Study on corrosion behavior of P110S steel in CO₂-H₂S-saturated solution

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The corrosion behavior of P110S steel in CO₂-H₂S-saturated completion fluid with pH buffer was studied using immersion tests and electrochemical tests. SEM, EDS, XRD, and potential-pH diagrams were used to analyze the corrosion scale characteristics. P110S steel experienced severe localized corrosion in CO₂-H₂S-saturated completion fluid despite the addition of pH buffer. The main component of the corrosion scale was mackinawite and FeCO₃. The corrosion scale with mackinawite as the main component had an excellent protective effect on the matrix when the scale was intact. However, the corrosion scale was poorly bonded to the matrix and was prone to partial cracking and peeling, which was the cause of severe localized corrosion of P110S steel.

Keywords: P110S, pH buffer, CO₂-H₂S corrosion, Corrosion scale, Electrochemical

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