DIONEX

Application Update

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Determination of Nitrite and Nitrate in Drinking Water Using Ion Chromatography with Direct UV Detection

INTRODUCTION

The ion chromatographic analysis of nitrite and nitrate in drinking water is accomplished using direct UV detection of the analytes. The method is free from most ionic interferences due to the specificity of UV detection. The method is applicable to all drinking water samples. Bromide may also be separated from other ions and detected using this method.

The method of chemically suppressed conductivity detection of nitrite and nitrate in drinking water (Dionex Application Update #131) is an alternative to this method. Note that if the two methods are combined, chemical suppression will yield additional benefits in the determination of nitrite and nitrate with UV detection. The use of a suppressor (AMMS-II, Dionex P/N 043074) between the column and the detector cell reduces background absorbance and eliminates negative peaks associated with chloride and sulfate in this method (see Fig. 3).

RECOMMENDED EQUIPMENT

Dionex Ion Chromatograph with a UV/Visible absorbance detector

REAGENT AND STANDARD PREPARATION

Sodium carbonate / sodium bicarbonate eluent concentrate (P/N 039513)

Sodium Nitrite, ACS Grade

Sodium Nitrate, ACS Grade

Eluent

To prepare 1.0 L of eluent (1.8 mM sodium carbonate, 1.7 mM sodium bicarbonate), dilute 10.0 mL of eluent concentrate to 1000 mL with deionized water.

Stock Standards

1000 ppm Nitrite: Dissolve 1.499 g $NaNO_2$ in 1.0 L of deionized water

1000 ppm Nitrate: Dissolve 1.371 g $NaNO_3$ in 1.0 L of deionized water

Working Standards

Dilute the stock standards to concentration levels that bracket the concentration level of interest. Prepare working standards from the stock standard just prior to analysis.

CONDITIONS

Column:	IonPac® AS9 analytical column with AG9 guard
Eluent:	1.8 mM Na_2CO_3 / 1.7 mM $NaHCO_3$
Flow Rate:	2.0 mL/min
Sample Volume:	25 µL
Detection:	UV at 210 nm, 0.2 AUFS

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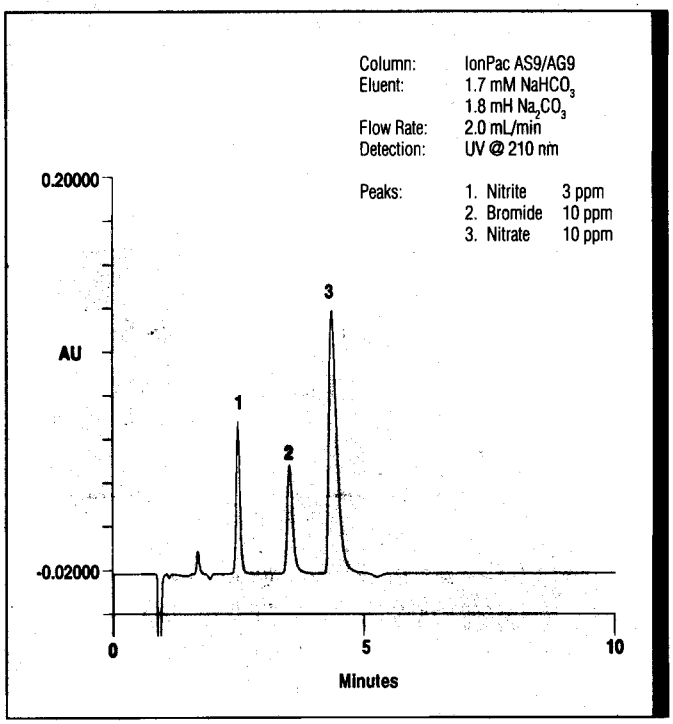

FIGURE 1. DETERMINATION OF NITRITE AND NITRATE WITH DIRECT UV DETECTION

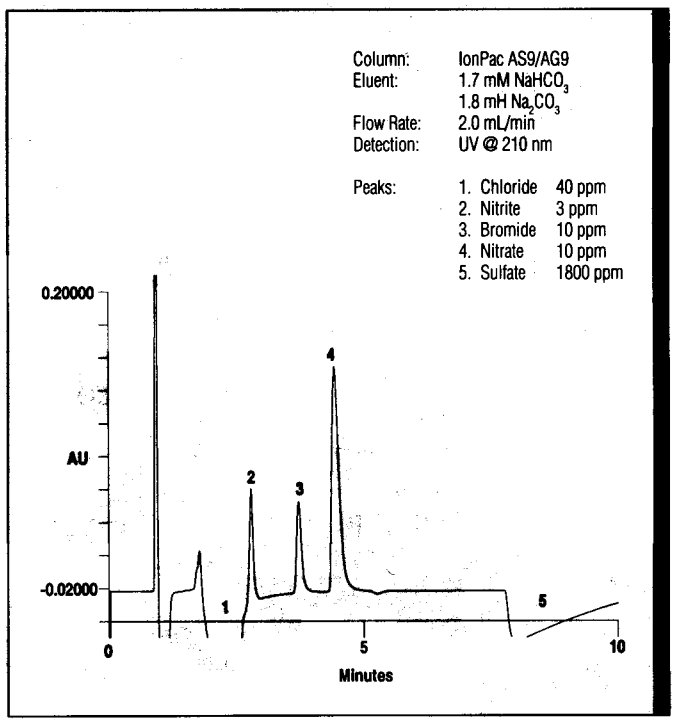

FIGURE 2. DIRECT UV DETECTION OF NITRITE AND NITRATE IN DRINKING WATER (PRESERVED WITH SULFURIC ACID*)

*Presently, the US EPA is evaluating the suitability of acid preservation as described in EPA/570/9-90/008

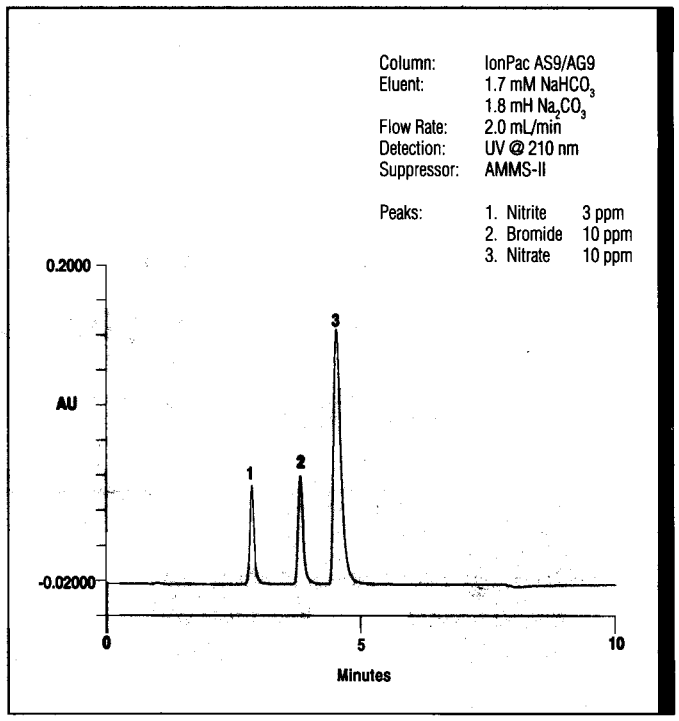

FIGURE 3. DIRECT UV DETECTION OF NITRITE AND NITRATE IN DRINKING WATER (PRESERVED WITH SULFURIC ACID*) WITH CHEMICAL SUPPRESSION OF ELUENT

PERFORMANCE CHARACTERISTICS

The detection limit in drinking water samples using a 25-µL loop is 10 ppb for nitrite and 15 ppb for nitrate. This corresponds to 3.0-ppb nitrogen as nitrite, and 3.5-ppb nitrogen as nitrate. The method is linear for nitrite over the range 10 ppb to 50 ppm. It is linear for nitrate over the range of 15 ppb to 75 ppm.