Prompt and accurate determination of sodium in concentrated sea water by flow injection analysis using catalytic decomposition of chelate-chromoionophore

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Summary

1. Introduction

Precious and accurate determination of sodium in concentrated sea water have been required in the manufacture process of salt. Although some instumental analyses have high sensitivity for sodium ion, their precision has not sometimes been satisfactory for the precious determination of sodium. Moreover, their sentitivity has inquired the multiple dilutions to analyze tconcentrated sea waters. In this work, we aimed to develop a direct determination methods of sodium, which is main component, in concentrated sea water by flow injection analysis (FIA) using the decompasition reaction of chelate-chromoionophore.

2. Experiment

Ammonium 1, 4, 7, 10, 13- pentaoxa- 16- azacyclooctadecane-*N*- carbodithioate (A18CC) was synthesized with 1-aza-18-crown-6 and carbondisulfide. Co^{II}-chelate of A18CC was synthesized with A18CC and cobalt chloride. In the normal mode of FIA, the Co^{II}-A18CC chelate solution and water which was used as the carrier solution were pumped, respectively. The sample solution was injected into the carrier solution flow. The effluent was monitored at 320 nm, which was corresponding to absorption maximum of the Co^{II}-A18CC chelate.

3. Results and discussion

The Co^{II}-A18CC solution was degenerated by the addition of sodium salt. The degeneration was based on the decomposition of Co^{II}-A18CC, and was highly selective for sodium ion. Some oxidants prompted the decomposition and some reductants inhibited the decomposition. The normal mode of FIA was superior to the reverse mode of FIA. The direct injection was achieved with the FIA. The calibration curve was linear in the range of sodium ion from 1 mol/l to 4 mol/l. The analyzing time was within 4 min per one analysis.