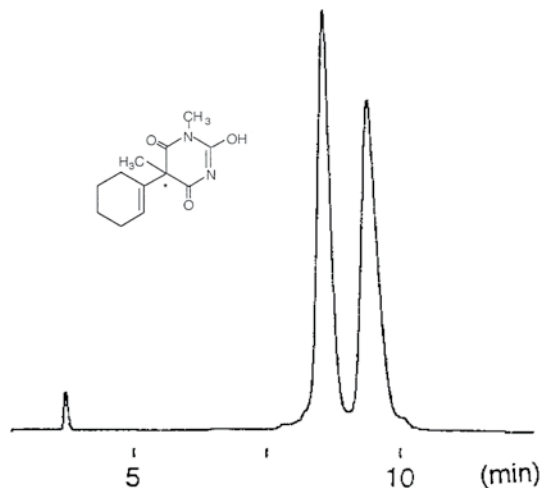
Column Care

YMC-Chiral CD BR columns have a pH range of pH 3.5-6.5 and can be used with the common buffer systems. However all salts and buffer components must be rinsed from the column with water/methanol solutions (80-100% water) before storage of the column. The columns should be stored in salt-free water/methanol solutions (50% methanol). It is possible to regenerate the column by removal of contamination with THF solution.

YMC Chiral CD BR

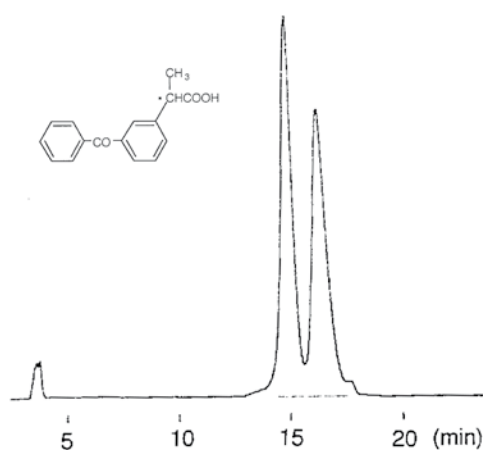
Applications

Hexobarbital*



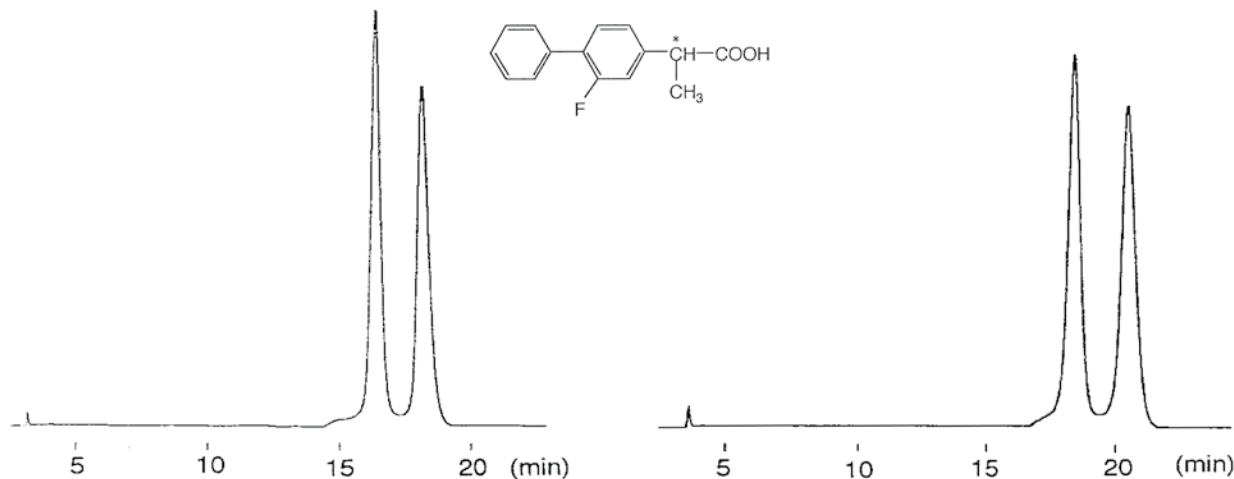
Column: YMC-Chiral β -CD BR 250 x 4.6 mm ID
 Part No.: DB12S05-2546WT
 Eluent: 0.1M acetic acid-triethylamine in water (pH5.6) / methanol (30/70)
 Flow: 1.0 ml/min
 Temperature: 30°C
 Detection: UV at 254 nm
 Injection: 5 μ l (1 mg/ml)

Ketoprofen*



Column: YMC-Chiral β -CD BR 250 x 4.6 mm ID
 Part No.: DB12S05-2546WT
 Eluent: 0.1M acetic acid-triethylamine in water (pH5.6) / methanol (30/70)
 Flow: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm
 Injection: 10 μ l (1 mg/ml)

Fluoribipropfen*

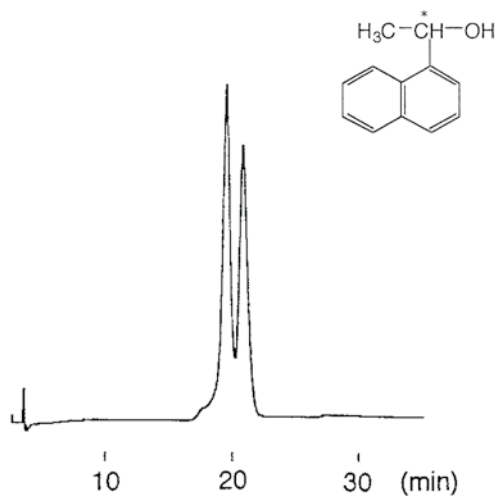


Column: YMC-Chiral β -CD BR 250 x 4.6 mm ID
 Part No.: DB12S05-2546WT
 Eluent: 0.1M acetic acid-triethylamine in water (pH4.0) / acetonitrile (10/90)
 Flow: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm
 Injection: 2 μ l (1 mg/ml)

Column: YMC-Chiral γ -CD BR 250 x 4.6 mm ID
 Part No.: DG12S05-2546WT
 Eluent: 0.1M acetic acid-triethylamine in water (pH4.0) / methanol (30/70)
 Flow: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm
 Injection: 2 μ l (1 mg/ml)

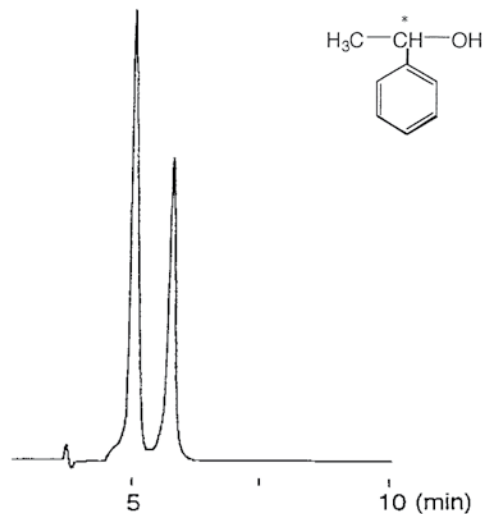
YMC Chiral CD BR

1-(1-naphthyl)-ethylalcohol*



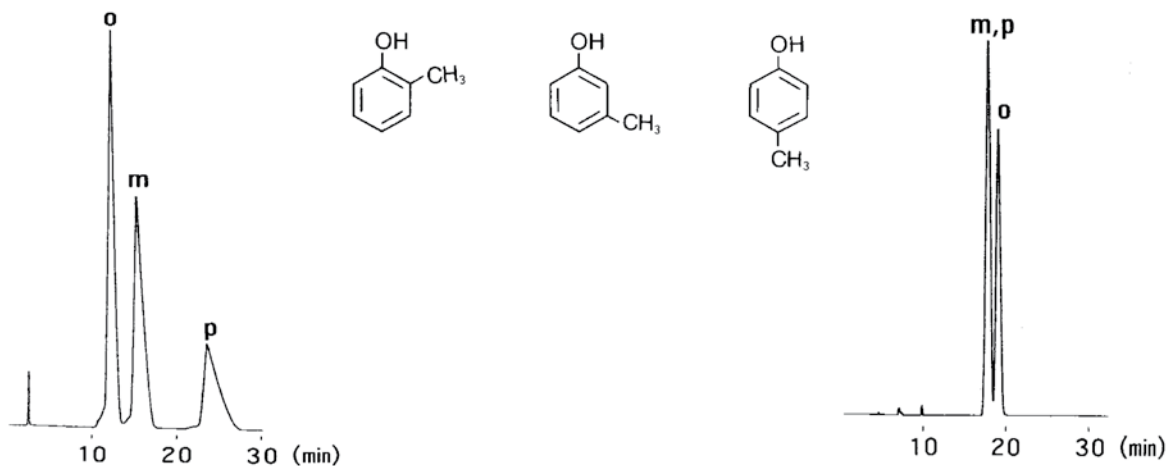
Column: YMC-Chiral γ -CD BR 250 x 4.6 mm ID
 Part No.: DG12S05-2546WT
 Eluent: 0.1M AcOH_{aq}-TEA (Triethylamine)_{aq} (pH5.6) / methanol (90/10)
 Flow: 1.0 ml/min
 Temperature: 30°C
 Detection: UV at 254 nm
 Injection: 5 μ l (1 mg/ml)

Phenylethylalcohol*



Column: YMC-Chiral γ -CD BR 250 x 4.6 mm ID
 Part No.: DG12S05-2546WT
 Eluent: 0.1M AcOH_{aq}-TEA (Triethylamine)_{aq} (pH4.0) / methanol (90/10)
 Flow: 1.0 ml/min
 Temperature: 30°C
 Detection: UV at 254 nm
 Injection: 5 μ l (10 mg/ml)

Cresols*

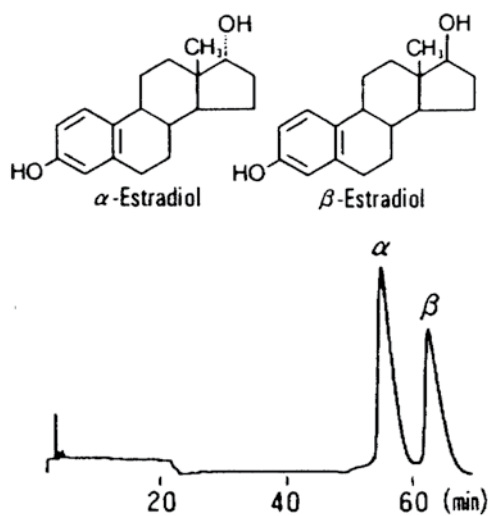


Column: YMC-Chiral β -CD BR 250 x 4.6 mm ID
 Part No.: DB12S05-2546WT
 Eluent: methanol / water (20/80)
 Flow: 1.0 ml/min
 Temperature: ambient
 Detection: UV at 254 nm

Column: YMC Pack ODS-AM 250 x 4.6 mm ID
 Part No.: AM12S05-2546WT
 Eluent: methanol / water (40/60)
 Flow: 1.0 ml/min
 Temperature: ambient
 Detection: UV at 254 nm

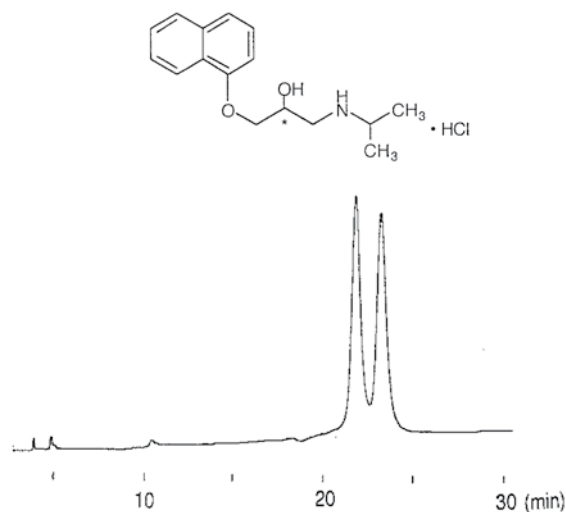
YMC Chiral CD BR

Estradiols*



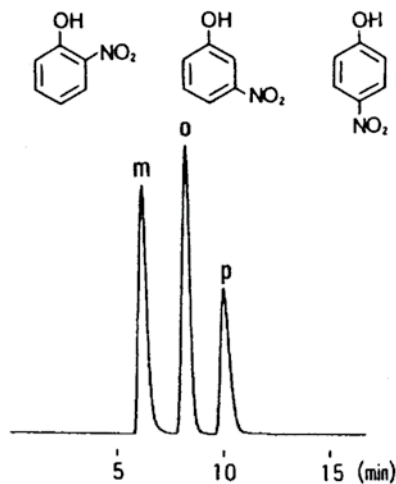
Column: YMC-Chiral γ -CD BR 250 x 4.6 mm ID
 Part No.: DG12S05-2546WT
 Eluent: methanol / water (50/50)
 Flow: 1.0 ml/min
 Temperature: 30°C
 Detection: UV at 230 nm

Propranolol HCl*



Column: YMC-Chiral γ -CD BR 250 x 4.6 mm ID
 Part No.: DG12S05-2546WT
 Eluent: acetonitrile / methanol / acetic acid / triethylamine (99/1/0.3/0.25)
 Flow: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm
 Injection: 5 μ l (1 mg/ml)

Nitrophenols*



Column: YMC-Chiral α -CD BR 250 x 4.6 mm ID
 Part No.: DA12S05-2546WT
 Eluent: 0.1M $\text{CH}_3\text{COOH}-\text{CH}_3\text{COONa}$ (pH4.0) / methanol (90/10)
 Flow: 1.0 ml/min
 Temperature: 25°C
 Detection: UV at 254 nm

Column Care

The recommended pH range for using YMC Chiral CD BR columns is 3.5-6.5. Remove acid and buffer salts before storage. Store the column in methanol/water = 50/50. If columns are affected by undesired contaminants or clogged inlet frits which cause back pressure increases, flush the column with THF in the opposite flow direction.

For detailed information please refer to the "Column Care and Use Instructions" which are shipped with each analytical column.

Ordering Information

Normal Phase: YMC Chiral NEA(R)(S)

Phase dimension	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length [pack of 5]
		50	100	150	250	
30 nm 5 μ m NEA(R)	4.6	CR30S05-0546WT	CR30S05-1046WT	CR30S05-1546WT	CR30S05-2546WT	CR30S05-0104GC
30 nm 5 μ m NEA(S)	4.6	CS30S05-0546WT	CS30S05-1046WT	CS30S05-1546WT	CS30S05-2546WT	CS30S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

Reversed Phase: YMC Chiral NEA(R)(S)

Phase dimension	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length [pack of 5]
		50	100	150	250	
30 nm 5 μ m NEA(R)	4.6	NR30S05-0546WT	NR30S05-1046WT	NR30S05-1546WT	NR30S05-2546WT	NR30S05-0104GC
30 nm 5 μ m NEA(S)	4.6	NS30S05-0546WT	NS30S05-1046WT	NS30S05-1546WT	NS30S05-2546WT	NS30S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

α -CD BR: YMC Chiral CD BR

Phase dimension	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length [pack of 5]
		50	100	150	250	
12 nm 5 μ m	4.6	DA12S05-0546WT	—	DA12S05-1546WT	DA12S05-2546WT	DA12S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

β -CD BR: YMC Chiral CD BR

Phase dimension	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length [pack of 5]
		50	100	150	250	
12 nm 5 μ m	4.6	DB12S05-0546WT	—	DB12S05-1546WT	DB12S05-2546WT	DB12S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

γ -CD BR: YMC Chiral CD BR

Phase dimension	Column ID [mm]	Column length [mm]				Guard cartridges* with 10 mm length [pack of 5]
		50	100	150	250	
12 nm 5 μ m	4.6	DG12S05-0546WT	—	DG12S05-1546WT	DG12S05-2546WT	DG12S05-0104GC

*Guard cartridge holder required, part no. XPGCH-Q1

