Amino acid derived Imidazole compound as Anti-corrosion additive in epoxy coating for mild steel in artifical seawater evironment

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Abstract The organic coating is widely used to control metal corrosion due to its high ionic resistance. The nitrogen atom containing heterocycle compounds is found an effective corrosion inhibitor additive for epoxy coating on metal [1,2]. The imidazole derivatives are an effective class of coating additive that enhances the disbanding [3], anticorrosive [3] and reduce the curing time [4] of epoxy coating for metal. In the present work, the phenyl and carboxylic substituent containing imidazole (IAA-P) was investigated as an anti-corrosive additive for epoxy coating additive for mild steel and aluminium alloy. The selected imidazole-derived compounds were synthesized following the green chemistry principles and their structure was characterized using the FTIR and NMR techniques. The IAA-P was synthesized using non-toxic chemicals having high LD50 (oral rat) values (> 300 mg/kg). The synthesized product was obtained around 99% product yield with high atom economy (80 %) and low product yield (1.394 g per kg). The corrosion studies were performed using electrochemical and surface analysis. The electrical results reveal that at 6.3 mmol L-1 concentration of IAA-P achieved maximum 80% inhibition efficiency for mild steel and 50% inhibition efficiency for alluminum alloy in artificial seawater. The 1.5 wt% of IAA-P also exhibits the two times anti-corrosive performance of epoxy coating of mild steel in artificial seawater. The results are well supported by the percentage of delamination through optical analysis. The SEM analysis after 30 days shows the IAA-P additive reduces the formation of cracks and pits over the metal surface of the epoxy coating.

Keywords: Epoxy coating, Imidazole, Mild Steel, seawater, EIS, SEM.

Reference

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