

Effect of particles on the induction time of calcium carbonate in synthetic SWRO concentrate

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ABSTRACT

Particles, which are naturally present in seawater, have been reported to affect the formation of CaCO₃ crystals. In this study the effect of foreign particles on induction time was explored. Induction time was monitored using a highly sensitive pH meter mounted in an air-tight glass reactor. Experimental work was performed with synthetic seawater prepared using ultra-pure water with a composition equivalent to 50% recovery SWRO concentrate (based on the composition of seawater from the Gulf of Oman). The prepared synthetic solutions were filtered through filters having different pore sizes namely 0.22 µm; 0. µm and 100 kD (≈ 0.03 µm). In addition, glass beads of diameter 20–30 nm were added in volumes of (1; 0.5 and 0.1 ml) to synthetic seawater to yield an increase in glass/water contact area of 123%, 16% and 1% compared to the total reactor glass area in contact with the synthetic water. Different mixing speeds were applied namely 10, 50, 150 and 300 rpm to investigate the effect of mixing on experimental results. Results showed that filtering synthetic seawater and applying different mixing speeds had a negligible effect on the experimental induction time results. On the contrary, the addition of glass beads shortened the induction time substantially from 30% to 100% (immediate precipitation), depending on the amount of beads added.

Keywords: Induction time; Membrane; Calcium carbonate; Glass beads; Filtration

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