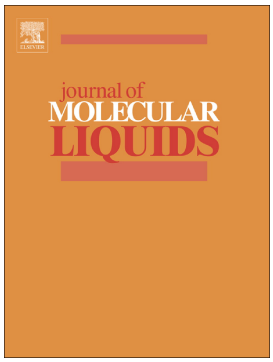

Thermodynamic, kinetic and mechanistic approach to the corrosion inhibition of carbon steel by new synthesized amino acids-based surfactants as green inhibitors in neutral and alkaline aqueous media

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Thermodynamic, kinetic and mechanistic approach to the corrosion inhibition of carbon steel by new synthesized amino acids-based surfactants as green inhibitors in neutral and alkaline aqueous media

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ABSTRACT

The inhibiting power of three synthesized amino acids based-surfactant molecules, namely, sodium *N*-dodecyl asparagines (AS), sodium *N*-dodecylhistidine (HS) and sodium *N*-dodecyltryptophan (TS) on the dissolution of carbon steel was inspected in 0.5 M NaCl and 05 M NaOH solutions at 25^{o}C. The methods employed in this work were weight-loss (WL), potentiodynamic polarization (PP) and electrochemical impedance spectroscopy (EIS). The chemical structures of the synthesized surfactants were confirmed by FT-IR and ^{1}HNMR. The inhibition efficiencies were found to increase as the surfactants concentrations increase, while decreasing with increasing the concentration of the corrosive media (NaCl & NaOH) and temperature. Results obtained from the different techniques revealed that the inhibition efficiency of the compound TS was higher than those of both AS and HS. The inhibition efficiencies of the synthesized surfactants were declined in terms of strong adsorption of surfactants on the surface of carbon steel and forming a protective film and such adsorption was found to obey Langmuir isotherm. Both thermodynamic and kinetic parameters were evaluated which support the mechanism of physical adsorption of the inhibitors. The tested surfactants were found to act as mixed-type inhibitors with anodic predominance. The surface morphology of the carbon steel surface was examined by scanning electron microscopy (SEM). The inhibitory mechanism of carbon steel corrosion was suggested. Results obtained from all employed methods are consistent with each others.

Keywords: Amino acids-based surfactants; Inhibitors; Sodium chloride; Sodium hydroxide; Corrosion; Carbon steel.

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