DETERMINATION OF MANGANESE IN SEAWATER USING FLOW INJECTION ANALYSIS WITH ONLINE PRECONCENTRATION AND SPECTROPHOTOMETRIC DETECTION

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By
Joseph A. Resing

Thesis Committee

Michael J. Mottl, Chairman
Eric H. DeCarlo
Christopher Measures
Francis J. Sansone

Abstract

A highly sensitive method for the rapid determination of dissolved Mn in seawater has been developed. The advantages of the method include speed of analysis, the use of relatively inexpensive instrumentation, selectivity, lack of a salinity effect, and an extremely low limit of detection (25 pmolar for a 15 ml sample.)

The method combines online concentration of Mn(II) from 15 ml of seawater onto 8-Hydroxyquinoline immobilized on fractogel TSK, with elution of the Mn into a flow injection analysis stream and subsequent spectrophotometric detection of the reaction of leucomalachite green (LMG) with potassium periodate and Mn (II). The method has a precision of $\pm$ 5% for concentrations greater than 400 pmolar. The analysis time is 5.5 minutes per sample. The accuracy has been proven using NASS-2 standard seawater. Further validation has been provided by the close agreement between natural seawater samples determined by this and other methods. The cause of the salinity effect on the LMG chemistry was identified and eliminated.

The limit of detection of this method is comparable to the lowest limits reported for Mn analysis. While other flow injection/online preconcentration methods have been developed, they use chemiluminescence detection and report significant interference problems. This method, by comparison, is extremely selective and uses the commonly available spectrophotometer as a detector. The ease of use makes this method very suitable for shipboard Mn determination.