Two Diamine Schiff Base as a Corrosion Inhibitors for Carbon Steel in Sulfuric Acid Solution: Electrochemical Assessment and Theoretical Calculation

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doi: 10.20964/2021.05.35

Received: 23 September 2020 / Accepted: 27 December 2020 / Published: 31 March 2021

In this paper, two new bis-Schiff bases corrosion inhibitors, including N¹E,N²E-(N¹,N²)-(bis(2-hydroxy-5-fluorobenzylidene))propane-1,2-diamine (L1) and (2E,2'E)-2,2'-(pyridine-2,6-diylbis (azanylylidene)) diacetic acid (L2) were synthesized and characterized by IR, UV, MS and ¹H-NMR. The purpose of this article is to explore the effect of two corrosion inhibitors on carbon steel in 1 mol/L sulfuric acid. The corrosion inhibition effect of L1 and L2 on carbon steel in sulfuric acid solution was determined by the weightlessness method, electrochemical method, scanning electron microscope, determination of adsorption isotherm and calculation of thermodynamic parameters and quantum chemistry calculations. The results indicated that both inhibitors had good resistance to 1.0 mol·L⁻¹ sulfuric acid corrosion and at 30 °C, the corrosion inhibition rates of L1 and L2 were 74.76% and 96.96%, respectively. Scanning electron microscopy, isothermal adsorption equation measurement and quantum chemical calculations indicated that both L1 and L2 were mixed corrosion inhibitors, which can be adsorbed on the surface of carbon steel to form a corrosion inhibitor film. The process of adsorption of Schiff base corrosion inhibitors on carbon steel surface was spontaneous.

Keywords: bis-Schiff bases; Corrosion inhibitors; Carbon steel; Electrochemical measurements; Quantum chemical calculation

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