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Automatization of chemical methods of analysis utilizing flow injection system for promoting the efficient and advanced uses of seawater resources

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Summary

Simple, rapid and sensitive method is presented based on a new concept of flow injection (FIA system) for determination of trace bromate in sea water and sea salts. Bromate, a potential human carcinogen, can be formed by the oxidation of bromide anions during ozonisation and possibly by other oxidants in water treatment (eg. chlorination). For this reason there is a strong need for determination of trace bromate in treated waters and also in sea salts because sea-salts contain bromide at concentrations from a few ten to hundred ppm and are the source to produce chlorine disinfectant. In order to achieve highly sensitive and selective determination of bromate in sea salts, a novel spectrophotometric detection of bromate has been developed based on the oxidation of V(IV) and chelate formation of resultant V(V) with Nitro-PAPS and directly in-line coupled with the separation/preconcentration with anion-exchange resin column (Muromac) in a flow system. The present FIA system offers many advantages with respect to simplicity and sensitivity, with a short analysis time (about 10 min), low limit of determination (0.08 ppm) and good reproducibility (rsd<3%). No complicated manual operation is needed and glass apparatus such as beaker, flask, and pipets usually required for analysis are omitted because most analytical operations are done automatically in flowing stream of solution in a narrow bore PTFE tubing system. The results for analysis of commercially available salts are described.