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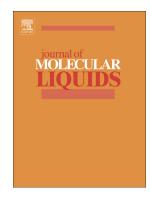
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Corrosion inhibition performance of spermidine on mild steel in acid media

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Abstract

The corrosion inhibition and adsorption behavior of spermidine on mild steel (MS) in 1 M sulfuric and 0.50 M hydrochloric acid have been investigated at room temperature by electrochemical methods viz., electrochemical impedance spectroscopy (EIS) and Tafel polarization techniques. The adsorption of spermidine on MS is studied by Langmuir adsorption isotherm, Fourier transform infrared (FT-IR) spectroscopy and density functional theory (DFT) analysis. The Tafel results imply that, spermidine behaves mixed mode inhibitor and the corrosion inhibition efficiency increases with increasing of spermidine concentration. The EIS results exposed that, the formation of adsorptive layer of spermidine increase the charge transfer resistance and subsequent drop in the double layer capacitance of MS in acids. The calculated free energy of adsorption (Δ G) for spermidine in HCl and H₂SO₄ are -31.92 and -30.48 kJ mol⁻¹ which suggested the physical along with chemical mode of adsorption of inhibitor. The formation of inhibitive protection layer on MS is confirmed by FT-IR spectroscopy. The correlation of corrosion inhibition performance and molecular Download English Version:

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