A Glycine Derivative as Corrosion Inhibitor for Carbon Steel in 3.5 wt% NaCl solution: The combined Experimental and Theoretical Calculation

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A novel glycine derivative, (9H-fluoren-9-yl) methyl (2-(heptadecyl amino)-2-oxoethylcarbamate (FMOC), was synthesized and investigated as a corrosion inhibitor for N80 carbon steel in a 3.5% sodium chloride solution using weight loss measurements, potentiodynamic polarization, and electrochemical impedance spectroscopy (EIS). The surfaces of the corrosive steels were studied with scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), and X-ray photoelectron spectroscopy (XPS). Polarization curves revealed that FMOC acted as a mixed-type inhibitor. The inhibition efficiency increased with increasing FMOC concentration at different temperatures. The adsorption of FMOC on the metal surface is confirmed to involve physisorption and chemisorption. Quantum chemical calculations were performed to explain the mechanism of the interaction between FMOC and the steel surface.

Keywords: Corrosion inhibitor, Glycine derivative, Quantum chemical calculations, Adsorption.

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