Inhibition Effect and Adsorption Behavior of Two Imidazolium-based Ionic Liquids on X70 Steel in Sulfuric Acid Solution

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In this work, two imidazolium-based ionic liquids with different chain lengths namely 1-allyl-3-ethylimidazolium bromide ([AEIM]Br) and 1-allyl-3-hexylimidazolium bromide ([AHIM]Br) respectively, were researched on corrosion of X70 steel in 0.5 M sulphuric acid. The corrosion resistance ability was tested by electrochemical methods including the electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization measurement. Results showed that [AHIM]Br have a better inhibition ability than [AEIM]Br. Scanning electron microscope (SEM) was utilized to further analysis the appearance of steel surface. Furthermore, the inhibition mechanism of two inhibitors was analyzed by adsorption isotherm study and molecular dynamics (MD) simulation. The experimental and theoretical results are consistent and the adsorption of the two inhibitors on steel surface belongs to mixed type of chemisorption and physisorption.

Keywords: Corrosion Inhibitor; Adsorption; X70 steel; EIS; Molecular Dynamics Simulation.

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