

Automated chemical analysis and separation systems for improving the efficiency and promoting the advancement of the utilization of seawater resources

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Summary

Two flow systems (A and B) for simple and rapid determination of trace boron are presented in order to improve the efficiency and to promote the advancement of the utilization of seawater resources. System A is based on the spectrophotometric detection utilizing complex formation of boron with azomethine H which is a prototype analysis system for on-line monitoring of boron in desalinated water from seawater. In order to achieve highly sensitive and selective determination of boron in sea salts, system B exploits fluorimetric detection with chromotropic acid which is directly in-line coupled with separation/preconcentration with a Sephadex G-25 gel column in a continuous flow system. The present systems offer many advantages with respect to simplicity and sensitivity, with a short analysis time (about 3 min for system A and 9 min for system B), low limit of determination (0.06 ppm in water by system A and 0.6 ppb in salt by system B) and good reproducibility (rsd < 3.6%). No complicated manual operation was needed and glass apparatus such as beaker, flask, and pipets usually required for analysis was omitted because most analytical operations were done automatically in a narrow bore PTFE tubing system. Those must be important requirements for eliminating boron contamination from glasswares. The system B was satisfactorily applied to the determination of trace boron in various salts.