Study on Electrochemical Corrosion Behavior of 13Cr Steel (0Cr13Ni2P) in Saturated CO₂ Solution

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A type of 13Cr Steel (0Cr13Ni2P) was selected in this paper as a research object. The corrosion behavior of this 13Cr steel in the CO₂ environment were studied by means of electrochemical testing technology, and the effects of Cl-, temperature and other factors on the corrosion behaviors were investigated. There was an obvious passivation region in the 13Cr steel when immersed in NaCl solution saturated with CO₂, and the AC impedance spectrum was characterized by dual capacitive arc. The addition of CO₂ reduced the charge transfer resistance and the passive film resistance, and increased the corrosion rate significantly. The increase of the temperature and Cl⁻ concentration had no effect on the characteristics of EIS. The composition of the passivation film on the surface of 13Cr steel was analyzed by XPS, the passive film is n-p type semiconductor. With the increase of the potential of forming passive film, the steady-state current density was decreased, the donor density and acceptor density of passive film was decreased, and the protection performance was improved.

Keywords: 13Cr steel; saturated CO₂; polarization; electrochemical corrosion

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