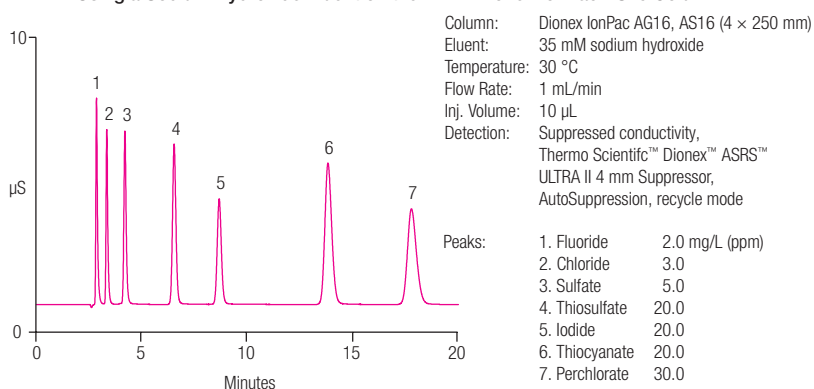


## Ion chromatography

# Thermo Scientific Dionex IonPac AS16 Anion-Exchange Column

The Thermo Scientific™ Dionex™ IonPac™ AS16 Column is a high-capacity, hydroxide-selective, anion-exchange column optimized for the determination of polarizable anions including thiosulfate, iodide, thiocyanate, and perchlorate in a variety of sample matrices. Using an isocratic sodium or potassium hydroxide eluent, polarizable anions can be determined in less than 20 min. The Dionex IonPac AS16 column is ideal for the determination of trace perchlorate in drinking water and ground water matrices. With an isocratic hydroxide eluent, perchlorate can be determined in 10 min. The Dionex IonPac AS16 column is the column specified in U.S. EPA Method 314.0 and Method 314.1 (Primary Method) for the determination of trace perchlorate in drinking water.

Isocratic Separation of Polarizable Anions and Inorganic Anions  
Using a Sodium Hydroxide Eluent on the 4 mm Dionex IonPac AS16 Column



### Superior performance

- Optimized hydrophilic resin for the isocratic separation of polarizable anions.
- Recommended for analysis of drinking water and groundwater matrices for perchlorate.
- Specified column in U.S. EPA Method 314.0 and Method 314.1 (Primary Method).
- Use with eluent generator (EG) for simplified Thermo Scientific™ Dionex™ Reagent-Free™ Ion Chromatography (RFIC™) system operation. Requires only a deionized water source to produce sodium or potassium hydroxide eluent.
- Either sodium or potassium hydroxide EG can be used with Method 314.0. Method 314.1 requires the use of sodium hydroxide EG.
- Eluent suppression using the Thermo Scientific™ Dionex™ AERS™ 500 Anion Electrolytically Regenerated Suppressor provides RFIC system operation with low backgrounds and enhanced analyte sensitivity.
- Ideal for analysis of polyphosphates and polycarboxylates.
- High-capacity: 170 µeq per column (4 × 250 mm).
- Large-loop injection for easy ppb level determinations (e.g., perchlorate in drinking and ground water).
- Compatible with organic solvents to enhance analyte solubility, modify column selectivity, and for effective column cleanup.
- Available in two formats (4 × 250 mm and 2 × 250 mm) supporting flow rates from 0.25 to 3.0 mL/min.

## High-efficiency particle structure

The Dionex IonPac AS16 column packing material is a unique structure composed of a highly crosslinked core and a Thermo Scientific™ Dionex™ MicroBead™ anion-exchange layer attached to the surface as illustrated in Figure 1. The substrate for the Dionex IonPac AS16 column is a 9 µm-diameter macroporous resin bead, consisting of ethylvinylbenzene crosslinked with 55% divinylbenzene.

The anion-exchange layer is functionalized with very hydrophilic quaternary ammonium groups. The latex bead anion-exchange layer has a controlled thickness, which results in excellent mass transfer characteristics and consequently very high-efficiency peaks.

## Isocratic separation of polarizable anions

The Dionex IonPac AS16 column has been optimized for the fast, isocratic determination of polarizable anions such as thiosulfate, iodide, thiocyanate, and perchlorate. Figure 2 shows the isocratic separation of the polarizable anions using a 35 mM sodium hydroxide eluent.

Typical applications for the Dionex IonPac AS16 column include trace perchlorate in environmental samples, such as drinking and groundwater. The Dionex IonPac AS16 column is also optimized for the determination of thiosulfate, iodide, and thiocyanate in chemical samples, including scrubber solutions, process streams, and brines.

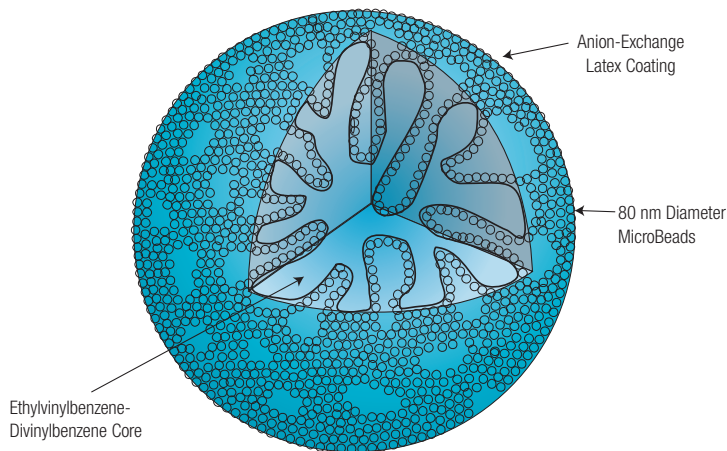


Figure 1. Macroporous resin with anion-exchange functionalized latex layer.

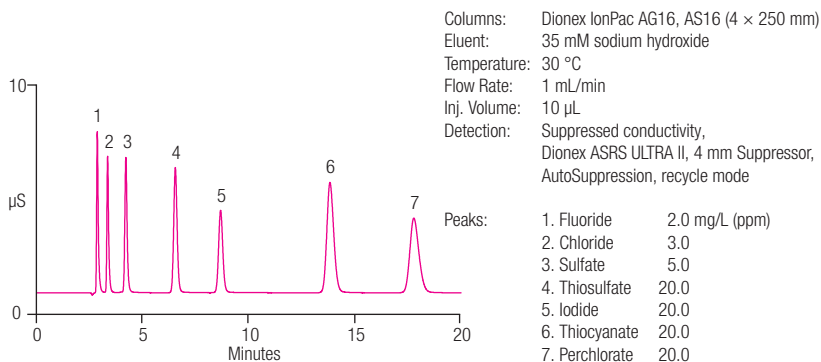


Figure 2. Isocratic separation of polarizable anions and inorganic anions using a sodium hydroxide eluent on the 4 mm Dionex IonPac AS16 column.

## Determination of trace perchlorate in drinking water and ground water matrices

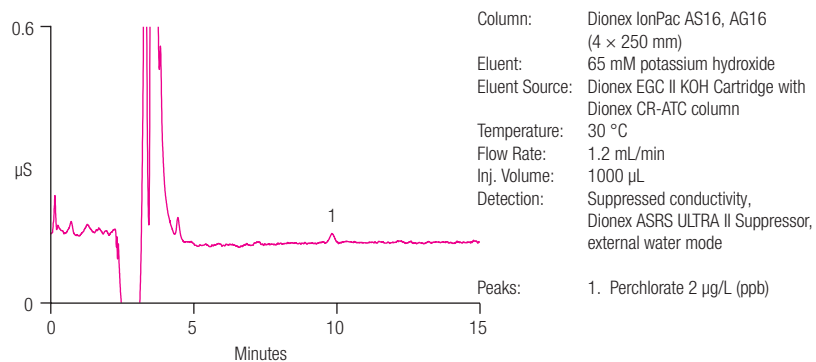
Perchlorate (initially as ammonium perchlorate), which is widely used in the manufacture of rocket propellants, munitions, fireworks, and road flares, has been found in drinking water in areas where aerospace materials and munitions have been manufactured and tested. Perchlorate is a potential health concern because it may interfere with the production of thyroid hormones. A simple, isocratic method has been developed using the high-capacity Dionex IonPac AS16 column to determine trace levels of perchlorate in drinking water matrices.

Figure 3 shows the determination of trace perchlorate in a drinking water sample, using a large-loop injection, with an isocratic hydroxide eluent coupled with suppressed conductivity detection. Low- $\mu\text{g/L}$  (ppb) levels of perchlorate can easily be quantified using a 1.0-mL injection loop on a 4 mm Dionex IonPac AS16 column.

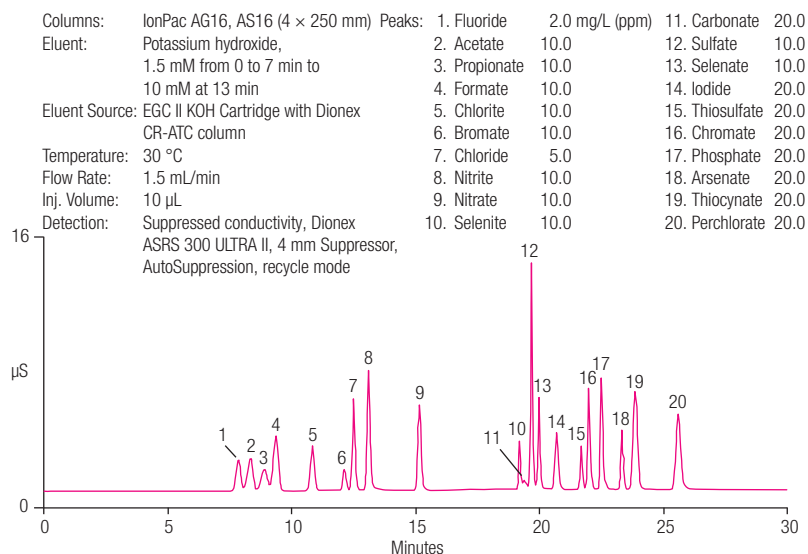
## Gradient separation of polarizable anions and inorganic anions

The Dionex IonPac AS16 column was designed for the determination of polarizable anions including thiosulfate, iodide, thiocyanate, and perchlorate. However, the Dionex IonPac AS16 column also provides excellent separation of a wide variety of other anions as shown in Figure 4.

With a potassium hydroxide gradient, 20 inorganic anions and polarizable anions are easily separated in approximately 25 minutes. Peak shape and efficiency are greatly improved for the polarizable anions on the Dionex IonPac AS16 column. Note that bromide and nitrate coelute on the Dionex IonPac AS16 column. For applications where bromide and nitrate are analytes, please refer to the product specifications for the Dionex IonPac AS20 column.



**Figure 3. Determination of trace perchlorate in drinking water using a large loop injection with 65 mM KOH on a 4 mm Dionex IonPac AS16 column as described in U.S. EPA Method 314.0. Using this specialized method for perchlorate, other anions in the sample are eluted quickly and do not interfere with the perchlorate peak.**



**Figure 4. Determination of polarizable anions and inorganic anions using a potassium hydroxide gradient delivered with an eluent generator using the 4-mm Dionex IonPac AS16 column.**

## Gradient separations as simple as isocratic runs with the eluent generator

The EG produces high-purity potassium or sodium hydroxide eluent electrolytically from water, eliminating the need for eluent preparation. The hydroxide eluent produced is free of carbonate contamination. The use of carbonate-free hydroxide eluents results in minimal baseline shifts during hydroxide gradients yielding lower background conductivities and lower detection limits for target analytes as shown in Figure 4.

## Dionex IonPac AS16 column for polyphosphates using gradient elution

Polyphosphates are widely used in a variety of industries. They are used for pharmaceutical and detergent formulations, water treatment applications to decrease water hardness, and in cleansers and fertilizers. Polyphosphates are also commonly used as food additives to control pH, to sequester metal ions, and to increase the ionic strength of solutions. Using a potassium hydroxide gradient on the Dionex IonPac AS16

column, low molecular weight polyphosphates can be separated in less than 10 min. Figure 5 shows the use of the Dionex IonPac AS16 column for the separation of polyphosphates in a detergent sample.

### Dionex IonPac AS16 column for highly charged anions using gradient elution

The separation of highly charged anions such as polycarboxylates is possible using gradient elution on a Dionex IonPac AS16 column. The high hydroxide selectivity on the Dionex IonPac AS16 column resin permits elution of these highly charged anions at lower hydroxide concentrations than on other anion-exchange columns.

### System recommendations

The Dionex IonPac AS16 column is recommended for use with Thermo Scientific™ Dionex™ Reagent-Free™ Ion Chromatography (RFIC™) Systems equipped with an eluent generator. The Dionex IonPac AS16 column can also be used with older Thermo Scientific Dionex IC systems equipped with an EG or a Thermo Scientific™ Dionex™ RFC-30 Reagent-Free Controller. The EG is used to automatically produce potassium hydroxide gradients from deionized water.

### Suppressor recommendations

For optimum ease-of-use and performance, the Dionex IonPac AS16 column should be used with the Thermo Scientific™ Dionex™ AERS™ 500 Anion Electrolytically Regenerated Suppressor.

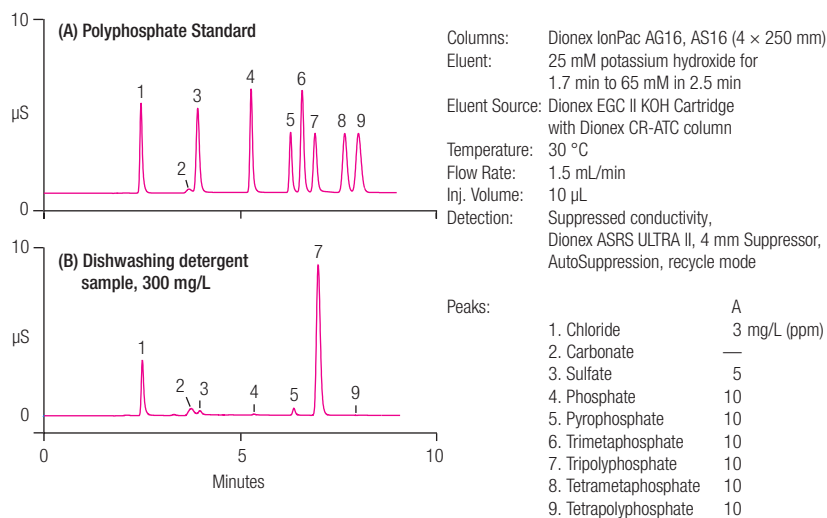


Figure 5. Separation of polyphosphates on the 4 mm Dionex IonPac AS16 column using a potassium hydroxide gradient delivered with an eluent generator.

### Anion trap columns

When using the EG for eluent delivery, a Thermo Scientific™ Dionex™ CR-ATC Continuously Regenerated Anion Trap Column should be installed between the eluent generator cartridge (EGC) and the degas module. As an alternative for 4 mm and 2 mm systems, a Thermo Scientific™ Dionex™ IonPac™ ATC-HC Column can be installed between the pump outlet and the EGC inlet. Alternatively, when using a manually-prepared sodium hydroxide gradient with the Dionex IonPac AS16 column, the Thermo Scientific™ Dionex™ IonPac™ ATC-3 Column should be installed between the gradient pump and the injection valve to remove anionic contaminants from the eluent.

### Concentrator columns

For concentrator work with a 2 mm or 4 mm Dionex IonPac AS16 column, use the: Thermo Scientific™ Dionex™ IonPac™ AG16 Guard Column; Thermo Scientific™ Dionex™ IonPac™ Ultratrace Anion Concentrator Columns (Dionex IonPac UTAC-ULP1, UTAC-XLP1, UTAC-ULP2, or UTAC-XLP2) or Thermo Scientific™ Dionex™ IonPac™ Trace Anion Concentrator Column (Dionex IonPac TAC-ULP1) 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, UTAC-LP2 or TAC-LP1 column when the sample is delivered using a syringe or a low-pressure autosampler, e.g., the Thermo Scientific™ Dionex™ AS-DV Autosampler.

Specifications	
<b>Dimensions</b>	Dionex IonPac AS16 Analytical Columns (2 × 250 mm) and (4 × 250 mm)
	Dionex IonPac AG16 Guard Columns (2 × 50 mm) and (4 × 50 mm)
<b>Maximum operating pressure</b>	4,000 psi
<b>Mobile phase compatibility</b>	pH 0–14; 0–100% HPLC solvents
<b>Substrate characteristics</b>	<b>Analytical column:</b> Super macroporous resin Bead diameter (µm): 9.0 Pore size: 2000 Å Crosslinking (%DVB): 55%
	<b>Guard column:</b> Microporous resin Bead diameter (µm): 13.0 Pore size: <10 Å Crosslinking (%DVB): 55%
<b>Latex characteristics</b>	Functional group: Alkanol quaternary ammonium ion
	Latex crosslinking: 1%
	Latex diameter: 80 nm
	Hydrophobicity: Ultralow
<b>Capacity</b>	42.5 µeq (2 × 250 mm analytical column)
	0.875 µeq* (2 × 50 mm guard column)
	170 µeq (4 × 250 mm analytical column)
	3.5 µeq* (4 × 50 mm guard column)
<b>Column construction</b>	PEEK with 10–32 threaded ferrule-style end fittings
	All components are nonmetallic

\*Guards are packed with a low-capacity microporous resin.

## Ordering information

To order in the U.S., call 1-800-346-6390, or contact the Thermo Fisher Scientific office nearest you. Outside the U.S., order through your local Thermo Fisher Scientific office or distributor. Refer to the following part numbers.

Description	Part number
<b>IonPac Columns</b>	
Dionex IonPac AS16 Analytical Column (4 × 250 mm)	055376
Dionex IonPac AG16 Guard Column (4 × 50 mm)	055377
Dionex IonPac AS16 Analytical Column (2 × 250 mm)	055378
Dionex IonPac AG16 Guard Column (2 × 50 mm)	055379
<b>Anion Trap Columns</b>	
Dionex CR-ATC 600 Continuously Regenerated Anion Trap Column (for use with Thermo Scientific™ Dionex™ ICS-6000 and Thermo Scientific™ Dionex™ Integriion Systems)	088662
Dionex CR-ATC 500 Continuously Regenerated Anion Trap Column (for use with Thermo Scientific™ Dionex™ ICS-5000 and Thermo Scientific™ Dionex™ ICS-5000+ Systems)	075550
Dionex CR-ATC Continuously Regenerated Anion Trap Column (for use with older RFIC systems that operate up to 3,000 psi or Dionex RFC-30 Reagent-Free Controller)	060477
Dionex IonPac ATC-3 4 mm (9 × 24 mm) Anion Trap Column (for use with 4 mm columns)	059660
Dionex IonPac ATC-3 2 mm (4 × 35 mm) Anion Trap Column (for use with 2 mm columns)	079932
Dionex IonPac ATC-HC (9 × 75 mm) Anion Trap Column (for use with the Thermo Scientific™ Dionex™ EG40 Eluent Generator)	059604
<b>Trace Anion Concentrator Columns</b>	
Dionex IonPac TAC-2 Trace Anion Concentrator (3 × 35 mm)	043101
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 Ultratrace Anion Concentrator Low Pressure (4 × 35 mm)	063079
Dionex IonPac UTAC-ULP1 Ultratrace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	063475
Dionex IonPac UTAC-XLP1 Ultratrace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	063459
Dionex IonPac UTAC-LP2 Ultratrace Anion Concentrator Low Pressure (4 × 35 mm)	079917
Dionex IonPac UTAC-ULP2 Ultratrace Anion Concentrator Ultra Low Pressure (5 × 23 mm)	079918
Dionex IonPac UTAC-XLP2 Ultratrace Anion Concentrator Extremely Low Pressure (6 × 16 mm)	072781

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