Determination of Nitrite and Nitrate in Drinking Water Using Chemically Suppressed Ion Chromatography

INTRODUCTION

Ion chromatography provides a convenient method for the determination of common inorganic anions in drinking water, including nitrite and nitrate. Using chemically suppressed ion chromatography, trace nitrite and nitrate are accurately and rapidly determined in drinking water. This includes water samples that have been preserved with sulfuric acid. The method will tolerate chloride levels up to 150 ppm and sulfuric acid concentrations as high as 0.5%. For most drinking water samples, the addition of 0.1% by volume sulfuric acid will acidify the sample to pH <2. This ion chromatographic method, using an IonPac® AS9, will tolerate levels of sulfate up to five times that amount.

Figure 1 shows a chromatogram of drinking water spiked to 3.3 ppm nitrite and 22.0 ppm nitrate. The sample is preserved with sulfuric acid to pH <2.

Figure 1   *Nitrite and nitrate in acid preserved drinking water.*

RECOMMENDED EQUIPMENT

Any Dionex Ion Chromatograph with a conductivity detector.

CONDITIONS

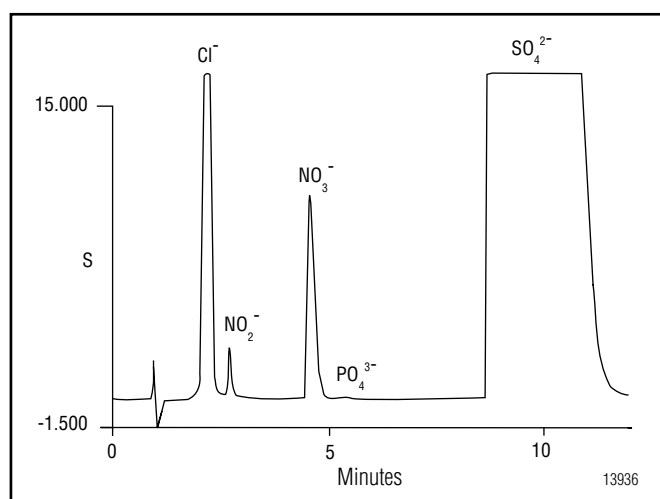|	
Column:	IonPac AS9 analytical with IonPac AG9 guard
Eluent:	1.8 mM Sodium carbonate
	1.7 mM Sodium bicarbonate
Flow Rate:	2.0 mL/min
Suppressor:	Anion MicroMembrane™ Suppressor (AMMS®)
Regenerant:	25 mN Sulfuric acid
Regenerant Flow Rate:	6 mL/min using AutoRegen® accessory
Sample Volume:	25 µL
Detection:	Suppressed conductivity, 10 µS full scale

REAGENT AND STANDARD PREPARATION

Sodium carbonate/sodium bicarbonate concentrate
(P/N 39513)
Suppressor regenerant concentrate
(4 pack, P/N 37164)
Sodium nitrite, ACS Grade
Sodium nitrate, ACS Grade

ELUENT

To prepare 1.0-L of eluent, dilute 10.0 mL of eluent concentrate to 1000 mL with deionized water.

REGENERANT

To prepare 1.0-L of regenerant, dilute regenerant concentrate to 1000 mL with deionized water as directed on the regenerant concentrate label.

STOCK STANDARDS

1000 ppm Nitrite – Dissolve 1.499 g of sodium nitrite in 1.0 L of deionized water. 1000 ppm Nitrate – Dissolve 1.371 g sodium nitrate in 1.0 L of deionized water.

WORKING STANDARDS

Dilute the stock standards to concentration levels that bracket the concentration level of interest. Prepare work-ing standards fresh from the stock standard prior to analysis.

PERFORMANCE CHARACTERISTICS

Detection limits in drinking water samples using a 25-µL loop are 10 ppb for nitrite and nitrate. This corresponds to 3.0 ppb nitrogen as nitrite, and 2.3 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 20 ppb to 100 ppm.