

Ion Chromatography Columns (Anion Analysis)

Features

- NI-424**
 - Ideal for anion non-suppressor methods
 - NI-424 provides simultaneous analysis of fluoride and phosphate ions
- I-524A**
 - I-524A fulfills USP-NF L23 requirements
- SI-90 4E**
 - Suitable for anion suppressor methods with sodium carbonate eluent
- SI-50 4E**
 - Suitable for the quantitative analysis of fluoride ion
- SI-52 4E**
 - 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**
 - Rapid-analysis type columns used with suppressor and 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
- SI-36 4D**
 - Suitable for anion suppressor methods with potassium hydroxide
 - Good separation of sulfite and sulfate ions
 - Analysis of seven general inorganic anions within 30 minutes under isocratic conditions

For 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 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 ₂ CO ₃ + 1.7 mM NaHCO ₃ aq.
F6709620	IC SI-90G	(guard column)	Quaternary ammonium	9	4.6 x 10	1.8 mM Na ₂ CO 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 ₂ CO ₃ + 1.0 mM NaHCO ₃ aq.
F6709625	IC SI-50G	(guard column)	Quaternary ammonium	5	4.6 x 10	3.2 mM Na ₂ CO ₃ + 1.0 mM NaHCO ₃ aq.

Base Material: Polyvinyl alcohol
Housing Material: PEEK

<For oxyhalides analysis>

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 ₂ CO ₃ aq.
F6709626	IC SI-92G	(guard column)	Quaternary ammonium	9	4.6 x 10	3.6 mM Na ₂ CO ₃ aq.

Base Material: Polyvinyl alcohol
Housing Material: PEEK

<For oxyhalides 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 ₂ CO ₃ aq.
F6709627	IC SI-95G	(guard column)	Quaternary ammonium	9	4.6 x 10	3.6 mM Na ₂ CO 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 ₂ CO ₃ + 2.0 mM NaHCO ₃ aq.

Base Material: Polyvinyl alcohol
Housing Material: PEEK

• Guard filter for IC 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 sample-origin insoluble components.

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	IC SI-36 4D	≥ 8,500	Quaternary ammonium	3.5	4.0 x 150	10 mM Na ₂ SO ₄ aq.
F6709620	IC SI-90G	(guard column)	Quaternary ammonium	9	4.6 x 10	1.8 mM Na ₂ CO ₃ + 1.7 mM NaHCO ₃ aq.

Base Material: Polyvinyl alcohol
Housing Material: PEEK

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-NF L76 requirements

For non-suppressor method/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
F7122000	IC YS-50	≥ 5,500	Carboxyl	5	4.6 x 125	10 mM Na ₂ SO ₄ aq.
F6700530	IC YS-G	(guard column)	Carboxyl	5	4.6 x 10	10 mM Na ₂ SO ₄ aq.

Base Material: Polyvinyl alcohol
Housing Material: SUS

For 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
F7120012	IC YK-421	≥ 2,800	Carboxyl	5	4.6 x 125	5 mM Tartaric acid + 1 mM Dipicolinic acid + 24 mM Boric acid aq.
F6709608	IC YK-G	(guard column)	Carboxyl	5	4.6 x 10	5 mM Tartaric acid + 1 mM Dipicolinic acid + 24 mM Boric acid aq.

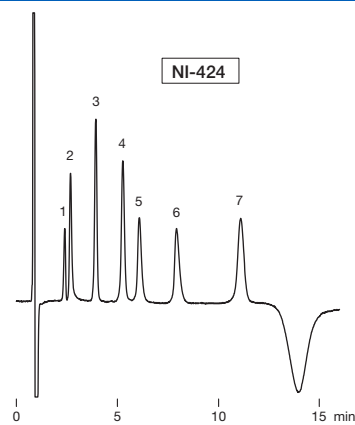
Base Material: Silica
Housing Material: SUS

• Line filters for IC columns (Suitable either for anion or cation analyses)

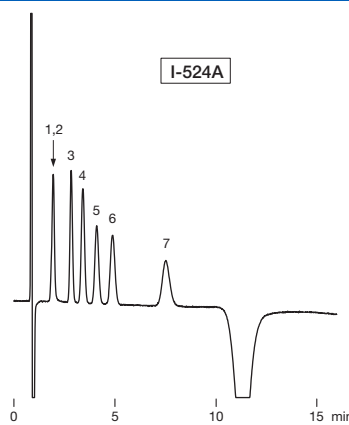
Product Code	Product Name	Contents
F8500630	IC FL-1	One holder and one filter
F8500640	IC FL-1 filter	5 filters

Install in upstream of the injector. Removes eluent-origin insoluble components.

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



Sample : 20 µL
 1. H₂PO₄⁻ 10 mg/L
 2. F⁻ 1 mg/L
 3. Cl⁻ 1 mg/L
 4. NO₂⁻ 5 mg/L
 5. Br⁻ 5 mg/L
 6. NO₃⁻ 5 mg/L
 7. SO₄²⁻ 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 H₂PO₄⁻ 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 NO₂⁻ is improved.

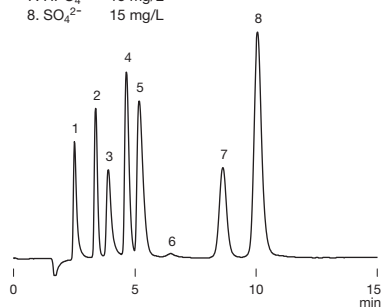
Column : Shodex IC NI-424
 Eluent : 8 mM 4-Hydroxybenzoic acid + 2.8 mM Bis-Tris + 2 mM Phenylboronic acid + 0.005 mM *CyDTA aq.
 Flow rate : 1.0 mL/min
 Detector : Non-suppressed conductivity
 Column temp. : 40 °C

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

*CyDTA : trans-1,2-Diaminocyclohexane-N,N,N',N'-tetra acetic acid

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

Sample : 20 µL
 1. F⁻ 2 mg/L
 2. Cl⁻ 3 mg/L
 3. NO₂⁻ 5 mg/L
 4. Br⁻ 10 mg/L
 5. NO₃⁻ 10 mg/L
 6. HCO₃⁻ 300 mg/L
 7. HPO₄²⁻ 15 mg/L
 8. SO₄²⁻ 15 mg/L

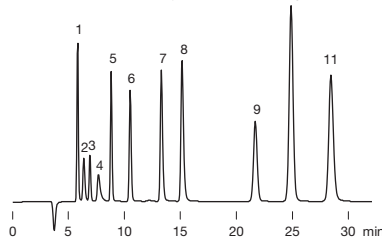


Column : Shodex IC SI-90 4E
 Eluent : 1.8 mM Na₂CO₃ + 1.7 mM NaHCO₃ aq.
 Flow rate : 1.5 mL/min
 Detector : Suppressed conductivity
 Column temp. : Room temp. (25 °C)

Anion analysis using SI-50 4E (suppressor method)

SI-50 4E is a high performance type of SI-90 4E. Acetic acid, formic acid, and methacrylic acid elute between F⁻ and Cl⁻. The carbonate system peak appears between NO₂⁻ 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. NO₂⁻ 5 mg/L
 7. Br⁻ 10 mg/L
 8. NO₃⁻ 10 mg/L
 9. HPO₄²⁻ 15 mg/L
 10. SO₄²⁻ 15 mg/L
 11. Oxalic acid 15 mg/L

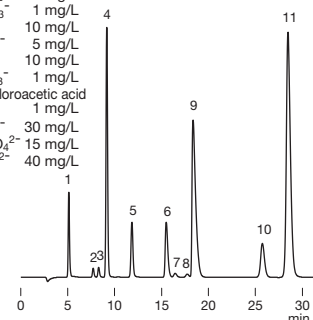


Column : Shodex IC SI-50 4E
 Eluent : 3.2 mM Na₂CO₃ + 1.0 mM NaHCO₃ aq.
 Flow rate : 0.7 mL/min
 Detector : Suppressed conductivity
 Column temp. : 25 °C

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.

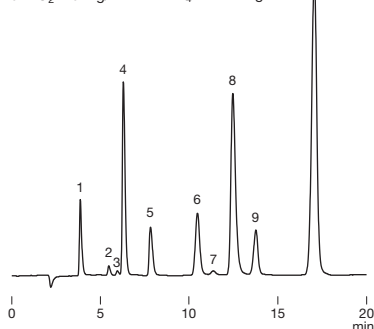
Sample : 50 µL
 1. F⁻ 2 mg/L
 2. ClO₂⁻ 1 mg/L
 3. BrO₃⁻ 1 mg/L
 4. Cl⁻ 10 mg/L
 5. NO₂⁻ 5 mg/L
 6. Br⁻ 10 mg/L
 7. ClO₃⁻ 1 mg/L
 8. Dichloroacetic acid 1 mg/L
 9. NO₃⁻ 30 mg/L
 10. HPO₄²⁻ 15 mg/L
 11. SO₄²⁻ 40 mg/L



Column : Shodex IC SI-52 4E
 Eluent : 3.6 mM Na₂CO₃ 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)

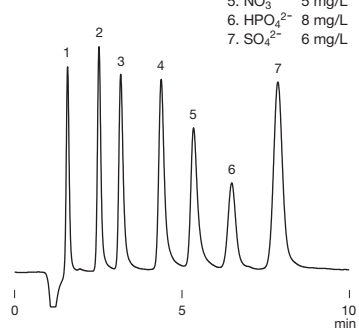
Sample : 20 µL
 1. F⁻ 2 mg/L
 2. ClO₂⁻ 1 mg/L
 3. BrO₃⁻ 1 mg/L
 4. Cl⁻ 10 mg/L
 5. NO₂⁻ 5 mg/L
 6. Br⁻ 10 mg/L
 7. ClO₃⁻ 1 mg/L
 8. NO₃⁻ 30 mg/L
 9. HPO₄²⁻ 15 mg/L
 10. SO₄²⁻ 40 mg/L



Column : Shodex IC SI-35 4D
 Eluent : 2.0 mM Na₂CO₃ + 4.5 mM NaHCO₃ aq.
 Flow rate : 0.6 mL/min
 Detector : Suppressed conductivity
 Column temp. : 45 °C

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

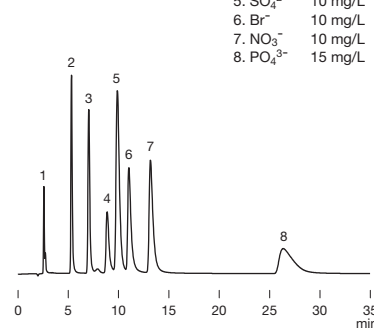
Sample : 2 µL
 1. F⁻ 1 mg/L
 2. Cl⁻ 2 mg/L
 3. NO₂⁻ 3 mg/L
 4. Br⁻ 5 mg/L
 5. NO₃⁻ 5 mg/L
 6. HPO₄²⁻ 8 mg/L
 7. SO₄²⁻ 6 mg/L



Column : Shodex IC SI-35 2B
 Eluent : 1.0 mM Na₂CO₃ + 2.0 mM NaHCO₃ 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)

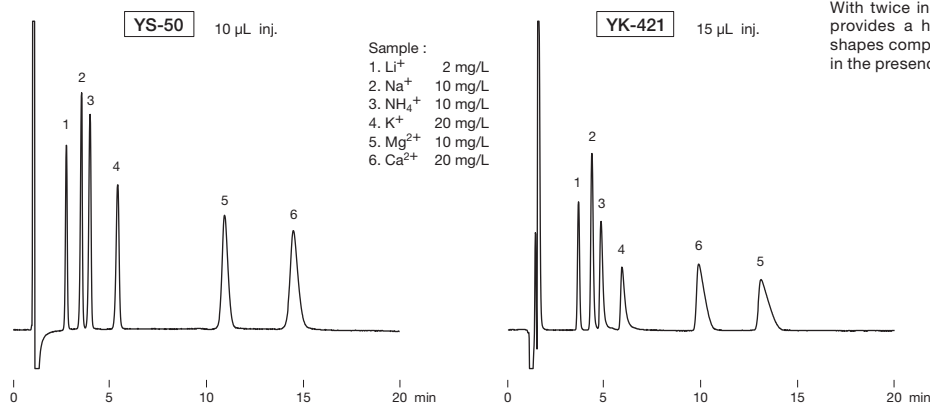
Sample : 25 µL
 1. F⁻ 0.5 mg/L
 2. Cl⁻ 3 mg/L
 3. NO₂⁻ 5 mg/L
 4. SO₃²⁻ 5 mg/L
 5. SO₄²⁻ 10 mg/L
 6. Br⁻ 10 mg/L
 7. NO₃⁻ 10 mg/L
 8. PO₄³⁻ 15 mg/L



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

Cation analysis using YS-50 and YK-421



Sample :

1. Li^+ 2 mg/L
2. Na^+ 10 mg/L
3. NH_4^+ 10 mg/L
4. K^+ 20 mg/L
5. Mg^{2+} 10 mg/L
6. Ca^{2+} 20 mg/L

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

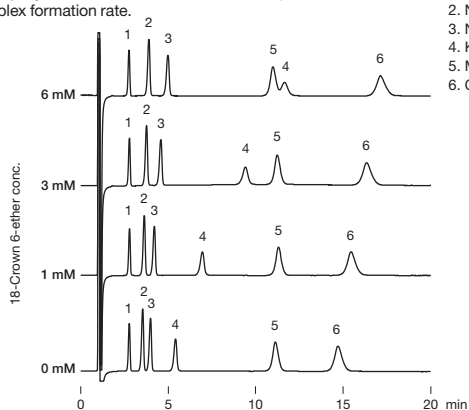
Resolution ($\text{Na}^+ / \text{NH}_4^+$)	YS-50	YK-421
	2.5	2.1

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 + 24 mM 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

The elution of cations (particularly K^+) can be well controlled by modifying the eluent concentration, as it provides different complex formation rate.

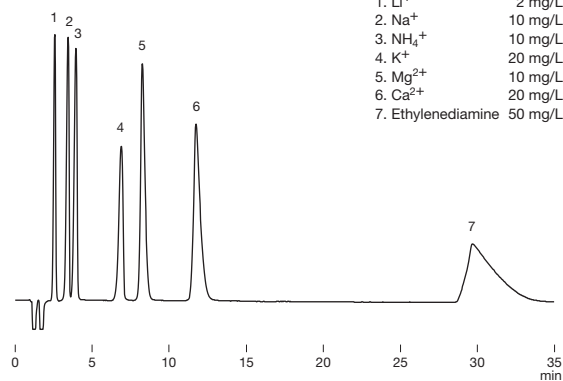


Sample : 10 µL

1. Li^+ 2 mg/L
2. Na^+ 10 mg/L
3. NH_4^+ 10 mg/L
4. K^+ 20 mg/L
5. Mg^{2+} 10 mg/L
6. Ca^{2+} 20 mg/L

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

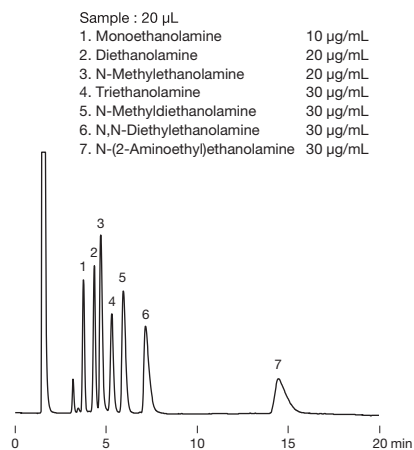


Sample : 50 µL

1. Li^+ 2 mg/L
2. Na^+ 10 mg/L
3. NH_4^+ 10 mg/L
4. K^+ 20 mg/L
5. Mg^{2+} 10 mg/L
6. Ca^{2+} 20 mg/L
7. Ethylenediamine 50 mg/L

Column : Shodex IC YS-50
Eluent : 4 mM Nitric acid + 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

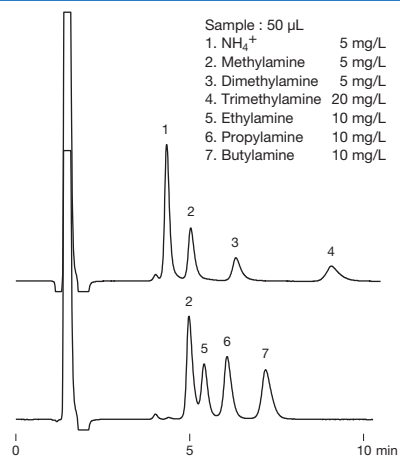


Sample : 20 µL

1. Monoethanolamine 10 µg/mL
2. Diethanolamine 20 µg/mL
3. N-Methylethanolamine 20 µg/mL
4. Triethanolamine 30 µg/mL
5. N-Methyldiethanolamine 30 µg/mL
6. N,N-Diethylethanolamine 30 µg/mL
7. N-(2-Aminoethyl)ethanolamine 30 µg/mL

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

Alkylamines



Sample : 50 µL

1. NH_4^+ 5 mg/L
2. Methylamine 5 mg/L
3. Dimethylamine 5 mg/L
4. Trimethylamine 20 mg/L
5. Ethylamine 10 mg/L
6. Propylamine 10 mg/L
7. Butylamine 10 mg/L

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