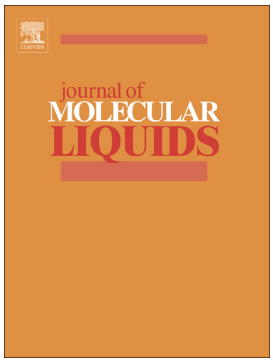

Minified dose of urispas drug as better corrosion constraint for soft steel in sulphuric acid solution

Nisha Saini, Rajeev Kumar, Hssane Lgaz, Rachid Salghi, Ill-Min Chung, Sumit Kumar, Suman Lata

PII: S0167-7322(18)30199-5
DOI: doi:10.1016/j.molliq.2018.08.070
Reference: MOLLIQ 9515

To appear in: *Journal of Molecular Liquids*

Received date: 12 January 2018
Revised date: 1 August 2018
Accepted date: 11 August 2018

Please cite this article as: Nisha Saini, Rajeev Kumar, Hssane Lgaz, Rachid Salghi, Ill-Min Chung, Sumit Kumar, Suman Lata , Minified dose of urispas drug as better corrosion constraint for soft steel in sulphuric acid solution. Molliq (2018), doi:10.1016/j.molliq.2018.08.070

Minified dose of Urispas drug as better corrosion constraint for soft steel in Sulphuric acid solution

Nisha Saini[1], Rajeev Kumar[1], Hssane Lgaz[2], Rachid Salghi[3], Ill-Min chung[2], Sumit Kumar[1], Suman Lata[1]*

[1]Deenbandhu Chhotu Ram University of Science and Technology, Murthal, 131039, Haryana, India

[2] Department of Applied Bioscience, College of Life and Environment Science, Konkuk University, South Korea

[3]Laboratory of Applied Chemistry and Environment, ENSA, Ibn Zohr University, Agadir, Morocco

Corresponding Author, sumanjakhar.chem@dcrustm.org Tel. +91-9416259536

Abstract

Corrosion protective performance of commercial mild steel (soft steel) by Urispas drug was evaluated by gravimetric measurements, potentiostatic polarization and electrochemical impedance spectroscopy in 1M H_2SO_4 solution. The results indicate that urispas acts as quite a good corrosion constraint for mild steel exhibiting 97.85 % inhibition efficiency at 150ppm of the drug at 303K on polarizing it electrochemically which is a quite minified amount of urispas. Weight loss study also shows that inhibition efficiency gets optimized at 150ppm of the drug molecule at lower temperature. Polarization curves depict that the drug acts as a mixed type inhibitor. The results of electrochemical impedance spectroscopy (EIS) indicate that the charge transfer phenomenon controlled the corrosion reaction. The morphological behavior of the uncorroded and corroded coupons was investigated by scanning electron microscopy and atomic force microscopy studies. The mechanism of adsorption from the variation of inhibition effectiveness with kinetic and activation parameter through Langmuir, Freundlich, Frumkin and Flory-Huggins isotherm, put forward a significant physiochemical mode of interaction of the drug on the metal surface. The outcomes obtained from all the experimental techniques and the information obtained via Molecular Dynamics (MD) and Density Functional Theory (DFT) evaluation are in good correlation.

Keywords: Corrosion; Drug; Mild steel; Polarization; Adsorption isotherm

1. Introduction