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Experimental study and Theoretical Simulations of Some Indolinone Based Mannich Bases as Novel Corrosion Inhibitors for Mild Steel in Acid Solutions

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The adsorption behaviour of three Mannich bases [3-(4-chlorophenylimino)-1-(piperidin-1-ylmethyl)indolin-2-one{M-1}, 3-(4-chlorophenylimino)-1-(morpholinomethyl)indolin-2-one{M-2} and 3-(4-chlorophenylimino)-1-[(dibutylamino)methyl]indolin-2-one{M-3}] on mild steel surface in 1M HCl solution was investigated using electrochemical impedance spectroscopy (EIS), polarization curves, and weight loss techniques. The experimental results showed that all Mannich bases are good inhibitors showing >90% inhibition efficiency. Potentiodynamic polarization measurements showed that all studied inhibitors are mixed type. Further, quantum chemical calculations were carried out and the relations between computed parameters and corrosion inhibition efficiency have been discussed.

Keywords: Electrochemical impedance spectroscopy; Mannich base; Corrosion; Quantum chemical calculations

FULL TEXT