Corrosion Inhibition Effect of 5-Azidomethyl-8-Hydroxyquinoline on AISI 321 Stainless Steel in Phosphoric Acid Solution

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In the present paper, 5-Azidomethyl-8-hydroxyquinoline (AMHQ), a synthesized molecule, has been evaluated as a corrosion inhibitor for AISI 321 stainless steel in 5.5 M phosphoric acid solution, using chemical and electrochemical methods such as, hydrogen gas evolution, potentiostatic tests, potentiodynamic polarization, and impedance measurements (EIS). The obtained results show that the inhibition ability is enhanced with increasing concentrations of AMHQ and decreased with temperature. Potentiodynamic polarization curves showed that the AMHQ was acting as a mixed type inhibitor, by adsorption on both anodic and cathodic sites of Alloy 321. EIS measurements revealed that the dissolution of Alloy 321 is controlled by a mechanism of pure activation. The AMHQ is adsorbed on Alloy 321 surface according to the Langmuir isotherm adsorption model and thermodynamic parameters of the adsorption were also determined. Functional density theory (DFT) was used to modelize the interactions between the molecular structure of AMHQ and stainless steel surface.

Keywords: Corrosion; Inhibitor; Stainless steel; EIS; Phosphoric acid

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