Electrochemical and Theoretical Evaluation on the Corrosion Inhibition of Carbon Steel by Organic Selenides in Acidic Medium

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The influence of organic solenoids as inhibitors for carbon steel (CS) dissolved in 1.0 M HCl had been tested via different electrochemical tests at 298K. Open circuit (OC), Tafel plots, electrochemical impedance spectroscopy (EIS) and electrochemical frequency modulation (EFM) tests had been examined. The gained data had been illustrated that organic selenides functioned as an effective and good inhibitors. The inhibition efficiency (IE%) had been found to improve with improvement of inhibitor concentrations reaching maximum inhibition efficiency more than 80% at 298K. The Tafel plots had been illustrated that the organic selenides coordination were mixed type. The surface morphology of the carbon steel specimens in the absence and presence of organic solenoids had been evaluated by Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM) measurements. The influence of molecular structure on the inhibition efficiency (IE%) has been investigated by quantum chemical computations. The relation between the inhibition efficiency and some quantum parameters have been evaluated and discussed.

Keywords: Organic selenides, 1.0 M HCl, Corrosion, Carbon steel, Tafel plots, EIS, EFM, SEM, AFM, FMO_s.

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