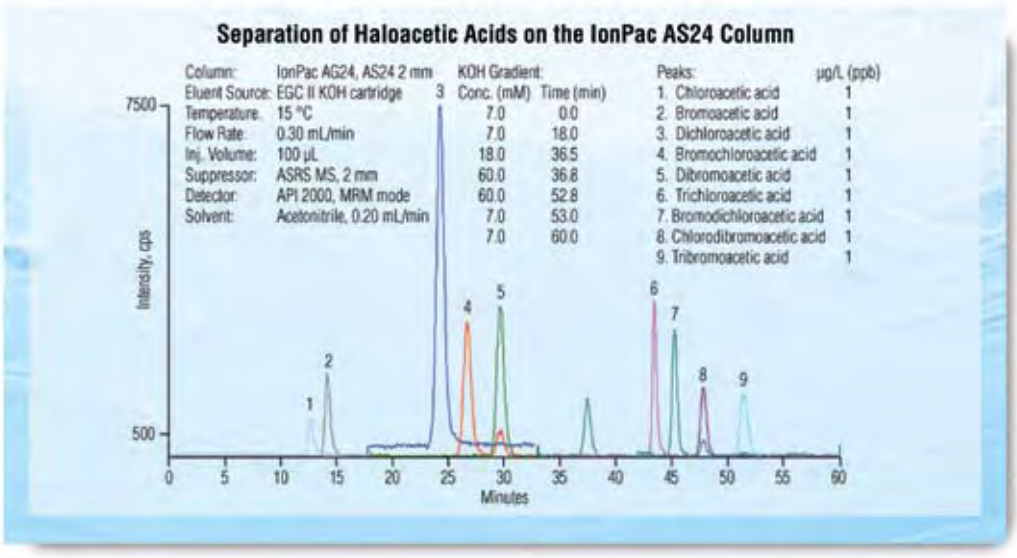
columns

IonPac AS24 Anion-Exchange Column



The IonPac® AS24 is a high-capacity, hydroxide-selective anion exchange column designed for separation of haloacetic acids (HAAs) and bromate in drinking water prior to detection with mass spectrometry. The IonPac AS24 2 × 250 mm column format was specifically developed for use with MS or MS/MS, and is specified in U.S. EPA Method 557. This column can also be used for determination of trace bromate using two-dimensional ion chromatography, and it is ideal for development of specialized applications using Reagent Free Ion Chromatography (RFIC™) systems with gradient elution.

Now sold under the Thermo Scientific brand

Thermo SCIENTIFIC

Superior Chromatographic Performance

- Recommended anion-exchange column for separation of haloacetic acids prior to MS or MS/MS detection
- Optimized for hydroxide mobile phases
- High capacity: 140 µeq per column. (2 × 250 mm column)
- Determine HAAs in high-ionic strength matrices without sample pretreatment
- Can operate at ambient or elevated temperatures; column selectivity is optimized for 15 °C to ensure reproducible recoveries for haloacetic acids
- Compatible with HPLC organic solvents to enhance analyte solubility, modify column selectivity, or for effective column clean up

DIONEX

Passion. Power. Productivity.

- Ready to use internal standards for haloacetic acid analysis using electrospray–mass spectrometric detection

High Efficiency Particle Structure

The IonPac AS24 column was developed using a unique polymer synthesis technology. The stationary phase consists of a novel, hyper-branched anion-exchange condensation polymer, electrostatically attached to the surface of a sulfonated wide-pore polymeric substrate. The resin capacity is not only controlled through the number of alternating coating cycles, but also through the use of Aggregate Monolith Technology. Aggregate Monolith Technology utilizes resin agglomerates produced by combining two oppositely charged resins, then packing these resin agglomerates into a column before adding the final two layers of the monomer and amine. This achieves higher capacity while still maintaing high chromatographic efficiency and reasonable column pressure. The AS24 2 mm

uses a high-capacity resin (140 µeq per column) with optimized selectivity for the haloacetic acids and other anions in drinking water.

Determination of Haloacetic Acids in Drinking Water Using IC-MS/MS

Haloacetic acids containing chlorine and bromine are formed during the chlorination disinfection of drinking water. The presence of haloacetic acids in drinking water has been linked to several adverse effects including bladder, kidney, and colorectal cancer.

The AS24 column can separate the following HAAs:

- Monochloroacetic acid (MCAA)
- Dichloroacetic acid (DCAA)
- Trichloroacetic acid (TCAA)
- Monobromoacetic acid (MBAA)
- Dibromoacetic acid (DBAA)
- Tribromoacetic acid (TBAA)
- Bromochloroacetic acid (BCAA)
- Dibromochloroacetic acid (DBCAA)
- Dichlorobromoacetic acid (DCBAA)

Five HAAs including MCAA, DCAA, TCAA, MBAA, and DBAA are cited in the U.S. EPA haloacetic acid regulation. This regulation requires that the total of these five HAAs does not exceed a maximum concentration (MCL) of 60 µg/L.[1] All drinking water plants in the United States must determine the HAA level in drinking water.

The IonPac AS24 column is designed for analysis of haloacetic acids by IC-MS/MS in high ionic strength matrices. Figure 2 shows determination of haloacetic acids in a drinking water sample using a potassium hydroxide gradient delivered by the Eluent Generator. Low µg/L (ppb) levels of haloacetic acids can easily be determined using MS/MS detection.

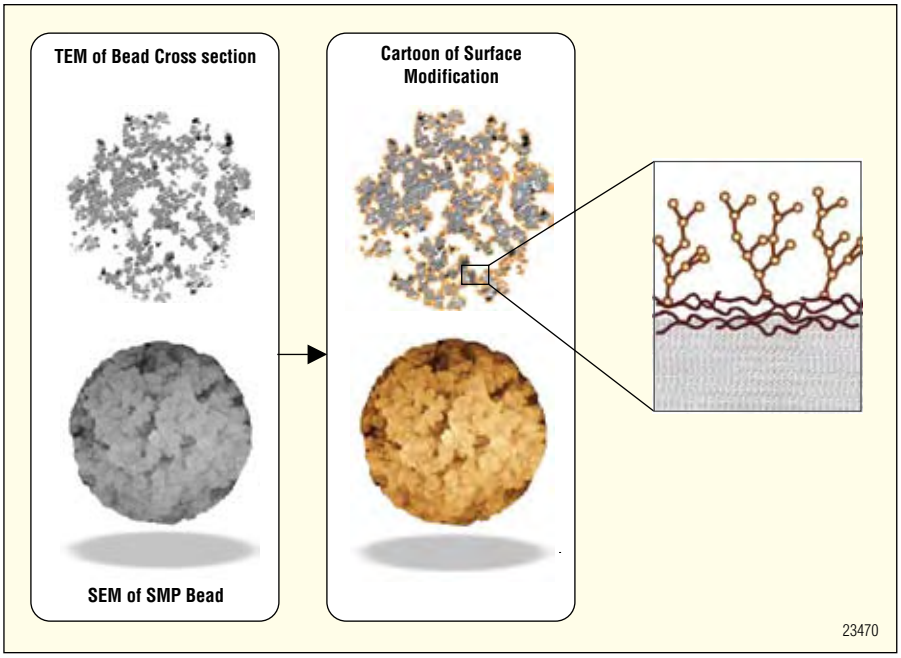
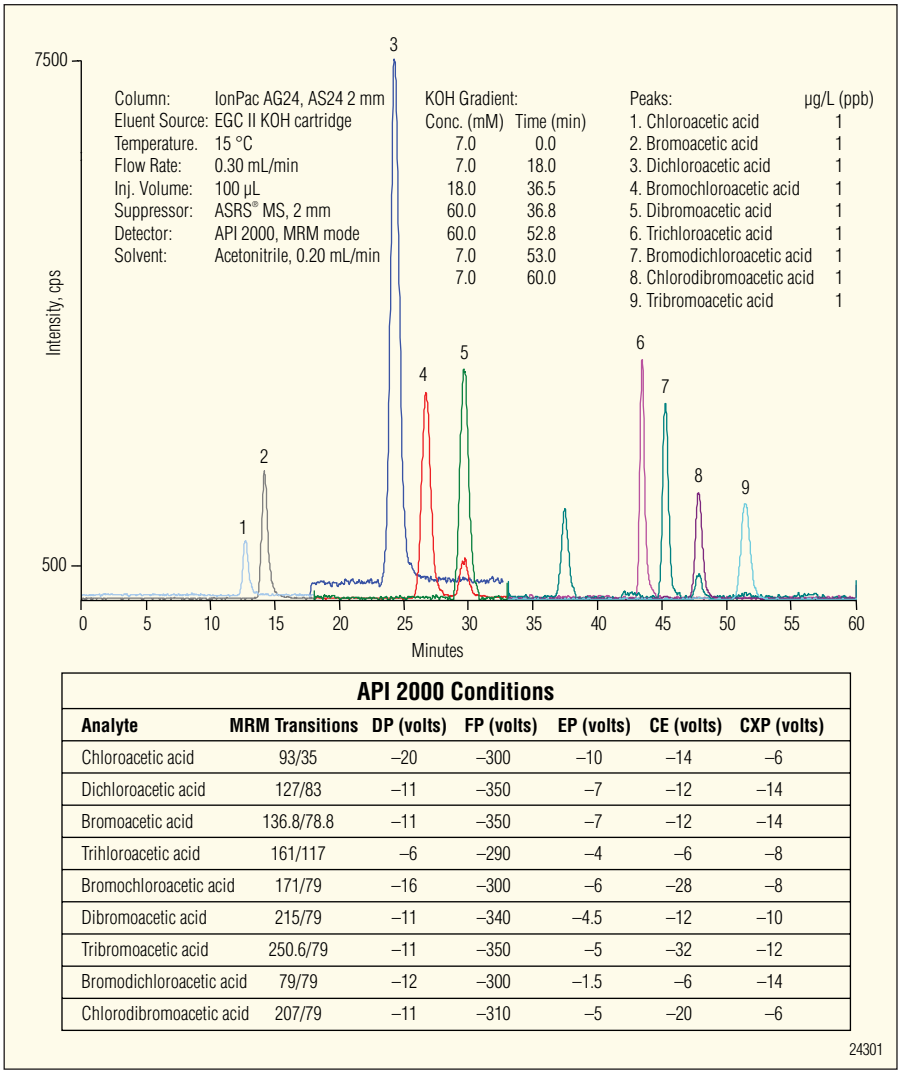


Figure 1. Structure of an IonPac AS24 packing particle.



API 2000 Conditions

Analyte	MRM Transitions	DP (volts)	FP (volts)	EP (volts)	CE (volts)	CXP (volts)
Chloroacetic acid	93/35	–20	–300	–10	–14	–6
Dichloroacetic acid	127/83	–11	–350	–7	–12	–14
Bromoacetic acid	136.8/78.8	–11	–350	–7	–12	–14
Trihloroacetic acid	161/117	–6	–290	–4	–6	–8
Bromochloroacetic acid	171/79	–16	–300	–6	–28	–8
Dibromoacetic acid	215/79	–11	–340	–4.5	–12	–10
Tribromoacetic acid	250.6/79	–11	–350	–5	–32	–12
Bromodichloroacetic acid	79/79	–12	–300	–1.5	–6	–14
Chlorodibromoacetic acid	207/79	–11	–310	–5	–20	–6

Figure 2. Determination of haloacetic acids using the IonPac AS24 column and MS/MS detection.

Determination of Haloacetic Acids Using IC-MS

The IonPac AS24 can also be used for determination of haloacetic acids using IC-MS with a potassium hydroxide gradient. This method combines a RFIC system with matrix diversion of common salts prior to MS detection. This method is both sensitive and selective when used for determination of haloacetic acids as shown in Figure 3.

Determination of Trace Bromate Using Two-Dimensional Ion Chromatography

The AS24 column can be used with suppressed conductivity detection for determination of bromate. Using a two-dimensional ion chromatography system, trace concentrations can be determined in drinking water samples as shown in Figure 4. For further information, refer to Application Note 187.

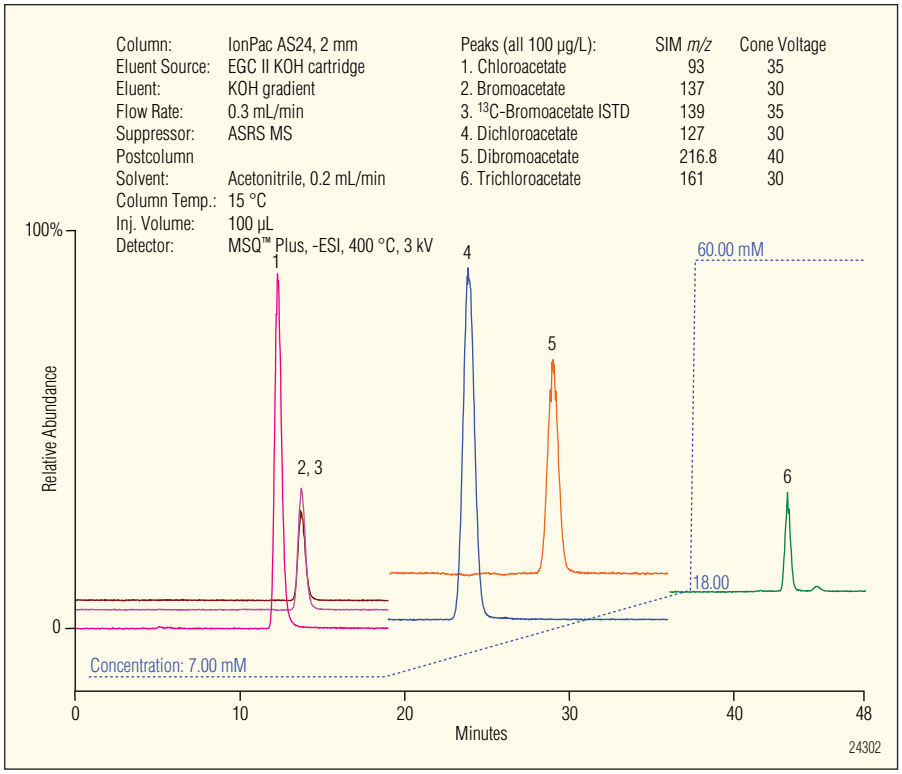


Figure 3. Determination of haloacetic acids using the IonPac AS24 column and MS detection.

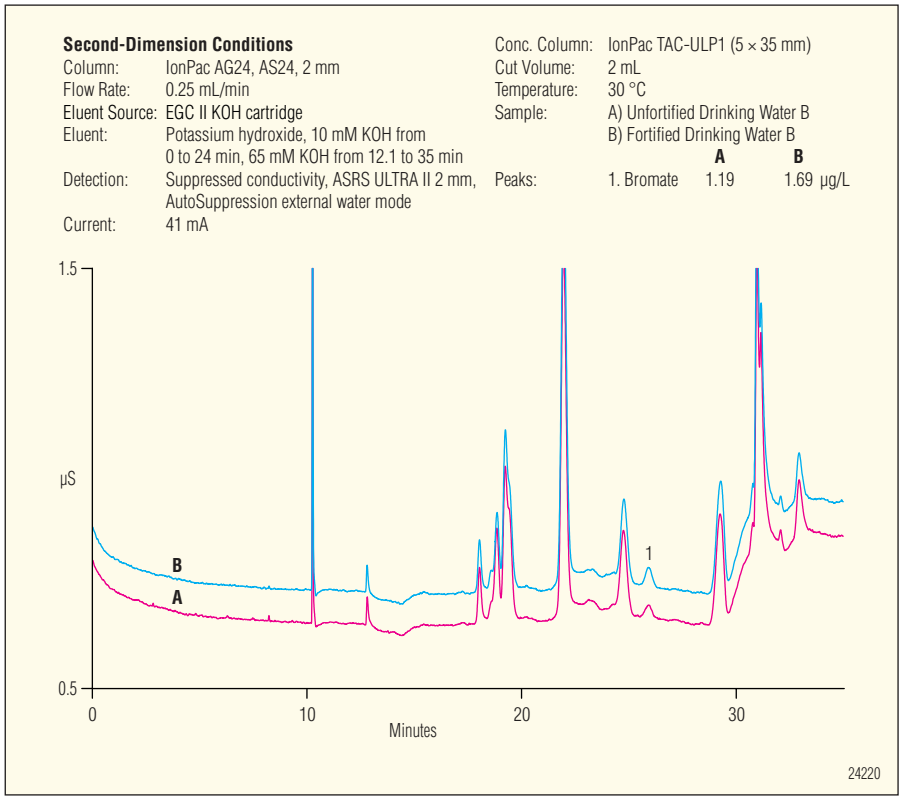


Figure 4. Determination of trace concentrations of bromate using the IonPac AS24 column with two-dimensional ion chromatography.

Extended Application Capabilities

The unique selectivity and high capacity of the IonPac AS24 makes it an ideal column for development of specialized applications, providing excellent separation of environmental anions including inorganic anions, oxyhalides, oxyanions, and organic acids using potassium hydroxide eluent. Using gradient elution, these analytes are easily separated in less than 37 minutes as shown in Figure 5.

References

1. Stage 1 Disinfectants and Disinfection Byproducts Rule: A Quick Reference Guide, p. 2, US EPA, 816-F-01-010

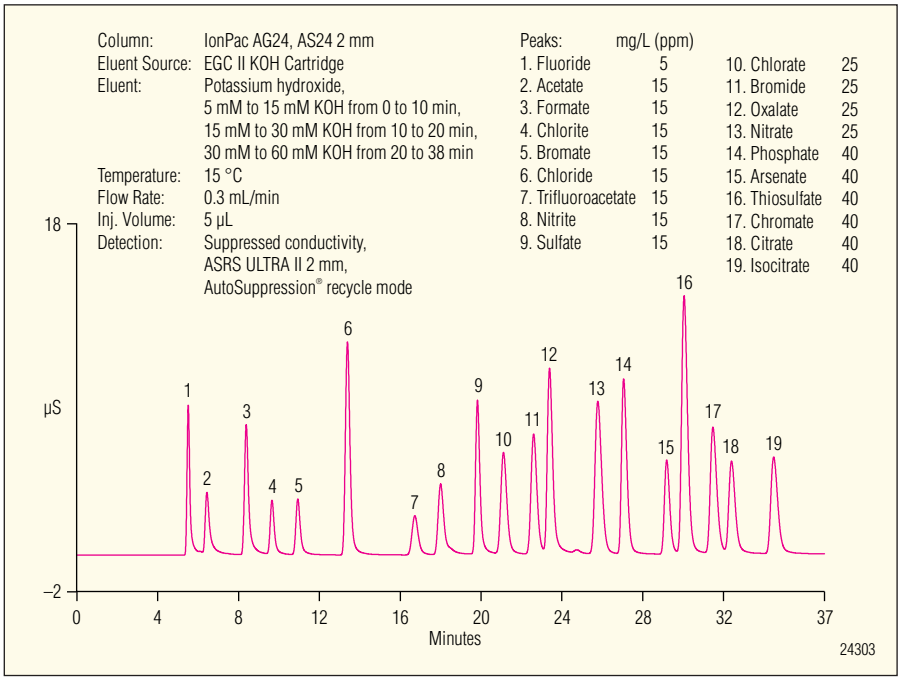


Figure 5. Separation of various anions including inorganic anions, organic acids, oxyanions and oxyhalides on an IonPac AS24 column using a potassium hydroxide eluent delivered by an Eluent Generator.

SPECIFICATIONS

Dimensions:
IonPac AS24 Analytical column:
2 × 250 mm
IonPac AG24 Guard column:
2 × 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): 7.0 µm
Pore size: 2000 Å
Crosslinking (%DVB): 55%
Guard Column:
Microporous resin
Bead diameter (µm): 11 µm
Pore size: <10 Å
Crosslinking (%DVB): 55%

Ion-Exchange Group:
Functional group: alkanol quaternary ammonium ion

Functional Group Characteristics:
Hydrophobicity: Ultralow

Capacity:
140 µeq (2 × 250 mm column)
1.5 µeq (2 × 50 mm column)

Column Construction:
PEEK with 10-32 threaded ferrule-style end fittings. All components are nonmetallic.

ORDERING INFORMATION

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.

IonPac AS24 Columns

IonPac AS24 Analytical Column
(2 × 250 mm) ..... P/N 064153
IonPac AG24 Guard Column
(2 × 50 mm) ..... P/N 064151

Haloacetic Acid Internal Standards

Monochloroacetic acid MCAA-2-13C, 1000 µg/mL..... P/N 069406
Monobromoacetic acid MBAA-1-13C, 1000 µg/mL..... P/N 069407
Dichloroacetic Acid DCAA-2-13C, 1000 µg/mL ..... P/N 069408
Trichloroacetic Acid TCAA-2-13C, 1000 µg/mL..... P/N 069409

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Dionex Corporation
1228 Titan Way
P.O. Box 3603
Sunnyvale, CA
94088-3603
(408) 737-0700

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