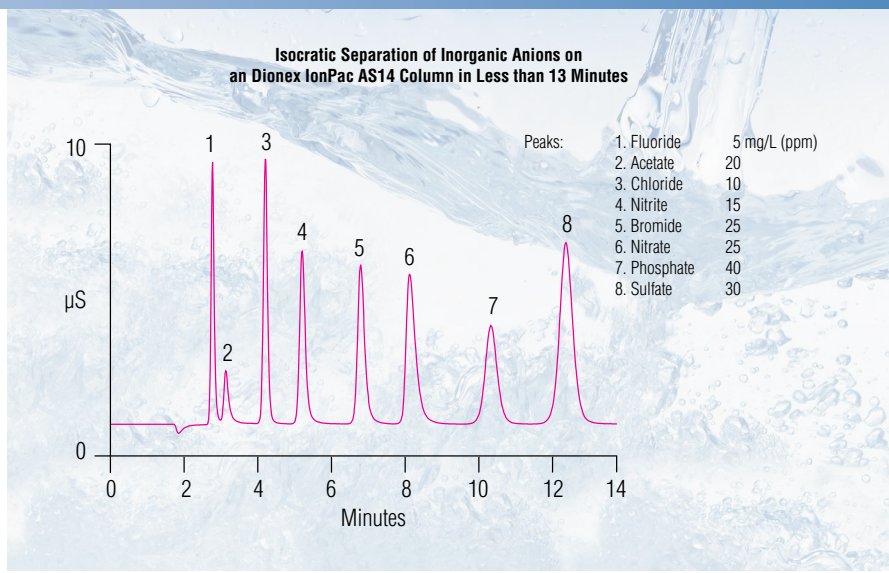
Thermo Scientific Dionex IonPac AS14 Anion-Exchange Column

The Thermo Scientific™ Dionex™ IonPac™ AS14 anion-exchange column is designed for the fast analysis of inorganic anions, including fluoride, acetate, chloride, nitrite, bromide, nitrate, phosphate, and sulfate. The Dionex IonPac AS14 column is suited for applications performed using the Dionex IonPac AS4A-SC and Dionex IonPac AS12A columns with the advantages of improved peak resolution and retention of fluoride. Solvent compatibility permits easy column clean-up after the analysis of complex matrices. The Dionex IonPac AS14A column can also be used for the fast, isocratic separation of the common inorganic anions. Refer to the Dionex IonPac AS14A column Product Specifications for more information.



Determination of Inorganic Anions in Diverse Sample Matrices

- Source water and drinking water
- Municipal and industrial wastewater
- Industrial cooling water
- Power plant waters
- Hazardous waste extracts and dump site leachates
- Acid rain
- Inorganic anions in foods and beverages
- Anionic counterions in pharmaceutical preparations and synthetic peptides
- Polymers such as polyols and polysulfonates
- Kraft liquors

Superior Chromatographic Performance

- Universal column for inorganic anions. Designed to be used in Dionex IonPac AS4A, Dionex IonPac AS4A-SC, and Dionex IonPac AS12A column applications with equivalent linearity and precision.
- Fast isocratic separation of fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate using a simple carbonate/bicarbonate eluent. Retains fluoride out of the water dip, free of interference from organic acids, with elution of sulfate in 13 min.
- Meets or exceeds requirements of U.S. EPA Method 300.0 (A).
- Superior retention and quantification of fluoride, glycolate, acetate, and formate.
- Sodium tetraborate gradient optimizes difficult separations.
- Solvent compatible. Solvent samples for determining contaminating anions. Use organic solvents to enhance analyte solubility, modify column selectivity, or for effective column clean-up.
- Available in 4 mm or 2 mm formats. Use the 2 mm microbore column for economical operation.

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High Efficiency Particle Structure

The Dionex IonPac AS14 column packing is a unique structure composed of a highly crosslinked core and an anion-exchange layer grafted to the surface, as shown in Figure 1. The substrate for the Dionex IonPac AS14 column is a 9 µm diameter macroporous resin bead consisting of ethylvinylbenzene crosslinked with 55% divinylbenzene. The anion-exchange layer is functionalized with quaternary ammonium groups. The anion-exchange layer has a controlled thickness resulting in excellent mass transfer characteristics and consequently very high efficiency peaks.

Unique Selectivity and Increased Capacity

The Dionex IonPac AS14 column has a unique selectivity and increased capacity compared to the Dionex IonPac AS4A column. As shown in Figure 2, fluoride is well resolved from the system void and free from interference from acetate and formate. These features make the Dionex IonPac AS14 column ideal for routine inorganic anion determinations. The increased capacity of the Dionex IonPac AS14 column allows the injection of complex matrices or injection of up to 100 µL of sample, as shown in Figure 3.

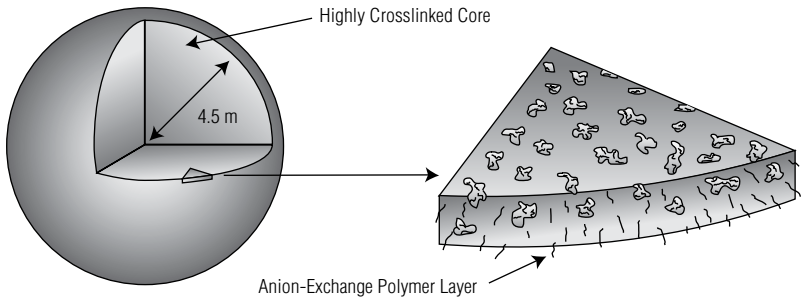
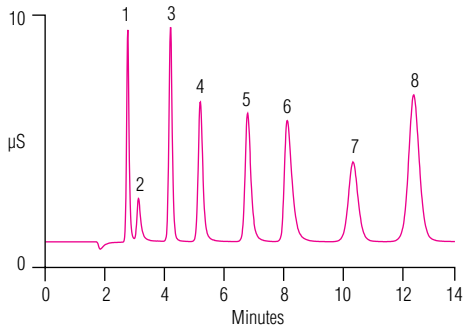


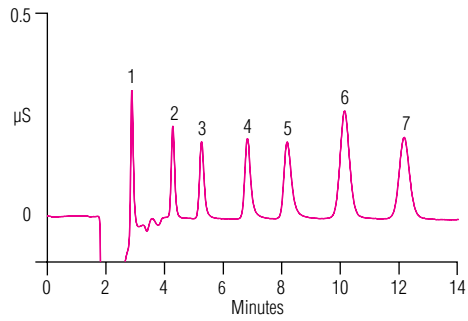
Figure 1. Structure of an Dionex IonPac AS14 column packing particle.



Column:	Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent:	3.5 mM Sodium carbonate 1.0 mM Sodium bicarbonate
Flow Rate:	1.2 mL/min
Inj. Volume:	10 µL
Detection:	Suppressed conductivity, Thermo Scientific™ Dionex™ ASRS™-ULTRA Anion Self-Regenerating suppressor, 4 mm, AutoSuppression™, recycle mode

Peaks:		
	1. Fluoride	5 mg/L (ppm)
	2. Acetate	20
	3. Chloride	10
	4. Nitrite	15
	5. Bromide	25
	6. Nitrate	25
	7. Phosphate	40
	8. Sulfate	30

Figure 2. Isocratic separation of inorganic anions on an Dionex IonPac AS14 column in less than 13 minutes.



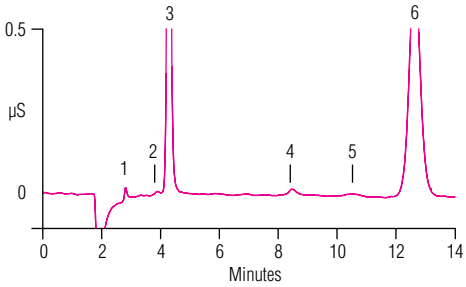
Column:	Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent:	3.5 mM Sodium carbonate 1.0 mM Sodium bicarbonate
Flow Rate:	1.2 mL/min
Inj. Volume:	100 µL
Detection:	Suppressed conductivity, Dionex ASRS-ULTRA suppressor, 4 mm, Auto Suppression, external water mode

Peaks:		
	1. Fluoride	50 µg/L (ppb)
	2. Chloride	70
	3. Nitrite	120
	4. Bromide	250
	5. Nitrate	250
	6. Phosphate	800
	7. Sulfate	250

Figure 3. Determination of trace level anions in high-purity water using the Dionex IonPac AS14 column with a large loop injection.

Ideal for the Determination of Inorganic Anions in Drinking Water and Wastewater

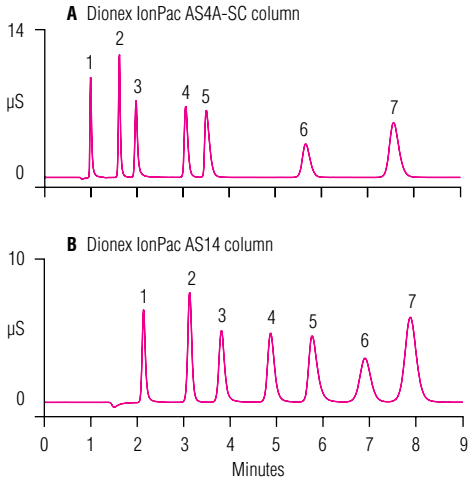
The Dionex IonPac AS14 column is the ideal column for compliance monitoring of drinking water and waste water. The Dionex IonPac AS14 column meets or exceeds the requirements of U.S. EPA Method 300.0 (A). As shown in Figure 4, fluoride is easily separated from the system void and can be determined even at very low concentrations. The Dionex IonPac AS14 column has significantly improved retention of fluoride compared to the Dionex IonPac AS4A column, as illustrated in Figure 5.



Column:	Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent:	3.5 mM Sodium carbonate 1.0 mM Sodium bicarbonate
Flow Rate:	1.2 mL/min
Inj. Volume:	10 µL
Detection:	Suppressed conductivity, Dionex ASRS-ULTRA, suppressor, 4 mm, AutoSuppression, recycle mode
Sample:	Drinking water from Milpitas, CA

Peaks:		
	1. Fluoride	0.03 mg/L (ppm)
	2. Bicarbonate	30
	3. Chloride	3.1
	4. Nitrate	0.15
	5. Phosphate	0.04
	6. Sulfate	4.4

Figure 4. The Dionex IonPac AS14 column is ideal for interference-free determination of inorganic anions, including fluoride, in drinking water.



Column:	**A:** Dionex IonPac AG4A-SC, Dionex IonPac AS4A-SC, 4 mm **B:** Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent:	**A:** 1.8 mM Sodium carbonate 1.7 mM Sodium bicarbonate **B:** 4.8 mM Sodium carbonate 0.6 mM Sodium bicarbonate
Flow Rate:	**A:** 2 mL/min **B:** 1.5 mL/min
Inj. Volume:	10 µL
Detection:	Suppressed conductivity, Dionex ASRS-ULTRA suppressor, 4 mm, AutoSuppression, recycle mode

Peaks:		
	1. Fluoride	5 mg/L (ppm)
	2. Chloride	10
	3. Nitrite	15
	4. Bromide	25
	5. Nitrate	25
	6. Phosphate	40
	7. Sulfate	30

Figure 5. Fast isocratic elution of inorganic anions. The increased capacity and unique selectivity of the Dionex IonPac AS14 column allows the retention of fluoride out of the water dip while eluting sulfate in less than 9 minutes.

Determination of Inorganic Acids and Low Molecular Weight Organic Acids

Low molecular weight organic acids and mono- and divalent inorganic anions commonly encountered in the chemical and power industries can be determined in a single run. Figure 6 illustrates the separation of weakly retained anions such as fluoride, glycolate, acetate, and formate on the Dionex IonPac AS14 column by using a sodium tetraborate gradient.

The Dionex IonPac AS14 column can be used to evaluate the mass balance of drugs and synthetic peptide preparations. Figure 7 illustrates the use of the Dionex IonPac AS14 column to determine the anionic counterion amount and type.

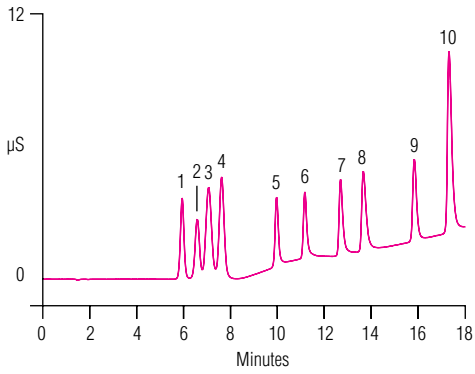
Solvent Compatible Packing

Since the Dionex IonPac AS14 column is 100% HPLC solvent compatible, organic solvents can be used for efficient column clean-up or to enhance sample solubility. Users save time and money by eliminating time consuming sample preparation steps. This feature allows complex matrices to be analyzed with minimal sample preparation and extends the utility of the column to new applications requiring solvents. Adding organic solvents to the eluent modifies column selectivity and enables the elution of nonpolar analytes or contaminants from the column.

Economical Microbore Operation

The Dionex IonPac AS14 column is available in the 2 mm format to provide the advantages of reduced operating costs with microbore operation.

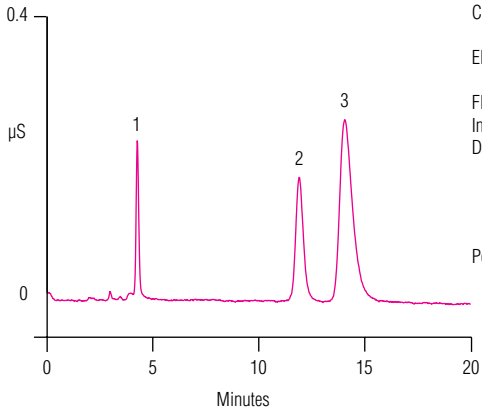
- Higher mass sensitivity compared to 4 mm separations. Ideal for limited sample volumes.
- Reduced mobile phase consumption (3–4 times).
- 4 mm applications can be directly transferred to the 2 mm format.



Column: Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent: 2 mM Sodium tetraborate for 6 min; 10 min gradient to 17.5 mM Sodium tetraborate
Flow Rate: 1.5 mL/min
Inj. Volume: 25 µL
Detection: Suppressed conductivity, Dionex ASRS-ULTRA suppressor, 4 mm, AutoSuppression, external water mode

Peaks:		
1.	Fluoride	5 mg/L (ppm)
2.	Glycolate	10
3.	Acetate	20
4.	Formate	10
5.	Chloride	3
6.	Nitrite	10
7.	Bromide	10
8.	Nitrate	10
9.	Phosphate	15
10.	Sulfate	15

Figure 6. Sodium tetraborate gradient separation of anions using the Dionex IonPac AS14 column.



Column: Dionex IonPac AG14, Dionex IonPac AS14, 4 mm
Eluent: 3.5 mM Sodium carbonate 0.8 mM Sodium bicarbonate
Flow Rate: 1.2 mL/min
Inj. Volume: 10 µL
Detection: Suppressed conductivity, Dionex ASRS-ULTRA suppressor, 4 mm, AutoSuppression, recycle mode

Peaks:		
1.	Chloride	0.3 mg/L (ppm)
2.	Sulfate	0.9
3.	Trifluoroacetic acid	6.5

Figure 7. Determination of anionic counterions present in a gel permeation purified peptide.

SPECIFICATIONS	
Dimensions	
Analytical	2 × 250 mm and 4 × 250 mm
Guard	2 × 50 mm and 4 × 50 mm
Maximum Operating Pressure	27.6 MPa (4000 psi)
Mobile Phase Compatibility	pH 2–12; 0–100% HPLC solvents
Substrate Characteristics	
Bead Diameter (µm)	9
Pore Size Å	100
Cross-Linking (%DVB)	55
Ion-Exchange Functional Group	Surface-functionalized alkyl quaternary ammonium ion
Functional Group Characteristics	Medium-high hydrophobic
Capacity	
16 µeq	(2 × 250 mm column)
65 µeq	(4 × 250 mm column)
Column Construction	PEEK with 10–32 threaded ferrule-style end fittings. All components are nonmetallic.

Ordering Information

For more information or to place an order, contact the Thermo Scientific Dionex Products office nearest you or your local distributor. Phone numbers and addresses for worldwide subsidiaries can be found in the About Us section of www.thermoscientific.com.

For optimum ease-of-use and economy, the Dionex IonPac AS14 column should be used with the Thermo Scientific™ Dionex™ AERS 500 suppressor. The Dionex IonPac AS14 column offers improved performance for Dionex IonPac AS4A, Dionex IonPac AS4A-SC, and Dionex IonPac AS12A column applications.

When performing sodium tetraborate gradient anion-exchange applications on the Dionex IonPac AS14 column, a Dionex IonPac ATC column should be installed between the gradient pump and the injection valve to remove anionic contaminants from the eluent.

For concentrator work, use the Dionex IonPac AG14 guard column; Ultratrace Anion Concentrator Columns (Dionex IonPac UTAC-ULP1, UTAC-XLP1, UTAC-ULP2, or UTAC-XLP2 columns) or Trace Anion Concentrator Column (Dionex IonPac TAC-ULP1 column) when a single piston pump such as the Thermo Scientific Dionex AXP Auxiliary Pump (pulse damper required) is used for sample delivery. In addition to the concentrator columns listed above, use the Dionex IonPac UTAC-LP1, Dionex IonPac UTAC-LP2, or Dionex IonPac TAC-LP1 column when the sample is delivered using a syringe or a low-pressure autosampler, such as the Thermo Scientific Dionex AS-DV Autosampler.

Dionex IonPac AS14 Columns	Part Number
Dionex IonPac AS14 Analytical Column (4 × 250 mm)	046124
Dionex IonPac AG14 Guard Column (4 × 50 mm)	046134
Dionex IonPac AS14 Analytical Column (2 × 250 mm)	046129
Dionex IonPac AG14 Guard Column (2 × 50 mm)	046138

Trace Anion Concentrator Columns	Part Number
Dionex IonPac TAC-2 Trace Anion Concentrator (3 × 35 mm)	043101
Dionex IonPac TAC-LP1 Trace Anion Concentrator (4 × 35 mm)	046026
Dionex IonSwift MAC-100 Monolith Anion Concentrator (0.5 × 80 mm) (for use with Capillary IC)	074702
Dionex IonPac TAC-LP1 Trace Anion Concentrator (4 × 35 mm)	046026
Dionex IonPac TAC-ULP1 Trace Anion Concentrator (5 × 23 mm)	061400
Dionex IonPac UTAC-LP1 Ultra Trace Anion Concentrator Low-Pressure (4 × 35 mm)	063079
Dionex IonPac UTAC-ULP1 Ultra Trace Anion Concentrator Ultra Low-Pressure (5 × 23 mm)	063475
Dionex IonPac UTAC-XLP1 Ultra Trace Anion Concentrator Extremely Low-Pressure (6 × 16 mm)	063459
Dionex IonPac UTAC-LP2 Ultra Trace Anion Concentrator Low-Pressure (4 × 35 mm)	079917
Dionex IonPac UTAC-ULP2 Ultra Trace Anion Concentrator Ultra Low-Pressure (5 × 23 mm)	079918
Dionex IonPac UTAC-XLP2 Ultra Trace Anion Concentrator Extremely Low-Pressure (6 × 16 mm)	072781

Anion Trap Columns	Part Number
Dionex IonPac ATC-3 Anion Trap Column (9 × 24 mm) (for use with 4 mm columns)	059660
Dionex IonPac ATC-3 Anion Trap Column (4 × 35 mm) (for use with 2 mm columns)	079932

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