Ion Chromatography Columns (Anion Analysis)

Features

NI-424 **I-524A**	• Ideal for anion non-suppressor methods • NI-424 provides simultaneous analysis of fluoride and phosphate ions
SI-90 4E **SI-50 4E** **SI-52 4E**	• Suitable for anion suppressor methods with sodium carbonate eluent • Suitable for the quantitative analysis of fluoride ion • SI-50 4E separates target inorganic anions from organic acids • SI-52 4E provides simultaneous analysis of oxyhalides and general inorganic ions • Carbonate peak does not interfere with analysis
SI-35	• Columns for rapid analysis with suppressor method with sodium carbonate eluent • SI-35 4D provides rapid analysis of oxyhalides and general inorganic ions • SI-35 2B provides rapid analysis of general inorganic ions
New **SI-36 4D**	• A column using potassium hydroxide as eluent for anion analysis with suppressor method • Good separation of sulfite ion / sulfate ion • Analysis of seven general inorganic anions within 30 minutes under isocratic conditions

For anion non-suppressor method

●Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995243	**IC NI-424**	≥ 5,000	Quaternary ammonium	5	**4.6 x 100**	8 mM 4-Hydroxybenzoic acid + 2.8 mM Bis-Tris + 2 mM Phenylboronic acid + 0.005 mM CyDTA aq.
F6709616	**IC NI-G**	(guard column)	Quaternary ammonium	5	**4.6 x 10**	8 mM 4-Hydroxybenzoic acid + 2.8 mM Bis-Tris + 2 mM Phenylboronic acid + 0.005 mM CyDTA aq.
F6995240	**IC I-524A**	≥ 2,000	Quaternary ammonium	12	**4.6 x 100**	2.5 mM Phthalic acid aq.
F6700400	**IC IA-G**	(guard column)	Quaternary ammonium	12	**4.6 x 10**	2.5 mM Phthalic acid aq.

Base Material: Polyhydroxymethacrylate Housing Material: SUS

For anion suppressor method (Sodium carbonate eluent)

●Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995244	**IC SI-90 4E**	≥ 5,000	Quaternary ammonium	9	**4.0 x 250**	1.8 mM Na_2CO_3 + 1.7 mM $NaHCO_3$ aq.
F6709620	**IC SI-90G**	(guard column)	Quaternary ammonium	9	**4.6 x 10**	1.8 mM Na_2CO_3 + 1.7 mM $NaHCO_3$ aq.
F6995245	**IC SI-50 4E**	≥ 10,000	Quaternary ammonium	5	**4.0 x 250**	3.2 mM Na_2CO_3 + 1.0 mM $NaHCO_3$ aq.
F6709625	**IC SI-50G**	(guard column)	Quaternary ammonium	5	**4.6 x 10**	3.2 mM Na_2CO_3 + 1.0 mM $NaHCO_3$ aq.

Base Material: Polyvinyl alcohol Housing Material: PEEK

[For oxyhalides suppressor method]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995260	**IC SI-52 4E**	≥ 14,000	Quaternary ammonium	5	**4.0 x 250**	3.6 mM Na_2CO_3 aq.
F6709626	**IC SI-92G**	(guard column)	Quaternary ammonium	9	**4.6 x 10**	3.6 mM Na_2CO_3 aq.

Base Material: Polyvinyl alcohol Housing Material: PEEK

[For rapid analysis]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995290	**IC SI-35 4D**	≥ 13,000	Quaternary ammonium	3.5	**4.0 x 150**	3.6 mM Na_2CO_3 aq.
F6709627	**IC SI-95G**	(guard column)	Quaternary ammonium	9	**4.6 x 10**	3.6 mM Na_2CO_3 aq.

Base Material: Polyvinyl alcohol Housing Material: PEEK

●Semi-micro columns

[For rapid analysis]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995291	**IC SI-35 2B**	≥ 4,000	Quaternary ammonium	3.5	**2.0 x 50**	1.0 mM Na_2CO_3 + 2.0 mM $NaHCO_3$ aq.

Base Material: Polyvinyl alcohol Housing Material: PEEK

For anion suppressor method (Potassium hydroxide eluent)

●Standard columns

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6999361	New **IC SI-36 4D**	≥ 8,500	Quaternary ammonium	3.5	**4.0 x 150**	25 mM KOH aq.

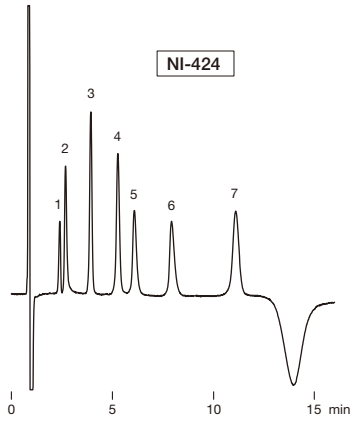
Base Material: Polyvinyl alcohol Housing Material: PEEK

[Guard filter for SI-35 2B]

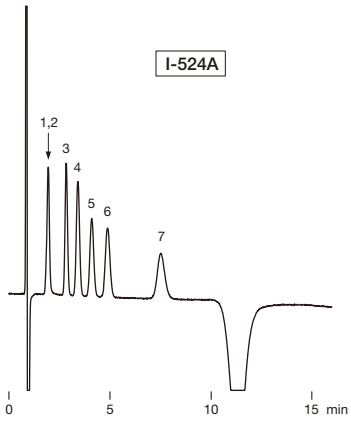
Product Code	Product Name	Contents
F6709720	**IC SI-2GF**	One holder and one filter
F6709730	**IC SI-2GF filter**	3 filters

Removes insoluble components in the sample

Anion analysis using NI-424 and I-524A (non-suppressor methods)



Sample : 20 µL
1. $H_2PO_4^-$ 10 mg/L
2. F^- 1 mg/L
3. Cl^- 1 mg/L
4. NO_2^- 5 mg/L
5. Br^- 5 mg/L
6. NO_3^- 5 mg/L
7. SO_4^{2-} 5 mg/L



With twice increased theoretical plate number, NI-424 provides a higher performance compared to I-524A.

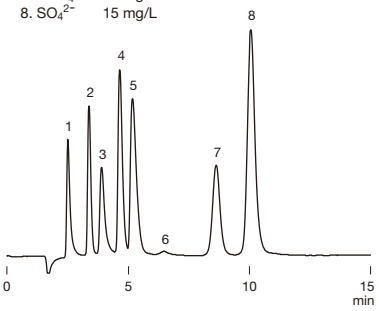
[Features of NI-424]
(1) Enables the separation of $H_2PO_4^-$ and F^- which were difficult to separate with I-524A.
(2) Provides sharper peaks, and resolution between all peaks are well defined. Especially, the separation of Cl^- and NO_2^- is improved.

Column : **Shodex IC NI-424**
Eluent : 8 mM 4-Hydroxybenzoic acid + 2.8 mM Bis-Tris + 2 mM Phenylboronic acid + 0.005 mM CyDTA* aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 °C
*CyDTA : trans-1,2-Diaminocyclohexane-N,N,N',N'-tetra acetic acid

Column : **Shodex IC I-524A**
Eluent : 2.5 mM Phthalic acid + 2.3 mM Tris(hydroxymethyl)aminomethane aq.
Flow rate : 1.2 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 °C

Anion analysis using SI-90 4E (suppressor method)

Sample : 20 µL
1. F^- 2 mg/L
2. Cl^- 3 mg/L
3. NO_2^- 5 mg/L
4. Br^- 10 mg/L
5. NO_3^- 10 mg/L
6. HCO_3^- 300 mg/L
7. HPO_4^{2-} 15 mg/L
8. SO_4^{2-} 15 mg/L

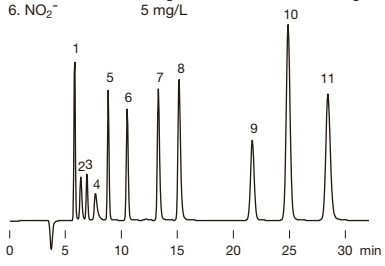


Column : **Shodex IC SI-90 4E**
Eluent : 1.8 mM Na_2CO_3 + 1.7 mM $NaHCO_3$ aq.
Flow rate : 1.5 mL/min
Detector : Suppressed conductivity
Column temp. : Room temp. (25 °C)

Anion analysis using SI-90 4E (suppressor method)

SI-50 4E is a high performance type of SI-90 4E. Acetic acid, formic acid, and methacrylic acid eluted between F^- and Cl^-.
The carbonate system peak appears between NO_2^- and Br^- peaks.

Sample : 20 µL
1. F^- 2 mg/L
2. Acetic acid 10 mg/L
3. Formic acid 2 mg/L
4. Methacrylic acid 10 mg/L
5. Cl^- 3 mg/L
6. NO_2^- 5 mg/L
7. Br^- 10 mg/L
8. NO_3^- 10 mg/L
9. HPO_4^{2-} 15 mg/L
10. SO_4^{2-} 15 mg/L
11. Oxalic acid 15 mg/L

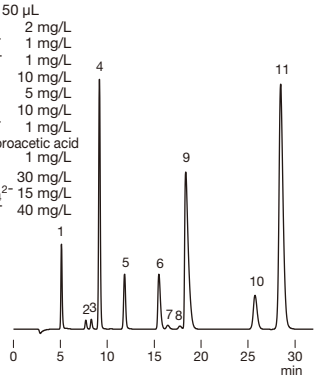


Column : **Shodex IC SI-50 4E**
Eluent : 3.2 mM Na_2CO_3 + 1.0 mM $NaHCO_3$ aq.
Flow rate : 0.7 mL/min
Detector : Suppressed conductivity
Column temp. : 25 °C

Oxyhalides and anions analysis using SI-52 4E (suppressor method)

SI-52 4E is a high resolution column offering 14,000 or higher theoretical plate number. It supports simultaneous analysis of oxyhalides and inorganic anions. It is recommended to set the column temperature at 45 °C.

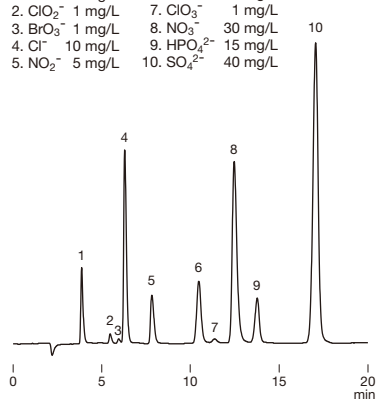
Sample : 50 µL
1. F^- 2 mg/L
2. ClO_2^- 1 mg/L
3. BrO_3^- 1 mg/L
4. Cl^- 10 mg/L
5. NO_2^- 5 mg/L
6. Br^- 10 mg/L
7. ClO_3^- 1 mg/L
8. Dichloroacetic acid 1 mg/L
9. NO_3^- 30 mg/L
10. HPO_4^{2-} 15 mg/L
11. SO_4^{2-} 40 mg/L



Column : **Shodex IC SI-52 4E**
Eluent : 3.6 mM Na_2CO_3 aq.
Flow rate : 0.8 mL/min
Detector : Suppressed conductivity
Column temp. : 45 °C

Rapid analysis of oxyhalides and anions using SI-35 4D (suppressor method)

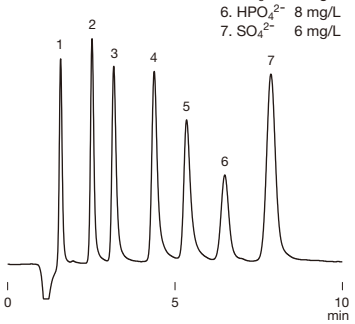
Sample : 20 µL
1. F^- 2 mg/L
2. ClO_2^- 1 mg/L
3. BrO_3^- 1 mg/L
4. Cl^- 10 mg/L
5. NO_2^- 5 mg/L
6. Br^- 10 mg/L
7. ClO_3^- 1 mg/L
8. NO_3^- 30 mg/L
9. HPO_4^{2-} 15 mg/L
10. SO_4^{2-} 40 mg/L



Column : **Shodex IC SI-35 4D**
Eluent : 2.0 mM Na_2CO_3 + 4.5 mM $NaHCO_3$ aq.
Flow rate : 0.6 mL/min
Detector : Suppressed conductivity
Column temp. : 45 °C

Rapid analysis of anions using SI-35 2B (suppressor method)

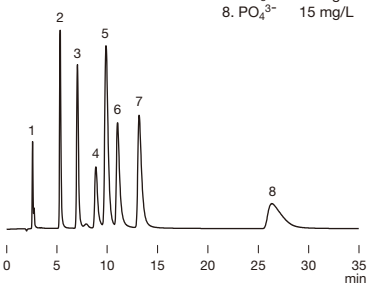
Sample : 2 µL
1. F^- 1 mg/L
2. Cl^- 2 mg/L
3. NO_2^- 3 mg/L
4. Br^- 5 mg/L
5. NO_3^- 5 mg/L
6. HPO_4^{2-} 8 mg/L
7. SO_4^{2-} 6 mg/L



Column : **Shodex IC SI-35 2B**
Eluent : 1.0 mM Na_2CO_3 + 2.0 mM $NaHCO_3$ aq.
Flow rate : 0.2 mL/min
Detector : Suppressed conductivity
Column temp. : 30 °C

Anions and sulfite ion analysis using SI-36 4D (suppressor method)

Sample : 25 µL
1. F^- 0.5 mg/L
2. Cl^- 3 mg/L
3. NO_2^- 5 mg/L
4. SO_3^{2-} 5 mg/L
5. SO_4^{2-} 10 mg/L
6. Br^- 10 mg/L
7. NO_3^- 10 mg/L
8. PO_4^{3-} 15 mg/L



Column : **Shodex IC SI-36 4D**
Eluent : 25 mM KOH aq.
Flow rate : 0.7 mL/min
Detector : Suppressed conductivity
Column temp. : 30 °C
Eluent source : Dionex™ EGC 500 KOH

Ion Chromatography Columns (Cation Analysis)

Features

YS-50
- High performance type of YK-421
- Applicable to both suppressor and non-suppressor methods
- Provides sharp peaks; more significant for divalent cation analysis
- Supports the analysis of alkylamines and transition metals

YK-421
- Column for cation analysis with non-suppressor method
- Simultaneous analysis of monovalent and divalent cations
- Suitable separating of alkylamines
- Fulfills USP L76 requirements

Y-521
- Column for cation analysis with non-suppressor method
- Separates monovalent cations or divalent cations
- Fulfills USP L17 and L22 requirements

T-521
- Column for transition metal ion analysis
- Highly sensitive analysis achievable using post column color reaction method
- Fulfills USP L17 and L22 requirements

●Standard columns

[For cations]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Base Material	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F7122000	**IC YS-50**	≥ 5,500	Carboxyl	Polyvinyl alcohol	5	**4.6 × 125**	H_2O
F6700530	**IC YS-G**	(guard column)	Carboxyl	Polyvinyl alcohol	5	**4.6 × 10**	H_2O
F7120012	**IC YK-421**	≥ 2,800	Carboxyl	Silica	5	**4.6 × 125**	5 mM Tartaric acid + 1 mM Dipicolinic acid + 1.5 g/L Boric acid aq.
F6709608	**IC YK-G**	(guard column)	Carboxyl	Silica	5	**4.6 × 10**	5 mM Tartaric acid + 1 mM Dipicolinic acid + 1.5 g/L Boric acid aq.
F6995210	**IC Y-521**	≥ 3,000	Sulfo	Styrene divinylbenzene copolymer	12	**4.6 × 150**	4 mM HNO_3 aq.
F6700230	**IC Y-G**	(guard column)	Sulfo	Styrene divinylbenzene copolymer	12	**4.6 × 10**	4 mM HNO_3 aq.

Housing Material: SUS

●Standard columns

[For transition metal ions]

Product Code	Product Name	Plate Number (TP/column)	Functional Group	Particle Size (µm)	Column Size (mm) I.D. x Length	Shipping Solvent
F6995250	**IC T-521**	≥ 3,000	Sulfo	12	**4.6 × 150**	3 mM HNO_3 aq.
F6700412	**IC T-G**	(guard column)	Sulfo	12	**4.6 × 10**	3 mM HNO_3 aq.

Base Material: Styrene divinylbenzene copolymer Housing Material: PEEK

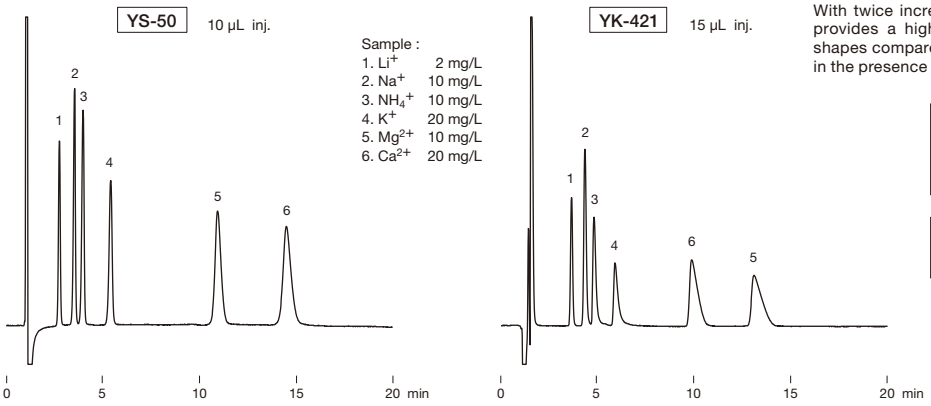
●Line filters for IC

[Shareable for anion analysis and cation analysis]

Product Code	Product Name	Contents
F8500630	**IC FL-1**	One holder and one filter
F8500640	**IC FL-1 filter**	5 filters

Removes insoluble components in the eluent by installing it upstream of the injector

Cation analysis using YS-50 and YK-421



With twice increased theoretical plate number, YS-50 provides a higher performance with improved peak shapes compared to YK-421. The quantitation of NH_4^+ in the presence of high Na^+ content is also improved.

TP	YS-50	YK-421
Mg^{2+}	6,900	3,000
Ca^{2+}	6,600	3,000

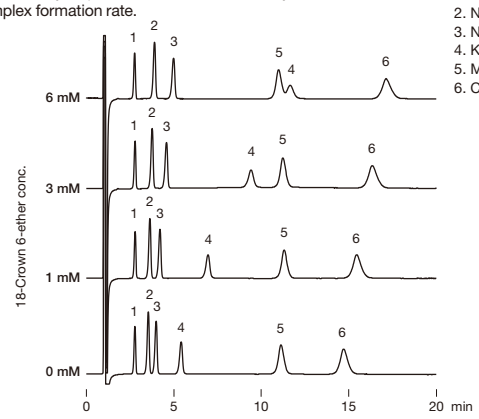
Resolution ($Na^+$and NH_4^+)	YS-50	YK-421
	2.5	2.1

Column : Shodex IC YS-50
Eluent : 4 mM Methanesulfonic acid aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C

Column : Shodex IC YK-421
Eluent : 5 mM Tartaric acid + 1 mM Dipicolinic acid + 1.5 g/L Boric acid aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C

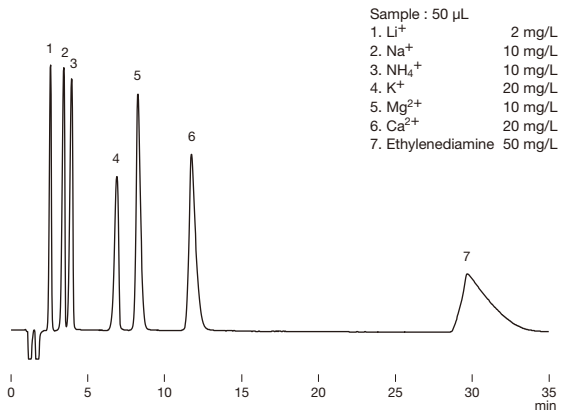
Effects of added crown ether in the eluent

Crown ether forms complex with cations. The elution of cations (particularly K^+) can be well controlled by the difference in complex formation rate.



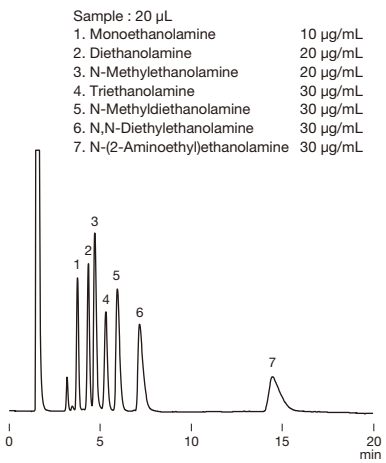
Column : Shodex IC YS-50
Eluent : 4 mM Methanesulfonic acid + 18-Crown 6-ether aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C

Simultaneous analysis of cations and ethylenediamine



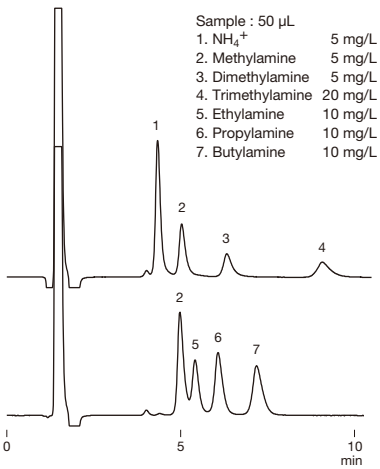
Column : Shodex IC YS-50
Eluent : 4 mM HNO_3 + 1.5 mM 18-Crown 6-ether aq. /CH_3CN=90/10
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C

Amino alcohols



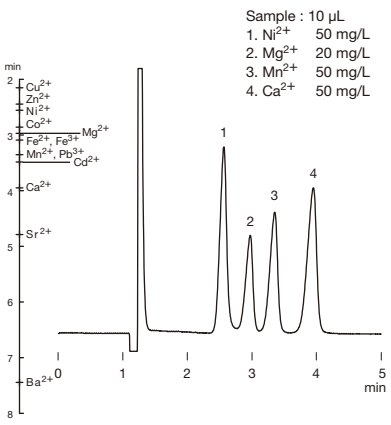
Column : Shodex IC YK-421
Eluent : 4 mM HNO_3 aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C

Alkylamines



Column : Shodex IC YK-421
Eluent : 4 mM H_3PO_4 aq./CH_3CN=90/10
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 25 ˚C

Alkaline earth metal ions



Column : Shodex IC Y-521
Eluent : 4 mM Tartaric acid + 2 mM Ethylenediamine aq.
Flow rate : 1.0 mL/min
Detector : Non-suppressed conductivity
Column temp. : 40 ˚C