

## Accepted Manuscript

Corrosion inhibition performance of spermidine on mild steel in acid media

Thomas Nesakumar Jebakumar Immanuel Edison, Raji Atchudan, Arivalagan Pugazhendhi, Yong Rok Lee, Mathur Gopalakrishnan Sethuraman



PII: S0167-7322(18)31178-4  
DOI: doi:[10.1016/j.molliq.2018.05.087](https://doi.org/10.1016/j.molliq.2018.05.087)  
Reference: MOLLIQ 9142  
To appear in: *Journal of Molecular Liquids*  
Received date: 7 March 2018  
Revised date: 2 May 2018  
Accepted date: 20 May 2018

Please cite this article as: Thomas Nesakumar Jebakumar Immanuel Edison, Raji Atchudan, Arivalagan Pugazhendhi, Yong Rok Lee, Mathur Gopalakrishnan Sethuraman , Corrosion inhibition performance of spermidine on mild steel in acid media. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.05.087](https://doi.org/10.1016/j.molliq.2018.05.087)

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.

## Corrosion inhibition performance of spermidine on mild steel in acid media

Thomas Nesakumar Jebakumar Immanuel Edison<sup>a,\*</sup>, Raji Atchudan<sup>a</sup>, Arivalagan

Pugazhendhi<sup>b</sup>, Yong Rok Lee<sup>a,\*</sup>, Mathur Gopalakrishnan Sethuraman<sup>c,\*</sup>

<sup>a</sup> School of Chemical Engineering, Yeungnam University, Gyeongsan, Gyeongbuk 38541,  
Republic of Korea

<sup>b</sup> Innovative Green Product synthesis and Renewable Environment Development Research  
Group, Faculty of Environment and Labour Safety, Ton Duc Thang University,  
Ho Chi Minh City, Vietnam. Email: arivalagan.pugazhendhi@tdt.edu.vn

<sup>c</sup> Department of Chemistry, The Gandhigram Rural Institute-Deemed to be university,  
Gandhigram - 624 302, Dindigul District, Tamil Nadu, India

### Abstract

The corrosion inhibition and adsorption behavior of spermidine on mild steel (MS) in 1 M sulfuric and 0.50 M hydrochloric acid have been investigated at room temperature by electrochemical methods viz., electrochemical impedance spectroscopy (EIS) and Tafel polarization techniques. The adsorption of spermidine on MS is studied by Langmuir adsorption isotherm, Fourier transform infrared (FT-IR) spectroscopy and density functional theory (DFT) analysis. The Tafel results imply that, spermidine behaves mixed mode inhibitor and the corrosion inhibition efficiency increases with increasing of spermidine concentration. The EIS results exposed that, the formation of adsorptive layer of spermidine increase the charge transfer resistance and subsequent drop in the double layer capacitance of MS in acids. The calculated free energy of adsorption ( $\Delta G$ ) for spermidine in HCl and H<sub>2</sub>SO<sub>4</sub> are  $-31.92$  and  $-30.48$  kJ mol<sup>-1</sup> which suggested the physical along with chemical mode of adsorption of inhibitor. The formation of inhibitive protection layer on MS is confirmed by FT-IR spectroscopy. The correlation of corrosion inhibition performance and molecular

Download English Version:

<https://daneshyari.com/en/article/7842220>

Download Persian Version:

<https://daneshyari.com/article/7842220>

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