Corrosion Inhibitive Action of Tenofovir Disproxil Fumarate (TDF) on Low Carbon Steel in 1M HCl

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The effect of Tenofovir Disproxil Fumarate (TDF) on the corrosion of low carbon steel in 1M HCl was investigated using theoretical and experimental methods at the temperature range of 303-333 K. The electrochemical measurements such as polarization and impedance measurements suggested that the inhibition efficiencies increase with the increasing concentrations of TDF and decreases with the increase in temperature. The electrochemical potentiodynamic polarization measurement reveals that the TDF acts as a mixed type corrosion inhibitor for steel in 1M HCl. The overall increasing inhibition efficiency of an inhibitor is attributed to the adsorption onto the steel surfaces from the bulk of the solution. The adsorption process is the most appropriate fit with the Langmuir adsorption isotherm model, and computed thermodynamic parameters were discussed. Thermodynamic parameters reveal that the TDF adsorbs spontaneously onto the metal surfaces and retards the corrosion by the chemisorption method. The activation parameters explain the effect of temperature on TDF inhibition efficiency for low carbon steel in 1M HCl. The quantum chemical parameters strengthen the experimental results and are also a good agreement between them. Scanning electron microscopic measurement provides a visual idea of creating a protective layer on steel surfaces, which reduces corrosion.

Keywords: Corrosion inhibitors; TDF; Electrochemical; SEM; Quantum

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