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The work presented during 21st INTERNATIONAL CORROSION CONGRESS & 8th INTERNATIONAL CORROSION MEETING in the month of July of 2021.

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Study of calcium carbonate scaling and corrosion on steel using a high salinity NaCl and CaCl₂ brine

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Abstract

In Brazilian pre-salt production, the high levels of carbon dioxide (CO₂) in the associated gas and the high salinity, in addition to the high levels of calcium ions, cause problems related to corrosion and scale. The deposition of these products in the internal pipe wall reduces the diameter of the pipe and can impact in production flow guarantee. Parameters related both to substrate and environment can influence calcium carbonate (CaCO₃) precipitation mechanisms. In this study, the effect of surface roughness of steel on calcium carbonate scaling experiments had been performed in a high salinity NaCl and CaCl₂ brine, simulating pre-salt produced water and under flow conditions. The scale deposition was characterized by using techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM) and energy dispersion X-ray spectroscopy (EDS). It will be shown that both roughness and flow influence the calcium carbonate scale formation and substrate corrosion.

Keywords: pre-salt, calcium carbonate scale, surface effects.

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