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Effect of Pyrophosphate Ions on the Mechanism of Discharge–Ionization of Copper in Acid Sulfate Solutions

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Abstract

The acceleration of the electrodeposition and anodic dissolution of copper in acid sulfate solutions, caused by sodium pyrophosphate, is found to be due to a chemical heterogeneous stage, which involves an adsorbed pyrophosphate ion (probably, $H_2P_2O_7{}^{2-}$). The assumption about the presence of a surface complex on the surface of copper is substantiated. As follows from adsorption isotherms, obtained for strongly acid (to 2 M H_2SO_4) solutions from anodic Tafel plots, the effect of the acid concentration on the rate of the discharge–ionization of copper is caused by its effect on the surface coverage by the adsorbate. Measurements of the quasi-equilibrium potential of the freshly renewed surface of copper confirm the assumption about the inhibiting of the surface

diffusion of adsorbed atoms by adsorbed pyrophosphate.

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