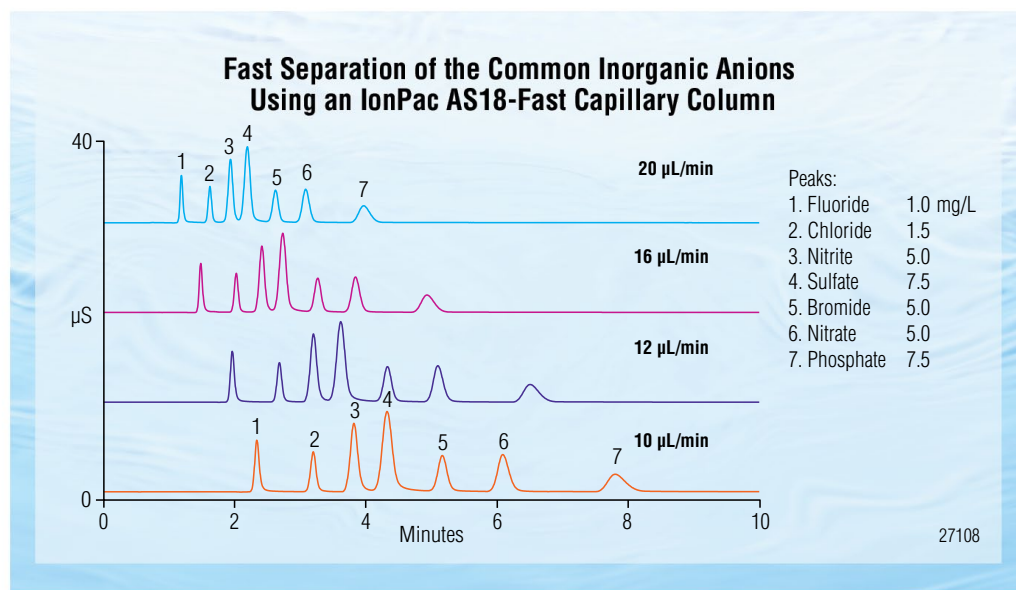


## IonPac AS18 Anion-Exchange Column



The IonPac® AS18 is a hydroxide-selective anion-exchange column designed for the determination of inorganic anions and low-molecular-weight organic acids including fluoride, acetate, formate, chloride, nitrite, bromide, nitrate, sulfate, and phosphate. The IonPac AS18 column can be used with isocratic hydroxide eluents or hydroxide gradients for determination of inorganic anions. This column is recommended for use in combination with an eluent generator, which automatically produces hydroxide eluents from water.

New additions to the IonPac AS18 column line, the AS18 Capillary column and the AS18-Fast Capillary and Analytical columns offer the advantage of reduced eluent consumption, thereby lowering operating costs. They are ideal for ion chromatography (IC) using eluent generation. The IonPac AS18 and AS18-Fast are available 0.4 mm, 2 mm, and 4 mm, formats, allowing flow rates from 10 µL/min to 3 mL/min.

### Column Performance

The capacity and selectivity of the IonPac AS18 column provides the flexibility to modify the eluent conditions for optimum separation of the anions of interest. The AS18 column is ideal for use with isocratic hydroxide eluents for fast separation of the common inorganic anions in simple sample matrices. The high capacity of the AS18 column allows the use of hydroxide gradients and large-loop injections to determine low levels of inorganic anions in complex sample matrices, including drinking water and wastewater samples.

Using hydroxide eluents, the IonPac AS18 column meets the performance requirements specified in U.S. EPA Method 300.0 (A). The U.S. EPA Office of Water has approved hydroxide eluents and hydroxide-selective columns for compliance monitoring of inorganic anions in drinking water and wastewater samples in accordance with EPA Methods 300.0 and 300.1. The common inorganic anions can easily be separated in a variety of sample matrices, including drinking water, wastewater, process streams and scrubber solutions. The IonPac AS18 column selectivity provides excellent retention of fluoride from the water dip and baseline resolution of fluoride, acetate, and formate. Solvent compatibility permits easy column cleanup after the analysis of samples with hydrophobic components.



Passion. Power. Productivity.

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## Recommended for Inorganic Anions in Diverse Sample Matrices

- Source water and drinking water
- Municipal and industrial wastewater
- Industrial cooling water
- Hazardous waste extracts and dump site leachates
- Acid rain
- Foods and beverages
- Anionic counterions in pharmaceutical preparations and synthetic peptides
- Polymers such as polyols and polysulfonates
- Scrubber solutions

## Superior Chromatographic Performance

- Fast separation of the common inorganic anions in 4 min using the AS18-Fast Capillary or Analytical column.
- Isocratic separation of the common inorganic anions in 9 min using the AS18 column.
- Hydroxide gradients for inorganic anion and low-molecular-weight organic acids for optimum separations in complex sample matrices.
- Superior retention and quantification of fluoride, acetate, and formate.
- Meets performance requirements specified in U.S. EPA Method 300.0 (A).
- Simplified Reagent-Free™ IC (RFIC™) operation provided by an eluent generator (EG), which requires only a deionized water source to produce hydroxide eluent.
- Eluent suppression using the Anion Self-Regenerating Suppressor (ASRS® 300) or the Anion Capillary Electrolytic Suppressor (ACES™ 300) technology provides RFIC operation with low backgrounds and enhanced analyte sensitivity.
- High capacity: 285 µeq/col. (4 × 250 mm column).

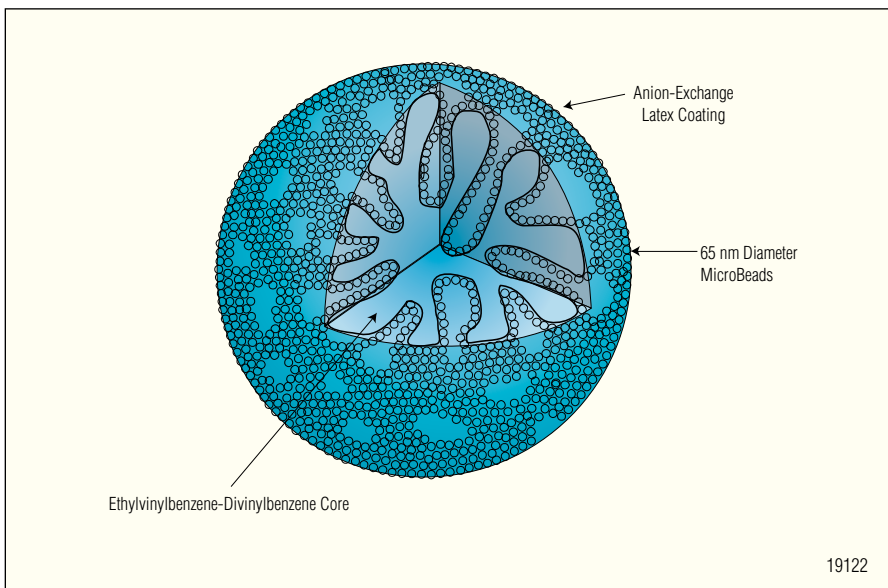


Figure 1. Structure of an IonPac AS18 packing particle.

- Operate at ambient or elevated temperatures. Column selectivity is optimized for a 30 °C operating temperature to ensure reproducible retention times.
- Compatible with organic solvents to enhance analyte solubility, modify column selectivity, or for effective column cleanup.

## High-Efficiency Particle Structure

The IonPac AS18 packing is a unique pellicular structure composed of a highly crosslinked core and a MicroBead™ latex anion-exchange layer attached to the surface, as shown in Figure 1. The substrate for the IonPac AS18 analytical column is a 7.5 µm diameter supermacroporous resin bead, consisting of ethylvinylbenzene crosslinked with 55% divinylbenzene.

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

19122

## Fast IC

The IonPac AS18-Fast is ideal for Fast IC as it is designed to have sufficient capacity to maintain resolution even in a short column format. Fast separations are achieved on any Dionex system at higher flow rates. In a short column format, backpressures produced at higher flow rates are reduced while allowing overall shorter run times. This allows for the determination of anions with high resolution even in drinking, surface, groundwater, and wastewater matrices in under 5 min. Laboratories can achieve higher productivity and increased throughput.

The IonPac AS18-Fast column is suitable for separations requiring higher flow rates for the fast analysis of inorganic anions as shown in Figure 2. The IonPac AS18-Fast column (4 × 150 mm) was operated with the same eluent at 1.0 and 1.5 mL/min. Using a higher flow rate in a shorter column format, the overall run time was reduced to 5 min with optimal resolution of the common inorganic anions.

Using an AS18-Fast 2 × 150 mm column format allows greater linear velocities and reduced eluent consumption compared to a 4 mm format. Figure 3 shows the excellent resolution of the common inorganic anions in wastewater in less than 4 min.

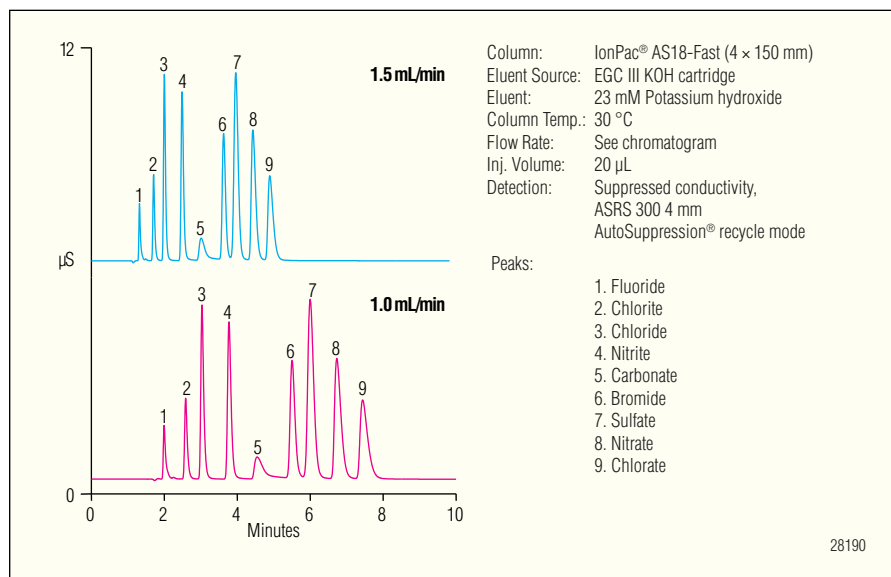


Figure 2. Fast separation of inorganic anions at higher flow rates on the IonPac AS18-Fast column.

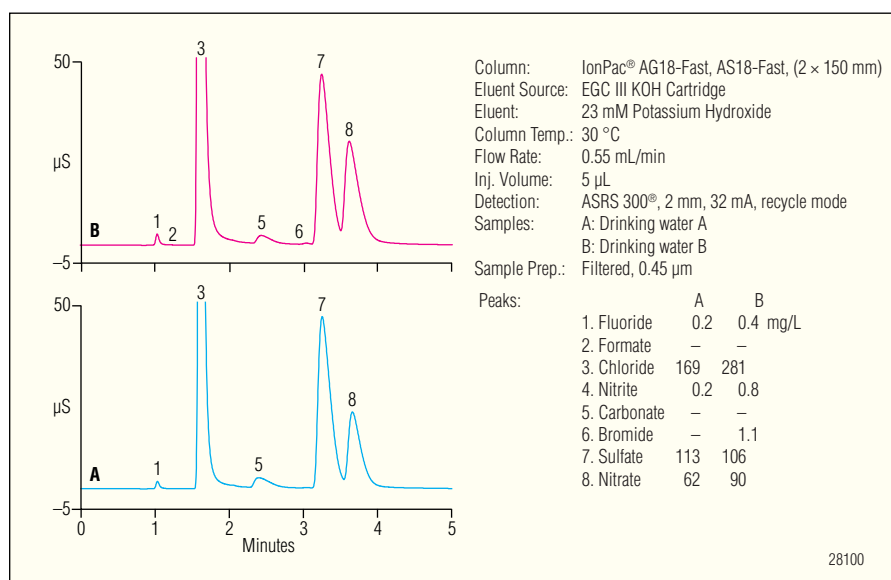


Figure 3. Analysis of two municipal wastewater effluent samples separated using the IonPac AS18-Fast Column.

## Reduced Operating Costs with the AS18 Capillary Format

The AS18 Capillary columns (0.4 × 150 and 0.4 × 250 mm) are packed with the same material as the equivalent analytical scale version, thus producing the same performance as the 4 mm column, but only requires 1/100th the eluent flow rate. With a reduced length of 150 mm, the AS18-Fast column can separate the seven common anions in significantly less time. The capillary format offers the advantage of less eluent consumption providing reduced operating costs. Figure 4 illustrates fast separation of the common inorganic anions in less than 4 min using the AS18-Fast Capillary column.

Figure 5 shows the isocratic separation of inorganic anions, organic acids and oxyhalides using the IonPac AS18 Capillary column (0.4 × 250 mm) with a hydroxide eluent produced by an eluent generator.

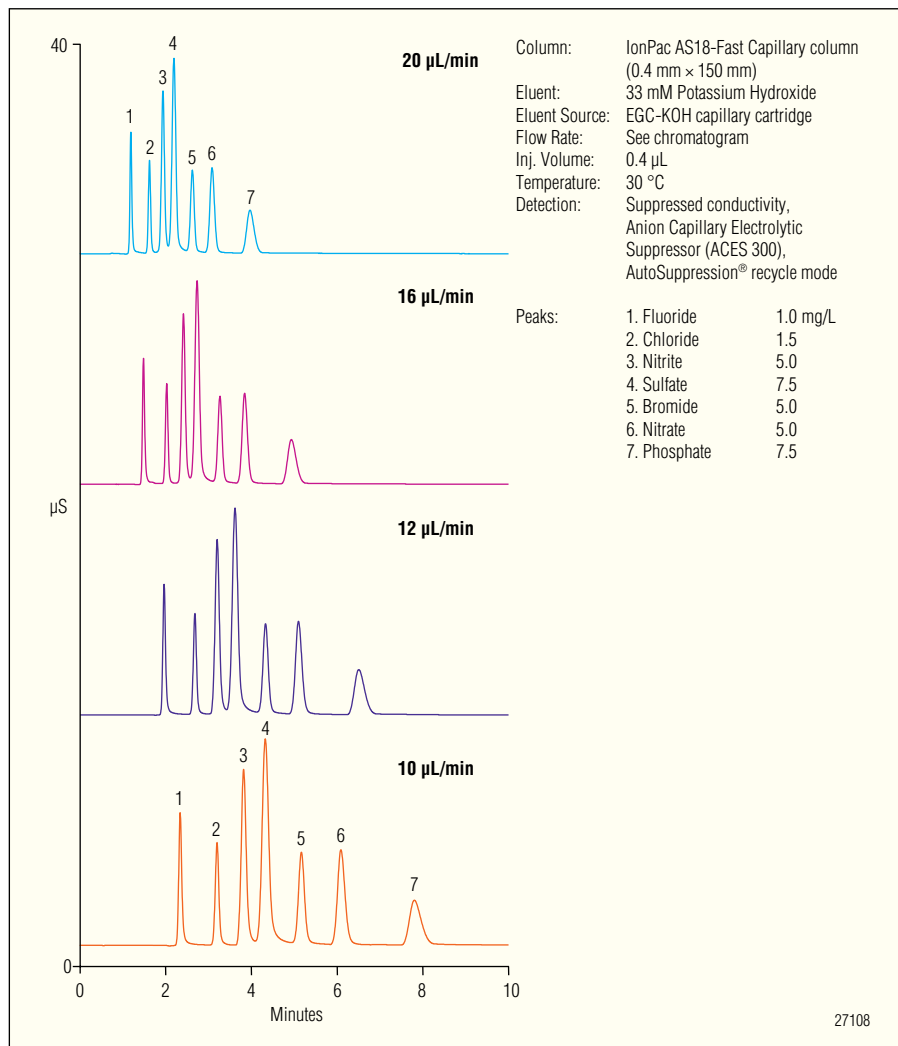


Figure 4. Fast separation of the common inorganic anions using an IonPac AS18-Fast Capillary column.

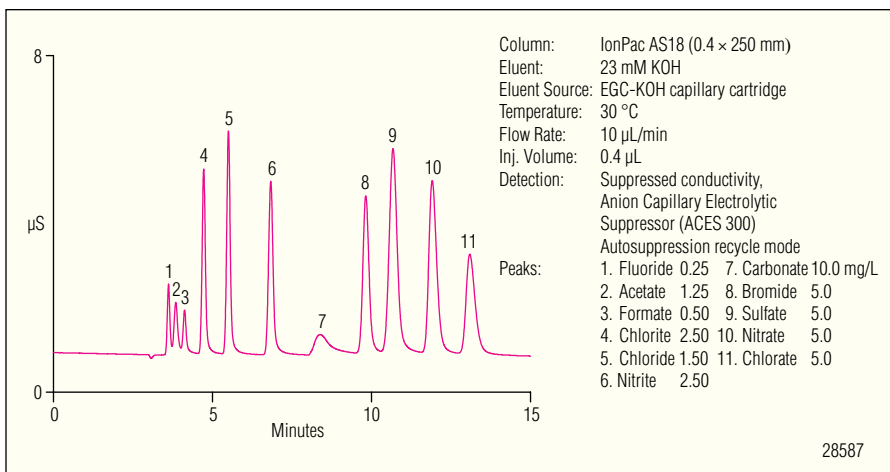


Figure 5. Isocratic separation of inorganic anions, organic acids and oxyhalides using the IonPac AS18 Capillary column (0.4 × 250 mm) with a potassium hydroxide eluent produced by an eluent generator.

## Isocratic Separation of Common Inorganic Anions

The AS18 column easily resolves fluoride, chloride, nitrite, bromide, nitrate, phosphate, and sulfate using an isocratic hydroxide eluent and suppressed conductivity detection. Using 39 mM hydroxide eluent, the common inorganic anions can be separated easily in 9 min, as illustrated in Figure 6. The isocratic hydroxide eluent can be modified to resolve the common inorganic anions, plus low-molecular-weight organic acids and oxyhalides. Figure 7 shows the separation of these analytes eluting in 11 min using an optimized 33 mM potassium hydroxide eluent.

## Hydroxide Gradients for Complex Sample Matrices

The AS18 column can be operated with hydroxide gradients for optimum separation of inorganic anions in complex sample matrices. The IonPac AS18 is an ideal column for compliance monitoring of drinking water and wastewater. The AS18 column meets the requirements of U.S. EPA Method 300.0 Part A. As shown in Figure 8, fluoride is well resolved from the system void and can be determined even at very low concentrations. Low levels of inorganic anions can easily be determined in drinking water using an optimized hydroxide gradient, as illustrated in Figure 8. Wastewater can be a more complex sample than drinking water; however, with the AS18 column, inorganic anions in wastewater can easily be determined using a fast dual-hydroxide gradient, as illustrated in Figure 9.

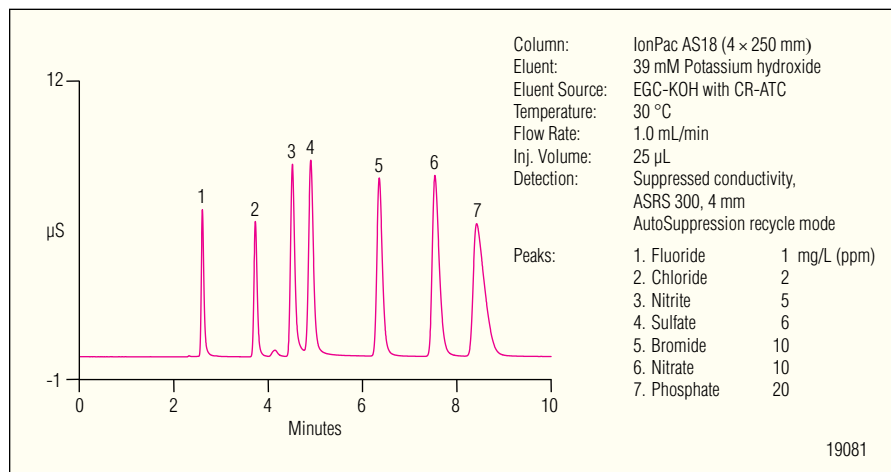


Figure 6. Isocratic separation of the common inorganic anions using the IonPac AS18 column with a 39 mM potassium hydroxide eluent delivered by an EG.

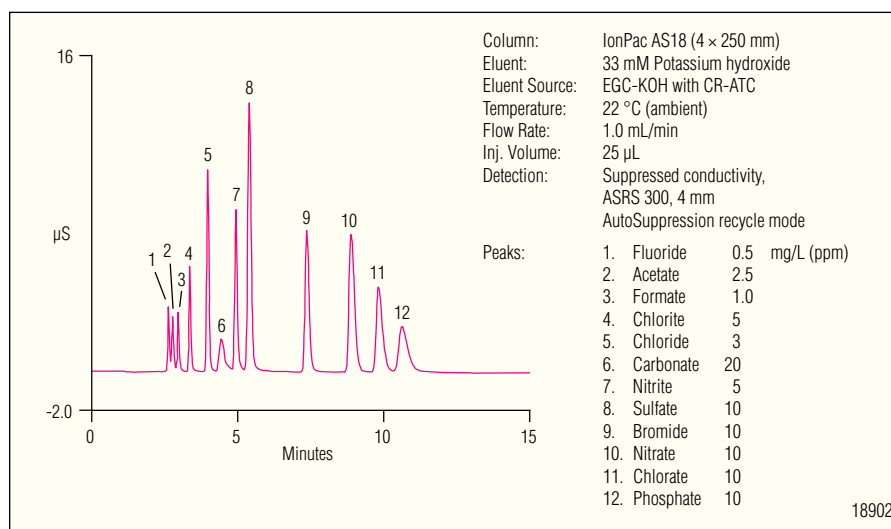


Figure 7. Optimized isocratic separation of the common inorganic anions, plus organic acids and oxyhalides using the IonPac AS18 column with a 33 mM potassium hydroxide eluent delivered by an EG.

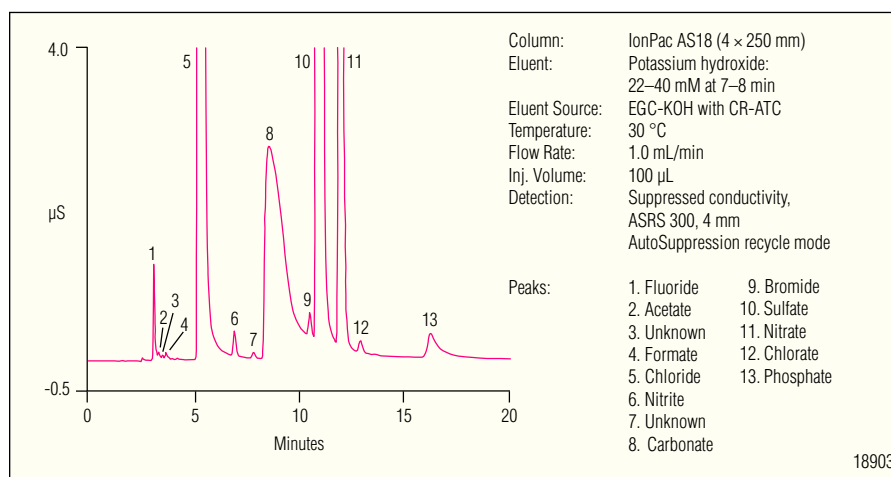


Figure 8. Determination of inorganic anions in a drinking water sample using the IonPac AS18 column with a potassium hydroxide gradient delivered by an EG.

The AS18 column provides excellent separation of a variety of environmental anions, including inorganic anions, oxyhalides (excluding bromate), oxyanions, and organic acids using a potassium hydroxide gradient. With a fast dual-hydroxide gradient, these analytes are easily separated in less than 14 min, as illustrated in Figure 10.

### Gradient Separations as Simple as Isocratic Runs with an Eluent Generator

The IonPac AS18 column is recommended for use in combination with an Eluent Generator (EG). An eluent generator electrolytically produces high-purity hydroxide from water, eliminating the need for eluent preparation. The hydroxide eluent is free of carbonate contamination. Carbonate-free hydroxide eluents minimize baseline shifts during hydroxide gradients, which provide greater retention time reproducibility, lower background conductivity, and lower consistent detection limits for target analytes.

Figure 11 illustrates the determination of anions in a well water sample using a hydroxide gradient with an EG for eluent delivery. A CR-ATC Continuously Regenerated Anion Trap Column was used to remove carbonate from the source water to minimize the baseline shift during the gradient. This sample contains unusually high concentrations of nitrate, which exceed the allowed concentrations in drinking water.

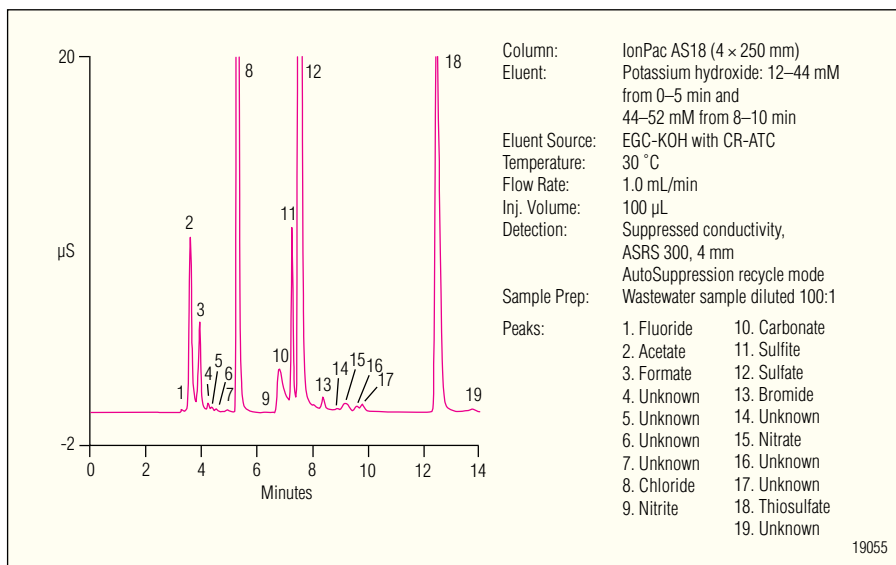


Figure 9. Determination of inorganic anions in a wastewater sample using the IonPac AS18 column with a potassium hydroxide gradient delivered by an EG.

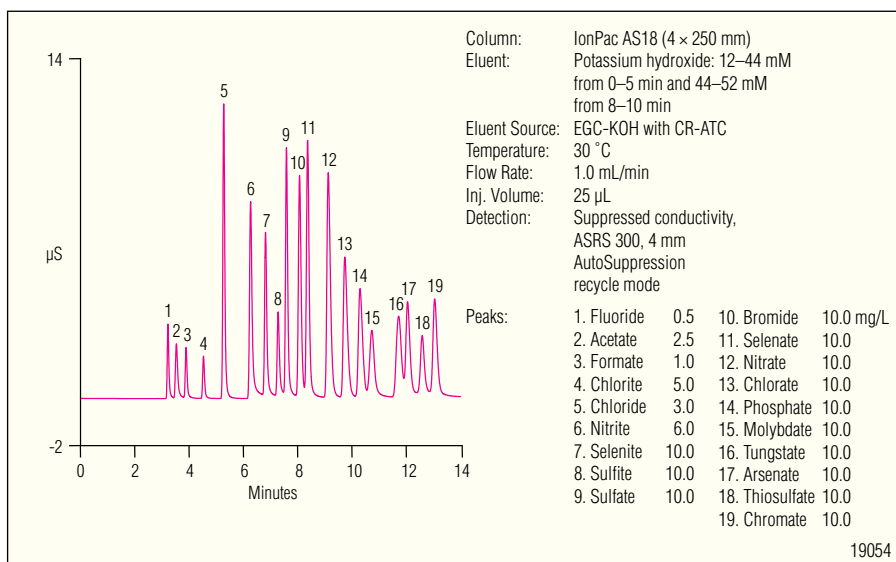


Figure 10. Anion separation including inorganic anions, organic acids, oxyanions, and oxyhalides on an IonPac AS18 column using a hydroxide eluent delivered by an EG.

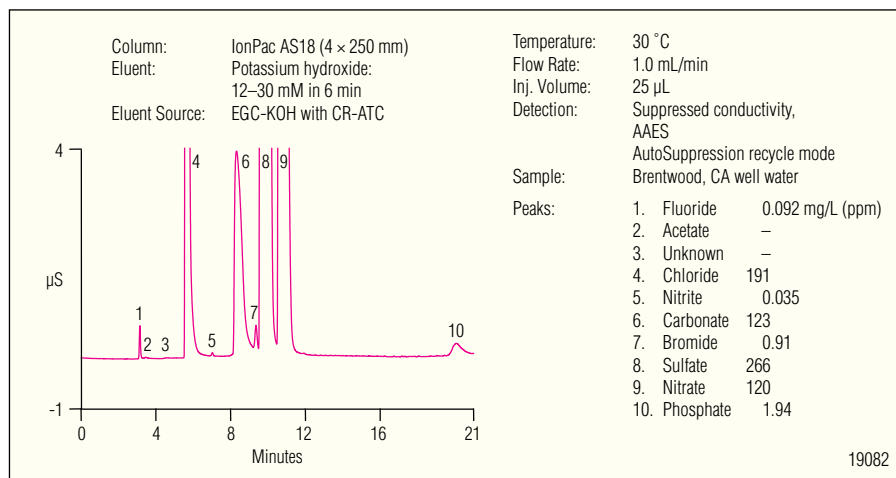


Figure 11. Determination of inorganic anions in a well water sample on the IonPac AS18 column using a hydroxide gradient delivered by an EG.

Figure 12 illustrates the determination of anions in a bottled spring water using a hydroxide gradient using the EG for eluent delivery. This sample contains high concentrations of chloride, carbonate, and sulfate. Acetate and formate were also present in the sample which may be caused by bacterial contamination or may have been added as salts for flavor.

### System Requirements for EGC-KOH Eluent Generation

The AS18 column is recommended for use with the Dionex ICS-2100 or ICS-5000 RFIC systems equipped with an EG. The AS18 Capillary columns must be used with a ICS-5000 capillary system. The AS18 can also be used with older Dionex IC systems equipped with an EG or an 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 IonPac AS18 column should be used with the Anion Self-Regenerating Suppressor, ASRS 300 or the Anion Capillary Electrolytic Suppressor, ACES 300. Operate the IonPac AS18 column at an elevated temperature (30 °C) to ensure reproducible retention times.

### Anion Trap Columns

When using the eluent generator (EG) for eluent delivery, a CR-ATC Continuously Regenerated Anion Trap Column should be installed between the EG cartridge and the EG degas module. As an alternative for 4 mm and 2 mm systems, an ATC-HC column can be installed between the pump outlet and inlet of the EG cartridge in the eluent generator module. Alternatively, when performing sodium hydroxide gradient anion exchange applications on the AS18 using hand-prepared bottled eluents, the ATC-3 Anion Trap Column should be installed between the gradient pump and the injection valve to remove anionic contaminants from the eluent.

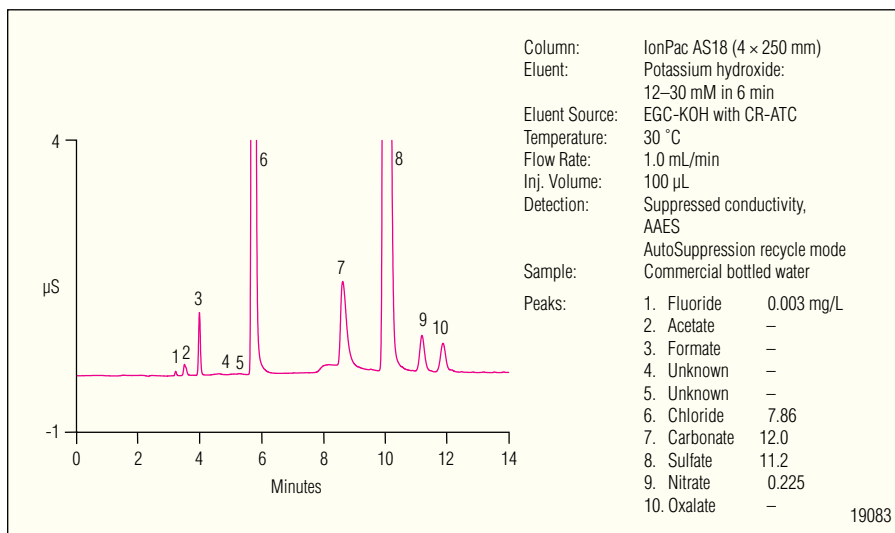


Figure 12. Determination of anions in bottled drinking water using the IonPac AS18 column with a hydroxide gradient delivered by an EG.

## SPECIFICATIONS

### Dimensions:

IonPac AS18 Analytical Column: 2 × 250 mm, 4 × 250 mm  
 IonPac AS18-Fast Analytical Column: 2 × 150 mm, 4 × 150 mm  
 IonPac AS18 Capillary Column: 0.4 × 250 mm  
 IonPac AS18-Fast Capillary Column: 0.4 × 150 mm  
 IonPac AG18 Guard Column: 2 × 50 mm, 4 × 50 mm  
 IonPac AG18-Fast Guard Column: 2 × 30 mm, 4 × 30 mm  
 IonPac AG18 Capillary Guard Column: 0.4 × 50 mm  
 IonPac AG18-Fast Capillary Guard Column: 0.4 × 35 mm

### Maximum Operating Pressure:

4000 psi (Standard or microbore)  
 5000 psi (Capillary)

### Mobile Phase Compatibility:

pH 0–14; 0–100%  
 HPLC solvents

### Substrate Characteristics:

Analytical Column:  
 2 × 250 mm, 4 × 250 mm,  
 2 × 150 mm, 4 × 150 mm,  
 0.4 × 250 mm, 0.4 × 150 mm  
 Super macroporous resin  
 Bead Diameter: 7.5 µm  
 Pore Size: 2000 Å  
 Crosslinking (%DVB): 55%

### Guard Column:

2 × 50 mm, 4 × 50 mm,  
 2 × 30 mm, 4 × 30 mm,  
 0.4 × 35 mm, 0.4 × 50 mm  
 Microporous resin  
 Bead Diameter: 13 µm  
 Pore Size: < 10 Å  
 Crosslinking (%DVB): 55%

### Latex Characteristics:

Functional Group: Alkanol quaternary ammonium ion  
 Latex Crosslinking: Effective crosslinking after functionalization is 8%  
 Latex Diameter: 65 nm  
 Hydrophobicity: Low hydrophobic

### Capacity:

1.71 µeq (0.4 × 150 mm)  
 0.07 µeq (0.4 × 35 mm)  
 171 µeq (4 × 150 mm)  
 6 µeq (4 × 30 mm)  
 45 µeq (2 × 150 mm)  
 1.5 µeq (2 × 30 mm)  
 2.85 µeq/col (0.4 × 250 mm)  
 1.0 µeq/column (0.4 × 50 mm)  
 75 µeq (2 × 250 mm)  
 2.5 µeq (2 × 50 mm)  
 285 µeq (4 × 250 mm)  
 10 µeq (4 × 50 mm)

### Column Construction:

PEEK™ with 10–32 threaded ferrule-style end fittings. All components are nonmetallic.

## Concentrator Columns

For concentrator work with a 2 mm or 4 mm AS18 column, use the IonPac AG18 guard column, UTAC-LP1, UTAC-ULP1, UTAC-XLP1, UTAC-LP2, UTAC-ULP2, or UTAC-XLP2 Ultra Trace Anion Concentrator Columns, TAC-ULP1 Trace Anion Concentrator Column, or TAC-2 Trace Anion Concentrator Column, when a single piston pump such as the AXP pump (pulse damper required) is used for sample delivery. Use the UTAC-LP1, UTAC-LP2 or TAC-LP1 Trace Anion Concentrator Column when the sample is delivered with a syringe or with a low pressure autosampler such as the AS-DV. For concentrator work with a 0.4 mm capillary column, use the AG18 capillary guard column or the IonSwift MAC-100 concentrator column.

## ORDERING INFORMATION

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

Analytical and Guard Columns	Part Numbers
IonPac AS18-Fast Capillary Column (0.4 × 150 mm).....	072062
IonPac AG18-Fast Capillary Guard Column (0.4 × 35 mm).....	072063
IonPac AS18-Fast Analytical Column (4 × 150 mm).....	075760
IonPac AG18-Fast Guard Column (4 × 30 mm).....	075762
IonPac AS18-Fast Analytical Column (2 × 150 mm).....	075759
IonPac AG18-Fast Guard Column (2 × 30 mm).....	075761
IonPac AS18 Capillary Column (0.4 × 250 mm).....	075772
IonPac AG18 Capillary Guard (0.4 × 50 mm).....	075773
IonPac AS18 Analytical Column (4 × 250 mm).....	060549
IonPac AG18 Guard Column (4 × 50 mm).....	060551
IonPac AS18 Analytical Column (2 × 250 mm).....	060553
IonPac AG18 Guard Column (2 × 50 mm).....	060555

### Trap Columns

CR-ATC Continuously Regenerated Anion Trap Column (For use with systems equipped with an Eluent Generator or RFC-30).....	060477
CR-ATC Continuously Regenerated Anion Trap Column (Capillary) (For use with Capillary Anion Columns).....	072078
ATC-3 Anion Trap Column (9 × 24 mm) (for use with 4 mm columns).....	059660
ATC-3 Anion Trap Column (4 × 35 mm) (for use with 2 mm columns).....	079932
ATC-HC Anion Trap Column (for use with the EG).....	059604

### Trace Anion Concentrator

IonSwift MAC-100 Anion Concentrator Column (0.50 × 80 mm).....	074702
TAC-LP1 Trace Anion Concentrator (4 × 35 mm).....	046026
UTAC-LP1 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm).....	063079
UTAC-ULP1 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 2mm).....	063475
UTAC-XLP1 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm).....	063459
UTAC-LP2 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm).....	079917
UTAC-ULP2 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm).....	079918
UTAC-XLP2 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm).....	072781

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