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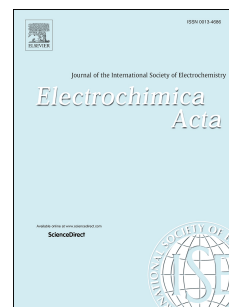
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Effect of HCO_3^- on Electrochemical Kinetics of Carbon Steel Corrosion in CO_2 -saturated Brines

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ABSTRACT

The effect of $\text{HCO}_3^-(\text{aq})$ on CO_2 corrosion of carbon steel was investigated in deaerated 3.5 wt% NaCl solutions at 30 °C from pH 3.96 to 7.15. In the CO_2 -saturated solutions, the pH was adjusted with different $\text{HCO}_3^-(\text{aq})$ concentrations, $c[\text{HCO}_3^-(\text{aq})]$. The corrosion rate decreased by a factor of 2 as the pH and $c[\text{HCO}_3^-(\text{aq})]$ increased. The cathodic current density during polarization increased at higher pH with higher $c[\text{HCO}_3^-(\text{aq})]$, indicating that $\text{HCO}_3^-(\text{aq})$ acted as an additional hydrogen source for the hydrogen evolution reaction. As the pH increased, the active dissolution regions displayed similar

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