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Prediction of Corrosion Inhibition Using Methyl Ester Sulfonate Anionic Surfactants

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Abstract : The study of the corrosion inhibition of a standard carbon steel "API 5L grade X70" by two biodegradable anionic surfactants derived from fatty acids by photo sulfochlorination, called sodium lauryl methyl ester sulfonates and sodium palmityl methyl ester sulfonates was carried. A solution at 2.5 g/l NaCl saturated with carbon dioxide is used as a corrosive medium. The gravimetric and electrochemical technics (stationary and transient) were used in order to quantify the rate of corrosion and to evaluate the electrochemical inhibition efficiency, thus the nature of the mode of action of the inhibitor, in addition to a surface characterization by scanning electron microscopy (MEB) coupled to energy dispersive X-ray spectroscopy (EDX). The variation of the concentration and the temperature were examined, and the mode of adsorption of these inhibitors on the surface of the metal was established by assigning it the appropriate isotherm and determining the corresponding thermodynamic parameters. The MEB-EDX allowed the visualization of good adhesion of the protective film formed by the surfactants to the surface of the steel. The corrosion inhibition was evaluated at around 93% for sodium lauryl methyl ester sulfonate surfactant at 20 ppm and 87.2% at 50 ppm for sodium palmityl methyl ester sulfonate surfactant.

Keywords : carbon steel, oilfield, corrosion, anionic surfactants
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