

Influence of Liquid Structure of Water on Dehydration Reaction of $\text{LiBr} \cdot 2 \text{H}_2\text{O}$ In Aqueous LiBr Solution

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Abstract

Synopsis: The liquid structure of water can be changed and is generated a single molecule water by adding 1,4-dioxane into water. In order to clarify a possibility of increasing the water-solubility of LiBr, the effect of controlling a liquid structure of water on dehydration energy of $\text{LiBr} \cdot 2 \text{H}_2\text{O}$ were examined using the differential calorie analysis in the work. Measurements were carried out over the range of 18.8~27.9 mol/kg (62~70 wt%) in LiBr-concentration and 0.92~0.95 in mole fraction taking water as the first component.

The following results were obtained:

- 1) Adding 1,4-dioxane into LiBr saturated aqueous solution is effective for increasing the water-solubility of LiBr.
- 2) Dehydration energy of $\text{LiBr} \cdot 2 \text{H}_2\text{O}$ can be decreased to 16 kJ/ H_2O -mol, which is about less half than without adding 1,4-dioxane.
- 3) The information about the liquid structure of water in the solution by 1,4-dioxane adding method was reconfirmed through its application to LiBr saturated aqueous solution.

Key words: liquid structure of water, Solubility, Water of crystallization, LiBr, 1,4-dioxane, dehydration

Introduction

Some researches¹⁾ have already been done on the increase of water-solubility of LiBr which has been required for making small and of high performance of the absorption type refrigerator, which uses water and aqueous LiBr solution as working pair.

Dr. Koseki & etal showed²⁾ the importance of the effective utilization of the water molecule by the co-hydration in the improvement of the water solubility of LiBr and realized it by adding CaCl_2 to the aqueous solution. There is a report³⁾ that examined the improvement in the water solubility of LiBr by adding LiI, LiCl, LiNO_3 instead of CaCl_2 in the similar idea. Also, there is a report⁴⁾ that examined increase of the steam pressure difference between water and LiBr solution and prevention of crystallization by adding the ethylene glycol.

The authors showed that water and 1,4-dioxane independently mix in 1,4-dioxane aqueous solution and that water (Primary component) changes its liquid structure with mixing mole

平成 13 年 12 月 21 日受理

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