Electrochemical and Quantum Chemical Investigations of some Cyanoacetamide Derivatives as Eco-Friendly Corrosion Inhibitors for Aluminum-Silicon Alloy in Acidic Solution

A. S. Fouda^{1,*}, A.M.Eldesoky², F.Sh.Mohamed³ and M. W. El-Sherbeni¹

¹Department of Chemistry, Faculty of Science, El-Mansoura University, El-Mansoura-35516, Egypt

² Engineering Chemistry Department, High Institute of Engineering & Technology (New Damietta), Egypt and Al-Qunfudah Center for Scientific Research (QCSR), Chemistry Department, Al-Qunfudah College, Umm Al-Qura University, KSA.

³Department of Chemistry, Faculty of Science, Damietta University, Damietta, Egypt.

*E-mail: asfouda@hotmail.com

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Cyanoacetamide derivatives (CyD) were investigated as eco-friendly corrosion inhibitors at various doses for alloy (Al/Si) in one molar HCl utilized Tafel polarization (TP), (EFM) electrochemical frequency modulation and (EIS) impedance method. The temperature influence on corrosion behaviour with appending of various doses was carried out in range of temperature of 25-45°C by EFM technique. TP plots revealed that the investigated CyD were of mixed-type. The protection efficiency (% η) was found to rise with increasing the concentration of investigated CyD but decrease with improving the medium temperature. CyD adsorption on Al/Si alloy surface was found to obey Temkin isotherm. Some adsorption and activation thermodynamic functions were measured and explained. The order of the % η of CyD is given: (1) > (2) > (3). It was noted that the data of quantum chemical calculations run parallel to the rise in % η given which support the preceding order.

Keywords: Cyanoacetamide derivatives, Al-Si alloy, HCl, TP, EIS, EFM

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