RStech

# HPLC Column Catalog


RS tech

A leading manufacturer of HPLC column since 2010

# Contents

# 1. RStech Column Overview

RStech columns are designed for HPLC, LC/MS, SFC, and SMB. RStech columns are manufactured under the most stringently controlled conditions, guaranteeing constant particles and pore distribution as well as a constant size and pore volume and low metal impurity. RStech columns are well end-capped for reproducibility and durability. Therefore, RStech columns, which have a lower concentration of free silanols, affect the retention time and peak shapes of basic solutes. We offer a full line of phases to provide our customers with a wide range of selectivity.

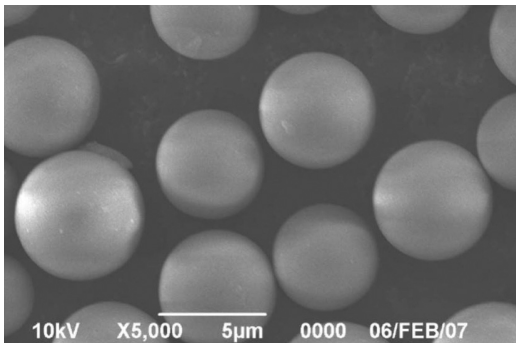
RStech Columns are based on 3, 5, and 10 μm particles with high-purity silica. We provide various lengths and inside diameters. These columns have a superb performance for a variety of applications in the pharmaceutical, chemical, environmental, and food separation area.

RStech corporation has been steadily supplying with columns and has established a very good reputation around the world. They are available with the same quality and the same performance anywhere in the world.

# 1-1. Silica Information

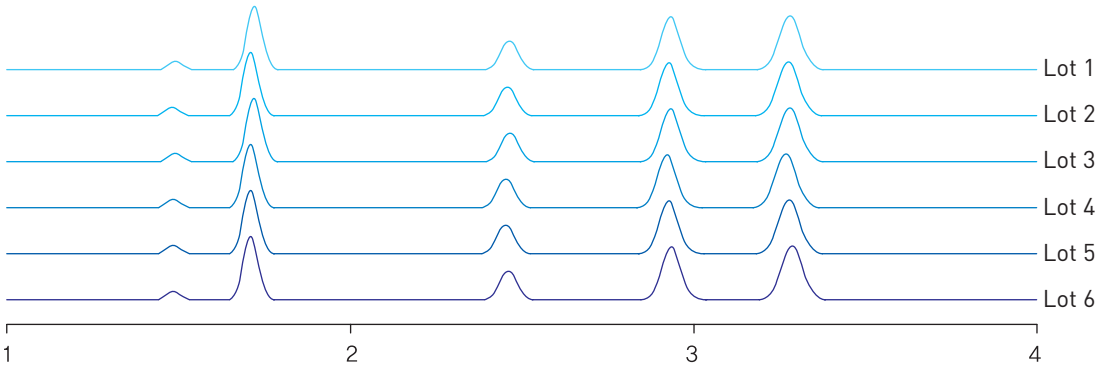
**RStech columns provide a silica material with $SiO_2$〉99.99 % purity, which points to a total metal content of 〈100 ppm.**

- Most lot data show less than 10 ppm
- Selection of particle sizes to optimize the efficiency
- Spherical particle shape to reduce the pressure
- Consistent and reproducible retention times to allow direct scale-up from the laboratory through the process applications
- Lot-to-lot consistency for reproducible performance
- Bulk quantities for larger-scale applications available, secured lots offered for process use




5 μm Bare Silica

■ **Silica lot to lot data of Hector M C18**




Column : Hector M C18 5 μm
Dimension : 150 X 4.6 mm
Mobile phase : MeOH / Water = 90 / 10
Flow rate : 1.0ml/min
Detection : 254 nm
Temperature : 25 °C
Injection Volume : 10μL

Sample : 1. Uracil
2. Aniline
3. Benzene
4. Toluene
5. Naphthalene

## 1-2. Column line up

### 1) Hector

| | Phase | Description | Particle size (μm) | Pore Size (Å) | Surface Area ($m^2/g$) | Carbon Load (%) | Phase Type | End-capping | USP |
|---|---|---|---|---|---|---|---|---|---|
| Hector M | $C_{18}$ | ODS-bonded phase that used reversed phase. | 3,5,10 | 100 | 320 | 17 | monomeric | Yes | L01 |
| | $C_8$ | When $C_{18}$ is too retentive. It has lower C% than $C_{18}$. | 3,5,10 | 100 | 320 | 10 | monomeric | Yes | L07 |
| | $C_4$ | | 3,5,10 | 100 | 320 | 3-4 | monomeric | Yes | L26 |
| | $NH_2$ | Polar phase that can be used normal and ion exchange mode | 3,5,10 | 100 | 320 | 4 | monomeric | Yes | L08 |
| | Diol | Alcoholic hydroxyl, mild adsorption, neutral charge. | 3,5,10 | 100 | 320 | 4 | monomeric | Yes | L20 |
| | CN | Stable, long-life, cyano phase | 3,5,10 | 100 | 320 | 6-7 | monomeric | Yes | L10 |
| | Phenyl | Nonpolar. hydrophobic retention of a phenyl phase is similar to that of a $C_8$ bonded phase, but unique selectivity | 3,5,10 | 100 | 320 | 10 | monomeric | Yes | L11 |
| | Sil | For general purpose normal-phase application | 3,5,10 | 100 | 320 | - | - | - | L03 |
| Hector A | $C_{18}$ | $C_{18}$ bonded silica with hydrophilic functional group | 3,5,10 | 100 | 320 | 12-13 | monomeric | Yes | L01 |
| | $C_8$ | Similar but less retentive than $C_{18}$ | 3,5,10 | 100 | 320 | 8 | monomeric | Yes | L07 |
| Hector T | $C_{18}$ | $C_{18}$ is based on trifunctional silane chemistry. More stability for wide pH range | 3,5,10 | 100 | 320 | 19 | Trifunctional | Yes | L01 |
| Hector W | $C_{18}$ | $C_{18}$ bonded wide pore silica, it can be used for a wide range of molecular weights. | 3,5,10 | 300 | - | 7 | monomeric | Yes | L01 |
| | $C_8$ | When $C_{18}$ is too retentive. It has lower C% than $C_{18}$. | 3,5,10 | 300 | - | 4 | monomeric | Yes | L07 |
| | $C_4$ | | 3,5,10 | 300 | - | 3 | monomeric | Yes | L26 |
| | $NH_2$ | Polar phase that can be used normal and ionexchange mode | 3,5,10 | 300 | - | - | monomeric | Yes | L08 |
| Hector U | $C_{18}$ | ODS-bonded phase that used reversed phase for UHPLC | 1.6, 1.8, 2 | 100 | 320 | 19 | monomeric | Yes | L01 |
| Hector ACD | WCX | COOH boned silica surface | 3,5,10 | 100 | 320 | 6-7 | monomeric | Yes | - |
| | SCX | $SO_3H$ boned silica surface | 3,5,10 | 100 | 320 | 5 | monomeric | Yes | L09 |

## 2) Optimapak

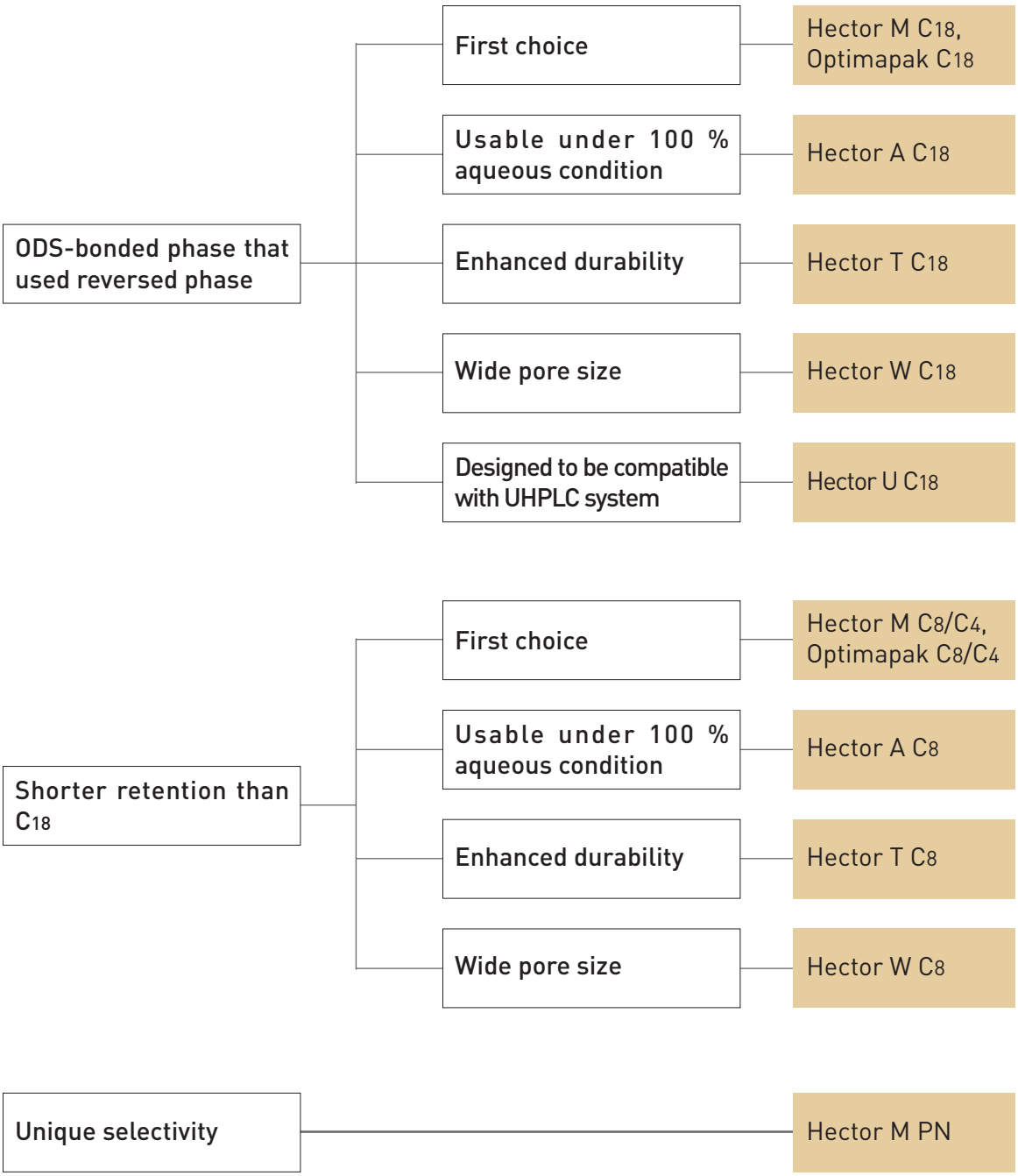
| Phase | Description | Particle size (μm) | Pore Size (Å) | Surface Area ($m^2/g$) | Carbon Load (%) | Phase Type | End-capping | USP |
|---|---|---|---|---|---|---|---|---|
| $C_{18}$ | ODS-bonded phase that used reversed phase. | 3.5,5,10 | 100 | 320 | 20 | monomeric | Yes | L01 |
| $C_8$ | When $C_{18}$ is too retentive. It has lower C% than $C_{18}$. | 3.5,5,10 | 100 | 320 | 12 | monomeric | Yes | L07 |
| $NH_2$ | Polar phase that can be used normal and ion exchange mode | 3.5,5,10 | 100 | 320 | 1.7 | monomeric | Yes | L08 |
| Sil | For general purpose normal-phase application | 3.5,5,10 | 100 | 320 | - | monomeric | - | L03 |

## 3) ChiroSil / ChiroSil ME

| Phase | Description | Particle size (μm) | Pore Size (Å) |
|---|---|---|---|
| RCA | (+)-(18-Crown-6)-tetracarboxylic acid chemically bonded Aminopropyl silane, 5-10μm in diameter. The active site is (+)-(18-Crown-6)-tetracarboxylic acid. | 5 | 5 |
| SCA | (-)-(18-Crown-6)-tetracarboxylic acid chemically bonded Aminopropyl silane, 5-10μm in diameter. The active site is (-)-(18-Crown-6)-tetracarboxylic acid. | 5 | 5 |

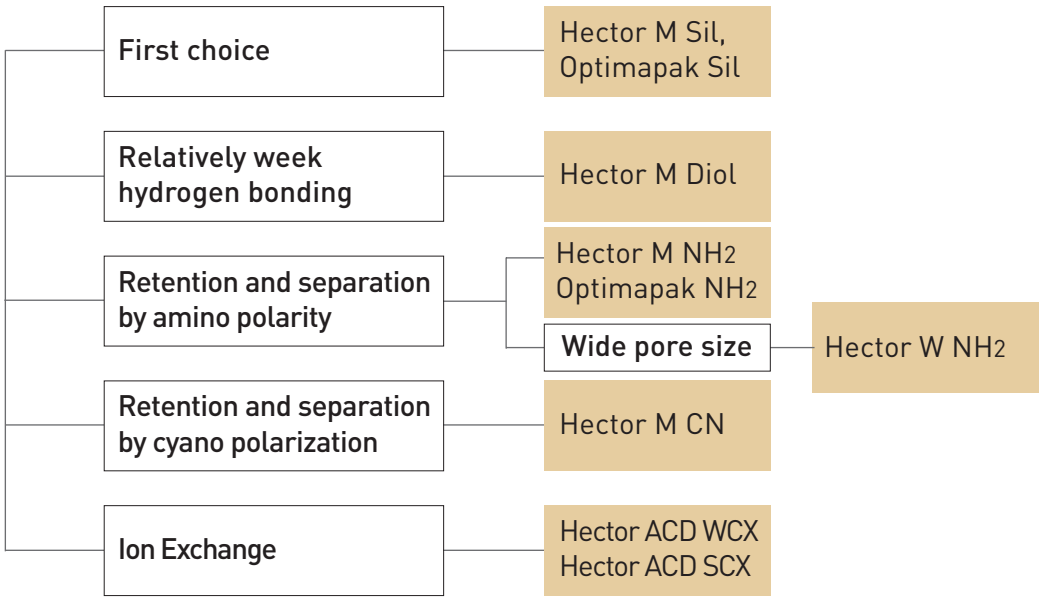
## 1-3. Column Selection Guide

· Reverse Phase Columns



## 1-3. Column Selection Guide

### · Normal Phase Columns



## Column Selection by USP Listing

| USP Code | Kind | USP Description | RStech Column Name |
|---|---|---|---|
| L01 | C18 | Octadecyl silane chemically bonded to porous silica or ceramic particles, 1.5 to 10 µm in diameter, or a monolithic rod. | Hector M C18<br>Hector A C18<br>Hector T C18<br>Hector W C18<br>Hector U C18<br>Optimapak C18 |
| L03 | Sil | Porous silica particles, 1.5 to 10 µm in Diameter, or a monolithic silica rod. | Hector M Sil<br>Optimapak Sil |
| L07 | C8 | Octylsilane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod. | Hector M C8<br>Hector A C8<br>Hector T C8<br>Hector W C8<br>Optimapak C8 |
| L08 | NH2 | An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel upport, 1.5 to 10 µm in diameter, or a monolithic silica rod. | Hector M NH2<br>Hector W NH2<br>Optimapak NH2 |
| L09 | Strongly acidic cation group | Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter. | Hector ACD SCX |
| L10 | CN | Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod. | Hector M CN |
| L11 | Phenyl | Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod. | Hector M Phenyl |
| L20 | Diol | Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter, or a monolithic silica rod. | Hector M Diol |
| L26 | C4 | Butyl silane chemically bonded to totally porous or superficially porous silica particles, 1.5 to 10 µm in diameter | Hector M C4<br>Hector W C4 |

## Column Selection by Manufacturer

| Phase | Manufacturer | Pore Size(Å) | Area($m^2$/g) | %C | Recommanded Hector Column |
|---|---|---|---|---|---|
| ACE AQ | ACT | 100 | 300 | 14 | Hector A C18 |
| ACE C18 | ACT | 100 | 300 | 15.5 | Hector M C18 |
| ACE C18 300 | ACT | 300 | 300 | 9 | Hector W C18 |
| ACE C4 | ACT | 100 | 300 | 5.5 | Hector M C4 |
| ACE C8 | ACT | 100 | 300 | 9 | Hector M C8 |
| ACE Phenyl | ACT | 100 | 300 | 5.5 | Hector M Phenyl |
| ACE CN | ACT | 100 | 300 | 5.5 | Hector M CN |
| Alltima HP C18 | Grace | 190 | 200 | 12 | Hector M C18 |
| Alltima HP C18 AQ | Grace | 100 | 450 | 20 | Hector A C18 |
| Alltima HP C8 | Grace | 190 | 200 | 8 | Hector M C8 |
| Alltima HP CN | Grace | 190 | 200 | 4 | Hector A CN |
| Alltima HP Silica | Grace | 190 | 200 | - | Hector M Sil |
| Ascentis C18 | Supelco | 100 | 450 | 25 | Hector M C18 |
| Ascentis C8 | Supelco | 100 | 450 | 15 | Hector M C8 |
| Ascentis Phenyl | Supelco | 100 | 450 | 19 | Hector M Phenyl |
| Atlantis dC18 | Waters | 100 | 330 | 12 | Hector A C18 |
| Capcell pak C18 UG 80, 120 | Shiseido | 80, 120 | 300 | 15 | Hector M C18 |
| Capcell pak UG 300 | Shiseido | 300 | 300 | 15 | Hector W C18 |
| Capcell pak C18 MG | Shiseido | 100 | 260 | 15 | Hector M C18 |
| Capcell pak C18 MGII | Shiseido | 100 | 260 | 15 | Hector M C18 |
| Capcell pak C18 ACR | Shiseido | 80 | 300 | 17 | Hector T C18 |
| Capcell pak C18 AQ | Shiseido | 80 | 300 | 11 | Hector A C18 |
| Capcell pak SCX | Shiseido | 80 | 450 | 9 | Hector SCX |
| Columbus C18 | Phenomenex | 110 | 375 | 19 | Hector M C18 |
| Columbus C8 | Phenomenex | 110 | 375 | 13 | Hector M C8 |
| Discovery BIO Wide Pore C18 | Supelco | 300 | - | - | Hector W C18 |
| Discovery BIO Wide Pore C8 | Supelco | 300 | - | - | Hector W C8 |
| Discovery C18 | Supelco | 180 | 200 | 14 | Hector M C18 |
| Discovery C8 | Supelco | 180 | 200 | - | Hector M C8 |
| Discovery Cyano | Supelco | 180 | 200 | - | Hector M CN |
| Gemini C18 | Phenomenex | 110 | 375 | 14 | Hector M C18 |
| Genesis AQ | Grace | 120 | 300 | - | Hector A C18 |
| Genesis C4 | Grace | 120 | 300 | - | Hector M C4 |
| Genesis C8 | Grace | 120 | 300 | - | Hector M C8 |
| Genesis CN | Grace | 120 | 300 | 7 | Hector M CN |
| Genesis MOS | Grace | 120 | 300 | 11 | Hector M C8 |
| Genesis ODS | Grace | 120 | 300 | 18 | Hector M C18 |
| Genesis Phenyl | Grace | 120 | 300 | - | Hector M Phenyl |
| Genesis Silica | Grace | 120 | 300 | - | Hector M Sil |
| Inertsil C4 | GL Science | 150 | 320 | 8 | Hector M C4 |

Recommened Hector columns are not guaranteed to provide the same retention or selectivity.

| Phase | Manufacturer | Pore Size(Å) | Area($m^2$/g) | %C | Recommanded Hector Column |
|---|---|---|---|---|---|
| Inertsil C8 | GL Science | 150 | 320 | 11 | Hector M C8 |
| Inertsil ODS3V | GL Science | 100 | 450 | 15 | Hector M C18 |
| Inertsil Phenyl | GL Science | 150 | 320 | 10 | Hector M Phenyl |
| Inertsil Silica | GL Science | 150 | 320 | - | Hector M Sil |
| Jupiter C18 | Phenomenex | 300 | 170 | 13 | Hector W C18 |
| Jupiter C4 | Phenomenex | 300 | 170 | 5 | Hector W C4 |
| LiChrospher CN | Merck | 100 | 350 | 7 | Hector M CN |
| LiChrospher Diol | Merck | 100 | 350 | - | Hector M Diol |
| LiChrospher NH2 | Merck | 100 | 350 | 5 | Hector M NH2 |
| LiChrospher RP18 | Merck | 100 | 350 | 21 | Hector A C18 |
| LiChrospher RP-18e | Merck | 100 | 350 | 22 | Hector A C18 |
| LiChrospher RP-8 | Merck | 100 | 350 | 13 | Hector A C8 |
| LiChrospher RP-8e | Merck | 100 | 350 | 13 | Hector A C8 |
| Luna C18 | Phenomenex | 100 | 400 | 18 | Hector M C18 |
| Luna C8 | Phenomenex | 100 | 400 | 14 | Hector M C8 |
| Luna CN | Phenomenex | 100 | 400 | - | Hector M CN |
| Luna NH2 | Phenomenex | 100 | 400 | 10 | Hector M NH2 |
| Luna SCX | Phenomenex | 100 | 400 | - | Hector ACD SCX |
| µBondpak C18 | Waters | 125 | 330 | 10 | Hector M C18 |
| µBondpak CN | Waters | 125 | 330 | - | Hector M CN |
| µBondpak NH2 | Waters | 125 | 330 | 4 | Hector M NH2 |
| µBondpak Phenyl | Waters | 125 | 330 | - | Hector M Phenyl |
| Nova-Pak C8 | Waters | 60 | 120 | - | Hector M C8 |
| Nova-Pak CN | Waters | 60 | 120 | - | Hector M CN |
| Nova-Pak Silica | Waters | 60 | 120 | - | Hector M Sil |
| Nova-Pak (HR) C18 | Waters | 60 | 120 | 7 | Hector M C18 |
| NUCLEODUR C18 Gravity | Macherey-Nagel | 110 | 340 | 18 | Hector M C18 |
| NUCLEODUR C18 EC | Macherey-Nagel | 110 | 340 | 18 | Hector M C18 |
| NUCLEODUR CN | Macherey-Nagel | 110 | 340 | 7 | Hector M CN |
| NUCLEODUR Pyramid | Macherey-Nagel | 110 | 340 | 14 | Hector A C18 |
| Nucleosil 100 C18 | Macherey-Nagel | 100 | 350 | 17 | Hector M C18 |
| Nucleosil 100 C18 AB | Macherey-Nagel | 100 | 350 | 24 | Hector M C18 |
| Nucleosil 100 C6H5 | Macherey-Nagel | 100 | 350 | - | Hector M Phenyl |
| Nucleosil 100 C8 | Macherey-Nagel | 100 | 350 | 9 | Hector M C8 |
| Nucleosil 100 CN | Macherey-Nagel | 100 | 350 | - | Hector M CN |
| Nucleosil 100 NH2 | Macherey-Nagel | 100 | 350 | 4 | Hector M NH2 |
| Nucleosil 100 OH | Macherey-Nagel | 100 | 350 | - | Hector M Diol |
| Nucleosil 100 SA | Macherey-Nagel | 100 | 350 | 7 | Hector SCX |
| Nucleosil 300 C18 | Macherey-Nagel | 300 | 100 | 7 | Hector W C18 |
| Nucleosil 300 C4 | Macherey-Nagel | 300 | 100 | - | Hector W C4 |
| Nucleosil 300 C8 | Macherey-Nagel | 300 | 100 | - | Hector W C8 |
| Partisil C8 | Whatman | 85 | 350 | 9 | Hector M C8 |

Recommened Hector columns are not guaranteed to provide the same retention or selectivity.

| Phase | Manufacturer | Pore Size(Å) | Area($m^2$/g) | %C | Recommanded HECTOR Column |
|---|---|---|---|---|---|
| Partisil ODS | Whatman | 85 | 350 | 5 | Hector M C18 |
| Partisil ODS2 | Whatman | 85 | 350 | 16 | Hector M C18 |
| Partisil ODS-3 | Whatman | 85 | 350 | 11 | Hector M C18 |
| Partisil SCX | Whatman | 85 | 350 | - | Hector ACD SCX |
| Partisil Silica | Whatman | 85 | 350 | - | Hector M Sil |
| Pinnacle C18 | Restek | 120 | 170 | 10 | Hector M C18 |
| Pinnacle C4 | Restek | 120 | 170 | 4 | Hector M C4 |
| Pinnacle CN | Restek | 120 | 170 | 5 | Hector M CN |
| Pinnacle DB C18 | Restek | 140 | - | 11 | Hector M C18 |
| Pinnacle DB Cyano | Restek | 140 | - | 4 | Hector M CN |
| Pinnacle DB Phenyl | Restek | 140 | - | 5 | Hector M Phenyl |
| Pinnacle IBD | Restek | 120 | 170 | - | Hector M C18 |
| Pinnacle NH2 | Restek | 120 | 170 | 2 | Hector M NH2 |
| Pinnacle Phenyl | Restek | 120 | 170 | 5 | Hector M Phenyl |
| Pinnacle Silica | Restek | 120 | 170 | - | Hector M Sil |
| Pinnacle Ultra C18 | Restek | 100 | - | 20 | Hector M C18 |
| Pinnacle Wide Pore C4 | Restek | 300 | - | 2 | Hector W C4 |
| Polaris NH2 | Varian | - | - | - | Hector M NH2 |
| Prodigy C8 | Phenomenex | 150 | 310 | 13 | Hector M C8 |
| Prodigy ODS2 | Phenomenex | 150 | 310 | 18 | Hector M C18 |
| Prodigy ODS-3 | Phenomenex | 100 | 450 | 16 | Hector M C18 |
| Prodigy ODS-3V | Phenomenex | 100 | 450 | 16 | Hector M C18 |
| Prodigy Phenyl-3 | Phenomenex | 100 | 450 | 10 | Hector M Phenyl |
| Purospher RP-18 | Merck | 60 | 500 | - | Hector A C18 |
| Purospher RP-18e | Merck | 60 | 500 | - | Hector A C18 |
| Purospher STAR RP-18e | Merck | 120 | 300 | - | Hector A C18 |
| Purospher STAR-8e | Merck | 120 | 300 | - | Hector A C8 |
| Pursuit C18 | Varian | - | - | - | Hector M C18 |
| Pursuti C8 | Varian | - | - | - | Hector M C8 |
| Sunfire C18 | Waters | 90 | 340 | 16 | Hector M C18 |
| Sunfire C8 | Waters | 90 | 340 | 11.5 | Hector M C8 |
| Supelcosil LC-18 | Supelco | 120 | 170 | 11 | Hector M C18 |
| Supelcosil LC-18DB | Supelco | 120 | 170 | 11 | Hector M C18 |
| Supelcosil LC-8 | Supelco | 120 | 170 | - | Hector M C8 |
| Supelcosil LC-CN | Supelco | 120 | 170 | - | Hector M CN |
| Supelcosil LC-NH2 | Supelco | 120 | 170 | - | Hector M NH2 |
| Supelcosil LC-Si | Supelco | 120 | 170 | - | Hector M Sil |
| Symmetry C18 | Waters | 100 | 335 | 19 | Hector M C18 |
| Symmetry C8 | Waters | 100 | 335 | 12 | Hector M C8 |
| TSKgel Octyl-80TS | Tosoh | 80 | 200 | 11 | Hector M C8 |
| TSKgel ODS-120A | Tosoh | 120 | 200 | 22 | Hector M C18 |
| Waters Spherisorb C8 | Waters | 80 | 200 | 6 | Hector M C8 |

Recommened Hector columns are not guaranteed to provide the same retention or selectivity.

| Phase | Manufacturer | Pore Size(Å) | Area($m^2$/g) | %C | Recommanded HECTOR Column |
|---|---|---|---|---|---|
| Waters Spherisorb CN | Waters | 80 | 200 | 3 | Hector M CN |
| Waters Spherisorb NH2 | Waters | 80 | 200 | 2 | Hector M NH2 |
| Waters Spherisorb ODS1 | Waters | 80 | 200 | 6 | Hector M C18 |
| Waters Spherisorb ODS2 | Waters | 80 | 200 | 12 | Hector M C18 |
| Waters Spherisorb ODSB | Waters | 80 | 200 | 12 | Hector M C18 |
| Waters Spherisorb Phenyl | Waters | 80 | 200 | 3 | Hector M Phenyl |
| Waters Spherisorb SCX | Waters | 80 | 200 | - | Hector ACD SCX |
| Waters Spherisorb W (silica) | Waters | 80 | 200 | - | Hector M Sil |
| Viva C18 | Restek | 300 | - | 9 | Hector W C18 |
| Viva C4 | Restek | 300 | - | 4 | Hector W C4 |
| Viva C8 | Restek | 300 | - | 5 | Hector W C8 |
| X Bridge C18 | Waters | 135 | 185 | 17.5 | Hector T C18 |
| X Bridge C8 | Waters | 135 | 185 | 17.5 | Hector T C8 |
| Xterra MS C18 | Waters | 125 | 180 | 16 | Hector T C18 |
| Xterra MS C8 | Waters | 125 | 180 | 12 | Hector T C8 |
| YMCbasic | YMC | - | - | - | Hector M C8 |
| YMC-Pack C4 | YMC | 120 | 300 | 7 | Hector M C4 |
| YMC-Pack C8 | YMC | 120 | 300 | 10 | Hector M C8 |
| YMC-Pack CN | YMC | 120 | 300 | 7 | Hector M CN |
| YMC-Pack NH2 | YMC | 120 | - | - | Hector M NH2 |
| YMC-Pack ODS-AQ | YMC | 120 | 300 | 16 | Hector A C18 |
| YMC-Pack ODS-A | YMC | 120 | 300 | 17 | Hector M C18 |
| YMC-Pack ODS-A | YMC | 300 | 150 | 7 | Hector W C18 |
| YMC-Pack Phenyl | YMC | 120 | 300 | 9 | Hector M Phenyl |
| YMC-Pack Pro C18 | YMC | 120 | 350 | 16 | Hector M C18 |
| YMC-Pack Silica | YMC | 120 | - | - | Hector M Sil |
| Zorbax Eclipse XDB C18 | Agilent | 80 | 180 | 10 | Hector T C18 |
| Zorbax Eclipse Plus C18 | Agilent | 95 | 160 | 8 | Hector M C18 |
| Zorbax Eclipse Plus C8 | Agilent | 95 | 160 | 6 | Hector M C8 |
| Zorbax RRHT Eclipse Plus C18 | Agilent | 95 | 160 | 8 | Hector M C18 |
| Zorbax RRHT Eclipse Plus C8 | Agilent | 95 | 160 | 6 | Hector M C8 |
| Zorbax RRHT Eclipse XDB-C18 | Agilent | 80 | 180 | 10 | Hector M C18 |
| Zorbax RRHT Eclipse XDB-C8 | Agilent | 80 | 180 | 7.5 | Hector M C8 |
| Zorbax Eclipse SB-CN | Agilent | 80 | 180 | 4 | Hector M CN |
| Zorbax SB Aq | Agilent | 80 | 180 | - | Hector A C18 |
| Zorbax SB C18 | Agilent | 80 | 18 | 10 | Hector M C18 |
| Zorbax SB C18 | Agilent | 300 | 45 | 3 | Hector W C18 |
| Zorbax SB C8 | Agilent | 80 | 180 | 6 | Hector M C8 |
| Zorbax SB C8 | Agilent | 300 | 45 | 2 | Hector W C8 |
| Zorbax SB CN | Agilent | 80 | 180 | 4 | Hector M CN |
| Zorbax SB Phenyl | Agilent | 80 | 180 | 6 | Hector M Phenyl |

Recommened Hector columns are not guaranteed to provide the same retention or selectivity.

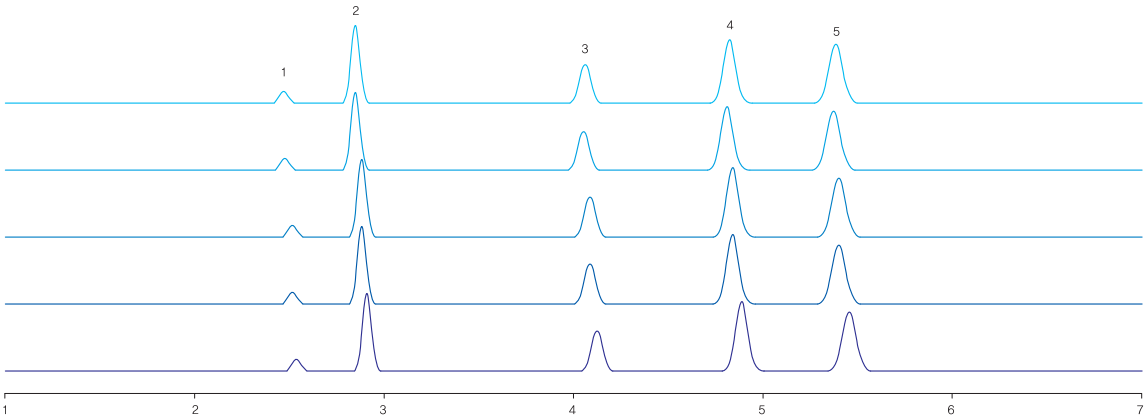
# 2. Hector

## 2-1. Hector M: First choice, Wide range application

Hector M columns are well end-capped for reproducibility and durability. Their wide range of stationary phases supports the customer demands, from the analytical to the semi-prep scales. For the reversed-phase mode, the C18, C8, C4, NH2, CN, and phenyl phases are available, depending on the polarity. On the Other hand, Sil, NH2, Diol and CN are available for the normal-phase mode. These normal-phase columns separate acidic, neutral, and basic compounds through the right choice of stationary phase.

- Differentiated Phases: C18, C8, C4, Phenyl, NH2, Diol, CN, Sil
- Specification: Spherical silica, Monomerically bonded, End capped, 100 Å pore size
- Format: Analytical, Semi-prep

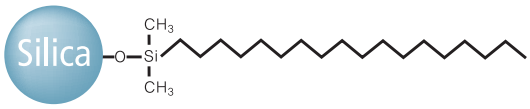
■ Column to column reproducibility data of Hector M C18




Column: Hector M C18 5 μm
Dimension: 250 X 4.6 mm
Mobile Phase: MeOH / Water = 90 / 10
Flow rate: 1.0 mL/min
Detection: 254 nm
Temperature: 25 ˚C
Injection Volume: 10 μL

Sample : 1. Uracil
2. Aniline
3. Benzene
4. Toluene
5. Naphthalene

# Hector M C18

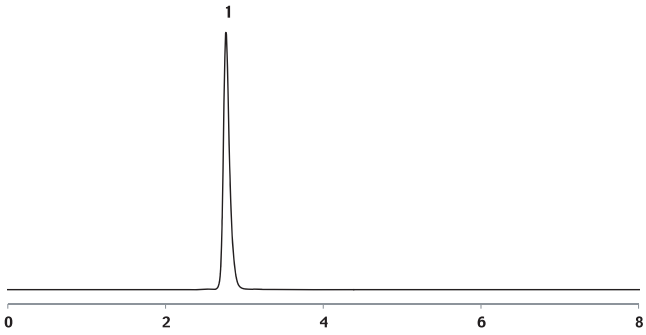



Hector M C18 is the most versatile and popular reversed phase. It is extremely suitable for the validation of various analytes. It has an about 17 % carbon load and is fully end-capped. It provides high selectivity, efficiency, and a good peak shape.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100, 120 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 17 %
- USP Code: L1
- Usable pH range: 2-8

Rantidine HCl(USP)

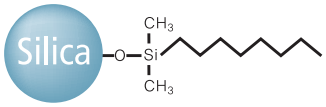



Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 M Ammonium acetate aq. / MeOH = 15 / 85
Flow rate : 1.0 ml/min
Detection : UV 322nm
Temperature : 35 ˚C
Injection Volume : 10μL
Sample : 1. Rantidine HCl

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C18-M31000521 | C18-M31000530 | C18-M31000539 | C18-M31000546 | - | C18-M310005100 | - |
| | 70 | C18-M31000721 | C18-M31000730 | C18-M31000739 | C18-M31000746 | - | C18-M310007100 | - |
| | 100 | C18-M31001021 | C18-M31001030 | C18-M31001039 | C18-M31001046 | - | C18-M310010100 | - |
| | 150 | C18-M31001521 | C18-M31001530 | C18-M31001539 | C18-M31001546 | - | C18-M310015100 | - |
| | 250 | C18-M31002521 | C18-M31002530 | C18-M31002539 | C18-M31002546 | - | C18-M310025100 | - |
| 5 | 50 | C18-M51000521 | C18-M51000530 | C18-M51000539 | C18-M51000546 | - | C18-M510005100 | C18-M510005200 |
| | 70 | C18-M51000721 | C18-M51000730 | C18-M51000739 | C18-M51000746 | - | C18-M510007100 | C18-M510007200 |
| | 100 | C18-M51001021 | C18-M51001030 | C18-M51001039 | C18-M51001046 | - | C18-M510010100 | C18-M510010200 |
| | 150 | C18-M51001521 | C18-M51001530 | C18-M51001539 | C18-M51001546 | C18-M51001578 | C18-M510015100 | C18-M510015200 |
| | 250 | C18-M51002521 | C18-M51002530 | C18-M51002539 | C18-M51002546 | C18-M51002578 | C18-M510025100 | C18-M510025200 |
| 10 | 100 | - | - | - | C18-M101001046 | - | C18-M1010010100 | C18-M1010010200 |
| | 150 | - | - | - | C18-M101001546 | C18-M101001578 | C18-M1010015100 | C18-M1010015200 |
| | 250 | - | - | - | C18-M101002546 | C18-M101002578 | C18-M1010025100 | C18-M1010025200 |

# Hector M C8

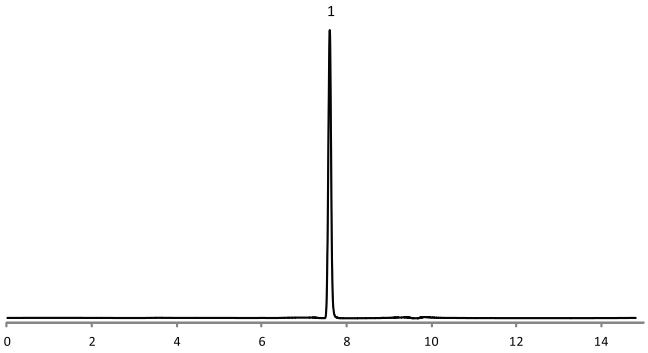



Hector M C8 is packed with alkylchain-group-bonded silica particles. It has a lower carbon load than Hector M C18. We recommend Hector M C8 when the sample has a high retention time. It can be used for pharmaceutical, environmental, food, and other industrial chromatographic separations. It provides less retention and greater speed.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 100 Å
- Bonded phase: Octyl Groups
- Carbon contents: 10 %
- USP Code: L7
- Usable pH range: 2-8

Acetaminophen( USP)




Column : Hector-M C8 3µm Dimension : 150 X 4.6 mm
Mobile Phase : A: 1.7 g/L of monobasic $KH_2PO_4$ and 1.8 g/L of dibasic sodium phosphate
B: Methanol

Gradient :

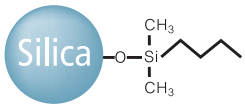
| Time | 0.0 | 3.0 | 7.0 | 7.1 | 10.0 |
|---|---|---|---|---|---|
| % B | 1 | 1 | 81 | 1 | 1 |

Flow rate : 1.0 mL/min Detection : UV 230 nm
Temperature : 35 °C Injection Volume : 5µL
Sample : 1. Acetaminophen

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C8-M31000521 | C8-M31000530 | C8-M31000539 | C8-M31000546 | - | - | - |
| | 70 | C8-M31000721 | C8-M31000730 | C8-M31000739 | C8-M31000746 | - | - | - |
| | 100 | C8-M31001021 | C8-M31001030 | C8-M31001039 | C8-M31001046 | - | - | - |
| | 150 | C8-M31001521 | C8-M31001530 | C8-M31001539 | C8-M31001546 | - | - | - |
| | 250 | C8-M31002521 | C8-M31002530 | C8-M31002539 | C8-M31002546 | - | - | - |
| 5 | 50 | C8-M51000521 | C8-M51000530 | C8-M51000539 | C8-M51000546 | - | C8-M510005100 | C8-M510005200 |
| | 70 | C8-M51000721 | C8-M51000730 | C8-M51000739 | C8-M51000746 | - | C8-M510007100 | C8-M510007200 |
| | 100 | C8-M51001021 | C8-M51001030 | C8-M51001039 | C8-M51001046 | - | C8-M510010100 | C8-M510010200 |
| | 150 | C8-M51001521 | C8-M51001530 | C8-M51001539 | C8-M51001546 | C8-M51001578 | C8-M510015100 | C8-M510015200 |
| | 250 | C8-M51002521 | C8-M51002530 | C8-M51002539 | C8-M51002546 | C8-M51002578 | C8-M510025100 | C8-M510025200 |
| 10 | 100 | - | - | - | C8-M101001046 | - | C8-M1010010100 | C8-M1010010200 |
| | 150 | - | - | - | C8-M101001546 | C8-M101001578 | C8-M1010015100 | C8-M1010015200 |
| | 250 | - | - | - | C8-M101002546 | C8-M101002578 | C8-M1010025100 | C8-M1010025200 |

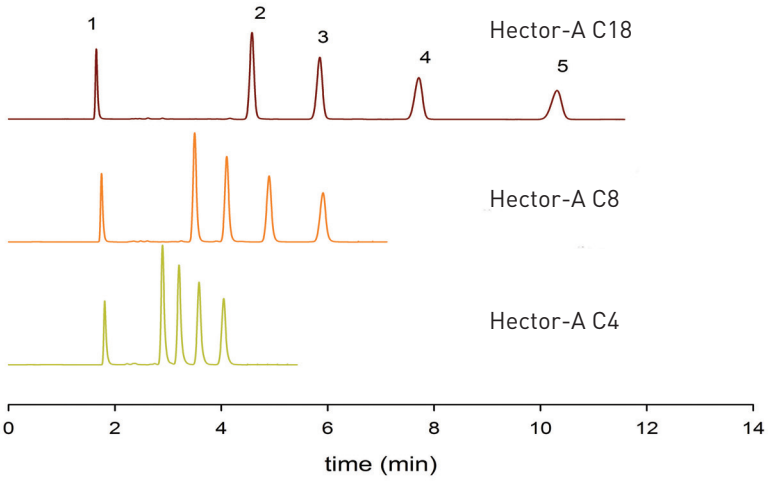
# Hector M C4




Hector M C4 is packed with alkylchain-group bonded silica particles. It has a lower carbon load than Hector C18 and Hector C8. We recommend Hector M C4 when the sample has a high retention time. It can be used for pharmaceutical, environmental, food, and other industrial chromatographic separations. It provides less retention and greater speed.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Butyl Groups
- Carbon contents: 3 %
- USP Code: L26
- Usable pH range: 2-8

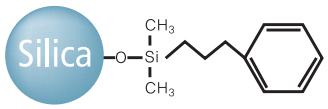



Mobile phase : MeOH/H2O =80/20
Flow Rate : 1.0 mL/min
Sample : 1. Uracil
2. Ethylbenzene
3. N-Propylbenzene
4. N-Butylbenzene
5. N-Amylbenzene

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C4-M31000521 | C4-M31000530 | C4-M31000539 | C4-M31000546 | - | - | - |
| | 70 | C4-M31000721 | C4-M31000730 | C4-M31000739 | C4-M31000746 | - | - | - |
| | 100 | C4-M31001021 | C4-M31001030 | C4-M31001039 | C4-M31001046 | - | - | - |
| | 150 | C4-M31001521 | C4-M31001530 | C4-M31001539 | C4-M31001546 | - | - | - |
| | 250 | C4-M31002521 | C4-M31002530 | C4-M31002539 | C4-M31002546 | - | - | - |
| 5 | 50 | C4-M51000521 | C4-M51000530 | C4-M51000539 | C4-M51000546 | - | C4-M510005100 | C4-M510005200 |
| | 70 | C4-M51000721 | C4-M51000730 | C4-M51000739 | C4-M51000746 | - | C4-M510007100 | C4-M510007200 |
| | 100 | C4-M51001021 | C4-M51001030 | C4-M51001039 | C4-M51001046 | - | C4-M510010100 | C4-M510010200 |
| | 150 | C4-M51001521 | C4-M51001530 | C4-M51001539 | C4-M51001546 | C4-M51001578 | C4-M510015100 | C4-M510015200 |
| | 250 | C4-M51002521 | C4-M51002530 | C4-M51002539 | C4-M51002546 | C4-M51002578 | C4-M510025100 | C4-M510025200 |
| 10 | 100 | - | - | - | C4-M101001046 | - | C4-M1010010100 | C4-M1010010200 |
| | 150 | - | - | - | C4-M101001546 | C4-M101001578 | C4-M1010015100 | C4-M1010015200 |
| | 250 | - | - | - | C4-M101002546 | C4-M101002578 | C4-M1010025100 | C4-M1010025200 |

# Hector M Phenyl

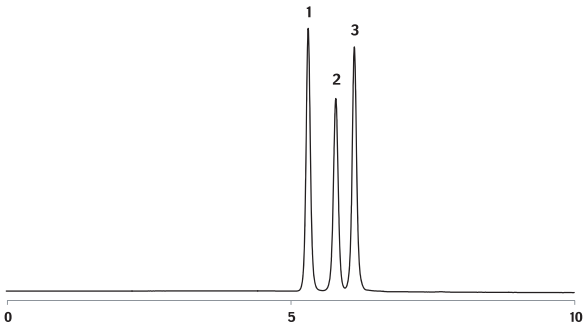



The Phenyl-modified stationary phase has $\pi$-electrons. The hydrophobic and $\pi$-$\pi$ interactions between the stationary phase and the solute show unique separation characteristics compared with the alkyl-bonding stationary phases, such as C18, C8, and C4.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Phenylpropyl Groups
- Carbon contents: 10 %
- USP Code: L11
- Usable pH range: 2-8

Nucleic acid & base

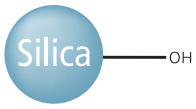



Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / MeOH = 85 / 15
Flow rate : 0.5ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Cytidin 2. Cytosine 3. Adenonin

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | PN-M31000521 | PN-M31000530 | PN-M31000539 | PN-M31000546 | - | - | - |
| | 70 | PN-M31000721 | PN-M31000730 | PN-M31000739 | PN-M31000746 | - | - | - |
| | 100 | PN-M31001021 | PN-M31001030 | PN-M31001039 | PN-M31001046 | - | - | - |
| | 150 | PN-M31001521 | PN-M31001530 | PN-M31001539 | PN-M31001546 | - | - | - |
| | 250 | PN-M31002521 | PN-M31002530 | PN-M31002539 | PN-M31002546 | - | - | - |
| 5 | 50 | PN-M51000521 | PN-M51000530 | PN-M51000539 | PN-M51000546 | - | PN-M510005100 | PN-M510005200 |
| | 70 | PN-M51000721 | PN-M51000730 | PN-M51000739 | PN-M51000746 | - | PN-M510007100 | PN-M510007200 |
| | 100 | PN-M51001021 | PN-M51001030 | PN-M51001039 | PN-M51001046 | - | PN-M510010100 | PN-M510010200 |
| | 150 | PN-M51001521 | PN-M51001530 | PN-M51001539 | PN-M51001546 | PN-M51001578 | PN-M510015100 | PN-M510015200 |
| | 250 | PN-M51002521 | PN-M51002530 | PN-M51002539 | PN-M51002546 | PN-M51002578 | PN-M510025100 | PN-M510025200 |
| 10 | 100 | - | - | - | PN-M101001046 | - | PN-M1010010100 | PN-M1010010200 |
| | 150 | - | - | - | PN-M101001546 | PN-M101001578 | PN-M1010015100 | PN-M1010015200 |
| | 250 | - | - | - | PN-M101002546 | PN-M101002578 | PN-M1010025100 | PN-M1010025200 |

# Hector M Sil

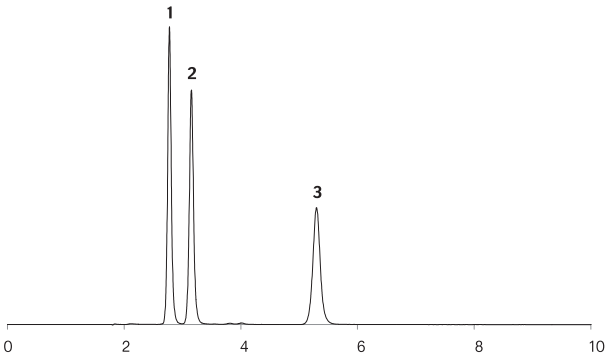



Sil stationary phase is widely used in normal phase separation. Especially, separation of position isomer and lipid-soluble compounds is effective. Hector M Sil is produced by high purity silica (99.99 % purity) and enhanced mechanical strength.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- USP Code: L3
- Usable pH range: 2-8

Steroid(estriol, estrone, estradiol)

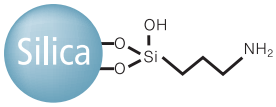



Column : Hector-M Sil 5μm
Dimension : 150 X 4.6mm
Mobile phase : Hexane / Ethanol = 80 / 20
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 25 ˚C
Injection Volume : 10μL
Sample : 1. Estrone 2. Estriol 3. Estradiol

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | Sil-M31000521 | Sil-M31000530 | Sil-M31000539 | Sil-M31000546 | - | - | - |
| | 70 | Sil-M31000721 | Sil-M31000730 | Sil-M31000739 | Sil-M31000746 | - | - | - |
| | 100 | Sil-M31001021 | Sil-M31001030 | Sil-M31001039 | Sil-M31001046 | - | - | - |
| | 150 | Sil-M31001521 | Sil-M31001530 | Sil-M31001539 | Sil-M31001546 | - | - | - |
| | 250 | Sil-M31002521 | Sil-M31002530 | Sil-M31002539 | Sil-M31002546 | - | - | - |
| 5 | 50 | Sil-M51000521 | Sil-M51000530 | Sil-M51000539 | Sil-M51000546 | - | Sil-M510005100 | Sil-M510005200 |
| | 70 | Sil-M51000721 | Sil-M51000730 | Sil-M51000739 | Sil-M51000746 | - | Sil-M510007100 | Sil-M510007200 |
| | 100 | Sil-M51001021 | Sil-M51001030 | Sil-M51001039 | Sil-M51001046 | - | Sil-M510010100 | Sil-M510010200 |
| | 150 | Sil-M51001521 | Sil-M51001530 | Sil-M51001539 | Sil-M51001546 | Sil-M51001578 | Sil-M510015100 | Sil-M510015200 |
| | 250 | Sil-M51002521 | Sil-M51002530 | Sil-M51002539 | Sil-M51002546 | Sil-M51002578 | Sil-M510025100 | Sil-M510025200 |
| 10 | 100 | - | - | - | Sil-M101001046 | - | Sil-M1010010100 | Sil-M1010010200 |
| | 150 | - | - | - | Sil-M101001546 | Sil-M101001578 | Sil-M1010015100 | Sil-M1010015200 |
| | 250 | - | - | - | Sil-M101002546 | Sil-M101002578 | Sil-M1010025100 | Sil-M1010025200 |

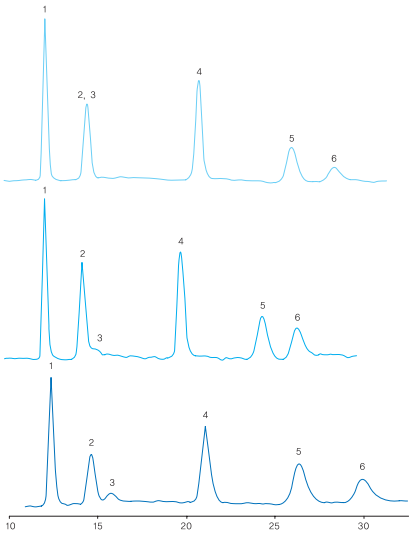
# Hector M NH2




Hector M NH2-modified stationary phase can be used in the HILIC, IEC, and NP modes. The HILIC mode is for the separation of polar compounds, such as carbohydrates. In the IEC mode, the NH2 phase works as a weak anion exchanger in aqueous buffers at a low pH. In the NP mode, it is useful for separating basic compounds because the plus charge of the surface prevents ionic interaction with basic compounds. Hector M MH2 51202546 provides good separations of a variety of carbohydrates, especially monosaccharides.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 100, 120 Å
- Bonded phase: Aminopropyl Groups
- Carbon contents: 4 %
- USP Code: L8
- Usable pH range: 2-8



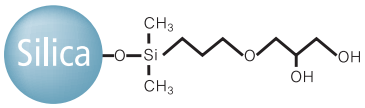

Mobile Phase: 75 % ACN
Flow rate: 0.8 mL/min
Detection: RID
Temperature: 25 °C
Injection Volume: 20µL

Sample : 1. Fructose 2. Glucose
3. Galactose 4. Sucrose
5. Maltose 6. Lactose

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | NH2-M31000521 | NH2-M31000530 | NH2-M31000539 | NH2-M31000546 | - | - | - |
| | 70 | NH2-M31000721 | NH2-M31000730 | NH2-M31000739 | NH2-M31000746 | - | - | - |
| | 100 | NH2-M31001021 | NH2-M31001030 | NH2-M31001039 | NH2-M31001046 | - | - | - |
| | 150 | NH2-M31001521 | NH2-M31001530 | NH2-M31001539 | NH2-M31001546 | - | - | - |
| | 250 | NH2-M31002521 | NH2-M31002530 | NH2-M31002539 | NH2-M31002546 | - | - | - |
| 5 | 50 | NH2-M51000521 | NH2-M51000530 | NH2-M51000539 | NH2-M51000546 | - | NH2-M510005100 | NH2-M510005200 |
| | 70 | NH2-M51000721 | NH2-M51000730 | NH2-M51000739 | NH2-M51000746 | - | NH2-M510007100 | NH2-M510007200 |
| | 100 | NH2-M51001021 | NH2-M51001030 | NH2-M51001039 | NH2-M51001046 | - | NH2-M510010100 | NH2-M510010200 |
| | 150 | NH2-M51001521 | NH2-M51001530 | NH2-M51001539 | NH2-M51001546 | NH2-M51001578 | NH2-M510015100 | NH2-M510015200 |
| | 250 | NH2-M51002521 | NH2-M51002530 | NH2-M51002539 | NH2-M51002546 | NH2-M51002578 | NH2-M510025100 | NH2-M510025200 |
| 10 | 100 | - | - | - | NH2-M101001046 | - | NH2-M1010010100 | NH2-M1010010200 |
| | 150 | - | - | - | NH2-M101001546 | NH2-M101001578 | NH2-M1010015100 | NH2-M1010015200 |
| | 250 | - | - | - | NH2-M101002546 | NH2-M101002578 | NH2-M1010025100 | NH2-M1010025200 |

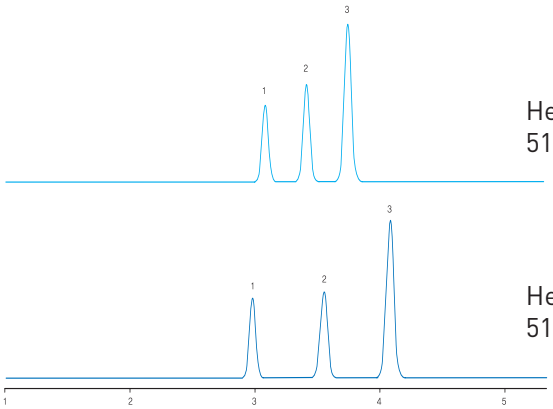
# Hector M Diol




The Diol-modified normal phase has a neutral hydroxyl group and is thus a more versatile alternative to silica. The hydrogen bonding on the diol layer is not as strong as with that on silanol on a bare silica surface, and shows improved reproducibility. The diol matrix is appropriate for the separation of neutral, acidic, and basic compounds.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Diol Groups
- Carbon contents: 4 %
- USP Code: L20
- Usable pH range: 2-8

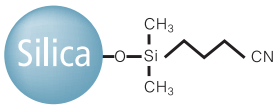



Mobile Phase: Hexane / IPA = 90 / 10
Flow rate: 1 mL/min
Detection: UV 254 nm
Temperature: 25 °C
Injection Volume: 1μL
Sample : 1. Ethylbenzene
2. 2-Chloro-6-nitrotoluene
3. Nitrobenzene

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | Diol-M31000521 | Diol-M31000530 | Diol-M31000539 | Diol-M31000546 | - | - | - |
| | 70 | Diol-M31000721 | Diol-M31000730 | Diol-M31000739 | Diol-M31000746 | - | - | - |
| | 100 | Diol-M31001021 | Diol-M31001030 | Diol-M31001039 | Diol-M31001046 | - | - | - |
| | 150 | Diol-M31001521 | Diol-M31001530 | Diol-M31001539 | Diol-M31001546 | - | - | - |
| | 250 | Diol-M31002521 | Diol-M31002530 | Diol-M31002539 | Diol-M31002546 | - | - | - |
| 5 | 50 | Diol-M51000521 | Diol-M51000530 | Diol-M51000539 | Diol-M51000546 | - | Diol-M510005100 | Diol-M510005200 |
| | 70 | Diol-M51000721 | Diol-M51000730 | Diol-M51000739 | Diol-M51000746 | - | Diol-M510007100 | Diol-M510007200 |
| | 100 | Diol-M51001021 | Diol-M51001030 | Diol-M51001039 | Diol-M51001046 | - | Diol-M510010100 | Diol-M510010200 |
| | 150 | Diol-M51001521 | Diol-M51001530 | Diol-M51001539 | Diol-M51001546 | Diol-M51001578 | Diol-M510015100 | Diol-M510015200 |
| | 250 | Diol-M51002521 | Diol-M51002530 | Diol-M51002539 | Diol-M51002546 | Diol-M51002578 | Diol-M510025100 | Diol-M510025200 |
| 10 | 100 | - | - | - | Diol-M101001046 | - | Diol-M1010010100 | Diol-M1010010200 |
| | 150 | - | - | - | Diol-M101001546 | Diol-M101001578 | Diol-M1010015100 | Diol-M1010015200 |
| | 250 | - | - | - | Diol-M101002546 | Diol-M101002578 | Diol-M1010025100 | Diol-M1010025200 |

# Hector M CN




The Nitrile-bonded phase is the most polar and the least retentive mode. In the case of the RP mode, the CN-modified phase is for the separation of extremely hydrophobic compounds. In the case of the NP mode, the CN-modified phase shows more uniform surface activity and often increased resistance to possible dissolution compared to bare silica.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 100 Å
- Bonded phase: Cyanopropryl Groups
- Carbon contents: 6-7 %
- USP Code: L10
- Usable pH range: 2-8

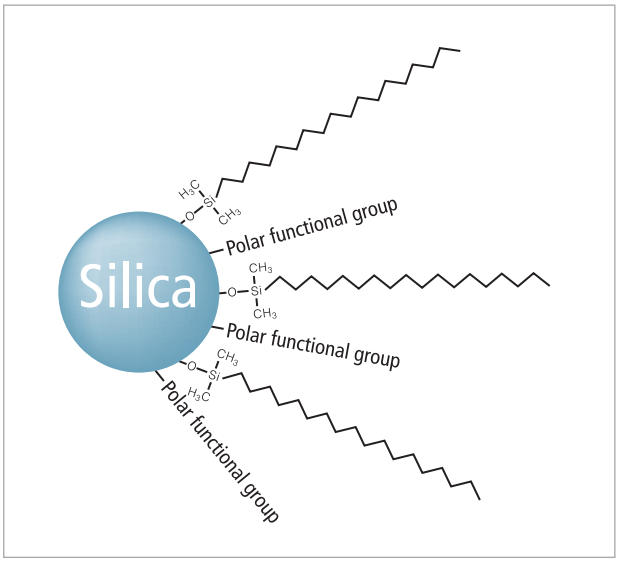
## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | CN-M31000521 | CN-M31000530 | CN-M31000539 | CN-M31000546 | - | - | - |
| | 70 | CN-M31000721 | CN-M31000730 | CN-M31000739 | CN-M31000746 | - | - | - |
| | 100 | CN-M31001021 | CN-M31001030 | CN-M31001039 | CN-M31001046 | - | - | - |
| | 150 | CN-M31001521 | CN-M31001530 | CN-M31001539 | CN-M31001546 | - | - | - |
| | 250 | CN-M31002521 | CN-M31002530 | CN-M31002539 | CN-M31002546 | - | - | - |
| 5 | 50 | CN-M51000521 | CN-M51000530 | CN-M51000539 | CN-M51000546 | - | CN-M510005100 | CN-M510005200 |
| | 70 | CN-M51000721 | CN-M51000730 | CN-M51000739 | CN-M51000746 | - | CN-M510007100 | CN-M510007200 |
| | 100 | CN-M51001021 | CN-M51001030 | CN-M51001039 | CN-M51001046 | - | CN-M510010100 | CN-M510010200 |
| | 150 | CN-M51001521 | CN-M51001530 | CN-M51001539 | CN-M51001546 | CN-M51001578 | CN-M510015100 | CN-M510015200 |
| | 250 | CN-M51002521 | CN-M51002530 | CN-M51002539 | CN-M51002546 | CN-M51002578 | CN-M510025100 | CN-M510025200 |
| 10 | 100 | - | - | - | CN-M101001046 | - | CN-M1010010100 | CN-M1010010200 |
| | 150 | - | - | - | CN-M101001546 | CN-M101001578 | CN-M1010015100 | CN-M1010015200 |
| | 250 | - | - | - | CN-M101002546 | CN-M101002578 | CN-M1010025100 | CN-M1010025200 |

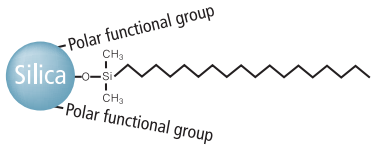
## 2-2. Hector A: Usable under 100 % aqueous condition

Hector A's packing surface allows the use of 100 % water as an eluent, enabling good solvation between the mobile and hydrophilic surfaces. The Hector A phases can be used for the separation of hydrophobic compounds without a phenomenon commonly known as "phase collapse". Hector A packing introduces high-purity $SiO_2$ 〉99.99 %, which points to a total metal content of 〈100 ppm. As such, it provides a good peak shape and reproducibility.

- Differentiated Phases: C18, C8
- Specification: Spherical silica, Monomerically bonded, End capped, 100 Å pore size
- Format: Analytical, Semi-prep



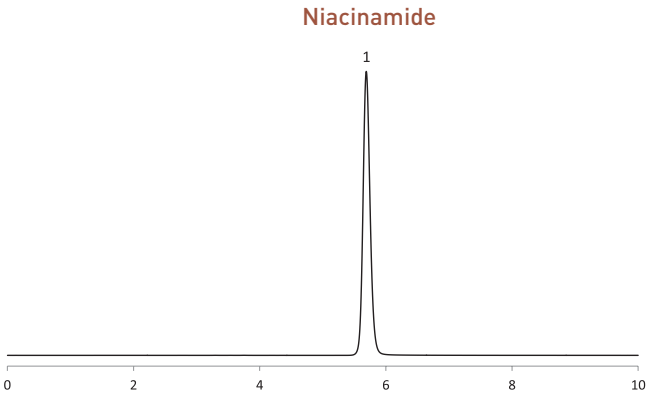
# Hector A C18




The Hector A C18 phase shows similar selectivity as the conventional C18 phases when used for the separation of hydrophobic compounds with typical reversed-phase mobile phases. It is thus suitable for use as a unique universal C18 column.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 12-13 %
- USP Code: L1
- Usable pH range: 2-8

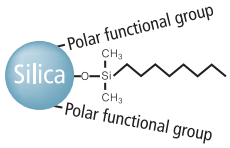



Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.05 M $KH_2PO_4$ monobasic(pH 7.0 with Sodium hydroxide) / MeOH = 75 / 25
Flow rate : 1ml/min
Detection : UV 263nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Niacinamide

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C18-A31000521 | C18-A31000530 | C18-A31000539 | C18-A31000546 | - | - | - |
| | 70 | C18-A31000721 | C18-A31000730 | C18-A31000739 | C18-A31000746 | - | - | - |
| | 100 | C18-A31001021 | C18-A31001030 | C18-A31001039 | C18-A31001046 | - | - | - |
| | 150 | C18-A31001521 | C18-A31001530 | C18-A31001539 | C18-A31001546 | - | - | - |
| | 250 | C18-A31002521 | C18-A31002530 | C18-A31002539 | C18-A31002546 | - | - | - |
| 5 | 50 | C18-A51000521 | C18-A51000530 | C18-A51000539 | C18-A51000546 | - | C18-A510005100 | C18-A510005200 |
| | 70 | C18-A51000721 | C18-A51000730 | C18-A51000739 | C18-A51000746 | - | C18-A510007100 | C18-A510007200 |
| | 100 | C18-A51001021 | C18-A51001030 | C18-A51001039 | C18-A51001046 | - | C18-A510010100 | C18-A510010200 |
| | 150 | C18-A51001521 | C18-A51001530 | C18-A51001539 | C18-A51001546 | C18-A51001578 | C18-A510015100 | C18-A510015200 |
| | 250 | C18-A51002521 | C18-A51002530 | C18-A51002539 | C18-A51002546 | C18-A51002578 | C18-A510025100 | C18-A510025200 |
| 10 | 100 | - | - | - | C18-A101001046 | - | C18-A1010010100 | C18-A1010010200 |
| | 150 | - | - | - | C18-A101001546 | C18-A101001578 | C18-A1010015100 | C18-A1010015200 |
| | 250 | - | - | - | C18-A101002546 | C18-A101002578 | C18-A1010025100 | C18-A1010025200 |

# Hector A C8




Besides C18, universal C8 is the material of choice for investigation. Hector A C8 offers a "hydrophilic" alternative for the regular C8 material.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 100 Å
- Bonded phase: Octyl Groups
- Carbon contents: 8 %
- USP Code: L7
- Usable pH range: 2-8

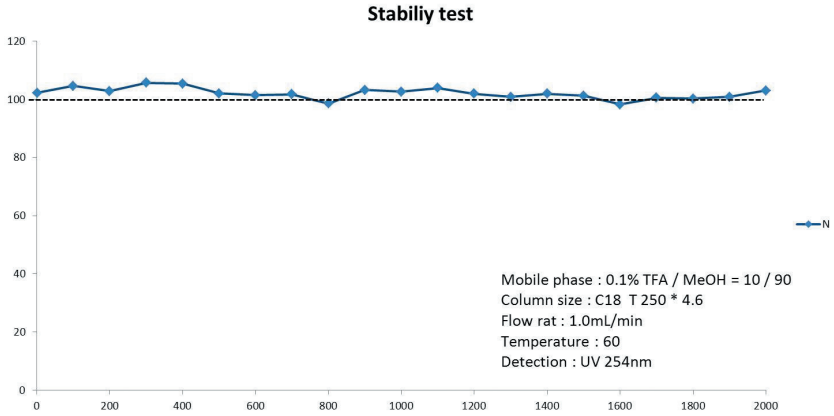
## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C8-A31000521 | C8-A31000530 | C8-A31000539 | C8-A31000546 | - | - | - |
| | 70 | C8-A31000721 | C8-A31000730 | C8-A31000739 | C8-A31000746 | - | - | - |
| | 100 | C8-A31001021 | C8-A31001030 | C8-A31001039 | C8-A31001046 | - | - | - |
| | 150 | C8-A31001521 | C8-A31001530 | C8-A31001539 | C8-A31001546 | - | - | - |
| | 250 | C8-A31002521 | C8-A31002530 | C8-A31002539 | C8-A31002546 | - | - | - |
| 5 | 50 | C8-A51000521 | C8-A51000530 | C8-A51000539 | C8-A51000546 | - | C8-A510005100 | C8-A510005200 |
| | 70 | C8-A51000721 | C8-A51000730 | C8-A51000739 | C8-A51000746 | - | C8-A510007100 | C8-A510007200 |
| | 100 | C8-A51001021 | C8-A51001030 | C8-A51001039 | C8-A51001046 | - | C8-A510010100 | C8-A510010200 |
| | 150 | C8-A51001521 | C8-A51001530 | C8-A51001539 | C8-A51001546 | C8-A51001578 | C8-A510015100 | C8-A510015200 |
| | 250 | C8-A51002521 | C8-A51002530 | C8-A51002539 | C8-A51002546 | C8-A51002578 | C8-A510025100 | C8-A510025200 |
| 10 | 100 | - | - | - | C8-A101001046 | - | C8-A1010010100 | C8-A1010010200 |
| | 150 | - | - | - | C8-A101001546 | C8-A101001578 | C8-A1010015100 | C8-A1010015200 |
| | 250 | - | - | - | C8-A101002546 | C8-A101002578 | C8-A1010025100 | C8-A1010025200 |

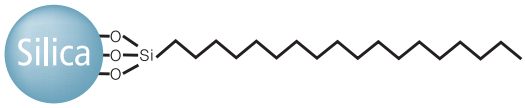
## 2-3. Hector T: Enhanced durability

Hector T has a higher acid and base durability than monofunctional C18. The wide range of pH conditions supports the easy optimization of separation conditions. In addition, the tailing factor of the basic compounds has been improved. The polymeric-bonded phase from trifunctional silane may be more stable than the monomeric phases at a low pH.

- Differentiated Phases: C18
- Specification: Spherical silica, Trifunctional bonded, End capped, 100 Å pore size
- Format: Analytical, Semi-prep



# Hector T C18

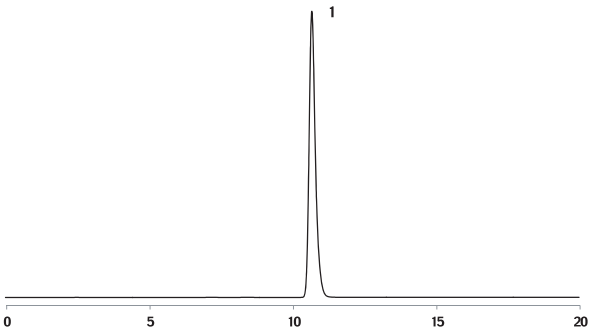



Hector T C18 phase shows similar selectivity as the conventional C18 phases when used for the separation of hydrophobic compounds with typical reversed-phase mobile phases, but it has a fast analysis time. Hector T phase is available in trifunctional silica form. If the pH will be adjusted to acid values, it will be critical to use trifunctional silica to prevent the hydrolysis of the hydrocarbon group from the surface of Hector T packings. This phase extends the stability, robustness, and reproducibility.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 19 %
- USP Code: L1
- Usable pH range: 2-8

Lometazepam(USP)




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN / Acetic aicd = 60 / 40 / 0.4
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Lometazepam

## Product List

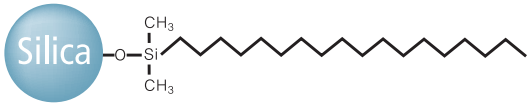
| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | Sil-M31000521 | Sil-M31000530 | Sil-M31000539 | Sil-M31000546 | - | - | - |
| | 70 | Sil-M31000721 | Sil-M31000730 | Sil-M31000739 | Sil-M31000746 | - | - | - |
| | 100 | Sil-M31001021 | Sil-M31001030 | Sil-M31001039 | Sil-M31001046 | - | - | - |
| | 150 | Sil-M31001521 | Sil-M31001530 | Sil-M31001539 | Sil-M31001546 | - | - | - |
| | 250 | Sil-M31002521 | Sil-M31002530 | Sil-M31002539 | Sil-M31002546 | - | - | - |
| 5 | 50 | Sil-M51000521 | Sil-M51000530 | Sil-M51000539 | Sil-M51000546 | - | Sil-M510005100 | Sil-M510005200 |
| | 70 | Sil-M51000721 | Sil-M51000730 | Sil-M51000739 | Sil-M51000746 | - | Sil-M510007100 | Sil-M510007200 |
| | 100 | Sil-M51001021 | Sil-M51001030 | Sil-M51001039 | Sil-M51001046 | - | Sil-M510010100 | Sil-M510010200 |
| | 150 | Sil-M51001521 | Sil-M51001530 | Sil-M51001539 | Sil-M51001546 | Sil-M51001578 | Sil-M510015100 | Sil-M510015200 |
| | 250 | Sil-M51002521 | Sil-M51002530 | Sil-M51002539 | Sil-M51002546 | Sil-M51002578 | Sil-M510025100 | Sil-M510025200 |
| 10 | 100 | - | - | - | Sil-M101001046 | - | Sil-M1010010100 | Sil-M1010010200 |
| | 150 | - | - | - | Sil-M101001546 | Sil-M101001578 | Sil-M1010015100 | Sil-M1010015200 |
| | 250 | - | - | - | Sil-M101002546 | Sil-M101002578 | Sil-M1010025100 | Sil-M1010025200 |

## 2-4. Hector W: Wide pore for compounds with large molecule

Hector W has 300 Å wide-pore silica with C18, C8, C4 and NH2 derivatizations. This wide-pore silica is for the separation of peptides, proteins, and oligonucleotides. The derivatization type is selected by target compounds property.

- Differentiated Phases: C18, C8, C4, NH2
- Specification: Spherical silica, Monomerically bonded, End capped, 300 Å pore size
- Format: Analytical, Semi-prep

# Hector W C18

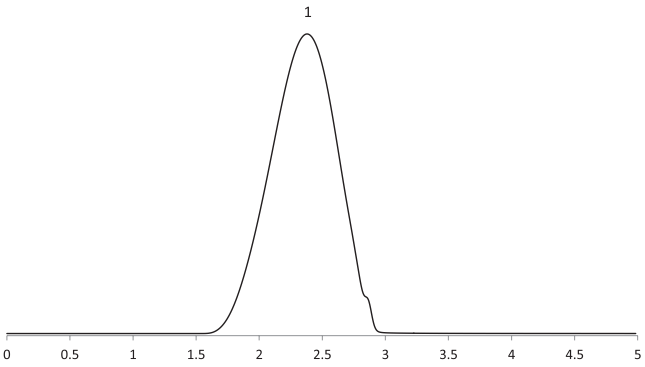



Hector W C18 is designed for the separation of biological compounds, such as proteins, peptides, nucleotides, and oligosaccharides. 300 Å pore size affects analysis and provides high efficiency and a good peak shape. It is produced with the use of high-purity silica and is fully end-capped. It is available in 3, 5, and 10 µm particle sizes and in various column sizes. The advanced total end-capping system that is used in its production makes this material excellent for analyzing basic substances and some metal complexes, where any trace of residual silanol sites will cause peak tailing.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 300 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 7 %
- USP Code: L1
- Usable pH range: 2-8

Polysilicon-15

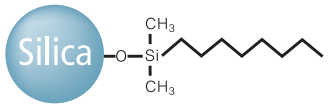



Column : Hector-W C18 5 µm
Dimension : 250 X 4.6mm
Mobile phase : THF
Flow rate : 1.0 ml/min
Detection : UV 310nm
Temperature : 40 ˚C
Injection Volume : 10µL
Sample : 1. Polysilicon-15

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C18-W33000521 | C18-W33000530 | C18-W33000539 | C18-W33000546 | - | - | - |
| | 70 | C18-W33000721 | C18-W33000730 | C18-W33000739 | C18-W33000746 | - | - | - |
| | 100 | C18-W33001021 | C18-W33001030 | C18-W33001039 | C18-W33001046 | - | - | - |
| | 150 | C18-W33001521 | C18-W33001530 | C18-W33001539 | C18-W33001546 | - | - | - |
| | 250 | C18-W33002521 | C18-W33002530 | C18-W33002539 | C18-W33002546 | - | - | - |
| 5 | 50 | C18-W53000521 | C18-W53000530 | C18-W53000539 | C18-W53000546 | - | C18-W530005100 | C18-W530005200 |
| | 70 | C18-W53000721 | C18-W53000730 | C18-W53000739 | C18-W53000746 | - | C18-W530007100 | C18-W530007200 |
| | 100 | C18-W53001021 | C18-W53001030 | C18-W53001039 | C18-W53001046 | - | C18-W530010100 | C18-W530010200 |
| | 150 | C18-W53001521 | C18-W53001530 | C18-W53001539 | C18-W53001546 | C18-W51001578 | C18-W530015100 | C18-W530015200 |
| | 250 | C18-W53002521 | C18-W53002530 | C18-W53002539 | C18-W53002546 | C18-W51002578 | C18-W530025100 | C18-W530025200 |
| 10 | 100 | - | - | - | C18-W103001046 | - | C18-W1030010100 | C18-W1030010200 |
| | 150 | - | - | - | C18-W103001546 | C18-W101001578 | C18-W1030015100 | C18-W1030015200 |
| | 250 | - | - | - | C18-W103002546 | C18-W101002578 | C18-W1030025100 | C18-W1030025200 |

# Hector W C8




As it contains highly hydrophobic compounds, Hector W C8 is a good alternative to Hector W C18 when less retention is desired.

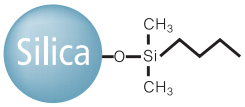
Specification

- Particle size: 3, 5, 10 µm
- Pore size: 300 Å
- Bonded phase: Octyl Groups
- Carbon contents: 4 %
- USP Code: L7
- Usable pH range: 2-8

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C8-W 33000521 | C8-W33000530 | C8-W33000539 | C8-W33000546 | - | - | - |
| | 70 | C8-W 33000721 | C8-W33000730 | C8-W33000739 | C8-W33000746 | - | - | - |
| | 100 | C8-W 33001021 | C8-W33001030 | C8-W33001039 | C8-W33001046 | - | - | - |
| | 150 | C8-W 33001521 | C8-W33001530 | C8-W33001539 | C8-W33001546 | - | - | - |
| | 250 | C8-W 33002521 | C8-W33002530 | C8-W33002539 | C8-W33002546 | - | - | - |
| 5 | 50 | C8-W53000521 | C8-W53000530 | C8-W53000539 | C8-W53000546 | - | C8-W530005100 | C8-W530005200 |
| | 70 | C8-W53000721 | C8-W53000730 | C8-W53000739 | C8-W53000746 | - | C8-W530007100 | C8-W530007200 |
| | 100 | C8-W53001021 | C8-W53001030 | C8-W53001039 | C8-W53001046 | - | C8-W530010100 | C8-W530010200 |
| | 150 | C8-W53001521 | C8-W53001530 | C8-W53001539 | C8-W53001546 | C8-W51001578 | C8-W530015100 | C8-W530015200 |
| | 250 | C8-W53002521 | C8-W53002530 | C8-W53002539 | C8-W53002546 | C8-W51002578 | C8-W530025100 | C8-W530025200 |
| 10 | 100 | - | - | - | C8-W103001046 | - | C8-W1030010100 | C8-W1030010200 |
| | 150 | - | - | - | C8-W103001546 | C8-W101001578 | C8-W1030015100 | C8-W1030015200 |
| | 250 | - | - | - | C8-W103002546 | C8-W101002578 | C8-W1030025100 | C8-W1030025200 |

# Hector W C4




As it contains highly hydrophobic compounds, Hector W C4 is a good alternative to hector W C18 or C8 when less retention is desired.

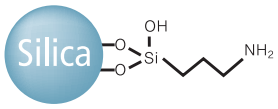
Specification

- Particle size: 3, 5, 10 μm
- Pore size: 300 Å
- Bonded phase: Butyl Groups
- Carbon contents: 3 %
- USP Code: L26
- Usable pH range: 2-8

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | C4-W33000521 | C4-W33000530 | C4-W33000539 | C4-W33000546 | - | - | - |
| | 70 | C4-W33000721 | C4-W33000730 | C4-W33000739 | C4-W33000746 | - | - | - |
| | 100 | C4-W33001021 | C4-W33001030 | C4-W33001039 | C4-W33001046 | - | - | - |
| | 150 | C4-W33001521 | C4-W33001530 | C4-W33001539 | C4-W33001546 | - | - | - |
| | 250 | C4-W33002521 | C4-W33002530 | C4-W33002539 | C4-W33002546 | - | - | - |
| 5 | 50 | C4-W53000521 | C4-W53000530 | C4-W53000539 | C4-W53000546 | - | C4-W530005100 | C4-W530005200 |
| | 70 | C4-W53000721 | C4-W53000730 | C4-W53000739 | C4-W53000746 | - | C4-W530007100 | C4-W530007200 |
| | 100 | C4-W53001021 | C4-W53001030 | C4-W53001039 | C4-W53001046 | - | C4-W530010100 | C4-W530010200 |
| | 150 | C4-W53001521 | C4-W53001530 | C4-W53001539 | C4-W53001546 | C4-W51001578 | C4-W530015100 | C4-W530015200 |
| | 250 | C4-W53002521 | C4-W53002530 | C4-W53002539 | C4-W53002546 | C4-W51002578 | C4-W530025100 | C4-W530025200 |
| 10 | 100 | - | - | - | C4-W103001046 | - | C4-W1030010100 | C4-W1030010200 |
| | 150 | - | - | - | C4-W103001546 | C4-W101001578 | C4-W1030015100 | C4-W1030015200 |
| | 250 | - | - | - | C4-W103002546 | C4-W101002578 | C4-W1030025100 | C4-W1030025200 |

# Hector W NH2




NH2 phase is for reversed- or normal-phase separation. It is excellent for the reversed-phase analysis of sugars, sugar alcohols, and anionic compounds, or for hydrogen-bonding compounds, under normal-phase conditions.

Specification

- Particle size: 3, 5, 10 µm
- Pore size: 300 Å
- Bonded phase: Aminopropyl Groups
- Carbon contents: 3 %
- USP Code: L8
- Usable pH range: 2-8

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | NH2-W33000521 | NH2-W 33000530 | NH2-W 33000539 | NH2-W 33000546 | - | - | - |
| | 70 | NH2-W33000721 | NH2-W 33000730 | NH2-W 33000739 | NH2-W 33000746 | - | - | - |
| | 100 | NH2-W33001021 | NH2-W 33001030 | NH2-W 33001039 | NH2-W 33001046 | - | - | - |
| | 150 | NH2-W33001521 | NH2-W 33001530 | NH2-W 33001539 | NH2-W 33001546 | - | - | - |
| | 250 | NH2-W33002521 | NH2-W 33002530 | NH2-W 33002539 | NH2-W 33002546 | - | - | - |
| 5 | 50 | NH2-W53000521 | NH2-W53000530 | NH2-W53000539 | NH2-W53000546 | - | NH2-W530005100 | NH2-W530005200 |
| | 70 | NH2-W53000721 | NH2-W53000730 | NH2-W53000739 | NH2-W53000746 | - | NH2-W530007100 | NH2-W530007200 |
| | 100 | NH2-W53001021 | NH2-W53001030 | NH2-W53001039 | NH2-W53001046 | - | NH2-W530010100 | NH2-W530010200 |
| | 150 | NH2-W53001521 | NH2-W53001530 | NH2-W53001539 | NH2-W53001546 | NH2-W51001578 | NH2-W530015100 | NH2-W530015200 |
| | 250 | NH2-W53002521 | NH2-W53002530 | NH2-W53002539 | NH2-W53002546 | NH2-W51002578 | NH2-W530025100 | NH2-W530025200 |
| 10 | 100 | - | - | - | NH2-W103001046 | - | NH2-W1030010100 | NH2-W1030010200 |
| | 150 | - | - | - | NH2-W103001546 | NH2-W101001578 | NH2-W1030015100 | NH2-W1030015200 |
| | 250 | - | - | - | NH2-W103002546 | NH2-W101002578 | NH2-W1030025100 | NH2-W1030025200 |

## 2-5. Hector U: Designed to be compatible with all commercially available UHPLC systems

UHPLC substantially reduces time and cost-per-sample analysis, while improving the quality of decision making results. Hector U enables chromatographers to benefit the separation efficiency improvements, thereby improving their business' productivity and profitability.

Specification

- Particle size: 1.6, 1.8, 2 μm
- Pore size: 100 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 19 %
- USP Code: L1
- Usable pH range: 2-8

### Product List

| Particle size (μm) | I.D. (mm) | 50 mm | 75 mm | 100 mm | 120 mm | 150 mm |
|---|---|---|---|---|---|---|
| 1.6<br>1.8<br>2 | 2.1 | C18-U21000521 | C18-U21000721 | C18-U21001021 | C18-U21001221 | C18-U21001521 |

## 2-6. Hector ACD: Dedicated for separation of acidic compounds

Liquid chromatography has been widely used for the purification of organic compounds. Especially, normal-phase chromatography using nonpolar solvents such as hexane and ethyl acetate has been applied due to the high solubility of its compounds and as it can be easy handled after treatment. There is separation difficulty with silica gel, however, depending on the characteristics of the compounds. Although adaptable media have been developed for compounds that have separation difficulty, there are no proper media for separating acid compounds with the carboxyl group, etc. Hector ACD supplies a superior separation method for acidic compounds by introducing COOH and $SO_3H$ bonds on the silica surface (patent applied). This acid silica has been placed on the market for the separation of problematic compounds.

Normal-phase silica grades

In the case of the normal-phase separation of organic compounds, it is necessary to select the proper media based on their characteristics. Neutral compounds are well separated by the contemporary silica gel. NH2 and Diol silica are used for the separation of basic compounds. Additionally, "ACD silica" can be applied to acid compounds.

COOH silica: For the separation of ordinary acid compounds, but cannot be used for the separation of strong acid compounds
SO3H: For the separation of strong acid compounds. Please pay attention to the decomposition of the compounds due to the strong acid characteristics.

- Differentiated Phases: WCX(Weak Cation Exchange), SCX(Strong Cation Exchange)
- Specification: Spherical silica, Monomerically bonded, End capped, 100 Å pore size
- Format: Analytical, Semi-prep

# Hector ACD WCX


To separate acidic compounds using normal-phase bare silica gel, the addition of acid to the solution is necessary. There is no problem with the use of a pH buffer as an agent in the case of analytical separation, but when performing preparative separation, the pH-buffering agent must be removed later in the process. As Hector ACD WCX with an "immobilized acid functional group" works just as well as a buffer, however, there is no need to add a TFA buffer.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Acid Functional Groups
- Carbon contents: 6-7 %
- Usable pH range: 2-8

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | WCX-31000521 | WCX-31000530 | WCX-31000539 | WCX-31000546 | - | - | - |
| | 70 | WCX-31000721 | WCX-31000730 | WCX-31000739 | WCX-31000746 | - | - | - |
| | 100 | WCX-31001021 | WCX-31001030 | WCX-31001039 | WCX-31001046 | - | - | - |
| | 150 | WCX-31001521 | WCX-31001530 | WCX-31001539 | WCX-31001546 | - | - | - |
| | 250 | WCX-31002521 | WCX-31002530 | WCX-31002539 | WCX-31002546 | - | - | - |
| 5 | 50 | WCX-51000521 | WCX-51000530 | WCX-51000539 | WCX-51000546 | - | WCX-510005100 | WCX-510005200 |
| | 70 | WCX-51000721 | WCX-51000730 | WCX-51000739 | WCX-51000746 | - | WCX-510007100 | WCX-510007200 |
| | 100 | WCX-51001021 | WCX-51001030 | WCX-51001039 | WCX-51001046 | - | WCX-510010100 | WCX-510010200 |
| | 150 | WCX-51001521 | WCX-51001530 | WCX-51001539 | WCX-51001546 | WCX-51001578 | WCX-510015100 | WCX-510015200 |
| | 250 | WCX-51002521 | WCX-51002530 | WCX-51002539 | WCX-51002546 | WCX-51002578 | WCX-510025100 | WCX-510025200 |
| 10 | 100 | - | - | - | WCX-101001046 | - | WCX-1010010100 | WCX-1010010200 |
| | 150 | - | - | - | WCX-101001546 | WCX-101001578 | WCX-1010015100 | WCX-1010015200 |
| | 250 | - | - | - | WCX-101002546 | WCX-101002578 | WCX-1010025100 | WCX-1010025200 |

# Hector ACD SCX


For the separation of strong acid compounds. Please pay attention to the decomposition of the compounds due to the strong acid characteristics.

Specification

- Particle size: 3, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Acid  Functional Groups
- Carbon contents: 5 %
- USP Code: L9
- Usable pH range: 2-8

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3 | 50 | SCX-31000521 | SCX-31000530 | SCX-31000539 | SCX-31000546 | - | - | - |
| | 70 | SCX-31000721 | SCX-31000730 | SCX-31000739 | SCX-31000746 | - | - | - |
| | 100 | SCX-31001021 | SCX-31001030 | SCX-31001039 | SCX-31001046 | - | - | - |
| | 150 | SCX-31001521 | SCX-31001530 | SCX-31001539 | SCX-31001546 | - | - | - |
| | 250 | SCX-31002521 | SCX-31002530 | SCX-31002539 | SCX-31002546 | - | - | - |
| 5 | 50 | SCX-51000521 | SCX-51000530 | SCX-51000539 | SCX-51000546 | - | SCX-510005100 | SCX-510005200 |
| | 70 | SCX-51000721 | SCX-51000730 | SCX-51000739 | SCX-51000746 | - | SCX-510007100 | SCX-510007200 |
| | 100 | SCX-51001021 | SCX-51001030 | SCX-51001039 | SCX-51001046 | - | SCX-510010100 | SCX-510010200 |
| | 150 | SCX-51001521 | SCX-51001530 | SCX-51001539 | SCX-51001546 | SCX-51001578 | SCX-510015100 | SCX-510015200 |
| | 250 | SCX-51002521 | SCX-51002530 | SCX-51002539 | SCX-51002546 | SCX-51002578 | SCX-510025100 | SCX-510025200 |
| 10 | 100 | - | - | - | SCX-101001046 | - | SCX-1010010100 | SCX-1010010200 |
| | 150 | - | - | - | SCX-101001546 | SCX-101001578 | SCX-1010015100 | SCX-1010015200 |
| | 250 | - | - | - | SCX-101002546 | SCX-101002578 | SCX-1010025100 | SCX-1010025200 |

# 3. Optimapak

Optimapak is designed to meet the highest demand in HPLC, SFC and SMB from analytical to process scale. Rigorous quality control of physical properties and strict chromatographic tests for inertness and selectivity, contribute to the production of Optimapak C18 with an outstanding reproducibility and long column lifetime.

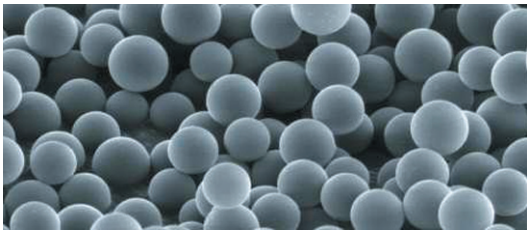
Advantages of optimapak silica
The uniqueness of optimapak high performance spherical silica is the combination of:
- high surface area
- mechanical strength

Other outstanding properties are:
- chemical purity
- chemical stability
- optimaized surface properties
- well-defined pore structure

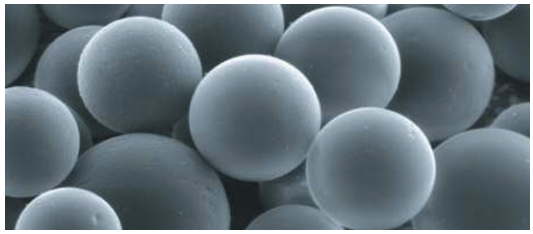
Optimapak HPLC silica consists of perfectly spherical, totally porous particles, a narrow particle size distribution for high efficiency, low pressure drop and best total economy in chromatographic purifications.

- Differentiated Phases: C18, C8, NH2, Sil
- Specification: Spherical silica, Monomerically bonded, End capped, 100 Å pore size
- Format: Analytical, Semi-prep

■ SEM photographs of optimapak 3.5 μm and 10 μm silica gels



3.5 μm Silica



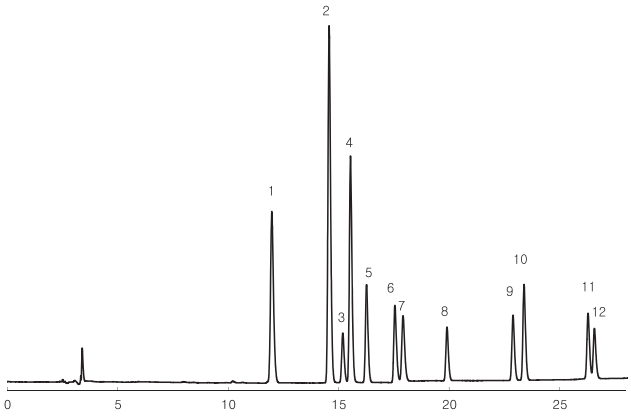
10 μm Silica

# Optimapak C18

Optimapak C18 offers all of the outstanding chromatographic benefits of Hector M C18 with the added benefit of high carbon loading. Optimapak C18 silica particles designed for high mechanical stability, they provide long column lifetime and good resolution.

Specification

- Particle size: 3.5, 5, 10 µm
- Pore size: 100 Å
- Bonded phase: Octadecyl Groups
- Carbon contents: 20 %
- USP Code: L1
- Usable pH range: 2-8




Column : Optimapak C18
Dimension : 250 X 4.6 mm
Mobile Phase : A: 0.1% Phosphoric acid
B: ACN

Gradient :

| Time | 0 | 8 | 20 | 30 | 35 |
|---|---|---|---|---|---|
| % B | 15 | 25 | 40 | 60 | 61 |

Flow rate : 1.0 mL/min
Detection : UV 220 nm
Temperature : 25 °C
Injection Volume : 5µL

Sample : 1. Benzyl alchol
2. Phenoxy ethanol
3. Sorbic acid
4. Benzoic acid
5. Methyl Paraben
6. Salicylic acid
7. Dehydroacetic acid
8. Ethyl paraben
9. iso- Propyl paravben
10. Propyl paravben
11. iso- Buthyl paravben
12. Buthyl paravben

## Product List

| Particle size (µm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3.5 | 50 | OP C18-31000521 | OP C18-31000530 | OP C18-31000539 | OP C18-31000546 | - | - | - |
| | 70 | OP C18-31000721 | OP C18-31000730 | OP C18-31000739 | OP C18-31000746 | - | - | - |
| | 100 | OP C18-31001021 | OP C18-31001030 | OP C18-31001039 | OP C18-31001046 | - | - | - |
| | 150 | OP C18-31001521 | OP C18-31001530 | OP C18-31001539 | OP C18-31001546 | - | - | - |
| | 250 | OP C18-31002521 | OP C18-31002530 | OP C18-31002539 | OP C18-31002546 | - | - | - |
| 5 | 50 | OP C18-51000521 | OP C18-51000530 | OP C18-51000539 | OP C18-51000546 | - | OP C18-510005100 | OP C18-510005200 |
| | 70 | OP C18-51000721 | OP C18-51000730 | OP C18-51000739 | OP C18-51000746 | - | OP C18-510007100 | OP C18-510007200 |
| | 100 | OP C18-51001021 | OP C18-51001030 | OP C18-51001039 | OP C18-51001046 | - | OP C18-510010100 | OP C18-510010200 |
| | 150 | OP C18-51001521 | OP C18-51001530 | OP C18-51001539 | OP C18-51001546 | OP C18-51001578 | OP C18-510015100 | OP C18-510015200 |
| | 250 | OP C18-51002521 | OP C18-51002530 | OP C18-1002539 | OP C18-51002546 | OP C18-51002578 | OP C18-510025100 | OP C18-510025200 |
| 10 | 100 | - | - | - | OP C18-101001046 | - | OP C18-1010010100 | OP C18-1010010200 |
| | 150 | - | - | - | OP C18-101001546 | OP C18-101001578 | OP C18-1010015100 | OP C18-1010015200 |
| | 250 | - | - | - | OP C18-101002546 | OP C18-101002578 | OP C18-1010025100 | OP C18-1010025200 |

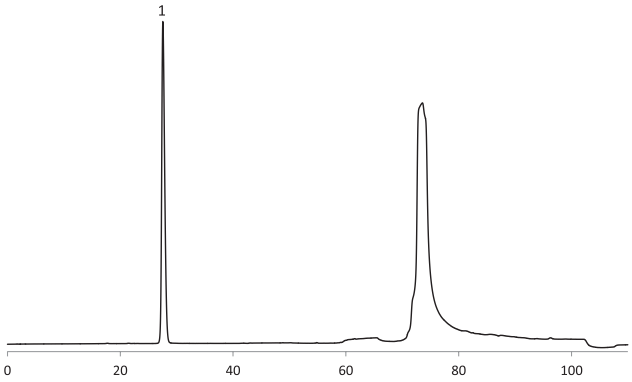
# Optimapak C8

Optimapak C8 provides rapid analysis of highly hydrophobic compounds. Optimapak C8 is a good alternative to ODS columns when less retention is desired.

Specification

- Particle size: 3.5, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Octyl Groups
- Carbon contents: 12 %
- USP Code: L1
- Usable pH range: 2-8

Atorvastatin(USP)




Column : Optimapak C8 5 μm
Dimension : 250 X 4.6 mm
Mobile Phase : Buffer: 3.9 g/L of ammonium acetate in water(pH 5.1 with acetic acid)
Solution A: ACN / THF / Buffer = 23 / 12 / 65
Solution B: ACN / THF / Buffer = 61 / 12 / 27

| Time | 0 | 40 | 70 | 85 | 100 | 105 | 115 |
|---|---|---|---|---|---|---|---|
| % B | 0 | 0 | 80 | 100 | 100 | 0 | 0 |

Flow rate : 1.5 mL/min
Detection : UV 244 nm
Temperature : 35 ˚C
Injection Volume : 20μL
Sample : 1. Atorvastatin Calcium

## Product List

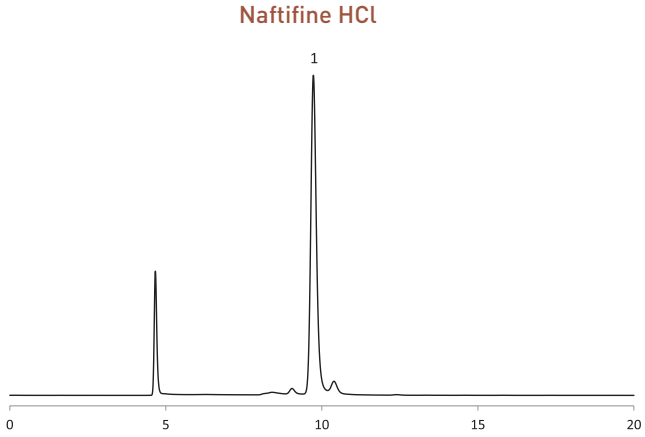
| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3.5 | 50 | OP C8-31000521 | OP C8-31000530 | OP C8-31000539 | OP C8-31000546 | - | - | - |
| | 70 | OP C8-31000721 | OP C8-31000730 | OP C8-31000739 | OP C8-31000746 | - | - | - |
| | 100 | OP C8-31001021 | OP C8-31001030 | OP C8-31001039 | OP C8-31001046 | - | - | - |
| | 150 | OP C8-31001521 | OP C8-31001530 | OP C8-31001539 | OP C8-31001546 | - | - | - |
| | 250 | OP C8-31002521 | OP C8-31002530 | OP C8-31002539 | OP C8-31002546 | - | - | - |
| 5 | 50 | OP C8-51000521 | OP C8-51000530 | OP C8-51000539 | OP C8-51000546 | - | OP C8-510005100 | OP C8-510005200 |
| | 70 | OP C8-51000721 | OP C8-51000730 | OP C8-51000739 | OP C8-51000746 | - | OP C8-510007100 | OP C8-510007200 |
| | 100 | OP C8-51001021 | OP C8-51001030 | OP C8-51001039 | OP C8-51001046 | - | OP C8-510010100 | OP C8-510010200 |
| | 150 | OP C8-51001521 | OP C8-51001530 | OP C8-51001539 | OP C8-51001546 | OP C8-51001578 | OP C8-510015100 | OP C8-510015200 |
| | 250 | OP C8-51002521 | OP C8-51002530 | OP C8-1002539 | OP C8-51002546 | OP C8-51002578 | OP C8-510025100 | OP C8-510025200 |
| 10 | 100 | - | - | - | OP C8-101001046 | - | OP C8-1010010100 | OP C8-1010010200 |
| | 150 | - | - | - | OP C8-101001546 | OP C8-101001578 | OP C8-1010015100 | OP C8-1010015200 |
| | 250 | - | - | - | OP C8-101002546 | OP C8-101002578 | OP C8-1010025100 | OP C8-1010025200 |

# Optimapak Sil

Optimapak Sil is a pure silica gel column available in normal phase mode. High performance spherical silica for analytical to process scale liquid chromatography. Optimapak Sil is manufactured using monofunctional silanes, and is fully end-capped. This gives high reproducibility and chemical stability.

Specification

- Particle size: 3.5, 5, 10 μm
- Pore size: 100 Å
- USP Code: L3
- Usable pH range: 2-8




Column : Optimapak Sil 5 μm
Dimension : 250 X 4.6mm
Mobile phase : Hexane / Ethanol = 2 / 1 ( 0.5 % perchloric acid)
Flow rate : 0.8 ml/min
Detection : UV 282nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Naftifine HCl

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3.5 | 50 | OPSil-M31000521 | OPSil-M31000530 | OPSil-M31000539 | OPSil-M31000546 | - | - | - |
| | 70 | OPSil-M31000721 | OPSil-M31000730 | OPSil-M31000739 | OPSil-M31000746 | - | - | - |
| | 100 | OPSil-M31001021 | OPSil-M31001030 | OPSil-M31001039 | OPSil-M31001046 | - | - | - |
| | 150 | OPSil-M31001521 | OPSil-M31001530 | OPSil-M31001539 | OPSil-M31001546 | - | - | - |
| | 250 | OPSil-M31002521 | OPSil-M31002530 | OPSil-M31002539 | OPSil-M31002546 | - | - | - |
| 5 | 50 | OPSil-M51000521 | OPSil-M51000530 | OPSil-M51000539 | OPSil-M51000546 | - | OPSil-M510005100 | OPSil-M510005200 |
| | 70 | OPSil-M51000721 | OPSil-M51000730 | OPSil-M51000739 | OPSil-M51000746 | - | OPSil-M510007100 | OPSil-M510007200 |
| | 100 | OPSil-M51001021 | OPSil-M51001030 | OPSil-M51001039 | OPSil-M51001046 | - | OPSil-M510010100 | OPSil-M510010200 |
| | 150 | OPSil-M51001521 | OPSil-M51001530 | OPSil-M51001539 | OPSil-M51001546 | OPSil-M51001578 | OPSil-M510015100 | OPSil-M510015200 |
| | 250 | OPSil-M51002521 | OPSil-M51002530 | OPSil-M1002539 | OPSil-M51002546 | OPSil-M51002578 | OPSil-M510025100 | OPSil-M510025200 |
| 10 | 100 | - | - | - | OPSil-M101001046 | - | OPSil-M1010010100 | OPSil-M1010010200 |
| | 150 | - | - | - | OPSil-M101001546 | OPSil-M101001578 | OPSil-M1010015100 | OPSil-M1010015200 |
| | 250 | - | - | - | OPSil-M101002546 | OPSil-M101002578 | OPSil-M1010025100 | OPSil-M1010025200 |

# Optimapak NH2

Optimapak NH2 performs a sharp peaks, and high reproducible results with exceptional stability and durability that will maintain performance over the lifetime of the method.

Specification

- Particle size: 3.5, 5, 10 μm
- Pore size: 100 Å
- Bonded phase: Aminopropyl Groups
- Carbon contents: 1.7 %
- USP Code: L8
- Usable pH range: 2-8

## Product List

| Particle size (μm) | Length (mm) | 2.1 mm ID | 3.0 mm ID | 3.9 mm ID | 4.6 mm ID | 7.8 mm ID | 10.0 mm ID | 21.2 mm ID |
|---|---|---|---|---|---|---|---|---|
| 3.5 | 50 | OP NH2-M31000521 | OP NH2-M31000530 | OP NH2-M31000539 | OP NH2-M31000546 | - | - | - |
| | 70 | OP NH2-M31000721 | OP NH2-M31000730 | OP NH2-M31000739 | OP NH2-M31000746 | - | - | - |
| | 100 | OP NH2-M31001021 | OP NH2-M31001030 | OP NH2-M31001039 | OP NH2-M31001046 | - | - | - |
| | 150 | OP NH2-M31001521 | OP NH2-M31001530 | OP NH2-M31001539 | OP NH2-M31001546 | - | - | - |
| | 250 | OP NH2-M31002521 | OP NH2-M31002530 | OP NH2-M31002539 | OP NH2-M31002546 | - | - | - |
| 5 | 50 | OP NH2-M51000521 | OP NH2-M51000530 | OP NH2-M51000539 | OP NH2-M51000546 | - | OP NH2-M510005100 | OP NH2-M510005200 |
| | 70 | OP NH2-M51000721 | OP NH2-M51000730 | OP NH2-M51000739 | OP NH2-M51000746 | - | OP NH2-M510007100 | OP NH2-M510007200 |
| | 100 | OP NH2-M51001021 | OP NH2-M51001030 | OP NH2-M51001039 | OP NH2-M51001046 | - | OP NH2-M510010100 | OP NH2-M510010200 |
| | 150 | OP NH2-M51001521 | OP NH2-M51001530 | OP NH2-M51001539 | OP NH2-M51001546 | OP NH2-M51001578 | OP NH2-M510015100 | OP NH2-M510015200 |
| | 250 | OP NH2-M51002521 | OP NH2-M51002530 | OP NH2-M1002539 | OP NH2-M51002546 | OP NH2-M51002578 | OP NH2-M510025100 | OP NH2-M510025200 |
| 10 | 100 | - | - | - | OP NH2-M101001046 | - | OP NH2-M1010010100 | OP NH2-M1010010200 |
| | 150 | - | - | - | OP NH2-M101001546 | OP NH2-M101001578 | OP NH2-M1010015100 | OP NH2-M1010015200 |
| | 250 | - | - | - | OP NH2-M101002546 | OP NH2-M101002578 | OP NH2-M1010025100 | OP NH2-M1010025200 |

# 4. ChiroSil

## 4-1. Introduction

### Application Range

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

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

### The structure of ChiroSil Stationary phase

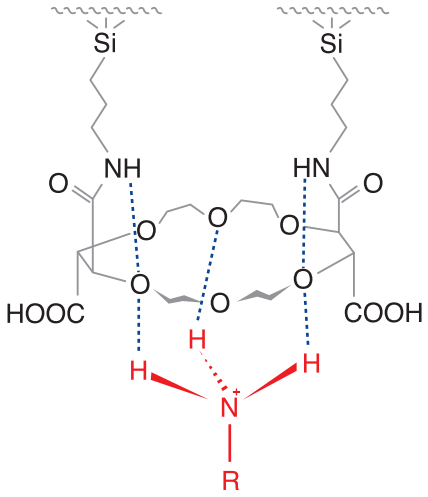
The chiral stationary phase for ChiroSil RCA(+) and SCA(-) is prepared by a covalent trifunctional bonding of (+) or (-)-(18-Crown-6)-tetracarboxylic acid as the chiral selector to aminopropyl silica gel.

### Separation Mechanism

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

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

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




### Product List

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

# 4-2. Advantages of ChiroSil

## Universal Solvent Capability

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

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

## Ability to Invert Elution Order

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

## Excellent Column Durabiltiy

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

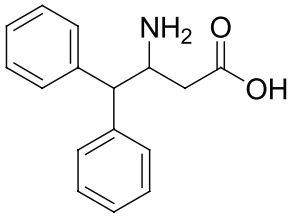
## 4-3. Method Development

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

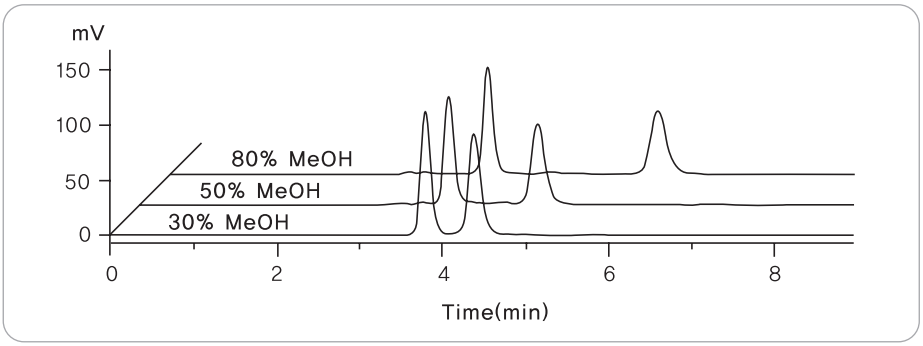
### Effect of organic modifier

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

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



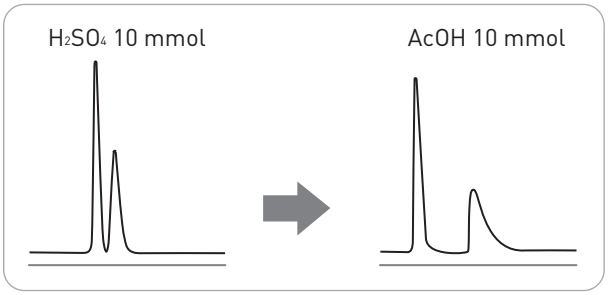

Mobile phase: Methanol in $H_2O$+ sulfuric acid (10mM)
Column: ChiroSil RCA type
Flow rate: 0.5ml/min
Detector: UV 210nm
Sample: 3-amino-4, 4-diphenylbutyric acid

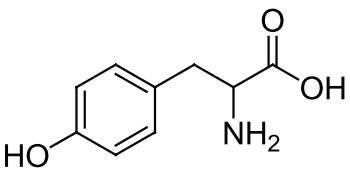



### Effect of acidic modifier and acid concentration

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

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

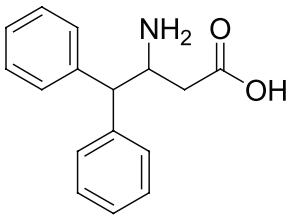


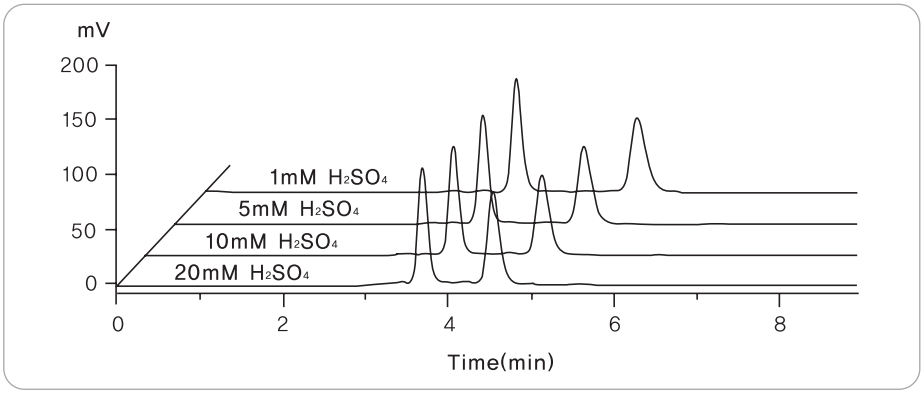

Column : ChiroSil SCA(-) 150x4.6mm
Flow rate: 1.0ml/min
Detector : UV 210nm
Sample: Tyrosine

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

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

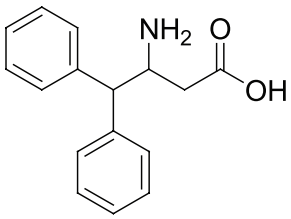



Mobile phase: 50% Methanol in $H_2O$+ sulfuric acid (10mM)
Column: ChiroSil RCA type
Flow rate: 0.5ml/min
Detector: UV 210nm
Sample: 3-amino-4, 4-diphenylbutyric acid

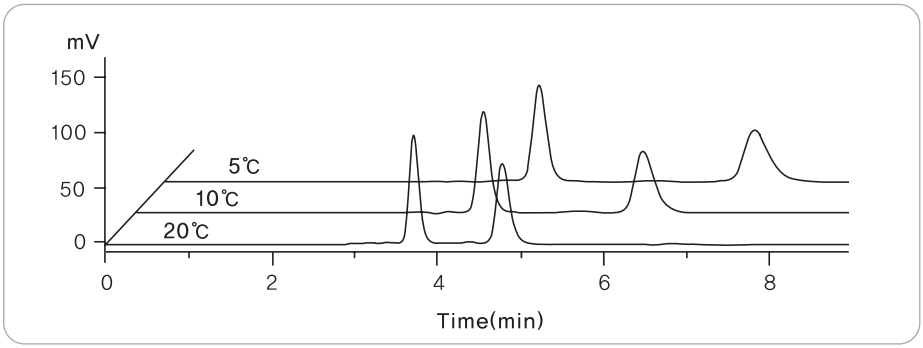



## Effect of temperature

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




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



# 4-4. General Operation Conditions

## Storage

ChiroSil columns are shipped in methanol only.

## Temperature

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

## pH rage

ChiroSil can used in the pH range 1.5 ~ 7.5.

## Pressure

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

## Cleaning of the Column

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

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

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

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

## Equilibration Time

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

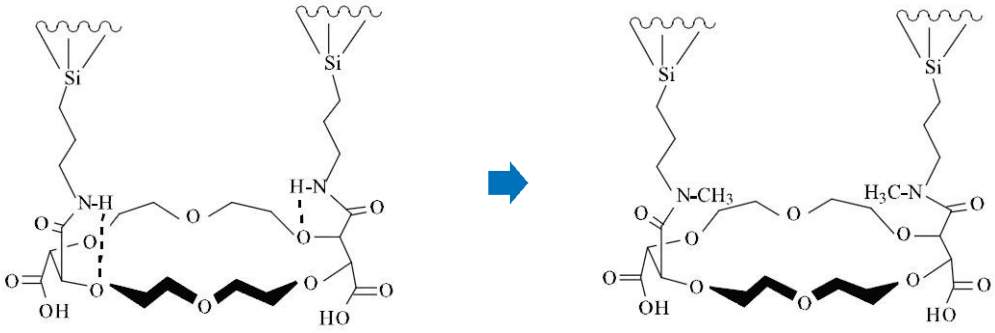
During mobile phase equilibration, enantioselective separations are obtained for all analytes, but retention factors are slowly decreased until stable retention factors are obtained

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

# 5. ChiroSil ME

## 5-1. Introduction

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




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

### Product List

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

# 5-2. General Operation Conditions

## Storage

ChiroSil ME columns are shipped in methanol only.

## Temperature

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

## pH rage

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

## Pressure

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

## Cleaning of the Column

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

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

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

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

## Equilibration Time

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

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

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

# 6. INOPAK

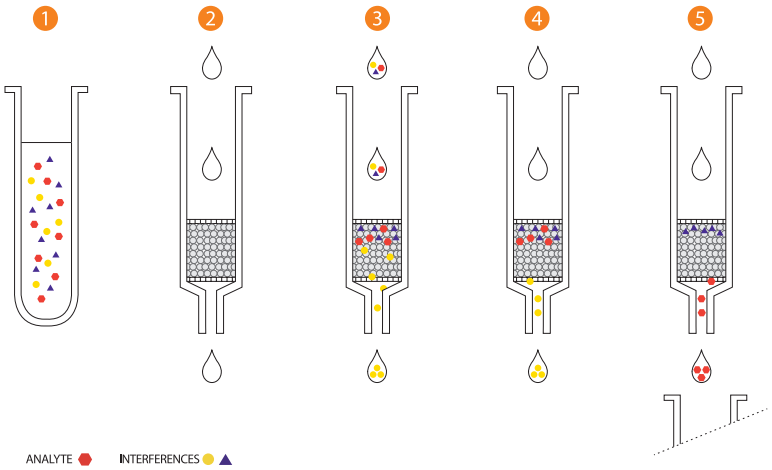
## 6-1. Introduction

Solid phase extraction is the most powerful sample preparation technique and a separation process that is used to extract compounds (called analytes) from a mixture of impurities. Initially introduced as an alternative to liquid-liquid extraction, SPE employs a solid phase and a mobile phase to separate a sample component for cleanup, concentration, medium exchange or sample preservation.

INOPAK SPE Column is widely used for the purication of biologically useful materials, catalysis, toxic substance monitors organic synthesis, biopolymer blotting, ionic exchange and wastewater cleanup.

INOPAK has wide range of applications with high selectivity and enhanced recovery and offers reproducible result through automated potential. INOPAK sorbent includes C18, C8, NH2, Silica and Florisil packed in 1, 3, 6 ml syringes.

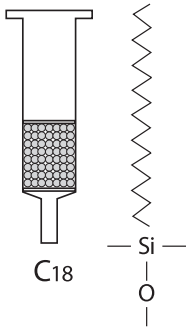

### Mechanisms of Retention in SPE




1 Sample conditioning & Selection of SPE Column
2 SPE Column precondition
3 Sample Loading
4 SPE Column Washing
5 Analyte Elution

# 6-2. Non-polar sorbent for Reversed Phase

## INOPAK C18

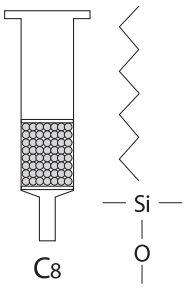



INOPAK C18 is packed with octadecyl bonded silica particles.
For nonpolar to moderately polar compounds

- Sorbent: Octadecyl bonded
- Typical Loading (% C) : 18
- End-capping : Yes
- Average Particle Size (μm) : 60
- Pore Diameter (Å) : 100
- Sample Composition: water, water/polar organic mixtures
- Application : neutral, weakly acidic, and basic compounds, antibiotics, barbiturates, benzodiazepines, bases, hydrocarbons, parabens, phenols, phthalate esters, steroids, surfactants, theophylline, water soluble vitamins, organic acids

| Bed Weight | Column Volume | Part No. | Quantity |
|---|---|---|---|
| 50 mg | 1 mL | 100-005-A | 100 ea |
| 100 mg | 1 mL | 100-010-A | 100 ea |
| 500 mg | 3 mL | 100-050-B | 50 ea |
| 500 mg | 6 mL | 100-050-C | 30 ea |
| 1g | 6 mL | 100-100-C | 30 ea |

## INOPAK C8



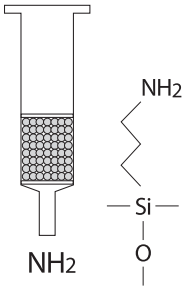

INOPAK C8 is packed with octyl bonded silica particles.
Lower carbone content than INOPAK C18.
We recommend INOPAK C8 when use less retentive phase for the rapid release of hydrophobic molecules.

- Sorbent: octyl bonded, end-capped silica, regular silica
- Typical Loading (% C) : 10
- End-capping: Yes
- Average Particle Size (μm) : 60
- Pore Diameter (Å) : 100
- Sample composition : water, water/polar organic mixtures
- Application : Less retentive alternative to C18 for polar and non-polar compounds, antibiotics, barbiturates, benzodiazepines, caeine, drugs, dyes, essential oils, fat soluble vitamins, fungicides, herbicides, pesticides, hydrocarbons, parabens, phenols, phthalate esters, steroids, surfactants, theophylline, water soluble vitamins

| Bed Weight | Column Volume | Part No. | Quantity |
|---|---|---|---|
| 50 mg | 1 mL | 110-005-A | 100 ea |
| 100 mg | 1 mL | 110-010-A | 100 ea |
| 500 mg | 3 mL | 110-050-B | 50 ea |
| 500 mg | 6 mL | 110-050-C | 30 ea |
| 1g | 6 mL | 110-100-C | 30 ea |

# 6-3. Polar Sorbent for Normal Phase/Ion Exchanger

## INOPAK NH2

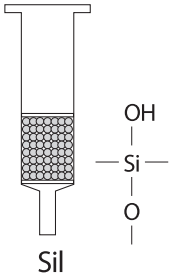



INOPAK NH2 is used normal phase. INOPAK NH2 is weak anion exchanger for anionic analytes from aqueous samples for extraction of anion analyte from non-aqueous matrixs. It is used for the extraction of anions that exhibit a negative charge at pH 8 or lower.

- Sorbent : Aminopropyl boned silica
- Typical Loading (%C) : 4
- End-capping : No
- Average Particle Size(μm) : 60
- Pore Diameter (Å) : 100
- Sample composition : organic or aqueous solutions
- Application : Peptide, drugs and metabolites form physiological fluids, Carbohydrates, Dyes, Strong acids

| Bed Weight | Column Volume | Part No. | Quantity |
|---|---|---|---|
| 50 mg | 1 mL | 120-005-A | 100 ea |
| 100 mg | 1 mL | 120-010-A | 100 ea |
| 500 mg | 3 mL | 120-050-B | 50 ea |
| 500 mg | 6 mL | 120-050-C | 30 ea |
| 1 g | 6 mL | 120-100-C | 30 ea |

## INOPAK Sil

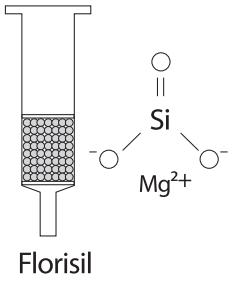



INOPAK Sil is packed with unbonded silica particles, regular type as the sorbent. The sorbent shows high polar interaction and is used for the extraction weak polar or non-polar compounds.

- Sorbent : Silica, -SiOH
- Typical Loading (%C) : -
- Average Particle Size (μm) : 60
- Pore Diameter (Å) : 100
- Sample composition : Hydrocarbons, chlorinated solvents, non-polar/polar organic mixtures
- Application : polar compounds, such as alcohols, aldehydes, amines, drugs, dyes, herbicides, pesticides, ketones, nitro compounds, organic acids, phenols, steroids

| Bed Weight | Column Volume | Part No. | Quantity |
|---|---|---|---|
| 50 mg | 1 mL | 130-005-A | 100 ea |
| 100 mg | 1 mL | 130-010-A | 100 ea |
| 500 mg | 3 mL | 130-050-B | 50 ea |
| 500 mg | 6 mL | 130-050-C | 30 ea |
| 1 g | 6 mL | 130-100-C | 30 ea |

## INOPAK Florisil




- Sorbent : Magnesium silicate
- Average Particle Size : mesh 60 / 100
- Pore Diameter (Å) : 80
- Sample composition
  : Hydrocarbons, chlorinated solvents, non-polar/polar organic mixtures
- Application : Cleanup of pesticide residues and other chlorinated hydrocarbons ; the separation of nitrogen compounds from hydrocarbons ; the separation of aromatic compounds from aliphatic-aromatic mixtures; and similar applications for use with fats, oils, and waxes. Additionally, Florisil is considered good for separations with steroids, esters, ketones, glycerides, alkaloids, and some carbohydrates.

| Bed Weight | Column Volume | Part No. | Quantity |
|---|---|---|---|
| 50 mg | 1 mL | 200-005-A | 100 ea |
| 100 mg | 1 mL | 200-010-A | 100 ea |
| 500 mg | 3 mL | 200-050-B | 50 ea |
| 500 mg | 6 mL | 200-050-C | 30 ea |
| 1 g | 6 mL | 200-100-C | 30 ea |

## 6-4. SPE Phase Selection by Manufacturer

**INOPAK C18**

- HyperSep $C_{18}$
- CLEAN-UP $C_{18}$-U
- Supelclean™ ENVI-18 /LC-18
- SampliQ C18
- BAKERBOND spe™ Polar Plus
- Isolute™$C_{18}$
- CHROMABOND™$C_{18}$
- Bond Elut™$C_{18}$
- strata™$C_{18}$-U
- SepPak™$C_{18}$

**INOPAK C8**

- HyperSep $C_8$
- CLEAN-UP $C_8$-U
- Supelclean™ ENVI-18 /LC-8
- SampliQ $C_8$
- BAKERBOND spe Octyl $C_8$
- Isolute™ $C_8$
- CHROMABOND™ $C_8$
- Bond Elut™ $C_8$
- strata™ $C_8$
- SepPak™ $C_8$

**INOPAK $NH_2$**

- HyperSepc Aminopropyl
- CLEAN-UP Aminopropyl
- Supelclean™ ENVI-18 /LC-$NH_2$
- SampliQ Amino
- BAKERBOND spe Amino
- Isolute $NH_2$
- CHROMABOND $NH_2$
- Bond Elut $NH_2$
- strata $NH_2$
- SepPak $NH_2$

**INOPAK Sil**

- HyperSep Silica
- CLEAN-UP Silica
- Supelclean SilicaZ
- SampliQ Silica
- BAKERBOND spe Silica Gel
- Isolute Silica
- CHROMABOND SiOH
- Bond Elut™ Si
- strata Si-1
- SepPak™ Si

**INOPAK Florisil**

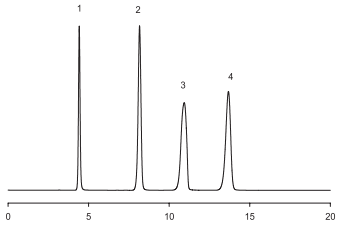
- HyperSep Florisil
- CLEAN-UP Florisil
- Supelclean™ ENVI-18 /LC- Florisil
- SampliQ Florisil
- BAKERBOND spe Florisil
- Isolute Florisil
- CHROMABONDc
- Bond Elut Florisil
- strata™ FL-PR
- SepPak™ Florisil

# APPLICATIONS

# 7. Applications

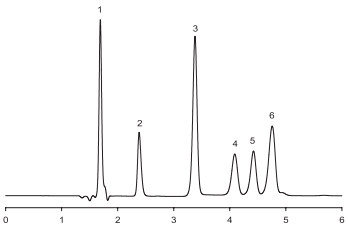
## 7-1. Biochemicals

### Amino acids-Underivatized



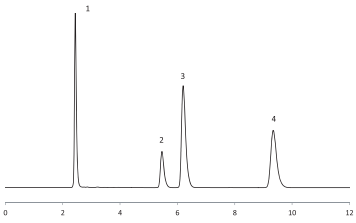
Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 20 mM $KH_2PO_4$ aq.
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Phenylalanine 2. Phenylglycine
3. 4-Fluorophenylalaine 4. Tryptophan

### Amino acids-Underivatized



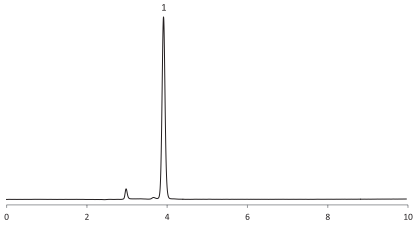
Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 20 mM $KH_2PO_4$ aq.
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Alanine 2. Valine 3. Methionine
4. Iso-leucine 5. Leucine 6. Nor-leucine

### Amino acids



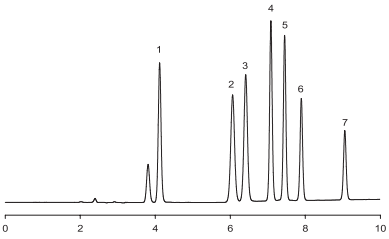
Column : Hector-M C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : 10mM $HClO_4$ aq. / MeOH = 60 / 40
Flow rate : 1.0mL/min Detection : UV 210nm
Temperature : 35 °C Injection Volume : 10μL
Sample : 1. Pyridin-Phenylalanine
2. Homo-Phenylalanine
3. 4-Chloro-DL-Phenylalanine
4. 4-Phenyl-DL-Phenylalanine

### DL-Norvaline



Column : Hector-A C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : 20 mM $NaH_2PO_4$ aq.
Flow rate : 1.0 mL/min
Detection : UV 210 nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. DL-Norvaline

### Amino acids, Fmoc-derivatives



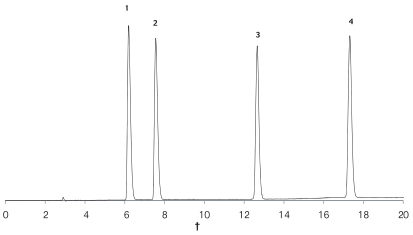
Column : Hector-T C18 5μm Dimension : 250 X 4.6mm
Mobile phase : A: 0.1 M Sodium acetate aq. (pH 4.4) / THF /
ACN =75 / 15 / 10 B: ACN / THF = 85 / 15

Gradient :

| Time | 0 | 3 | 4 | 10 |
|---|---|---|---|---|
| % B | 30 | 30 | 40 | 70 |

Flow rate : 1.0 ml/min Detection : UV 254nm
Temperature : 25 °C Injection Volume : 10μL
Sample : 1. Fmoc-proline 2. Fmoc-serine 3. Fmoc-tryptophane
4. Fmoc-leucine 5. Fmoc-arginine 6. Fmoc-tyrosine
7. Fmoc-histdine

### β-blockers



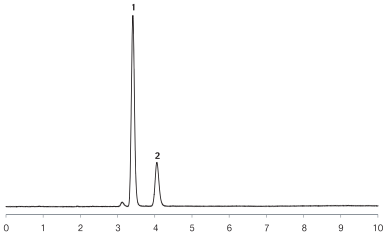
Column : Hector-M C18 5μm Dimension : 250 X 4.6mm
Mobile phase : A: 0.03% TFA aq. B: 0.03% TFA in ACN

| Time | 0 | 20 |
|---|---|---|
| % B | 30 | 50 |

Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. Pindolol 2. Metoprolol 3. Propranolol 4. Carvedilol

# 7-1. Biochemical

## Cystein & D,L-ATC

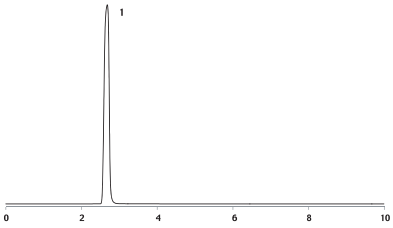



Column : Hector-M C18 5μm  Dimension : 250 X 4.6mm
Mobile phase : A: 10 mM $KH_2PO_4$, $K_2HPO_4$ (pH7.1)  B: ACN
Gradient :

| Time | 0 | 10 | 20 |
|---|---|---|---|
| % B | 0 | 3 | 60 |

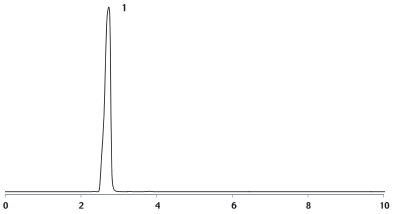
Flow rate : 1.0 ml/min  Detection : UV 210nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Cystein  2. D,L-ATC

## L-Histidin



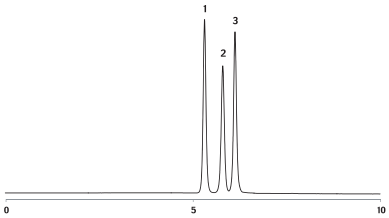

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % $H_3PO_4$ aq.
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. L-Histidin

## L-Pyroglutamic acid



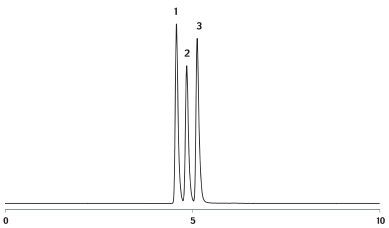

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / MeOH = 90 / 10
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. L-Pyroglutamic acid

## Nucleic acid & base



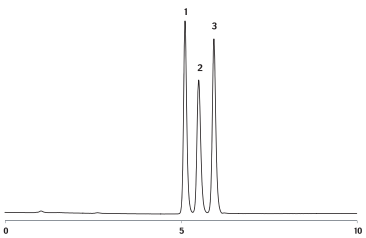

Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / MeOH = 85 / 15
Flow rate : 0.5ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Cytidin  2. Cytosine  3. Adenonin

## Nucleic acid & base




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $H_3PO_4$ aq. / MeOH = 85 / 15
Flow rate : 0.5ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Cytidin  2. Cytosine  3. Adenonin

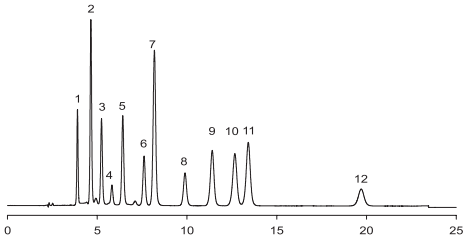
## Nucleic acid & base




Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $H_3PO_4$ aq. / MeOH = 85 / 15
Flow rate : 0.5ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Cytidin  2. Cytosine  3. Adenonin

# 7-1. Biochemical

## Nucleosides

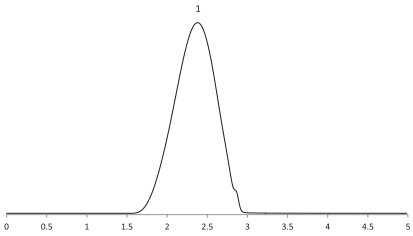



Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 30 mM $NH_4H_2PO_4$ aq.(pH5.3) / ACN = 98 / 2
Flow rate : 1.0ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 10μL

Sample : 1. β-Pseudouridine 25μg/ml
2. Cytidine 50μg/ml
3. 3-Methylcytidine methosulfate 100μg/ml
4. Uridine 25μg/ml
5. 1-Methyladenosine 25μg/ml
6. 2-Thiocytidine dihydrate 10μg/ml
7. 5-Methylcytidine 100μg/ml
8. 7-Methylguanosine 25μg/ml
9. 2'-O-Methylcytidine 20μg/ml
10. Inosine 25μg/ml
11. Guanosine 25μg/ml
12. 5-Methyluridine 100μg/ml

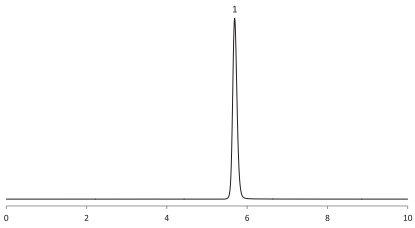
# 7-2. Cosmetics

## Polysilicon-15



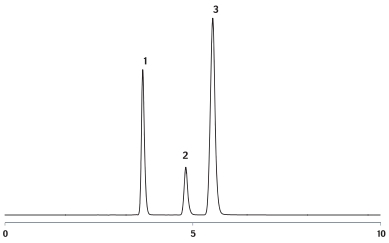

Column : Hector-W C18 5 μm
Dimension : 250 X 4.6mm
Mobile phase : THF
Flow rate : 1.0 ml/min
Detection : UV 310nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Polysilicon-15

## Niacinamide



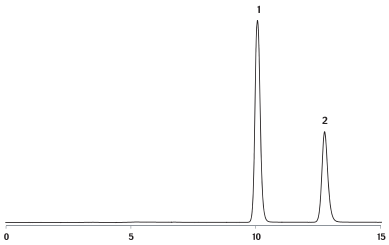

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.05 M $KH_2PO_4$ (pH 7.0 with Sodium hydroxide) / MeOH = 75 / 25
Flow rate : 1ml/min
Detection : UV 263nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Niacinamide

## Arbutin & Adenosine & Niacinamide



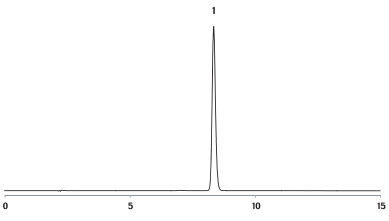

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / ACN = 92 / 8
Flow rate : 1.0ml/min
Detection : UV 280nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Arbutin 2. Niacinamide 3. Adenosine

## Benzoic acid & Salicylic acid



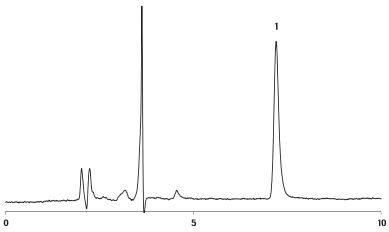

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % $H_3PO_4$ aq. / ACN = 60 / 40
Flow rate : 0.7 ml/min
Detection : UV 225nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Salicylic acid 2. Benzoic acid

## Dipotassium glycyrrhizate(DPG-K2)




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. DPG-K2

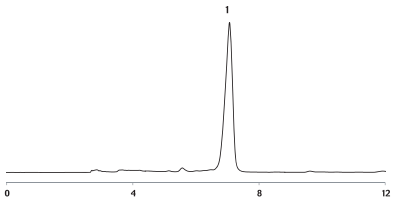
## Hydroquinone




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / ACN = 98 / 2
Flow rate : 1.0 ml/min
Detection : UV 280nm
Temperature : 25 °C
Injection Volume : 20μL
Sample : 1. Hydroquinone

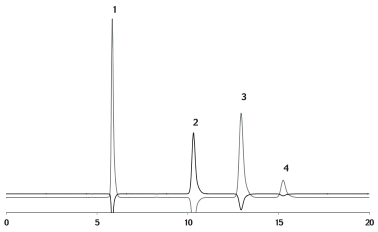
# 7-2. Cosmetics

## Madecassic acid



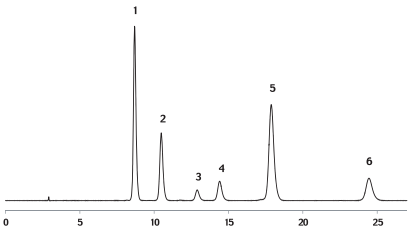

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 40 / 60
Flow rate : 0.7 ml/min
Detection : UV 220nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Madecassic acid

## Sun screen




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : ACN / Water = 85 / 15
Flow rate : 1.5 ml/min
Detection : UV 305, 360nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. IMC 2. DHHB (360 nm) 3. OMC 4. OS

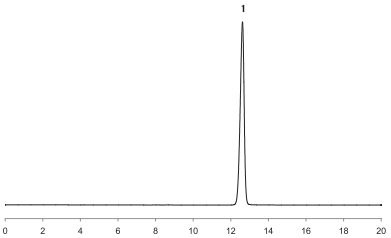
## Sun screen & S1




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : ACN / MeOH / Water = 60 / 20 / 20
Flow rate : 1.0 ml/min
Detection : UV 325nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. IMC 2. DHHB 3. $S_1$ 4. $S_1$ 5. OMC 6. OS

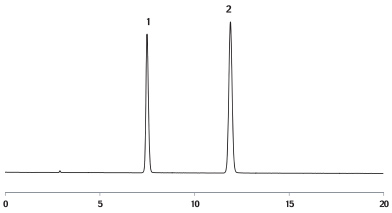
# 7-3. Pharmaceuticals

## Aciclovir(Acyclovir)



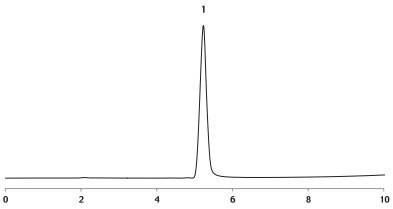

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.01M $KH_2PO_4$ aq. (0.1 % 1-Decansulfonic acid, pH 3.0) / ACN = 96 / 4
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 20 °C
Injection Volume : 10μL
Sample : 1. Aciclovir(Acyclovir)

## Aripiprazole



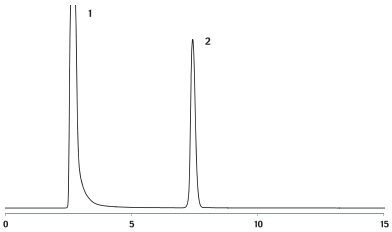

Column : Hector-M C8 5μm
Dimension : 250 X 4.6mm
Mobile phase : 20 mM $Na_2SO_4$ / ACN / MeOH / Acetic aicd = 560 / 330 / 110 / 1
Flow rate : 1.2 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Aripiprazole 2. Propyl Paraben

## Allantoin



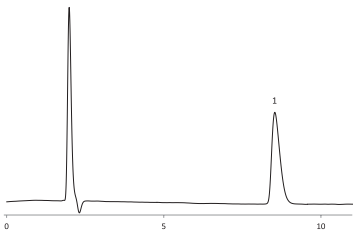

Column : Hector-M NH2 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 30 / 70
Flow rate : 1.2 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Allantoin

## Allylisopropylacetylurea



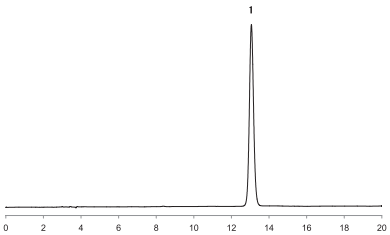

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : MeOH / Water / Acetic acid / Triethylamine = 600 / 400 / 1 / 1
Flow rate : 1.0 ml/min Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample solvent : DMSO / Mobile phase = 1 / 2
Sample : 1. DMSO 2. Allylisopropylacetylurea

## Topiramate




Column : Optimapak C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : 0.02 M Ammonium acetate aq. (pH 4.0) / Methanol = 60 / 40
Flow rate : 1.5 mL/min
Detection : RID
Temperature : 40 °C
Injection Volume : 20μL
Sample : 1. Topiramate

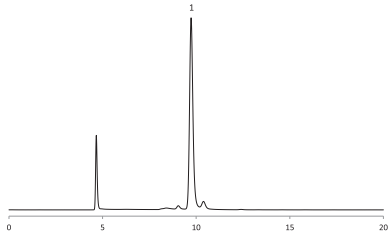
## Fluconazole




Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.01 M $KH_2PO_4$ aq. (0.1 % 1-Decansulfonic acid, pH 3.0) / MeOH = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Fluconazole

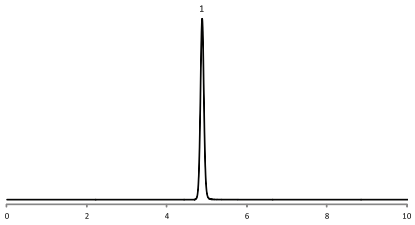
# 7-3. Pharmaceuticals

## Naftifine HCl



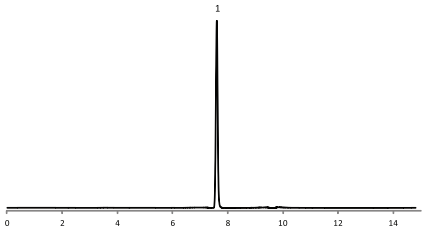
Column : Optimapak Sil 5 μm
Dimension : 250 X 4.6mm
Mobile phase : Hexane / Ethanol = 2 / 1 ( 0.5 % $HClO_4$)
Flow rate : 0.8 ml/min
Detection : UV 282nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Naftifine HCl

## Acetaminophen



Column : Hector-M C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : Water / Methanol = 3 / 1
Flow rate : 1.0 mL/min
Detection : UV 243 nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Acetaminophen

## Acetaminophen



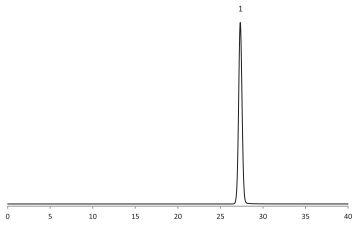
Column : Hector-M C8 3μm Dimension : 150 X 4.6 mm
Mobile Phase : A: 1.7 g/L of $KH_2PO_4$ and 1.8 g/L of $Na_2HPO_4$
B: Methanol

Gradient :

| Time | 0.0 | 3.0 | 7.0 | 7.1 | 10.0 |
|---|---|---|---|---|---|
| % B | 1 | 1 | 81 | 1 | 1 |

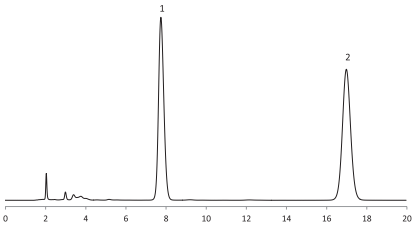
Flow rate : 1.0 mL/min Detection : UV 230 nm
Temperature : 35 °C Injection Volume : 5μL
Sample : 1. Acetaminophen

## Acetanilide



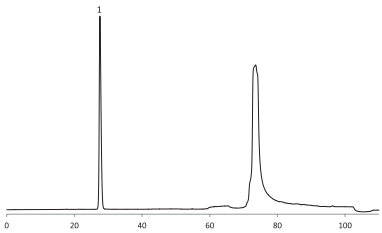
Column : Optimapak C8 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : A) MeOH / Water / Acetic acid = 50 / 850 / 1
B) MeOH / Water / Acetic acid = 500 / 500 / 1
A / B = 82 / 1 8
Flow rate : 0.9 mL/min
Detection : UV 254 nm
Temperature : 40 °C
Injection Volume : 1 0 μL
Sample : 1. Acetanilide

## Cefpiramide Sodium for Injection



Column : Hector-M C18 10μm
Dimension : 300 X 3.9 mm
Mobile Phase : 0.01 mol/L Phosphate buffer (pH 6.8) / MeOH / ACN / THF = 880 / 40 / 40 / 40
Flow rate : 1.2 mL/min
Detection : UV 254 nm
Temperature : 45 °C
Injection Volume : 5 μL
Sample : 1. Cefpiramide 2. Aminopyrine

## Atorvastatin Calcium



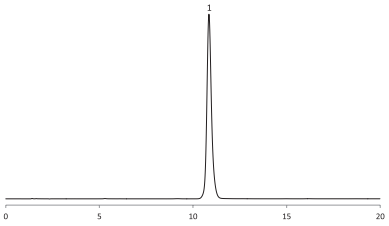
Column : Optimapak C8 5 μm
Dimension : 250 X 4.6 mm
Mobile Phase : Buffer: 3.9 g/L of ammonium acetate in water(pH 5.1 with acetic acid)
Solution A: ACN / THF / Buffer = 23 / 12 / 65
Solution B: ACN / THF / Buffer = 61 / 12 / 27

| Time | 0 | 40 | 70 | 85 | 100 | 105 | 115 |
|---|---|---|---|---|---|---|---|
| % B | 0 | 0 | 80 | 100 | 100 | 0 | 0 |

Flow rate : 1.5 mL/min Detection : UV 244 nm
Temperature : 35 °C Injection Volume : 20μL
Sample : 1. Atorvastatin Calcium

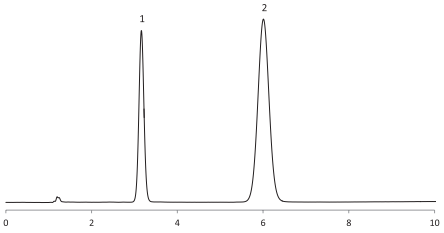
# 7-3. Pharmaceuticals

## Atorvastatin



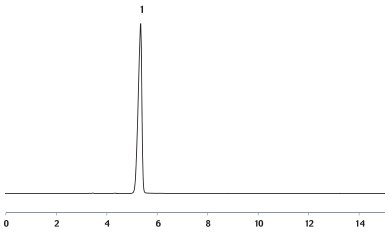

Column : Optimapak C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : buffer) 10.5g of Citric acid monohydrate in 1 L of water (pH 4.0)
buffer / ACN / THF = 530 / 270 / 200
Flow rate : 1.4 mL/min
Detection : UV 254 nm
Temperature : 40 °C
Injection Volume : 10 mL
Sample : 1. Atorvastatin

## Amoxicillin · Clavulanate Potassium



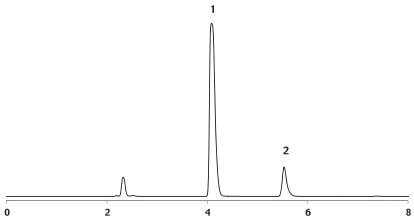

Column : HECTOR-M C18 10μm
Dimension : 300 X 3.9 mm
Mobile Phase : Phosphate buffer (pH 4.4) / MeOH = 95 / 5
Flow rate : 2.0 mL/min
Detection : UV 220 nm
Temperature : 25 °C
Injection Volume : 10 mL
Sample : 1. Clavulanate Potassium
2. Amoxicillin

## Fluconazole



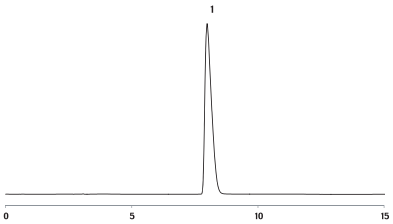

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% Ammonium acetate aq. / MeOH / ACN = 70 / 20 / 10
Flow rate : 1.0 ml/min
Detection : UV 322nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Fluconazole

## Benzenesulfonic acid & Butylhydroquinone



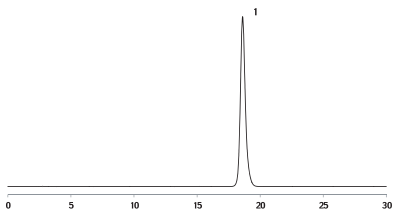

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 25mM Ammonium acetate aq. / ACN = 30 / 70
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Benzenesulfonic acid 2. Butylhydroquinone

## Bortezomib




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. (pH2.0) / MeOH = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Bortezomib

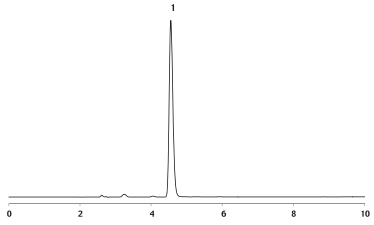
## Buprenorphine HCl




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 1.0 % Ammonium acetate aq. / MeOH / Acetic acid = 10 / 60 / 0.1
Flow rate : 1.0 ml/min
Detection : UV 280nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Buprenorphine HCl

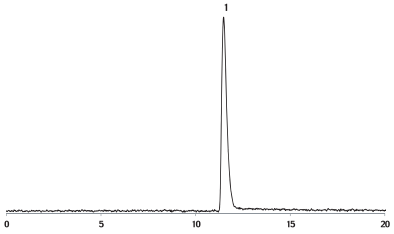
## 7-3. Pharmaceuticals

### CarbiDOPA



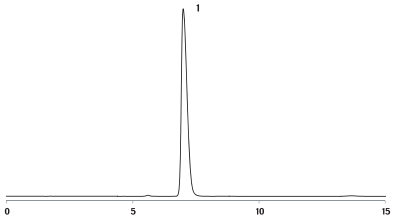

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. (pH2.0) / ACN = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 20 °C
Injection Volume : 10μL
Sample : 1. CarbiDOPA

### Carvedilol



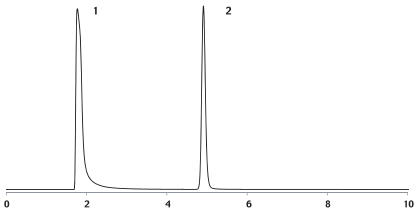

Column : Hector-M C8 5μm
Dimension : 250 X 4.6mm
Mobile phase : 20 mM $KH_2PO_4$ aq. (pH2.0) / ACN = 690 / 310
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 55 °C
Injection Volume : 10μL
Sample : 1. Carvedilol

### Chlordiazepoxide HCl



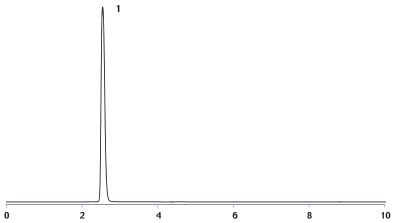

Column : Hector-M C18 5μm
Dimension : 100 X 8.0mm
Mobile phase : Buffer / THF / MeOH = 70 / 24 / 6
(10mM Octansulfonic acid aq.)
Flow rate : 2.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Chlordiazepoxide HCl

### Cilindipine



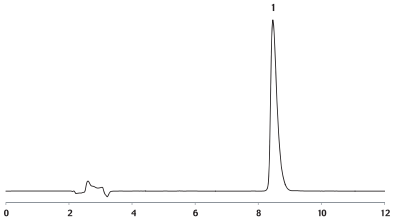

Column : Hector-M C18 5μm
Dimension : 250 X 3.9mm
Mobile phase : Water / ACN = 20 / 80
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 40 °C
Injection Volume : 10μL
Sample solvent : DMSO / Mobile phase = 1/ 2
Sample : 1. DMSO 2. Cilindipine

### Citicoline




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10mM Tetrabutylammonium hydrogen sulfate aq. / MeOH = 95 / 5
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Citicoline

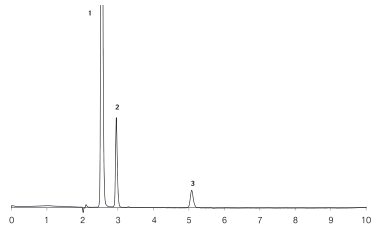
### Dexamethansone Phosphate disodium




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : $H_3PO_4$ aq. (pH2.3) / ACN = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 40 °C
Injection Volume : 20μL
Sample : 1. Dexamethansone Phosphate disodium

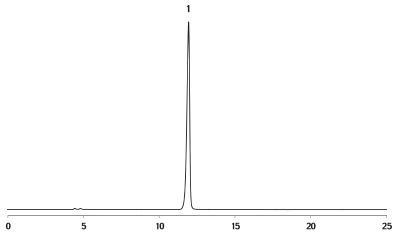
## 7-3. Pharmaceuticals

### Dexibuprofen



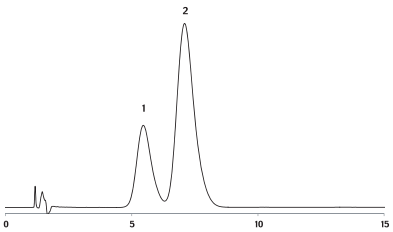

Column : Hector-M M18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % $H_3PO_4$ / ACN = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. Dexibuprofen 2. Phenol 3. Caffeine

### Doripenem



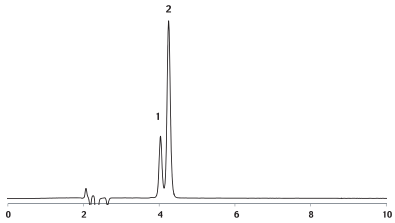

Column : Hector-A C18 3μm
Dimension : 150 X 4.6mm
Mobile phase : 0.1% Triethylamine (pH 5.8) / ACN = 95 / 5
Flow rate : 0.5 ml/min
Detection : UV 215nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Doripenem

### Ephedrine



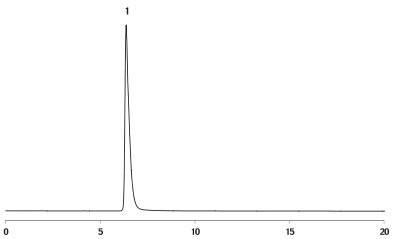

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Buffer / MeOH / $H_3PO_4$ = 640 / 340 / 1
(Buffer : 5g Sodium lauryl sulfate)
Flow rate : 1.5 ml/min
Detection : UV 210nm
Temperature : 45 °C
Injection Volume : 10μL
Sample : 1. Ephedrine 2. Atropine

### Ephedrine



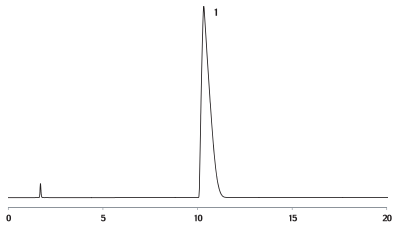

Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : Buffer / MeOH = 350 / 650
(Buffer : 6.8g Sodium acetate + 16.22g Sodium octane sulfonate with Acetic acid pH 4.6)
Flow rate : 1.2 ml/min
Detection : UV 215nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Ephedrine 2. Atropine

### Fenofibrate




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : $H_3PO_4$ (pH2.5) aq. / ACN = 30 / 70
Flow rate : 1.0 ml/min
Detection : UV 285nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Fenofibrate

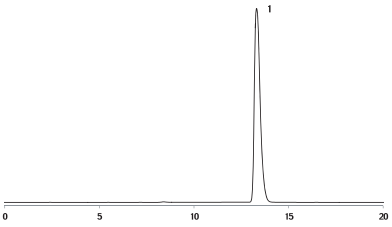
### Fentanyl citrate




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 65 / 35
Flow rate : 1.5 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Fentanyl citrate

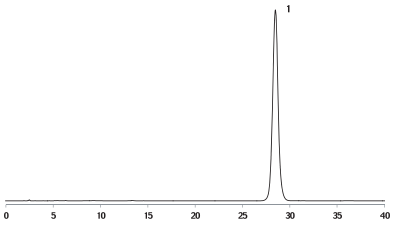
## 7-3. Pharmaceuticals

### Fludiazepam



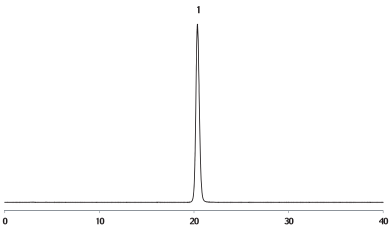

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN / Acetic aicd = 60 / 40 / 0.4
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Fludiazepam

### Gefitinib



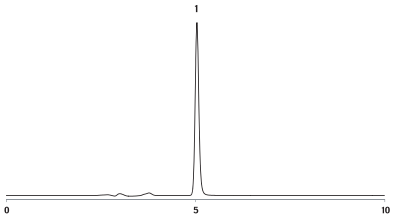

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ / ACN = 35 / 65
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Gefitinib

### Gemcitabine HCl



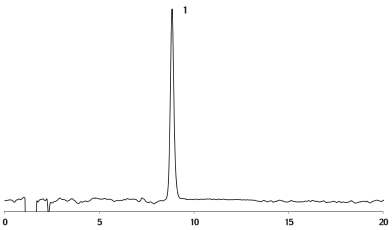

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10mM $NaH_2PO_4$ aq. (pH2.4)
Flow rate : 1.0 ml/min
Detection : UV 275nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Gemcitabine HCl

### Linezolide



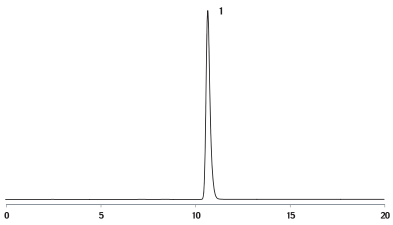

Column : Hector-T C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : 0.1 % TFA aq. / 0.1 % TFA in ACN = 66 / 34
Flow rate : 0.5 ml/min
Detection : UV 254nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Linezolide

### Lithocholic acid




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10mM Ammonium acetate aq. / ACN / Acetic acid = 30 / 70 / 1
Flow rate : 1.5 ml/min
Detection : RID
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Lithocholic acid

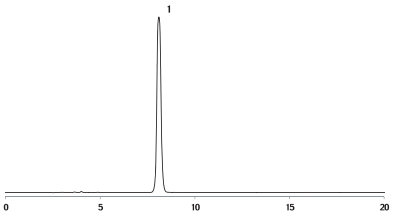
### Lometazepam




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN / Acetic aicd = 60 / 40 / 0.4
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Lometazepam

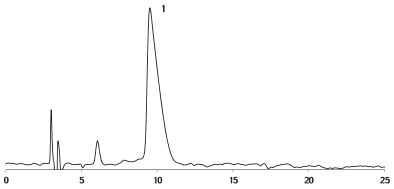
# 7-3. Pharmaceuticals

## Loxoprofen



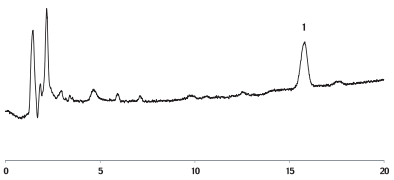

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : MeOH / Water / Acetic acid / Triethylamine
= 600 / 400 / 1 / 1
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Loxoprofen

## Lysozyme chloride



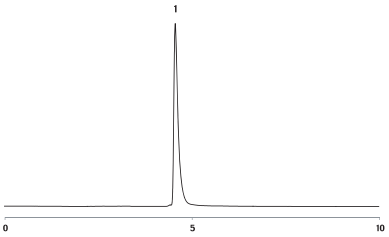

Column : Hector-W C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN / TFA = 638 / 630 / 2
Flow rate : 1.0 ml/min
Detection : RID
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Lysozyme chloride

## Misoprostol



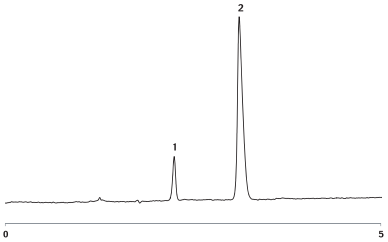

Column : Hector-M C18 3μm
Dimension : 150 X 4.6mm
Mobile phase : Water / ACN = 52 / 48
Flow rate : 0.2 ml/min
Detection : UV 210nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Misoprostol

## Ofloxacin



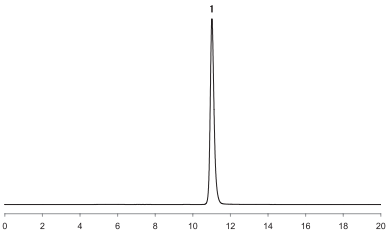

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : A : 20 mM $KH_2PO_4$ & $K_2HPO_4$
B : Acetonitrile
A / B = 50 / 50
Flow rate : 1.0ml/min
Detection : UV 240nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Ofloxacin

## Phenternmine




Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.03 % Diethylamine in MeOH
Flow rate : 1.5 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. Caffein 2. Phentermine

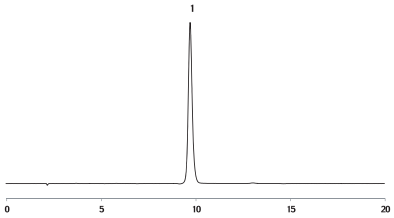
## Pirfenidone




Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 13.8g $NaH_2PO_4$ + 2.5mL $H_3PO_4$ / 1 L aq. (pH2.4) /
MeOH = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 317nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Pirfenidone

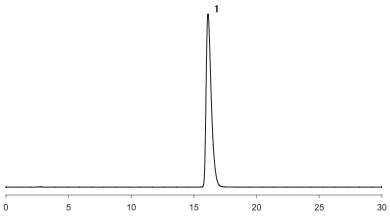
## 7-3. Pharmaceuticals

### Proxicam



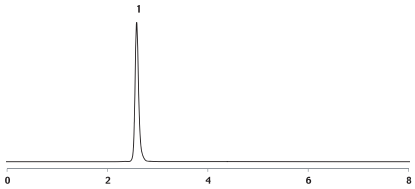

Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ / ACN = 40 / 60
Flow rate : 1.0 ml/min
Detection : UV 360nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Proxicam

### Propiverine



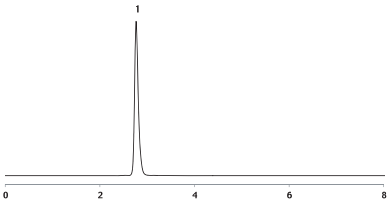

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / MeOH = 30 / 70
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Propiverine

### Rantidine HCl



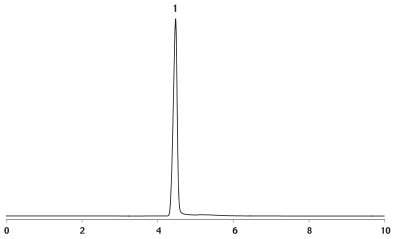

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1M Ammonium acetate aq. / MeOH = 15 / 85
Flow rate : 1.0 ml/min
Detection : UV 322nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Rantidine HCl

### Rantidine HCl



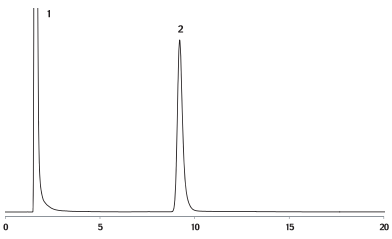

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 M Ammonium acetate aq. / MeOH = 15 / 85
Flow rate : 1.0 ml/min
Detection : UV 322nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Rantidine HCl

### Rasagiline




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 2g $KH_2PO_4$ + TEA (pH3.0) / ACN = 20 / 80
Flow rate : 0.5 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Rasagiline

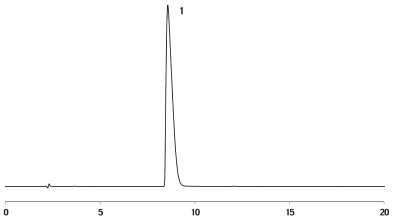
### Rebamipid




Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : Buffer / MeOH / $H_3PO_4$ = 50 / 50 / 0.5
(10mM Octansulfonic acid aq.)
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. DMSO(sample solvent) 2. Rebamipide

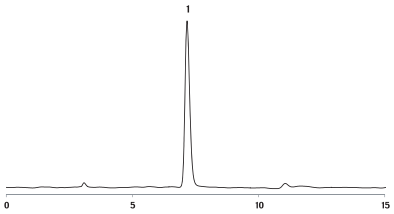
# 7-3. Pharmaceuticals

## Solifenacin succinate



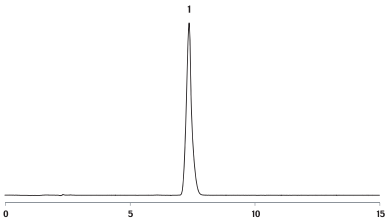

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN / TEA / TFA
= 600 / 400 / 0.6 / 0.6
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Solifenacin succinate

## Thioctic acid




Column : Hector-M PN 5μm
Dimension : 260 X 4.6mm
Mobile phase : 25mM Ammonium acetate aq. / MeOH
= 30 / 70
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Thioctic acid

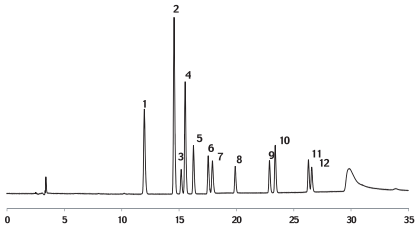
## Triclosan




Column : Hector-M C18
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 20 / 80
Flow rate : 1.0 ml/min
Detection : UV 280nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Triclosan

# 7-4. Foods

## Antiseptic



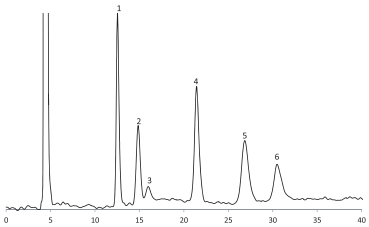

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : A: 0.1% $H_3PO_4$ aq. B: ACN
Gradient :

| Time | 0 | 8 | 15 | 25 | 30 |
|---|---|---|---|---|---|
| % B | 15 | 25 | 40 | 60 | 65 |

Flow rate : 1.0 ml/min
Detection : UV 220nm
Temperature : 25 °C
Injection Volume : 5μL

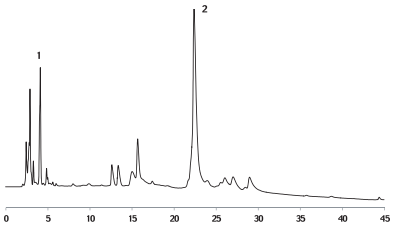
Sample : 1. Benzyl alcohol
2. Phenoxy ethanol
3. Sorbic acid
4. Benzoic acid
5. Methyl paraben
6. Salicylic acid
7. Dehydroacetic acid
8. Ethyl paraben
9. Iso-Propyl paraben
10. Propyl paraben
11. Iso-Butyl paraben
12. Butyl paraben

## Monosaccharides




Column: Hector-M NH2 5μm
Dimension : 250 X 4.6mm
Mobile phase : 75 % ACN
Flow rate : 0.8 ml/min
Detection : RID
Temperature : 25 °C
Injection Volume : 20μL
Sample : 1. Fructose 2. Glucose 3. Glactose 4. Sucrose
5. Maltose 6. Lactose

## Beehoney



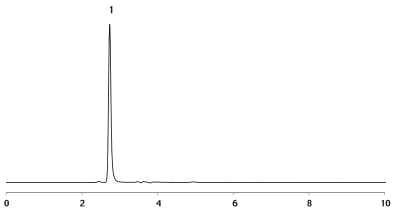

Column : Hector-M C18 5μm Dimension : 250 X 4.6mm
Mobile phase : A: 0.1% TFA aq. B: ACN

| Time | 0 | 5 | 40 | 45 |
|---|---|---|---|---|
| % B | 20 | 20 | 80 | 80 |

Flow rate : 1.0 ml/min
Detection : UV 220nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Apamine 2. Melittin

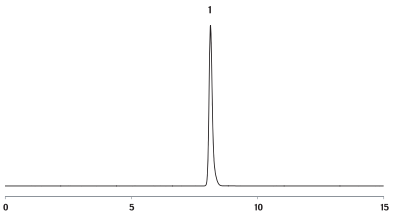
# 7-4. Foods

## Betaine



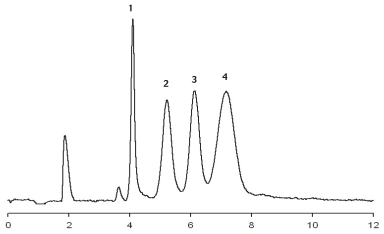

Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 70 / 30
Flow rate : 0.5 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Betaine

## Bisphenol A



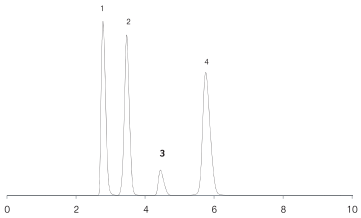

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 270nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Bisphenol A

## Carbohydrates



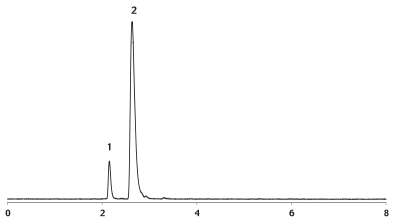

Column : Hector-M NH2 5μm
Dimension : 150 X 4.6mm
Mobile phase : Water / ACN / MeOH = 20 / 70 / 10
Flow rate : 1.0 ml/min
Detection : ELSD, tubing temp. 90 °C, gas flow rate 2ml/min
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Ribose 2. Arabinose 3. Mannose 4. Galactose

## Food Preservation



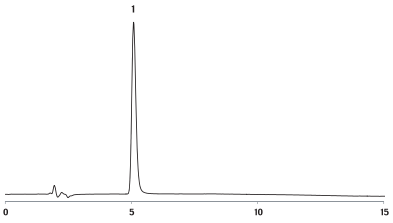

Column : Hector-A C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : MeOH / 20mM Ammonium acetate aq. = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. Benzoic acid 2. 4-Chloro benzoic acid
3. Caffein 4. Benzaldehyde

## L-Carnitine




Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : 25mM Ammonium acetate aq. / ACN
= 70 / 30
Flow rate : 0.8 ml/min
Detection : ELSD (80 °C, $N_2$ 2.0ml/min)
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Unknown 2. L-carnitine

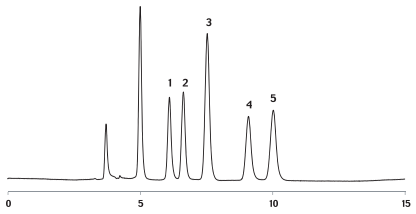
## Maltitol




Column : Hector-M NH2 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 40 / 60
Flow rate : 1.5 ml/min
Detection : RID
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Maltitol

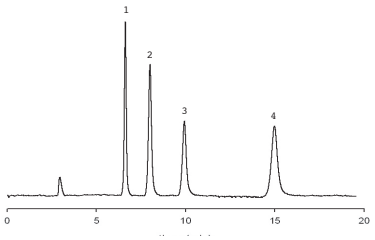
# 7-4. Foods

## Organic acid



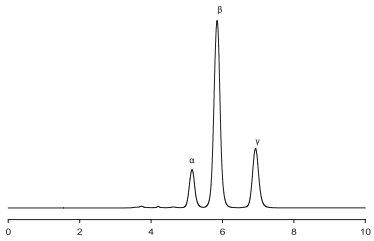

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 20 mM $KH_2PO_4$ & $K_2HPO_4$ aq. / MeOH = 90 / 10
Flow rate : 0.7ml/min
Detection : UV 210nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. Lactic acid 2. Acetic acid 3. Citric acid
4. Succinc acid 5. Malic acid

## Sugar alcohols



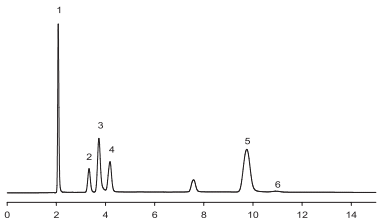

Column : Hector-M NH2 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 30 / 70
Flow rate : 1.0 ml/min
Detection : ELSD, tubing temp. 90 °C, gas flow rate 2ml/min
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. iso-erythitol 2. D(+)-arabitol
3. galacitol 4. Matitol

## DL-Tocopherol mixture, natural ($\alpha$, $\beta$, $\gamma$)




Column : Hector-M Sil 5μm
Dimension : 150 X 4.6mm
Mobile phase : Hexane / IPA = 98 / 2
Flow rate : 0.5 ml/min
Detection : UV 295nm
Temperature : 25 °C
Injection Volume : 10μL

## Vitamin




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : A: 20 mM $KH_2PO_4$ (pH 2.5) B: MeOH

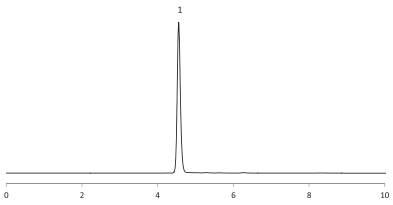
| Time | 1 | 3 | 5 |
|---|---|---|---|
| % B | 5 | 6 | 12 |

Flow rate : 1.0 ml/min
Detection : UV 220nm
Temperature : 25 °C
Injection Volume : 5μL

Sample : 1. Thiamine Hydrochloride
2. Pyridoxal Hydrochloride
3. Niacinamide
4. Pyridoxine Hydrochloride
5. p-Aminobenzoic acid
6. d-Pantothenic acid

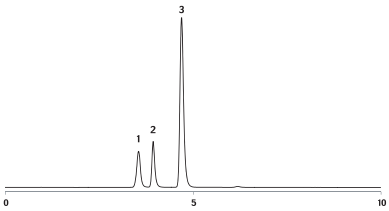
## 7-5. Others

### 3-hydroxy benzoic acid



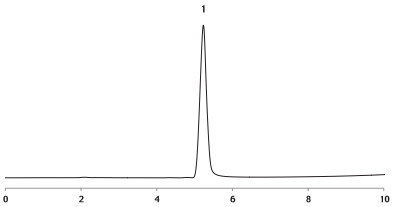

Column : Hector M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % $H_3PO_4$ aq. / ACN = 60 / 40
Flow rate : 0.7 ml/min
Detection : UV 225nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. 3-hydroxy benzoic acid

### Aniline 외 2종



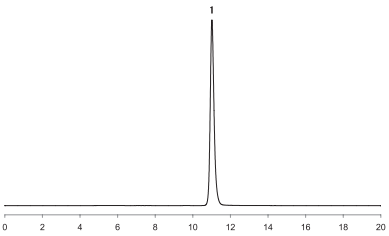

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 60 / 40
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. 1-phenyl-1H pyrrole-2,5 dione 2. Aniline
3. 4-oxo-4-(Phenylamino) but-2-enoic acid

### Allantoin



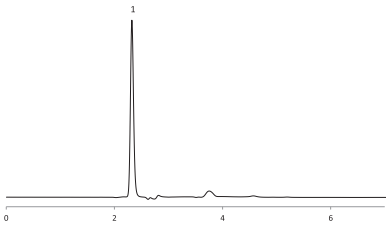

Column : Hector-M NH2 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 30 / 70
Flow rate : 1.2 ml/min
Detection : UV 210nm
Temperature : 4 °C
Injection Volume : 10μL
Sample : 1. Allantoin

### Pirfenidone



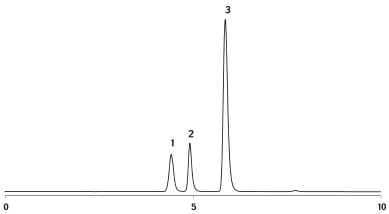

Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 13.8g Monobasic sodium phosphate + 2.5mL
$H_3PO_4$ / 1 L aq. (pH2.4) / MeOH = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 317nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Pirfenidone

### D-Glucuronic acid




Column : Hector-A C18 5μm
Dimension : 250 X 4.6 mm
Mobile Phase : 20 mM $KH_2PO_4$ / ACN = 80 / 20
Flow rate : 1.0 mL/min
Detection : UV 210 nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. D-Glucuronic acid

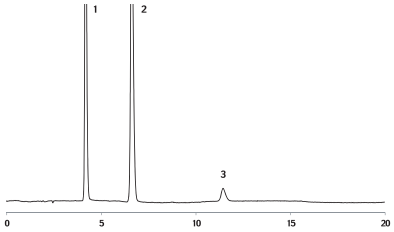
### Aniline 외 2종




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % $H_3PO_4$ aq. / ACN = 60 / 40
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. 1-phenyl-1H pyrrole-2,5 dione 2. Aniline
3. 4-oxo-4-(Phenylamino) but-2-enoic acid

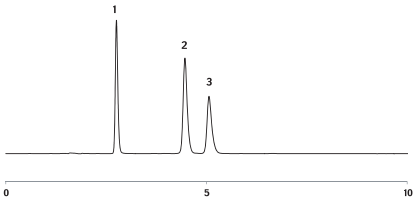
## 7-5. Others

### Formaldehyde



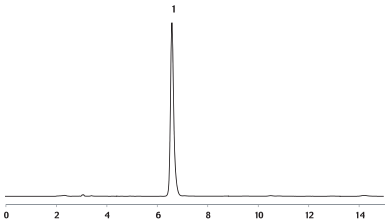

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 40 / 60
Flow rate : 1.0 ml/min
Detection : UV 354nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. unknown 2. Formaldehyd 3. Acetone

### Azoxystrobine & Fenhexamide



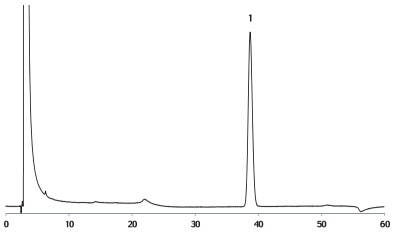

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 25 / 75
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Unknown 2. Azoxystrobine 3. Fenhexamide

### Baicalin



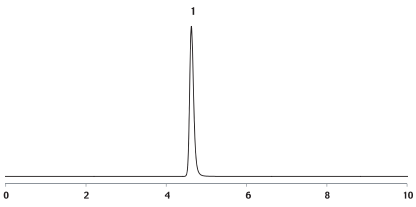

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : $H_3PO_4$ aq. (1→145) / ACN = 720 / 280
Flow rate : 1.0 ml/min
Detection : UV 277nm
Temperature : 50 °C
Injection Volume : 10μL
Sample : 1. Baicalin

### Biotine (Vitamie B7)



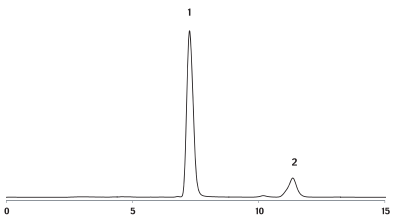

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 915 / 85
Flow rate : 1.0 ml/min
Detection : UV 200nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Biotine

### Bisphenol A




Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : Water / ACN = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 270nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Bisphenol A

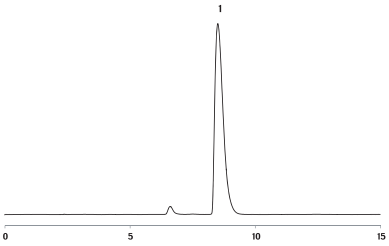
### Chenodecycholic acid




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 50 / 50
Flow rate : 1.0 ml/min
Detection : UV 220nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Chenodecycholic acid 2. Unknown

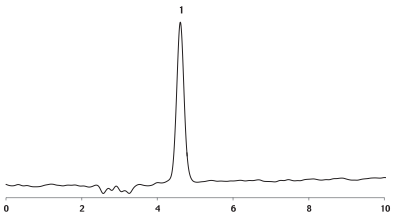
# 7-5. Others

## Chlorobenzoic acid



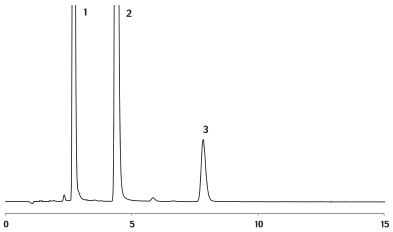

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1 % Acetic acid aq. / MeOH = 70 / 30
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. DPG-K2

## Cholic acid



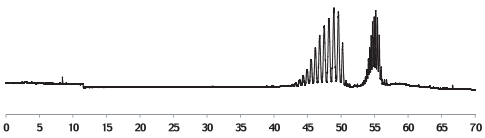

Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10mM Ammonium acetate aq. (pH4.0) / ACN = 30 / 70
Flow rate : 1.0 ml/min
Detection : RID
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. Cholic acid

## Formaldehyde




Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : Water / ACN = 40 / 60
Flow rate : 1.0 ml/min
Detection : UV 354nm
Temperature : 30 °C
Injection Volume : 10μL
Sample : 1. Unknown 2. Formaldehyde 3. Acetone

## LA-7

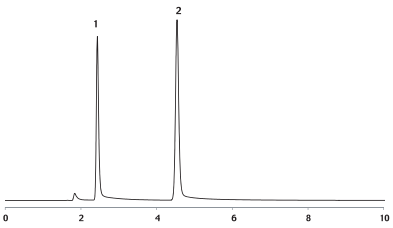



Column : Hector-M C18 5μm Dimension : 150 X 4.6mm
Mobile phase : A: Ammonium acetate B: ACN C: THF

| Time | 0 | 18 | 35 | 45 | 50 | 55 | 60 | 70 |
|---|---|---|---|---|---|---|---|---|
| % B | 45 | 54 | 60 | 68 | 70 | 70 | 45 | 45 |
| % C | 0 | 0 | 5 | 5 | 20 | 20 | 0 | 0 |

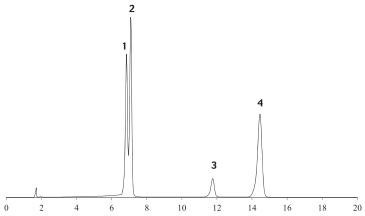
Flow rate : 0.6 ml/min
Detection : ELSD (115 °C, $N_2$ 2.0ml/min)
Temperature : 30 °C Injection Volume : 10μL

## MI & CMIT




Column : Hector-T C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 75 / 25
Flow rate : 1.0 ml/min
Detection : UV 260nm
Temperature : 30 °C
Injection Volume : 1μL
Sample : 1. Methylisothiazlinone(MI)
2. MethylChloroisothiazolinone(CMIT)

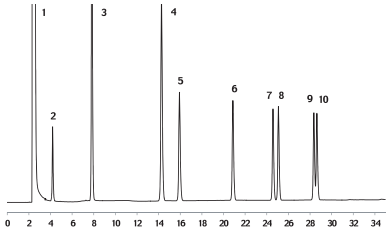
## Nitrobenzaldehyde




Column : Hector-M C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : Water / ACN = 20 / 80
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 5μL
Sample : 1. 4-nitrobenzensulfonyl chloride
2. 4-nitrobenzaldehyde 3. 3-nitrobenzaldehyde
4. 2-nitrobenzensulfonyl chloride

# 7-5. Others

## MI & CMIT & Paraben



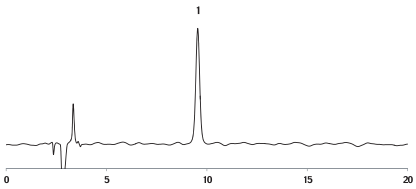

Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : A: 0.1% $H_3PO_4$ aq. B: ACN
Gradient :

| Time | 0 | 2 | 8 | 15 | 30 |
|---|---|---|---|---|---|
| % B | 10 | 20 | 25 | 35 | 65 |

Flow rate : 1.0 ml/min Detection : UV 220nm
Temperature : 35 °C
Injection Volume : 10μL

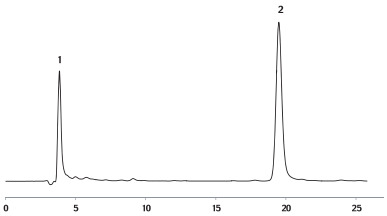
Sample : 1. Sample solvent
2. MI
3. CMIT
4. Phenoxy ethanol
5. Methyl paraben
6. Ethyl paraben
7. Iso-Propyl paraben
8. Propyl paraben
9. Iso-Butyl paraben
10. Butyl paraben

## Novaluron



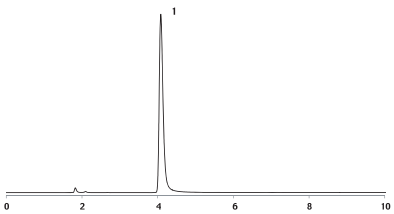

Column : Hector-M PN 5μm
Dimension : 250 X 4.6mm
Mobile phase : 0.1% $H_3PO_4$ aq. / ACN = 20 / 80
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Novaluron

## Oleanic acid



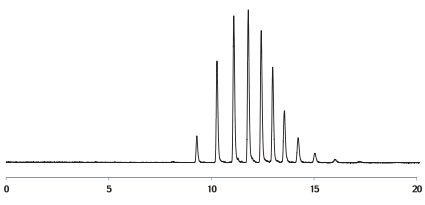

Column : Hector-M C8 5μm
Dimension : 250 X 3.0mm
Mobile phase : ACN / $H_3PO_4$ (pH2.3) = 75 / 25
Flow rate : 1.0 ml/min
Detection : UV 206nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Unknow 2. Oleanic acid

## p-Aminophenol




Column : Hector-T C18 5μm
Dimension : 250 X 4.6mm
Mobile phase : 10 mM $KH_2PO_4$ aq. / MeOH = 90 / 10
Flow rate : 1.0 ml/min
Detection : UV 210nm
Temperature : 40 °C
Injection Volume : 10μL
Sample : 1. p-Aminophenol

## Poyl oxyethyleneglycol(PEG_400)



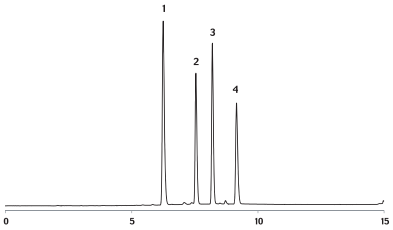

Column : Hector-M C18 5μm Dimension : 150 X 4.6mm
Mobile phase : A: Water B: ACN

| Time | 0 | 2 | 10 | 15 | 20 |
|---|---|---|---|---|---|
| % B | 5 | 5 | 20 | 20 | 5 |

Flow rate : 1.0 ml/min
Detection : ELSD (80 °C, $N_2$ 1.8ml/min)
Temperature : 35 °C
Injection Volume : 10μL

## 7-5. Others

### Pesticide

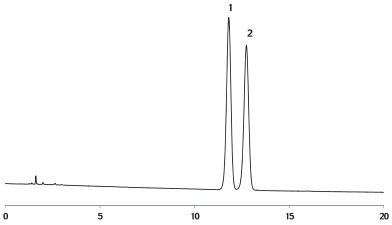



Column : Hector-T C18 5μm Dimension : 250 X 4.6mm
Mobile phase : A: 0.1 % $H_2PO_4$ B: ACN

| Time | 0 | 5 | 15 |
|---|---|---|---|
| % B | 60 | 100 | 100 |

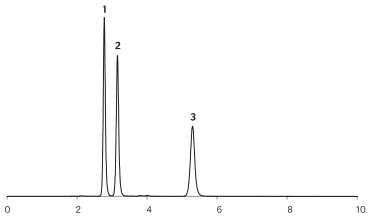
Flow rate : 0.8 ml/min Detection : UV 254nm
Temperature : 25 °C Injection Volume : 5μL
Sample : 1. Artrazine 2. Fenitrothion
3. Parathion 4. Diazinon

### Pyraclostrobin & BAS 500-3



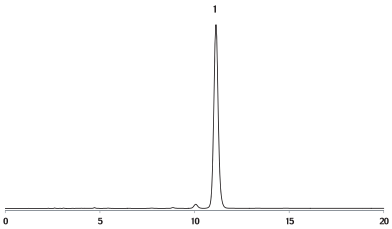

Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : 0.1% Formic acid aq. / ACN = 50 / 50
Flow rate : 1.5 ml/min
Detection : UV 274nm
Temperature : 35 °C
Injection Volume : 10μL
Sample : 1. Pyraclostrobin 2. BAS 500-3

### Steroid(estriol, estrone, estradiol)




Column : Hector-M Sil 5μm
Dimension : 150 X 4.6mm
Mobile phase : Hexane / Ethanol = 80 / 20
Flow rate : 1.0 ml/min
Detection : UV 230nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. Estrone 2. Estriol 3. Estradiol

### 1,1,1-tris(cinnamolyoxymethyl)ethane

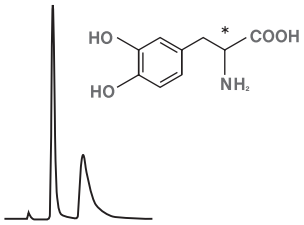



Column : Hector-M C18 5μm
Dimension : 150 X 4.6mm
Mobile phase : Water / MeOH = 10 / 90
Flow rate : 1.0 ml/min
Detection : UV 254nm
Temperature : 25 °C
Injection Volume : 10μL
Sample : 1. 1,1,1-tris(cinnamolyoxymethyl)ethane

# 7-6. Enantiomer separations-ChiroSil

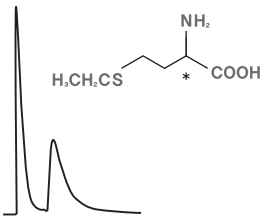
## • α-Amino Acids

### DL - DOPA



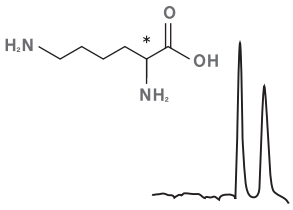

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 5.5 min
$k_1$ : 0.97 $\alpha$ : 2.30

### DL - Ethionine



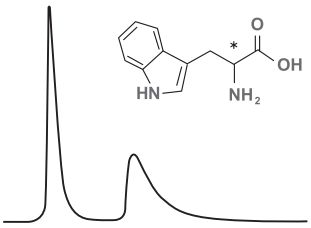

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 0.02% Acetic acid / MeOH = 25 / 75
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 6.2 min
$k_1$ : 1.29 $\alpha$ : 2.07

### DL - Lysine



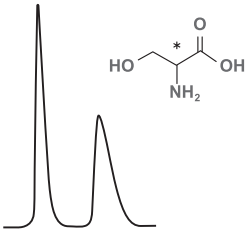

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 5.3 min
$k_1$ : 1.44 $\alpha$ : 1.48

### DL - Tryptophan



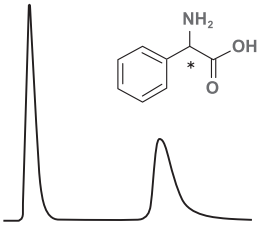

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 30 / 70
Flow Rate : 1.5 ml/min
Detection : UV 210nm
Run time : 11.0 min
$k_1$ : 4.06 $\alpha$ : 2.15

### DL - Serine




Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 5mM $HClO_4$ / MeOH = 16 / 84
Flow Rate : 0.8 ml/min
Detection : UV 210nm
Run time : 6.0 min
$k_1$ : 1.37 $\alpha$ : 1.99

### DL - Phenylgycine

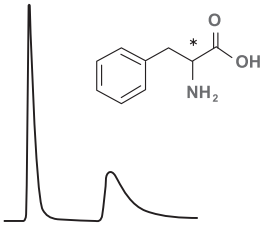



Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM $H_2SO_4$ and 0.1% TEA / MeOH = 30 / 70
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 13.1 min
$k_1$ : 3.14 $\alpha$ : 2.60

# 7-6. Enantiomer separations-ChiroSil

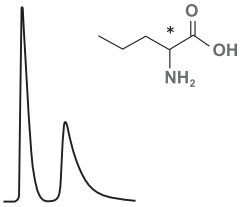
## • α-Amino Acids

### DL - Phenylalaine




Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 30 / 70
Flow Rate : 1.5 ml/min
Detection : UV 210nm
Run time : 8.9 min
*k1* : 2.66 $\alpha$ : 2.57

### DL - Norvaline

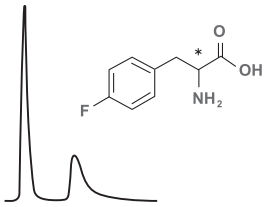



Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 55 / 45
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 5.3 min
*k1* : 1.15 $\alpha$ : 1.79

### DL - Norleucine

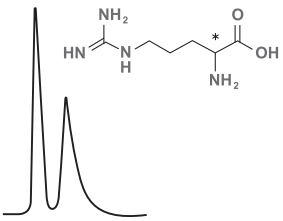

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 55 /45
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 5.6 min
*k1* : 1.28 $\alpha$ : 1.75

### DL-4-Fluorophenylalanine



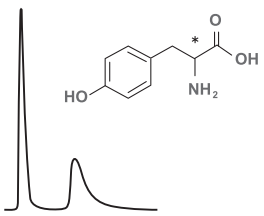

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 30 / 70
Flow Rate : 1.5 ml/min
Detection : UV 210nm
Run time : 9.6 min
*k1* : 2.92 $\alpha$ : 2.56

### DL - Arginine




Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM $H_2SO_4$ / MeOH = 16 / 84
Flow Rate : 0.8 ml/min
Detection : UV 210nm
Run time : 4.9 min
*k1* : 1.21 $\alpha$ : 1.64

### DL - Tyrosine

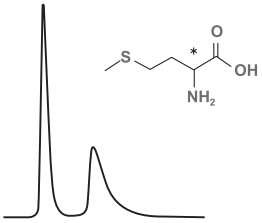



Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 30 / 70
Flow Rate : 1.5 ml/min
Detection : UV 210nm
Run time : 9.1 min
*k1* : 2.95 $\alpha$ : 2.38

# 7-6. Enantiomer separations-ChiroSil

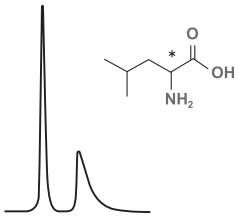
## • α-Amino Acids

### DL - Methionine



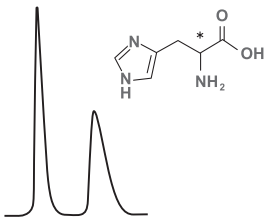

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 55 / 45
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 7.5 min
*k1* : 1.64 $\alpha$ : 2.04

### DL - Leucine



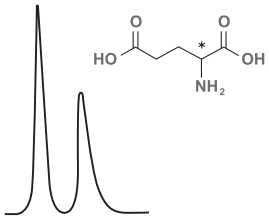

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 55 / 45
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 5.5 min
*k1* : 1.03 $\alpha$ : 2.14

### DL - Histidine




Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM Acetic acid / MeOH = 55 / 45
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 26.0 min
*k1* : 10.96 $\alpha$ : 1.27

### DL - Glutamic Acid



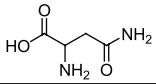
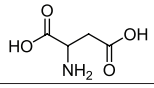
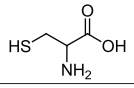
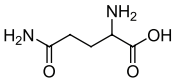
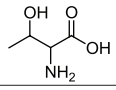
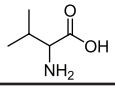

Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 0.05% $H_3PO_4$ / MeOH = 35 / 65
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 4.5 min
*k1* : 0.71 $\alpha$ : 2.27

### DL - Thyroxine[8]


Column: ChiroSil Type
Mobile phase: 5mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20°C

## 7-6. Enantiomer separations-ChiroSil

### • Other α-Amino Acids[1]

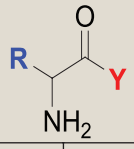
| α-Amino Acids | Structure | $k_1$ | α | $R_S$ |
|---|---|---|---|---|
| Alanine |  | 1.37 | 1.28 | 1.33 |
| Asparagine |  | 1.31 | 1.10 | 0.63 |
| Aspartic acid |  | 1.51 | 1.22 | 1.25 |
| Cysteine |  | 1.32 | 1.10 | 0.30 |
| Glutamine |  | 1.31 | 1.32 | 1.72 |
| Threonine |  | 0.24 | 1.42 | 1.30 |
| Valine |  | 0.40 | 1.31 | 1.14 |

### Condition

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

## 7-6. Enantiomer separations-ChiroSil

### • α-Amino amides and esters[1]

|  | | $k_1$ | $\alpha$ | Rs |
|---|---|---|---|---|
| R | Y | | | |
| $CH_3$ | $NH(CH_2)_3CH_3$ | 1.60 | 1.41 | 2.34 |
| | $NHC(CH_3)_3$ | 1.39 | 1.42 | 2.32 |
| | $NHCH_2C_6H_5$ | 2.58 | 1.38 | 2.33 |
| | $OCH_3$ | 1.36 | 1.10 | 0.48 |
| $CH(CH_3)_2$ | $NH(CH_2)_3CH_3$ | 0.28 | 1.64 | 1.32 |
| | $NHC(CH_3)_3$ | 0.25 | 1.59 | 1.11 |
| | NHCH2C6H5 | 0.46 | 1.48 | 1.50 |
| | $OCH_2CH_3$ | 0.39 | 1.33 | 0.80 |
| $CH_2CH(CH_3)_2$ | $NH(CH_2)_2CH_3$ | 1.07 | 2.48 | 8.15 |
| | $NH(CH_2)_3CH_3$ | 1.03 | 2.71 | 8.30 |
| | $N(CH_2CH_3)_2$ | 0.42 | 1.24 | 0.94 |
| $CH_2C_6H_5$ | $NH(CH_2)_2CH_3$ | 1.94 | 2.45 | 6.99 |
| | $NHC(CH_3)_3$ | 2.06 | 2.28 | 7.36 |
| $C_6H_5$ | $NH(CH_2)_2CH_3$ | 1.55 | 2.46 | 7.27 |
| | $NHC(CH_3)_3$ | 1.28 | 2.67 | 6.32 |
| | $N(CH_2CH_3)_2$ | 1.40 | 3.15 | 9.77 |
| | $OCH_3$ | 2.10 | 2.09 | 6.85 |
| 4-$CH_3O$-$C_6H_5$ | $NHCH_3$ | 1.73 | 2.39 | 8.63 |
| | $NH(CH_2)_2CH_3$ | 1.59 | 2.43 | 7.27 |
| | $NHC(CH_3)_3$ | 1.35 | 2.62 | 7.47 |

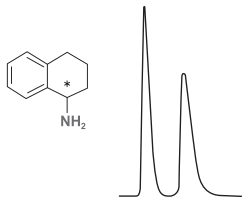
### Condition

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

# 7-6. Enantiomer separations-ChiroSil

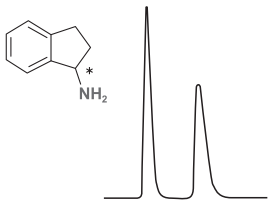
## • Amines[2] [10]

### 1,2,3,4-Tetrahydro-1-naphthylamine

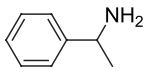
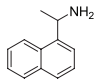
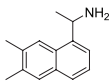
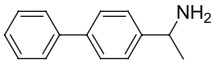
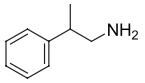
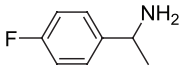
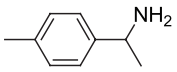
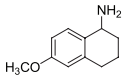



Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM $H_2SO_4$ and 0.1% TEA / MeOH = 16 / 84
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 3.5 min
$k1$ : 0.82 $\alpha$ : 1.76

### 1-Aminoindan




Column : ChiroSil RCA(+) or SCA(-)
150 X 4.6mm
Mobile Phase : 10mM $H_2SO_4$ and 0.1% TEA / MeOH = 16 / 84
Flow Rate : 1.0 ml/min
Detection : UV 210nm
Run time : 4.8 min
$k1$ : 1.44 $\alpha$ : 1.91

| Amines | $k_1$ | $\alpha$ | $R_S$ | Condition |
|---|---|---|---|---|
|  | 2.45 | 1.10 | 0.80 | A |
|  | 1.90 | 1.28 | 2.57 | A |
|  | 1.38 | 1.84 | 5.23 | A |
|  | 2.86 | 1.11 | 1.05 | A |
|  | 1.40 | 1.11 | 1.02 | A |
|  | 0.42 | 1.22 | 0.82 | B |
|  | 0.41 | 1.11 | 0.38 | B |
|  | 0.51 | 1.39 | 1.69 | A |
|  | 5.21 | 3.46 | 12.00 | A |

### Condition A

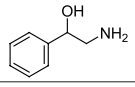
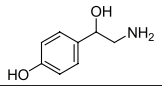
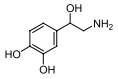
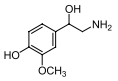
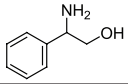
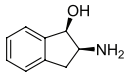
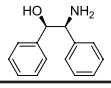
Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

### Condition B

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

# 7-6. Enantiomer separations-ChiroSil

## • Amino Alcohols[2] [10]

| Amino Alcohols | Structure | $k_1$ | $\alpha$ | $R_S$ | Condition |
|---|---|---|---|---|---|
| 2-amino-1-phenylethanol |  | 1.10 | 1.40 | 1.52 | B |
| 4-(2-amino-1-hydroxyethyl)phenol |  | 0.92 | 1.19 | 1.41 | B |
| 4-(2 amino-1-hydroxyethyl)benzene -1,2-diol |  | 0.90 | 1.15 | 1.00 | B |
| 4-(2-amino-1-hydroxyethyl)-2-methoxyphenol |  | 1.25 | 1.18 | 1.23 | B |
| 2-amino-2-phenylethanol |  | 1.44 (S) | 1.35 | 2.18 | A |
| 2-amino-2,3-dihydro-1H-inden-1-ol |  | 1.98 (1R, 2S) | 1.78 | 0.80 | A |
| 2-amino-1,2-diphenylethanol |  | 0.29 (1S, 2R) | 1.53 | 1.48 | C |

### Condition A

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

### Condition B

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

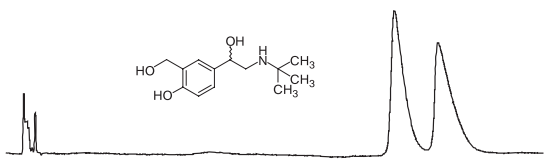
### Condition C

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

# 7-6. Enantiomer separations-ChiroSil

## • β-Blockers[9]

### Albuterol

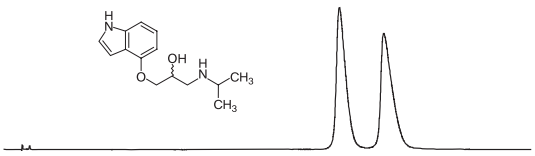



Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / MeOH / ACN
= 0.1 / 0.1 / 50 / 50
Flow rate: 1 ml/min
Detection: 260 nm UV
Temperature: 20°C
$k_1$: 21.34 $\alpha$: 1.2

### Atenolol

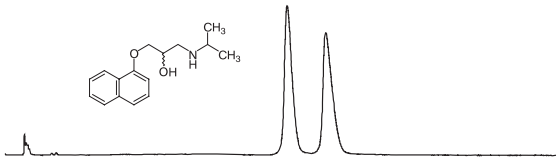

Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / MeOH / ACN
= 0.1 / 0.1 / 50 / 50
Flow rate: 1 ml/min
Detection: 260 nm UV
Temperature: 20°C
$k_1$: 15.86 $\alpha$: 1.10

### Pindolol




Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / MeOH / ACN
= 0.1 / 0.1 / 50 / 50
Flow rate: 1 ml/min
Detection: 260 nm UV
Temperature: 20°C
$k_1$: 18.99 $\alpha$: 1.14

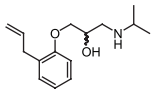
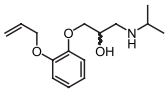
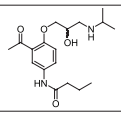
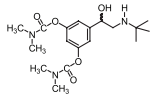
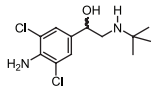
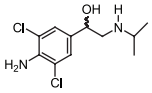
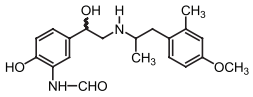
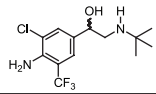
### Propranolol




Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / MeOH / ACN
= 0.1 / 0.1 / 50 / 50
Flow rate: 1 ml/min
Detection: 260 nm UV
Temperature: 20°C
$k_1$: 15.16 $\alpha$: 1.15

## 7-6. Enantiomer separations-ChiroSil

### Other β-Blockers[19]

| β-Blockers | Structure | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|---|
| Alprenolol |  | 29.35 | 1.26 | 2.12 |
| Oxprenolol |  | 24.61 | 1.22 | 2.29 |
| Acebutolol |  | 45.60 | 1.29 | 2.90 |
| Bambuterol |  | 22.52 | 1.85 | 4.21 |
| Clenbuterol |  | 53.61 | 1.59 | 4.37 |
| Clenpropol |  | 48.61 | 1.13 | 1.58 |
| Fumoterol |  | 98.08 | 1.23 | 1.36 |
| Mabuterol |  | 43.07 | 1.64 | 5.79 |

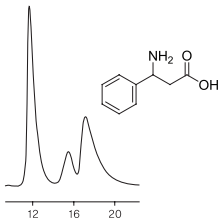
### Condition

Column: ChiroSil Type
Mobile phase: TFA / TEA / EtOH / ACN = 0.1 / 0.5 / 20 / 80
Flow rate: 1 ml/min
Detection: 260 nm UV
Temperature: 20 °C

# 7-6. Enantiomer separations-ChiroSil

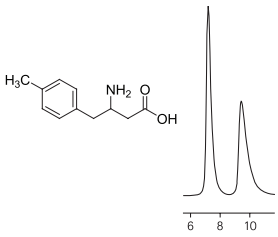
## • β-Blockers Acids[6]

### 3-amino-3-phenylpropanoic acid



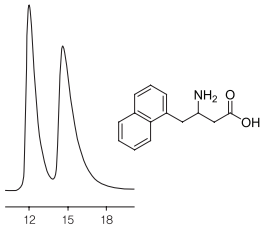

Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 3.60 $\alpha$: 102

### 3-amino-4-(4-methylphenyl)butanoic acid



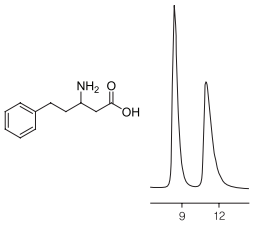

Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 1.26 $\alpha$: 1.40

### 3-amino-4-(1-naphthyl)butanoic acid



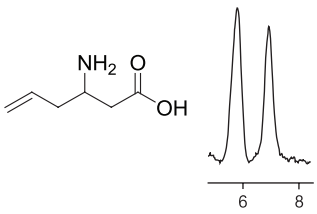

Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 3.72 $\alpha$: 1.28

### 3-amino-5-phenylpentanoic acid



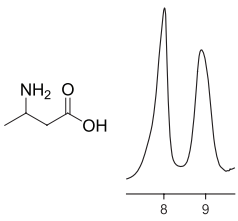

Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 2.30 $\alpha$: 1.44

### 3-amino-5-hexenoic acid




Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 1.02 $\alpha$: 1.37

### 3-aminobutyric acid

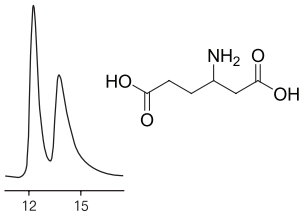



Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20˚C
$k_1$: 2.16 $\alpha$: 1.16

# 7-6. Enantiomer separations-ChiroSil

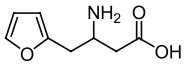
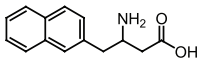
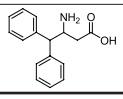
## • β-Blockers Acids[6]

### 3-aminoadipic acid




Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20°C
$k_1$ : 3.83 $\alpha$ : 1.16

## • Other β-Amino Acids[11]

| β-Blockers | Structure | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|---|
| 3-amino-4-(2-furyl)butyric acid |  | 1.33 | 1.33 | 1.66 |
| 3-amino-4-(2-naphthyl)butyric acid |  | 2.38 | 1.53 | 2.07 |
| 3-amino-4,4-diphenylbutyric acid |  | 0.67 | 1.34 | 1.38 |

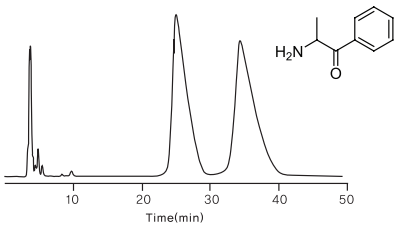
### Condition

Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

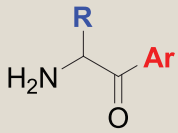
# 7-6. Enantiomer separations-ChiroSil

## • Aryl α-Amino Ketones[15]

### Cathinone




Column: ChiroSil Type
Mobile phase: 10mM Acetic acid / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20°C
$k_1$: 3.83 $\alpha$: 1.16

|  | | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|---|
| Ar | R | | | |
| $C_6H_5$ | $CH(CH_3)_2$ | 0.11 | 2.12 | 2.13 |
| $C_6H_5$ | $CH_2CH(CH_3)_2$ | 0.34 | 1.95 | 3.11 |
| $C_6H_5$ | $CH_2CH_2SCH_3$ | 0.84 | 1.57 | 2.29 |
| $C_6H_5$ | $CH_2C_6H_5$ | 1.03 | 1.55 | 3.55 |
| 4-$CH_3C_6H_4$ | $CH_3$ | 1.22 | 1.55 | 2.80 |
| 4-$CH_3C_6H_4$ | $CH(CH_3)_2$ | 0.16 | 2.08 | 1.89 |
| 4-$CH_3C_6H_4$ | $CH_2CH(CH_3)_2$ | 0.31 | 1.99 | 2.88 |
| 4-$CH_3C_6H_4$ | $CH_2CH_2SCH_3$ | 0.78 | 1.65 | 2.98 |
| 4-$CH_3C_6H_4$ | $CH_2C_6H_5$ | 0.86 | 1.58 | 3.09 |
| 1-Naphthyl | $CH(CH_3)_2$ | 0.25 | 2.20 | 3.87 |
| 2-Naphthyl | $CH(CH_3)_2$ | 0.26 | 2.19 | 3.77 |

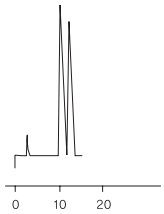
### Condition

Column: ChiroSil Type
Mobile phase: 10mM H2SO4 / EtOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

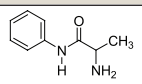
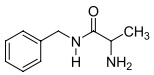
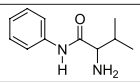
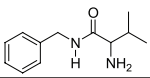
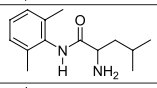
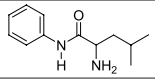
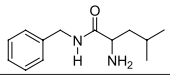
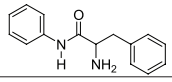
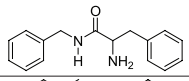
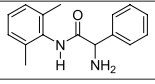
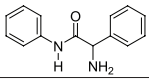
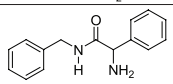
# 7-6. Enantiomer separations-ChiroSil

## • Tocainide's Analogues

### Tocainide




Column: ChiroSil Type
Mobile phase: 5mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20°C

| Tocainide's Analogue | Structure | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|---|
| 2-amino-N-phenylpropanamide |  | 1.82 | 1.73 | 2.52 |
| 2-amino-N-benzylpropanamide |  | 1.38 | 1.44 | 2.10 |
| 2-amino-3-methyl-N-phenylbutanamide |  | 0.34 | 2.10 | 2.56 |
| 2-amino-N-benzyl-3-methylbutanamide |  | 0.30 | 1.42 | 1.00 |
| 2-amino-4-methyl-N-(2,6-dimethylphenyl)pentanamide |  | 0.25 | 1.17 | 0.25 |
| 2-amino-4-methyl-N-phenylpentanamide |  | 1.35 | 5.00 | 4.00 |
| 2-amino-N-benzyl-4-methylpentanamide |  | 1.07 | 2.39 | 5.50 |
| 2-amino-N,3-diphenylpropanamide |  | 2.29 | 3.72 | 5.33 |
| 2-amino-N-benzyl-3-phenylpropanamide |  | 2.08 | 2.19 | 3.29 |
| 2-amino-N-(2,6-dimethylphenyl)-2-phenylacetamide |  | 1.49 | 2.05 | 3.52 |
| 2-amino-N,2-diphenylacetamide |  | 1.55 | 3.50 | 5.50 |
| 2-amino-N-benzyl-2-phenylacetamide |  | 1.60 | 2.58 | 4.89 |

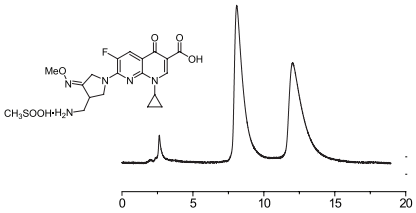
## Condition

Column: ChiroSil Type
Mobile phase: 10mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 210 nm UV
Temperature: 20 °C

# 7-6. Enantiomer separations-ChiroSil

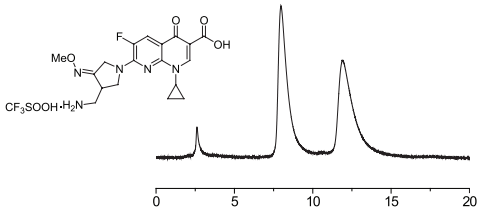
## • Gemifloxacin[7]

### Gemifloxacin mesylate



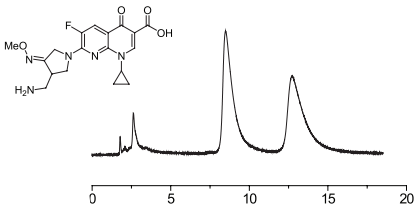

Column: ChiroSil Type
Mobile phase: 10mM $HClO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20˚C
$k_1$: 3.55 $\alpha$: 1.62

### Gemifloxacin triflate



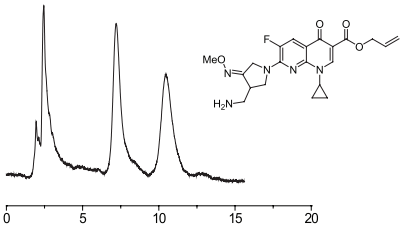

Column: ChiroSil Type
Mobile phase: 10mM $HClO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20˚C
$k_1$: 3.49 $\alpha$: 1.63

### Free form of Gemifloxacin



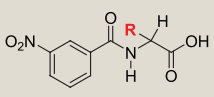

Column: ChiroSil Type
Mobile phase: 10mM $HClO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20˚C
$k_1$: 3.78 $\alpha$: 1.63

### Allyl ester of Gemifloxacin




Column: ChiroSil Type
Mobile phase: 10mM $HClO_4$ / MeOH = 20 / 80
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20˚C
$k_1$: 3.05 $\alpha$: 1.60

## • N-benzyl-$\alpha$-Amino Acids[18]



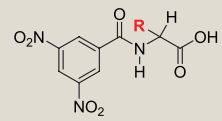

| R | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|
| $(CH_3)_2CH$ | 3.35 | 1.11 | 0.41 |
| $(CH_3)_2CHCH_2$ | 3.68 | 1.14 | 0.55 |

### Condition

Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / ACN = 0.05 / 0.25 / 100
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20 ˚C

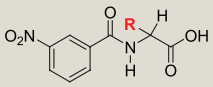
## 7-6. Enantiomer separations-ChiroSil

### • N-(3, 5-dinitrobenzoyl)-α-Amino Acid[18]

|  R | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|
| $CH_3$ | 6.81 | 1.20 | 0.76 |
| $(CH_3)_2CH$ | 3.22 | 1.81 | 2.81 |
| $(CH_3)_2CHCH_2$ | 4.56 | 1.57 | 2.01 |
| $C_6H_5$ | 3.56 | 1.47 | 1.49 |
| $C_6H_5CH_2$ | 5.11 | 1.61 | 1.78 |
| $HOCH_2$ | 21.25 | 1.06 | 0.54 |
| $CH_3(OH)CH$ | 8.85 | 1.23 | 0.74 |
| 4-OH-$C_6H_4CH_2$ | 36.20 | 1.27 | 0.73 |

Condition
Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / ACN = 0.05 / 0.25 / 100
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20 °C

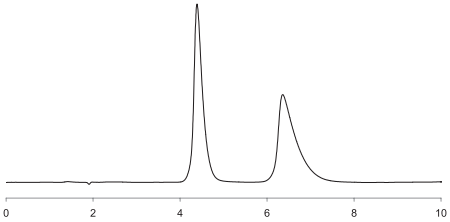
### • N-(3-dinitrobenzoyl)-α-Amino Acids[18]

|  R | $k_1$ | $\alpha$ | $R_S$ |
|---|---|---|---|
| $CH_3$ | 5.71 | 1.14 | 0.60 |
| $(CH_3)_2CH$ | 3.06 | 1.46 | 1.40 |
| $(CH_3)_2CHCH_2$ | 4.26 | 1.45 | 1.68 |
| $C_6H_5$ | 2.86 | 1.25 | 0.97 |

Condition
Column: ChiroSil Type
Mobile phase: Acetic acid / TEA / ACN = 0.05 / 0.25 / 100
Flow rate: 0.5 ml/min
Detection: 254 nm UV
Temperature: 20 °C

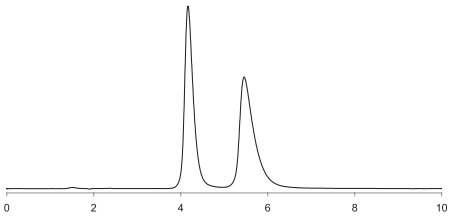
# 7-7. Enantiomer separations-ChiroSil ME

## DL-Methionine



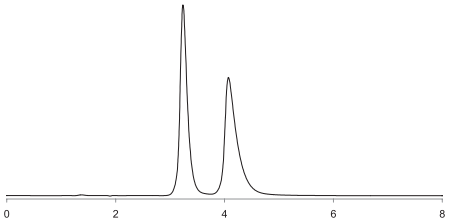

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 1.32 $\alpha$ : 1.79

## DL-DOPA



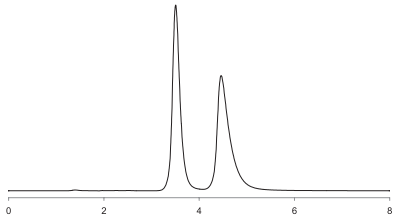

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 1.20 $\alpha$ : 1.57

## DL-Phenylalanine



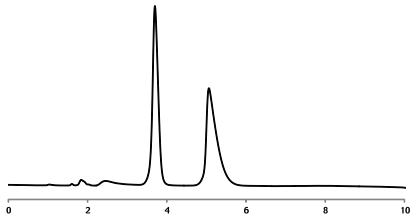

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 0.71 $\alpha$ : 1.62

## DL-Tryptophane



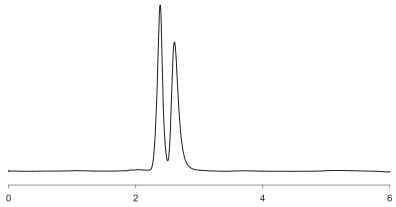

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 0.86 $\alpha$ : 1.59

## DL-Norvaline




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 10 mM Acetic acid / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 1.01 $\alpha$ : 1.73

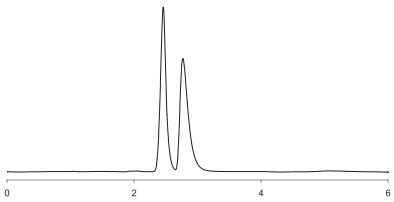
## DL-Leucine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 10mM Acetic acid / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 0.14 $\alpha$ : 1.79

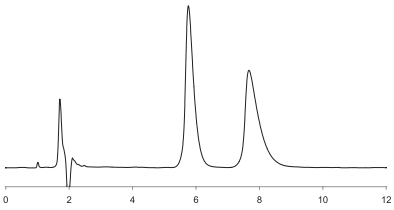
# 7-7. Enantiomer separations-ChiroSil ME

## DL-Norleucine



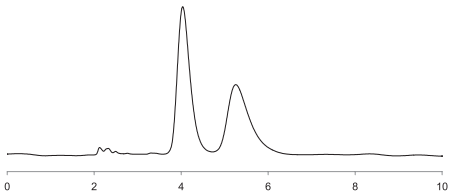

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 10mM Acetic acid / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20˚C
k' : 0.17 $\alpha$ : 1.86

## DL-Tryosine



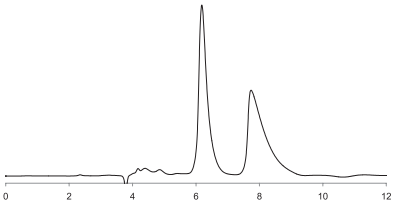

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3POP_4$ / MeOH = 15 / 85
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 40˚C
k' : 1.91 $\alpha$ : 1.51

## DL-Arginine



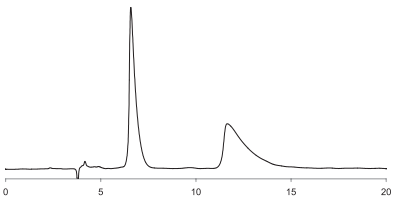

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $HClO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: UV 210nm
Temperature: 10˚C
k' : 0.66 $\alpha$ : 1.40

## DL-Alanine



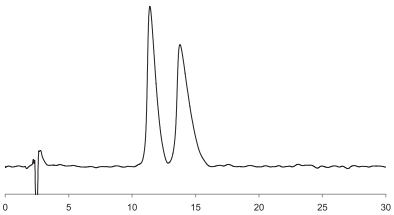

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $HClO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: UV 210nm
Temperature: 20˚C
k' : 0.63 $\alpha$ : 1.65 Rs : 3.96

## DL-Serine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $HClO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: UV 210nm
Temperature: 20˚C
k' : 0.74 $\alpha$ : 2.82 Rs : 5.87

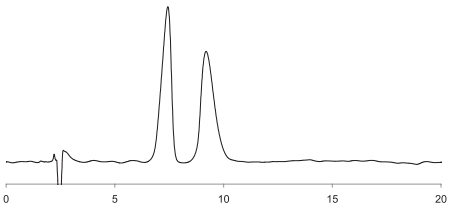
## DL-Asparagine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.8 ml/min
Detection: UV 210nm
Temperature: 25˚C
k' : 3.63 $\alpha$ : 1.22

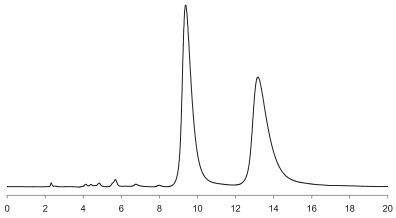
# 7-7. Enantiomer separations-ChiroSil ME

## DL-Valine



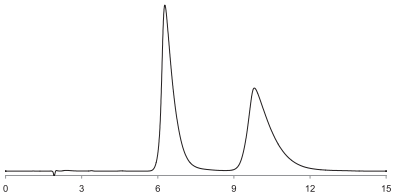

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $H_2SO_4$ / MeOH = 20 / 80
Flow rate: 0.8 ml/min
Detection: UV 210nm
Temperature: 25°C
k' : 2.02 $\alpha$ : 1.35

## DL-Threonine



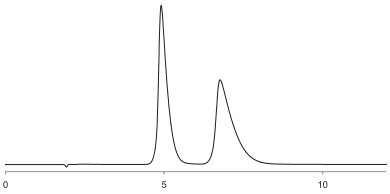

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $HClO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 1.47 $\alpha$ : 1.68 Rs : 5.45

## DL-Homephenylalanine



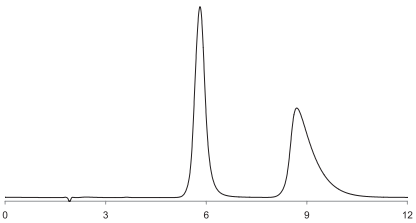

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 2.27 $\alpha$ : 1.81

## DL-4 - Chloro - phenylalanine



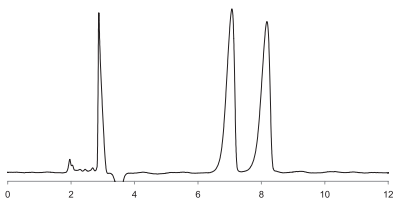

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 40 / 60
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 40°C
k' : 0.78 $\alpha$ : 1.58

## DL-Pyridylalanine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 2.03 $\alpha$ : 1.74

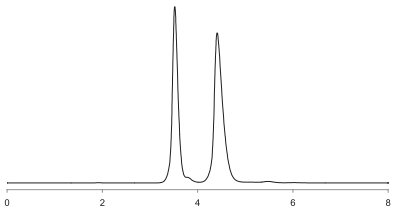
## DL-Penicillamine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 10mM $H_2SO_4$ / ACN = 10 / 90
Flow rate: 0.8 ml/min
Detection: UV 210nm
Temperature: 15°C

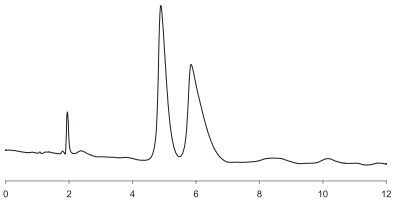
# 7-7. Enantiomer separations-ChiroSil ME

## DL-4 - Nitro - Phenylalanine



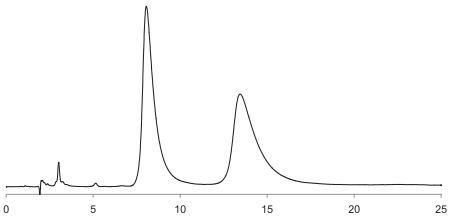

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 40 / 60
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 40°C
k' : 1.91 $\alpha$ : 1.51

## DL-Homo - Serine



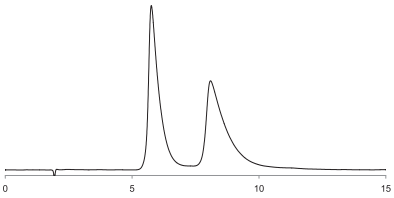

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 20°C
k' : 1.51 $\alpha$ : 1.32

## DL-BPA



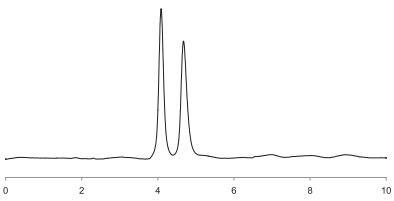

Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 0°C
k' : 3.14 $\alpha$ : 1.88

## DL-Thienylalnine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 0.01% $H_3PO_4$ / MeOH = 30 / 70
Flow rate: 1.0 ml/min
Detection: UV 210nm
Temperature: 0°C
k' : 1.96 $\alpha$ : 1.61

## DL-Naphtylalnine




Column: ChiroSil ME NF RCA(+) 5μm
Dimension: 150 X 4.6mm
Mobile phase: 5mM $HClO_4$ / MeOH = 50 / 50
Flow rate: 0.5 ml/min
Detection: UV 210nm
Temperature: 10°C
k' : 0.08 $\alpha$ : 2.99

## RStech Corporation

RStech is a leading company in technologies from synthesis of
chiral intermediates to chiral separation & analysis

(Office)
3th Floor Samoh Bldg. 151 Yeoksam-ro, Gangnam-gu,
Seoul, 06244, Korea

(R&D Center and Plant)
55, Osongsaengmyeong 5-ro, Osong-eup, Heungdeok-gu,
Cheongju-si, Chungcheongbuk-do, Korea

TEL : +82-70-5153-7000
Fax : 02-554-0134
Web Site : http://www.rstechcorp.co.kr
E-Mail : commercial@rstechcorp.co.kr