ADVANCES IN MATERIALS ENGINEERING

Volume 2

Edited By:
Md Abdul Maleque
Iskandar Idris Yaacob
Zahurin Halim

IIUM PRESS
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

ADVANCES IN MATERIALS ENGINEERING VOLUME 2

Edited By:
Md Abdul Maleque
Iskandar Idris Yaacob
Zahurin Halim

IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Md Abdul Maleque, Iskandar Idris Yaacob & Zahurin Halim: Advances in Materials Engineering

ISBN: 978-967-418-168-0

Member of Majlis Penerbitan Ilmiah Malaysia -- MAPIM
(Malaysian Scholarly Publishing Council)

PRINTED BY:
IIUM PRINTING SDN.BHD.
NO. 1, JALAN INDUSTRI BATU CAVES 1/3
TAMAN PERINDUSTRIAN BATU CAVES
BATU CAVES CENTRE POINT
68100 BATU CAVES
SELANGOR DARUL EHSAN
TEL: +603-6188 1542 / 44 / 45 FAX: +603-6188 1543
EMAIL: iiumprinting@yahoo.com

Table of Content

Chapter 003

Corrosion Behavior of Zinc in Potassium Hydroxide Aqueous Solution

Suryanto
Faculty of Engineering – International Islamic University Malaysia
✉ : surya@iium.edu.my

Keywords: Corrosion, Zinc, Potassium hydroxide.

Abstract. The corrosion properties of zinc metal in aqueous potassium hydroxide (KOH) electrolyte have been studied. A three corrosion cell configuration was employed. A zinc foil of 99% purity and 1.15 mm in diameter was used as the working electrode. A nickel — plated mesh was used as the counter electrode. The reference electrode was Hg/HgO system. The concentration of aqueous KOH was varied from 1 M to 7 M. Surface roughness measurement and metallographic observation was also performed to support the corrosion rate data. The investigation shows that corrosion rate of zinc increases accordingly from 1M to 7M but the increasing rate is slower at 5M and above. Impedance measurement of KOH solution was also performed.

Introduction

Corrosion is commonly known as rust, an undesirable phenomena which destroys the luster and beauty of objects and shortens their life. Since ancient times, corrosion has affected not only the quality of daily lives of people, but also their technical progress. Corrosion is a natural and costly process. Whereas we can be only a silent spectator to the above process of destruction, corrosion can be prevented or at least controlled [1]. So, in order to control corrosion, we have to know the corrosion rates and all related information regarding the material and the process involved.

Corrosion can be defined in many ways. Some definitions are very narrow and deal with a specific form of corrosions, while others are quite broad and cover many forms of corrosion. The general definition of corrode is to eat into or wear away gradually. Corrosion can be defined as a chemical or electrochemical reaction between a material, usually a metal, and its environment that produces a deterioration of the material and its properties.

The environment consists of entire surrounding in contact with the material. The primary factors to describe the environment are the physical state (either in gas, liquid or solid), chemical compositions (constituents and concentrations) and temperature. Other factors can be the relative velocity of a solution (because of flow or agitation) and mechanical loads on the material, including residual stress within the material. When corrosion is discussed, it is important to think of a combination of a material and an environment. The corrosion behavior of a material cannot be described unless the environment in which the material is to be exposed is identified. Similarly, the aggressiveness of an environment cannot be described unless the material that is to be exposed to that environment is identified. In simple ways, we can say that the corrosion behavior of a material depends on the