Inhibitive Properties and Quantum Chemical Calculations of a New Synthesized Schiff Base 1-[(3hydroxyphenylamino)methylene]-naphtalen-2-one for XC48 in Hydrochloric Acid Solution

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doi: 10.20964/2018.07.23

Received: 16 January 2018 / Accepted: 2 April 2018 / Published: 5 June 2018

A new Schiff base derived from o-hydroxy aromatic aldehyde, namely 1-[(3-hydroxyphenylamino)methylene]-naphtalen-2-one (L), was synthesized and characterized by X-ray crystallographic technique. It is then evaluated as inhibitor on the corrosion of mild steel XC48 in a 1M hydrochloric acid solution. The study was carried out using weight loss, polarization, electrochemical impedance spectroscopy and Quantum chemical. At constant temperature, the corrosion rate decreases with increasing the inhibitor content. A maximum inhibition efficiency of 78.3 % was obtained at 10^{-3} M. However, the increase in temperature leads to an increase in the corrosion rate of steel. Calculation and estimation of thermodynamic parameters E_a , ΔH°_{ads} , ΔS°_{ads} , and ΔG°_{ads} help in determining the inhibition mechanism of the Schiff base. It was found that Schiff base acted as mixed type inhibitor with predominant cathodic inhibition and adsorbs according to Langmuir adsorption isotherm model. Morphological surface aspect has been investigated using optical microscope. Quantum chemical calculations study corroborates experimental results.

Keywords: Synthesis; Mild steel; Weight loss; Adsorption; Polarization; Impedance

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