

Accepted Manuscript

Title: Experimental and theoretical study on corrosion inhibition performance of environmentally benign non-ionic surfactants for mild steel in 3.5% NaCl solution

Author: Mohammad Mobin Ruby Aslam

PII: S0957-5820(18)30004-1

DOI: <https://doi.org/doi:10.1016/j.psep.2018.01.001>

Reference: PSEP 1266

To appear in: *Process Safety and Environment Protection*

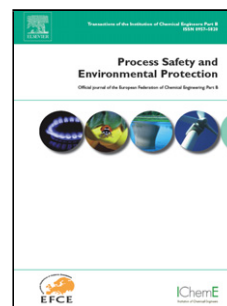
Received date: 1-9-2017

Revised date: 22-12-2017

Accepted date: 3-1-2018

Please cite this article as: Mobin, M., Aslam, R., Experimental and theoretical study on corrosion inhibition performance of environmentally benign non-ionic surfactants for mild steel in 3.5% NaCl solution, *Process Safety and Environment Protection* (2018), <https://doi.org/10.1016/j.psep.2018.01.001>

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.



Experimental and theoretical study on corrosion inhibition performance of environmentally benign non-ionic surfactants for mild steel in 3.5% NaCl solution

Mohammad Mobin*, Ruby Aslam

Corrosion Research Laboratory, Department of Applied Chemistry, Faculty of Engineering and Technology, Aligarh Muslim University, Aligarh, 202002-India

ABSTRACT

Two 'natural' non-ionic surfactants namely, *N*-alkyl-*N*-glucosylethylenediamine with formula $C_nH_{2n+1}NH(CH_2)_2NHCO(CHOH)_4CH_2OH$ ($n = 10, 12$), designated as Glu (n) were prepared and identified by FT-IR and 1H -NMR. Synthesized compounds were investigated for mild steel corrosion in 3.5% NaCl medium using electrochemical measurement, gravimetric measurement and surface characterization techniques like fourier transform infra-red spectroscopy (FT-IR), atomic force microscopy (AFM) and scanning electron microscopy (SEM)/energy dispersive spectroscopy (EDAX). The compounds act as predominantly anodic corrosion inhibitors and their inhibition efficiencies are observed to increase with increasing inhibitors concentrations, chain length and temperature. The adsorption of Glu (n) inhibitor on the mild steel surface in 3.5% NaCl solution followed the Langmuir adsorption isotherm. The AFM micrographs showed a reduction of surface roughness in the presence of the investigated inhibitor. SEM micrographs confirmed the existence of an adsorbed protective film on the mild steel surface. EDAX was carried out to characterize the chemical composition of the inhibitive film formed on the steel surface. Density functional theory (DFT) calculations are made to correlate the efficiencies of Glu (n) with their intrinsic molecular parameters.

Keywords: Mild steel; EIS; Polarization; AFM; Anodic protection; Neutral inhibition

* Corresponding author. Tel.: +91 5712703515-3003 (Extn.)

E-mail address: drmmobin@hotmail.com (Mohammad Mobin)

Download English Version:

<https://daneshyari.com/en/article/6974209>

Download Persian Version:

<https://daneshyari.com/article/6974209>

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