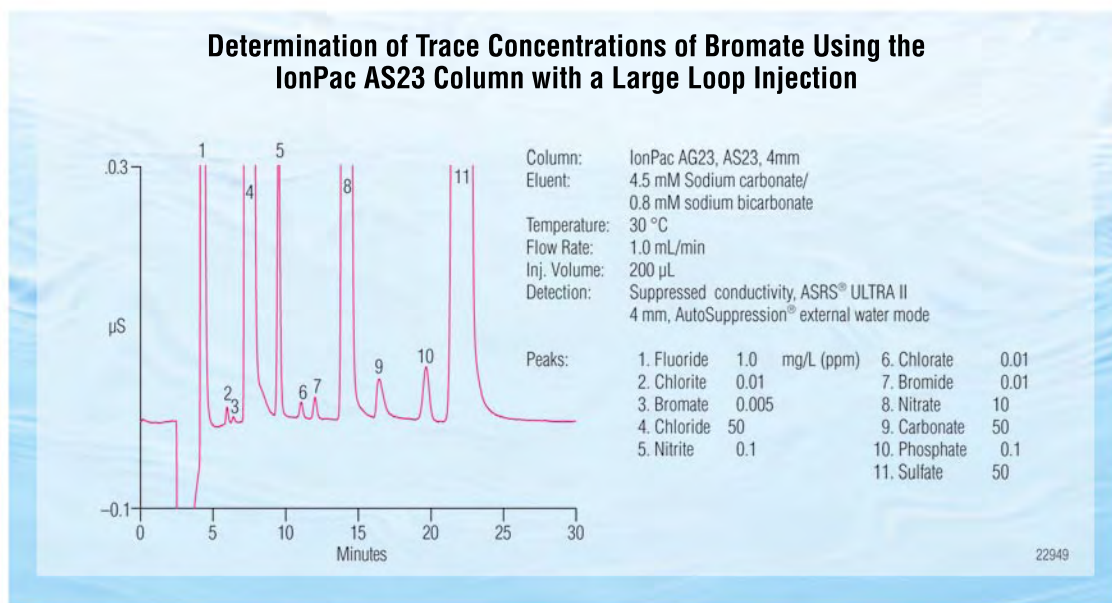


## IonPac® AS23 Anion-Exchange Column



The IonPac AS23 high-capacity, carbonate based anion-exchange column is designed for the analysis of oxyhalides and the common inorganic anions including fluoride, chlorite, bromate, chloride, nitrite, chlorate, bromide, nitrate, phosphate, and sulfate in drinking water, groundwater, wastewater, and other diverse sample matrices. The key application for the IonPac AS23 anion exchange column is determination of trace bromate in drinking water matrices using an isocratic carbonate/bicarbonate eluent with suppressed conductivity detection. The AS23 column can be used in combination with Dionex Eluent Generators and the Electrolytic pH Modifier (EPM) which automatically produce potassium carbonate/bicarbonate eluents from water.

### Meets Regulatory Requirements

The IonPac AS23 column meets the performance requirements specified in U.S. EPA Methods 300.0 and 300.1 for the determination of oxyhalides produced as by-products in disinfection of drinking water. The selectivity of the AS23 ensures that bromate, a toxic by-product 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. The AS23 allows the analysis of most drinking water, disinfected with ozone, without the use of sample pretreatment or preconcentration. Solvent compatibility permits easy column cleanup after the analysis of samples with hydrophobic components.

### Superior Chromatographic Performance

- Recommended carbonate based anion-exchange column for trace bromate in drinking water matrices.
- Optimized isocratic carbonate/bicarbonate eluent for the separation of oxyhalides and inorganic anions in a variety of sample matrices.
- Carbonate peak well resolved from common inorganic anions and oxyhalides.
- Meets performance requirements specified in U.S. EPA Methods 300.0 and 300.1.
- Ideal alternative for AS9-HC oxyhalide and inorganic anion applications.
- Simplified Reagent-Free™ Ion Chromatography (RFIC™) System operation provided by Dionex Eluent Generators and EPM, which require only a deionized water source to produce potassium carbonate/bicarbonate eluent.

Now sold under the  
Thermo Scientific brand

**Thermo**  
SCIENTIFIC



Passion. Power. Productivity.

- Simple, accurate eluent preparation with the AS23 Eluent Concentrate— just dilute in deionized water and start operation.
- Eluent suppression using the ASRS ULTRA or AAES® technology provides Reagent-Free IC operation with low backgrounds and enhanced analyte sensitivity.
- High Capacity: 320 µeq/col. (4 × 250 mm column).
- Operate at ambient or elevated temperatures. Column selectivity is optimized for a 30 °C operating temperature to ensure reproducible retention times in all environmental conditions.
- Compatible with organic solvents to enhance analyte solubility, modify column selectivity, or for effective column cleanup.

### High Efficiency Particle Structure

The IonPac AS23 column was developed using a unique polymer bonding technology. The stationary phase consists of a novel hyper-branched 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 is common in Dionex latex coated anion exchange materials. However, in this anion-exchange resin, alternating treatments of epoxy monomer and amines produce a coating which is grown directly off the substrate surface as illustrated in Figure 1. Resin capacity is controlled through the number of alternating coating cycles. The AS23 uses a high-capacity resin (320 µeq/column) with optimized selectivity for the oxyhalides and common inorganic anions in diverse sample matrices.

### Determination of Oxyhalides and Inorganic Anions in Diverse Sample Matrices

The IonPac AS23 is designed for the separation of oxyhalides and the common inorganic anions in a variety of sample matrices. These analytes can easily be separated in approximately 23 min using an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection as shown in Figure 2.

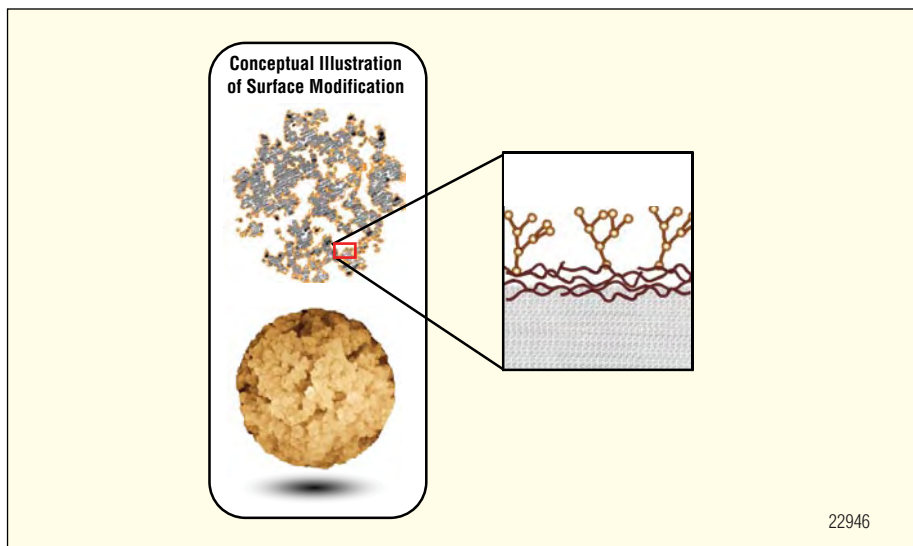


Figure 1. Structure of an IonPac AS23 packing particle.

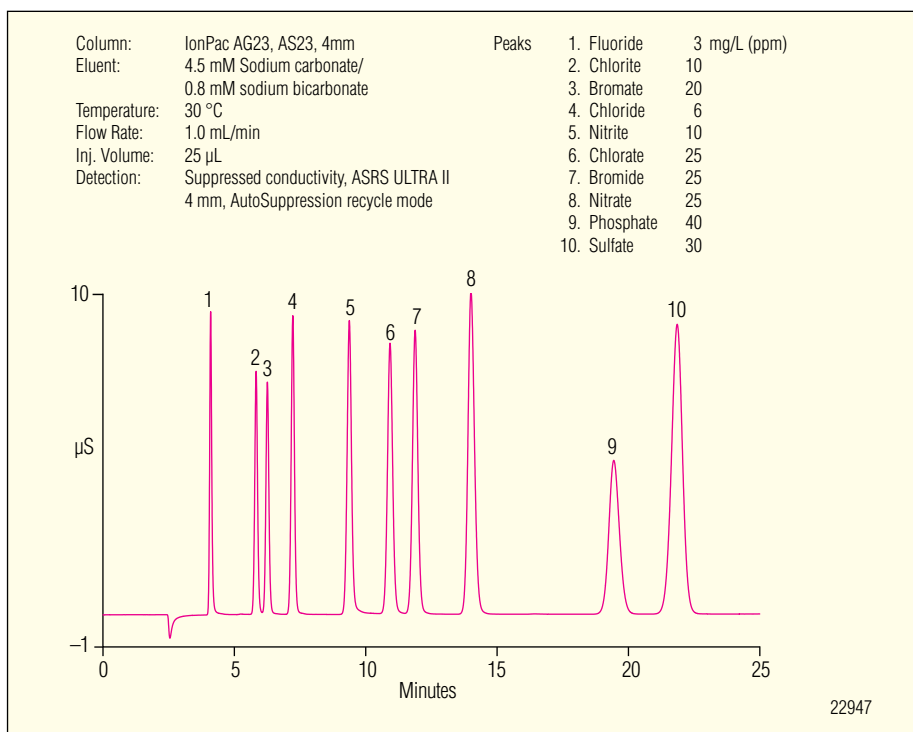


Figure 2. Determination of oxyhalides and inorganic anions on an IonPac AS23 column.

Figure 3 shows the separation of the oxyhalides and the common inorganic anions in a municipal drinking water sample. The high capacity and selectivity allows for the separation of nitrate from carbonate even in the presence of high concentrations (over 300 mg/L) of carbonate.

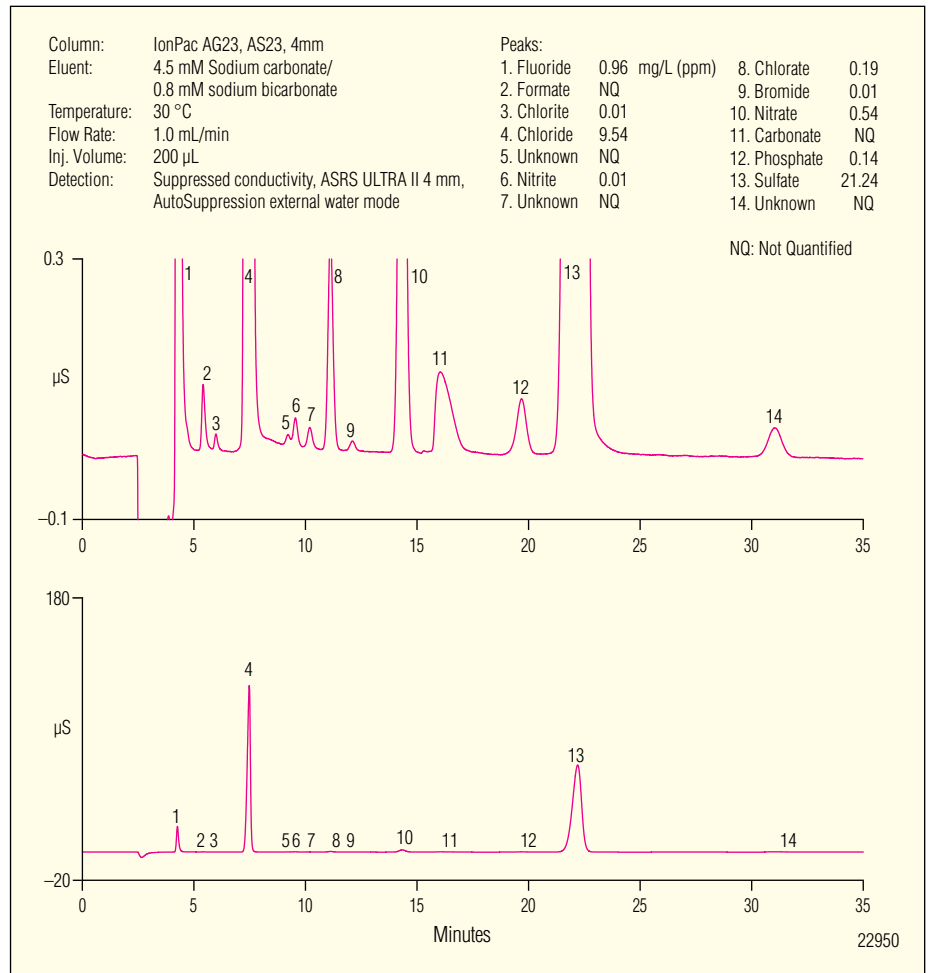


Figure 3. Determination of oxyhalides and inorganic anions in a municipal drinking water sample using an IonPac AS23 column.

Figure 4 shows the separation of inorganic anions, oxyhalides, and organic acids in a chemical plant wastewater sample. Low levels of inorganic anions can easily be determined even in the presence of high levels of sulfate, chlorate, and formate.

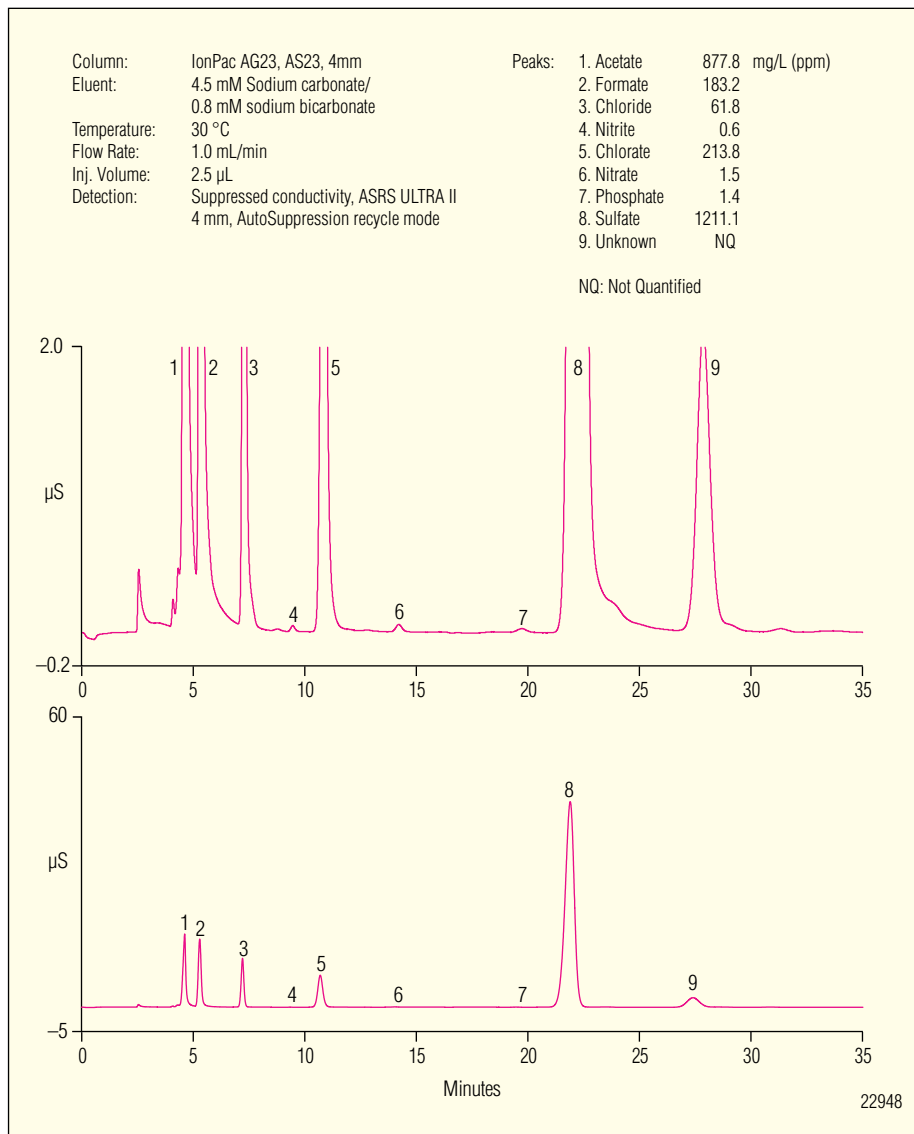


Figure 4. Separation of inorganic anions, oxyhalides, and organic acids in a chemical wastewater sample using an IonPac AS23 column.

## Determination of Trace Bromate in Drinking Water Matrices

The high capacity IonPac AS23 column can easily determine bromate at low  $\mu\text{g/L}$  concentrations in drinking water matrices. Bromate, a disinfection by-product of the ozonation disinfection process for drinking water, has been cited by the U.S. 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, with a MCL of  $10 \mu\text{g/L}$ , plus the common inorganic anions. The AS23 allows the analysis of most drinking water, disinfected with ozone, without the use of sample pretreatment or preconcentration. This method uses a large-loop injection with an isocratic carbonate/bicarbonate eluent coupled with suppressed conductivity detection as shown in Figure 5.

## Extended Application Capabilities

The unique selectivity and high capacity of the AS23 column make it an ideal column for methods development of specialized anion applications. The AS23 column provides excellent separation of a variety of environmental anions including inorganic anions, oxyhalides, oxyanions, and organic acids using potassium hydroxide eluent. With a hydroxide gradient, these analytes are easily separated in less than 35 min as shown in Figure 6.

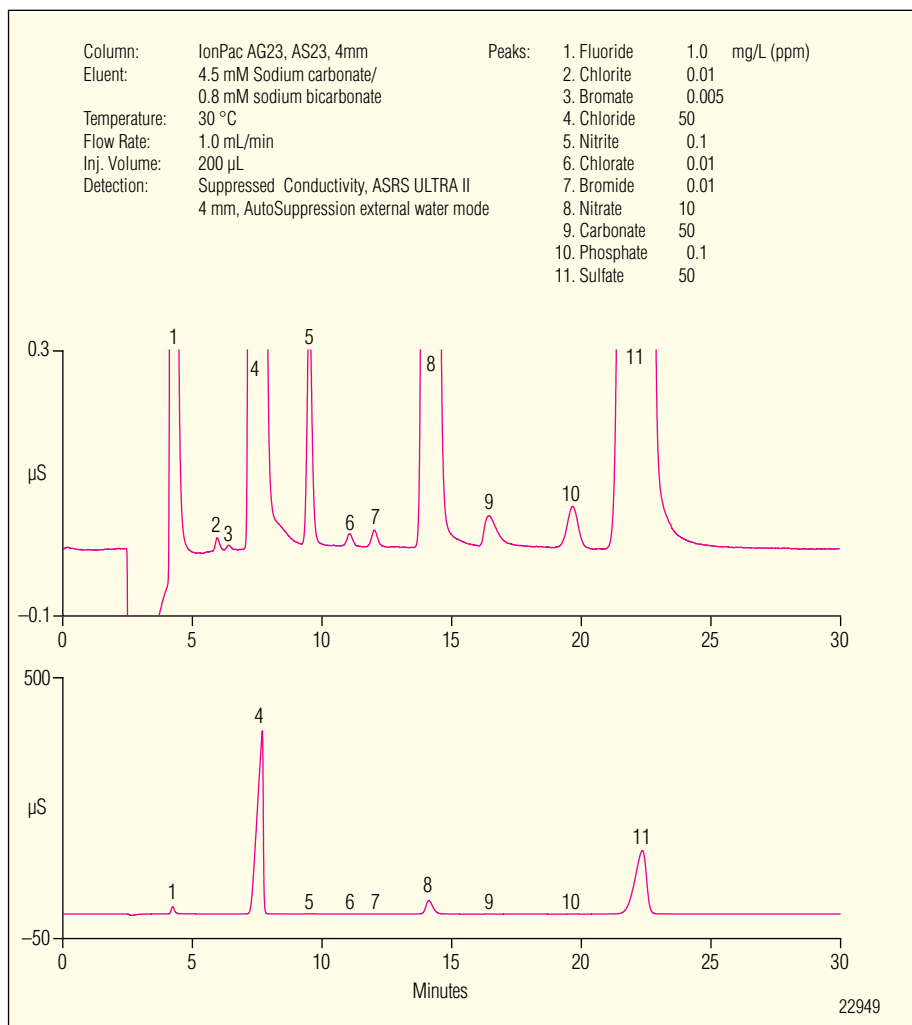


Figure 5. Determination of trace concentrations of bromate using the IonPac AS23 column with a large-loop injection.

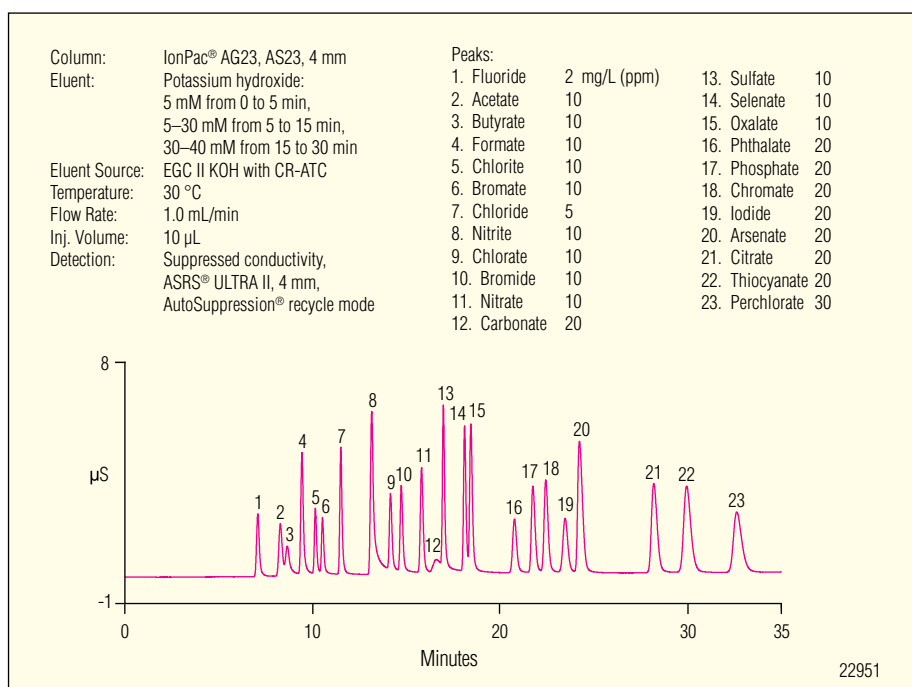


Figure 6. Anion separation including inorganic anions, organic acids, oxyanions, and oxyhalides on an IonPac AS23 column using a potassium hydroxide eluent delivered by an eluent generator.

## SPECIFICATIONS

### Dimensions:

IonPac AS23 Analytical Column:  
2 × 250 mm and 4 × 250 mm  
IonPac AG23 Guard Column:  
2 × 50 mm and 4 × 50 mm

### Maximum Operating Pressure:

3000 psi

### Mobile Phase Compatibility:

pH 0–14; 0–100% HPLC solvents

### Substrate Characteristics:

Analytical Column:  
Supermacroporous resin  
Bead Diameter (µm): 6.0 µm  
Pore Size: 2000 Å  
Cross-linking (%DVB): 55%

### Guard Column:

Microporous resin  
Bead Diameter (µm): 11 µm  
Pore Size: <1 Å  
Cross-linking (%DVB): 55%

### Ion Exchange Group:

Functional Group: Alkanol quaternary ammonium ion

### Functional Group Characteristics:

Hydrophobicity: Ultralow hydrophobic

### Capacity:

80 µeq (2 × 250 mm column)  
1.5 µeq (2 × 50 mm column)  
320 µeq (4 × 250 mm column)  
6.0 µeq (4 × 50 mm column)

### Column Construction:

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

## ORDERING INFORMATION

### System Requirements for EGC-K<sub>2</sub>CO<sub>3</sub>/KHCO<sub>3</sub> Eluent Generation

For K<sub>2</sub>CO<sub>3</sub>/KHCO<sub>3</sub> eluents generated using the EGC-K<sub>2</sub>CO<sub>3</sub> cartridge and the EPM, use with ICS-2000 or ICS-3000 IC Systems equipped with an Eluent Generator. The Eluent Generator is used to automatically produce potassium carbonate/bicarbonate eluents from deionized water. The EGC-K<sub>2</sub>CO<sub>3</sub> cartridge can only be controlled using Chromeleon® 6.6 and subsequent Chromeleon releases.

### Suppressor Recommendations

For optimum ease-of-use and economy, the IonPac AS23 column should be used with the ASRS Anion Self-Regenerating Suppressor®, ASRS ULTRA II or the Anion Atlas® Electrolytic Suppressor, AAES. It is recommended to operate the IonPac AS23 column at an elevated temperature (30 °C) to ensure reproducible retention times.

### Concentrator Columns

For concentrator work, use the IonPac AG23 guard column, UTAC-LP1, UTAC-ULP1 or UTAC-XLP1 Ultra Trace Anion Concentrator Columns, TAC-LP1 or TAC-ULP1 Trace Anion Concentrator Column, TAC-2 Trace Anion Concentrator Column, or AMC-1 Anion MicroConcentrator when a single piston pump such as the DQP or DXP pump (pulse damper required) is used for sample delivery. Use the UTAC-LP1 Ultra Trace Anion Concentrator Column or TAC-LP1 Trace Anion Concentrator Column when the sample is delivered with a syringe or with a low pressure autosampler such as the AS40.

IonPac AS23 Analytical Column (4 × 250 mm) .....	P/N 064149
IonPac AG23 Guard Column (4 × 50 mm) .....	P/N 064147
IonPac AS23 Analytical Column (2 × 250 mm) .....	P/N 064145
IonPac AG23 Guard Column (2 × 50 mm) .....	P/N 064143
AMC-1 Anion MicroConcentrator (2 × 15 mm) .....	P/N 051760
TAC-2 Trace Anion Concentrator (3 × 35 mm) .....	P/N 043101
TAC-LP1 Low Pressure Trace Anion Concentrator (4 × 35 mm) .....	P/N 046026
TAC-ULP1 Ultra Low Pressure Trace Anion Concentrator (5 × 23 mm) .....	P/N 061400
UTAC-LP1 Ultra Trace Anion Concentrator—Low Pressure (4 × 35 mm) .....	P/N 063079
UTAC-ULP1 Ultra Trace Anion Concentrator—Ultra Low Pressure (5 × 23 mm) .....	P/N 063475
UTAC-XLP1 Ultra Trace Anion Concentrator—Extremely Low Pressure (6 × 16 mm) .....	P/N 063459
AS23 Sodium Carbonate/Bicarbonate Eluent Concentrate (250 mL of 100X concentrate).....	P/N 064161

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