

Proc. NIPR Symp. Polar Meteorol. Glaciol., **11**, 244, 1997

DECREASE OF SOLUTES IN THE AQUEOUS SOLUTION  
IN THE FREEZING PROCESS (2) (ABSTRACT)

Keiichi SATO, Norimichi TAKENAKA, Hiroshi BANDOW  
and Yasuaki MAEDA

*College of Engineering, Osaka Prefecture University, 1-1, Gakuen-cho, Sakai 593*

Dilute acidic solution containing formate, acetate, propionate, n-butyrate, chloride or nitrite was frozen from bottom to top and allowed to stand in a freezer. After the sample was thawed, the composition of the sample was measured. The anion concentration of the sample decreased and the loss of anions increased linearly with standing time in the frozen state. Moreover, the rate increased with increasing surface area. From these results, the decrease rates of anions for 10  $\mu\text{m}$  diameter frozen spherical droplets were 1.16, 0.534, 0.522, 0.285 and 0.119  $\mu\text{mol dm}^{-3} \text{s}^{-1}$  for formate, acetate, propionate, n-butyrate and chloride, respectively. From this result, the decrease rate was enough to evaporate to the gas phase during rain. The solute, which escaped from the ice, was detected in the gas phase. Therefore, it is considered that the volatile acid such as formic acid, acetic acid, propanoic acid, n-butyric acid or hydrochloric acid is formed by bonding anions with protons and evaporates into the gas phase.

*(Received November 5, 1996; Revised manuscript accepted January 13, 1997)*