

# Columns for Special Separation Modes

## Column for Hydrophobic Interaction Chromatography

### Features

- PH-814**
- Separates proteins without denaturation
  - Applicable to samples obtained after ammonium sulfate fraction treatment

### Standard columns

Product Code	Product Name	Functional Group	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F6110003	<b>HIC PH-814</b>	Phenyl	10	2,000	<b>8.0 x 75</b>	H <sub>2</sub> O

Base Material : Polyhydroxymethacrylate

## Columns for Affinity Chromatography

### Features

- AFpak**
- Rigid polymer-based packing materials enable high speed analysis
  - Functional group is modified with chemically stable ligand (spacer)
  - Minimum detachment of functional groups ensures highly reproducible analysis

### Standard columns

Product Code	Product Name	Ligand	Ligand Load/Gel (g)	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F7118954	<b>AFpak ADS-894</b>	Dextran sulfate	30mg	18	<b>8.0 x 50</b>	50mM Sodium phosphate buffer + 0.02% NaN <sub>3</sub> (pH7.4)
F7118945	<b>AFpak AHR-894</b>	Heparin	5mg	18	<b>8.0 x 50</b>	10mM Tris-HCl buffer + 10mM NaCl + 0.02% NaN <sub>3</sub> (pH7.4)
F7118946	<b>AFpak APA-894</b>	Protein A	4mg	18	<b>8.0 x 50</b>	0.1M Sodium phosphate buffer + 0.5M NaCl + 0.02% NaN <sub>3</sub> (pH7.0)
F7113050	<b>AFpak APG-894</b>	Protein G	4–5mg	18	<b>8.0 x 50</b>	10mM Sodium phosphate buffer + 0.15M NaCl + 0.02% NaN <sub>3</sub> (pH7.4)
F7118959	<b>AFpak AWG-894</b>	Wheat germ agglutinin (WGA)	14mg	18	<b>8.0 x 50</b>	0.1M Tris-HCl buffer + 0.15M NaCl + 0.2M N-Acetylglucosamine + 0.02% NaN <sub>3</sub> (pH7.4)
F7118964	<b>AFpak ACH-494</b>	Choline oxydase, Acetylcholine esterase	–	18	<b>4.6 x 10</b>	10mM Phosphate buffer + 1.0M NaCl (pH7.4)

Base Material : Polyhydroxymethacrylate

## Columns for Chiral Separation

### Features

- CDBS-453**
- Separates optical isomers by using their conformational compatibility differences
  - Versatile column for chiral separation
  - Corresponds to USP L45
- CRX-853**
- Separates optical isomers by using the differences in metal complex formation capacities of functional group and metal ion in eluent and optical isomers
  - Suitable for amino acids, hydroxyl acids, and their derivatives

### Standard columns

Product Code	Product Name	Functional Group	Base Material	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F7146003	<b>ORpak CDBS-453</b>	β-Cyclodextrin derivative	Silica	3	<b>4.6 x 150</b>	1.0% Acetic acid + 0.2M NaCl aq. /CH <sub>3</sub> CN=70/30
F7140040	<b>ORpak CRX-853</b>	L-amino acid derivative	Polyhydroxymethacrylate	6	<b>8.0 x 50</b>	0.25mM CuSO <sub>4</sub> aq.
F6709300	<b>ORpak CRX-G</b>	L-amino acid derivative	Polyhydroxymethacrylate	6	<b>4.6 x 10</b>	0.25mM CuSO <sub>4</sub> aq.

## Column for High Temperature Reversed Phase Chromatography

### Features

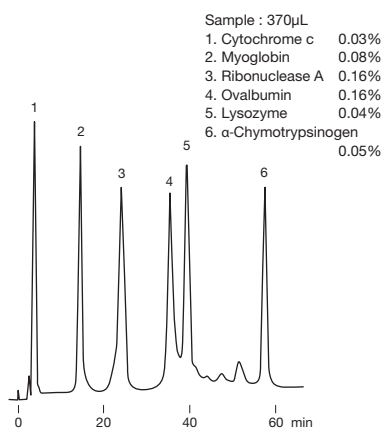
- ET-RP1**
- Capable of high temperature analysis up to 150°C
  - High temperature analysis improves column efficiency and enables rapid analysis
  - Corresponds to USP L67

### Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F7623001	<b>ET-RP1 4D</b>	≥ 11,000	Octadecyl	4	250	<b>4.6 x 150</b>	H <sub>2</sub> O/CH <sub>3</sub> CN=35/65

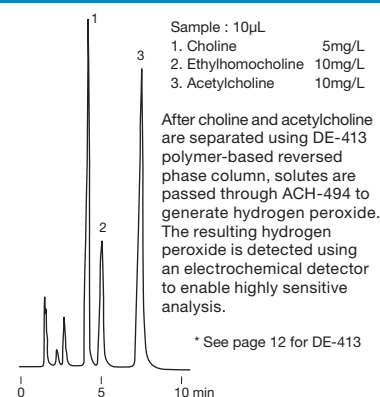
Base Material : Polyvinyl alcohol

## Protein separation by hydrophobic interaction chromatography



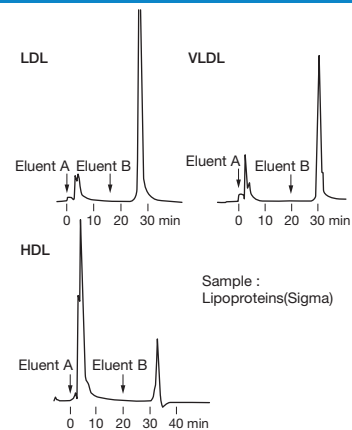
**Column** : Shodex HIC PH-814  
**Eluent** : (A); 1.8M Ammonium sulfate + (B)  
 (B); 0.1M Phosphate buffer (pH7.0)  
 Linear gradient; (A) to (B), 60min  
**Flow rate** : 1.0mL/min  
**Detector** : UV (280nm)  
**Column temp.** : Room temp.

## Choline and acetylcholine



**Column** : Shodex RSpak DE-413  
**Post column** : Shodex AFpak ACH-494  
**Eluent** : 0.1M H<sub>3</sub>PO<sub>4</sub> +  
 300mg/L Sodium 1-decansulfonate +  
 65mg/L Tetramethylammonium chloride  
 (pH8.0 adjusted by 1.0M NaOH)  
**Flow rate** : 1.0mL/min  
**Detector** : Electrochemical (Electrode : Pt, 350mV SCE)  
**Column temp.** : 37°C

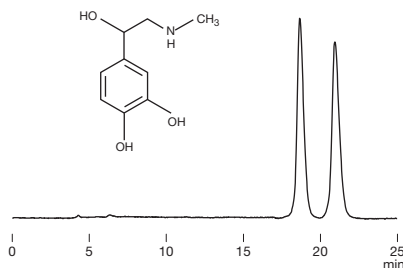
## Lipoproteins in plasma



**Column** : Shodex AFpak ADS-894  
**Eluent** : (A); 50mM Sodium phosphate buffer (pH7.4)  
 (B); (A) + 1.0M NaCl  
 Step gradient; (A) to (B)  
**Flow rate** : 1.0mL/min  
**Detector** : UV (280nm)  
**Column temp.** : Room temp.

## Chiral separation of epinephrines

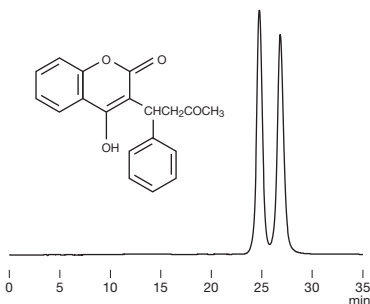
Sample : Epinephrine 50µg/mL, 50µL



**Column** : Shodex ORpak CDBS-453  
**Eluent** : 0.05% Acetic acid + 0.2M NaCl aq.  
 /CH<sub>3</sub>CN=95/5  
**Flow rate** : 0.5mL/min  
**Detector** : UV (254nm)  
**Column temp.** : 10°C

## Chiral separation of warfarin

Sample : Warfarin 20µg/mL, 20µL

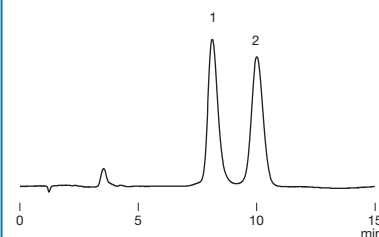


**Column** : Shodex ORpak CDBS-453  
**Eluent** : 1.0% Acetic acid + 0.2M NaCl aq.  
 /CH<sub>3</sub>CN=80/20  
**Flow rate** : 0.6mL/min  
**Detector** : UV (310nm)  
**Column temp.** : 16°C

## Chiral separation of lactic acids

Sample : Lactic acid 50µg/mL, 50µL

1. L-Lactic acid
2. D-Lactic acid

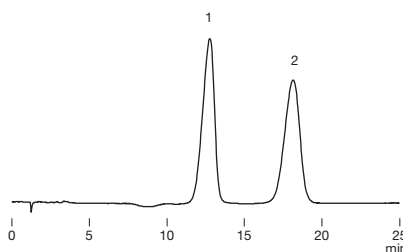


**Column** : Shodex ORpak CRX-853  
**Eluent** : 0.5mM CuSO<sub>4</sub> aq.  
**Flow rate** : 1.0mL/min  
**Detector** : UV (230nm)  
**Column temp.** : 50°C

## Chiral separation of mandelic acids

Sample : Mandelic acid 100µg/mL, 20µL

1. D-Mandelic acid
2. L-Mandelic acid

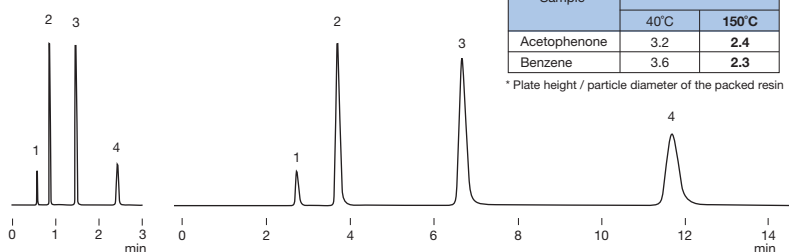


**Column** : Shodex ORpak CRX-853  
**Eluent** : 0.25mM CuSO<sub>4</sub> aq.  
**Flow rate** : 1.0mL/min  
**Detector** : UV (230nm)  
**Column temp.** : 50°C

## Comparison of ET-RP1's column efficiencies (theoretical plate height) observed at high and normal temperature conditions

high temp. (150°C)  
2.4mL/min

normal temp. (40°C)  
0.5mL/min



**Column** : Shodex ET-RP1 4D  
**Eluent** : (Left) H<sub>2</sub>O/CH<sub>3</sub>CN=50/50  
 (Right) H<sub>2</sub>O/CH<sub>3</sub>CN=75/25  
**Detector** : Photodiode array (210nm)  
**Column Oven** : Polaratherm 9000 Series  
 (SandraSelerity Technologies, Inc)

**Note** :  
 The eluent was introduced into the column after being preheated and was cooled after column elution, then introduced into the detector.

Data provided by Research Institute for Chromatography bvba