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Inhibition of API 5L X60 steel Corrosion in CO₂ –Saturated 3.5% NaCl solution by Tannic Acid and Synergistic Effect of KI additive.

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Abstract

The corrosion inhibition performance of Tannic Acid (TA) on API 5L X60 pipeline steel in CO₂-saturated 3.5 % NaCl solution was investigated using electrochemical techniques namely; Linear Polarization Resistance (LPR) and Electrochemical Impedance Spectroscopy (EIS). The effect of KI addition on the inhibitive performance was assessed. Results obtained showed that TA moderately inhibited the steel corrosion in the studied medium. Addition of KI synergistically enhanced the inhibitive performance of TA. Corrosion inhibition performance of TA alone and on addition of KI was influenced by concentration and immersion time. Excellent inhibition with protection efficiency of about 90% was achieved on addition of KI to TA at longer immersion time up to 24 h. Surface characterization techniques namely Scanning Electron Microscopy (SEM), X-ray Photoelectron Spectroscopy (XPS) and Fourier Transformed Infrared (FTIR) spectroscopy were employed to elucidate the mechanism of the inhibition.

Keywords: CO₂-Corrosion; Tannic acid; Synergistic effect; Potassium Iodide; Corrosion inhibition; Steel;

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