

The effects of Ca^{2+} and Mg^{2+} ion concentrations in brine on scaling formation and morphology on metal surfaces

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ABSTRACT

The scale formation and morphology for aluminum brass tube surfaces in high-temperature brine were studied and experimented on. The scaling morphology was detected using scanning electron microscopy and an energy-dispersive X-ray spectroscopy. The effects of Ca^{2+} and Mg^{2+} ion concentrations on scaling morphology for $\text{Mg}(\text{OH})_2$ crystals and CaCO_3 crystals on tube surfaces were investigated. After a piece of metal tube is immersed in high-temperature brine for a period of time, the scaling would appear on the tube surface, primarily composed of $\text{Mg}(\text{OH})_2$ crystals and CaCO_3 crystals. Scaling structure and crystal morphology are affected by concentrations of Mg^{2+} and Ca^{2+} ions. Appropriate amounts of Mg^{2+} ions could cause CaCO_3 crystals to split into scattered irregular crystals on aluminum brass tube surfaces.

Keywords: Scaling; Ion concentration; Brine; Desalination; Crystallization mechanism

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