Inhibition Effect of 1-vinyl-3-ethylimidazolium Bromide for X65 Steel in 0.5 M Sulfuric Acid Solution

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The corrosion inhibitive effect of 1-vinyl-3-ethylimidazolium bromide ([VEIM]Br) for X65 steel in 0.5 M H₂SO₄ solution has been investigated through electrochemical tests, weight loss, scanning electronic microscopy (SEM) and quantum chemical calculation. The electrochemical and weight loss results revealed that 1-vinyl-3-ethylimidazolium bromide acted as a modest cathodic inhibitor and the inhibition efficiency was up to 85% when the concentration of inhibitor reached 10 mM. SEM observation showed obviously the protection effect using the ionic liquid. The adsorption of [VEIM]Br molecule on the X65 steel surface was found to obey the Langmuir adsorption isotherm. The quantum chemical calculations and molecular dynamics simulation appeared that [VEIM]Br was adsorbed strongly on the X65 steel surface.

Keywords: X65 steel, Corrosion inhibition, Ionic liquids, Electrochemical tests, Theoretical study

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