

Accepted Manuscript

An evaluation of the anticorrosion effect of ethylene glycol for AA7075-T6 alloy in 3.5% NaCl solution

Hüsnü Gerengi, Moses M. Solomon, Ertuğrul Kaya, Fatma E. Bagci, Ekaette J. Abai

PII: S0263-2241(17)30739-X

DOI: <https://doi.org/10.1016/j.measurement.2017.11.030>

Reference: MEASUR 5099

To appear in: *Measurement*

Received Date: 12 July 2017

Revised Date: 4 October 2017

Accepted Date: 13 November 2017



Please cite this article as: H. Gerengi, M.M. Solomon, E. Kaya, F.E. Bagci, E.J. Abai, An evaluation of the anticorrosion effect of ethylene glycol for AA7075-T6 alloy in 3.5% NaCl solution, *Measurement* (2017), doi: <https://doi.org/10.1016/j.measurement.2017.11.030>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

An evaluation of the anticorrosion effect of ethylene glycol for AA7075-T6 alloy in 3.5% NaCl solution

Hüsnü Gerengi^{a*}, Moses M. Solomon^a, Ertuğrul Kaya^a, Fatma E. Bağcı^a and Ekaette J. Abai^b

^a*Corrosion Research Laboratory, Department of Mechanical Engineering, Faculty of Engineering, Duzce University, 81620 Duzce, Turkey*

^b*Department of Science Technology, Akwa Ibom State Polytechnic, Ikot Osurua, Ikot Ekpene, Akwa Ibom State, Nigeria*

*husnugerengi@gmail.com

Abstract

The corrosion behaviour of AA7075-T6 aluminum alloy in 3.5% NaCl devoid of and containing various amounts of ethylene glycol (EG) has been examined by DEIS (dynamic electrochemical spectroscopy), PDP (Potentiodynamic polarization), SEM (scanning electron microscope), EDAX (energy dispersive X-ray spectroscopy), and AFM (atomic force microscope). AA7075-T6 alloy specimen corroded significantly in 3.5% NaCl solution. In 3.5% NaCl containing EG, the alloy is protected but the extent of protection is a function of immersion duration and concentration of EG. EG affects both the anodic and cathodic corrosion reactions according to PDP results. The adsorption of EG molecules onto AA7075-T6 surface follow Langmuir adsorption isotherm model. The ΔG_{ads}^0 value calculated for the adsorption process reveals that physisorption is the prevailing mechanism. SEM and AFM pictures support the experimental results and EDAX results confirm the presence of EG molecules on AA7075-T6 surface.

Keywords: AA7075-T6 alloy; NaCl solution; Corrosion; Ethylene glycol; Corrosion inhibition; DEIS

1. Introduction

AA7075 is an alloy of aluminum with Zn, Mg, and Cu as the alloying elements. Notable characteristics of this alloy include high strength, excellent ductility, toughness, and high fatigue. Depending on the heat treatment, AA7075 is differentiated into 7075-0, 7075-T6, 7075-T651, 7075-T7, 7075-T73, and 7075-RRA. Compared with other grades, the AA7075-

Download English Version:

<https://daneshyari.com/en/article/7122079>

Download Persian Version:

<https://daneshyari.com/article/7122079>

[Daneshyari.com](https://daneshyari.com)