APPLICATION BRIEF

Municipal drinking water analysis by fast IC

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Key words
EPA Method 300.0 (Part A), EPA Method 300.1 (Part A), IonPac AS22-Fast column, suppressed conductivity, ICS-1100 Integrated IC system, Aquion Ion Chromatography system, inorganic anions, bromide, chloride, fluoride, nitrate, nitrite, phosphate, sulfate

Introduction

The determination of inorganic anions (fluoride, chloride, nitrite, sulfate, bromide, nitrate, and phosphate) in municipal drinking water is one of the most important ion chromatography (IC) applications worldwide. In the United States, water integrity is legislated through the Safe Drinking Water Act (SDWA), which ensures water quality and safety.[1] Other industrialized countries have similar regulations and, therefore, have similar analytical needs.

Since the 1980s, with the approval of EPA Method 300.0 (Part A), Thermo Scientific™ Dionex™ IC methods have been used for compliance testing of inorganic anions. In 1993 and 1997, methods using Thermo Scientific™ Dionex™ IonPac™ AS4A and Dionex IonPac AS9-HC anion-exchange columns were specified in Methods 300.0 (Part A) and 300.1 (Part A).[2,3] As advancements in column technology continued, new columns were proposed, such as the Dionex IonPac AS14 column in Dionex AN 133 in 2004.[4] However, both methods have run times of more than 14 min.

In this study, mg/L concentrations of inorganic anions were separated on a 2 × 150 mm, Dionex IonPac AS22-Fast anion-exchange column designed for fast separations using carbonate eluents. Eluents were prepared by diluting the Dionex IonPac AS22 Reagent Concentrate for ease of use and to minimize eluent preparation errors. The results demonstrate the separation of mg/L concentrations of seven anions in a municipal drinking water sample using carbonate eluents at 0.5 mL/min (Figure 1). All anions were eluted from the column within 5 min and detected by suppressed conductivity detection with the Thermo Scientific™ Dionex™ ASRS™ 300 Anion Self-Regenerating Suppressor.™ This suppressor uses electrolytic suppression to provide low background noise and improve the accuracy of the results. This means faster equilibration times without regenerant preparation, saving time and money.

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Conditions

A Thermo Scientific™ Dionex™ ICS-1100 Integrated IC system or a Thermo Scientific™ Dionex™ Aquion™ Ion Chromatography (IC) system with electrolytic suppression, an AS Autosampler, and Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) software were used for the analyses. The chromatography conditions are listed in Figure 1.

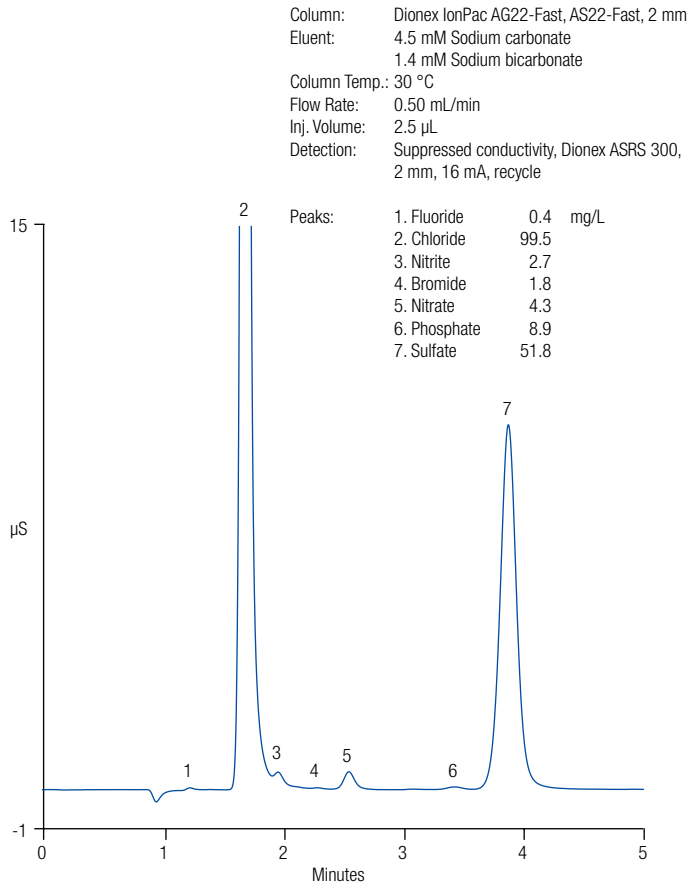

Figure 1. Determination of anions in a municipal drinking water sample by fast IC on the Dionex IonPac AS22-Fast column.

Sample preparation

The municipal drinking water sample was filtered with a 0.45 µm IC syringe filter prior to analysis.

Conclusion

This method using the Dionex IonPac AS22-Fast column provides an equivalent method—using the latest column technology—to the EPA 300.0 (Part A) and 300.1 (Part A) approved methods, while providing a 5 min run time, reducing cycle time, lowering the overall cost, saving time, and increasing the sample throughput. This method uses the Dionex ICS-1100 Integrated IC system or Dionex Aquion IC system, but can be performed easily on any other Dionex IC system, including Reagent-Free™ IC (RFIC™) with eluent regeneration and eluent generation IC systems. Anion determinations in municipal drinking water using carbonate eluents are thoroughly discussed in Thermo Scientific AN 133.[4]

References

1. Fed. Regist. **2010;** Vol. 75, No. 184.
2. *The Determination of Inorganic Anions in Water by Ion Chromatography;* Method 300.0, Revision 2.1; U.S. Environmental Protection Agency; Cincinnati, OH, 1993.
3. *The Determination of Inorganic Anions in Water by Ion Chromatography;* Method 301.0, Revision 1.0; U.S. Environmental Protection Agency; Cincinnati, OH, 1997.
4. Thermo Scientific Application Note 133. Sunnyvale, CA, 2004. [Online] http://tools.thermofisher.com/content/sfs/brochures/AN-133-IC-Inorganic-Anions-Drinking-Water-AN71691-EN.pdf (accessed October 10, 2016).

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