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Research Article

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Inhibitory Properties of N, N-Diethylaniline for Zinc in H_2SO_4 Solutions

R. T. Vashi[1], S. A. Zele[2], B. B. Patel [3*]

[1]Department of Chemistry, [1]Navyug Science College – Rander Road, Surat, Gujarat, India.

[2]B. K. M. Science College, Tithal Road, Valsad, Gujarat, India.

[*3]Bhagwan Mahavir College of Science & Technology, Vesu, Surat, Gujarat, India.

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Abstract: The inhibition of the corrosion of zinc in sulphuric acid solution by N, N-Diethylaniline (DEA) has been studied using weight loss, Potentiodynamic Polarization and Electrochemical Impedance Spectroscopic (EIS) techniques. Corrosion rate increases with the increase in acid concentration and with increase in temperature. As inhibitor concentration increases corrosion rate decreases while percentage of inhibition efficiency (I.E.) increases. At constant inhibitor concentration, corrosion rate and I.E. increases with increase in acid concentration. Maximum I.E. of DEA was found up to 96.98 % at 60 mM inhibitor concentration in 0.5 M H_2SO_4 solution. The value of free energy of adsorption (ΔG^0_{ads}), heat of adsorption (Q_{ads}), energy of activation, (E_a), enthalpy of adsorption (ΔH^0_{ads}) and entropy of adsorption (ΔS^0_{ads}) were calculated. The inhibition effect is discussed in view of DEA molecules adsorbed on the metal surface and it obeys Langmuir adsorption isotherm. Polarization curve indicates that inhibitor act as mixed type. The results obtained showed that the DEA could serve as an effective inhibitor for corrosion of zinc in sulphuric acid.

Keywords: Zinc, H_2SO_4, N, N-Diethylaniline, Corrosion, Polarization, EIS