Evaporative Crystallization of Sodium Sulfate Dicarbonate

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Crystallization of sodium sulfate dicarbonate (~$2Na_2CO_3$•Na_2SO_4) is known to be a primary contributor to fouling heat-transfer equipment in spent-liquor evaporators used in the pulp and paper industry [1]. Therefore, understanding the conditions leading to formation and the in-process stability of this double salt and the related burkeite salt is crucial to the elimination or reduction of industrial problems. This poster summarizes a recently-completed project [2, 3], in which double salts were generated in a batch crystallizer at near-industrial process conditions. X-ray diffraction, calorimetry, and microscopic observation were used to investigate the stability of the salts to in-process aging, isolation and storage, and exposure to high temperature. The results verify that sodium sulfate dicarbonate exists as a unique phase in this system and remains stable at process conditions. The existence of sodium sulfate dicarbonate in industrial equipment deposits has recently been verified [4]. Microscopic observation of crystals under polarized light revealed two apparent growth habits of sodium sulfate dicarbonate crystals, monoaxial rods that tend to form 10-100μm agglomerates and 20-50μm hexagonal-dipyramidal structures [2, 3]. Investigation of the interaction of the two crystal shapes with heat-transfer surfaces may provide an important key to resolving sodium salt fouling problems in spent-liquor evaporators.

References

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