

## Separation and Determination of Trace Ionic Substances in Sea Water and Concentrated Electrolyte Solutions by Capillary Electrophoresis and Its Application to Speciation of Substances

Shoji MOTOMIZU, Dept. Chem., Fac. Sci, Okayama University

Mitsuko OSHIMA, Dept. Chem., Fac. Sci, Okayama University

Toshio TAKAYANAGI, Dept. Chem., Fac. Sci, Okayama University

### Summary

In the determination of trace amounts of various ions in concentrated electrolyte solutions, it must be noticed that the interference from matrices contained in samples at large amounts is usually very serious. The separation efficiency in capillary electrophoresis is excellent, compared with the conventional methods used so far; therefore no pretreatment is required before analyzing such sample solutions. In this study, various fundamentals concerning the development of the analysis and the speciation methods for trace ions in the concentrated electrolyte solutions were studied.

#### **1. Highly sensitive detection method for oxoacid anions by capillary zone electrophoresis.**

Peak shapes for oxoacid anions, as well as the detection sensitivity, were improved by stacking the analyte ions at the beginning of the electrophoresis by adding electrolytes, such as sodium sulfate etc., in the migrating solution. Analysis time was also shortened with such migrating solutions. To improve the detection sensitivity, large volume sample injection technique and the use of Z-shaped cell were also found to be very successful. The detection sensitivity reached down to sub-ppb levels by the combined use of the stacking, large volume sample injection and Z-shaped detection cell.

#### **2. Application of the proposed sensitive method to the determination of oxoacid anion.**

The proposed sensitive determination method was applied to the determination of tungstate ion in semiconductor etching solutions which were examples of a concentrated electrolyte solution. Tungstate ion existing at  $10^{-5}$  M levels was preferably determined and its species was found to be  $\text{HWO}_4^-$ .

#### **3. Novel separation and detection method for minor anions in sea water by CM-ID method with various ion association reagent.**

Separability of minor anions in sea water, such as  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{NO}_3^-$ ,  $\text{SCN}^-$  and  $\text{NO}_2^-$ , was improved by adding CM-ID reagent in migrating solutions, which was attributed to the formation of ion associate between the analyte anions and the CM-ID reagent. Peak broadening was also suppressed by diluting the sea water 10 fold with KCl at 100 mM in the migrating solution.