Influence of Anions on the Corrosion Inhibition Effect of Imidazolium Based Ionic Liquids for Copper in 3.5 % NaCl Solution

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The corrosion inhibition of effect of 1-octyl-3-methylimidazolium L-tartrate ([OMIM]TA), 1-octyl-3-methylimidazolium L-lactate ([OMIM]LA) and 1-octyl-3-methylimidazolium acetate ([OMIM]Ac) on copper in 3.5 % NaCl solution was investigated by potentiodynamic polarization, electrochemical impedance analysis, and corrosion morphology analysis. Moreover, the effect of anions on the corrosion inhibition of copper performance of the tested ionic liquids was also investigated and analyzed. The results shown that the three ionic liquids are mixed inhibitors, and anions have a significant effect on their inhibition behavior. [OMIM]TA mainly inhibited the anodic reaction of copper in 3.5 % NaCl solution, while [OMIM]LA had a greater inhibition effect on the cathode. The inhibition efficiency of [OMIM]TA and [OMIM]LA increased with the increase of concentration, but that of [OMIM]Ac decreased. The inhibition efficiency of [OMIM]TA is higher than that of [OMIM]LA under the same conditions, its corrosion inhibition efficiency of copper could reach 86.3% at the concentration of 0.005 mol/L. The morphology analysis of the corrosion samples by SEM confirmed the electrochemical results. Meanwhile, it was found that the adsorption of [OMIM]TA and [OMIM]LA on the copper surface conforms to the Langmuir isotherm, and the adsorption parameters and kinetic parameters were obtained and discussed.

Keywords: ionic liquid, anion, copper, corrosion inhibitor, adsorption

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