
Electrochemical characterization of a flexible riser exposed to saline media in the absence and presence of CO₂

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With the technological advances in offshore oil and gas exploration and production, the structures known as flexible risers have come to the fore because they enable deepwater activities. Despite their high corrosion resistance properties, risers can suffer deterioration, leading to failure accidents, high repair costs, and the risk of environmental and employee safety problems. Given the above, this work aimed to assess the corrosion resistance of steel with a eutectoid composition containing 0.49% Mn using the techniques of open circuit potential (OCP) monitoring over time, potentiodynamic polarisation (PP), and electrochemical impedance spectroscopy (EIE) in a medium of 3.5% (w/v) NaCl in the absence of and saturated with CO₂. The surface morphology was investigated by optical microscopy. The experimental results showed that the corrosion current densities of the steel exposed to the environment with and without CO₂ are significantly similar. Finally, the EIE results showed that the polarisation resistance (Rp) is higher in the absence of CO₂, indicating the damaging factor caused by the presence of CO₂.