

## High-Pressure Solubility of Sodium Chloride in Water

SAWAMURA, Seiji and SUZUKI, Yoshihisa

Department of Chemistry, Faculty of Science and Engineering,  
Ritsumeikan University

In the present work, high-pressure solubility of sodium chloride, and also rubidium and cesium chlorides, in water were measured using a high-pressure vessel with a valve designed by us. The sample of the electrolyte and water and Teflon ball (for stirring the sample) were placed in the vessel and pressure was applied to it. The vessel was put on a seesaw in the thermostatic water bath and shaken for a few days. After that, saturated solution was slowly taken out from the valve holding the pressure at a constant. The concentration of the sample was measured by drying it in an electric oven. The measurement was done in the ranges of 273.2-313.2 K and 0.1-300 MPa.

Solubility of rubidium and cesium chloride in water increased with increasing temperature at all pressures. On the other hand, pressure dependence of them differed each other even in the sign of the slopes, that is, the former increased with increasing pressure but the latter decreased. We showed solubility surfaces, not solubility curves, as a function of both pressure and temperature. Any breaking suggesting a phase transition can not be observed on the surfaces.

Solubility of sodium chloride was increased with increasing pressure as well as that of rubidium chloride. Both solutes have the same structure of NaCl type. On the other hand, cesium chloride has that of CsCl type. The difference may cause the different sign for the pressure coefficient of the solubility. Reproducibility of the solubility for sodium chloride suddenly becomes poor in low temperature and high pressure region. It suggests a phase transition to hydrated crystal, i. e.,  $\text{NaCl}\cdot 2\text{H}_2\text{O}$ . To obtain a precise solubility surface in the region, we have to use a crystal of  $\text{NaCl}\cdot 2\text{H}_2\text{O}$  though it is not present at normal pressure and temperature.