البحث السابع

The inhibition tendencies of novel hydrazide derivatives on the corrosion behavior of mild steel in hydrochloric acid solution.

Abstract:

Three different simple and polymeric hydrazide derivatives have been synthesized, evaluated and investigated as corrosion inhibitors for mild steel in 1 M hydrochloric acid medium. The corrosion inhibition performance of these additives was evaluated using electrochemical impedance spectroscopy (EIS) and polarizations measurements. The inhibition efficiency obtained from polarization measurement followed the order of PACAH > ACAH > CAH. The inhibition efficiency of the polyhydrazide derivative (PACAH) at concentration of 50 and 500 ppm was found to be 90.66 and 96.79% respectively, while 500 ppm of cyanoacetohydrazide (CAH) was 39.79% and for the monomer N-acryloyl-N0-cyanoacetohydrazide (ACAH) was 88.66%. The surface morphology of the steel electrode was studied with and without the inhibitor after immersion in 1 M HCl solution for 6 h using SEM, EDAX and AFM measurements. The results showed an improvement in the surface morphology where the flawed regions were repaired and the cracks were healed. This improvement was attributed to the adsorption of the inhibitor molecules and the formation of a protective layer at the steel surface. The adsorption isotherm indicated a spontaneous physical adsorption of the inhibitor on the surface of mild steel electrode. Quantum chemical calculation was used to correlate the inhibition efficiencies data of the hydrazide derivatives with their electronic structural parameters. Theoretical calculations supported and elucidated the experimental results

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