Nucleation Phenomena of Sodium Chloride Crystals by Antisolvent Crystallization

Izumi HIRASAWA, Shogo KANEKO, Yasuhiro YAMAGAMI and
Heisuke TOCHIHARA
Department of Applied Chemistry, Waseda University

Summary

The antisolvent crystallization of sodium chloride was carried out batchwisely to observe nucleation phenomena using ethanol as antisolvent. Generally, antisolvent crystallization often results in producing fine, variously shaped crystals and agglomerated, because of the high supersaturation produced by the addition of antisolvent in the local area of the inlet region. Authors have proposed a new idea to relieve high local and bulk supersaturation by choosing the operational conditions of high ethanol concentration. Obtained crystals were seemed to be unagglomerated and monodispersed in the optimum range of ethanol concentration. From the observation of nucleation phenomena, it was considered that nucleation induced by antisolvent addition would occur at the local supersaturation produced on the interface between starting solution and feed solution. On the other hand, crystal growth would proceed at the supersaturation produced by the sufficient mixing of feed solution with the starting solution. Average crystal size increased with increasing operational supersaturation σ_g. The number of produced crystals increased with increasing relative initial supersaturation ratio σ_n. The induction time was influenced by both relative initial supersaturation ratio and operational supersaturation ratio. Since the number of crystals depended on the relative initial supersaturation ratio, nucleation was considered to be influenced by local mixing.