Polystyrene Sulfonic Acid-Doped Polypyrrol (dppy) as a Corrosion Inhibitor for Carbon Steel in 1.0 M HCl Solution

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The inhibition performance of doped polypyrrol (dppy) for carbon steel corrosion in 1.0 M HCl solution was investigated and analyzed by weight loss method, electrochemical techniques and SEM micrographs. The results denote that both the concentration of dppy and the experimental temperature enhance the inhibitive efficiency, and the highest inhibitive efficiency is 87.1% at 40 mg L⁻¹ (333 K) based on the weight loss results. Dppy hinders both anodic and cathodic processes simultaneously by removing water molecules through stronger adsorption, and the self-corrosion potential (*E*) exhibits almost no change with the increasing dppy concentration, suggesting dppy is a mixed-type corrosion inhibitor. Dppy is adsorbed on the carbon steel surface by mixed physisorption and chemisorption. The dppy adsorption conforms to the Langmuir isotherm model, and the adsorption is a spontaneous, endothermic process with an increase in entropy.

Keywords: Corrosion Inhibitor; Doped Polypyrrol (dppy); Carbon Steel; 1.0 M HCl Solution; Electrochemical Technique

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