Inhibition Effect of *Coleus forskohlii* leaf extract on Steel Corrosion in 1.0 M HCl Solution: Experimental and Theoretical Approaches

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doi: 10.20964/2018.12.53

Received: 10 August 2018 / Accepted: 17 September 2018 / Published: 5 November 2018

The inhibitive performance of *Coleus forskohlii* leaf extract on mild steel corrosion process in 1.0 M HCl aqueous solutions was studied. Several methods have been adopted such as, mass loss, Tafel polarization curves as well as electrochemical impedance spectroscopy (EIS). The inhibition effectiveness was found to increase as the inhibitor concentration increased. The impact of temperature on corrosion inhibition was studied by using EIS method. The thermodynamic parameters (activation energy, free energy change and entropy change) were calculated. The inhibitor under study is classified as a mixed type inhibitor. Adsorption isotherms models were examined. Adsorption process obeys Langmuir model. The electronic properties concluded from DFT calculations were exploited to give more understandings to the action approach of studied inhibitor. Scanning electron microscope (SEM) and Energy-dispersive X-ray spectroscopy (EDS) were used to explore the efficiency of the inhibitor. The obtained results confirmed the effectiveness of the studied inhibitor.

Keywords: mild steel; acid solution; *Coleus forskohlii* ; inhibition ; corrosion; DFT

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