

## EFFECT OF ADDITIVES ON THE ELECTRODEPOSITION OF Zn-Ni-Co ALLOYS

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### INTRODUCTION:

Zinc nickel alloy electroplated coatings were investigated because of containing corrosion problem to normally zinc plated defense material in storage. A possible solution for this problem was to alloy zinc with less reactive metal. The alloying lowers the chemical reactivity of zinc coating and improves their corrosion resistant electroplate.

The electroplating of zinc cobalt is still comparatively a novel process. The corrosion resistance of the Zn<sub>2</sub>Co alloy is related to the Co content in the coating. The corrosion resistance of the alloy is raised with increase of cobalt content. However, when the cobalt content raises above 1% the corrosion properties diminishes therefore people usually adopt a cobalt concentration of 0.6-1%(1,2). Manufacture of alloys contains less than 1% Co using sulphate or chloride solutions have been reported [3,4].

In this present work a bright ternary Zn-Ni-Co electroplates from acidic chloride bath with and without additives. The effect of the parameter like concentration, current density, temperature and pH are also studied.

### EXPERIMENTAL:

Electrolytes were freshly prepared from distilled water Zn-Ni-Co alloys were deposited from the bath given in Table 1. As for Zn-Ni-Co alloys deposition, pure zinc and nickel anodes are used 86.5% of the total current was supplied through the zinc and remaining 13.5% through the nickel by operating current regulators. Electrodeposits were obtained on mild steel of 0.1mm thick (exposed area 6.45cm<sup>2</sup>). Before electroplating the mild steel substrates were pretreated as follows. Degreasing with Trichloro ethylene, following the cathodic cleaning in alkaline solution and immersing it in 5% HCl. Varying current density, pH and molar ratio electroplating is carried out. The composition of the deposited ternary Zn-Ni-Co is determined by X-ray fluorescence, the surface morphology and crystal orientation were examined using scanning electron microscope and XRD.

### RESULT AND DISCUSSIONS:

Figure 1 shows the curves obtained for the ternary Zn-Ni-Co alloy at various pH the percentage of zinc increases with increasing pH.

Table 1

Bath composition for ternary Zn-Ni-Co

Bath ingredients	Concentrations
ZnCl <sub>2</sub>	0.4 M
NiCl <sub>2</sub> .6H <sub>2</sub> O	0.4 M
CoCl <sub>2</sub> .6H <sub>2</sub> O	0.06 M
NaCl	2.5 M
CH <sub>3</sub> COONa.3H <sub>2</sub> O	0.3 M
H <sub>3</sub> BO <sub>3</sub>	0.5 M
Additive 1	1 gpl
Additive 2	2 gpl

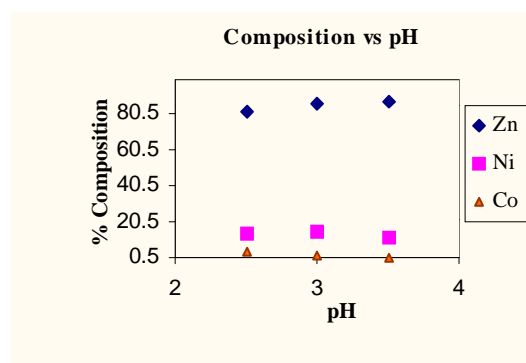


Figure 1

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