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Research Article

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Copper Coatings in an Alkaline Environment under Organic Polyamines-Complexors Effects

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ABSTRACT

Safety and compliance with environmental regulations are major issues for humanity. The compounds used here are not all free consequences for our environment. This is why we must be careful with the use of cyanides which can be very breakneck for our ecosystem. The use of Copper Sulphate Pentahydrate ($CuSO_4{}^*5H_2O$) under the effect of organic polyamines-complexors , as well as sodium hydroxide (NaOH) at concentrations varying from (0.25 to 0.375) mol/l, applying low current densities (less than or equal to 0.2 A/dm^2), make it possible to obtain very good electrolytic yields of copper coating in a strongly alkaline media without the direct use of cyanide complexing agent in the electrochemical bath on different substrates. The physical characterization carried out by the Fischer Scope X-ray Xulm expedited the determination of the copper electrodeposited thicknesses on the Iron (steel) substrates for the various studied cases and to draw profiles.

Keywords: Copper, Plating, Alkaline media, Polyamines, Fischer Scope X-ray Xulm, Complexors

INTRODUCTION

It is well known that coatings of copper can be practically reached in a strongly alkaline medium by means of certain bodies (complexing agents). Bright, ductile, and easily oxidized copper coatings are hold in a very alkaline medium with good thicknesses, using sodium or potassium cyanide and double potassium and sodium tartrate as complexing agents' cupric ions [1]. However, the use of cyanide based electrolyte baths in an industrial environment is a great peril for terrestrial and aquatic organisms [2]. Moreover, copper coatings can also be beautiful and well acquire in a strongly acid media using various electrolytes reported in the scientific articles/books [3]. Operating with a limited copper plating possibility, because do not allow to copper all substrates. Certain substrates require alkaline copper plating before being conveyed in an acid copper or nickel plating bath, this is the case of substrates made of zinc, zamak, steel, and many others, to avoid the formation of blisters on the deposit or embrittlement by hydrogen gas of the deposit. In addition to the two preceding methods, the deposits of copper can be received from a chemical copper plating baths, using electrolytes and catalysts (reducing agents) very suitable allowing the reduction of copper ions in the solution on the substrate without any supply of an electric power generation during the process. However, this chemical copper plating procedure turns out to be too expensive.