Available online at www.joac.info

ISSN: 2278-1862

Journal of Applicable Chemistry

2020, 9 (1): 135-145

(International Peer Reviewed Journal)

Inhibitive Action of *p*-Toluidine on Corrosion of Zinc in H_2SO_4 Medium

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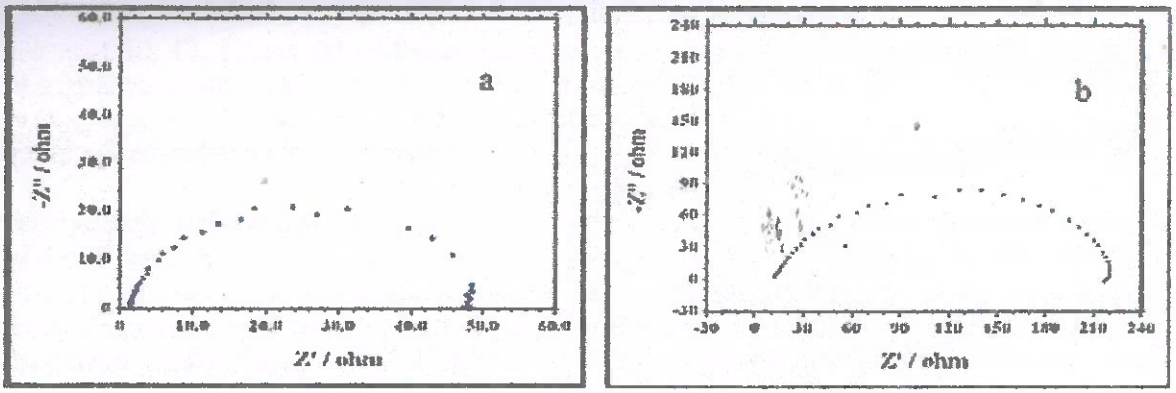
Accepted on 19th December, 2019

ABSTRACT

In the present study, the inhibition of the corrosion of zinc in H_2SO_4 solution by p-toluidine has been studied by using weight loss, Potentiodynamic Polarization and Electrochemical Impedance Spectroscopic (EIS) methods. Corrosion rate increases with the increase in acid concentration and 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. p-toluidine showed maximum I.E. of 94.87 % at 60 mM in 0.5 M H_2SO_4 acid at 301 K. 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. Plot of log [θ/(1- θ)] vs. log C shows straight line with almost unit slope, which suggest that the inhibitor cover both anodic and cathodic regions through general adsorption following Langmuir isotherm. Polarization curve indicates that inhibitor act as mixed type. The results obtained showed that the p-toluidine could serve as an effective inhibitor for corrosion of zinc in H_2SO_4 acid.

Graphical Abstract



Nyquist plots for corrosion of zinc in 0.1 M H_2SO_4 (a) in absence and (b) in presence of inhibitor.

Keywords: Zinc, H_2SO_4, Corrosion, *p*-Toluidine, Polarization and EIS.