The Initial Stage Corrosion of X80 Steel in Saturated Sandy Soil Containing Cl^- and SO_4^{2-}

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The corrosion differences of X80 steel are exhibited by electrochemical impedance spectroscopy, polarization curves, and scanning electron microscopy in saturated sandy soil containing different concentrations of NaCl and Na₂SO₄ under indoor simulation conditions. The corrosion rate of X80 steel is minimal with NaCl and Na₂SO₄ concentrations of 0.5% and 0.3%, respectively. Additionally, the corrosion morphologies are mainly shallow and small pits. However, the corrosion rates are hindered due to the accumulation of oxide films on the surface of X80 steel. The increase in sodium salt content accelerates the overall corrosion rate until 1.0%. Meantime, the oxide films are eroded by Cl^- and SO_4^{2-} and re-accelerate the electrochemical corrosion process, so the pits evidently deepen and expand.

Keywords: X80 steel, saturated soil, corrosion, polarization curves, EIS

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