

Investigation of the inhibitive effect of some benzimidazole derivatives on corrosion of iron in 1M HCl solutions.

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Abstract

The inhibitive action of some benzimidazole derivatives namely 2-aminobenzimidazole (AB), 2-(2-pyridyl) benzimidazole (PB), 2-aminomethylbenzimidazole (MB), 2-hydroxybenzimidazole (HB) and benzimidazole (B), against the corrosion of iron (99.9999%) in solutions of hydrochloric acid has been studied using potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). At inhibitor concentration range (10^{-3} to 10^{-2} M) in 1 M acid, the results showed that these compounds suppressed both cathodic and anodic processes of iron corrosion in 1 M HCl by adsorption on the iron surface according to Langmuir adsorption isotherm. The efficiency of these inhibitors increases in the order $B < HB < MB < PB < AB$. Potentiodynamic and electrochemical impedance spectroscopy measurements reveal that these compounds inhibit the iron corrosion in 1M HCl and that the efficiency increases with increasing of the inhibitor concentration. Data obtained from EIS

are analyzed to model the corrosion inhibition process through equivalent circuit. A correlation between the highest occupied molecular orbital E_{HOMO} and inhibition efficiencies is presented.

Keywords: Benzimidazole derivatives, Iron; Polarization; EIS; Acid inhibition.