The Effect of BTA and TTA Composite Use on the Corrosion Resistance of Copper Alloys

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Abstract In order to improve the corrosion resistance of B30 copper nickel alloy and explore the optimal conditions for the composite use of benzotriazole (BTA) and methylbenzotriazole (TTA), an orthogonal experimental design was adopted to analyze the effects of BTA concentration, TTA concentration, film formation time, and film formation temperature on the corrosion resistance of B30 copper nickel alloy through electrochemical impedance spectroscopy, SEM images, energy spectrum analysis, polarization curve testing, and weighing method. The optimal experimental conditions obtained through the above experiment are 5 g/L of BTA, 2.5 g/L of TTA, film formation temperature of 40 ℃, and film formation time of 3 hours. The influence of various factors, from primary to secondary, is as follows: film-forming temperature> BTA>film-forming time> TTA. After the composite use of BTA and TTA, it can be seen in the SEM image that the pore radius and porosity decrease, and the average corrosion current density decreases by 30%. Under certain conditions, the combined effect of two corrosion inhibitors is improved compared to using them alone.

Keywords BTA, TTA, corrosion inhibitor, B30 copper nickel alloy, passivation film