

Polymer-based Hydrophilic Interaction Chromatography (HILIC) Columns (HILICpak)

Features

VG-25 New VG-50

- Suitable for saccharide analysis using HILIC mode
- High recovery rate of reducing saccharides
- Polymer-based packing material provides excellent chemical stability and minimum deterioration over an extended time period
- Easily regenerated by washing in an alkaline solution
- Appropriate for evaporative light scattering detector, corona charged aerosol detector, and LC/MS
- With smaller packing material, VG-25 provides an improved separation ability

VT-50 2D

- Suitable for anionic substances (especially phosphate compounds) analysis using HILIC mode
- Use of some eluents add ion exchange mode
- Polymer-based packing material provides excellent chemical stability and minimum deterioration over an extended time period
- Suitable for LC/MS analysis

VC-50 2D

- Modified carboxyl group is suitable for cationic substance analysis including amines
- The dominant separation mode is RP or IEX rather than HILIC mode

VN-50

- The modified diol groups on the packing material create the HILIC mode
- Suitable for oligonucleotide and oligosaccharide separation which is not possible by SEC or conventional HILIC columns
- Physical weakness of PEEK housing is supported by adopting double structured, outer SUS, housing for VN-50 1D, which allows its use under high pressure conditions
- Small inner diameter (1.0 mm) of VN-50 1D allows its use at 0.1-mL/min flow rate, which is suitable for LC/MS high sensitivity analyses

VG

- **Standard columns** (Housing Material: PEEK [VG-25 series], SUS [VG-50 series])

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
F7631000	HILICpak VG-25 4D New	≥ 16,500	Amino	2.5	130	4.6 x 150	H ₂ O/CH ₃ CN = 20/80
F6711800	HILICpak VG-25G 4A New	(guard column)	Amino	2.5	130	4.6 x 10	H ₂ O/CH ₃ CN = 20/80
F7630200	HILICpak VG-50 4D	≥ 5,500	Amino	5	100	4.6 x 150	H ₂ O/CH ₃ CN = 20/80
F7630100	HILICpak VG-50 4E	≥ 7,500	Amino	5	100	4.6 x 250	H ₂ O/CH ₃ CN = 20/80
F6711100	HILICpak VG-50G 4A	(guard column)	Amino	5	100	4.6 x 10	H ₂ O/CH ₃ CN = 20/80

Base Material: Polyvinyl alcohol

- **Semi-micro columns** (Housing Material: PEEK)

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
F7631100	HILICpak VG-25 2B New	≥ 3,500	Amino	2.5	130	2.0 x 50	H ₂ O/CH ₃ CN = 15/85
F6711900	HILICpak VG-25G 2A New	(guard column)	Amino	2.5	130	2.0 x 10	H ₂ O/CH ₃ CN = 15/85
F7630300	HILICpak VG-50 2D	≥ 3,500	Amino	5	100	2.0 x 150	H ₂ O/CH ₃ CN = 15/85
F6711200	HILICpak VG-50G 2A	(guard column)	Amino	5	100	2.0 x 10	H ₂ O/CH ₃ CN = 15/85

Base Material: Polyvinyl alcohol

VT-50

- **Semi-micro columns** (Housing Material: PEEK)

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
F7630400	HILICpak VT-50 2D	≥ 4,500	Quaternary ammonium	5	100	2.0 x 150	25 mM HCOONH ₄ aq./ CH ₃ CN = 15/85
F6711300	HILICpak VT-50G 2A	(guard column)	Quaternary ammonium	5	100	2.0 x 10	25 mM HCOONH ₄ aq./ CH ₃ CN = 15/85

Base Material: Polyvinyl alcohol

VC-50

- **Semi-micro columns** (Housing Material: PEEK)

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
F7630700	HILICpak VC-50 2D	≥ 3,500	Carboxyl	5	100	2.0 x 150	H ₂ O
F6711600	HILICpak VC-50G 2A	(guard column)	Carboxyl	5	100	2.0 x 10	H ₂ O

Base Material: Polyvinyl alcohol

VN-50

Standard columns (Housing Material: PEEK)

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
F7630500	HILICpak VN-50 4D	≥ 10,000	Diol	5	100	4.6 x 150	H ₂ O/CH ₃ CN = 25/75
F6711400	HILICpak VN-50G 4A	(guard column)	Diol	5	100	4.6 x 10	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

Semi-micro columns (Housing Material: PEEK)

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
F7630600	HILICpak VN-50 2D	≥ 3,500	Diol	5	100	2.0 x 150	H ₂ O/CH ₃ CN = 25/75
F6711500	HILICpak VN-50G 2A	(guard column)	Diol	5	100	2.0 x 10	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

Semi-micro columns (Housing material: Outer SUS and inner (wetted part) PEEK double structure) [VN-50 1D is made to order]

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
F7630800	HILICpak VN-50 1D New	≥ 2,800	Diol	5	100	1.0 x 150	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

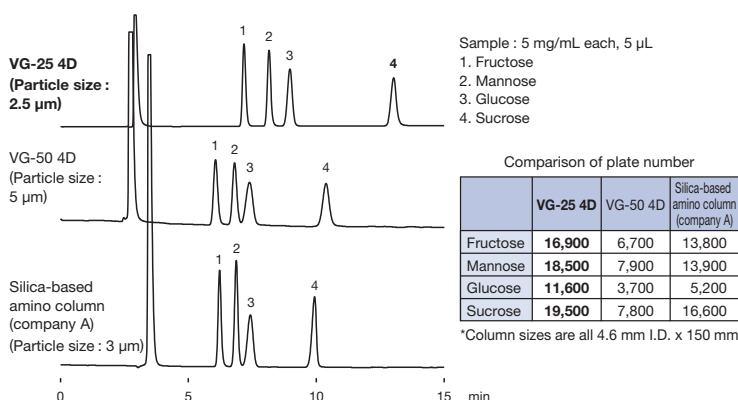
Preparative columns (Housing Material: SUS [VN-50 10E], PEEK [VN-50G 4A]) [VN-50 10E is made to order]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (μm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6830100	HILICpak VN-50 10E	≥ 11,000	Diol	5	10.0 x 250	H ₂ O/CH ₃ CN = 25/75
F6711400	HILICpak VN-50G 4A	(guard column)	Diol	5	4.6 x 10	H ₂ O/CH ₃ CN = 25/75

Base Material: Polyvinyl alcohol

Comparisons of separation ability

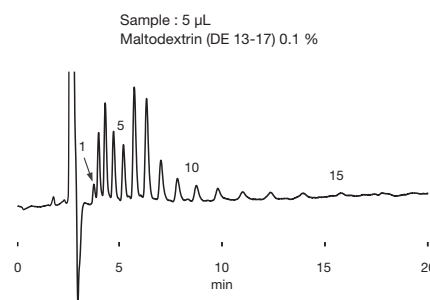
The new VG-25 4D showed significantly higher theoretical plate number over VG-50 4D. It also provided superior separation over other manufacturer's column (3 μm particles).



Column : Shodex HILICpak VG-25 4D, Shodex HILICpak VG-50 4D
Eluent : H₂O/CH₃CN = 20/80
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 40 °C

Maltodextrin

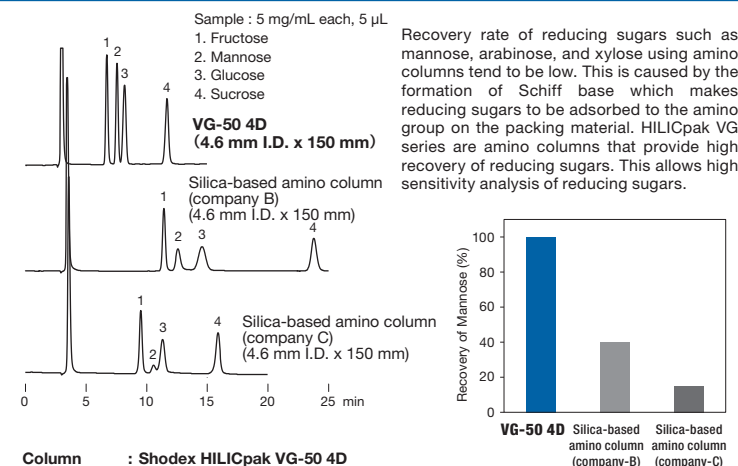
VG-25 4D can analyze oligosaccharides in a range of 1 to 15 saccharides using an isocratic elution instead of gradient elution generally used.



Note : The numbers mentioned on the chromatogram peaks are degree of polymerization (Dp).

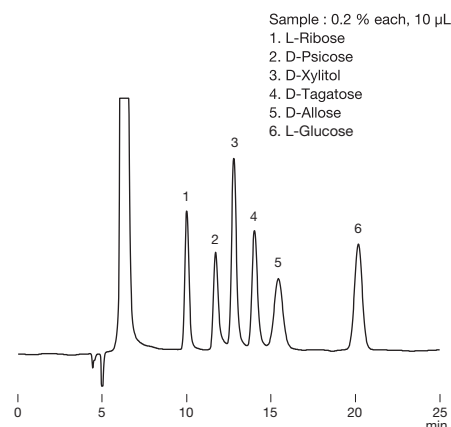
Column : Shodex HILICpak VG-25 4D
Eluent : H₂O/CH₃CN = 35/65
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 60 °C

Recovery of reducing sugar



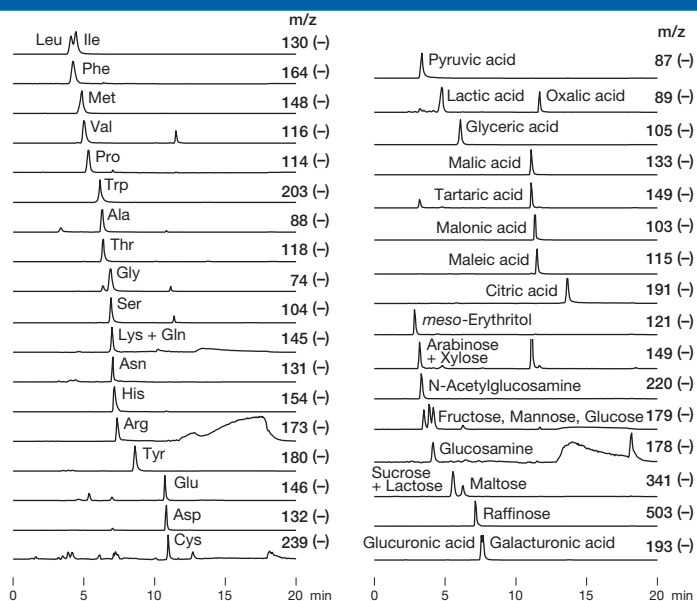
Column : Shodex HILICpak VG-50 4D
Eluent : H₂O/CH₃CN = 20/80
Flow rate : 0.6 mL/min (VG-50 4D)
1.0 mL/min (Silica based amino column)
Detector : RI
Column temp. : 40 °C

Rare sugar



Column : Shodex HILICpak VG-50 4E
Eluent : H₂O/CH₃CN/CH₃OH = 5/85/10
Flow rate : 0.6 mL/min
Detector : RI
Column temp. : 50 °C

Simultaneous analysis of saccharides, organic acids and amino acids with LC/MS

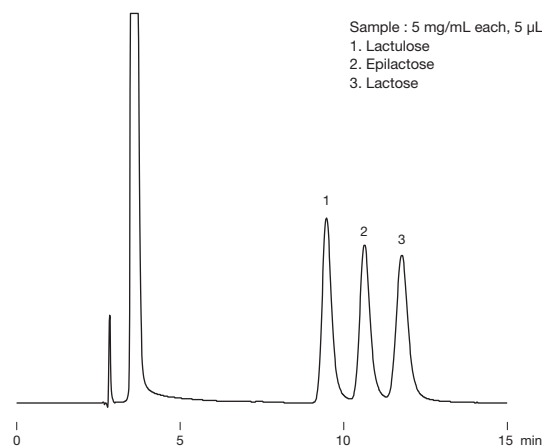


Sample : 1 µg/mL each (in H₂O/CH₃CN = 1/4), 5 µL

VG-50 2D allows simultaneous analysis of saccharides, organic acids and amino acids with LC/MS detection under alkaline conditions. High anionic substances elute under alkaline conditions. Furthermore, alkaline conditions promote the deprotonation of hydroxyl groups at the time of ionization. Therefore, alkaline conditions are suitable for high sensitive detection of substances with hydroxyl groups such as saccharides under the negative mode.

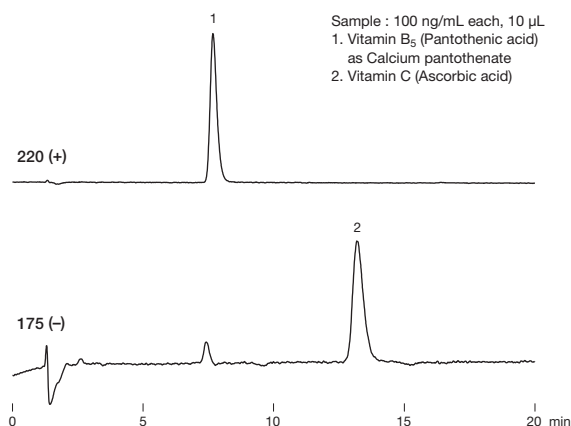
Column : Shodex HILICpak VG-50 2D
Eluent : (A); 0.5 % NH₃ aq./ (B); CH₃CN
 Linear gradient (High pressure);
 80 B % (0 to 2 min), 80 B % to 10 B % (2 to 12 min),
 10 B % (12 to 15 min), 80 B % (15 to 20 min)
Flow rate : 0.2 mL/min
Detector : ESI-MS (SIM)
Column temp. : 40 °C

Lactose, epilactose, and lactulose



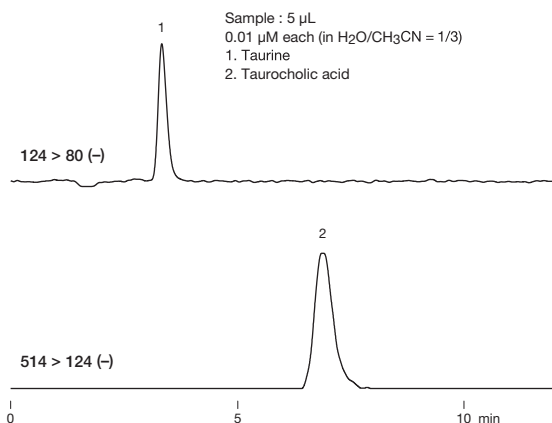
Column : Shodex HILICpak VG-50 4E
Eluent : H₂O/CH₃CN/CH₃OH = 5/75/20
Flow rate : 1.0 mL/min
Detector : RI
Column temp. : 40 °C

LC/MS analysis of pantothenic acid and vitamin C



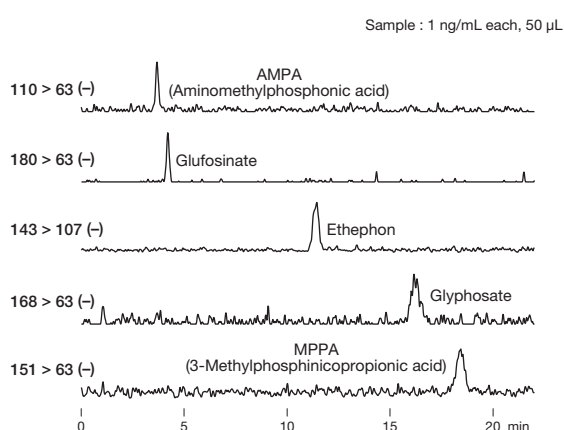
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM HCOONH₄ aq./CH₃CN = 30/70
Flow rate : 0.2 mL/min
Detector : ESI-MS (SIM)
Column temp. : 30 °C

LC/MS/MS analysis of organic sulfonic acids



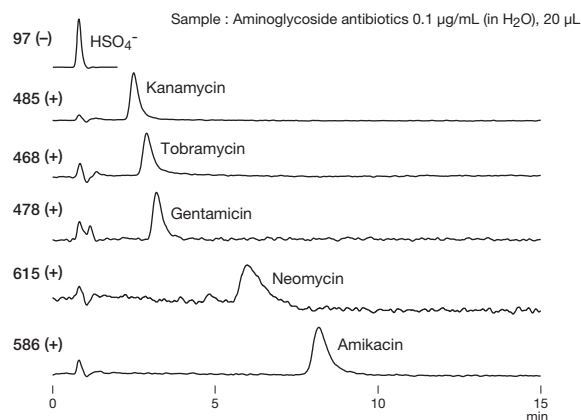
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM HCOONH₄ aq./CH₃CN = 20/80
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 30 °C

LC/MS/MS analysis of glyphosate and glufosinate



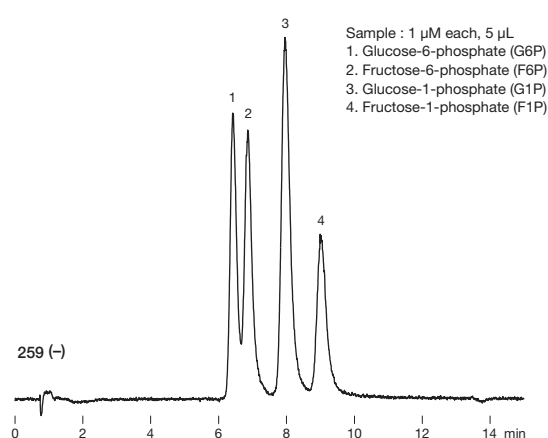
Column : Shodex HILICpak VT-50 2D
Eluent : 50 mM NH₄HCO₃ aq./CH₃CN = 50/50
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 40 °C

LC/MS analysis of aminoglycoside antibiotics



Column : Shodex HILICpak VC-50 2D
Eluent : (A); 1.5 % NH₃ aq./ (B); CH₃CN
 Linear gradient (High pressure);
 30 B % to 10 B % (0 to 5 min), 10 B % (5 to 15 min)
Flow rate : 0.3 mL/min
Detector : ESI-MS (SIM)
Column temp. : 40 °C

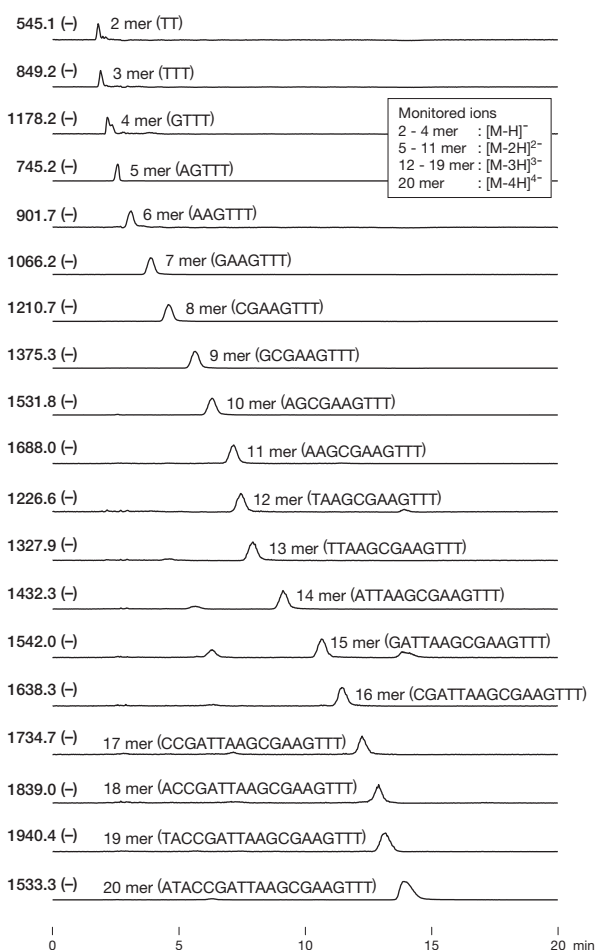
LC/MS analysis of phosphorylated saccharides



Column : Shodex HILICpak VT-50 2D
Eluent : 25 mM HCOONH₄ aq./CH₃CN = 80/20
Flow rate : 0.3 mL/min
Detector : ESI-MS (SIM)
Column temp. : 60 °C

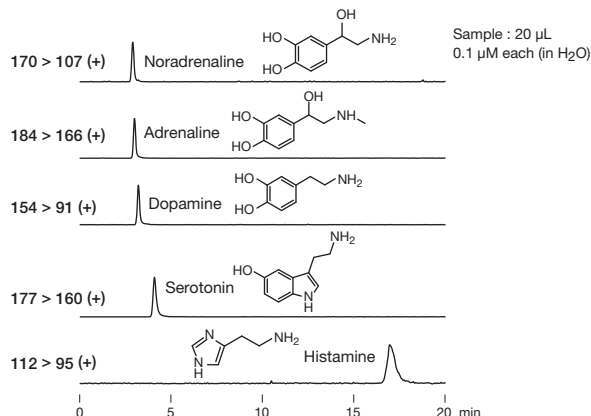
LC/MS analysis of oligo DNA

Sample : 1 µL
 Synthesized oligo DNA 20 mer (ATACCGATTAAGCGAAGTTT; crude)
 2.2 mg/mL (in H₂O)



Column : Shodex HILICpak VN-50 2D
Eluent : (A); 50 mM HCOONH₄ aq./ (B); CH₃CN
 Linear gradient;
 60 B % (0 to 10 min), 60 B % to 55 B % (10 to 15 min),
 60 B % (15 to 20 min)
Flow rate : 0.2 mL/min
Detector : ESI-MS (SIM)
Column temp. : 40 °C

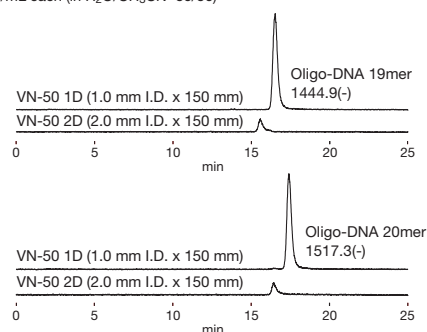
LC/MS/MS analysis of monoamine neurotransmitters



Column : Shodex HILICpak VC-50 2D
Eluent : (A); 200 mM HCOOH aq./ (B); CH₃CN
 Linear gradient (High pressure);
 60 B % (0 to 5 min), 60 B % to 10 B % (5 to 6 min), 10 B % (6 to 20 min)
Flow rate : 0.3 mL/min
Detector : ESI-MS/MS (MRM)
Column temp. : 40 °C

High sensitive analysis of oligo DNA by VN-50 1D

Sample : 0.4 µL
 Synthesized oligo-DNA 19mer (TTCTCATGGTCTTCGGAA; crude)
 Synthesized oligo-DNA 20mer (CTTCTCATGGTCTTCGGAA; crude)
 0.05 mg/mL each (in H₂O/CH₃CN=50/50)



Column : Shodex HILICpak VN-50 1D, Shodex HILICpak VN-50 2D
Eluent : (A); 50 mM HCOONH₄ aq. / (B); CH₃CN
 Linear gradient;
 65 B % to 50 B % (0 to 20 min), 50 B % to 65 B % (20 to 20.01 min),
 65 B % (20.01 to 25 min)
Flow rate : 0.1 mL/min (VN-50 1D), 0.3 mL/min (VN-50 2D)
Detector : ESI-MS (SIM Negative)
Column temp. : 40 °C