Inhibition of mild steel corrosion in acid medium

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Abstrak

Since inhibition is the simplest mechanism used for mitigating the corrosion of metals and alloys, particularly in acidic environments, the present work aims to investigate the inhibiting effect of N-benzyl-N?-phenyl thiourea (BPTU) and N-cyclohexyl-N?-phenyl thiourea (CPTU) on mild steel corrosion in 0.1M HCl medium using the Tafel extrapolation technique. Tafel experiments were conducted with ±250 mV vs. rest potential (RP) in steps of 20 mV from the cathodic side for recording the corrosion currents, and then, the Tafel plot of potential vs. current was drawn for determining the corrosion current density (icorr). The linear polarization method was also used for validating the Tafel results. It was performed by polarizing the specimen with ±20 mV vs. RP in steps of 5 mV, and the corrosion currents were noted. The plot of potential vs. current was drawn for calculating icorr. The study reveals that both BPTU and CPTU act as anodic inhibitors for mild steel in the HCl medium, and good inhibition efficiency (>97%) was evidenced from both the compounds even at elevated temperatures. The study also reveals that the investigated compounds get adsorbed quickly on the steel surface, following Temkin’s adsorption isotherm. The kinetic parameters obtained from the study indicated that the inhibition was governed by a chemisorption mechanism and the presence of inhibitors substantially reduced the metal dissolution in the studied temperature range. The investigation shows that there was a good correlation between the Tafel extrapolation and linear polarization results.