No. 1208

The Development of High Efficiency Production Method with Anti-Solvent Modulated Operation in Salt Crystallization

Hiroshi TAKIYAMA

Department of Chemical Engineering, Tokyo University of Agriculture and Technology (TUAT)

Summary

Introduction Salt production has attracted attention from the viewpoint of processing byproducts in seawater desalination. Evaporative crystallization can remove the salt content, but an evaporative crystallizer must be operated at a low cost for production with high efficiency. In order to enhance productivity, fine crystals may improve the growth rate, but excess of fine crystals impairs size distribution and solid-liquid separation.

The purpose of the present study is to develop the method that can promote the crystal growth rate under high suspending solution with proper consideration on crystal-size distribution. Fine crystals generated to add anti-solvent under evaporative crystallization.

Results and Discussion While the growth rate increased temporarily by adding a anti-solvent, ***CV*** value also increased temporarily (**Fig. 1**).

However, ***CV*** value has improved immediately after addition of anti-solvent as an interesting phenomenon. It became clear that the operating condition which growth rate enhancement and a crystal-size distribution improvement can realize simultaneously exists. Change of solution concentration after anti-solvent addition was considered by using ternary phase diagram. As a result, when the anti-solvent evaporated, the solution became undersaturation temporarily, and the fine crystals were dissolved.

Conclusion As a result, the fine crystal advanced crystal growth rate. On the other hand, extra fine crystals were dissolved after evaporation of anti-solvent. This method could improve crystal-size distribution. In summary, a method that produces crystals with high efficiency could be developed by adding anti-solvent to evaporative crystallization

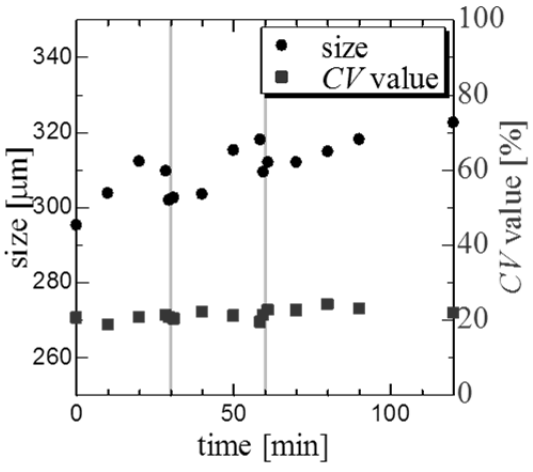

Fig.1. Changes in size and ***CV*** value