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Crystallization from Brine Ponds

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Abstract

Brine production ponds provide a sustainable low energy and cost effective solution for the manufacture of valuable mineral salts from brine sources. This study presents a physicochemical pond model for predicting pond performance as a function of climatic conditions and pond area. Brines from both solar and cooling crystallization ponds are explored.

The Mixed Solvent Electrolyte and Pitzer thermodynamic models are applied along with phase diagram rules to make predictions of the brine concentrations and precipitated salts composition from feedstock brines. Illustrative examples from different brines sources around the world that are rich in potassium, magnesium and sodium ions are included, and the thermodynamic model predictions are compared and discussed.

The modeling results show good agreement with the brine data reported at different stages in pond systems. The results are useful for the proper design and operation of new and existing mixed-salt production ponds that produce potassium and magnesium salt derivatives of the hydrous and anhydrous types.

Key words: Solar Ponds, Thermodynamic Modeling, Mixed Solvent Electrolyte, Pitzer, Carnallite, Sylvinite, Potassium Chloride, Magnesium.