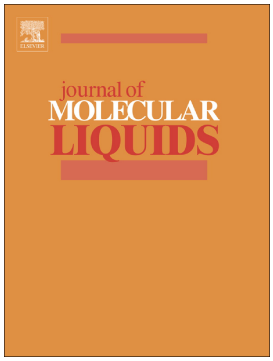

Inhibition of API 5L X60 steel corrosion in CO2-saturated 3.5% NaCl solution by tannic acid and synergistic effect of KI additive

Bashir J. Usman, Saviour A. Umoren, Zuhair M. Gasem

PII: S0167-7322(17)30733-X
DOI: doi: 10.1016/j.molliq.2017.04.064
Reference: MOLLIQ 7220

To appear in: *Journal of Molecular Liquids*

Received date: 17 February 2017
Revised date: 21 March 2017
Accepted date: 15 April 2017

Please cite this article as: Bashir J. Usman, Saviour A. Umoren, Zuhair M. Gasem , Inhibition of API 5L X60 steel corrosion in CO2-saturated 3.5% NaCl solution by tannic acid and synergistic effect of KI additive. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi: 10.1016/j.molliq.2017.04.064

Inhibition of API 5L X60 steel Corrosion in CO_2 –Saturated 3.5% NaCl solution by Tannic Acid and Synergistic Effect of KI additive.

Bashir J. Usman[a], Saviour A. Umoren*[b,] Zuhair M. Gasem[a]

[a]*Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia*
[b]*Center for Research Excellence in Corrosion, Research Institute, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia*

*For correspondence: Email: umoren@kfupm.edu.sa; Phone: +966533010989; Fax: +966138603996

Abstract

The corrosion inhibition performance of Tannic Acid (TA) on API 5L X60 pipeline steel in CO_2-saturated 3.5 % NaCl solution was investigated using electrochemical techniques namely; Linear Polarization Resistance (LPR) and Electrochemical Impedance Spectroscopy (EIS). The effect of KI addition on the inhibitive performance was assessed. Results obtained showed that TA moderately inhibited the steel corrosion in the studied medium. Addition of KI synergistically enhanced the inhibitive performance of TA. Corrosion inhibition performance of TA alone and on addition of KI was influenced by concentration and immersion time. Excellent inhibition with protection efficiency of about 90% was achieved on addition of KI to TA at longer immersion time up to 24 h. Surface characterization techniques namely Scanning Electron Microscopy (SEM), X–ray Photoelectron Spectroscopy (XPS) and Fourier Transformed Infrared (FTIR) spectroscopy were employed to elucidate the mechanism of the inhibition.

Keywords: CO_2-Corrosion; Tannic acid; Synergistic effect; Potassium Iodide; Corrosion inhibition; Steel;