

Effects Pre-strain of Carbon Steel on Stress-Strain Diagram in CO₂ Environment with the Presence of H₂S

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ABSTRACT

In oil and gas industrial environments, carbon dioxide (CO₂) and hydrogen sulfide (H₂S) contained in aqueous system are the most common corrosive factors which deteriorate infrastructure made of carbon steel. One of the key factors to accelerate corrosion rate is strain conditions of the steel. Higher strain is suspected to contribute on more hydrogen penetration. This research tested simultaneously the effects pre-strain of carbon steel under saturated CO₂ and CO₂/H₂S environment. The steels were tested in between 5 to 35 percents of initial pre-strain. It showed that the existence of H₂S decrease the ultimate tensile strength of the steel. While, the initial pre-strains condition increases the maximum tensile stress. In addition, CO₂ and H₂S contribute on decreasing toughness.

KEYWORDS: CO₂ corrosion, Response surface model, Empirical model.