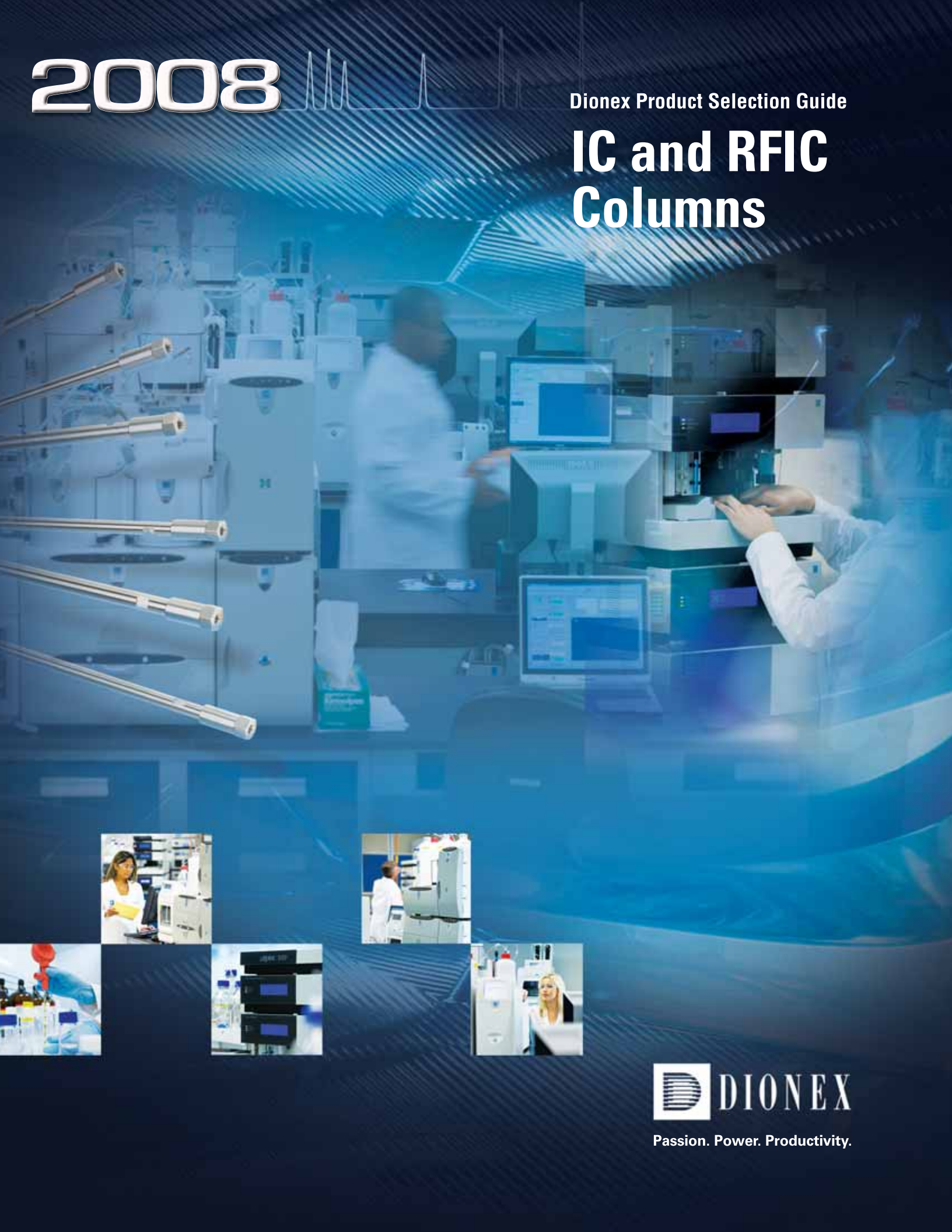


2008

Dionex Product Selection Guide

IC and RFIC Columns



DIONEX

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IC & RFIC Columns

Hydroxide-Selective Anion-Exchange Columns

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Hydroxide-Selective Anion-Exchange Columns

Hydroxide-selective anion-exchange columns optimized for use with hydroxide eluent

Choose a hydroxide eluent column for use with an eluent generator for isocratic and gradient analysis. Hydroxide eluents for isocratic or gradient elution are very convenient with Reagent-Free Ion Chromatography (RFIC) systems with electrolytic eluent generation. Hydroxide-selective anion-exchange columns are available in a wide range of capacities and hydrophobicities.

RFIC technology simplifies method development for hydroxide-gradient systems; the electrolytic eluent generator provides gradient methods that are simpler to use than manually-prepared isocratic eluents. Modern continuous-eluent-suppression systems are designed to suppress hydroxide eluents, even at high concentrations.



IonPac AS24: High-capacity anion-exchange column for separation of haloacetic acids and bromate in drinking water prior to MS or MS/MS detection or 2-D analysis.

IonPac Fast Anion IIIA: Hydroxide-selective anion-exchange column designed for the rapid determination of phosphoric and citric acids in cola soft drink samples

IonPac AS21: Hydroxide-selective anion-exchange column for fast analysis of trace perchlorate in drinking water prior to detection with MS/MS.

IonPac AS20: High-capacity anion-exchange column for determination of trace perchlorate using suppressed conductivity detection.

IonPac AS19: High-capacity hydroxide-selective column for determination of oxyhalides and inorganic anions.

IonPac AS18: Hydroxide-selective anion-exchange column for determination of inorganic anions and low-molecular-weight organic acids.

IonPac AS17-C: Hydroxide-selective anion-exchange column for fast gradient separation of inorganic anions in high-purity water matrices.

IonPac AS16: High-capacity hydroxide-selective anion-exchange column optimized for the determination of highly polarizable anions.

IonPac AS15: High-capacity anion-exchange column for determination of trace-level concentrations of inorganic anions and low molecular weight organic acids.

IonPac AS11-HC: High-capacity anion-exchange column designed to resolve a large number of organic acids and inorganic anion in complex matrices.

IonPac AS11: Anion-exchange column for fast profiling of inorganic anions and organic acid anions.

IonPac AS10: High-capacity hydroxide-selective, anion-exchange column designed for the isocratic and gradient separation of inorganic anions and organic acids.

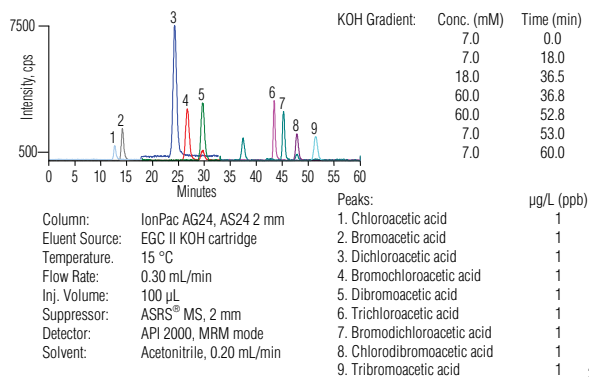
IonPac AS24

For separation of haloacetic acids and bromate in drinking water prior to MS or MS/MS detection

The IonPac AS24 hydroxide-selective anion-exchange column is specifically designed for haloacetic acids in drinking water prior to MS or MS/MS detection. The capacity and selectivity enables analysis of haloacetic acids in drinking water at low- $\mu\text{g/L}$ concentrations. The AS24 column is the specified column in US EPA Method 553.

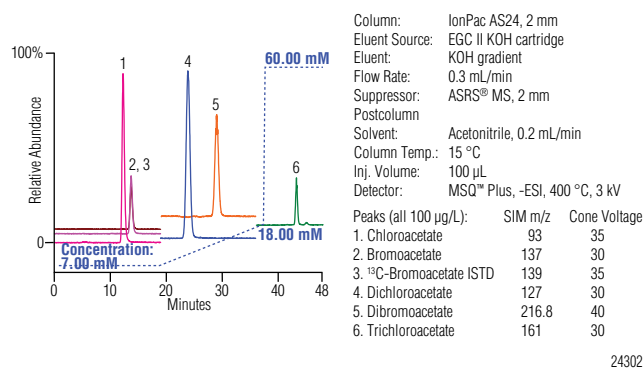
- Specified column for US EPA Method 553
- High capacity: 140 μeq per column (2×250 mm)
- Determine HAAs in high-ionic strength matrices without sample pretreatment
- Column selectivity is optimized for a 15 °C operating temperature
- Compatible with HPLC organic solvents
- Used as second dimension column in 2-D method for bromate in US EPA Method 302.0

Determination of Haloacetic Acids Using the IonPac® AS24 Column and MS/MS Detection



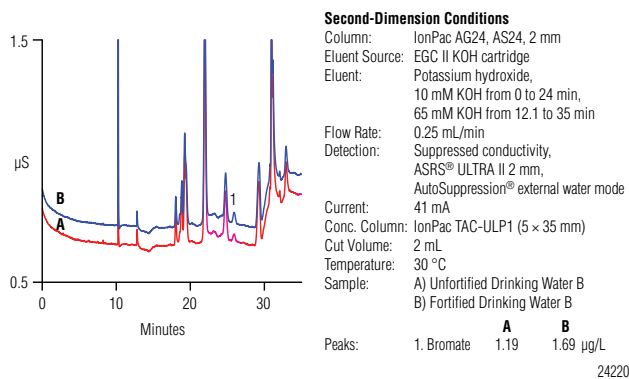
Determination of haloacetic acids using the IonPac AS24 column and MS/MS detection.

Determination of Haloacetic Acids Using the IonPac® AS24 Column and MS Detection



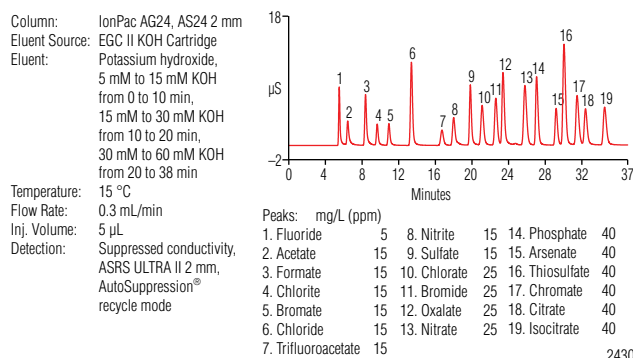
Determination of haloacetic acids using the IonPac AS24 column and MS detection.

Determination of Trace Concentrations of Bromate Using the IonPac® AS24 Column with Two-Dimensional Ion Chromatography



Determination of trace concentrations of bromate using the IonPac AS24 column with two-dimensional ion chromatography.

Anion Separation Including Inorganic Anions, Organic Acids, Oxyanions, and Oxyhalides on an IonPac® AS24 Column Using a Potassium Hydroxide Eluent Delivered by an Eluent Generator



Separation of various anions on an IonPac AS24 column using a potassium hydroxide eluent delivered by an Eluent Generator.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS24 Anion-Exchange Column

Application Notes

AN 187: Determination of Sub-µg/L Bromate in Municipal and Natural Mineral Waters Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

Ordering Information

Analytical Columns

IonPac AS24 Analytical Column (2 × 250 mm) 064153

Guard Columns

IonPac AG24 Guard Column (2 × 50 mm) 064151

IonPac Fast Anion IIIA

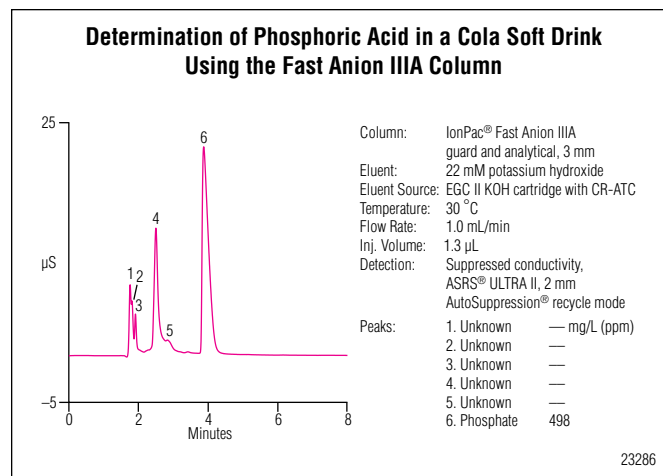
Rugged and reliable, rapid determination of phosphoric and citric acids in colas

This hydroxide-selective anion-exchange column is specifically designed for the determination of phosphoric and citric acids in cola soft drinks. Its capacity and selectivity allows rapid analysis of these acids in less than 7 minutes.

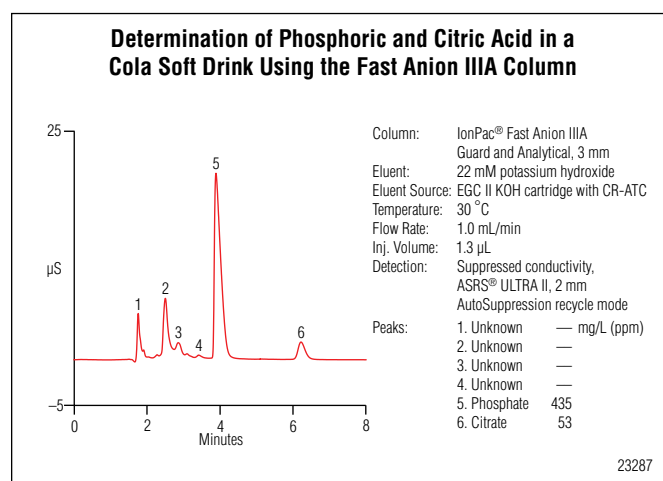
- Use with the Eluent Generator for simplified Reagent-Free IC operation.
- The 3 mm i.d. configuration provides economical operation.
- Combine with the ASRS 300 suppressor for low background and enhanced sensitivity.
- Compatible with organic solvents.

The Fast Anion IIIA is optimized for a 30 °C operating temperature to ensure reproducible retention times in all environmental conditions. It is compatible with organic solvents to enhance analyte solubility, modify column selectivity, or allow effective column cleanup. The Fast Anion IIIA column is recommended for use with the Eluent Generator, requiring only a deionized water source to produce potassium hydroxide eluent.

The cola samples may require sample pretreatment with sonication to remove carbonation. Sample dilution of cola syrups is recommended prior to analysis to ensure optimum column life. These acids can be analyzed in less than 7 minutes using an isocratic potassium hydroxide eluent delivered by an Eluent Generator in combination with suppressed conductivity detection.

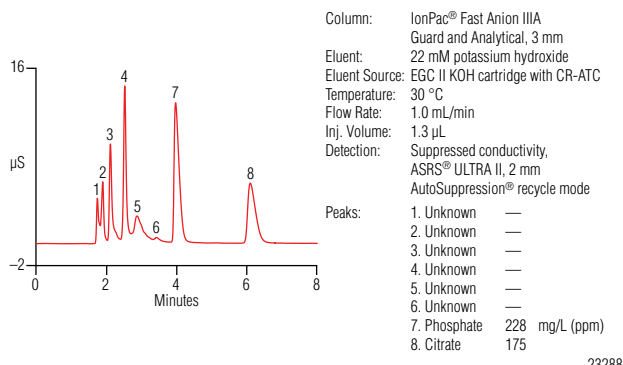


Determination of phosphoric acid in a cola soft drink using the Fast Anion IIIA column.



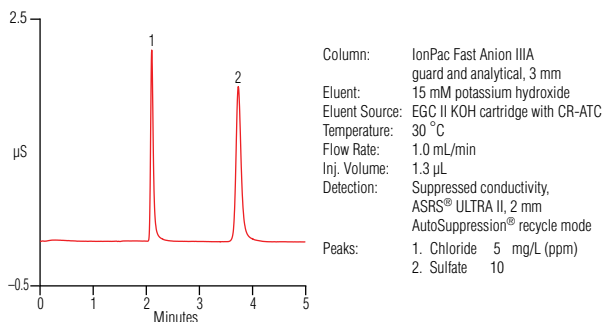
Determination of phosphoric and citric acid in a cola soft drink using the Fast Anion IIIA column.

Determination of Phosphoric and Citric Acid in a Diet Cola Soft Drink Using the Fast Anion IIIA Column



Determination of phosphoric and citric acid in a diet cola soft drink using the Fast Anion IIIA column.

Rapid Analysis of Chloride and Sulfate on an IonPac® Fast Anion IIIA Column



Rapid analysis of chloride and sulfate on an IonPac Fast Anion IIIA column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac Fast Anion IIIA Anion-Exchange Column

Application Updates

AU 153: Fast Determinations of Phosphate and Citrate in Carbonated Beverages Using On-Line Degassing with the Carbonate Removal Device (CRD) and a Reagent-Free Ion Chromatography System

Ordering Information

Analytical Columns

IonPac Fast Anion IIIA Analytical Column (3 × 250 mm)..... 062964

Guard Columns

IonPac Fast Anion IIIA Guard Column (3 × 50 mm) 062966

IonPac AS21

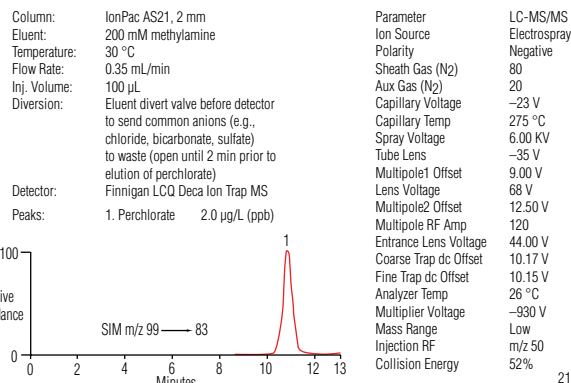
For fast analysis of trace perchlorate in drinking water prior to detection with MS/MS

The AS21 hydroxide-selective anion-exchange column is specifically designed for determination of trace perchlorate in drinking water prior to MS/MS detection. The capacity and selectivity enable fast analysis of perchlorate at low $\mu\text{g/L}$ concentrations. The AS21 is the specified column in US EPA Method 331.0.

- Fast separation of perchlorate prior to MS/MS detection
- Optimized for methylamine or hydroxide mobile phases
- Specified column for US EPA Method 331.0
- Optimum capacity: 45 μeq per column (2×250 mm)
- Operates at ambient or elevated temperatures
- Compatible with organic solvents

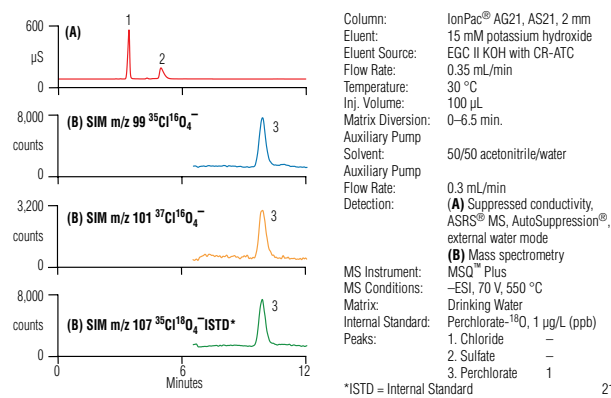
The AS21 2×250 mm column format was specifically developed for MS/MS compatibility to allow use of volatile mobile phases such as methylamine.

Determination of Perchlorate Using the IonPac® AS21 and MS/MS Detection



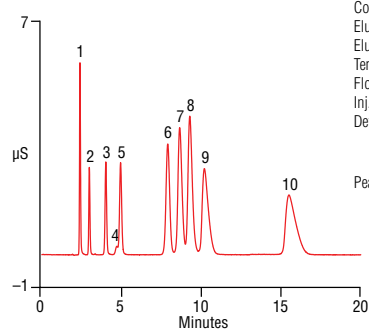
Determination of perchlorate using the IonPac AS21 and MS/MS detection.

IC/MS Determination of Perchlorate in Drinking Water Using the IonPac® AS21 Column



IC/MS determination of perchlorate in drinking water using the IonPac AS21 column.

Analysis of Environmental Anions Using the IonPac® AS21 Column



Column: IonPac AG21, AS21, 2 mm
 Eluent: 15 mM potassium hydroxide
 Eluent Source: EGC II KOH cartridge with CR-ATC
 Temperature: 30 °C
 Flow Rate: 0.35 mL/min
 Inj. Volume: 2.5 μ L
 Detection: Suppressed conductivity,
 ASRS® ULTRA II, 2 mm,
 AutoSuppression® recycle mode

Peaks:	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	Fluoride	Chloride	Nitrate	Carbonate	Sulfate	Tungstate	Chromate	Perchlorate	Phosphate	Arsenate
	2	2	5	—	5	30	30	30	30	30
	mg/L (ppm)									

21062

Ordering Information

Analytical Columns

IonPac AS21 Analytical Column (2 \times 250 mm) 063009

Guard Columns

IonPac AG21 Guard Column (2 \times 50 mm) 063071

Analysis of environmental anions using the IonPac AS21 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS21 Anion-Exchange Column Data Sheet

IonPac AS20

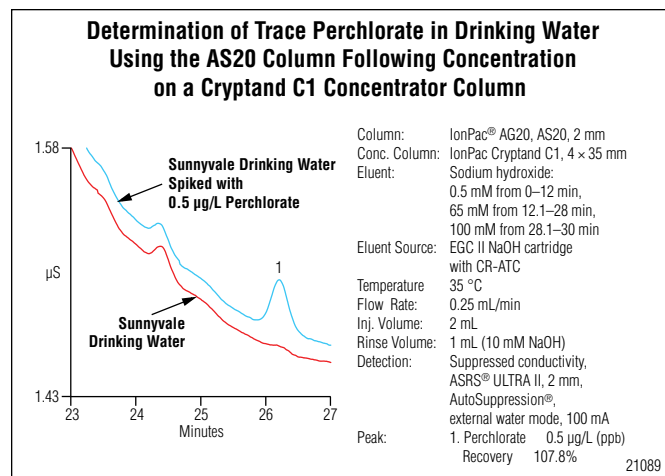
For determination of trace perchlorate using suppressed conductivity detection

The AS20 hydroxide-selective anion-exchange column is specifically designed for the determination of trace concentrations of perchlorate in drinking water, surface water, and groundwater matrices. The capacity and selectivity of the AS20 ensures that perchlorate can be quantified at low $\mu\text{g/L}$ concentrations using suppressed conductivity detection even in the presence of very high concentrations of chloride, carbonate, and sulfate.

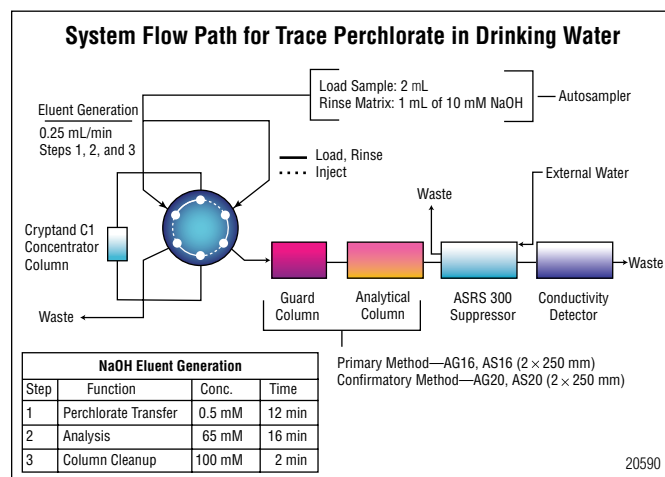
- Recommended for US EPA Method 314.1 (Confirmatory Method)
- High capacity: 310 μeq per column. (4 \times 250 mm)
- Use the Cryptand C1 Concentrator Column for sample preconcentration
- Simplified Reagent-Free IC operation provided by the Eluent Generator
- ASRS 300 provides RFIC operation with low background and enhanced analyte sensitivity
- Column selectivity is optimized for 30 °C operating temperature
- Compatible with organic solvents

The AS20 is the specified column in US EPA Method 314.1 (Confirmatory Method). The Cryptand C1 Concentrator Column is the specified concentrator column for sample preconcentration in that method.

The AS20 column is ideally used with an RFIC system for best detection limits. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS20 column for eluent suppression.



Determination of trace perchlorate in drinking water using the AS20 column following concentration on a Cryptand C1 Concentrator column.

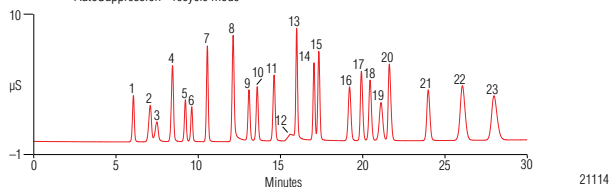


System flow path for trace perchlorate in drinking water.

Gradient Separation of a Variety of Environmental Anions Using the AS20 Column

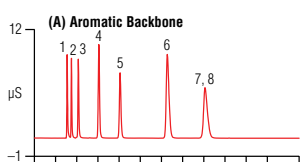
Column: IonPac® AG20, AS20, 4 mm
 Eluent: Potassium hydroxide:
 5 mM from 0 to 5 min,
 5–30 mM from 5 to 15 min,
 30–55 mM from 15 to 30 min
 Eluent Source: EGC II KOH with CR-ATC
 Temperature: 30 °C
 Flow Rate: 1.0 mL/min
 Inj. Volume: 10 µL
 Detection: Suppressed conductivity,
 ASRS® ULTRA II, 4 mm,
 AutoSuppression® recycle mode

Peaks: mg/L (ppm)	
1. Fluoride	2
2. Acetate	10
3. Butyrate	10
4. Formate	10
5. Chlorite	10
6. Bromate	10
7. Chloride	5
8. Nitrite	10
9. Chlorate	10
10. Bromide	10
11. Nitrate	10
12. Carbonate	20
13. Sulfate	10
14. Selenate	10
15. Oxalate	10
16. Phthalate	20
17. Phosphate	20
18. Chromate	20
19. Iodide	20
20. Arsenate	20
21. Citrate	20
22. Thiocyanate	20
23. Perchlorate	30



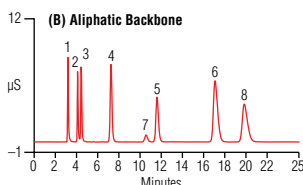
Gradient separation of a variety of environmental anions using the AS20 column.

Comparison of the AS16 and AS20 Columns for Separation of Common Anions, Hydrophobic Anions and 4-Chlorobenzene Sulfonate



Columns: (A) IonPac® AG16, AS16, 2 mm
 (B) IonPac AG20, AS20, 2 mm
 Eluent: 35 mM sodium hydroxide
 Eluent Source: EGC II NaOH cartridge
 with CR-ATC
 Flow Rate: 0.25 mL/min
 Temperature: 30 °C
 Inj. Volume: 2.5 µL
 Detection: Suppressed conductivity,
 ASRS® ULTRA II, 2 mm,
 AutoSuppression® recycle mode

Peaks:	
1. Fluoride	2 mg/L (ppm)
2. Chloride	3
3. Sulfate	5
4. Thiosulfate	10
5. Iodide	20
6. Thiocyanate	20
7. 4-Chlorobenzene sulfonate	5
8. Perchlorate	30



Comparison of the AS16 and AS20 columns for separation of common anions, hydrophobic anions and 4-chlorobenzene sulfonate.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS20 Anion-Exchange Column Data Sheet

Application Notes

AN 176: Determining Sub-ppb Perchlorate in Drinking Water Using Preconcentration/Matrix Elimination IC with Suppressed Conductivity Detection by U.S. EPA Method 314.1

AN 178: Improved Determination of Trace Concentrations of Perchlorate in Drinking Water Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

Ordering Information

Analytical Columns

IonPac AS20 Analytical Column (2 × 250 mm).....	063065
IonPac AS20 Analytical Column (4 × 250 mm).....	063148

Guard Columns

IonPac AG20 Guard Column (2 × 50 mm).....	063066
IonPac AG20 Guard Column (4 × 50 mm).....	063154

IonPac AS19

For determination of oxyhalides and inorganic anions

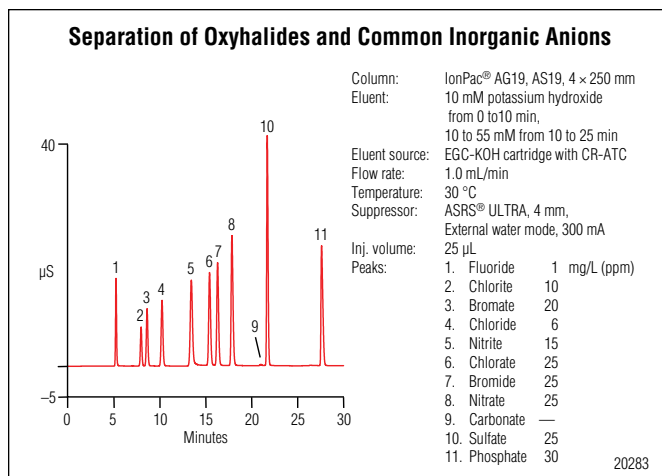
The IonPac AS19 hydroxide-selective anion-exchange column is specifically designed for trace bromate in drinking water. Its high capacity and selectivity allow the determination of bromate in drinking water at the low- $\mu\text{g/L}$ level. The AS19 meets the performance requirements of US EPA Methods 300.0 and 300.1.

- Recommended hydroxide-selective column for trace bromate in drinking water matrices
- High capacity: 240 μeq per column (4 \times 250 mm)
- Meets or exceeds performance requirements of US EPA Methods 300.0 and 300.1
- Column selectivity is optimized for a 30 °C operating temperature
- Compatible with organic solvents
- Low backgrounds and enhanced analyte sensitivity with the ASRS 300 and an RFIC system

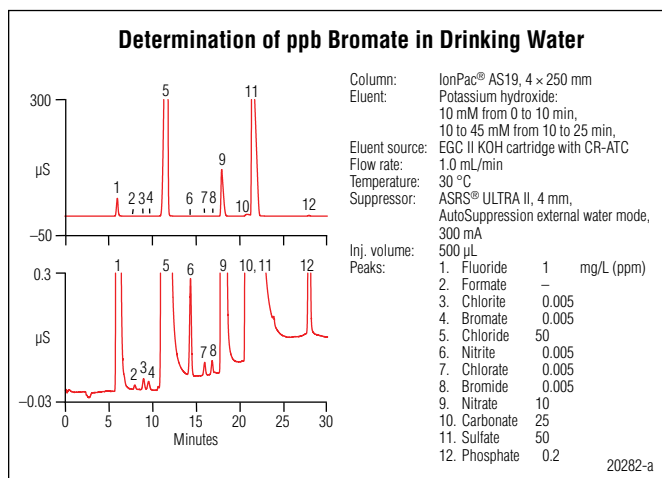
The AS19 is designed for the analysis of oxyhalides and common inorganic anions including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, groundwater, wastewater, and other diverse sample matrices. The AS19 allows analysis of most drinking water without the use of sample pretreatment or pre-concentration. The AS19 column is ideally used with an RFIC system for automatic eluent generation.

The key application for the AS19 is the determination of trace bromate in drinking water matrices using a potassium hydroxide gradient with suppressed conductivity detection. The selectivity of the AS19 ensures that bromate, a toxic byproduct of ozone disinfection, can be quantified at low $\mu\text{g/L}$ concentrations using suppressed conductivity detection even in the presence of very high concentrations of chloride, sulfate, and carbonate.

Note: Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS19 column for eluent suppression.

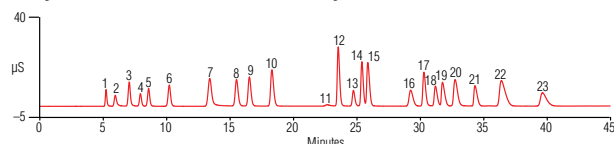


Determination of oxyhalides and common inorganic anions using the AS19 column.



Determination of trace concentration of bromate in a simulated drinking water sample using the AS19 column with a large-loop injection.

Determination of Inorganic Anions, Oxyhalides, Organic Acids, and Oxyanions on an IonPac® AS19 Column Using a Potassium Hydroxide Gradient Delivered by an EG50 Eluent Generator



Column:	IonPac AG19, AS19, 4 mm	Peaks:	1. Fluoride	2 mg/L (ppm)	12. Sulfate	25
Eluent:	Potassium hydroxide:		2. Acetate	10	13. Malonate	25
	10 mM from 0 to 10 min,		3. Formate	10	14. Selenate	25
	10–58 mM from 10 to 40 min		4. Chlorite	10	15. Oxalate	25
Eluent source:	EGC II KOH with CR-ATC		5. Bromate	20	16. Iodide	30
Flow rate:	1.0 mL/min		6. Chloride	6	17. Thiosulfate	25
Temperature:	30 °C		7. Nitrite	15	18. Chromate	25
Suppressor:	ASRS® ULTRA II, 4 mm,		8. Chlorate	25	19. Phosphate	30
	AutoSuppression recycle mode,		9. Bromide	25	20. Fumarate	30
	300 mA		10. Nitrate	25	21. Arsenate	30
Inj. volume:	25 µL		11. Carbonate	25	22. Thiocyanate	30
					23. Perchlorate	30

20284

Determination of inorganic anions, oxyhalides, organic acids and oxyanions on an IonPac AS19 column using a hydroxide gradient delivered by an Eluent Generator

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS19 Anion-Exchange Column Data Sheet

Application Notes

AN 93: Determination of Trace Anions in Concentrated Bases Using AutoNeutralization Pretreatment/Ion Chromatography

AN 167: Determination of Trace Concentrations of Oxyhalides and Bromide in Municipal and Bottled Waters Using a Hydroxide-Selective Column with a Reagent-Free Ion Chromatography System

AN 168: Determination of Trace Concentrations of Disinfection By-Product Anions and Bromide in Drinking Water Using Reagent-Free Ion Chromatography Followed by Postcolumn Addition of o-Dianisidine for Trace Bromate Analysis

AN 171: Determination of Disinfection By-Product Anions and Bromide in Drinking Water Using a Reagent-Free Ion Chromatography System Followed by Postcolumn Addition of an Acidified On-Line Generated Reagent for Trace Bromate Analysis

AN 184: Determination of Trace Concentrations of Chlorite, Bromate, and Chlorate in Bottled Natural Mineral Waters

AN 187: Determination of Sub-μg/L Bromate in Municipal and Natural Mineral Waters Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

Application Updates

AU 154: Determination of Bromate in Drinking and Mineral Water by Isocratic Ion Chromatography with a Hydroxide Eluent

AU 159: Determination of Volcanic Gases as Anions in Caustic Solutions Using AutoNeutralization, Automated Dilutions, and a Reagent-Free Ion Chromatography System

Ordering Information

Analytical Columns

IonPac AS19 Analytical Column (4 × 250 mm) 062885

IonPac AS19 Analytical Column (2 × 250 mm) 062886

Guard Columns

IonPac AG19 Guard Column (4 × 50 mm) 062887

IonPac AG19 Guard Column (2 × 50 mm) 062888

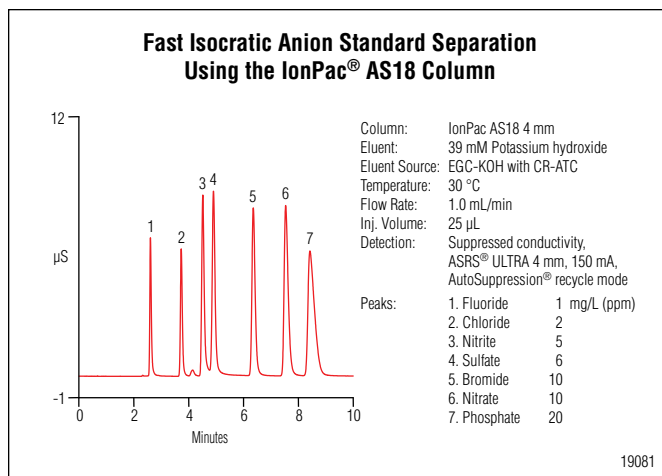
IonPac AS18

For determination of inorganic anions and low-molecular-weight organic acids

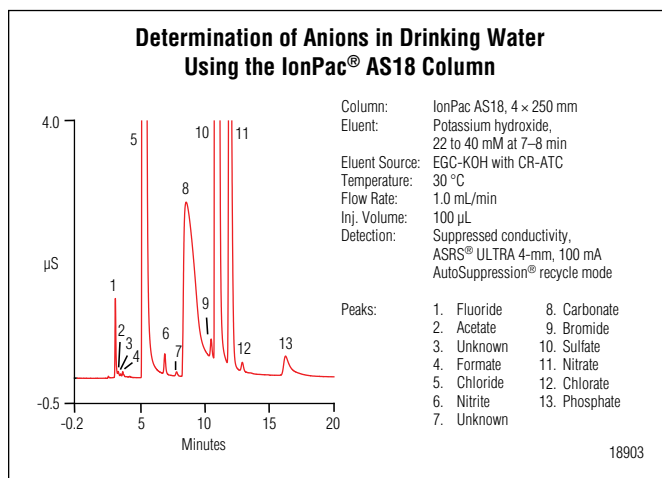
The IonPac AS18 anion-exchange column is the hydroxide-selective column of choice for compliance monitoring of inorganic anions in drinking water and wastewater samples in accordance with US EPA Methods 300.0 (A) and 300.1.

- Recommended hydroxide-selective column for inorganic anions in diverse sample matrices
- Fast isocratic separation of common inorganic anions in 9 min
- Inorganic anion and low-molecular weight organic acids in complex sample matrices
- Superior retention and quantification of fluoride, acetate, and formate
- Meets performance requirements specified in US EPA Method 300.0 (A)

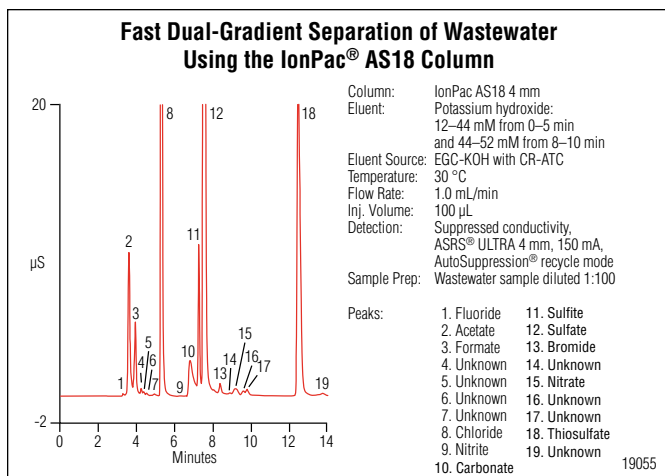
The AS18 can determine inorganic anions and low-molecular-weight organic acids in a variety of sample matrices. This column has excellent retention of fluoride from the water dip. It is approved for compliance monitoring of inorganic anions in drinking water and wastewater samples in accordance with US EPA Methods 300.0 and 300.1.



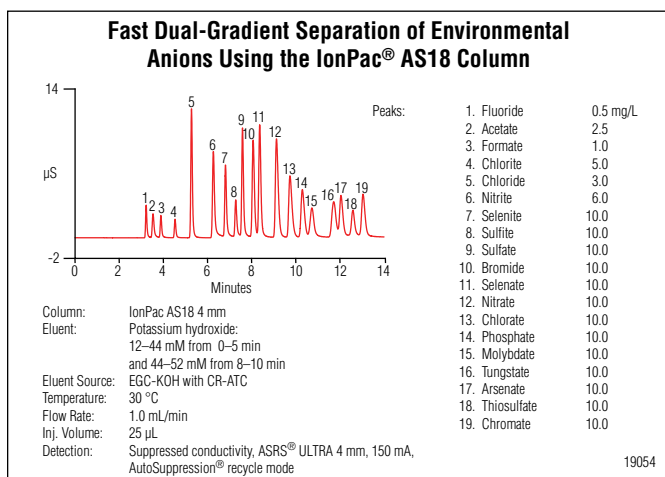
Fast isocratic separation of the common inorganic anions on an IonPac AS18.



Determination of inorganic anions in a drinking water sample on an IonPac AS18 column using a potassium hydroxide gradient delivered by an Eluent Generator.



Determination of inorganic anions in a wastewater sample on an IonPac AS18 column using a potassium hydroxide gradient delivered by an Eluent Generator.



Fast dual-gradient separation of environmental anions using the IonPac AS18 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS18 Anion-Exchange Columns Data Sheet

Application Notes

AN 154: Determination of Inorganic Anions in Environmental Waters Using a Hydroxide-Selective Column

AN 156: Determination of Anions in Toothpaste by Ion Chromatography

AN 165: Determination of Benzoate in Liquid Food Products by Reagent-Free Ion Chromatography

Application Updates

AU 146: Determination of Anions in Acid Rain by Ion Chromatography

Ordering Information

Analytical Columns

IonPac AS18 4 mm Analytical Column (4 × 250 mm)..... 060549
 IonPac AS18 2 mm Analytical Column (2 × 250 mm)..... 060553

Guard Columns

IonPac AG18 4 mm Guard Column (4 × 50 mm)..... 060551
 IonPac AG18 2 mm Guard Column (2 × 50 mm)..... 060555

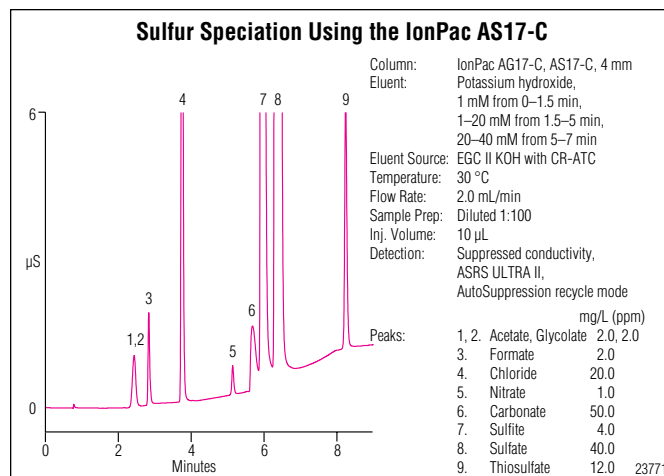
IonPac AS17-C

For fast gradient separation of inorganic anions in high-purity water matrices

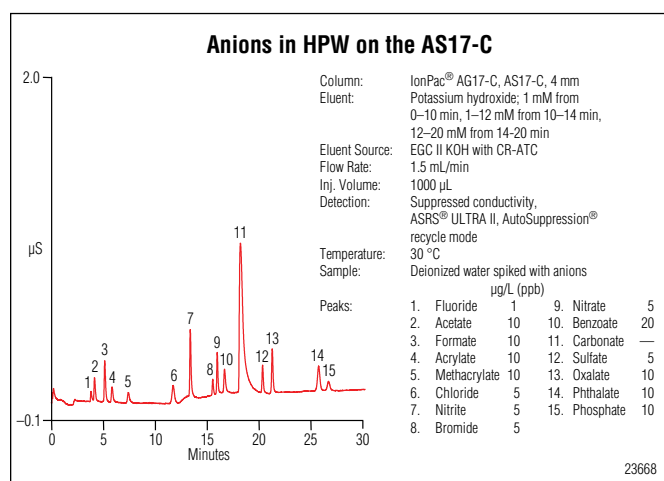
The IonPac AS17-C column is a low-capacity column for fast, gradient separation of inorganic anions. Its key application is the determination of common inorganic anions in high-purity water matrices. The AS17-C provides low sulfate blanks and fast equilibration time. It is recommended for use with RFIC systems using the Eluent Generator for automatic eluent generation. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS17-C column.

- Recommended replacement for all AS17 anion applications
- Optimized for common inorganic anions in simple sample matrices
- Fast gradient separation of inorganic anions in high-purity water matrices
- Fast, gradient separation of sulfur species including sulfite, sulfate, and thiosulfate
- Compatible with RFIC systems and the Eluent Generator for automatic eluent generation

Note: The IonPac AS18 column is the recommended hydroxide-selective column for determination of common anions in diverse sample matrices.



Determination of sulfur species in a simulated industrial wastewater sample using an IonPac AS17-C Column



Determination of anions and organic acids in high-purity water using a large loop injection with potassium hydroxide gradient on a 4 mm IonPac AS17-C column.

Ordering Information

Analytical Columns

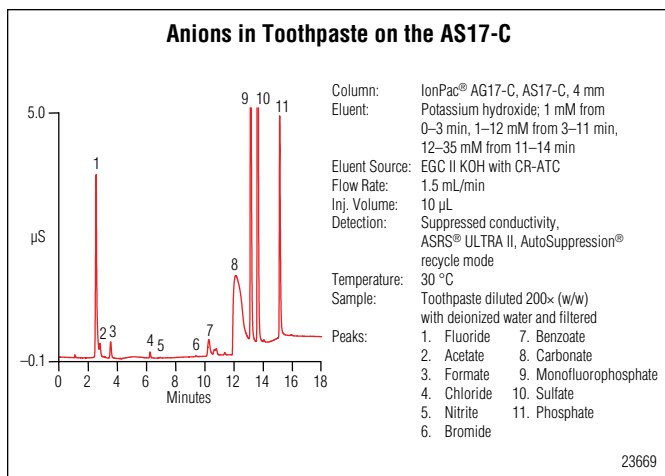
IonPac AS17-C Analytical Column (4 × 250 mm) 066294

IonPac AS17-C Analytical Column (2 × 250 mm) 066296

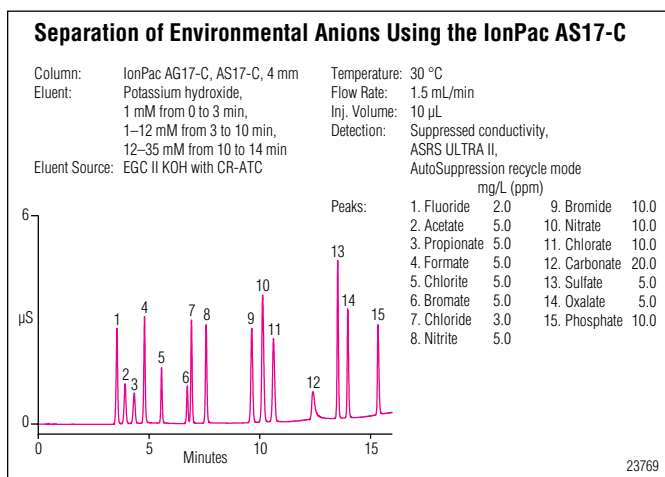
Guard Columns

IonPac AG17-C Guard Column (4 × 50 mm)..... 066295

IonPac AG17-C Guard Column (2 × 50 mm)..... 066297



Determination of anionic additives in toothpaste on an IonPac AS17-C column using a potassium hydroxide gradient delivered by an Eluent Generator.



Anion separation including oxyhalides on an IonPac AS17-C column using a potassium hydroxide gradient delivered by an Eluent Generator.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS17-C Anion Exchange Column Data Sheet

IonPac AS16

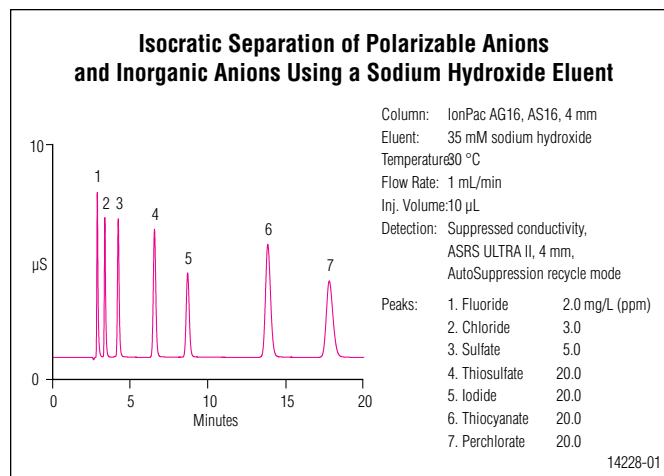
High-capacity column optimized for determination of polarizable anions

The IonPac AS16 column is ideally suited for trace perchlorate in drinking water in accordance with US EPA Methods 314.0 and 314.1 (Primary Method). The AS16 column simplifies the determination of polarizable anions, including thiosulfate, iodide, thiocyanate, and perchlorate using an isocratic hydroxide eluent.

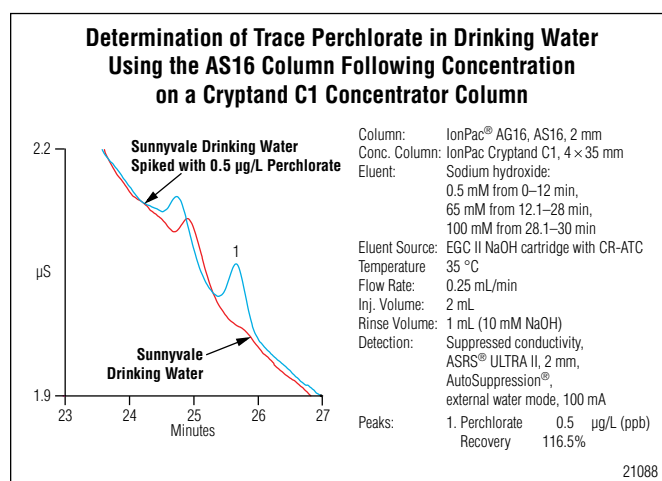
- Separate hydrophobic anions (iodide, thiocyanate, and thiosulfate) in less than 20 min
- Can be used for trace perchlorate in drinking water matrices
- Ideal for polyvalent anions, including polyphosphates and polycarboxylates
- Ultralow hydrophobicity allows fast analysis of polarizable anions

The AS16 is a high-capacity, hydroxide-selective column for the determination of polarizable anions in a variety of sample matrices. Trace concentrations of perchlorate in drinking water, surface water, and groundwater matrices can easily be determined using a large-loop injection.

Note: Also see the IonPac AS20, with complementary selectivity for confirmation of perchlorate identification when using EPA Method 314.1

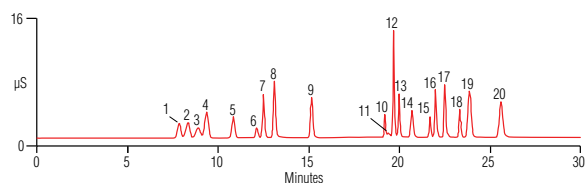


Isocratic separation of polarizable anions and inorganic anions using a sodium hydroxide eluent on the 4 mm IonPac AS16 column.



Determination of trace perchlorate in drinking water using the AS16 column.

Gradient Separation of Polarizable Anions and Inorganic Anions Using the IonPac® AS16 and EG50 Eluent Generator

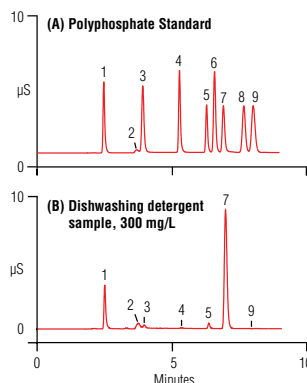


Column:	IonPac AG16, AS16, 4 mm	Peaks:	1. Fluoride	2.0	11. Carbonate	20.0
Eluent:	Potassium hydroxide, 1.5 mM from 0 to 7 min to 10 mM at 13 min		2. Acetate	10.0	12. Sulfate	10.0
Eluent Source:	EGC-KOH		3. Propionate	10.0	13. Selenate	10.0
Temperature:	30 °C		4. Formate	10.0	14. Iodide	20.0
Flow Rate:	1.5 mL/min		5. Chlorite	10.0	15. Thiosulfate	20.0
Inj. Volume:	10 µL		6. Bromate	10.0	16. Chromate	20.0
Detection:	Suppressed conductivity, ASRS® ULTRA, 4 mm, AutoSuppression® recycle mode		7. Chloride	5.0	17. Phosphate	20.0
			8. Nitrite	10.0	18. Arsenate	20.0
			9. Nitrate	10.0	19. Thiocyanate	20.0
			10. Selenite	10.0	20. Perchlorate	20.0

14230-01

Determination of polarizable anions and inorganic anions using a potassium hydroxide gradient delivered with an EG using the 4 mm IonPac AS16 column.

Separation of Polyphosphates in Detergent Using the IonPac® AS16 Column



Column:	IonPac AG16, AS16, 4 mm	
Eluent:	25 mM potassium hydroxide for 1.7 min to 65 mM in 2.5 min	
Eluent Source:	EG40	
Temperature:	30 °C	
Flow Rate:	1.5 mL/min	
Inj. Volume:	10 µL	
Detection:	Suppressed Conductivity, ASRS® ULTRA, 4 mm, AutoSuppression® recycle mode	

Peaks:	1. Chloride	3 mg/L (ppm)
	2. Carbonate	-
	3. Sulfate	5
	4. Phosphate	10
	5. Pyrophosphate	10
	6. Trimetaphosphate	10
	7. Tripolyphosphate	10
	8. Tetrametaphosphate	10
	9. Tetrapolyphosphate	10

14238

Separation of polyphosphates on the 4 mm IonPac AS16 column using a potassium hydroxide gradient delivered with an Eluent Generator.

AN 151: Determination of Perchlorate in Environmental Waters by Ion Chromatography Coupled with Electrospray Mass Spectrometry (IC-MS)

AN 176: Determining Sub-ppb Perchlorate in Drinking Water Using Preconcentration/Matrix Elimination IC with Suppressed Conductivity Detection by U.S. EPA Method 314.1

AN 178: Improved Determination of Trace Concentrations of Perchlorate in Drinking Water Using Preconcentration with Two-Dimensional Ion Chromatography and Suppressed Conductivity Detection

Application Updates

AU 145: Determination of Perchlorate in Drinking Water by Ion Chromatography

AU 148: Determination of Perchlorate in Drinking Water Using Reagent-Free™ Ion Chromatography

Ordering Information

Analytical Columns

IonPac AS16 Analytical Column (4 × 250 mm)	055376
IonPac AS16 Analytical Column (2 × 250 mm)	055378

Guard Columns

IonPac AG16 Guard Column (4 × 50 mm)	055377
IonPac AG16 Guard Column (2 × 50 mm)	055379

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS16 Anion-Exchange Column Data Sheet

Application Notes

AN 134: Determination of Low Concentrations of Perchlorate in Drinking and Ground Waters Using Ion Chromatography

AN 138: Determination of Thiosulfate in Refinery and Other Wastewaters

AN 144: Determination of Perchlorate in High Ionic Strength Fertilizer Extracts By Ion Chromatography

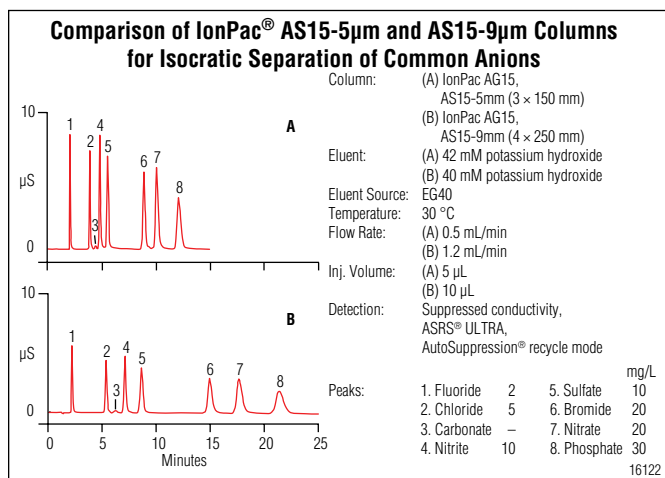
IonPac AS15

For trace-level concentrations of inorganic anions and low-molecular weight organic acids

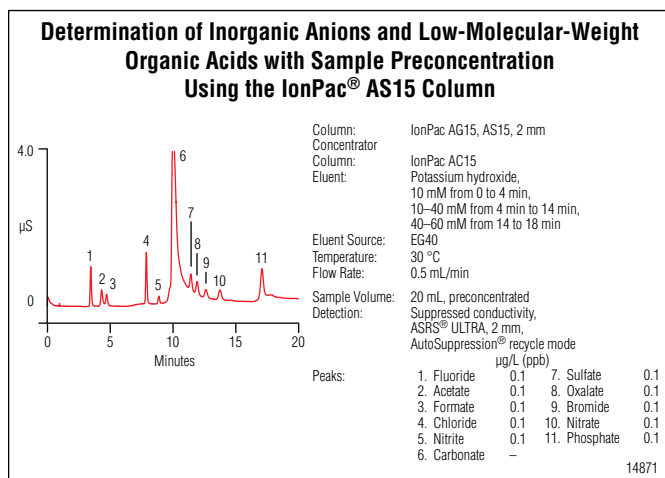
The IonPac AS15 column was designed specifically for analysis of trace anions in high-purity water matrices, for the semiconductor and power generation industries. Its high capacity and selectivity enable the determination of trace-level concentrations of inorganic anions and low-molecular-weight organic acids in high-purity water matrices.

- AS15-5 μm (3×150 mm) column for high efficiency, fast analysis (15 min)
- AS15-9 μm (2×250 and 4×250 mm) columns for higher-capacity applications
- Column selectivity optimized for 30 °C operating temperature
- Superior resolution of early-eluting anions (fluoride, glycolate, acetate, and formate)

This column is ideal for use with large-loop injections. Use the AC15 concentration column for ultratrace (ppt) analyses. Use with the Eluent Generator for simplified eluent preparation. Use the Anion Self-Regenerating Suppressor (ASRS 300) with this column.

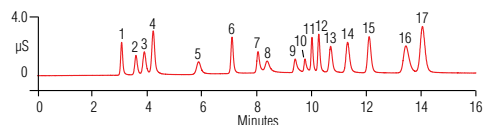


Comparison of the AS15-5 μm (3×150 mm) and AS15-9 μm (4×250 mm) for the separation of inorganic anions.



Determination of inorganic anions and low-molecular-weight organic acids with sample preconcentration using the IonPac AS15 column.

Separation of Weakly Retained Organic Acids Using the IonPac® AS15-5µm (3 × 150 mm) Column



Column:	IonPac AG15, AS15-5mm (3 × 150 mm)	Peaks:	1. Fluoride	1	10. Sulfite	2
Eluent:	10 mM Potassium hydroxide for 4 min to 60 mM at 9 min		2. Glycolate	5	11. Sulfate	2
Eluent Source:	EG40		3. Acetate	5	12. Oxalate	3
Temperature:	30 °C		4. Formate	5	13. Bromide	5
Flow Rate:	0.7 mL/min		5. Propionate	5	14. Nitrate	5
Inj. Volume:	5 µL		6. Chloride	2	15. Phosphate	10
Detection:	Suppressed conductivity, ASRS® ULTRA, 2 mm, AutoSuppression® recycle mode		7. Nitrite	2	16. Chlorate	10
			8. Butyrate	5	17. Thiosulfate	10
			9. Carbonate	30		

16393

Ordering Information

Analytical Columns

IonPac AS15 Analytical Column (4 × 250 mm)	053940
IonPac AS15 Analytical Column (2 × 250 mm)	053941
IonPac AS15-5µm Analytical Column (3x150 mm)	057594

Guard Columns

IonPac AG15 Guard Column (4 × 50 mm)	053942
IonPac AG15 Guard Column (2 × 50 mm)	053943
IonPac AG15-5µm Guard Column (3x30 mm)	057597

Separation of weakly-retained organic acids using a potassium hydroxide gradient on the IonPac AS15-5 µm (3 × 150 mm) column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS15 Anion-Exchange Column Data Sheet

Application Notes

AN 137: Determination of Trace Anions in High-Nitrate Matrices by Ion Chromatography

AN 171: Determination of Disinfection By-Product Anions and Bromide in Drinking Water Using a Reagent-Free Ion Chromatography System Followed by Postcolumn Addition of an Acidified On-Line Generated Reagent for Trace Bromate Analysis

AN 173: Direct Determination of Cyanide in Drinking Water by Ion Chromatography with Pulsed Amperometric Detection (PAD)

AN 179: Carbohydrate and Amino Acid Analysis Using 3-D Amperometry

Application Updates

AU 142: Improved Determination of Trace Anions in High Purity Waters by High-Volume Direct Injection with the EG40

AU 143: Determination of Chloride in Acid Copper Plating Bath

Technical Notes

TN 48: Determination of Trace Anions in High-Purity Water by High-Volume Direct Injection with the EG40

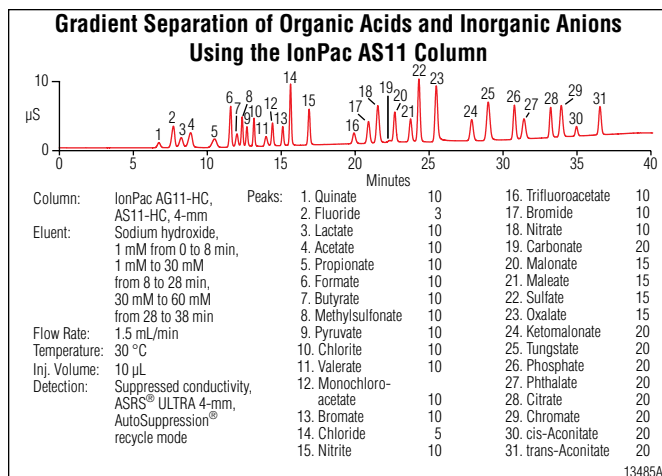
IonPac AS11-HC

For resolving a large number of inorganic anions and organic acid anions in complex matrices

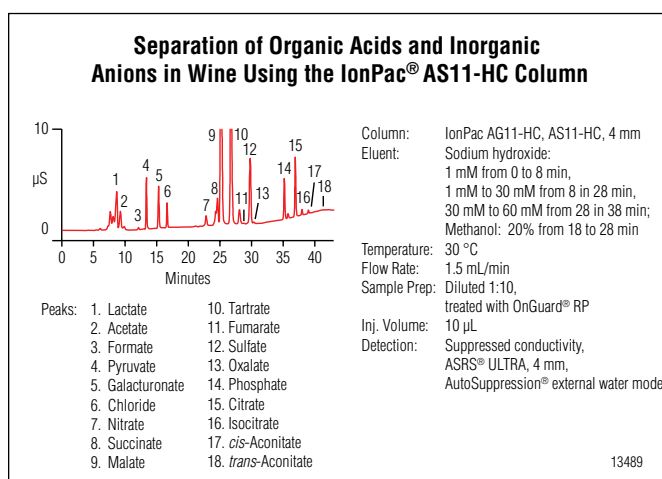
Complex sample matrices such as chemical wastewater effluents and fermentation broth solutions contain a variety of inorganic anions and organic acids. The IonPac AS11-HC was specifically designed to resolve a large number of inorganic anions and organic acid anions in a single run using a hydroxide gradient.

- Use for organic acids and anions in complex sample matrices or uncharacterized samples.
- Recommended for monovalent and divalent organic acids.
- Use the AS11 for fast analysis of organic acids and anions in well-characterized samples.
- Use the ICE-AS1 or ICE-AS6 columns for organic acids in high-ionic-strength samples.
- High capacity translates into longer retention times, but with higher resolution.

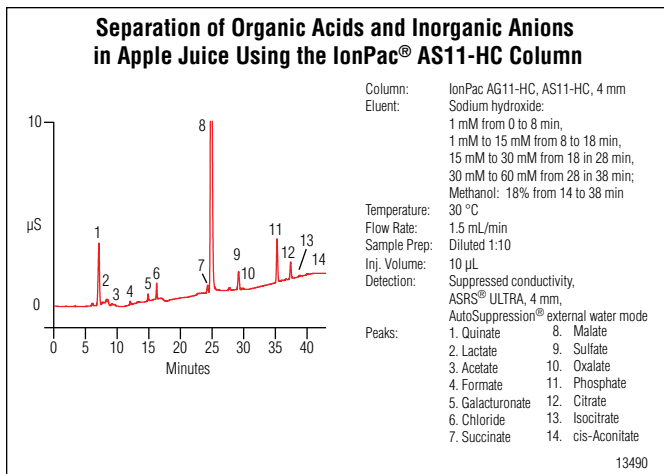
The high-capacity AS11-HC column allows the injection of more concentrated samples without overloading or peak broadening, and provides improved separation over the AS11 column for monovalent carboxylic acids, including quinate, lactate, acetate, propionate, formate, and butyrate.



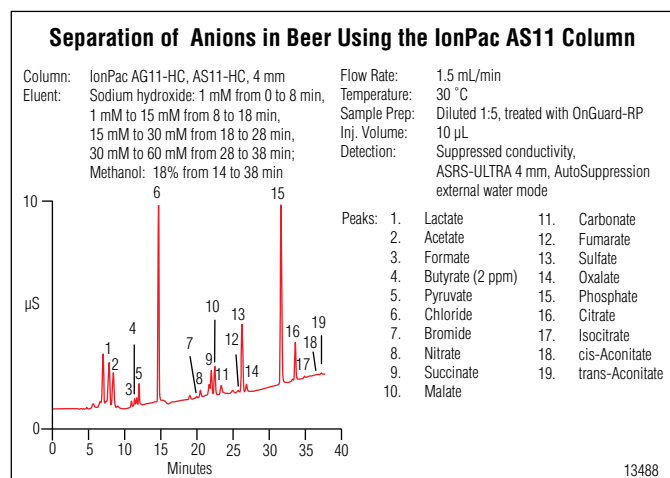
Determination of organic acids and inorganic anions using the IonPac AS11-HC column.



Separation of organic acids and inorganic anions in wine using the IonPac AS11-HC column.



Separation of organic acids and inorganic anions in apple juice using the IonPac AS11-HC column.



IonPac AS11-HC column used for the analysis of beer spiked with 2 mg/L (ppm) butyrate.

Application Notes

AN 123: The Determination of Inorganic Anions and Organic Acids in Fermentation Broths

AN 143: Determination of Organic Acids in Fruit Juices

Technical Notes

TN 44: The Determination of Trace Anions in Concentrated Phosphoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

Ordering Information

Analytical Columns

IonPac AS11-HC Analytical Column (4 × 250 mm).....	052960
IonPac AS11-HC Analytical Column (2 × 250 mm).....	052961

Guard Columns

IonPac AG11-HC Guard Column (4 × 50 mm).....	052962
IonPac AG11-HC Guard Column (2 × 50 mm).....	052963

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS11 and AS11-HC Anion-Exchange Columns Data Sheet

IonPac AS11

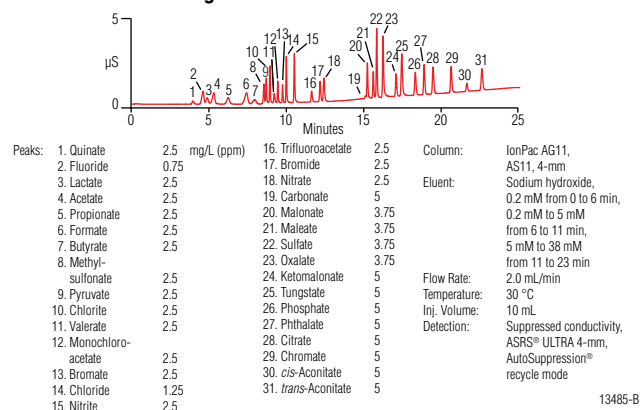
For fast profiling of inorganic anions and organic acid anions

The AS11 is a relatively low-capacity column designed for fast, gradient screening of inorganic anions and organic acid anions in simple sample matrices.

- Fast analysis of organic acids and inorganic anions in well-characterized samples
- Ideal for highly charged anions, including polyphosphates and polycarboxylates
- For organic acids and inorganic anions in complex sample matrices
- Low capacity translates into fast analysis times and high throughput

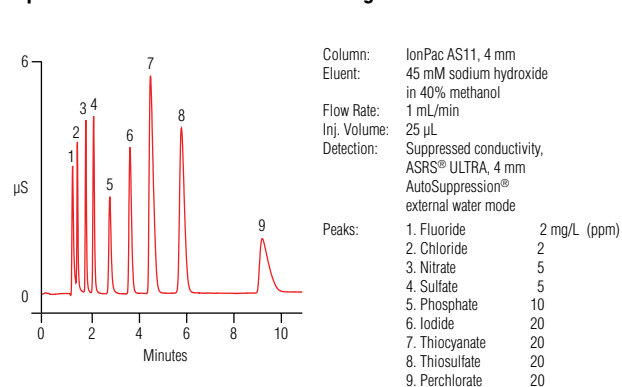
The AS11 is designed for fast profiling of inorganic anions and organic acid anions in foods, beverages, chemical process solutions, wastewater, brines, and power plant waters. The AS11 column can resolve a large number of inorganic anions and organic acids in approximately 15 minutes.

Determination of Organic Acids and Inorganic Anions Using the IonPac® AS11 Column

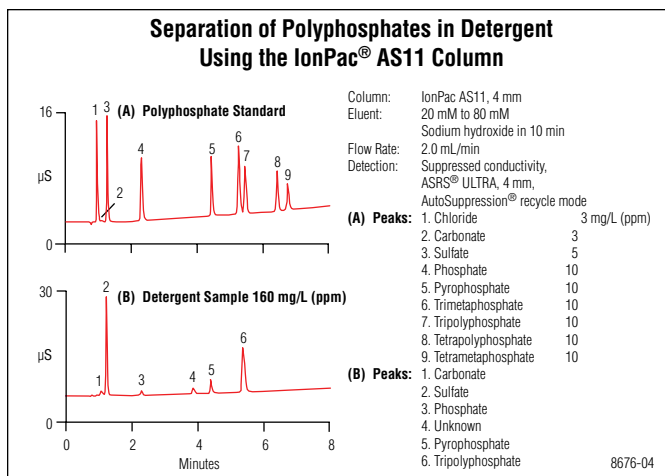


Determination of organic acids and inorganic anions using the IonPac AS11 column.

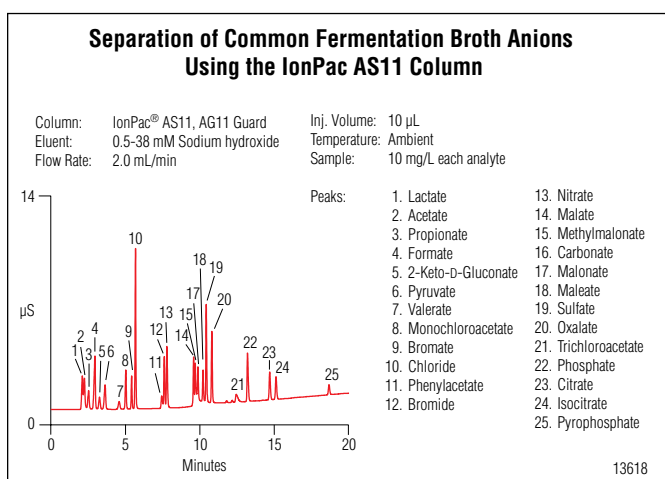
Separation of Polarizable Anions Using the IonPac® AS11 Column



Separation of polarizable anions using the IonPac AS11 column.



Separation of polarizable anions in detergent using the IonPac AS11 column.



Yeast fermentation broth culture (10-fold dilution) analyzed using the IonPac AS11.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS11 and AS11-HC Anion-Exchange Columns Data Sheet

Application Notes

AN 37: The Determination of Iodide in Milk Products

AN 71: Determination of Polyphosphates Using Ion Chromatography with Suppressed Conductivity Detection

AN 93: Determination of Trace Anions in Concentrated Bases Using AutoNeutralization Pretreatment/Ion Chromatography

AN 104: Analysis of Personal Care Products by Ion Chromatography

AN 107: Ions In Physiological Fluids

AN 112: Determination of Nitrate and Nitrite in Meat Using High-Performance Anion-Exchange Chromatography

AN 113: Determination of Trace Anions in High Purity Waters by High Volume/Direct Injection Ion Chromatography

AN 114: Determination of Trace Anions in High-Purity Waters Using Direct Injection and Two-Step Isocratic Ion Chromatography

AN 116: Quantification of Anions in Pharmaceuticals

AN 121: Analysis of Low Concentrations of Perchlorate in Drinking Water and Ground Water by Ion Chromatography

AN 123: The Determination of Inorganic Anions and Organic Acids in Fermentation Broths

AN 161: Determination of Metal Cyanide Complexes by Ion Chromatography with On-Line Sample Preconcentration and UV Absorbance Detection

AN 164: Assay for Citrate and Phosphate in Pharmaceutical Formulations

Application Updates

AU 122: The Determination of Iodide in Brine

AU 140: The Determination of Iodide in Urine

AU 147: Direct Determination of Metal Cyanides by Ion Chromatography with UV Absorbance Detection

AU 149: Determination of Metal Cyanide Complexes in Solid Wastes by Anion-Exchange Chromatography with UV Absorbance Detection

Technical Notes

TN 48: Determination of Trace Anions in High-Purity Water by High-Volume Direct Injection with the EG40

Ordering Information

Analytical Columns

IonPac AS11 Analytical Column (4 × 250 mm)	044076
IonPac AS11 Analytical Column (2 × 250 mm)	044077

Guard Columns

IonPac AG11 Guard Column (4 × 50 mm)	044078
IonPac AG11 Guard Column (2 × 50 mm)	044079

IonPac AS10

For isocratic and gradient separation of inorganic anions and organic acids

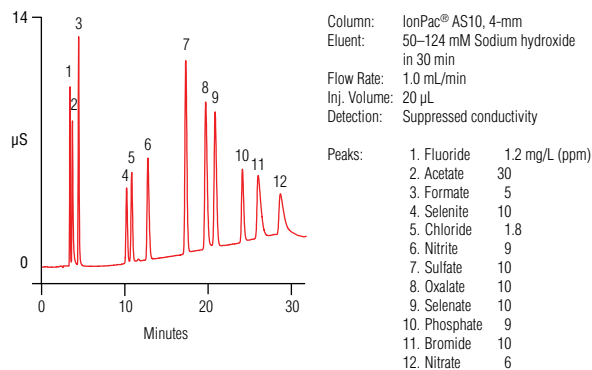
The IonPac AS10 is a high-capacity hydroxide-selective, anion-exchange column designed for isocratic and gradient separation of inorganic anions and organic acids. The column provides excellent resolution of weakly retained low-molecular-weight aliphatic acids. The high capacity of the AS10 permits the analysis of trace-level analytes in high-ionic-strength matrices.

- Use the AS10 column for analysis of inorganic anions in high nitrate samples

The column provides excellent resolution of weakly retained low-molecular-weight aliphatic acids. The selectivity and high capacity of the AS10 permits the analysis of trace-level analytes in high-ionic-strength matrices. The AS10 resin strongly retains nitrate, which makes this column well suited for the analysis of trace anions in nitric acid and nitrate salts.

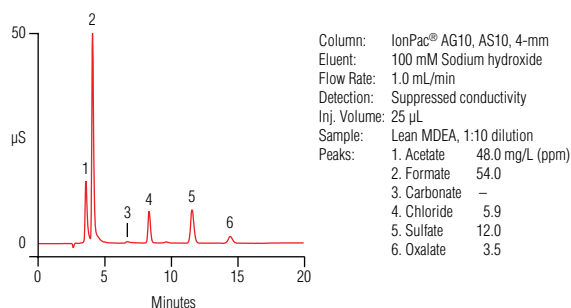
Use with the Eluent Generator for simplified eluent preparation for applications using less than 100 mN hydroxide. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS10 column.

Gradient Separation of Organic Acids and Inorganic Anions



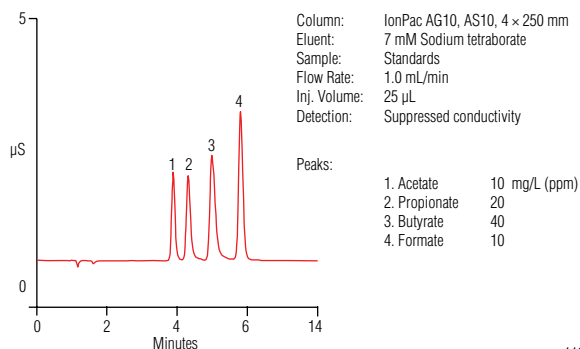
Separation of common organic and inorganic anions on the IonPac AS10 using a hydroxide gradient.

Analysis of Methyl-diethanolamine for Corrosive Anions



Analysis of methyl-diethanolamine for corrosive anions using the IonPac AS10 column.

Determination of Aliphatic Organic Acids in Amine Matrix on the IonPac® AS10



Ordering Information

Analytical Columns

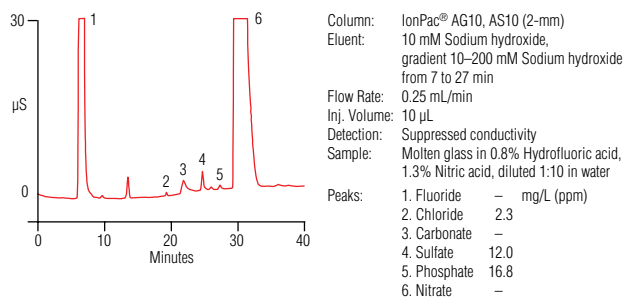
IonPac AS10 Analytical Column (4 × 250 mm)	043118
IonPac AS10 Analytical Column (2 × 250 mm)	043123

Guard Columns

IonPac AG10 Guard Column (4 × 50 mm)	043119
IonPac AG10 Guard Column (2 × 50 mm)	043124

Determination of aliphatic organic acids in amine matrix on the IonPac AS10.

Anions from Molten Glass



Anions in molten glass using the IonPac AS10 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS10 Anion-Exchange Column and the IonPac AC10 Concentrator Column Data Sheet

Application Notes

AN 78: Determination of Trace Anions in Concentrated Hydrofluoric Acid

AN 85: Determination of Trace Anions in Organic Solvents

Technical Notes

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

Carbonate Eluent Anion-Exchange Columns

Anion-exchange columns optimized for use with a carbonate/bicarbonate eluent

Dionex carbonate eluent columns provide well-characterized isocratic separations, including regulated methods for drinking and wastewater. Carbonate eluent columns are available in a wide range of capacities and are compatible with RFIC-EG and RFIC-ER systems.



IonPac AS23: High-capacity, carbonate eluent anion-exchange column for the analysis of oxyhalides and the common inorganic anions.

IonPac AS22: High capacity and resolution, carbonate eluent anion-exchange column recommended for the fast, isocratic separation of inorganic anions.

IonPac AS14: Moderate-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions.

IonPac AS14A: High-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions.

IonPac AS12A: Carbonate eluent anion-exchange column designed for the fast separation of inorganic anions offering excellent retention of fluoride

IonPac AS9-HC: High-capacity carbonate eluent anion-exchange column for the analysis of inorganic anions and oxyhalides.

IonPac AS9-SC: Carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions and oxyhalides.

IonPac AS4A-SC: Carbonate eluent anion exchange column for the fast, isocratic separation of inorganic anions in drinking water and wastewater.

IonPac AS23

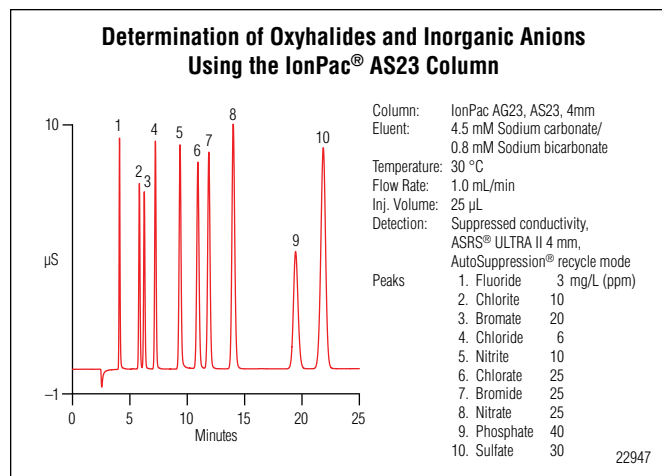
Precise, isocratic analysis of trace oxyhalides and the common inorganic anions

The AS23 carbonate eluent anion-exchange column is specifically designed for trace bromate in drinking water. Its high capacity and selectivity enables determination of bromate in drinking water at the low $\mu\text{g/L}$ level. The AS23 meets the performance requirements of U.S EPA Methods 300.0 and 300.1.

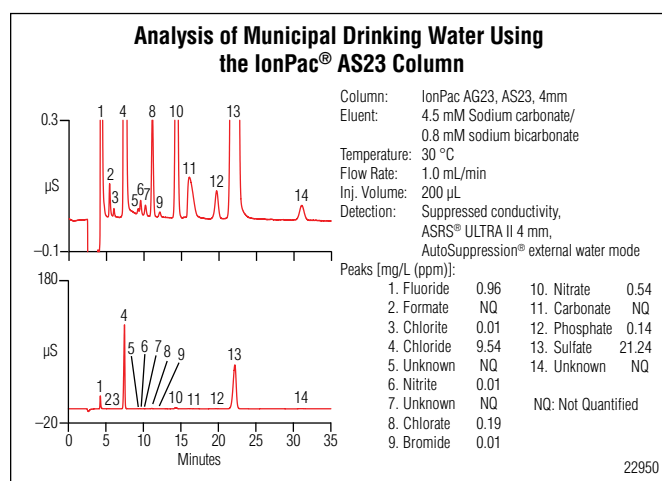
- Optimized for isocratic carbonate/bicarbonate eluent
- Recommended column for trace bromate in drinking water matrices
- Meets performance requirements specified in US EPA Methods 300.0 and 300.1
- Ideal alternative for AS9-HC oxyhalide and inorganic anion applications
- Simple, accurate eluent preparation with the AS23 Eluent Concentrate
- Optimized for a 30 °C operating temperature to ensure reproducible retention times
- Compatible with organic solvents to enhance analyte solubility

The AS23 is designed for the analysis of oxyhalides and the common inorganic anions including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, ground water, wastewater, and other diverse sample matrices.

The AS23 is the newest carbonate eluent column recommended for the analysis of oxyhalides including bromate. It can be used in combination with the Eluent Generator and the Electrolytic pH Modifier (EPM) which automatically produces potassium carbonate/bicarbonate eluents from water. The AS23 is an ideal alternative, using carbonate-bicarbonate eluents, for AS9-HC applications.



Determination of oxyhalides and inorganic anions on an IonPac AS23 column.



Determination of oxyhalides and inorganic anions in a municipal drinking water sample using an IonPac AS23 column.

Ordering Information

Analytical Columns

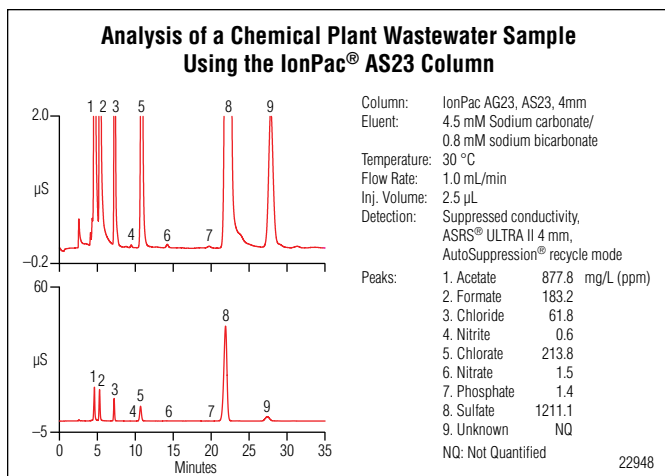
IonPac AS23 Analytical Column (2 × 250 mm) 064145

IonPac AS23 Analytical Column (4 × 250 mm) 064149

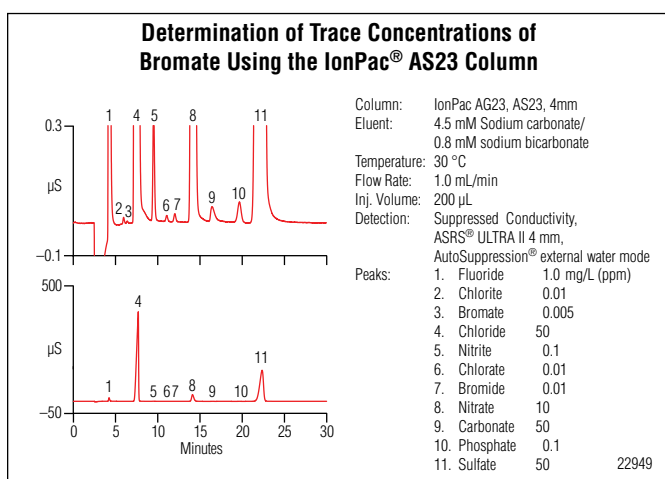
Guard Columns

IonPac AG23 Guard Column (2 × 50 mm) 064143

IonPac AG23 Guard Column (4 × 50 mm) 064147



Separation of inorganic anions, oxyhalides, and organic acids in a chemical wastewater sample using an IonPac AS23 column.



Determination of trace concentrations of bromate using the IonPac AS23 column with a large-loop injection.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS23 Datasheet

Application Notes

AN 184: Determination of Trace Concentrations of Chlorite, Bromate, and Chlorate in Bottled Natural Mineral Waters

IonPac AS22

Fast analysis of common inorganic anions

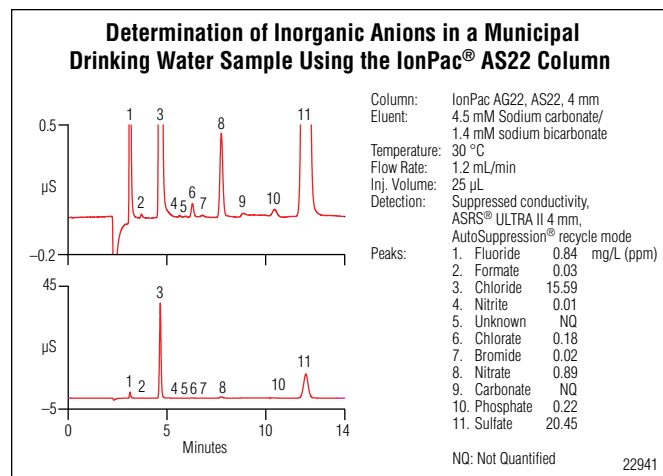
Designed specifically for compliance monitoring of inorganic anions in accordance with US EPA Method 300.0 (A) and 300.1, the IonPac AS22 represents the culmination of more than 20 years of column development, and is a key complement to our award-winning Reagent-Free IC system.

- Fast isocratic separation of the common inorganic anions in 8 minutes
- Isocratic separation of inorganic anions in complex sample matrices in 12 minutes
- Carbonate peak well-resolved from the common inorganic anions
- Meets performance requirements specified in US EPA Method 300.0 (A)
- Ideal alternative for AS4A-SC, AS12A, AS14, and AS14A inorganic anion applications
- Simple, accurate eluent preparation with the AS22 Eluent Concentrate
- Optimized for a 30 °C operating temperature to ensure reproducible retention times

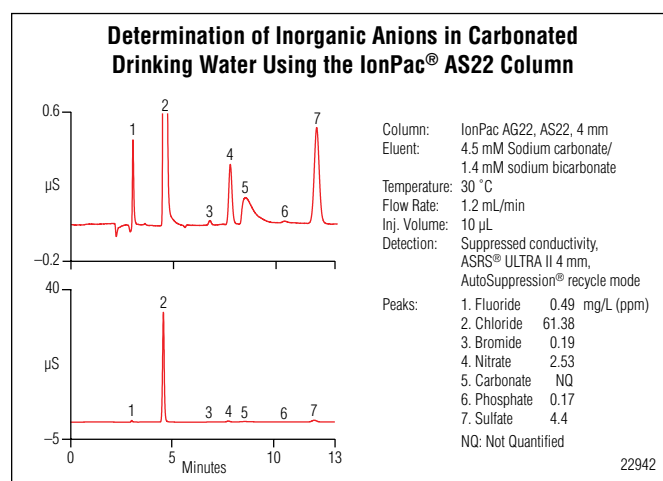
The AS22 is designed for the determination of inorganic anions and low molecular weight organic acids including fluoride, acetate, formate, chloride, nitrite, bromide, nitrate, phosphate, and sulfate. The AS22 can be used with isocratic carbonate/bicarbonate eluents and suppressed conductivity detection. Common inorganic anions can easily be separated in a variety of sample matrices including drinking water, wastewater, process streams, and scrubber solutions.

The AS22 can be used in combination with the Eluent Generator and the Electrolytic pH Modifier (EPM) which automatically produce potassium carbonate/bicarbonate eluents from water. The AS22 column is the newest carbonate eluent column recommended for fast analysis of inorganic anions and is an ideal alternative, using carbonate-bicarbonate eluents, for AS4A-SC, AS12A, AS14, and AS14A inorganic anion applications.

Note: Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS22 column for eluent suppression.

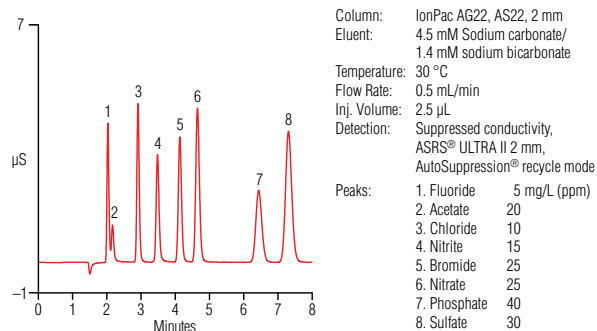


Common inorganic anions in a municipal drinking water sample can be separated in approximately 12 min.



The unique selectivity of the AS22 column positions carbonate well away from the common inorganic anions.

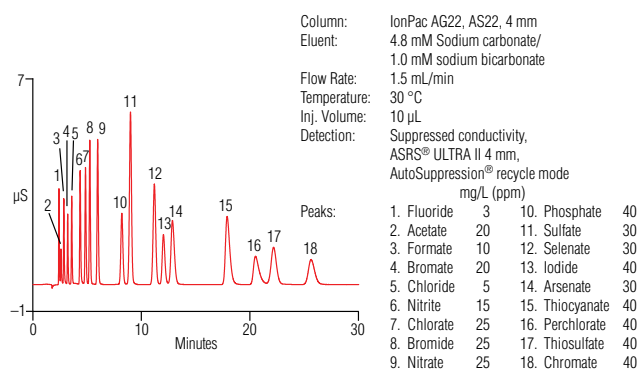
The IonPac® AS22 Permits Fast Anion Analysis



22943

The IonPac AS22 resin packing supports fast anion analysis.

Separation of Environmental Anions Using the IonPac® AS22 Column



22944

Separation of 18 environmental anions is completed in under 30 minutes using the IonPac AS22 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS22 Datasheet

Application Updates

AU 161: Determination of Sulfate and Chloride in Ethanol Using Ion Chromatography

Ordering Information

Analytical Columns

IonPac AS22 Analytical Column (2 × 250 mm) 064137

IonPac AS22 Analytical Column (4 × 250 mm) 064141

Guard Columns

IonPac AG22 Guard Column (2 × 50 mm) 064135

IonPac AG22 Guard Column (4 × 50 mm) 064139

IonPac AS14

For the analysis of fluoride and other inorganic anions

The IonPac AS14 is designed for fast analysis of the common inorganic anions in diverse sample matrices.

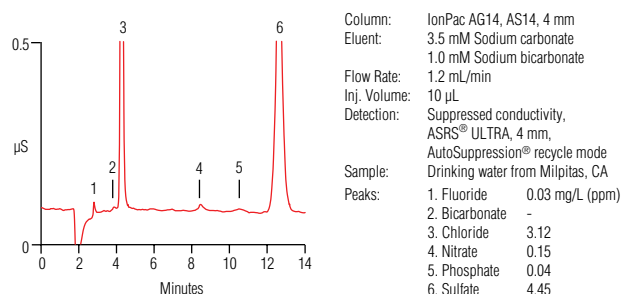
- Common inorganic anions are resolved in 13 minutes using an isocratic carbonate/bicarbonate eluent.
- Sodium tetraborate gradient optimizes difficult separations.
- The AS14 column meets or exceeds US EPA Method 300.0 (A) performance requirements.

The AS14 supports the separation of inorganic anions, including fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. With the AS14, inorganic anions can be determined easily in drinking water, wastewater, foods and beverages, scrubber solutions, and other diverse sample matrices.

For simplified operation, use the AS14 Eluent Concentrate and the Combined Seven Anion Standard. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS14 column for low-noise operation.

Note: See also the IonPac AS22, the latest column recommended for fast analysis of inorganic anions.

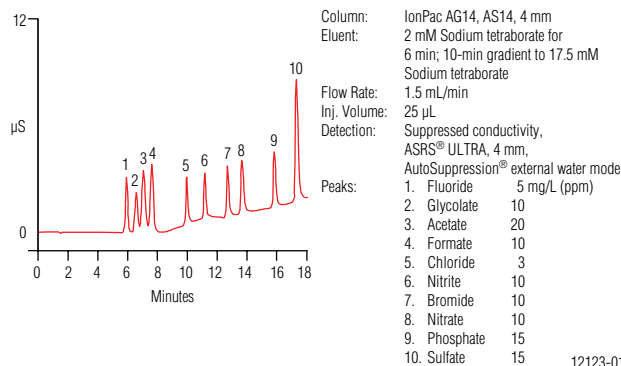
Analysis of Municipal Drinking Water Using the IonPac® AS14



12125

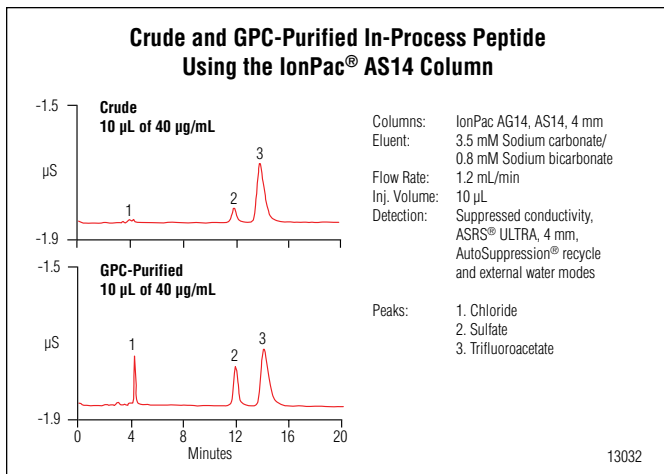
The IonPac AS14 column is ideal for interference-free determination of inorganic anions, including fluoride, in drinking water.

Sodium Tetraborate Gradient Separation of Anions Using the IonPac® AS14 Column

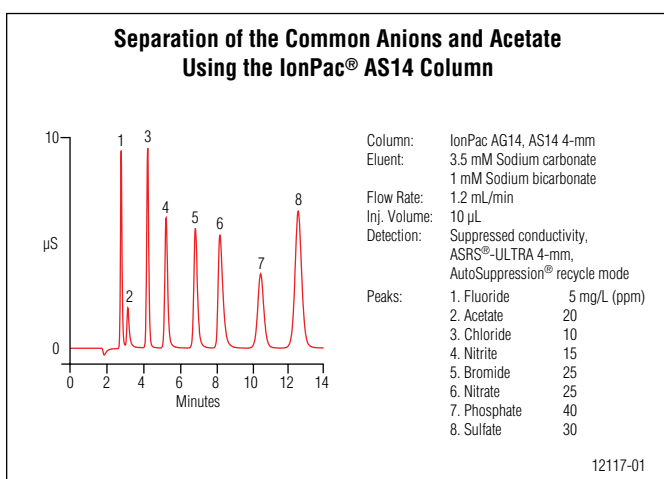


12123-01

Separation of weakly retained anions using a sodium tetraborate gradient elution.



Determination of anionic counterions present in a gel permeation purified peptide.



Isocratic separation of inorganic anions on an IonPac AS14 column in less than 13 minutes.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS14 Anion-Exchange Column Data Sheet

Application Notes

AN 115: Determination of Trifluoroacetic Acid (TFA) in Peptides

AN 116: Quantification of Anions in Pharmaceuticals

AN 133: Determination of Inorganic Anions in Drinking Water by Ion Chromatography

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 166: Application of Eluent Generation for Trace Anion Analysis of Borated Waters

AN 2: Determination of Nitrate and Sulfate Collected on Air Filters

AN 2: Determination of Nitrate and Sulfate Collected on Air Filters

Technical Notes

TN 47: Achieving Low Baseline Noise for Anion Determination by Suppressed Conductivity Using Carbonate Eluents

Ordering Information

Analytical Columns

IonPac AS14 Analytical Column (4 × 250 mm)	046124
IonPac AS14 Analytical Column (2 × 250 mm)	046129

Guard Columns

IonPac AG14 Guard Column (4 × 50 mm)	046134
IonPac AG14 Guard Column (2 × 50 mm)	046138

IonPac AS14A

Fast analysis of the common inorganic anions in diverse sample matrices

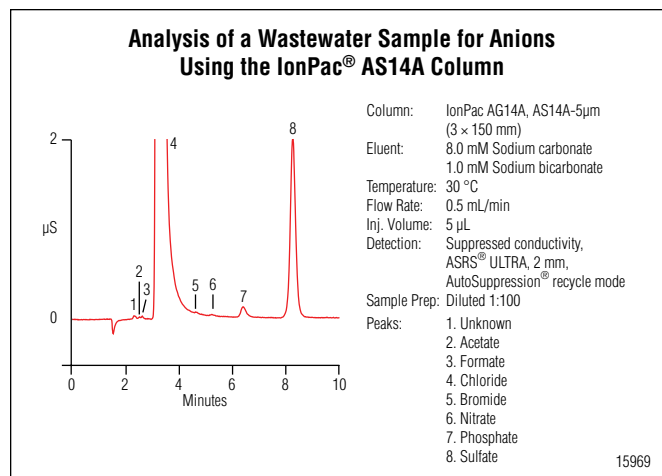
The IonPac AS14A anion-exchange column is a carbonate-based column for fast analysis of the common inorganic anions in diverse sample matrices. The AS14A meets the performance requirements specified in US EPA Method 300.0 (A).

- High-efficiency and fast analysis (8 minutes)
- High-capacity applications (13 minute run time)
- Improved peak shape, efficiency, and pH stability
- Meets or exceeds US EPA Method 300.0 (A) performance requirements
- Simplified operation with AS14A Eluent Concentrate and Combined Seven Anion Standard

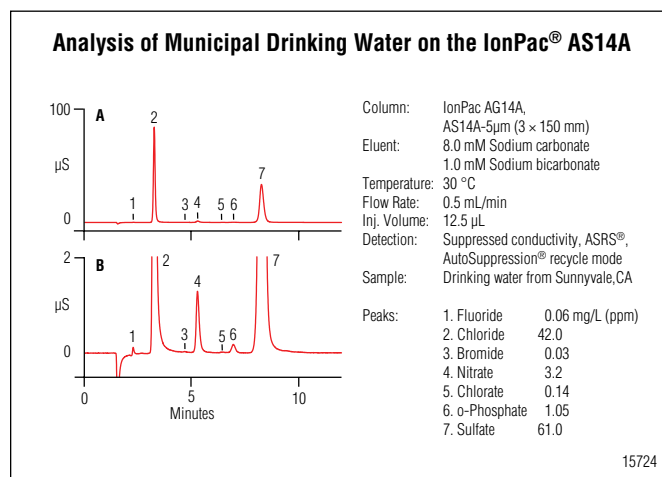
The AS14A is designed for the separation of inorganic anions, including fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate, using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. The inorganic anions can easily be determined in drinking water, wastewater, foods and beverages, scrubber solutions, and other diverse sample matrices.

For simplified operation use the AS14A with AS14A Eluent Concentrate and the Combined Seven Anion Standard. Use the ASRS 300 suppressor with the AS14A column for low-noise operation.

Note: See also the IonPac AS22, the newest carbonate eluent column recommended for fast analysis of inorganic anions.



Determination of inorganic anions in a wastewater sample from a chemical manufacturer on an IonPac AS14A-5µm (3 × 150 mm) column.



Determination of inorganic anions in municipal drinking water on the IonPac AS14A-5µm (3 × 150 mm) column.

Ordering Information

Analytical Columns

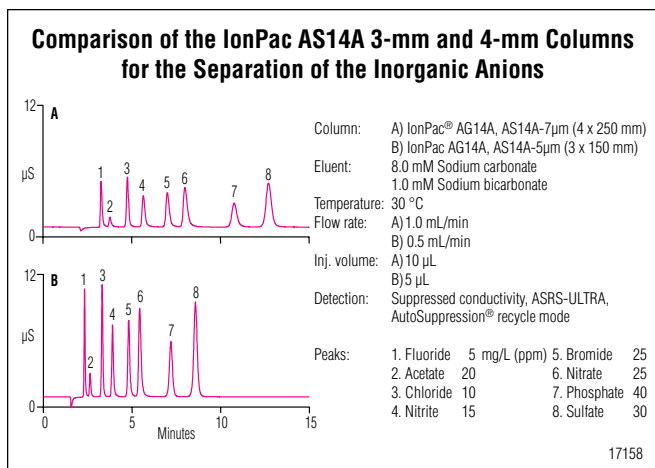
IonPac AS14A-7 μ m Analytical Column (4 \times 250 mm)..... 056904

IonPac AS14A-5 μ m Analytical Column (3 \times 150 mm)..... 056901

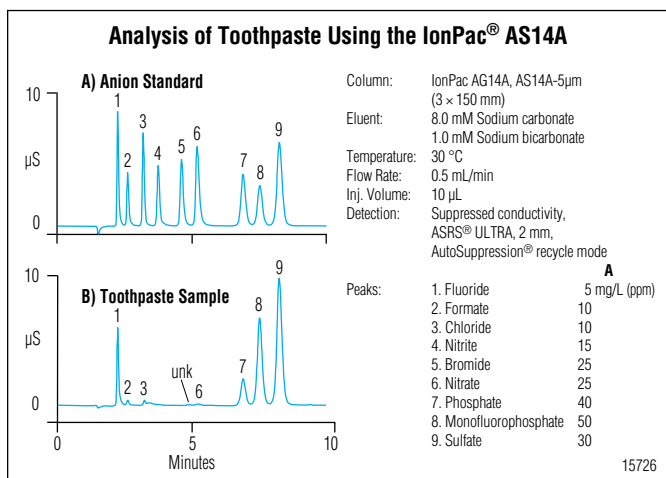
Guard Columns

IonPac AG14A-7 μ m Guard Column (4 \times 50 mm) 056897

IonPac AG14A-5 μ m Guard Column (3 \times 30 mm) 056899



Comparison of the separation of inorganic anions on 3 mm and 4 mm IonPac AS14A columns.



Determination of anionic additives in toothpaste on an IonPac AS14A-5 μ m (3 \times 150 mm) column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS14A Anion-Exchange Column Data Sheet

Application Notes

AN 140: Fast Analysis of Anions in Drinking Water by Ion Chromatography

IonPac AS12A

Fast separation of inorganic anions, with excellent retention of fluoride

The IonPac AS12A anion-exchange column provides fast analysis of common inorganic anions and oxyhalides, such as chlorite and bromate, in environmental waters. This column is also useful for trace chloride and sulfate in high-carbonate matrices.

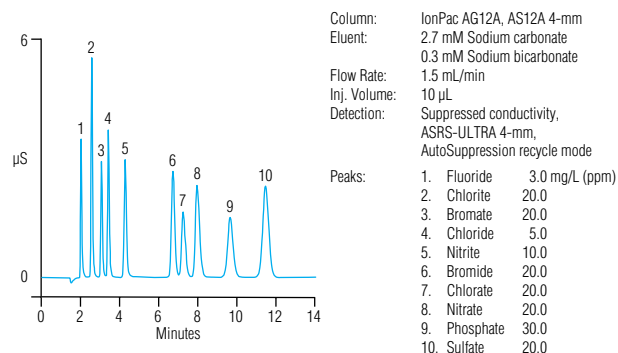
- Provides fast analysis of inorganic anions and oxyhalides at similar concentrations
- Resolves trace chloride and sulfate high-carbonate samples

The AS12A is a moderate-capacity, carbonate eluent anion-exchange column designed for the fast, isocratic separation of inorganic anions and oxyhalides, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, wastewater, groundwater, and other diverse sample matrices.

The common inorganic anions and oxyhalides can be determined in less than 12 min using an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection. It resolves chloride from high concentrations of carbonate. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS12A column.

Note: For trace bromate in ozonated drinking water, use the high-capacity IonPac AS23, recommended for determination of oxyhalides and inorganic anions.

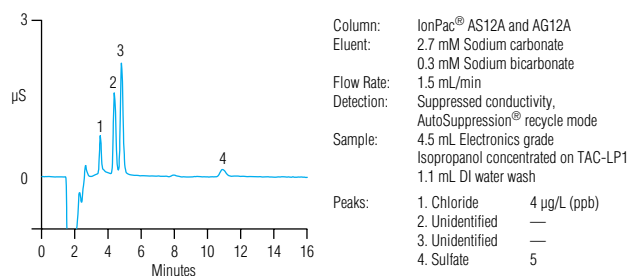
Separation of Oxyhalides Using the IonPac® AS12A Column



10191

Isocratic separation of inorganic anions and oxyhalides on the IonPac AS12A column.

Determination of Anions in High Purity Solvent



10198

Isocratic separation of anions in high-purity solvents using the IonPac AS12A column.

Ordering Information

Analytical Columns

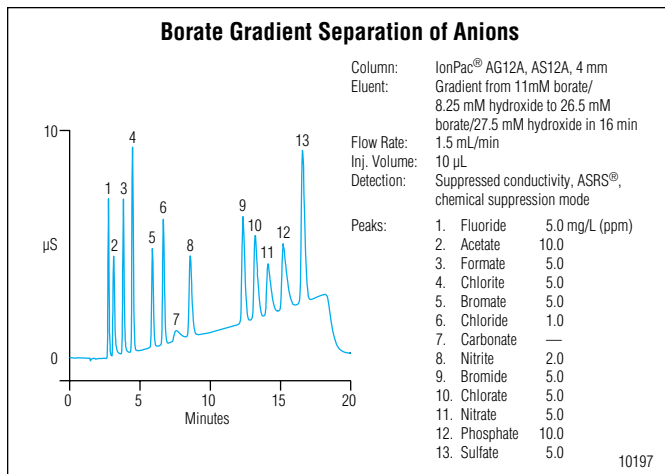
IonPac AS12A Analytical Column (4 × 200 mm) 046034

IonPac AS12A Analytical Column (2 × 200 mm) 046055

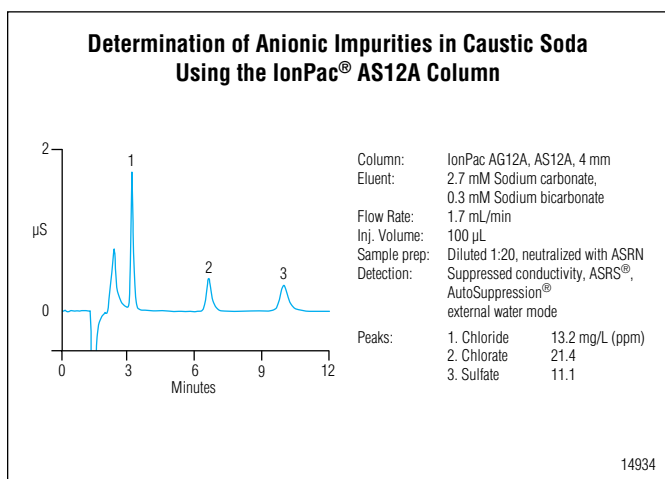
Guard Columns

IonPac AG12A Guard Column (4 × 50 mm) 046035

IonPac AG12A Guard Column (2 × 50 mm) 046056



Borate gradient separation of anions using the IonPac AS12A column.



Determination of anionic impurities in caustic soda using the IonPac AS12A column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS12A Anion-Exchange Column Data Sheet

IonPac AS9-HC

High-capacity column for the analysis of inorganic anions and oxyhalides including bromate.

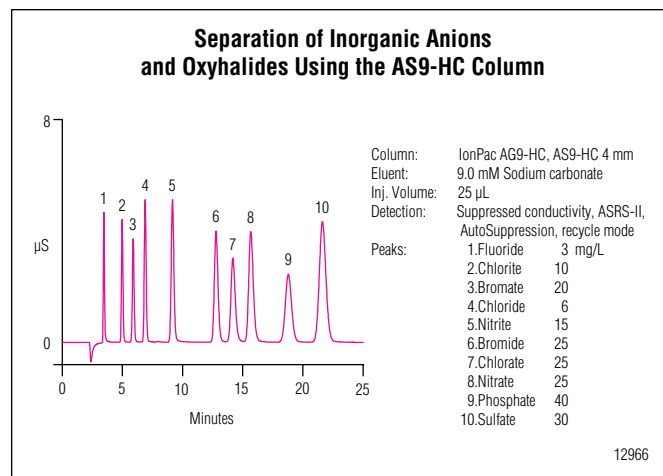
Specifically designed for trace bromate in drinking water, the AS9-HC is the specified column for U.S EPA Methods 300.1 and 317.0.

- For the analysis of oxyhalides and inorganic anions in complex sample matrices
- Simple, isocratic method for trace bromate (5 µg/L) in ozonated drinking water matrices
- Ideal for difficult applications, such as trace nitrite in complex sample matrices
- Improved separation of bromate/chloride, chloride/nitrite, chlorate/nitrate analyte pairs

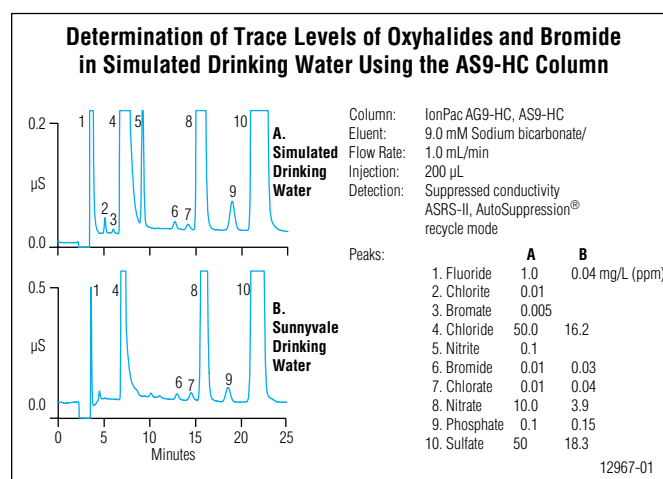
The AS9-HC is a high-capacity carbonate eluent anion-exchange column with selectivity similar to the AS9-SC column. The AS9-HC also supports the analysis of oxyhalides and inorganic anions, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate. The AS9-HC is specified in validated methods such as US EPA Method 300.1 and 317.0 and meets or exceeds the performance requirements of these methods.

This column separates trace bromate in drinking water matrices using an isocratic carbonate eluent and a large-loop injection. The AS9-HC also offers good retention of fluoride out of the water dip. The column's high capacity (190 µeq for 4 × 250 mm) increases retention time to approximately 22 min. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS9-HC column.

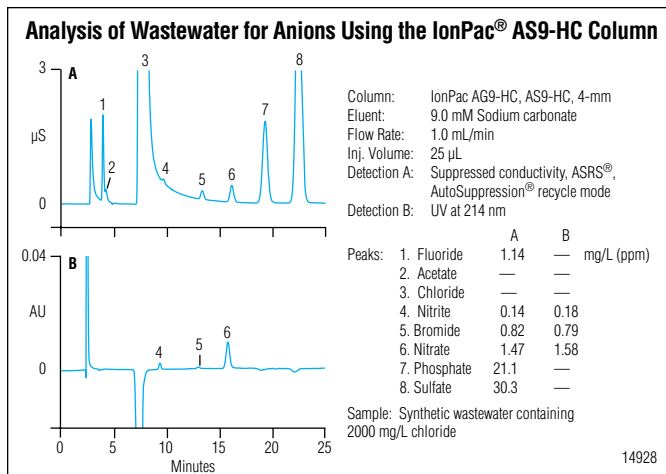
Note: The AS23 is the newest carbonate eluent column recommended for the analysis of oxyhalides including bromate.



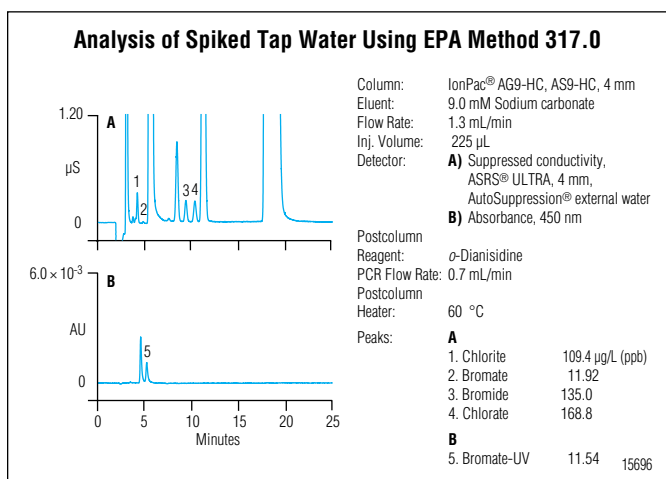
Separation of inorganic anions and oxyhalides using the AS9-HC column.



Determination of trace bromate in drinking water using the AS9-HC column.



Analysis of wastewater for anions using the IonPac AS9-HC column.



Analysis of spiked tap water using EPA Method 317.0.

AN 149: Determination of Chlorite, Bromate, Bromide, and Chlorate in Drinking Water by Ion Chromatography with an On-Line-Generated Postcolumn Reagent for Sub-µg/L Bromate Analysis

AN 81: Ion Chromatographic Determination of Oxyhalides and Bromide at Trace Level Concentrations in Drinking Water Using Direct Injection

AN 85: Determination of Trace Anions in Organic Solvents

Technical Notes

TN 45: Determination of Trace Anions in Concentrated Hydrofluoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

Ordering Information

Analytical Columns

IonPac AS9-HC Analytical Column (4 × 250 mm)	051786
IonPac AS9-HC Analytical Column (2 × 250 mm)	052244

Guard Columns

IonPac AG9-HC Guard Column (4 × 50 mm)	051791
IonPac AG9-HC Guard Column (2 × 50 mm)	052248

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS9-SC and AS9-HC Anion-Exchange Columns Data Sheet

Application Notes

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 136: Determination of Inorganic Oxyhalide Disinfection Byproduct Anions and Bromide in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis

IonPac AS9-SC

For the fast isocratic separation of inorganic anions and oxyhalides

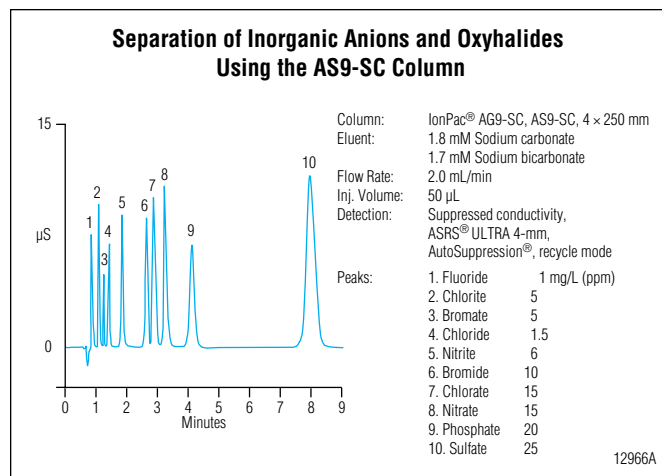
The AS9-SC is designed for the isocratic separation of oxyhalides and inorganic anions, including fluoride, chlorite, bromate, chloride, nitrite, bromide, chlorate, nitrate, phosphate, and sulfate in drinking water, wastewater, groundwater, and other diverse sample matrices.

- For fast analysis of oxyhalides and inorganic anions at similar concentrations
- Ideal for simple sample matrices

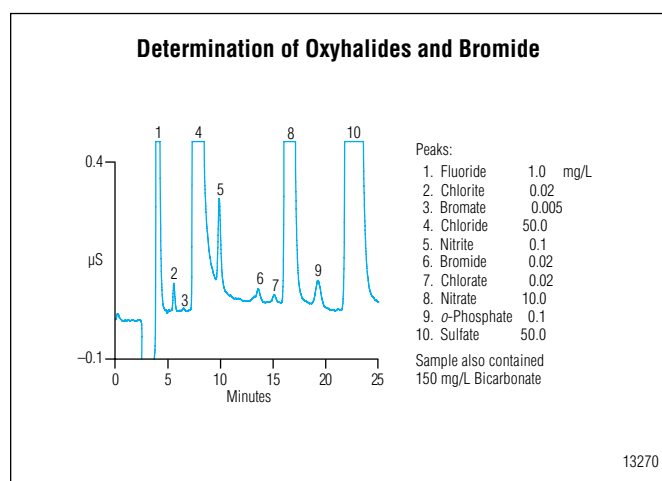
Common inorganic anions and oxyhalides can be determined in less than 10 minutes using an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection.

The AS9-SC column is specified in US EPA Method 300.0 (B), and meets or exceeds the performance requirements of this method. Use the Anion Self-Regenerating Suppressor (ASRS 300) with the AS9-SC column.

Note: See also the AS23, the recommended column for the analysis of oxyhalides, including bromate.



Separation of inorganic inions and oxyhaldies using the AS9-SC column.



Determination of oxyhalides and bromide in simulated drinking water.

Application Updates

AU 131: Determination of Nitrite and Nitrate in Drinking Water Using Chemically Suppressed Ion Chromatography

AU 132: Determination of Nitrite and Nitrate in Drinking Water Using Ion Chromatography with Direct UV Detection

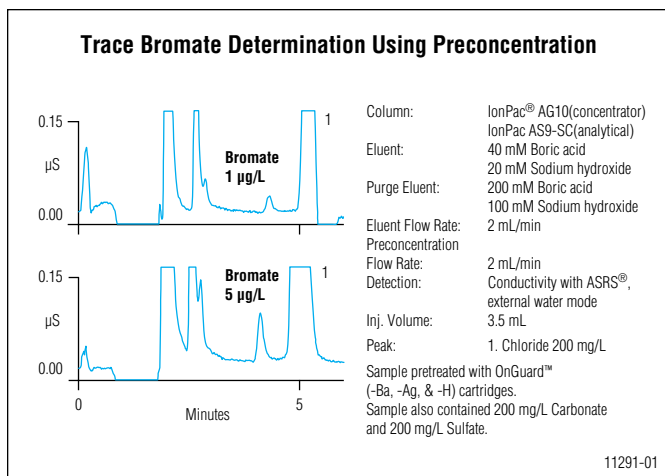
Ordering Information

Analytical Columns

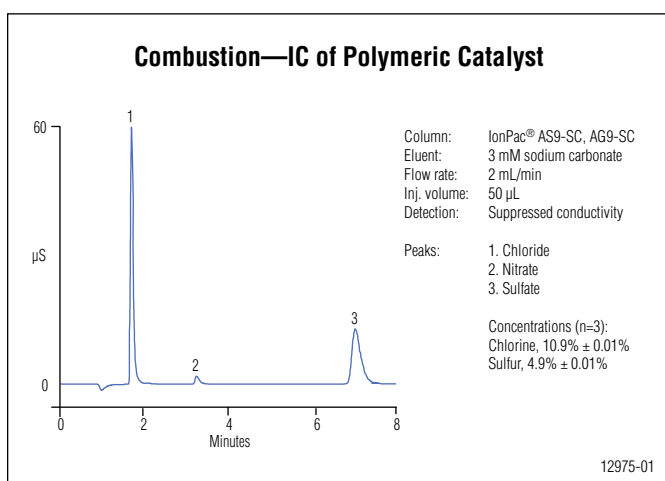
IonPac AS9-SC Analytical Column (4 × 250 mm) 043185

Guard Columns

IonPac AG9-SC Guard Column (4 × 50 mm)..... 043186



Trace bromate determination using preconcentration.



Determination of chloride and sulfate in a polymeric catalyst using the AS9-SC column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS9-SC and AS9-HC Anion-Exchange Columns Data Sheet

Application Notes

AN 101: Trace Level Determination of Bromate in Ozonated Drinking Water Using Ion Chromatography

AN 51: Method for Determination of Anions in Sodium Hydroxide

IonPac AS4A-SC

For the fast isocratic separation of inorganic anions in drinking water and wastewater

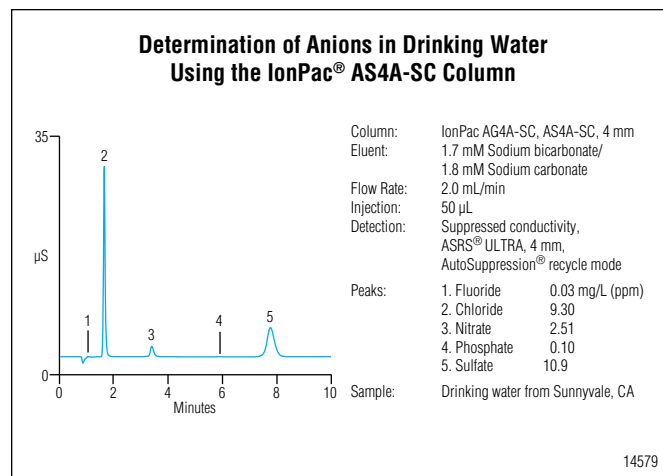
The IonPac AS4A-SC 2 mm and 4 mm anion-exchange columns are designed for the fast analysis of inorganic anions in environmental waters. The AS4A-SC was introduced in 1984 and has been the preferred column for inorganic anion analysis for many years. It is the specified column in US EPA Method 300.0 (A).

- Resolves inorganic anions in 8 min using an isocratic carbonate/bicarbonate eluent.
- Sodium tetraborate gradient optimizes difficult separations.
- Meets or exceeds US EPA Method 300.0 (A) performance requirements.
- Provides excellent performance for fast analysis of inorganic anions.

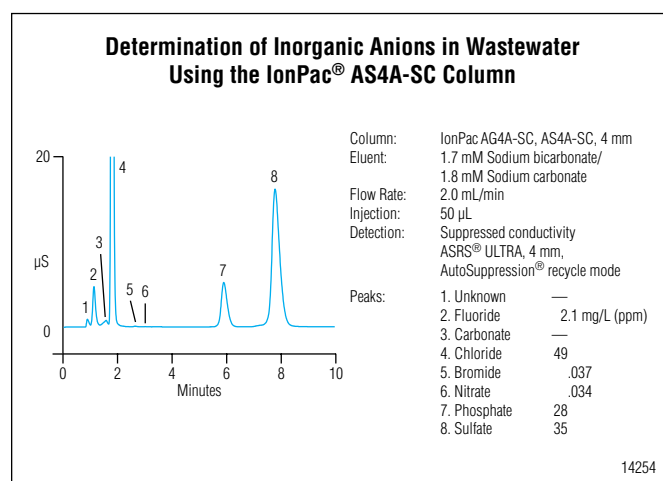
The IonPac AS4A-SC (solvent-compatible) is a low-capacity carbonate eluent anion-exchange column for the fast, isocratic separation of inorganic anions such as nitrate or sulfate, using a carbonate/bicarbonate eluent coupled with suppressed conductivity detection. Inorganic anions are easily determined in any liquid, including water, foods, and other diverse sample matrices.

Separation of the common inorganic anions can be achieved in less than 10 min using an isocratic carbonate/bicarbonate eluent. For simplified operation, use the AS4A-SC Eluent Concentrate and the Combined Seven Anion Standard. The Anion Self-Regenerating Suppressor (ASRS 300) is recommended for use with the AS4A-SC column.

Note: The AS22 is the newest carbonate eluent column recommended for fast analysis of inorganic anions.



Determination of inorganic anions in a drinking water sample using an IonPac AS4A-SC column.



Determination of inorganic anions in a wastewater sample using an IonPac AS4A-SC column.

Ordering Information

Analytical Columns

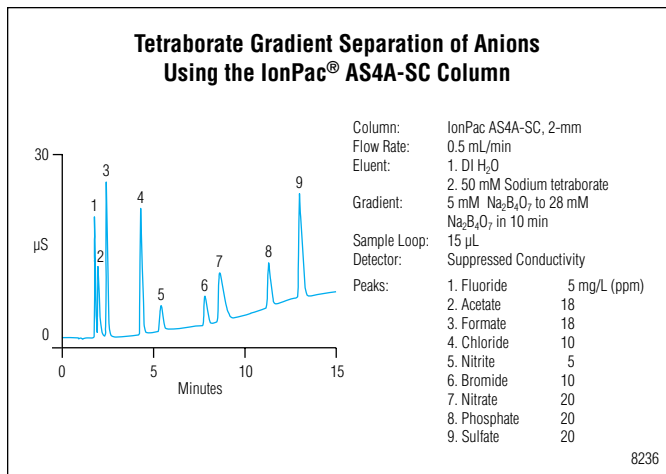
IonPac AS4A-SC Analytical Column (2 × 250 mm)..... 043125

IonPac AS4A-SC Analytical Column (4 × 250 mm)..... 043174

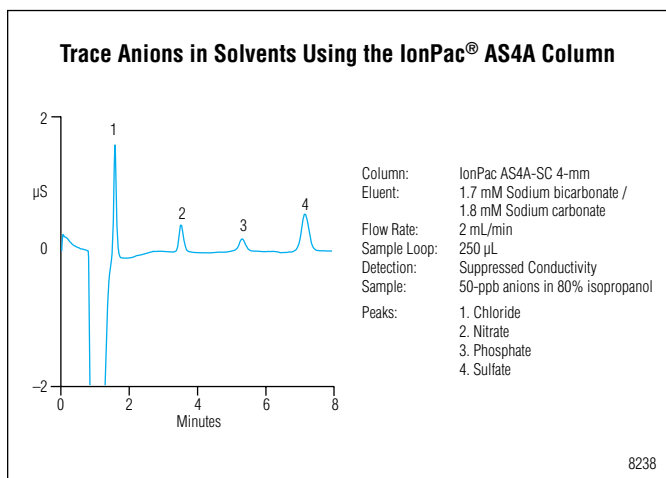
Guard Columns

IonPac AG4A-SC Guard Column (4 × 50 mm)..... 043175

IonPac AG4A-SC Guard Column (2 × 50 mm)..... 043126



Tetraborate gradient separation of anions using the IonPac AS4A-SC 2 mm column.



Direct injection of anions in a solvent extract using the IonPac AS4A-SC column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS4A-SC Anion-Exchange Column Data Sheet

Application Notes

AN 133: Determination of Inorganic Anions in Drinking Water by Ion Chromatography

AN 135: Determination of Inorganic Anions in Wastewater by Ion Chromatography

AN 31: Determination of Anions in Acid Rain by Ion Chromatography

AN 36: Determination of Oxalate in Urine by Ion Chromatography

Specialty Anion-Exchange Columns

Anion-exchange columns for special applications

These anion-exchange columns support special applications, such as non-suppressible eluents, in combination with a variety of detection modes, including amperometric and UV-VIS detection.



IonPac AS7: High-capacity, high-efficiency, hydrophobic anion-exchange column designed for the separation of a wide range of polyvalent anions.

IonPac AS5: Low-capacity, hydroxide-selective anion-exchange column for separating higher-valence anions

IonPac AS7

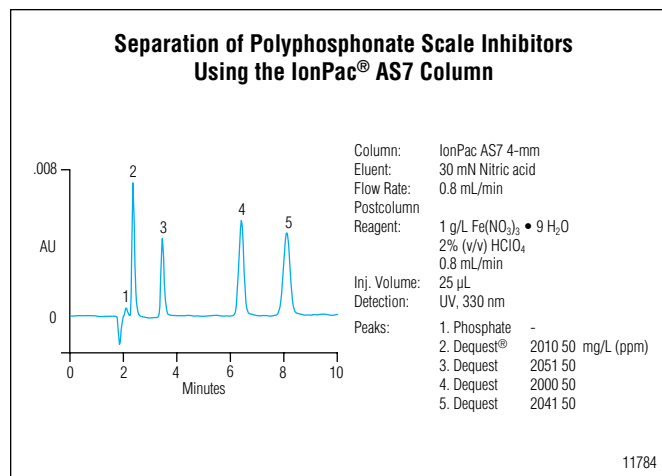
For the separation of a wide range of polyvalent anions

The IonPac AS7 separates a wide variety of polyvalent anions, including polyphosphates, polyphosphonates, and other polyvalent complexing agents such as EDTA and NTA using acidic elution (eliminating metal interferences) with post-column derivatization and UV-Vis detection.

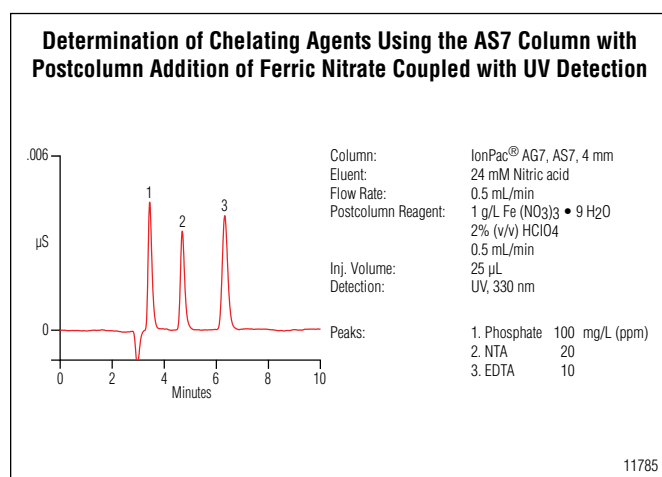
- For polyvalent anions and chelating agents in complex sample matrices
- Determines cyanide and sulfide using amperometric detection
- Useful for hexavalent chromium in environmental matrices

The AS7 column has a unique polymer packing that provides superior performance for separating ionic and polar compounds. The patented packing offers high-speed, high-efficiency, and high-loading capacity at moderate backpressures.

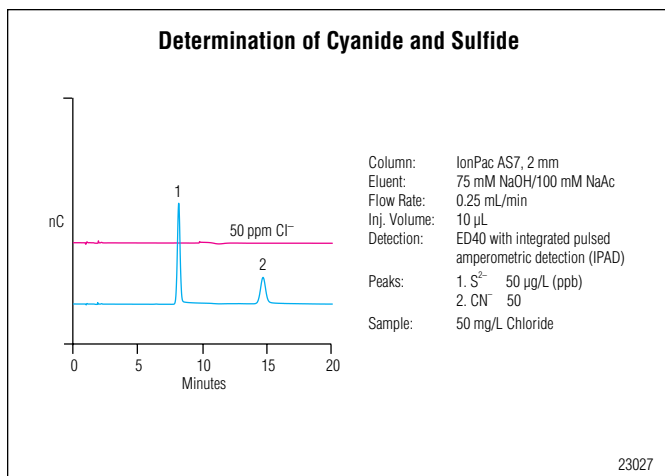
Note: The newer IonPac AS16 or AS20 column is recommended for polyphosphates.



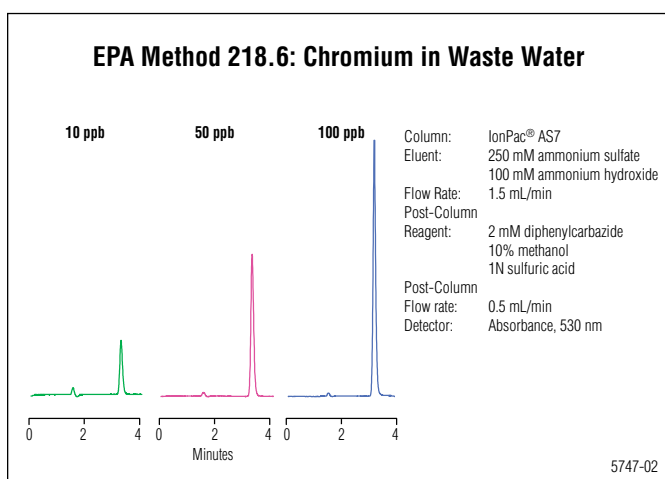
Determination of polyphosphonate scale inhibitors using the AS7 4 mm column.



Chelating agents by UV detection with postcolumn ferric nitrate.



Determination of cyanide and sulfide using the AS7 2 mm column with amperometric detection and a disposable silver electrode.



Determination of hexavalent chromium using the IonPac AS7 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS7 Anion Exchange Column Data Sheet

Application Notes

AN 80: Determination of Dissolved Hexavalent Chromium in Drinking Water, Groundwater and Industrial Waste Water Effluents by Ion Chromatography

Application Updates

AU 107: Determination of Cyanide in Strongly Alkaline Solutions

AU 144: Determination of Hexavalent Chromium in Drinking Water Using Ion Chromatography

Technical Notes

TN 26: Determination of Cr(VI) in Water, Waste Water, and Solid Waste Extracts

Ordering Information

Analytical Columns

IonPac AS7 Analytical Column (4 × 250 mm)	035393
IonPac AS7 Analytical Column (2 × 250 mm)	063097

Guard Columns

IonPac AG7 Guard Column (4 × 50 mm)	035394
IonPac AG7 Guard Column (2 × 50 mm)	063099

IonPac AS5

For separating higher-valence anions

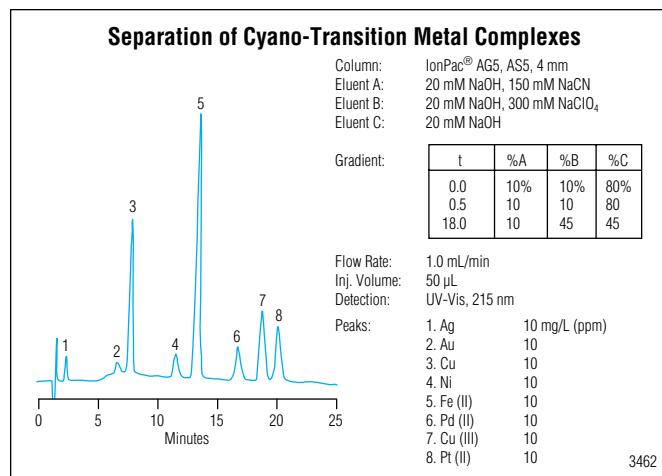
The IonPac AS5 separates higher-valence anions, including polyphosphates, oxyanions, EDTA complexes, metal cyanide complexes, and hydrophobic anions such as iodide, thiosulfate, and thiocyanate.

- For metal-EDTA complexes
- For cyano-transition metal complexes
- For hydrophobic anions, including iodide, thiocyanate, and thiosulfate
- AS16 or AS20 columns are recommended for hydrophobic anions and highly charged anions

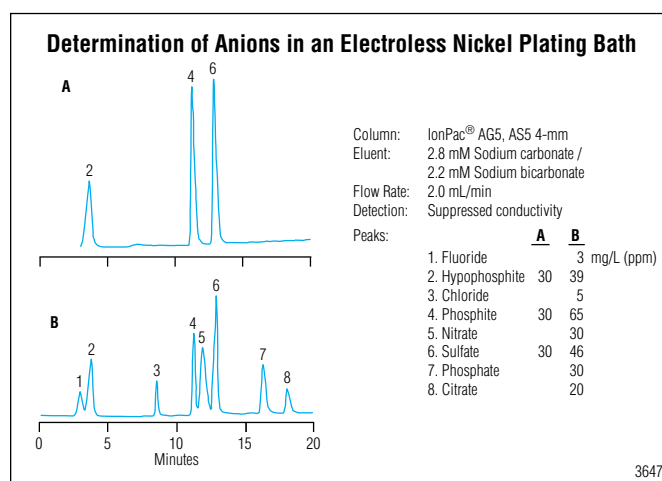
The AS5's compatibility with weak eluents simplifies the determination of strongly-retained species, since these eluents are compatible with a suppressor. Furthermore, the rapid elution of strongly-retained species greatly improves peak shapes, lowers minimum detection limits, and increases sample throughput potential.

The selectivity of the AS5 makes it possible to rapidly elute strongly-retained species such as iodide and thiocyanate in brines without interference from the large chloride peak typical of such samples.

Note: IonPac AS16 or AS20 columns are recommended for hydrophobic anions and highly-charged anions.

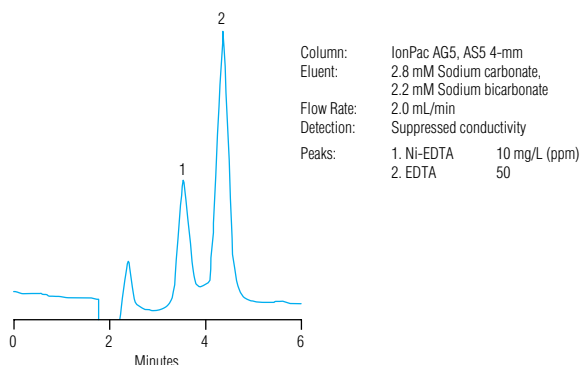


Separation of cyano-transition metal complexes.



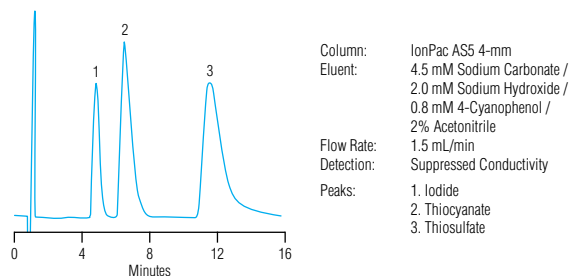
Determination of anions in an electroless nickel plating bath.

Separation of EDTA from Nickel-EDTA Complexes Using the IonPac® AS5 Column



Separation of EDTA from nickel-EDTA complexes using the IonPac AS5 column.

Isocratic Separation of Strongly Retained Anions Using the IonPac® AS5 Column



Isocratic separation of strongly-retained anions using the IonPac AS5 column.

Ordering Information

Analytical Columns

IonPac AS5 Analytical Column (4 × 250 mm) 035395

Guard Columns

IonPac AG5 Guard Column (4 × 50 mm) 035396

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac AS5 Data Sheet

Application Notes

AN 51: Method for Determination of Anions in Sodium Hydroxide

AN 55: Determination of Metal Cyanides

Cation-Exchange Columns

A complete family of columns for separation of inorganic cations, ammonium, and amines

Dionex cation-exchange columns provide high-resolution separations of inorganic cations, ammonium, and amines. They provide an excellent approach to separations of alkali metals, alkaline earth metals, alkylamines, alkanolamines and biogenic amines. The carboxylate-functionalized cation-exchange columns are available in a wide range of capacities and hydrophobicities. They are hydronium-selective and are compatible with RFIC-EG and RFIC-ER systems.



IonPac CS18: Low-capacity carboxylate-functionalized cation-exchange column for the separation of polar amines such as ethanolamines.

IonPac CS17: Low-capacity carboxylate-functionalized cation-exchange column for gradient profiling and amine determination.

IonPac CS16: High-capacity carboxylate-functionalized cation-exchange column for disparate concentration ratios of adjacent cations such as sodium and ammonium.

IonPac CS15: Medium-capacity carboxylate-functionalized cation-exchange column with unique selectivity for disparate concentration ratios of sodium and ammonium.

IonPac CS14: Medium low-capacity carboxylate-functionalized cation exchange column for aliphatic and aromatic amines and polyamines.

IonPac CS12A: Medium-capacity carboxylate-functionalized column for fast, isocratic separation of inorganic cations.

IonPac CS11: Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and diaminopropionic acid eluents.

IonPac CS10: Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and diaminopropionic acid eluents.

IonPac CS18

Low-capacity cation-exchange column for the separation of polar amines

The IonPac CS18 carboxylate-functionalized cation-exchange column is tailored for the separation of polar amines including alkanolamines and methylamines, and moderately hydrophobic and polyvalent amines including biogenic amines and alkyl diamines, using simple aqueous eluents and elevated temperature. The CS18 is ideally used with RFIC systems for automatic methanesulfonic acid eluent generation.

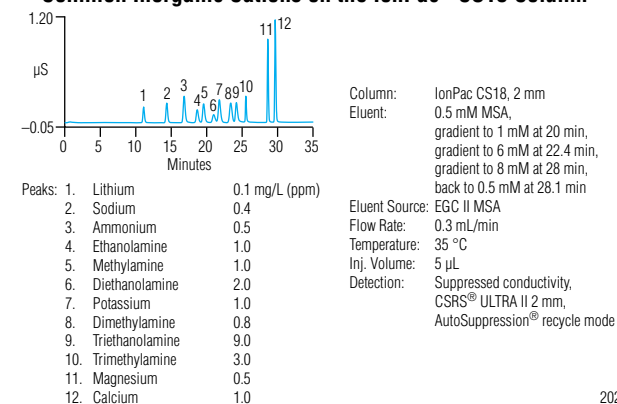
- For amines including alkanolamines and methylamines in diverse sample matrices
- For moderately-hydrophobic amines incl. biogenic amines, alkyl diamines, and polyvalent amines
- Optimized for simple acidic gradient separations with minimal baseline shift
- Ideal Reagent-Free electrolytic suppression with the Cation Self-Regenerating Suppressor CSRS 300
- Compatible with moderate amounts of organic solvents, excluding alcohols
- Requires only a modest acid concentration to elute polyvalent cations

The IonPac CS18 cation-exchange column supports isocratic and gradient separations of polar amines, moderately hydrophobic amines, and polyvalent cations using suppressed conductivity detection. The CS18 column with nonsuppressed conductivity detection is recommended when extended calibration linearity for ammonium or weak bases is required. The CS18 can be used for many of the nonsuppressed applications supported by the IonPac SCS-1 column but with much greater column stability.

The IonPac CS18 is targeted for analysis of power plant waters treated with ammonium, morpholine, or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; personal care products; and food samples.

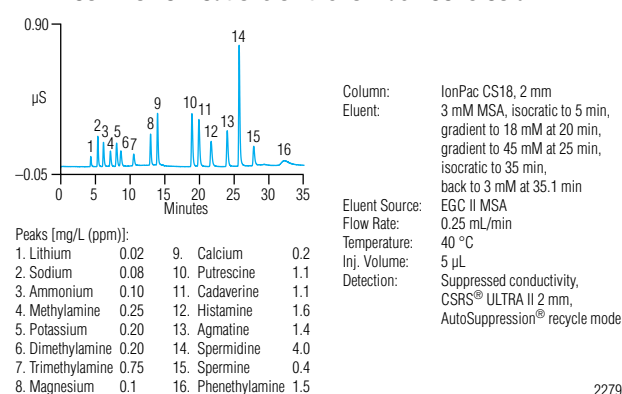
Note: Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS18 column.

Gradient Separation of Alkanolamines, Methylamines, and the Common Inorganic Cations on the IonPac® CS18 Column

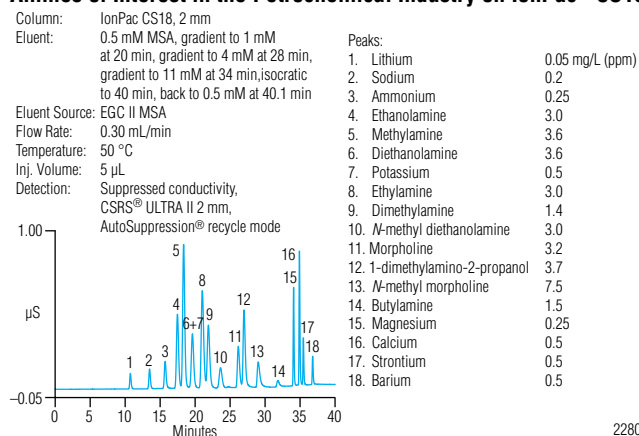


The CS18 column can separate small, hydrophilic amines, including alkanolamines and methylamines, in a single run using a modest acidic gradient.

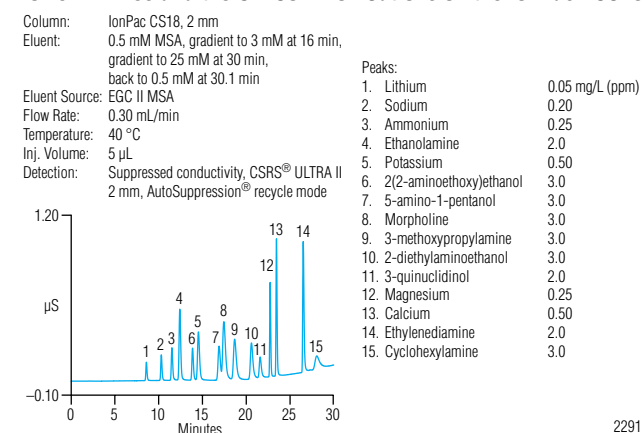
Biogenic Amines, Methylamines, and the Common Six Cations on the IonPac® CS18 Column



The IonPac CS18 column can easily separate biogenic amines, methylamines, and Group I and II cations using an aqueous eluent without organic solvent.

Amines of Interest in the Petrochemical Industry on IonPac® CS18

Separation of a variety of amines and the extended Group I and II inorganic cations that are monitored in the petrochemical industry.

Power Amines and the Six Common Cations on the IonPac® CS18

Separation of a variety of amines used in the power industry with the IonPac CS18 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS18 Datasheet

Application Notes

AN 182: Determination of Biogenic Amines in Alcoholic Beverages by Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detections

AN 183: Determination of Biogenic Amines in Fermented and Non-Fermented Foods Using Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric Detection

Application Updates

AU 162: Determination of Biogenic Amines in Fruit, Vegetables, and Chocolate Using Ion Chromatography with Suppressed Conductivity and Integrated Pulsed Amperometric

Ordering Information**Analytical Columns**

IonPac CS18 Analytical Column (2 × 250 mm) 062878

Guard Columns

IonPac CG18 Guard Column (2 × 50 mm) 062880

IonPac CS17

Low-capacity cation-exchange column for gradient profiling and amine determination

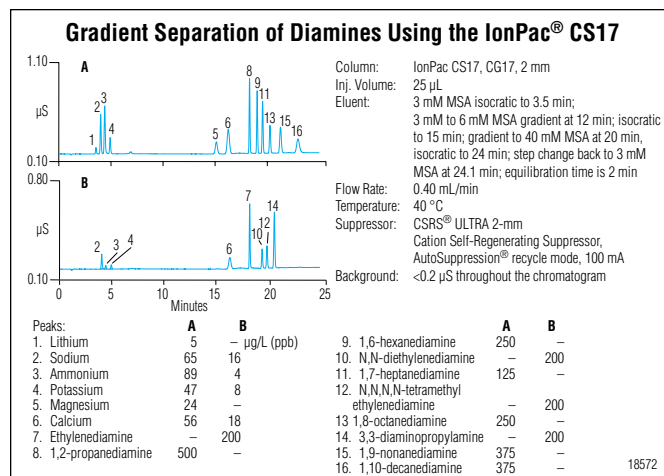
The IonPac CS17 carboxylate-functionalized cation-exchange column is tailored for gradient separation of polyvalent and moderately hydrophobic amines, including biogenic amines and diamines, using simple aqueous eluents and elevated temperature (40 °C). The CS17 is an excellent column for use with Reagent-Free IC systems using Eluent Generation, which requires only a deionized water source to produce methanesulfonic acid eluent.

- For polyvalent and moderately hydrophobic amines including diamines and biogenic amines
- Optimized for simple acidic gradient applications with minimal baseline shift
- Ideal alternative for IonPac CS14 amine applications
- Improved peak shape without adding organic solvent to the eluents
- Compatible with organic solvents

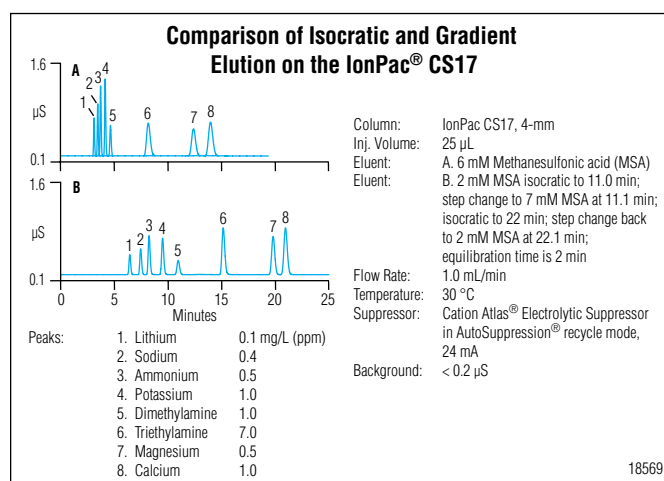
The CS17 column is recommended for polar amines including alkanolamines and methylamines. It can also be used for moderately hydrophobic amines, including biogenic amines, alkyldiamines, and polyamines. Sample matrices include environmental waters, power plant waters treated with ammonium, morpholine or ethanolamine, chemical additives, chemical process solutions, scrubber solutions, plating baths, and industrial solvents. The CS17 is also used extensively in the food industry.

The CS17 column offers improved peak shapes and efficiencies for IonPac CS14 amine applications. Solvent compatibility permits solvent use for elution of more hydrophobic amines and easy column cleanup after the analysis of complex sample matrices. Use the CS17 with Eluent Generation for simplified methanesulfonic acid eluent preparation.

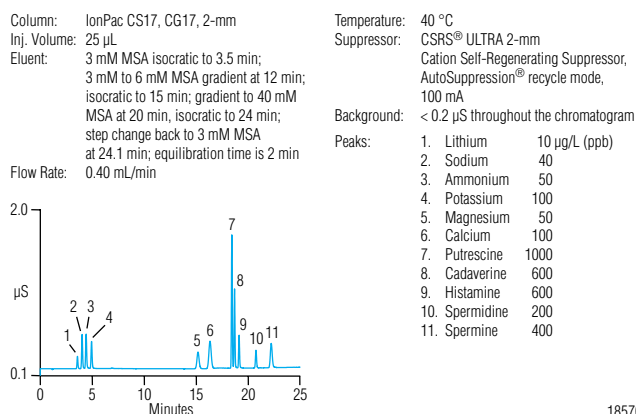
Note: Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS17 column.



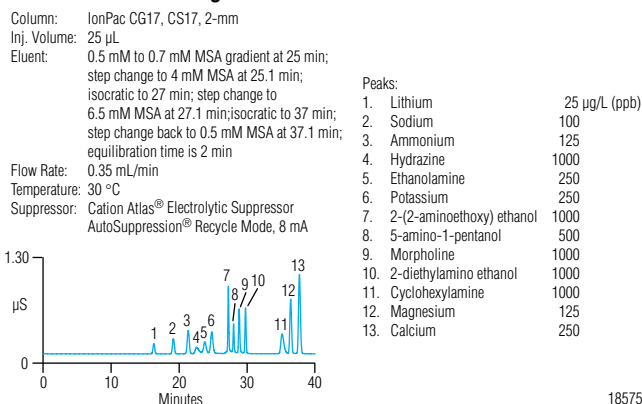
The IonPac CS17 column demonstrates excellent selectivity for diamines.



Gradient elution improves resolution of cations and amines without causing a baseline shift.

Determination of Biogenic Amines Using the IonPac® CS17

The IonPac CS17 column can easily separate biogenic amines and Group I and II cations using an aqueous eluent without added organic solvent.

Determination of Power Plant Amine Additives Using the IonPac® CS17 Column

The moderate capacity, hydrophilic IonPac CS17 column solves the difficult resolution problem of separating hydrazine from ammonium and ethanolamine.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS17 Cation-Exchange Column

Application Updates

AU 155: Determination of Cations and Amines in Hydrogen Peroxide by Ion Chromatography Using a RFIC (Reagent-Free) System

AU 160: Determination of N,N-Dimethyl-o-Toluidine and N,N-Diethyl-o-Toluidine in Ethylene Gas Samples

Ordering Information**Analytical Columns**

IonPac CS17 Analytical Column (4 × 250 mm) 060557

IonPac CS17 Analytical Column (2 × 250 mm) 060561

Guard Columns

IonPac CG17 Guard Column (4 × 50 mm)..... 060560

IonPac CG17 Guard Column (2 × 50 mm)..... 060563

IonPac CS16

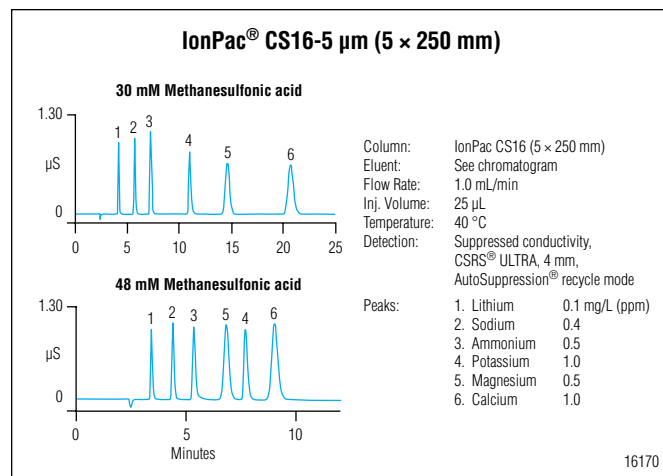
High-capacity carboxylate-functionalized column for disparate sodium and ammonium concentrations

The IonPac CS16 is the column of choice for disparate concentration ratios of adjacent eluting cations such as sodium and ammonium in diverse sample matrices. The high-capacity, high-resolution CS16 column can be used for short-chained amines, including alkylamines and alkanolamines, in diverse sample matrices.

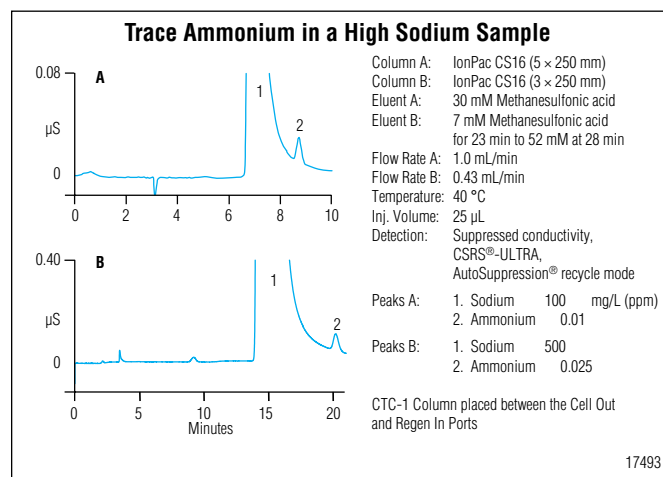
- For disparate concentration ratios of close-eluting cations such as ammonium and sodium in complex matrices
- Ideal for trace-level ammonium in high concentrations of sodium
- Ideal for trace-level sodium in high concentrations of ammonium or amines
- Best carboxylate-functionalized column to tolerate samples with low pH
- Isocratic acid eluent and elevated temperature (40 °C) required for sodium:ammonium ratios to 1:10,000
- Gradient MSA eluent and elevated temperature required for sodium:ammonium ratios up to 1:20,000
- Useful for short-chained amines, including alkylamines and alkanolamines
- Compatible with organic solvents excluding alcohols

Using an isocratic acid eluent and elevated temperature (40 °C) coupled with suppressed conductivity, ratios up to 10,000:1 of sodium and ammonium can be resolved in less than 20 min. Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents. The CS16 is designed for use in most IonPac CS15 applications.

The CS16 column has the highest capacity among Dionex carboxylate-based cation columns, resulting in improved loadability and resolution. Use the CS16 with the Eluent Generator for simplified, consistent methanesulfonic acid eluent preparation. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS16 column.

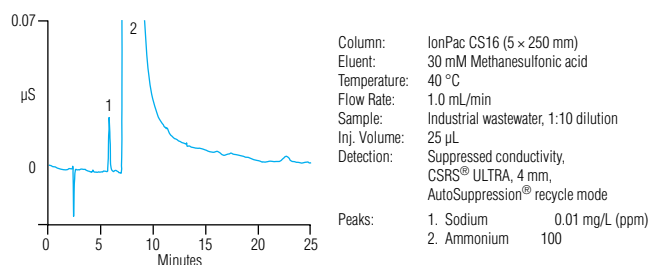


Isocratic separation of common inorganic cations and ammonium. Note that magnesium elutes before potassium at the higher eluent concentration.



Isocratic versus gradient determination of trace level ammonium in a high sodium sample.

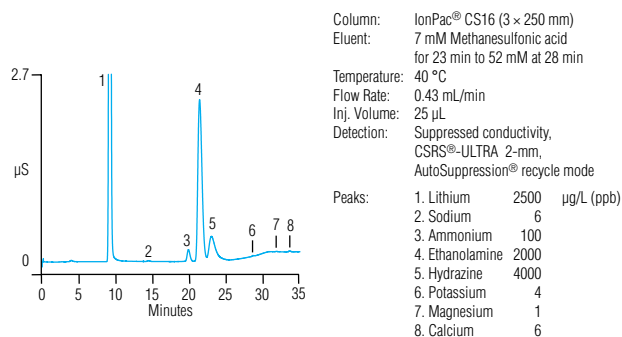
Determination of Trace-Level Sodium in a High Ammonium Sample Using the IonPac® CS16 Column



16391

Isocratic determination of a 1:10,000 sodium to ammonium concentration ratio.

Trace Sodium in a High Amine Sample



CTC-1 Column placed between the Cell Out and Regen In Ports

17494

Determination of trace level sodium in a high amine sample.

Application Notes

AN 94: Determination of Trace Cations in Concentrated Acids Using AutoNeutralization Pretreatment/Ion Chromatography

AN 141: Determination of Inorganic Cations and Ammonium in Environmental Waters by Ion Chromatography Using the IonPac CS16 Column

AN 152: Determination of Sodium at the Parts-Per-Trillion Level in the Presence of High Concentrations of Ethanolamine in Power Plant Waters

AN 157: Comparison of suppressed to nonsuppressed conductivity detection for the determination of common inorganic cations

Ordering Information

Analytical Columns

IonPac CS16 Analytical Column (5 × 250 mm) 057573

IonPac CS16 Analytical Column (3 × 250 mm) 059596

Guard Columns

IonPac CG16 Guard Column (5 × 50 mm) 057574

IonPac CG16 Guard Column (3 × 50 mm) 059595

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS16 Cation-Exchange Column Data Sheet

IonPac CS15

Medium-capacity cation-exchange column for disparate concentration ratios of sodium and ammonium

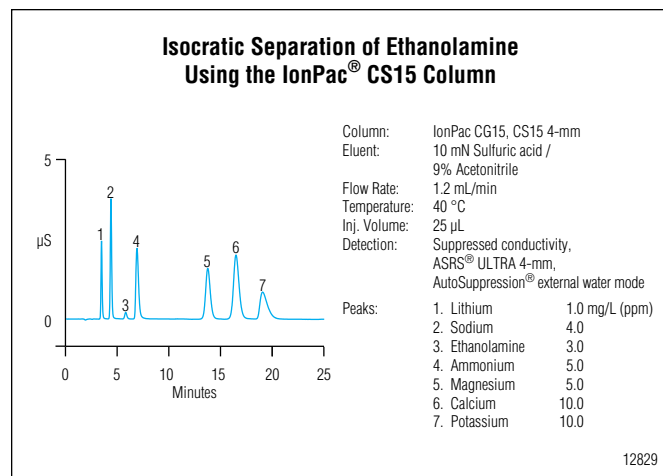
The IonPac CS15 is a medium-capacity carboxylate-function-alized cation-exchange column with crown ether moiety for the determination of disparate concentration ratios of sodium and ammonium in diverse sample matrices.

- Solvent and elevated temperature required for more efficient ammonium and potassium peaks
- Use the CS16 column for separating disparate concentrations of sodium and ammonium without an organic solvent
- Useful for determination of trace ethanolamine in high-ammonium or high-potassium concentrations
- Useful for separating alkanolamines and other small amines
- The crown ether moiety gives it unique selectivity, and may offer an advantage for certain types of matrices
- Compatible with organic solvent

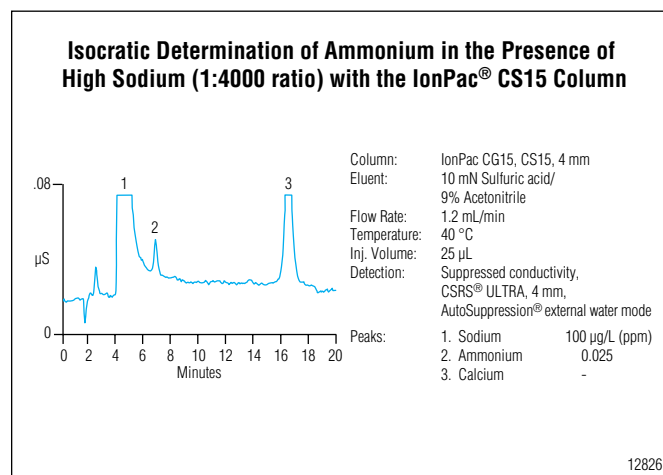
The IonPac CS15 has unique selectivity, and is the only carboxylic acid based cation column from Dionex in which ethanolamines elute before ammonium. Thus, for samples with high ammonium to low ethanolamine ratios, the CS15 is the column of choice. Using an isocratic acid or solvent eluent and elevated temperature (40 °C), coupled with suppressed conductivity detection, ratios of up to 8000:1 of sodium and ammonium can also be determined.

Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; industrial solvents; and soil matrices. The CS15 is also particularly useful for matrices with high potassium concentrations. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS15 column.

Note: See the IonPac CS16 for improved performance without using solvent.



The unique selectivity of the CS15 column causes ethanolamine to elute before ammonium, and potassium to elute after the divalent magnesium and calcium cations.



Isocratic determination of trace-level ammonium in environmental wastewater containing a high sodium concentration.

Ordering Information

Analytical Columns

IonPac CS15 Analytical Column (4 × 250 mm) 051795

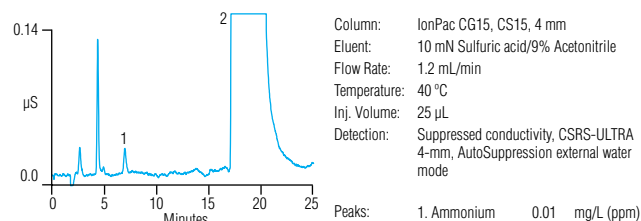
IonPac CS15 Analytical Column (2 × 250 mm) 052252

Guard Columns

IonPac CG15 Guard Column (4 × 50 mm) 052200

IonPac CG15 Guard Column (2 × 50 mm) 052256

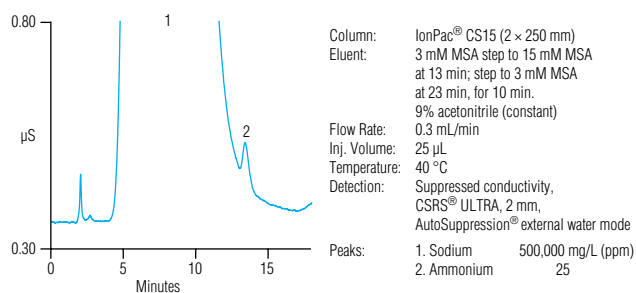
Trace Ammonium in a Potassium Chloride Soil Extract



12958

Determination of trace-level ammonium in a potassium chloride soil extract.

Step—Change Elution of 20,000:1 Ratio of Sodium to Ammonium



17097

Step change elution of 20,000:1 ratio of sodium to ammonium.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS15 Cation-Exchange Column Data Sheet

IonPac CS14

Medium low-capacity column for aliphatic and aromatic amines and polyamines

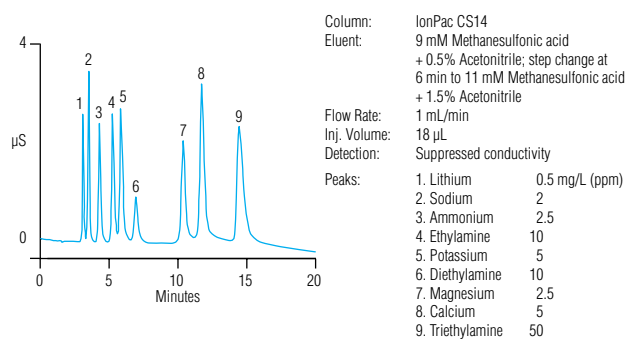
The IonPac CS14 is a medium low-capacity carboxylate-functionalized cation-exchange column for the determination of aliphatic, aromatic, and polyvalent amines. Sample matrices include environmental waters; power plant waters treated with ammonium, morpholine or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; industrial solvents; and wastewater.

- For amine separations, including aliphatic amines, aromatic amines, and polyamines
- For hydrophobic and polyvalent amines
- For polar amines including alkanolamines and alkylamines
- For moderately hydrophobic amines
- Compatible with organic solvents

The CS14 column can be used with isocratic or gradient methanesulfonic acid or sulfuric acid eluents to resolve a variety of amines from the Group I and II cations. Solvent and elevated temperature may be required for efficient elution of hydrophobic amines. Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS14 column.

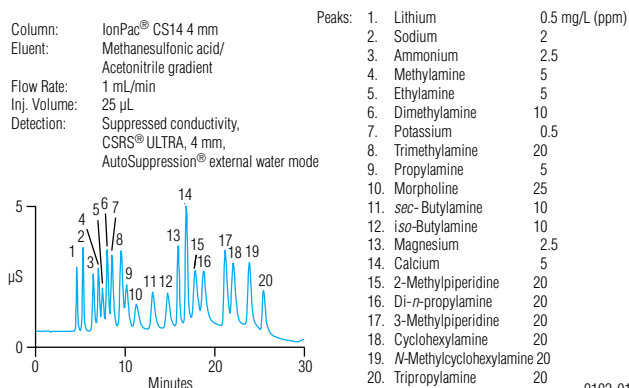
The CS18 and CS17 are recommended replacement columns for most CS14 applications. The CS17 is recommended replacement column for hydrophobic and polyvalent amines, including biogenic amines and diamines. The CS18 is recommended for polar amines, including alkanolamines and methylamines; and moderately hydrophobic and polyvalent amines, including biogenic amines and alkyldiamines.

Step Change Separation of Ethyl, Diethyl, and Triethylamine Plus the Group I & II Cations Using the IonPac® CS14 Column



Acetonitrile can be used to optimize the resolution of ethylamines from Group I and Group II cations.

Gradient Elution of Alkylamines and the Group I and II Cations on IonPac CS14



The unique selectivity of the IonPac CS14 allows a large number of aliphatic amines and Group I and Group II cations to be resolved.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS14 Cation Exchange Column Data Sheet

Application Notes

AN 86: Determination of Trace Cations in Power Plant Waters Containing Morpholine

AN 148: Determination of Bethanechol by Ion Chromatography

Ordering Information

Analytical Columns

IonPac CS14 Analytical Column (2 × 250 mm)	044121
IonPac CS14 Analytical Column (4 × 250 mm)	044123

Guard Columns

IonPac CG14 Guard Column (2 × 50 mm)	044122
IonPac CG14 Guard Column (4 × 50 mm)	044124

IonPac CS12A

Medium capacity column for fast, isocratic separation of cations using MSA or sulfuric acid

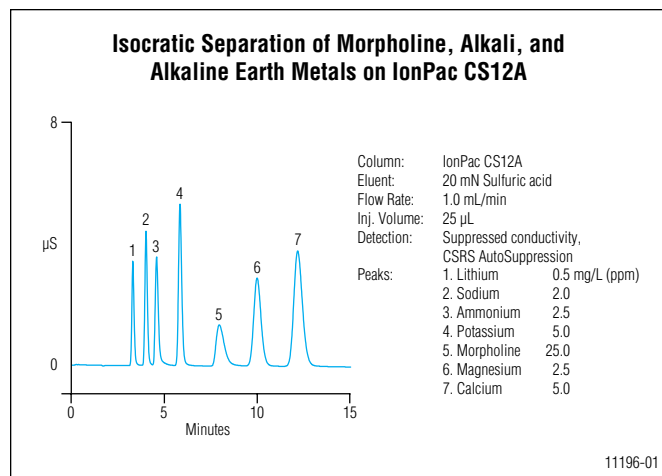
The IonPac CS12A is a medium-capacity carboxylate-functionalized cation-exchange column recommended for the fast, isocratic separation of lithium, sodium, ammonium, potassium, magnesium, and calcium using methanesulfonic or sulfuric acid eluents in diverse sample matrices.

- Robust, reliable column for group I and II cations plus ammonium
- Recommended for manganese and morpholine
- Recommended for inorganic cations in complex matrices
- Simplified Reagent-Free IC operation provided by the EG or eluent regeneration
- Compatible with organic solvents (except alcohols), high temperatures, and high acid concentrations
- Analysis time for common six cations as short as 3 min (CS12A-5 μ m) to 15 min (CS12A-8 μ m)
- The CS12A-MS column offers fast elution at the low flow rates required for IC-MS, making it ideal for IC-MS screening
- For disparate concentration ratios of adjacent-eluting cations, the high-capacity IonPac CS16 is recommended

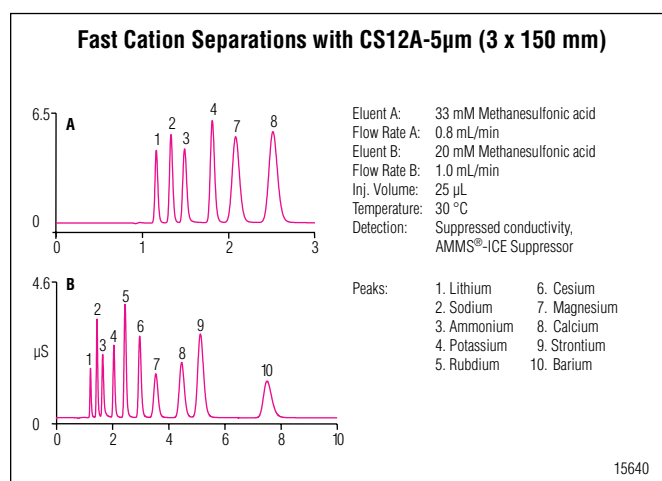
The medium-capacity IonPac CS12A cation-exchange column supports fast, isocratic separation with suppressed conductivity detection. Sample matrices include environmental and drinking waters; soil extracts; acid digests; power plant waters treated with ammonium or morpholine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents.

Use the CS12A-5 μ m (3 \times 150 mm) column for high efficiency and fast analysis (3 min). The smaller-diameter resin technology and reduced column length provide faster analysis time, reduced eluent consumption, and increased sensitivity. The CS12A column is the recommended replacement for all CS12 applications. Use the CS12A with the Eluent Generator for simplified methanesulfonic acid eluent preparation.

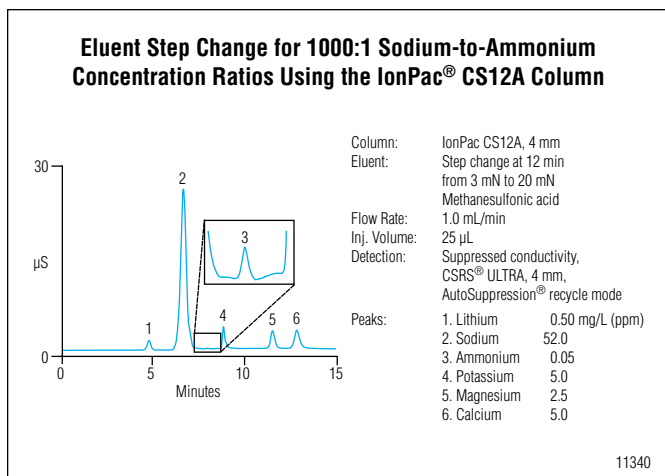
Note: Use the Cation Self-Regenerating Suppressor (CSRS 300) with the CS12A column.



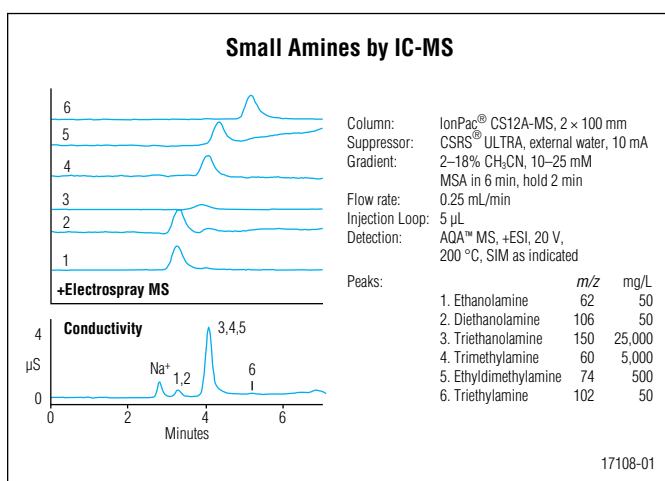
Power plant waters treated with morpholine and ammonium are well resolved on the IonPac CS12A column with an isocratic eluent.



Fast cation separations using the IonPac CS12A-5 μ m.



Trace-level quantification of ammonium in brine (1000:1 ratio) using the IonPac CS12A coupled with cation AutoSuppression.



Determination of alkylamines and alkanolamines using IC-MS detection.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS12A Cation-Exchange Column Data Sheet

Application Notes

AN 106: Ion Chromatography in the Pharmaceutical Industry

AN 107: Ions In Physiological Fluids

AN 120: Determination of Calcium and Magnesium in Brine

AN 124: Determination of Choline in Dry Milk and Infant Formula

Application Updates

AU 137: Determination of Trace Lithium in Industrial Process Waters

AU 158: Determination of Manganese in Brine

Ordering Information

Analytical Columns

IonPac CS12A-5µm Analytical Column (3 × 150 mm)	057185
IonPac CS12A-MS Analytical Column (2 × 100 mm)	059960
IonPac CS12A Analytical Column (4 × 250 mm).....	046073
IonPac CS12A Analytical Column (2 × 250 mm).....	046075

Guard Columns

IonPac CG12A-5µm Guard Column (3 × 30 mm).....	057184
IonPac CG12A Guard Column (2 × 50 mm)	046076
IonPac CG12A Guard Column (4 × 50 mm)	046074

IonPac CS11

Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and DAP.

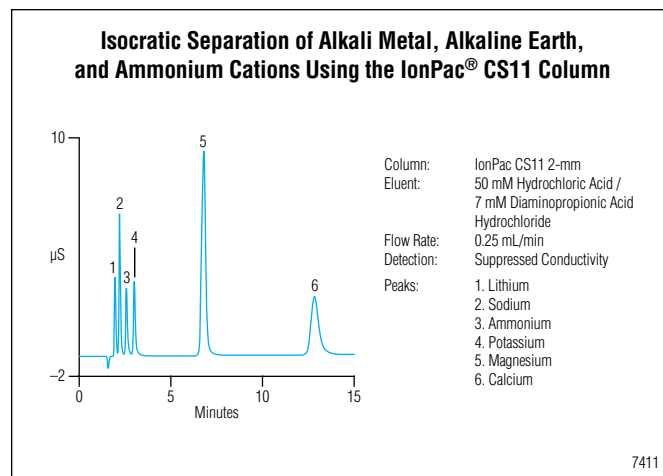
The IonPac CS11 is designed for the isocratic separation of inorganic cations using hydrochloric acid with diaminopropionic (DAP) acid eluents.

- The CS11 can be used for analysis of common inorganic cations and aliphatic, cyclic, and aromatic amines.
- Compatible with organic solvents
- The CS12A improves performance for fast analysis of inorganic cations and ammonium.
- The CS17 column is recommended for hydrophobic and polyvalent amines.
- The CS18 column is recommended for polar amines including alkanolamines and methylamines.
- The CS18 is also recommended for moderately hydrophobic amines and polyvalent amines.

The CS11 is useful in determining common inorganic cations and aliphatic and aromatic amines in diverse sample matrices, including environmental and drinking waters, power plant waters treated with ammonium, soil extracts, acid digests, chemical additives, chemical process solutions, scrubber solutions, plating baths, and industrial solvents.

The CS11 has selectivity similar to the CS10 column, with improved sensitivity and lower eluent consumption due to its smaller 2 mm i.d. format.

Note: Use the Cation MicroMembrane Suppressor (CMMS 300) with the CS11 column. Electrolytic suppression is not recommended with HCl and DAP eluents.



Common inorganic cations can be separated using the IonPac CS11 with a HCl/DAP acid eluent.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Application Updates

AU 138: Determination of Ethanolamines in Industrial Waters by Cation-Exchange Chromatography

Ordering Information

Analytical Columns

IonPac CS11 Analytical Column (2 × 250 mm) 043127

Guard Columns

IonPac CG11 Guard Column (2 × 50 mm)..... 043128

IonPac CS10

Sulfonate-functionalized cation-exchange column for isocratic separations using HCl and DAP.

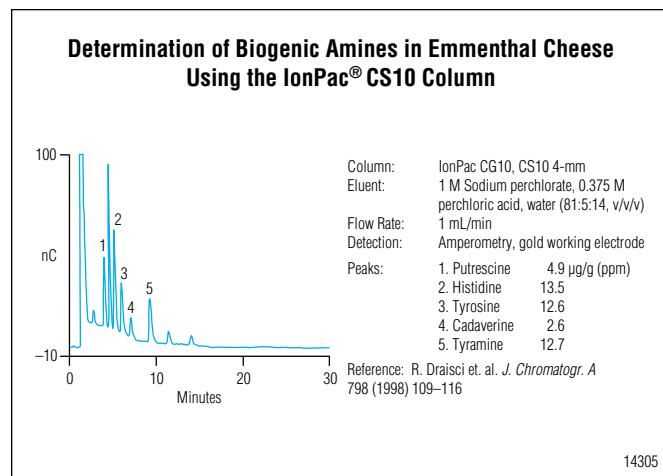
The IonPac CS10 is a sulfonate-functionalized cation-exchange column for the isocratic separation of inorganic cations using hydrochloric acid with diaminopropionic (DAP) acid eluents. The CS12A is the recommended column for the fast analysis of inorganic cations; the CS17, for hydrophobic and polyvalent amines; and the CS18, for polar amines. The CS18 is also recommended for moderately hydrophobic and polyvalent amines.

- The CS10 can be used for analysis of the common inorganic cations and aliphatic, cyclic, and aromatic amines.
- Compatible with organic solvents.
- The CS12A provides improved performance for fast analysis of inorganic cations and ammonium.
- The CS17 column is recommended for hydrophobic and polyvalent amines.
- The CS18 column is recommended for polar amines including alkanolamines and methylamines.
- The CS18 is also recommended for moderately hydrophobic amines and polyvalent amines.

The IonPac CS10 is designed for the isocratic separation of lithium, sodium, ammonium, potassium, magnesium, and calcium using hydrochloric acid with diaminopropionic acid eluents with suppressed conductivity detection. Sample matrices for the CS10 include environmental waters; power plant waters treated with ammonium, morpholine, or ethanolamine; chemical additives; chemical process solutions; scrubber solutions; plating baths; and industrial solvents.

The CS11 has selectivity similar to the CS10 column, with improved sensitivity due to its smaller 2 mm i.d. format.

Note: Use the Cation MicroMembrane Suppressor (CMMS 300) with the CS10 column. Electrolytic suppression is not recommended with HCl and DAP eluents.



Biogenic amines can be separated rapidly using the IonPac CS10 column.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS10 Cation Exchange Column Data Sheet

Ordering Information

Analytical Columns

IonPac CS10 Analytical Column (4 × 250 mm) 043015

Guard Columns

IonPac CG10 Guard Column (4 × 50 mm) 043016

Transition Metal Columns

For determination of metals in diverse sample matrices.

Cation-exchange chromatography is ideal for determination of transition and lanthanide metals in a variety of sample matrices. Because most transition and lanthanide metals are incompatible with suppressed conductivity detection, postcolumn reagent absorbance detection is typically used. Dionex transition metal columns are optimized for this mode of operation.



IonPac CS5A: High-resolution, ion-exchange column for determination of transition and lanthanide metals in diverse sample matrices.

IonPac CS5A

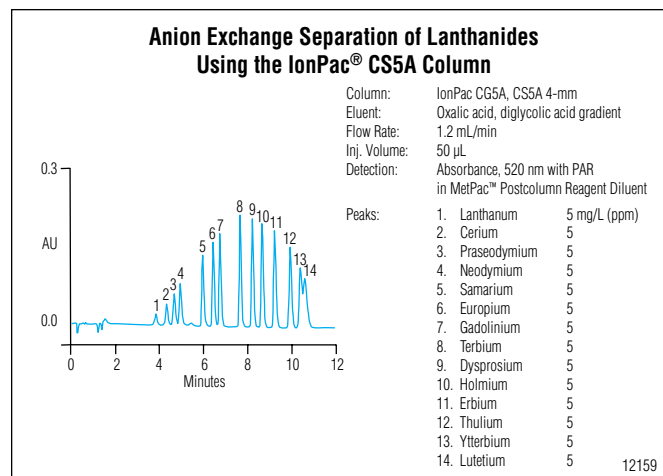
High-resolution, ion-exchange column for transition and lanthanide metals in diverse sample matrices

The IonPac CS5A is a high-resolution, ion-exchange column designed for determination of transition and lanthanide metals in a variety of sample matrices. The CS5A column, in combination with postcolumn derivitization and visible detection at 530 nm, provides a sensitive and selective method for transition metal analysis.

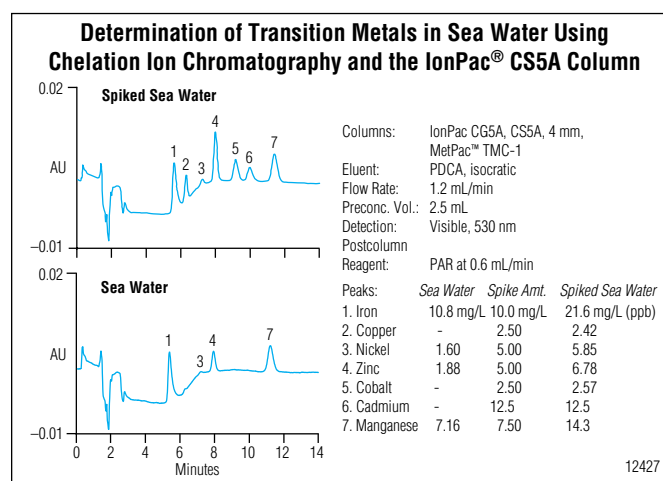
- Recommended for the separation of transition and lanthanide metals
- Also useful for aluminum analysis

The CS5A column provides simultaneous determination of common transition metals in less than 11 min using a unique bifunctional resin. The transition metals are detected following complexation with 4-(2-pyridylazo) resorcinol (PAR). The PAR derivative is detected at 520–530 nm. This method is both sensitive and selective for transition metals.

The CS5A provides improved selectivity and higher efficiencies than its predecessor, the CS5 column. Use the MetPac PDCA and Oxalic Acid Eluent Concentrates and PAR Postcolumn Reagent Diluent for simplified operation.

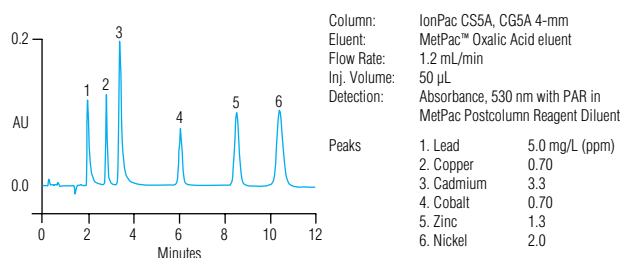


Separation of lanthanide metals using oxalic acid/diglycolic acid as the complexing agent.



Determination of transition metals in seawater.

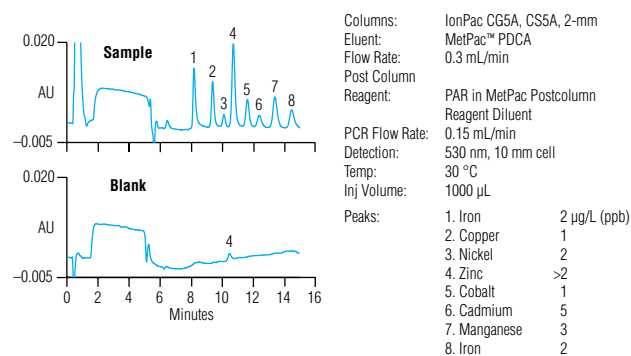
Separation of Transition Metals Using Oxalic Acid with the IonPac® CS5A



11871

Separation of transition metals by a mixed-mode mechanism using oxalate as a complexing agent.

Large Sample Loop Injection of µg/L Levels of Transition Metals Using the IonPac® CS5A Column



13775

Large sample loop injection of µg/L levels of transition metals on a 2 mm system with PC10 pneumatic postcolumn delivery.

Ordering Information

Analytical Columns

IonPac CS5A Analytical Column (4 × 250 mm)..... 046100

IonPac CS5A Analytical Column (2 × 250 mm)..... 052576

Guard Columns

IonPac CG5A Guard Column (4 × 50 mm)..... 046104

IonPac CG5A Guard Column (2 × 50 mm)..... 052836

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac CS5A Column and MetPac Reagents Data Sheet

Application Notes

AN 131: Determination of Transition Metals at PPT Levels in High-Purity Water and SC2 (D-clean) Baths

AN 108: Determination of Transition Metals in Serum and Whole Blood by Ion Chromatography

Technical Notes

TN 10: Determination of Transition Metals by Ion Chromatography

Ion-Exclusion Columns

Ion-exclusion for organic acid separations

In ion-exclusion separations, Donnan exclusion causes strong acids to elute in the void volume of the column. Weak acids that are protonated in the acidic eluent are not subject to Donnan exclusion and penetrate into the pores of the resin. Separation is accomplished by differences in pKa, size, and hydrophobicity.



IonPac ICE-AS1: Ion-exclusion column for fast analysis of aliphatic organic acids and alcohols in complex samples.

IonPac ICE-AS6: Ion-exclusion column for aliphatic organic acids, including hydroxy-substituted organic acids, and alcohols in complex samples

IonPac ICE-Borate: Ion-exclusion column ideal for monitoring trace levels of borate in high-purity water.

IonPac ICE-AS1

Ion-exclusion column for fast analysis of aliphatic organic acids and alcohols in complex samples

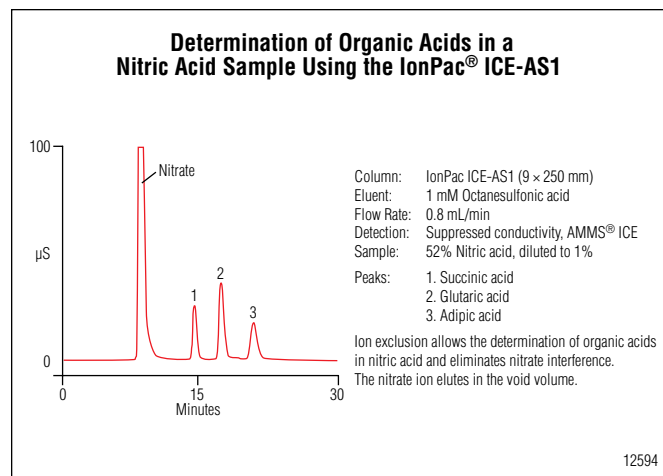
The IonPac ICE-AS1 ion-exclusion column supports fast analysis of aliphatic organic acids and alcohols in complex or high-ionic-strength samples, including foods and beverages, biological samples, fermentation processes, industrial process liquors, and wastewaters.

- Fast separation of organic acids
- Ideal for electroactive ions such as cyanide and sulfite
- Useful for organic acids and alcohols in complex sample matrices

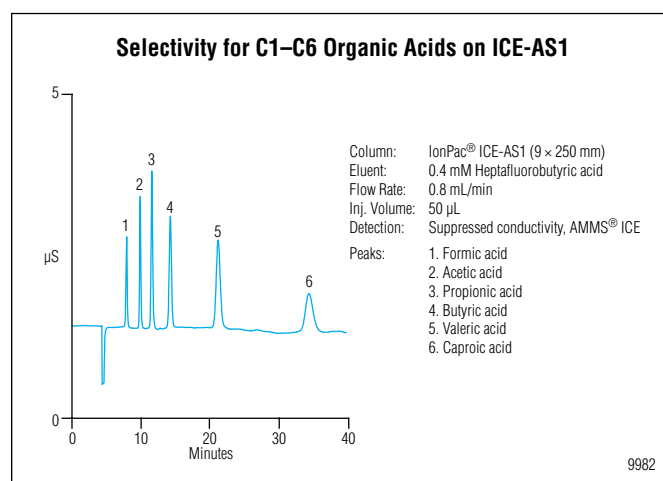
The IonPac AS11 is recommended for fast analysis of organic acids and inorganic anions in well-characterized samples. Use the high-capacity AS11-HC for organic acids and inorganic anions in complex sample matrices.

With the IonPac ICE-AS1 column, weakly ionized acids are separated by pKa differences, size, and hydrophobicity. Strong acid anions such as chloride, oxalate, and sulfate elute in the void and do not interfere with quantification of the organic acids. The ICE-AS1 column can be used with any typical strong acid eluent and a wide variety of detectors, including conductivity, amperometry, photometry, and refractive index, to determine aliphatic organic acids.

Note: Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS ICE 300) with the ICE-AS1 column.



Determination of organic acids in a nitric acid sample using the IonPac ICE-AS1.



Selectivity of ICE-AS1 for C1–C6 organic acids.

Application Notes

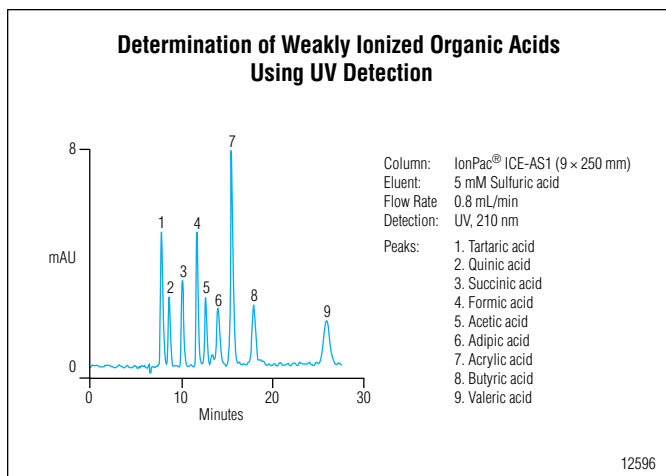
AN 21: Organic Acids in Wine

AN 54: Determination of Sulfite in Food and Beverages by Ion Exclusion Chromatography with Pulsed Amperometric Detection

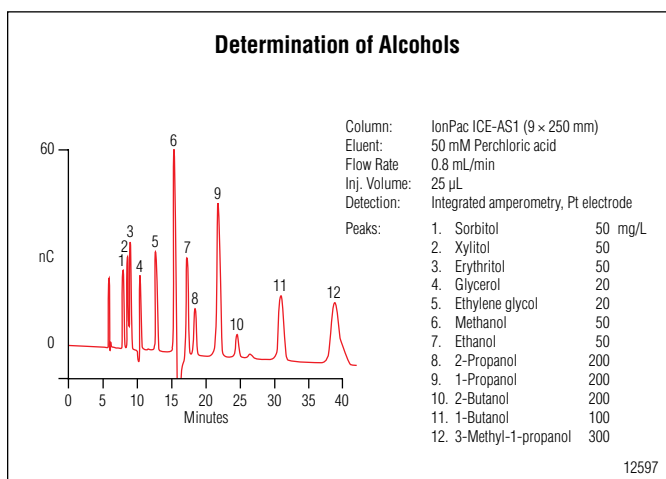
AN 116: Quantification of Anions in Pharmaceuticals

AN 117: Quantification of Carbohydrates and Glycols in Pharmaceuticals

AN 188: Determination of Glycols and Alcohols in Fermentation Broths Using Ion-Exclusion Chromatography and Pulsed Amperometric Detection



Determination of organic acids using the IonPac ICE-AS1 column.



Determination of alcohols using the IonPac ICE-AS1 with pulsed amperometric detection.

Ordering Information

IonPac ICE-AS1	
IonPac ICE-AS1 Analytical Column (9 × 250 mm)	043197
IonPac ICE-AS1 Analytical Column (4 × 250 mm)	064198
IonPac ICE-AS1 Guard Column (4 × 50 mm)	067842

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac ICE-AS1 Ion-Exclusion Column Data Sheet

IonPac ICE-AS6

Ion-exclusion column for aliphatic organic acids and alcohols in complex samples

The IonPac ICE-AS6 ion-exclusion column is designed for the fast analysis of aliphatic organic acids (including hydroxy-substituted organic acids) and alcohols in complex or high-ion-strength samples, including foods and beverages, biological samples, fermentation processes, industrial process liquors, and wastewaters. The ICE-AS6 column is ideally suited for most applications performed on the ICE-AS1 column.

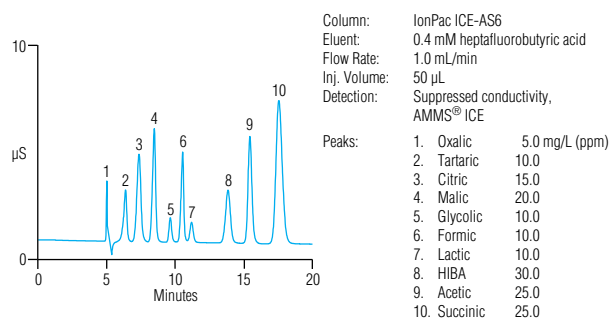
- Use the ICE-AS6 column for organic acids in complex sample matrices.
- Use the ICE-AS1 column for the fast separation of organic acids.

The ICE-AS6 column provides improved peak efficiencies and selectivity for carboxylic acids and alcohols. The weakly ionized acids are separated by pKa differences, size, and hydrophobicity. Strong acid anions such as chloride, oxalate, and sulfate elute in the void and do not interfere with the quantification of the organic acids.

The ICE-AS6 column can be used with any typical strong acid eluent and a wide range of detectors, including conductivity, amperometry, photometry, and refractive index to determine aliphatic organic acids. Use the AS11 for fast analysis of organic acids and inorganic anions in well-characterized samples. Use the high-capacity AS11-HC column for organic acids and inorganic anions in complex sample matrices or uncharacterized samples.

Note: Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS ICE 300) with the ICE-AS6 column.

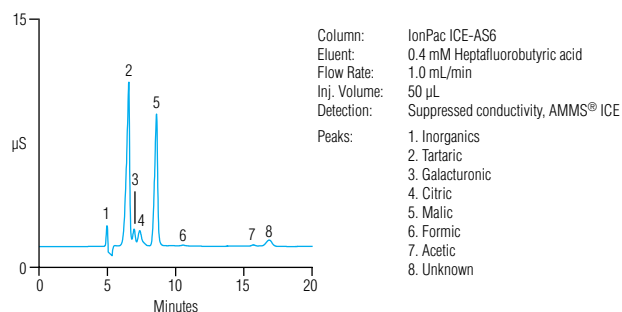
Separation of Low-Molecular-Weight Organic Acids Using the IonPac® ICE-AS6 Column



14427

Separation of low-molecular-weight organic acids using the IonPac ICE-AS6 column.

Determination of Trace Organic Acids in Grape Juice Using The IonPac® ICE-AS6 Column



14430

Determination of trace organic acids in grape juice using suppressed conductivity detection.

Technical Notes

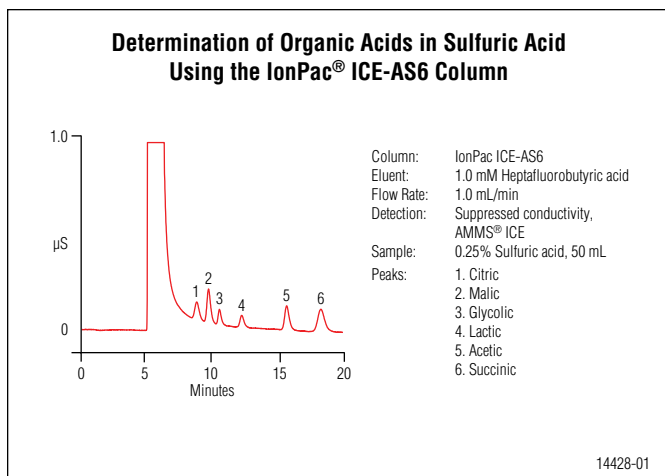
TN 44: The Determination of Trace Anions in Concentrated Phosphoric Acid

TN 46: Determination of Trace Anions in Concentrated Glycolic Acid

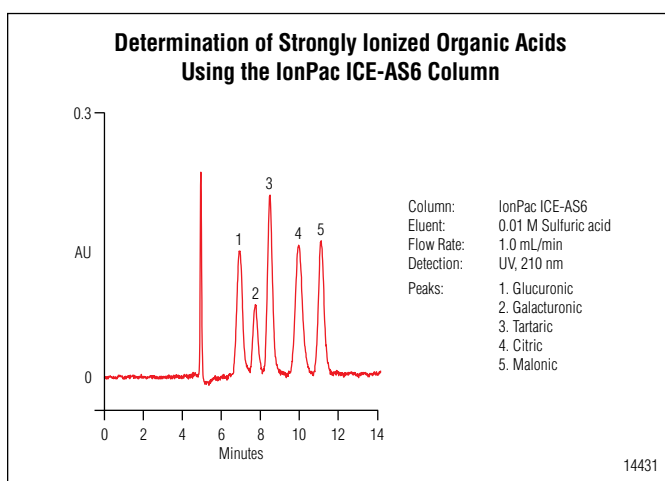
Ordering Information

IonPac ICE-AS6

IonPac ICE-AS6 Analytical Column (9 × 250 mm) 046023



Ion exclusion allows the determination of organic acids in sulfuric acid and eliminates sulfate interference.



Determination of strongly ionized organic acids using UV detection.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

IonPac ICE-AS6 Ion-Exclusion Column Data Sheet

Application Notes

AN 46: Ion Chromatography: A Versatile Technique for the Analysis of Beer

AN 104: Analysis of Personal Care Products by Ion Chromatography

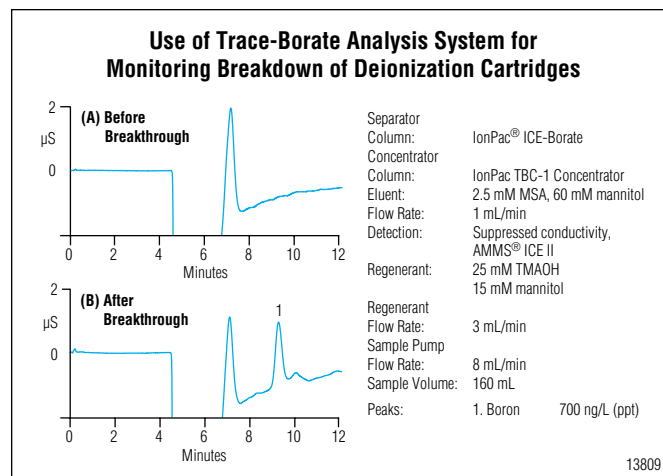
AN 106: Ion Chromatography in the Pharmaceutical Industry

IonPac ICE-Borate

Ion-exclusion column ideal for monitoring trace levels of borate in high-purity water

The IonPac ICE-Borate ion-exclusion column is designed for monitoring trace levels of borate in high-purity water.

Used with the TBC-1 Borate Concentrator column and conductivity detection, the ICE-Borate ion-exclusion column supports the determination of borate at ng/L (ppt) concentrations. Borate is separated and detected as the mannitol complex. Use the Anion MicroMembrane Ion-Exclusion Suppressor (AMMS-ICE 300) with the ICE-Borate column.



IC preconcentration system for trace-level borate determination.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

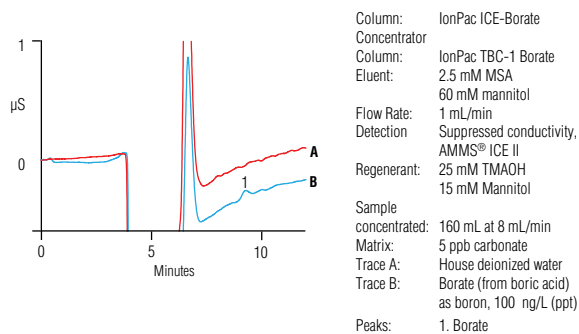
IonPac TBC-1 Borate Concentrator Column and IonPac ICE-Borate Column Data Sheet

Ordering Information

IonPac ICE-Borate

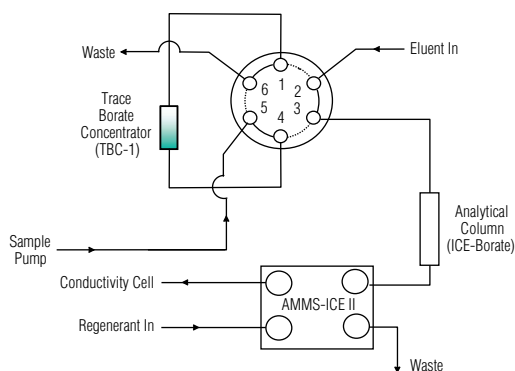
IonPac ICE-Borate Analytical Column (9 × 250 mm) 053945

Preconcentration of ng/L Levels of Borate Using the IonPac® TBC-1 Column



Determination of ng/L concentrations of borate using sample preconcentration.

Preconcentration System for Trace Borate Analysis



IC preconcentration system for trace-level borate determination.

IC Trap Columns

Columns to purify eluent or polish samples

Trap columns are short columns installed in the system to prevent unwanted analytes from interfering with the separation of your analytes of interest. IonPac trap columns contain high-capacity, low-efficiency, ion-exchange resin. The columns strip trace contaminants from the eluent and prevent them from reaching the guard and analytical columns. Polisher columns are specialized columns that remove unwanted counterions from the sample, and are installed between the sampler and injector.



Anion Trap Columns: Anion trap columns prevent anionic contaminants from causing spurious peaks

Cation Trap Columns: Cation trap columns prevent cationic contaminants from causing spurious peaks

Cation Polisher: For removal of metallic contaminants and other cations such as calcium and magnesium from the sample stream during anion analysis.

MFC-1 Metal-Free: Designed to remove transition metals from high-pH eluents.

Anion Trap Columns

IonPac Anion Trap Columns contain high-capacity, anion-exchange resin in the hydroxide form. The anion trap column is installed in the eluent line prior to the injection valve to prevent eluent contaminants from causing spurious peaks during gradient chromatography.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

ATC-3 Anion Trap Column

The IonPac ATC-3 Anion Trap Column contains a high-capacity, low-efficiency, anion-exchange resin used to remove trace anion contamination from eluents.

Ordering Information

Accessories

Trap Column / Suppressor Cleanup Kit.....	059659
ATC-3 4 mm Anion Trap Column (9 × 24 mm).....	059660
ATC-3 2 mm Anion Trap Column (4 × 35 mm).....	059661

ATC-HC Anion Trap Column

The IonPac ATC-HC Anion Trap Column is a high-capacity, anion-exchange trap column designed for use with hydroxide eluents.

For RFIC, EGC-KOH applications, use the CR-ATC.

Ordering Information

Accessories

ATC-HC Anion Trap Column (9 × 75 mm).....	059604
Trap Column / Suppressor Cleanup Kit.....	059659

ATC-HC Borate Form Anion Trap Column

The ATC-HC Borate Form Anion Trap Column is a high capacity anion-exchange trap column designed for use with borate eluents.

The ATC-HC Borate Form is placed between the pump outlet and the inlet of the EGC-KOH II cartridge to strip anionic contaminants from the deionized water and prevent them from reaching the guard and analytical columns.

Ordering Information

Accessories

Trap Column / Suppressor Cleanup Kit.....	059659
ATC-HC Anion Trap Column - Borate Form (9 × 75 mm).....	064755

Cation Trap Columns

IonPac Cation Trap Columns contain high-capacity, cation-exchange resin in the hydronium form. The cation trap column is installed in the eluent line prior to the injection valve to prevent eluent contaminants from causing spurious peaks during gradient chromatography.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

CTC Cation Trap

The IonPac CTC Cation Trap Column contains high-capacity, low-efficiency, cation-exchange resin in the hydronium ion form, to remove trace cation contaminants from eluents. The trap is installed in the eluent line prior to the injection valve to prevent spurious peaks and reduce baseline shifts during gradient chromatography. For RFIC-EGC MSA applications, use the CR-CTC.

Ordering Information

Accessories

IonPac CTC-1 Cation Trap Column	040192
IonPac CTC Cation Trap Column 2 mm	043132

Cation Polisher

IonPac CP1 Na⁺ Form and CP2 H⁺ Form Cation Polishers are designed for removal of metallic contaminants and other cations such as calcium and magnesium from the sample stream during anion analysis. They prevent high levels of metals or cations in samples from collecting on columns or suppressors, which can cause performance issues such as poor peak shapes or anion recoveries.

- Helps extend column and suppressor lifetimes
- Suited to phosphate analysis with metallic contaminants
- CP1 Na⁺ form: specifically designed for autosampler operation
- CP2 H⁺ form: recommended for large-volume sample preconcentration applications using an external pump

Dionex Cation Polisher Columns can aid removal of matrix cations during anion analysis with sample preconcentration. Matrix cations can elute species of interest from the concentrator column leading to poor peak shapes and recovery. Removing the matrix cations using the Cation Polisher Column enables improved chromatographic performance.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

Cation Polisher Na⁺ for Anion Analysis

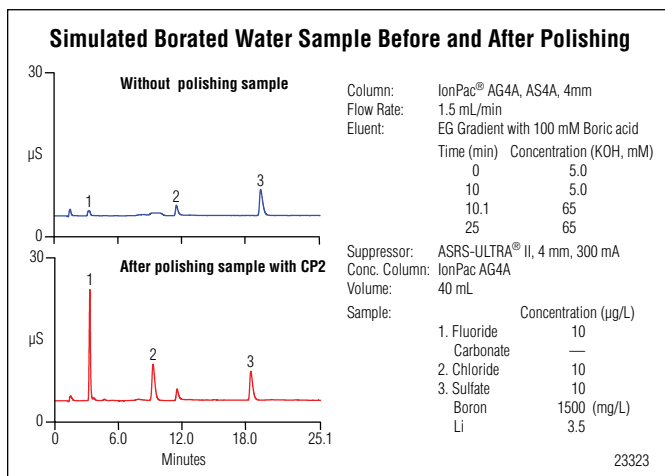
The CP1 Na⁺ Form (6 × 16 mm) column is a cation exchange column in the sodium form, packed in a low pressure format. It is specifically designed for autosampler operation. The void volume of this column is approximately 250 µL.

Ordering Information

Cation Polisher Na⁺

IonPac CP1 Na ⁺ Form Cation Polisher Column (6 × 16 mm)	064930
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Cation Polisher H+ for Anion Analysis



The CP2 H+ Form (9 × 24 mm) column is a higher-capacity version in the hydronium form, with a void volume of approximately 825 µL. The CP2 is recommended for large-volume sample preconcentration applications using an external pump. The Cation Polisher Columns can be regenerated off-line approximately every 2-3 months (depending on the level of contamination and usage).

Ordering Information

Cation Polisher H+

IonPac CP2 H+ Form Cation Polisher Column (9 × 24 mm) 064931

MFC-1 Metal-Free

The IonPac MFC-1 metal-free column contains a special chelating resin that strips trace transition metal contaminants from high-pH eluents.

Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

MFC-1 Metal Free Column

The IonPac MFC-1 metal-free column is installed in the eluent line prior to the injection valve to clear trace transition metal contaminants from high-pH eluents.

Ordering Information

Accessories

MFC-1 Metal-Free Column (3 × 27 mm) 037017

IC Concentrator Columns

Columns to capture and concentrate sample ions from large injection volumes

IonPac concentrator columns are designed primarily for high purity water analysis. A concentrator column retains ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits. Concentrator columns typically have internal volumes of hundreds of microliters, but can concentrate the ions from tens of milliliters, increasing sensitivity by 2–5 orders of magnitude compared to standard sample loops.



Anion Concentrator Columns: Retains anions from a measured volume of sample matrix, concentrating the analyte species.

Cation Concentrator Columns: Retains cations from a measured volume of aqueous sample matrix, concentrating the analyte species.

Transition Metal: High-capacity, cation-concentrator column for coupling the MetPac CC-1 chelating column to the IonPac CS5A analytical column.

Anion Concentrator Columns

IonPac anion concentrator columns are designed primarily for high-purity water analysis. The concentrator retains ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits by 2–5 orders of magnitude.

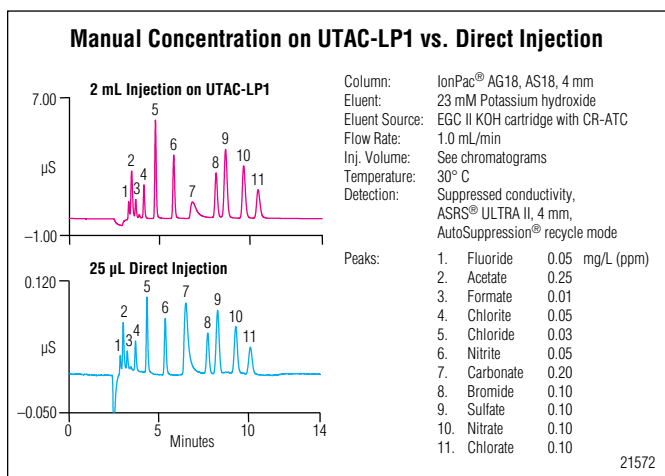
Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

UTAC-LP1



The UTAC-LP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator with low void volume. The ultraclean (low sulfate) UTAC-LP1 is a general purpose concentrator column for use with syringe or autosampler loading.

- Low-backpressure column
- Compatible with the AS40 Autosampler
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

Key Specifications

Format: 4 × 35 mm

Capacity: 25.0 µeq/column

Void Volume: approximately 145 µL

Backpressure: <60 psi at 2.0 mL/min.

Ordering Information

UTAC-LP1

UTAC-LP1 Ultra Trace Anion Concentrator—Low Pressure (4 × 35 mm)... 063079

UTAC-ULP1

The UTAC-ULP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with low void volume of approximately 145 µL.

- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The UTAC-ULP1 is a general purpose concentrator for use with syringe or autosampler loading. This ultralow backpressure concentrator can be used with the AS40, AS50, or AS Autosamplers, and with single piston sample delivery pumps including the DXP-1 and DQP. It is compatible with carbonate/bicarbonate, borate, and hydroxide eluents.

Key Specifications

Format: 5 × 23 mm

Capacity: 25.0 µeq/column

Void Volume: approximately 145 µL

Backpressure: <30 psi at 2.0 mL/min.

Ordering Information

UTAC-ULP1

UTAC-ULP1 Ultra Trace Anion Concentrator—Ultralow Pressure (5 × 23 mm) 063475

UTAC-XLP1

The UTAC-XLP1 Ultra Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with low void volume (approximately 145 µL).

- Ultraclean (low sulfate) concentrator column
- Supports carbonate/bicarbonate, borate, and hydroxide eluents
- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The UTAC-XLP1 is a general purpose concentrator for use with syringe or autosampler loading. This low-backpressure column can be used with the AS40, AS50, or AS Autosamplers, and with single piston sample delivery pumps including the DXP-1 and DQP.

Key Specifications

Format: 6 x 16 mm

Capacity: 25.0 µeq/column

Void Volume: approximately 145 µL.

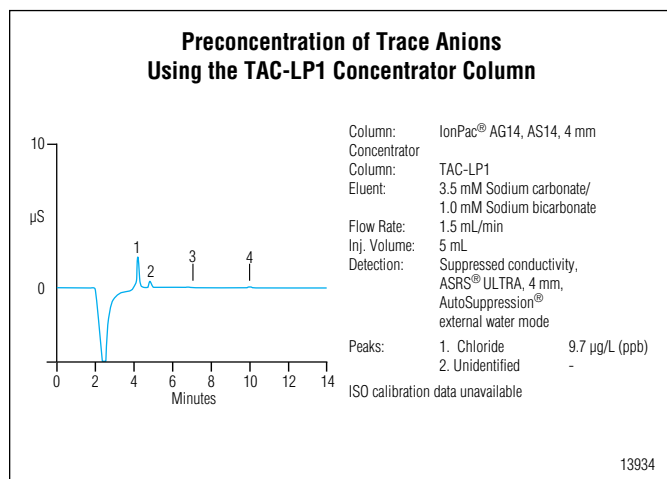
Backpressure: <10 psi at 2.0 mL/min.

Ordering Information

UTAC-XLP1

UTAC-XLP1 Ultra Trace Anion Concentrator—Extremely Low Pressure (6 x 16 mm) 063459

TAC-LP1



The IonPac TAC-LP1 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator.

- Supports carbonate/bicarbonate, borate, and hydroxide eluents

The TAC-LP1 is a general purpose, low-pressure concentrator for use with syringe or autosampler loading with void volume of approximately 145 µL. The TAC-LP1 is also designed for use as the concentrator column in the SP10 AutoNeutralization module for anions.

Key Specifications

Format: 4 x 35 mm

Capacity: 25 µeq/column

Void Volume: approximately 145 µL

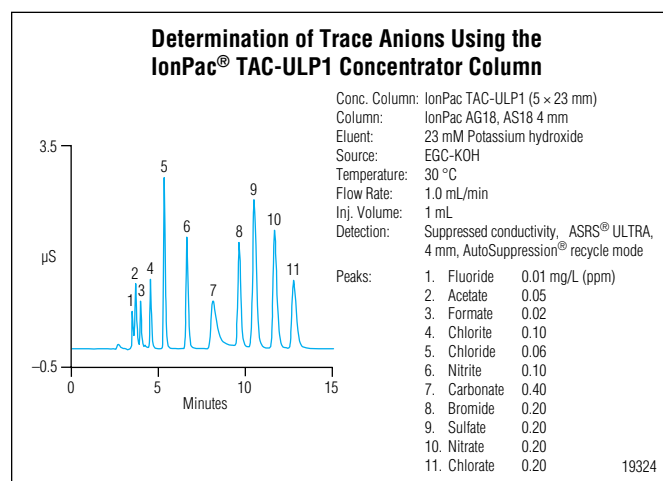
Backpressure: <60 psi at 2.0 mL/min.

Ordering Information

TAC-LP1

IonPac TAC-LP1 Low-Pressure Anion Concentrator (4 x 35 mm)..... 046026

TAC-ULP1



The IonPac TAC-ULP1 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator with moderately low void volume. It is an ultralow pressure concentrator for use with syringe or autosampler loading (AS40 and AS50 Autosamplers). It can be used with single-piston sample delivery pumps (e.g., DXP-1 or DQP). Compatible with carbonate, borate, or hydroxide eluents.

Key Specifications

Format: 5 x 23 mm

Capacity: 25.0 µeq/column

Void Volume: approximately 145 µL

Backpressure: <30 psi at 2.0 mL/min

Ordering Information

TAC-ULP1

TAC-ULP1 Ultralow Pressure Trace Anion Concentrator (5 x 23 mm) 061400

TAC-2

The IonPac TAC-2 Trace Anion Concentrator Column is a pellicular anion-exchange concentrator column with moderately low void volume (~50 μL).

- Can be used with carbonate/bicarbonate and borate eluents

Note: Not solvent compatible.

Ordering Information

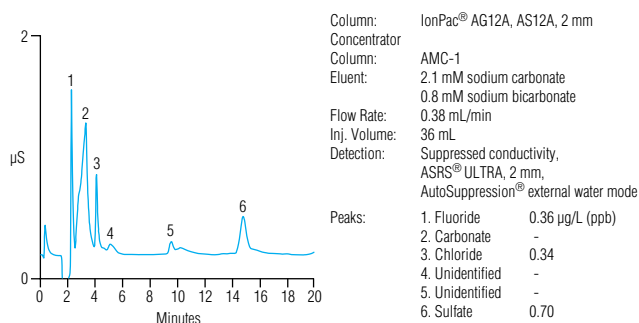
TAC-2

IonPac TAC-2 Trace Anion Concentrator..... 043101

IonPac TAC-2 Trace Anion Concentrator, Pkg of 4..... 043102

AMC-1

Determination of Trace-Level Fluoride, Chloride, and Sulfate Standard Using an AMC-1 Anion Microconcentrator Column and the AS12A Column



The AMC-1 is a very low void volume microconcentrator column designed for the concentration of inorganic anions and low-molecular-weight organic anions from ultrapure water. A unique, solvent-compatible resin technology ensures a low sulfate background and ruggedness during the concentration step.

The AMC-1 can be loaded with either a loop or sample load-injection pump. The low void volume (approximately 15 μL) ensures accurate determination of early-eluting anions such as fluoride, glycolate, acetate, and formate. The AMC-1 can be used with carbonate/bicarbonate or borate eluents.

Key Specifications

Format: 2 \times 15 mm

Capacity: 3 μeq /column

Void volume: 15 μL

Backpressure: 60–110 psi at 0.5 mL/min

Ordering Information

AMC-1

IonPac AMC-1 Anion Micro Concentrator (2 \times 15 mm) 051760

AC10

The IonPac AC10 is an anion-exchange concentrator column designed for use with the IonPac AS10 column.

Key Specifications

Format: 4 \times 50 and 2 \times 50 mm

Capacity: 4.0 μeq /column (4 mm); 0.8 μeq /column (2 mm)

Void volume: 207 μL (4 mm); 52 μL (2 mm)

Backpressure: <300 psi at 1.0 mL/min (4 mm);
<300 psi at 0.25 mL/min (2 mm)

Ordering Information

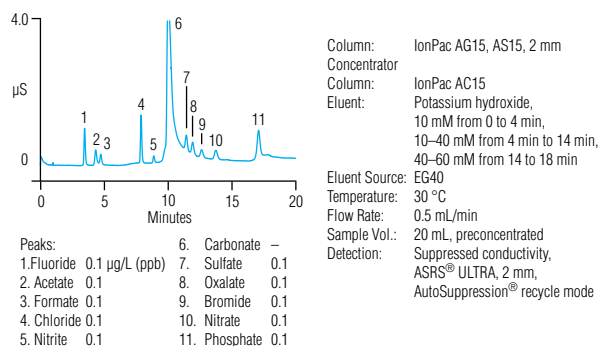
AC10

IonPac AC10 Concentrator Column (4 \times 50 mm) 043133

IonPac AC10 Concentrator Column (2 \times 50 mm) 043134

AC15

Determination of Inorganic Anions and Low-Molecular-Weight Organic Acids with Sample Preconcentration Using the IonPac® AS15 Column



The IonPac AC15 is an anion-exchange concentrator column designed for use with the IonPac AS15 column. Use the AC15 2 \times 50 mm format for 2 and 3 mm applications.

Key Specifications

Format: 4 \times 50 and 2 \times 50 mm

Capacity: 9 μeq /column (4 mm); 2.2 μeq /column (2 mm)

Void volume: 150 μL (4 mm); 53 μL (2 mm)

Backpressure: <140 psi at 1.0 mL/min; <160 psi at 0.42 mL/min

Ordering Information

AC15

IonPac AC15 Concentrator Column (4 × 50 mm)	055694
IonPac AC15 Concentrator Column (2 × 50 mm)	055695

Cryptand C1

The IonPac Cryptand C1 Concentrator Column is recommended for the analysis of trace perchlorate in drinking water. This adjustable-capacity column contains a macroporous, 17.5 µm resin grafted with the macrocyclic 2,2,2 cryptand compound. The column's functional capacity depends on eluent concentration and the type of cation bound within the cryptand molecule.

- Approximately 30 µeq/mol of cryptand capacity available for use
- Capacity adjustable from fixed amount to zero by via eluent concentration or cation type

The adjustable capacity makes the Cryptand C1 a powerful tool for determining trace perchlorate in drinking water and high ionic strength water. Methods using the C1 can quantify 140 ng/L of perchlorate in a background of total dissolved solids with concentrations as high as 3000 mg/L. The Cryptand C1 is specified for sample preconcentration in US EPA Method 314.1.

Ordering Information

Cryptand C1

IonPac Cryptand C1 Concentrator Column (4 × 35 mm)	062893
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IonPac TBC-1

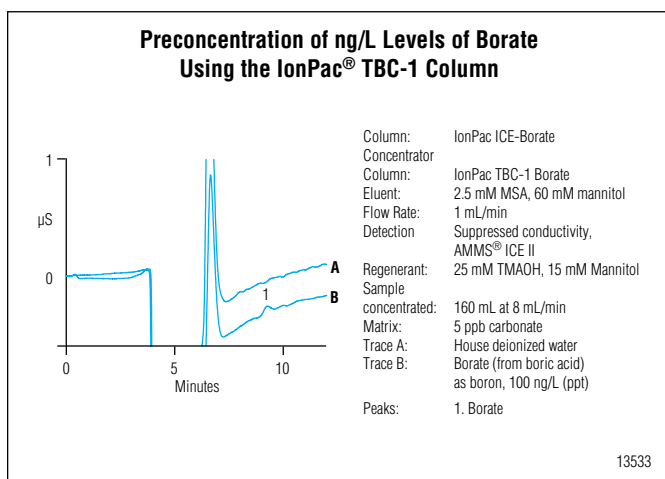
with highly selective polyol groups. The TBC-1 is coupled to a specially designed ICE-Borate column for the determination of borate at ng/L (ppt) concentrations.

Mannitol eluent quantitatively elutes borate from the TBC-1 concentrator column.

Ordering Information

TBC-1

IonPac TBC-1 Trace Borate Concentrator (4 × 50 mm)	053944
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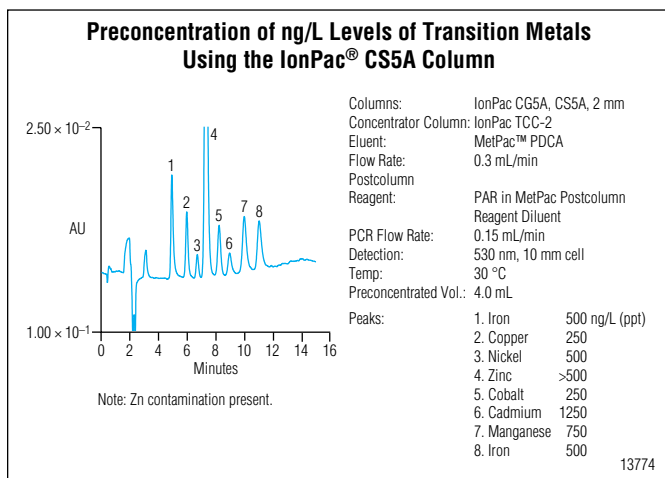


The IonPac TBC-1 Trace Borate Concentrator Column is optimized for trace analysis of borate. The TBC-1 has a low void volume and is packed with a unique resin surface grafted

Cation Concentrator Columns

IonPac cation concentrator columns are designed primarily for high-purity water analysis. The concentrator strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species and lowering detection limits by 2–5 orders of magnitude.

TCC-2



The IonPac TCC-2 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume (approximately 50 μ L).

The TCC-2 is a surface-sulfonated, cation-exchange concentrator column that is ideal for use with sulfonated columns such as the CS3, CS10, and CS11. It can also be used as a concentrator column for transition metals. The TCC-2 can be used with hydrochloric acid or diaminopropionic acid eluent.

Key Specifications

Format: 3 \times 35 mm

Capacity: 10 μ eq/column

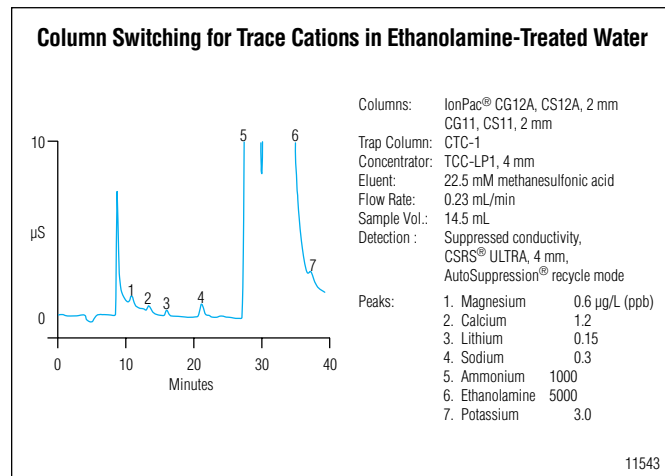
Void volume: 50 μ L

Ordering Information

Accessories

IonPac TCC-2 Trace Cation Concentrator (3 \times 35 mm) 043103
 IonPac TCC-2 Trace Cation Concentrator, Pkg of 4..... 043104

TCC-LP1



The IonPac TCC-LP1 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume (approximately 145 μ L).

The TCC-LP1 is a general purpose, very low-pressure concentrator for use with syringe or autosampler loading. It is also designed for use as the concentrator column in the SP10 AutoNeutralization module for cations. The TCC-LP1 can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

Note: The TCC-LP1 is recommended for use with carboxylated columns such as the CS12, CS12A, CS14, CS15, CS16, CS17, and CS18.

Key Specifications

Format: 4 \times 35 mm

Capacity: 260 mequiv/column

Void volume: 145 μ L

Backpressure: 70 psi at 1.0 mL/min

Ordering Information

Accessories

IonPac TCC-LP1 Low-Pressure Cation Concentrator 046027

TCC-ULP1

The IonPac TCC-ULP1 Trace Cation Concentrator Column is a pellicular cation-exchange concentrator column with moderately low void volume (approximately 145 μ L). It is designed primarily for high purity water analysis. The column strips ions from a measured volume of aqueous sample matrix, concentrating the analyte species, thereby lowering detection limits.

The TCC-ULP1 Ultralow Pressure Trace Cation Concentrator Column is a general purpose, ultralow-pressure concentrator for use with syringe or autosampler loading (AS40, AS50, or AS autosamplers) and with single-piston sample delivery pumps including the DXP-1 and DQP. The TCC-ULP1 can be used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

Note: The TCC-ULP1 is recommended for use with carboxylated columns such as the IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18 columns.

Key Specifications

Format: 5 \times 23 mm

Capacity: 260 μ eq/column

Void Volume: approximately 145 μ L

Backpressure: 45 psi at 1.0 mL/min

Ordering Information

Accessories

TCC-ULP1 Ultralow Pressure Trace Cation Concentrator (5 \times 23 mm) 063783

TCC-XLP1

The IonPac TCC-XLP1 Extremely-Low Pressure Trace Cation Concentrator Column is a pellicular cation-exchange concentrator with moderately low void volume.

The IonPac TCC-XLP1 is compatible with a syringe or autosampler (AS40, AS50 or AS Autosamplers) and with single-piston sample delivery pumps including the DXP-1 and DQP. It is recommended for use with carboxylated columns such as the IonPac CS12, CS12A, CS14, CS15, CS16, CS17, and CS18. The column is used with sulfuric acid, methanesulfonic acid, and hydrochloric acid eluents.

Key Specifications

Format: 6 \times 16 mm

Capacity: 260 μ eq/column

Void volume: approximately 145 μ L

Backpressure: 30 psi at 1.0 mL/min

Ordering Information

Accessories

TCC-XLP1 Extremely-Low Pressure Trace Cation Concentrator (6 \times 16 mm) 063889

Transition Metal Concentrator Columns

Dionex provides a trace metal concentrator for use in chelation ion chromatography.

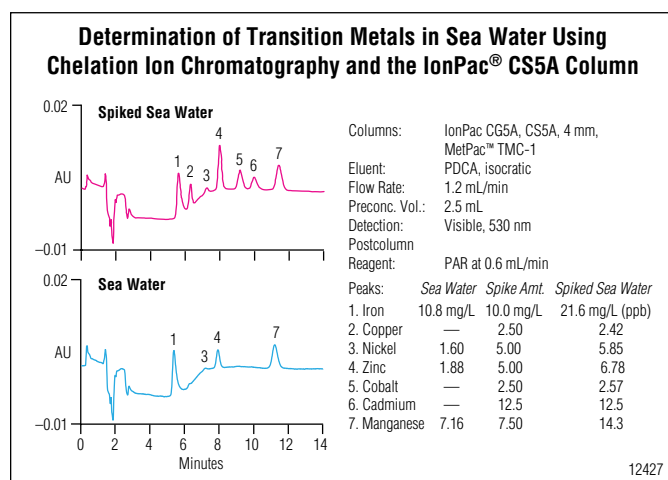
Related Literature

For detailed specifications and applications, see the following PDF documents under Literature on www.dionex.com.

Product Data Sheets

Concentrator and Trap Columns Data Sheet

TMC-1



The IonPac TMC-1 Trace Metal Concentrator is a high-capacity cation concentration column used for coupling the MetPac CC-1 to the IonPac CS5 and CS5A analytical columns when performing chelation IC.

Key Specifications

Format: 3 × 25 mm

Capacity: 6.3 µeq/column

Ordering Information

TMC-1

IonPac TMC-1 Trace Metal Concentrator (3 × 25 mm)..... 049000

Ordering Information

Contact your local sales office for ordering and additional information

Order terms and conditions vary by region. Please contact your local Dionex representative for more information.



Dionex Locations

Corporate Headquarters

Location

1228 Titan Way
Sunnyvale, CA 94085
U.S.A.

Mailing Address

500 Mercury Drive
P.O. Box 3603
Sunnyvale, CA 94088-3603
U.S.A.

Telephone and Fax

Fax: (408) 730-9403
Tel: (408) 737-0700
Tel (orders or Return Goods Authorization):
1-800-DIONEX-0 (6:00 a.m. to 5:00 p.m. PST)

Worldwide Offices and Subsidiaries

Asia Pacific

Australia

Dionex Pty Ltd
Unit 31, 2 Chaplin Drive
Lane Cove, NSW 2066 Australia
Phone: (61) 2 9420 5233
Fax: (61) 2 9420 5244

China

Dionex China Ltd.
Room 2001, Level 20
Metroplaza Tower 2
223 Hing Fong Road
Kwai Fong, N.T. Hong Kong China
Phone: (852) 2428 3282
Fax: (852) 2428 7898

India

Dionex India Pvt. Ltd
R-610, Rabale, TTC MIDC
Navi Mumbai 400 701 India
Phone: (91) 22 2764 2735
Fax: (91) 22 2764 2733

Japan

Nippon Dionex K.K.
DNX Shin-Osaka Bldg.
6-3-14 Nishi-Nakajima
Yodogawa-ku
Osaka 532-0011 Japan
Phone: (81) 6 6885 1213
Fax: (81) 6 6885 1215

Korea

Dionex Korea Ltd.
Ace High-Tech City, 3-601
Mullae-dong 3-ga 54-66
Yeongdeungpo-gu
Seoul, 150-972 Korea
Phone: (82) 2 2653 2580
Fax: (82) 2 2653 2508

Singapore

Dionex Singapore Pte. Ltd.
14 Little Road #05-02
Tropical Industrial Building
536987 Singapore
Phone: (65) 6289 1190
Fax: (65) 6289 2230

Taiwan

Dionex Taiwan Ltd.
1F., No.72 Jhouzih St.
Neihu District
Taipei City, 11493 Taiwan
Phone: (886) 2 8751 6655
Fax: (886) 2 8751 5353

Europe

Austria

Dionex Austria GmbH
Laxenburger Strasse 220
1230 Wien Austria
Phone: (43) 1 616 51 25
Fax: (43) 1 616 51 25 55

Benelux

Dionex Benelux B.V.
Abberdaan 114
1046 AA Amsterdam The Netherlands
Phone: (31) 20 683 9768
Fax: (31) 20 685 3452
Phone: (32) 3 353 42 94
Fax: (32) 3 353 42 93

Denmark

Dionex Denmark A/S
Stamholmen 193
2650 Hvidovre Denmark
Phone: (45) 36 36 90 90
Fax: (45) 36 36 90 99

France

Dionex S.A.
164-166 Avenue Joseph Kessel
78960 Voisins Le Bretonneux France
Phone: (33) 1 39 30 01 10
Fax: (33) 1 39 30 01 12

Germany

Dionex GmbH
Am Wörtzgarten 10
65510 Idstein Germany
Phone: (49) 6126 991 0
Fax: (49) 6126 991 272

Ireland

Dionex Ireland Ltd.
Suite 3C
Plato Business Park
Damastown
Dublin 15 Ireland
Phone: (353) 1 644 0064
Fax: (353) 1 885 1673

Italy

Dionex S.p.A.
Via XXV Aprile 6
20097 San Donato Milanese (MI) Italy
Phone: (39) 02 51 62 1267
Fax: (39) 02 51 62 8238

Sweden

Dionex Sweden AB
Månskärsvägen 9, 4 tr
S-141 75 Kungens Kurva
Phone: (46) 8 473 3380
Fax: (46) 8 180 717

Switzerland

Dionex (Switzerland) AG
Solothurnerstr. 259
4600 Olten Switzerland
Phone: (41) 62 205 99 66
Fax: (41) 62 205 99 60

United Kingdom

Dionex (UK) Ltd.
4 Albany Court
Camberley
Surrey, GU16 7QL United Kingdom
Phone: (44) 1276 691722
Fax: (44) 1276 691837

The Americas

Brazil

Dionex Brasil
Instrumentos Cientificos Ltda.
Av Comendador Alberto Bonfiglioli 669
CEP: 05593-001 Sao Paulo Brasil
Phone: (55) 11 3731 5140
Fax: (55) 11 3213 9530

Canada

Dionex Canada Ltd.
1540 Cornwall Road, Suite 204
Oakville, ON
L6J 7W5 Canada
Phone: (905) 844 9650
Fax: (905) 844 6134

United States

Dionex North American Sales and Service Headquarters and
Centers of Excellence
3000 Lakeside Drive, Suite 116N
Bannockburn, IL 60015 USA
Phone: (847) 295 7500
Fax: (847) 283 0722