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Corrosion Inhibition of Aluminum by Using Synthesized Dipyrindinium Salts

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Abstract

Some synthesized bipyridinium rings-containing compounds have been used as inhibitors of corrosion of aluminum in 1 M HCl at 45 degrees C. Three dipyrindinium compounds, DMdPyI, HMdPyBr and BMPyEI, and mono-pyridinium ring compound, TMPyI, were studied. Corrosion potential-time, cathodic-anodic polarization and impedance electrochemical measurements, and quantum calculations were applied. The study indicated that these compounds work as anodic inhibitors for Al, except higher concentrations of HMdPyBr and BMPyEI has additionally some cathodic inhibitive action. The inhibition efficiency of these compounds increased with increasing the inhibitor concentration reaching a plateau at $1 \times 10^{-4} \text{M}$ and the highest inhibition was observed by the compound BMPyEI. The inhibitors follow Langmuir adsorption isotherm, and the adsorption is endothermic and increase with temperature. The inhibitor compounds are adsorbed mainly physically and spontaneously on the aluminum surface.

Keywords

Author Keywords: Corrosion protection; Aluminum; Dipyrindinium Salts; inhibitors

KeyWords Plus: LOW-CARBON STEEL; PITTING CORROSION; SULFURIC-ACID; HYDROCHLORIC-ACID; STAINLESS-STEEL; CHLORIDE-IONS; MILD-STEEL; DERIVATIVES; POLYANILINE; ADSORPTION

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