The Efficiency of Eco-friendly Schiff Bases as Corrosion Inhibitor for Stainless Steel in Hydrochloric Acid Solution

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Six new Schiff bases, namely, ((E)-(Phenylimino)methyl)phenol (1), 2-((E)-(p-Tolylimino)methyl)phenol (2), (E)-2-(Hydroxybenzylideneamino)benzoic acid (3), (E)-2-(Hydroxybenzylideneamino)benzoi acid (4), 2-((E)-(2 Hydroxyphenylimino)methyl) phenol (5), and 2-((E)-(2 Mercaptophenylimino)methyl)phenol (6) were synthesized and fully characterized. The inhibition efficiencies on the corrosion of stainless steel (304SS) in hydrochloric acid solution were investigated by weight loss, cyclic polarization, and polarization resistance methods. The quantum chemical calculations were performed to provide further insight into the inhibition efficiencies that determined experimentally. Also, the surface morphology of few sample were analyzed by Atomic force microscopy (AFM). The results indicated that inhibition efficiency (I%) increased with increasing inhibitor concentration and decreasing the corrosive media concentration. The effectiveness of the tested inhibitors increased in the order of 1<4<2<3<5<6, and mainly depends on the adsorption behavior and molecular structure of the inhibitor.

Keywords: Schiff bases; stainless steel; weight loss; polarization; acid corrosion

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