

Columns for Polymer-based Reversed Phase Chromatography (RSpak)

Please refer to “Comparison of the Features Among Shodex Reverse Phase Chromatography (RPC) Columns” on page 6 and 7 for features.

Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Base Material	Particle Size (µm)	Pore Size (Å)	Column Size (mm) I.D. x Length	Shipping Solvent
F7009000	RSpak RP18-415	≥ 5,000	–	Styrene divinylbenzene copolymer	6	450	4.6 x 150	H ₂ O/CH ₃ CN=5/95
F6709558	RSpak RP18-G	(guard column)	–	Styrene divinylbenzene copolymer	6	–	4.6 x 10	H ₂ O/CH ₃ CN/THF=40/30/30
F7001001	RSpak DS-613	≥ 6,500	–	Styrene divinylbenzene copolymer	6	200	6.0 x 150	H ₂ O/CH ₃ CN/THF=30/40/30
F7001012	RSpak DS-413	≥ 11,000	–	Styrene divinylbenzene copolymer	3.5	200	4.6 x 150	H ₂ O/CH ₃ CN/THF=40/30/30
F6700140	RSpak DS-G	(guard column)	–	Styrene divinylbenzene copolymer	10	–	4.6 x 10	H ₂ O/CH ₃ CN/THF=30/40/30
F7001004	RSpak DE-613	≥ 7,000	–	Polymethacrylate	6	25	6.0 x 150	H ₂ O
F7001005	RSpak DE-413	≥ 11,000	–	Polymethacrylate	4	25	4.6 x 150	H ₂ O/CH ₃ CN=50/50
F7009030	RSpak DE-413L	≥ 17,000	–	Polymethacrylate	4	25	4.6 x 250	H ₂ O/CH ₃ CN=50/50
F6700150	RSpak DE-G 4A (RSpak DE-G)	(guard column)	–	Polymethacrylate	10	–	4.6 x 10	H ₂ O
F7001007	RSpak DE-213	≥ 8,000	–	Polymethacrylate	4	25	2.0 x 150	H ₂ O/CH ₃ CN=50/50
F6700151	RSpak DE-G 2A (RSpak DE-SG)	(guard column)	–	Polymethacrylate	6	–	2.0 x 10	H ₂ O/CH ₃ CN=50/50
F7001002	RSpak DM-614	≥ 4,500	–	Polyhydroxymethacrylate	10	200	6.0 x 150	5mM H ₃ PO ₄ aq.
F6700160	RSpak DM-G 4A (RSpak DM-G)	(guard column)	–	Polyhydroxymethacrylate	12	–	4.6 x 10	5mM H ₃ PO ₄ aq.
F7008140	RSpak NN-814	≥ 9,000	Sulfo	Polyhydroxymethacrylate	10	200	8.0 x 250	0.1M Sodium phosphate buffer (pH3.0)
F7008150	RSpak NN-614	≥ 4,000	Sulfo	Polyhydroxymethacrylate	10	200	6.0 x 150	0.1M Sodium phosphate buffer (pH3.0)
F6700510	RSpak NN-G	(guard column)	Sulfo	Polyhydroxymethacrylate	10	–	6.0 x 50	0.1M Sodium phosphate buffer (pH3.0)
F7008160	RSpak NN-414	≥ 6,000	Sulfo	Polyhydroxymethacrylate	10	200	4.6 x 150	0.1M Sodium phosphate buffer (pH3.0)
F7008240	RSpak JJ-50 4D	≥ 4,500	Quaternary ammonium	Polyvinyl alcohol	5	100	4.6 x 150	H ₂ O/CH ₃ CN=40/60
F7008220	RSpak JJ-50 2D	≥ 3,500	Quaternary ammonium	Polyvinyl alcohol	5	100	2.0 x 150	H ₂ O/CH ₃ CN=40/60

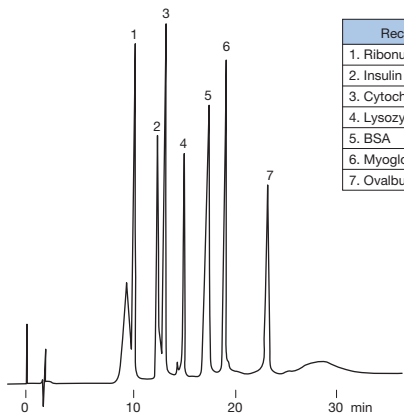
Semi-micro columns * The following semi-micro columns are made to order.

Product Code	Product Name	Functional Group	Base Material	Particle Size (μm)	Pore Size (\AA)	Column Size (mm) I.D. x Length
F7840123	DE413-2B	–	Polymethacrylate	4	25	2.0 x 50
F7840121	DE413-2E	–	Polymethacrylate	4	25	2.0 x 250
F7860122	NN414-2D	Sulfo	Polyhydroxymethacrylate	10	200	2.0 x 150

Preparative columns * Preparative columns are made to order.

Product Code	Product Name	Plate Number (TP/column)	Particle Size (μm)	Column Size (mm) I.D. x Length	Standard Column
F6513013	RSpak DE-2013	$\geq 10,000$	12	20.0 x 300	DE-413, DE-613
F6700190	RSpak DE-G 8B (RSpak DE-LG)	(guard column)	12	8.0 x 50	DE-413, DE-613
F6513015	RSpak DE-5013	–	12	50.0 x 300	DE-413, DE-613
F6700191	RSpak DE-G 20C (RSpak DE-LLG)	(guard column)	12	20.0 x 100	(guard column)
F6514014	RSpak DM-2014	$\geq 5,000$	12	20.0 x 300	DM-614
F6700404	RSpak DM-G 8B (RSpak DM-LG)	(guard column)	12	8.0 x 50	(guard column)
F6514022	RSpak DM-5014	–	12	50.0 x 300	DM-614
F6700162	RSpak DM-G 20C (RSpak DM-LLG)	(guard column)	12	20.0 x 100	(guard column)

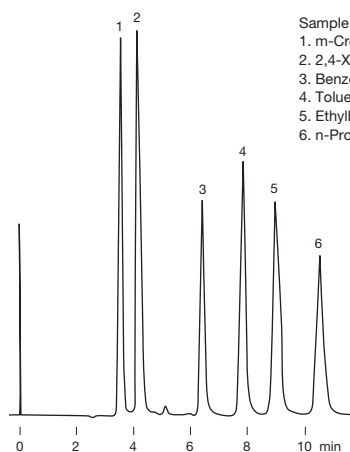
Separation and recovery rate of standard proteins



Recovery (%)	
1. Ribonuclease A	93
2. Insulin	98
3. Cytochrome c	100
4. Lysozyme	100
5. BSA	98
6. Myoglobin	108
7. Ovalbumin	-

Column : Shodex RSpak RP18-415
Eluent : (A); 0.1% TFA aq./CH₃CN=99/1
 (B); 0.1% TFA aq./CH₃CN=5/95
 Linear gradient; (B%) 20% to 60%, 20min
Flow rate : 1.0mL/min
Detector : UV (220nm)
Column temp. : Room temp.

Alkylbenzenes

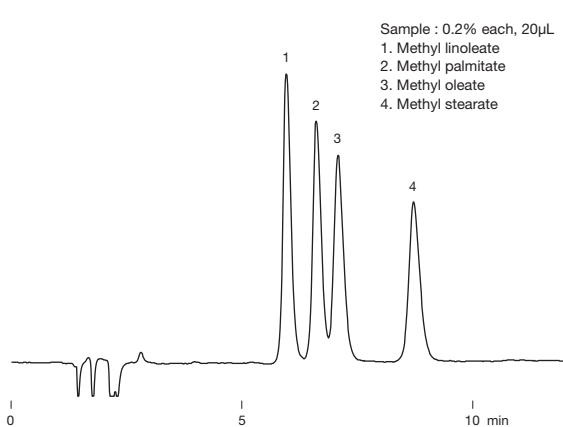


Sample : 5µL

1. m-Cresol	0.1%
2. 2,4-Xylenol	0.1%
3. Benzene	0.5%
4. Toluene	0.5%
5. Ethylbenzene	0.5%
6. n-Propylbenzene	0.5%

Column : Shodex RSpak DS-613
Eluent : H₂O/CH₃CN/THF=30/40/30
Flow rate : 1.0mL/min
Detector : UV (254nm)
Column temp. : 40°C

Fatty acid methyl esters

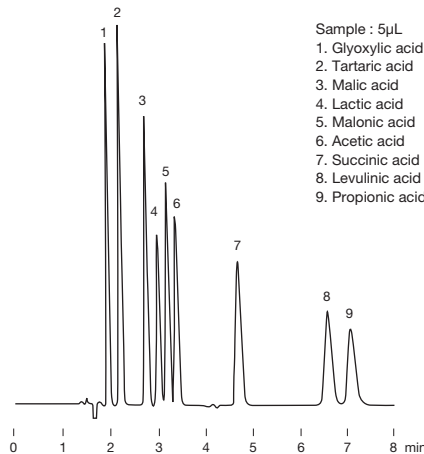


Sample : 0.2% each, 20µL

1. Methyl linoleate
2. Methyl palmitate
3. Methyl oleate
4. Methyl stearate

Column : Shodex RSpak DS-413
Eluent : H₂O/CH₃CN/THF=25/45/30
Flow rate : 1.0mL/min
Detector : RI
Column temp. : 40°C

Organic acids

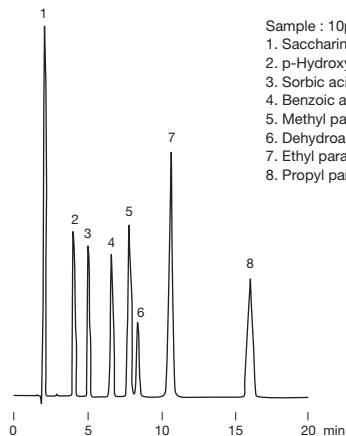


Sample : 5µL

1. Glyoxylic acid	1.78mg/mL
2. Tartaric acid	1.95mg/mL
3. Malic acid	2.06mg/mL
4. Lactic acid	2µL/mL
5. Malonic acid	1.95mg/mL
6. Acetic acid	2µL/mL
7. Succinic acid	2.05mg/mL
8. Levulinic acid	1.95mg/mL
9. Propionic acid	2µL/mL

Column : Shodex RSpak DE-413
Eluent : 10mM H₃PO₄ aq.
Flow rate : 1.0mL/min
Detector : RI
Column temp. : 50°C

Food additives (Preservatives)

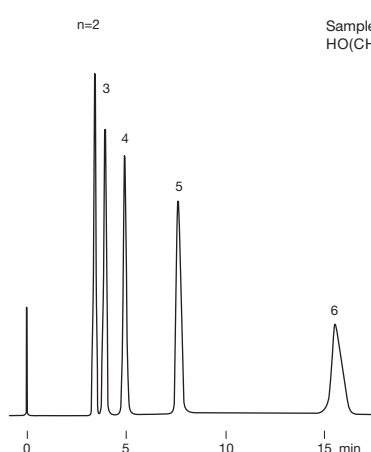


Sample : 10µL

1. Saccharin sodium	0.005%
2. p-Hydroxybenzoic acid	0.005%
3. Sorbic acid	0.02%
4. Benzoic acid	0.02%
5. Methyl paraben	0.01%
6. Dehydroacetic acid	0.01%
7. Ethyl paraben	0.02%
8. Propyl paraben	0.02%

Column : Shodex RSpak DE-413
Eluent : 50mM KH₂PO₄ + 0.1% H₃PO₄ aq.
 /CH₃CN=65/35
Flow rate : 1.0mL/min
Detector : UV (210nm)
Column temp. : 40°C

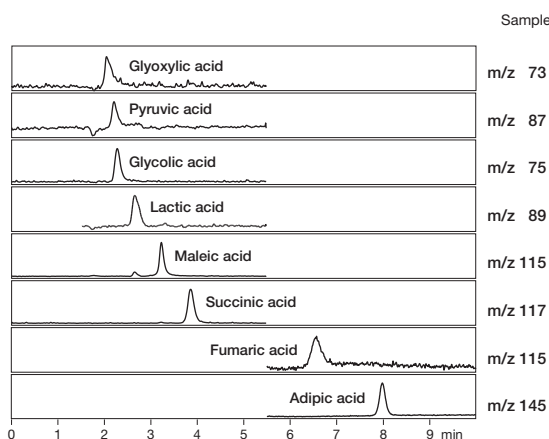
Diols



Sample : 1% each, 7.5µL
HO(CH₂)_nOH

Column : Shodex RSpak DE-613
Eluent : H₂O
Flow rate : 1.0mL/min
Detector : RI
Column temp. : 60°C

LC/MS analysis of organic acids

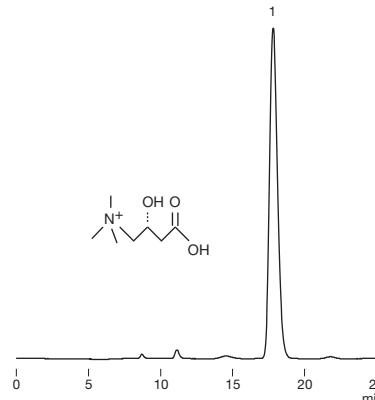


Sample : 50ng/mL each, 10µL

Column : Shodex RSPak DE-213
Eluent : (A); 0.1% (v/v) Formic acid aq. (B); CH₃CN
 Linear gradient; B%; 5% (0min)→5% (2min)→15% (2.5min)→15% (10min)
Flow rate : 0.2mL/min
Detector : ESI-MS (SIM Negative)
Column temp. : 30°C

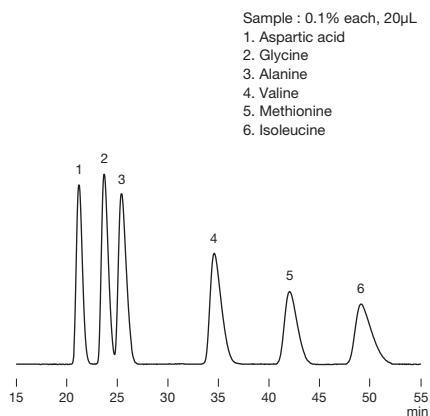
Carnitine

Sample : 20µL
 1. L-Carnitine 0.1%



Column : Shodex RSPak NN-814
Eluent : 0.1M H₃PO₄ aq.
Flow rate : 1.0mL/min
Detector : UV (210nm)
Column temp. : 25°C

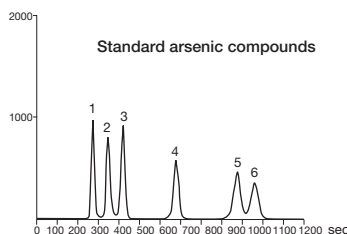
Amino acids



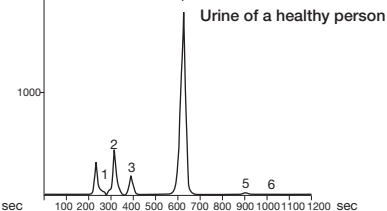
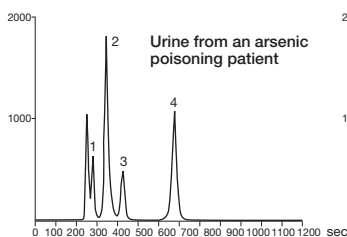
Sample : 0.1% each, 20µL
 1. Aspartic acid
 2. Glycine
 3. Alanine
 4. Valine
 5. Methionine
 6. Isoleucine

Column : Shodex RSPak NN-814
Eluent : 40mM H₃PO₄ aq.
Flow rate : 1.0mL/min
Detector : RI
Column temp. : 40°C

Speciation of arsenic



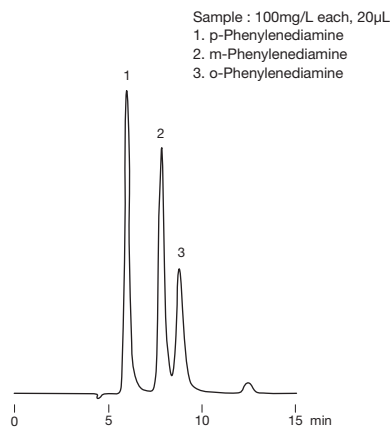
Sample : Arsenic compounds, 50µL
 1. Monomethylarsinic acid
 2. Arsinic acid
 3. Dimethylarsinic acid
 4. Arsenobetaine
 5. Tetramethylarsonium
 6. Trimethylarsine oxide



Column : Shodex RSPak NN-614
Eluent : 5mM HNO₃/8mM NH₄NO₃ aq.
Flow rate : 0.8mL/min
Detector : ICP-MS (SIM m/z 75)

Source:
 Noriko Tsunoda,
 Pharmacia. 1998, vol.34, No.12, p.1237-1241

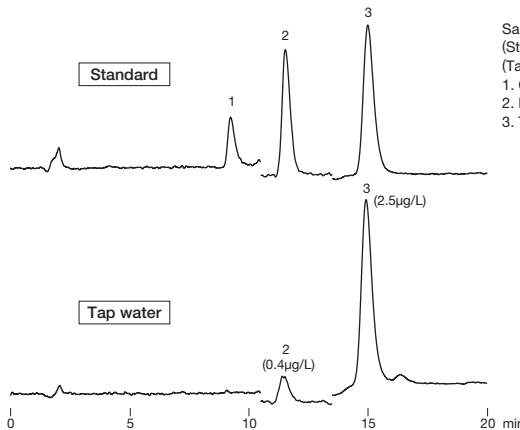
Phenylenediamine isomers



Sample : 100mg/L each, 20µL
 1. p-Phenylenediamine
 2. m-Phenylenediamine
 3. o-Phenylenediamine

Column : Shodex RSPak JJ-50 4D
Eluent : 25mM Ammonium acetate buffer
 (pH9.2)/CH₃CN=70/30
Flow rate : 0.4mL/min
Detector : UV (254nm)
Column temp. : 30°C

LC/MS analysis of haloacetic acids



Sample : 50µL each
 (Standard) 2ng/mL each
 (Tap water)
 1. Chloroacetic acid
 2. Dichloroacetic acid
 3. Trichloroacetic acid

Column : Shodex RSPak JJ-50 2D
Eluent : 25mM Ammonium acetate aq. (pH9.2)/CH₃CN=50/50
Flow rate : 0.2mL/min
Detector : Chloroacetic acid : ESI-MS (SIM Negative : m/z 93)
 Dichloroacetic acid : ESI-MS/MS (MRM Negative : m/z 127→83)
 Trichloroacetic acid : ESI-MS (SIM Negative : m/z 161)
Column temp. : 40°C