Inhibition Effect of Water-Soluble Chitosan N-quaternary Ammonium Salt on Carbon Steel in 0.25 M H₂SO₄ Solution

Xiumei Wang^{}, Qing Wang, Ye Wan, Ying Ma*

School of Materials Science and Engineering, Shenyang Jianzhu University, Shenyang, Liaoning, China 110168

^{*}E-mail: xmwang@alum.imr.ac.cn

doi: 10.20964/2016.07.10

Received: 4 March 2016 / Accepted: 29 April 2016 / Published: 4 June 2016

The corrosion inhibition of modified natural product (2-hydroxypropyltrimethyl ammonium chloride chitosan (HACC) for carbon steel in 0.25 M H₂SO₄ solution was studied through four methods including weight loss method, potentiodynamic polarization curves, electrochemical impedance spectroscopy (EIS) and scanning electron microscopy (SEM) techniques. The concentration of HACC and solution temperature affected HACC inhibition efficiency. The weight loss results indicated the high HACC concentration and low temperature lead to good inhibition. HACC was a mixed inhibitor by retarding both anodic and cathodic processes simultaneously. Standard free adsorption energy $\Delta G^{\circ}_{\text{ads}}$ was calculated and discussed. The adsorption of HACC obeyed the Langmuir isotherm and was of spontaneous characteristic accompanied by joint physisorption and chemisorption. The corrosion rate of carbon steel was mainly controlled by E_a in 0.25 M H₂SO₄ solution.

Keywords: Carbon steel; EIS; Polarization Curves; Sulfuric Acid; Inhibition Efficiency

[FULL TEXT](#)

© 2016 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).