

Aqueous Extract of Argemone Mexicana Roots for Effective Corrosion Inhibition of Mild Steel in HCl Environment

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Abstract : Inhibition effect of aqueous Argemone Mexicana root extract (AMRE) on mild steel corrosion in 1 M HCl has been studied by weight loss, Tafel polarization curves, electrochemical impedance spectroscopy (EIS), scanning electron microscopy (SEM) and atomic force microscopy (AFM) techniques. Results indicate that inhibition ability of AMRE increases with the increasing amount of the extract. A maximum corrosion inhibition of 94% is acknowledged at the extract concentration of 400 mg L⁻¹. Polarization curves and impedance spectra reveal that both cathodic and anodic reactions are suppressed due to passive layer formation at metal-acid interface. It is also confirmed by SEM micro graphs and FTIR studies. Furthermore, the effects of acid concentration (1-5 M), immersion time (120 hours) and temperature (30-60 °C) on inhibition potential of AMRE have been investigated by weight loss method and electrochemical techniques. Adsorption mechanism is also proposed on the basis of weight loss results, which shows good agreement with Langmuir isotherm.

Keywords : mild steel, polarization, SEM, acid corrosion, EIS, green inhibition

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