

## Studies on Mechanisms of Corrosion Inhibition of *Acalypha chamaedrifolia* Leaves Extract towards Mild Steel in Acid Medium

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**Abstract :** The mechanisms of corrosion inhibition of mild steel in acid medium using *Acalypha chamaedrifolia* leaves extract as potential green inhibitor were investigated. Gravimetric (weight loss) technique was used for the corrosion studies. Mild steel coupons of 2cm × 1cm × 0.27 cm dimensions were exposed for varying durations of between 24 to 120 hours, in 1M HCl medium containing a varying concentrations of the leaves extract (0.25g/L, - 1.25g/L). The results show that corrosion rates dropped from a value of 0.49 mgcm<sup>-2</sup>hr<sup>-1</sup> for the uninhibited medium to a value of 0.15 mgcm<sup>-2</sup>hr<sup>-1</sup> for the inhibited medium of 1M HCl in 0.25 g/l of the extract. Values of corrosion inhibition efficiencies of 70.38-85.11% were observed as the concentration of the inhibitor were increased from 0.25g/L, - 1.25g/L. Corrosion Inhibition was found to increase with increase in immersion time and temperature. The magnitude of the  $E_a$  indicates that the interaction between the metal surface and the inhibitor was chemisorptions. The Adsorption process fit into the Langmuir isotherm model with a correlation coefficient of 0.97. Evidence from molecular dynamics model shows that Methyl stearate (Line 5) and (3Z, 13Z)-2-methyloctadeca-3,13-dien-1-ol (line 11) were found to have the highest binding energy of  $-197.69 \pm 3.12$  and  $-194.56 \pm 10.04$  in kcal/mol respectively. The binding energy of these compounds indicates that they would be a very good corrosion inhibitor for mild steel and other Fe related materials.

**Keywords :** binding energy, corrosion, inhibitor, Langmuir isotherm, mild steel.

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