

Corrosion inhibition of carbon steel in hydrochloric acid solution by some synthesized surfactants from petroleum fractions

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Abstract The effects of newly synthesized anionic surfactants of two Algerian petroleum fractions, gasoil sulfonate (GOS) and kerosene sulfonate (KES), on the corrosion of carbon steel in 1.0 M HCl were investigated using potentiodynamic polarization, electrochemical impedance spectroscopy, scanning electron microscopy, and energy dispersive X-ray spectroscopy. All measurements showed that the inhibition efficiency increased with increase in the concentration of inhibitor, and the effectiveness of these inhibitors was on the order of GOS > KES. Polarization curves revealed that the studied inhibitors were mixed type inhibitors. Electrochemical impedance spectroscopy exhibited one capacitive loop indicating that the corrosion reaction is controlled by charge transfer process. The adsorption of the inhibitors on the carbon steel surface obeyed a Langmuir adsorption isotherm. Surface analysis supports the formation of a protective inhibitor film on the carbon steel surface. The results obtained from different techniques are in good agreement.

Keywords Corrosion inhibitors · Carbon steel · Acidic media · Electrochemical techniques · Surfactants from petroleum fractions · SEM

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