PROCESS OF ELECTROPLATING ON IRON IN PRESENCE OF TRANSITION METAL SALT, $ZnCl_2$

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Thesis submitted in partial fulfilment of the requirement for the
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ABSTRACT

The project is to determine the effect of various temperature, current density and percentage of the $ZnCl_2$ salts in electroplating process of zinc on iron. About 70 experiments were run and each experiment took 30 minutes. This experiment used iron rod as cathode electrode whereas zinc sheet as anode electrode. Electrolytes used in this experiment are a mixed aqueous solution of $ZnCl_2$ and NaOH. The ranges of temperature were used are from 5°C to 65°C, and current density from 1 Adm^{-2} to 6 Adm^{-2} , whereas the ranges of $ZnCl_2$ salt used in the electrolyte are between –20% up to 40% of 1.4980g. In this experiment, also shown, how the method of pre-treatment, which is to clean up the cathode electrode from any greases and oxide metals are very importance in the process of electroplating. A simple test was done to see the resistance of the sample from being oxidized. At the final stage of the experiment, a suitable or optimum and economical parameters of zinc electroplating have been determined.

ABSTRAK

Projek ini adalah untuk mengkaji kesan perubahan suhu, ketumpatan arus dan peratus garam $ZnCl_2$ di dalam proses penyaduran elektrik bagi zink ke atas rod besi. Sebanyak lebih kurang 70 eksperimen telah dijalankan dan setiap eksperimen mengambil masa 30 minit. Eksperimen ini menggunakan rod besi sebagai elektrod katod manakala kepingan zink digunakan sebagai elektrod anod. Elektrolit yang digunakan ialah campuran larutan akues $ZnCl_2$ dan NaOH. Julat suhu yang digunakan ialah di antara $5^{o}C$-$65^{o}C$ dan julat ketumpatan arus yang digunakan ialah diantara 1 Adm^{-2} – 6 Adm^{-2} , manakala julat peratus garam $ZnCl_2$ dalam elektrolit adalah antara –20% hingga 40% daripada 1.4980g. Dalam eksperimen ini, ditunjukkan juga bagaimana kaedah "pre-treatment" iaitu membersihkan elektrod katod daripada sebarang kotoran gris dan oksida logam amat penting dalam proses penyaduran. Ujian ringkas ke atas sampel juga dijalankan bagi melihat ketahanan sampel daripada mengalami pengoksidaan. Diakhir eksperimen ini, satu parameter yang sesuai atau optimum dan lebih ekonomikal telah diperolehi dalam menjalankan penyaduran elektrik bagi zink.