

## A COMPARATIVE STUDY ON THE INFLUENCE OF CURRENT DENSITY ON GROWTH KINETICS OF ANODIC OXIDE FILMS FORMED ON ZR-4 IN FEW SELECTED ELECTROLYTES

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### ABSTRACT

A comparative study on kinetics of the electrolytic oxide film formation on Zr-4 and influence of current density was carried out in few selected electrolytes (EDTA, Sodium Methoxide, L-Ascorbic acid, Potassium Malonate, Sodium Bisulphite, Sulphamic acid, Ferrous ammonium sulphate and Lithium Hydroxide) by high field ionic conduction. Zr-4 anodic oxide film growth kinetics study has been carried out at room temperature and at a varied current density, ranging from 4 mA cm<sup>-2</sup> to 12 mA cm<sup>-2</sup> in different selected electrolytes to examine kinetics of the electrolytic oxide film formation on Zr-4 and influence of current density. For Zr-4 within the ionic current density increment found in the kinetic parameters like “rate of formation, current efficiency and differential field of formation”. From the linear plots of logarithm of ionic current density against differential field and applying Cabrera-Mott theory, “the half jump distance (*a*) and height of energy barrier (*W*)” are calculated and compared. The “*a*” is found to be more in Lithium hydroxide and “*W*” is found to be more in Potassium Malonate.

**KEYWORDS:** “Current Density, Current Efficiency, Differential Field, Cabrera-Mott theory & Ionic Current Density”

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