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Allura Red, Sunset Yellow and Amaranth Azo Dyes for Corrosion Inhibition of Mild Steel in 0.5 H_2SO_4 Solutions

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Abstract : Corrosion inhibition potential of azo dyes namely Allura red (AR), Sunset Yellow (SY) and Amaranth (AN) have been investigated in 0.5 M H2SO4 solutions by electrochemical impedance spectroscopy (EIS), Tafel polarization curves, linear polarization curves, open circuit potential (ocp) curves, UV-Visible spectroscopy, Fourier Transform Infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) techniques. Amaranth dye is found to provide highest corrosion inhibition (90 %) against mild steel corrosion in sulfuric acid solutions among all the tested dyes; while SY and AR dye shows 80% and 78% corrosion inhibition efficiency respectively. The electrochemical measurements and surface morphology analysis reveal that molecular adsorption of dyes at metal acid interface is accountable for inhibition of mild steel corrosion in H2SO4 solutions. The adsorption behavior of dyes has been investigated by various isotherms models, which verifies that it is in accordance with Langmuir isotherm.

Keywords : mild steel, Azo dye, EIS, Langmuir isotherm
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