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Municipal Drinking Water Analysis by Fast IC

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), Dionex IC methods have been used for compliance testing of inorganic anions. In 1993 and 1997, Dionex IC methods using IonPac® AS4A and 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 IonPac AS14 column in 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, IonPac AS22-Fast anion-exchange column designed for fast separations using carbonate eluents. Eluents were prepared by diluting the 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 ASRS® 300 Anion Self-Regenerating Suppressor.[®]

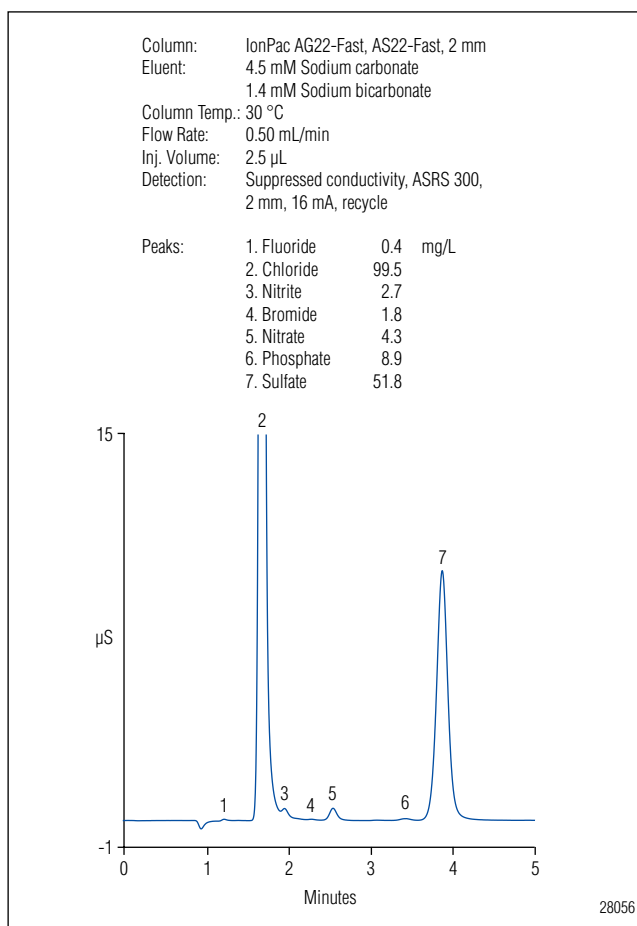


Figure 1. Determination of anions in a municipal drinking water sample by Fast IC on the IonPac AS22-Fast column.

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, which saves time and money.

CONDITIONS

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

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 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 that reduces cycle time, lowering the overall cost, saving time, and increasing the sample throughput. This method uses the ICS-1100 Integrated 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 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. *Dionex Corporation, Determination of Inorganic Anions in Drinking Water by Ion Chromatography*. Application Note 133, LPN 1192, Sunnyvale, CA, 2004.

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