Recent Advances in Modeling of Corrosion of Mild Steel in CO_2 and H_2S Aqueous Environments

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Over the past decade, the knowledge related to predicting internal pipeline corrosion for sweet and particularly sour environments has dramatically improved. Advancement in understanding of the corrosion mechanisms related to H_2S corrosion environments enabled the development of an integrated electrochemical model for CO2/H_2S uniform corrosion, including the effect of H_2S on the protective corrosion product formation on mild steel. The latest model of uniform CO_2/H_2S corrosion of carbon steel accounts for the key processes underlying of corrosion: chemical reactions in the bulk solution, electrochemical reactions at the steel surface, the mass transport between the bulk solution to the steel surface, and the corrosion product formation and growth (iron carbonate and iron sulfide). The model is able to predict the corrosion rate as well as the surface water chemistry as related to all the key species involved. The model has been successfully calibrated against experimental data in conditions where corrosion product layer do not form and in environments where they do, and compared to other similar models