Date Palm Seed Extract as a Green Corrosion Inhibitor in 0.5 M HCl Medium for Carbon Steel: Electrochemical Measurement and Weight Loss Studies

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In this work, the corrosion inhibiting properties of date palm seed extract (DSE) for carbon steel in 0.5 M hydrochloric acid (HCl) solution has been investigated using several techniques, including weight loss measurement, potentiodynamic polarisation (PDP), and electrochemical impedance spectroscopy (EIS). By adding the DSE concentrations in 0.5M HCl solution from 800 ppm to 2000 ppm, the inhibition efficiency (IE%) was improved with DSE concentration up to 1400 ppm. Highest IE% of 94 in weight loss, 92 in PDP, and 97 in EIS were all attained at an optimum DSE concentration of 1400 ppm. Further increasing the DSE concentration to 2000 ppm, IE% was shown to be decreased. Moreover, the PDP measurement indicated that DSE is a mixed-type inhibitor, affecting both cathodic and anodic partial reactions. From the Gas Chromatography and Mass Spectrometry (GC-MS) analysis, it was revealed that DSE is mainly composed of (wt.%) 36.0 lauric acid, 12.0 caprylic acid, and 10.7 myristic acid. This study revealed that DSE has it could serve as a green corrosion inhibitor for carbon steel in HCl medium.

Keywords: Date palm seed; green corrosion inhibitor; HCl; carbon steel; weight loss measurement; Potentiodynamic Polarisation (PDP) and Electrochemical Impedance Spectroscopy (EIS).

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