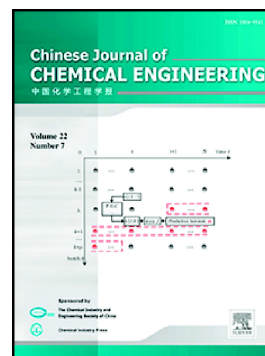


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Experimental investigation and cost assessment of the salt production by solar assisted evaporation of saturated brine*

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Abstract The technical feasibility and economy of solar heat collection-forced evaporation process are the keys to its practicality, especially its application in strong brine treatment. The operation cost of applying solar collection in salt manufacturing through depth evaporation of brine has been studied. For $\text{Na}^+, \text{K}^+, \text{Mg}^{2+} // \text{Cl}^-, \text{SO}_4^{2-} - \text{H}_2\text{O}$ salt-water system, most of the NaCl and all of the Carnallite were separated. The operation cost reached the optimum when the heat collection and evaporation were controlled at 75 and 55 °C, respectively. When the solar radiation amount was $19557 \text{ kJ} \cdot \text{m}^{-2} \cdot \text{d}^{-1}$, the solar collector area for producing Carnallite was about $34.27 \text{ m}^2 \cdot \text{t}^{-1}_{\text{salts}}$, and the operation cost was $\$13 \text{ t}^{-1}_{\text{salts}}$. The energy consumption of salt manufacturing is at least 25% higher than that of natural evaporation. Regarding the economy, the solar assisted salt manufacturing process is recommended to be performed at a production scale of more than 20 tons per day.

Keywords solar collection, evaporation, brine, salt manufacturing, economy

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