

Automated Chemical Analysis System for Salts and Seawater:  
Simultaneous Determination of Micro Amounts of Magnesium and  
Calcium in Salts with FIA System Utilizing On-Line Cation-  
Exchange Separation and Spectrophotometric Detection

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### Summary

A flow-injection system is presented for the simultaneous determination of micro amounts of magnesium and calcium in salts. The cation-exchange separation of magnesium and calcium from matrix, which also serves for concentration and mutual separation of those metals, is directly on-line coupled with spectrophotometric detection with 3,3'-bis[N,N-bis(carboxymethyl)aminomethyl]-o-cresolphthalein(PC) as chromogenic agent in a continuous flow system. The sample solution is directly injected into the FIA system and thus no laborious complicated manual operations for pre-concentration and separation is needed. The limit of detection is 0.13 ppm for magnesium and 0.33 ppm for calcium in salt sample when a 5-m sample loop is used for injecting the sample solution of 3 g/100 ml. The results for analysis of salt samples by this FIA system corresponded well with those obtained by the titration method and showed good precision. The analysis time for simultaneous determination of magnesium and calcium is about 12 min. The most appealing feature of the proposed FIA system is that the analysis is achieved in a continuous and nearly closed system without complicated manual operations, which can afford simpler and rapid as well as accurate and precise determination of magnesium and calcium.