

Influence of CO₂ and H₂S Concentration on Hydrogen Permeation Behavior of P110 Steel

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The effect of CO₂ and H₂S concentration on the electrochemical and hydrogen permeation behaviors of P110 steel was investigated separately. The results showed that the corrosion current density was enhanced, while the polarization resistance and charge-transfer resistance decreased as the concentration of CO₂ and H₂S increased. The variation rule of hydrogen permeation behaviors can be described below: the hydrogen diffusion coefficient had little changed, whereas both of the diffusible hydrogen concentration and the steady-state hydrogen permeation current density increased. The steady-state hydrogen permeation current density in H₂S environment was far greater than that in CO₂ environment, which was caused by the poisoning of H₂S. The relationship between the hydrogen diffusion coefficient and temperature can be described by Arrhenius equation according to the hydrogen permeation curves at different temperatures.

Keywords: Electrochemistry; Hydrogen Permeation; P110 Steel

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