OPTIMIZATION OF SOLUTION POTENTIAL AND TEMPERATURE ON ION ELECTRODEPOSITION PROCESS OF COPPER (II) USING AN ADDITIVE OF FORMALDEHYDE

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ABSTRACT

This research was conducted at the Chemical Research Laboratory of State University of Yogyakarta (UNY), Instruments Analysis Laboratory of Indonesian Islamic University (UII), and the Research Center for Physics of Indonesian Institute of Sciences (LIPI), Bandung. The purpose of this study was to determine the optimum solution potential and temperature on the electrodeposition process of Copper ion (II) using formaldehyde as an additive.

The subject of this study was 400 ppm of copper solution. The object of this research was copper deposit on the cathode. Electrodeposition process used CuSO4 solution as a source of Cu ion (II), H2SO4 solution as supporting electrolyte, HNO3 solution as depolarizator, formaldehyde as an additive, and platinum plates as electrodes (cathode and anode). Electrodeposition process was done by potential variations of 2, 3, 4, 5 and 6 volts, the solution's temperature variations of 27, 32, 37, 42 and 47°C and the deposition time of 25 minutes. Quantitative analysis was done by Atomic Absorption Spectrometry (AAS) to determine the concentration of Cu ion (II) after electrodeposition process. Qualitative analysis was by X-ray diffraction to determine crystal structures of Cu deposit of the electrodeposition on the optimum potential and temperature of the solution.

The results showed that the optimum potential was 3 volts and the optimum temperature of the solution was 27°C. The concentration of Cu ion (II) of the electrodeposition on the solution's optimum potential and temperature was 298.4750 ppm with the deposition efficiency of 25.38%. The crystal structure of Cu deposit of the electrodeposition on the solution's optimum potential and temperature had a face-centered cubic system with a lattice parameter of 3.5877 A and the lattice planes of (111), (200), (220) and (311).