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Anticorrosion potential of new synthesized naphthamide on mild steel in hydrochloric acid solution: Gravimetric, electrochemical, surface morphological, UV-visible and theoretical investigations (Article)

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Abstract

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The effect of N,N'-((methylazanediy)bis(propane-3,1-diyl))bis(2-hydroxy-1-naphthamide) (MPHN) on the corrosion of mild steel in an aqueous solution of 1 M hydrochloric acid was investigated at different temperatures by chemical and electrochemical techniques. The results obtained showed that MPHN could serve as an effective inhibitor for the corrosion of mild steel in hydrochloric acid media. The N,N'-((methylazanediy)bis(propane-3,1-diyl))bis(2-hydroxy-1-naphthamide) (MPHN) exhibited highest inhibition efficiency of 98% at concentration of 10^{-3} M. Tafel polarization measurements revealed that MPHN effectively suppressed both the anodic and cathodic processes of mild steel corrosion in acid solution and acted as a mixed-type inhibitor. EIS measurements indicated that the addition of the inhibitor increases the charge-transfer resistance (R_{ct}), decreases the double-layer capacitance (C_{dl}) of the corrosion process, and hence increases inhibition performance. The SEM/UV-Visible analysis was used to corroborate the mechanism of inhibition. Quantum chemical calculations were used to correlate the inhibition ability of MPHN with its electronic structural parameters. © 2018 by CEE (Center of Excellence in Electrochemistry).

SciVal Topic Prominence

Topic: Corrosion inhibitors | Carbon steel | mixed-type inhibitor

Prominence percentile: 99.785 

Author keywords



Corrosion inhibition DFT Electrochemical studies Mild steel SEM UV-visible Weight loss

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
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