Effect of Turbulent Flow on Corrosion Behavior of 6.5Cr Steel in CO₂-Containing Environment

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The effect of turbulent flow on the corrosion behavior of 6.5Cr steel in CO₂-saturated oil field formation water was examined using a rotating cylinder electrode. Electrochemical measurements demonstrated that increasing the flow rate could decrease the corrosion rate of 6.5Cr steel. When the rotation rate of the rotating cylinder electrode reached 2000 rpm, 6.5Cr steel could be passivated. Surface characterization and ion analysis results showed that increasing flow rate reduced Fe²⁺ concentration in the solution near the steel surface, inhibited FeCO₃ deposition, and then increased Cr(OH)₃ concentration in a corrosion film.

Keywords: Cr-bearing alloy steel, Rotating cylinder electrode, CO₂ corrosion, Passivity, Flow rate

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