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## Development of Simultaneous Analytical Method of Common Inorganic Species in Saline Water Samples

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### Summary

We developed simultaneous determination method of common inorganic anions and cations in various matrix-containing samples such as saline water or biological samples. The method is based on penetration for anions and cation-exchange for cations to a weakly acidic cation-exchange resin in a single column with weak acid as eluent. This has been called ion-exclusion/cation-exchange chromatography (ion-exclusion / CEC). In this project, we must consider either ion-exchange resin or eluent conditions corresponding to ion analysis of saline and biological samples, in terms of resolution of anions and cations, proteins or lipid adsorption to the resin, etc. Through this study, an optimum column conditions was a polymethacrylate-based weakly acidic cation-exchange column with 3  $\mu\text{m}$ -particle and 0.1 meq./ml-capacity, in terms of peak resolutions. It was possible to successfully determine  $\text{SO}_4^{2-}$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$  and  $\text{Ca}^{2+}$  from high concentration of  $\text{Cl}^-$  and  $\text{Na}^+$  in saline water. In contrast, ion analysis in biological samples such as saliva was required to suppress adsorptions of large organic matrices, e.g., proteins or lipids, to the resin phase. The reproducible separations of anions and cations were obtained by addition of bile salt-type zwitterionic surfactant, CHAPS, into the elution with 5.5 mM tartaric acid / 3 mM 18-crown-6. Consequently, the combination of the resin and the eluent optimized was useful for the direct determination of common ions not only in human's mixed saliva but also in several food samples.