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Effect of Environmental Media on the ElectrochemicalBehavior of API X70 Pipeline Steel

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Abstract: This work investigates the corrosion behavior of X70 steel in different environments: sea sand, desert sand, mud, and seawater. The principle of extracting solutions from these media consisted of mixing a soil material with distilled water, and the mixture was agitated using an automatic agitator, which resulted in the extraction of the solution. Potentiodynamic polarization and electrochemical impedance tests are used to characterize the samples in both media. The results show that the pipeline steel X70 has an excellent corrosion resistance in the sea sand solution, resulting in a low corrosion current density compared to other media. The impedance diagrams for both media are characterized by two capacitive loops, the first loop is attributed to charge transfer processes and the second loop is related to diffusion phenomena. The observation of corroded surfaces shows that the corrosion mechanism in different media is by pitting.

Keywords : pitting, sea sand, seawater, corrosion