

## Effect of $\text{CO}_3^{2-}$ Concentration on the Corrosion Behavior of X80 Pipeline Steel in Simulated Soil Solution

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In this paper, the effect of  $\text{CO}_3^{2-}$  concentration on the corrosion behavior of pipeline steels was studied by using potentiodynamic polarization and electrochemical impedance methods in a high-pH simulated soil solution. The results showed that the corrosion of X80 pipeline steel in a  $\text{Na}_2\text{CO}_3$  solution involved a self-passivation mechanism. As the  $\text{CO}_3^{2-}$  concentration increased, the protective performance of the passivated film increased, whereas the corrosion rate decreased. When 1 mol/L  $\text{NaHCO}_3$  was added, the corrosion followed an active-passive mechanism and displayed two anodic peaks. Moreover, the influence of the  $\text{CO}_3^{2-}$  concentration was different from that of  $\text{NaHCO}_3$ , the  $\text{NaHCO}_3$  addition increased the corrosion current density, which consequently increased the corrosion rate.

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**Keywords:** pipeline; high-pH simulated solution; potentiodynamic polarization; electrochemical corrosion

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