Corrosion inhibition performance of three antibacterial agents for mild steel in 1 M HCl solution at different temperature: experimental and theoretical studies

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The inhibiting properties of corrosion inhibitors of norfloxacin (NFA), ciprofloxacin (CFA), and ofloxacin (OFA) for steel in 1 M HCl solution had been studied, respectively. Their corrosion inhibiting property was performed in 1 mol/L hydrochloric acid by potentiodynamic polarization (PDP) and electrochemical spectroscopy (EIS) tests at different temperatures range. The order of their corrosion inhibition efficiency is as follows: CFA > NFA > OFA. Polarization data suggest that the corrosion inhibitors are predominantly mixed-type. The best fit for inhibitors adsorption is obey Langmuir isotherm model. The structure properties of corrosion inhibitors are correlated by means of a density-functional quantum-chemical approach. Moreover, the molecular dynamics calculation vividly simulates the adsorption behavior of CFA, NFA and OFA molecules on the surface of steel.

Keywords: Corrosion; Inhibition; Mild steel; Acid; Molecular dynamics

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