Crystallization-based CO_2 Separation from Potassium Bicarbonate Solution Using a Continuous Cooling Crystallizer

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Absorption process using alkali solutions is the standard industrial method for removing CO_2. However, the regeneration of large amount of solution by steam causes an increase in cost of electricity. Therefore, there have been many efforts to reduce the CO_2 capture cost by phase changing solvent. Precipitating K_2CO_3 solution with high concentration is a promising solvent for reducing CO_2 capture cost by selectively regenerating CO_2-rich $KHCO_3$ slurry which is separated from CO_2-lean aqueous solution. Since large amount of water is removed by cooling crystallization of $KHCO_3$, sensible heat and latent heat of water can be reduced. However, the yield of $KHCO_3$ is not enough because the solubility is very limited when the solution is cooled by typical cooling water. Therefore, in this study, some alkanolamine antisolvents were used to enhance the crystal yield by further reducing the solubility. From the results using a continuous cooling crystallizer, their effect on crystal size distribution, crystal growth rate, and ion compositions in solution will be presented.