

The IonPac® AS19 high-capacity, hydroxide-selective, anion-exchange column is designed for the analysis of oxyhalides and common inorganic anions, including fluoride, chlorite, bromate, chloride, nitrite, chlorate, bromide, nitrate, sulfate, and phosphate in drinking water, groundwater, wastewater, and other diverse sample matrices.

The AS19 column meets the performance requirements specified in U.S. EPA Methods 300.0 and 300.1 for the determination of oxyhalide byproducts from the disinfection of drinking water. The AS19 column allows the analysis of most drinking water disinfected with ozone, without the use of sample pretreatment or preconcentration. Formats available range from 0.4 to 4 mm, allowing use of capillary to analytical flow rates, and supporting advanced IC × IC applications.

### Superior Chromatographic Performance

- Formats available include 0.4, 2, and 4 mm, supporting capillary to analytical flow rates.
- Recommended column for trace bromate in drinking water matrices using a potassium hydroxide gradient with suppressed conductivity detection.
- Capacity of 240 µeq per column (4 × 250 mm).
- AS19 Capillary column offers reduced eluent consumption and reduced operating costs.
- Simplified Reagent-Free™ IC (RFIC™) operation provided by the eluent generator. Requires only a deionized water source to produce potassium hydroxide eluent.

- Eluent suppression using the ASRS® 300 or ACES™ 300 system provides RFIC operation with low background and enhanced analyte sensitivity.
- Selectivity of the AS19 column ensures that bromate, a toxic byproduct in ozone disinfection, can be quantified at low-µg/L concentrations using suppressed conductivity detection, even in the presence of very high concentrations of chloride, sulfate, and carbonate.
- Operates at ambient or elevated temperatures. Column selectivity is optimized for operation at 30 °C to ensure reproducible retention times in all environmental conditions.
- Compatible with organic solvents to enhance analyte solubility, modify column selectivity, or allow effective column cleanup.

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## High-Efficiency Particle Structure

The IonPac AS19 column is a new advancement in Dionex polymer bonding technology and uses a high-capacity resin with optimized selectivity for bromate and bromide. The stationary phase consists of a novel hyperbranched anion-exchange condensation polymer, electrostatically attached to the surface of a wide-pore polymeric substrate. The substrate is surface-sulfonated in exactly the same manner as Dionex latex-coated anion-exchange materials; however, in this anion-exchange resin, alternating treatments of epoxy monomer and amines produce a coating that grows directly off the surface of the substrate, as illustrated in Figure 1. The number of alternating coating cycles controls the capacity of the resin. The resulting polymer is extremely hydrophilic and therefore has excellent selectivity for hydroxide eluents, allowing the use of lower eluent concentrations.

## AS19 Capillary Format

The AS19 Capillary column (0.4 × 250 mm) is packed with the same material as the equivalent standard bore version (producing the same performance as a 4 mm column), but requires only 1/100<sup>th</sup> the eluent flow rate. The capillary format offers the advantage of less eluent consumption providing reduced operating costs. Figure 2 illustrates the separation of 22 environmental anions using the AS19 capillary column. Excellent retention time reproducibility can be achieved with the capillary format.

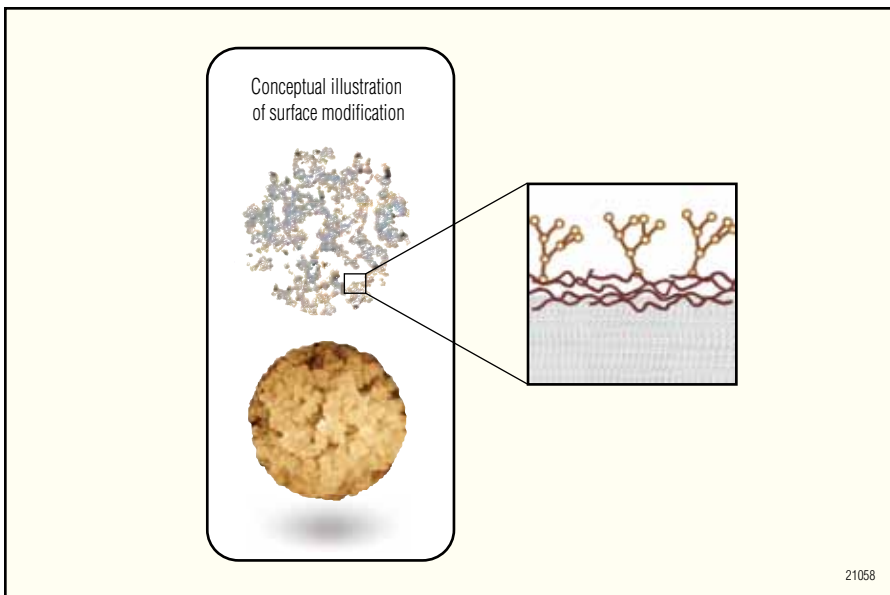


Figure 1. Preparation and anatomy of AS19 resin.

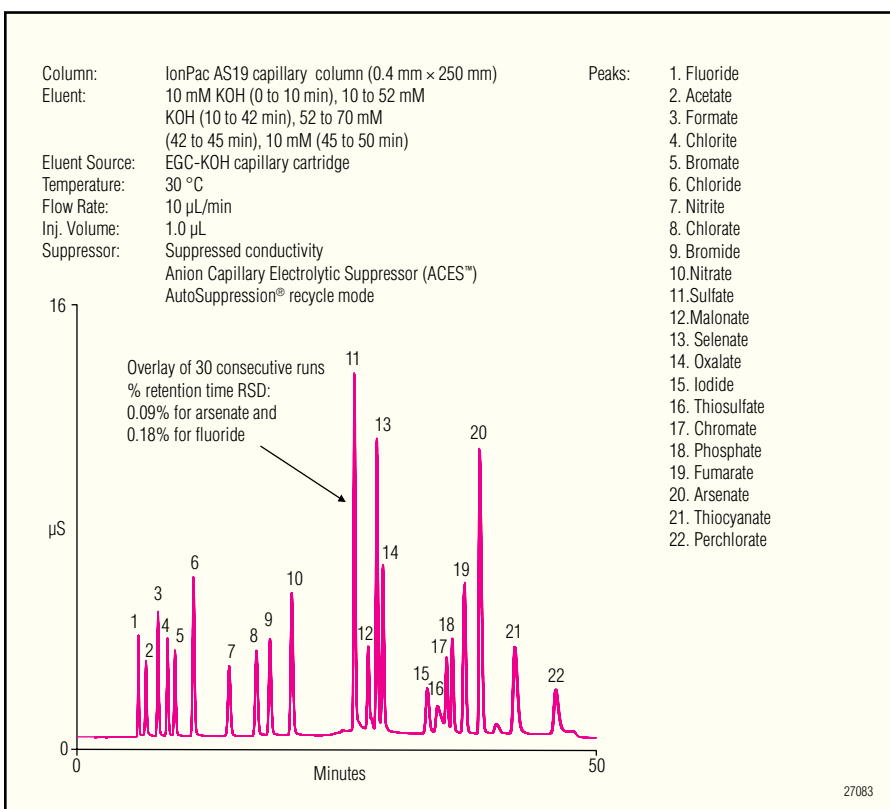


Figure 2. Separation of 22 anions on an IonPac AS19 capillary column.

## Determination of Trace Bromate in Drinking Water Matrices

The high-capacity IonPac AS19 column can be used to determine bromate at low- $\mu\text{g/L}$  concentrations in drinking water matrices. Bromate, a byproduct of the ozonation disinfection process for drinking water, has been cited by the EPA and the World Health Organization as a potential carcinogen, even at low- $\mu\text{g/L}$  concentrations. Treatment plants that use ozone for disinfection are required to monitor bromate, at an MCL of  $10 \mu\text{g/L}$ , in addition to the common inorganic anions. The AS19 column does not require sample pretreatment or preconcentration. This method uses a large-loop injection with a potassium hydroxide gradient coupled with suppressed conductivity detection, as illustrated in Figures 3 and 4.

## Gradient Separations as Simple as Isocratic Runs with the Eluent Generator and RFIC

The IonPac AS19 column is recommended for use with eluent generation and RFIC-EG™ systems. The eluent generator (EG) electrolytically produces high-purity potassium hydroxide eluent from water, eliminating the need for eluent preparation. The potassium hydroxide eluent is free of carbonate contamination. Carbonate-free hydroxide eluents minimize baseline shifts during hydroxide gradients, which provides greater retention time reproducibility, lower background conductivity, and lower detection limits for target analytes.

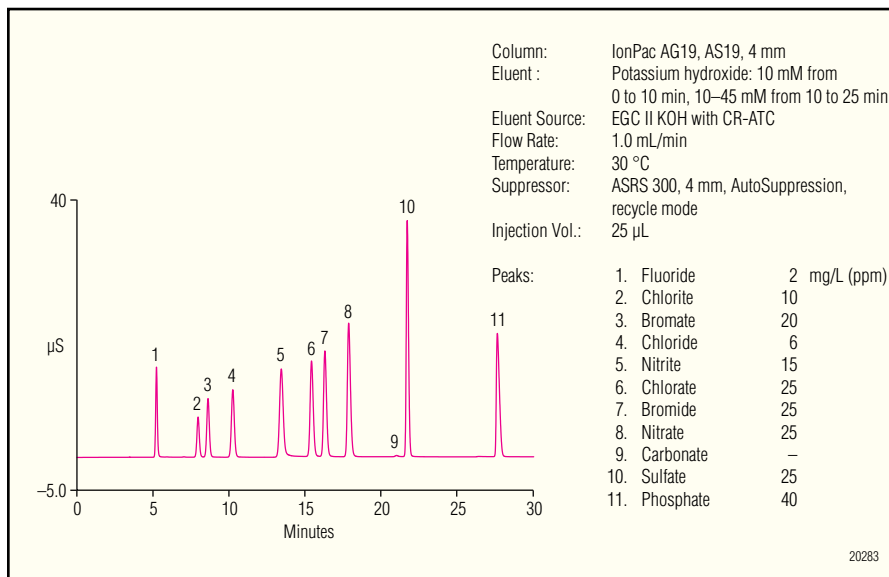


Figure 3. Determination of oxhalides and common inorganic anions using the AS19 column.

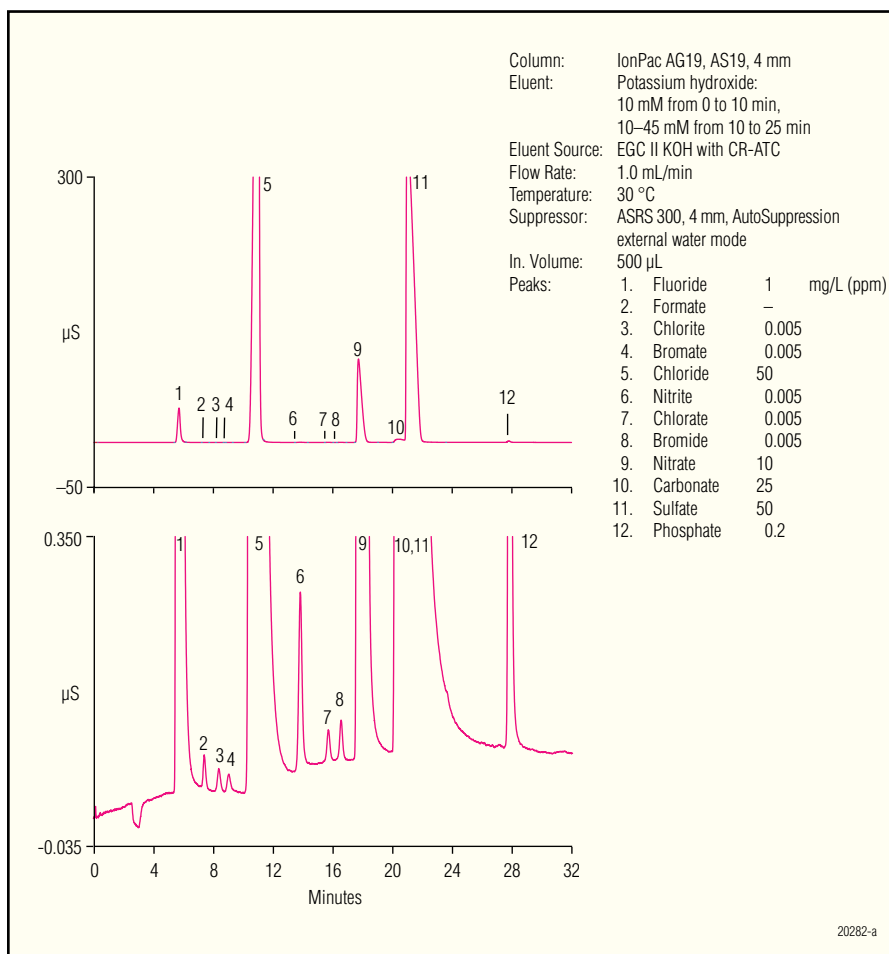


Figure 4. Determination of trace concentration of bromate in simulated drinking water using the AS19 column with a large-loop injection.

The separation of 23 environmental anions using a potassium hydroxide gradient with the EGC II KOH for eluent delivery is demonstrated in Figure 5. A continuously regenerated anion-trap column (CR-ATC) was used to remove carbonate from the source water to minimize the baseline shift during the gradient.

### System Recommendations

The AS19 column is recommended for use with the Dionex ICS-2100 or ICS-5000 IC systems equipped with an EG. The AS19 column can 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 economy, the AS19 column is used with the ASRS 300 or ACES 300 Anion Suppressor. Operate the AS19 at an elevated temperature (30 °C) to ensure reproducible retention times.

### Anion Trap Columns

When using the EG for eluent delivery, a CR-ATC column should be installed between the EluGen® cartridge and the EG degas module. An alternative for 4 mm and 2 mm systems is to use an ATC-HC column that can be installed between the pump outlet and inlet of the EluGen cartridge in the eluent generator module.

When performing sodium hydroxide-gradient anion-exchange applications on the AS19 analytical column using hand-prepared bottled eluents, the ATC-3 should be installed between the gradient pump and the injection valve to remove anionic contaminants from the eluent.

### Concentrator Columns

For concentrator work, when a single piston pump such as the AXP pump (pulse damper required) is used for sample delivery, use the IonPac AG19 guard column, ultratrace anion concentrator columns (UTAC-LP1, UTAC-ULP1, UTAC-XLP1, UTAC-LP2, UTAC-ULP2, or UTAC-XLP2), or the trace anion concentrator columns (TAC-ULP1 or TAC-2). Use the UTAC-LP1, UTAC-LP2 or the TAC-LP1 when the sample is delivered with a syringe or with a low-pressure auto-sampler such as the AS-DV.

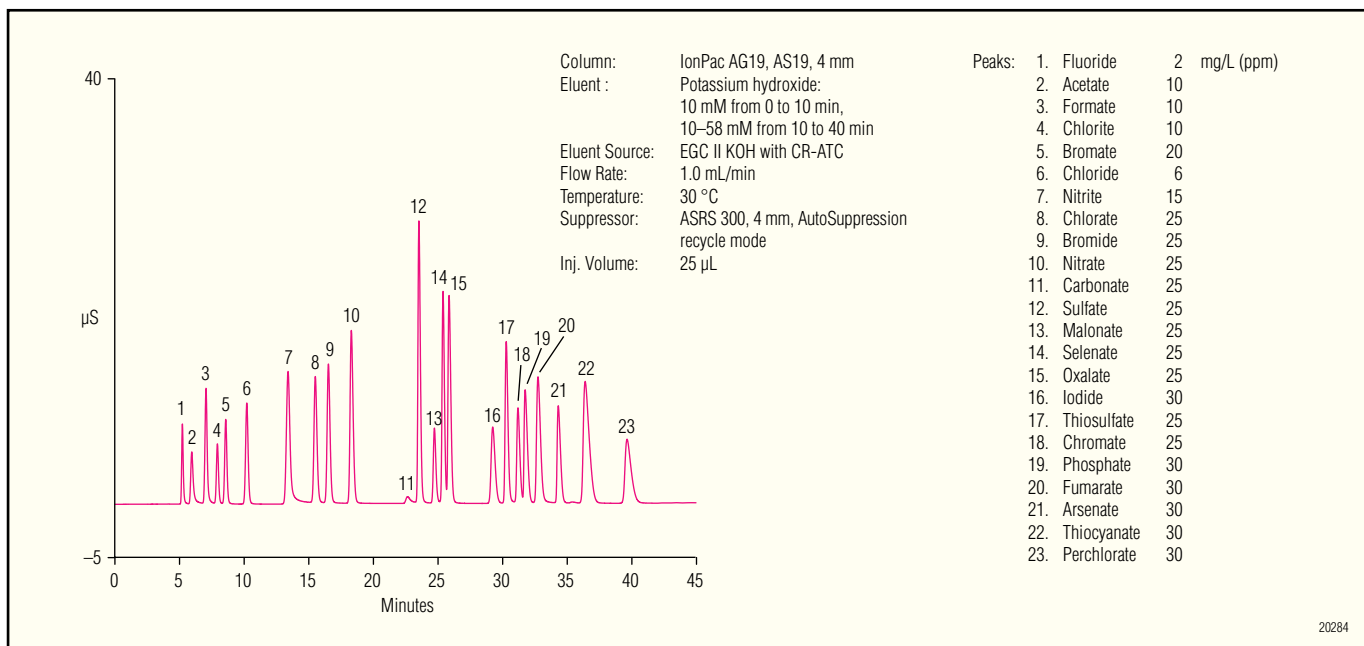


Figure 5. Determination of inorganic anions, oxyhalides, organic acids, and oxyanions using the IonPac AS19 column using a potassium hydroxide gradient delivered by eluent generator.

## SPECIFICATIONS

### Dimensions:

#### IonPac AS19 Analytical Column:

2 × 250 mm, 4 × 250 mm

#### IonPac AS19 Capillary Column:

0.4 × 250 mm

#### IonPac AG19 Guard Column:

2 × 50 mm, 4 × 50 mm

#### IonPac AG19 Capillary Guard Column:

0.4 × 50 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:

Supermacroporous Resin

Bead Diameter (µm): 7.5 µm

Pore Size: 2000 Å

Crosslinking (%DVB): 55%

#### Guard Column:

Microporous Resin

Bead Diameter (µm): 11 µm

Pore Size: < 1 Å

Crosslinking (%DVB): 55%

### Ion-Exchange Group:

Functional Group: Alkanol

quaternary ammonium ion

### Functional Group Characteristics:

Hydrophobicity: Low hydrophobic

### Capacity:

2.4 µeq (0.4 × 250 mm column)

0.06 µeq (0.4 × 50 mm column)

60 µeq (2 × 250 mm column)

1.5 µeq (2 × 50 mm column)

240 µeq (4 × 250 mm column)

6 µeq (4 × 50 mm column)

### Column Construction:

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

## 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 Number
IonPac AS19 Capillary Column (0.4 × 250 mm) .....	072064
IonPac AG19 Capillary Guard Column (0.4 × 50 mm) .....	072065
IonPac AS19 Analytical Column (4 × 250 mm) .....	062885
IonPac AG19 Guard Column (4 × 50 mm) .....	062887
IonPac AS19 Analytical Column (2 × 250 mm) .....	062886
IonPac AG19 Guard Column (2 × 50 mm) .....	062888

### Trap Columns

CR-ATC Continuously Regenerated Anion Trap Column (for use with systems equipped with an eluent generator or RFC-30 Reagent-Free Controller) .....	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) .....	059661
ATC-HC Anion Trap Column (for use with the EG) .....	059604

### Trace Anion Concentrator Columns

TAC-LP1 Trace Anion Concentrator (4 × 35 mm) .....	046026
TAC-ULP1 Trace Anion Concentrator (5 × 23 mm) .....	061400
UTAC-LP1 Ultra Trace Anion Concentrator Low Pressure (4 × 35 mm) .....	063079
UTAC-ULP1 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm) .....	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) .....	072779
UTAC-ULP2 Ultra Trace Anion Concentrator Ultra Low Pressure (5 × 23 mm) .....	072780
UTAC-XLP2 Ultra Trace Anion Concentrator Extremely Low Pressure (6 × 16 mm) .....	072781

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