Synergistic Effect of Potassium Iodide with L-Tryptophane on the Corrosion Inhibition of Mild Steel: A Combined Electrochemical and Theoretical Study

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The inhibition effects of L-tryptophane (Trp) and its synergistic effect with KI on the corrosion of mild steel in 1.0 M HCl solution have been investigated by electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization (PDP) measurements. The results show that the inhibition efficiency increases with the concentration of Trp and increases further when KI exists. The synergistic effect between Trp and KI was discussed by calculating the synergism parameter, which suggests that there is a cooperative mechanism between iodide anion and Trp cation. Finally, Monte Carlo simulation was utilized to search for the equilibrium configurations of inhibitors/Fe(110) adsorption systems in the presence of water molecules.

Keywords: L-tryptophane, Corrosion inhibitor, Mild steel, Theoretical calculations, Electrochemical investigation

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