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Some alginates polymeric cationic surfactants; surface study and their evaluation as biocide and corrosion inhibitors

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Abstract

Three cationic polymeric surfactants were synthesized by alkylation of prepared alginate ester to obtain on three polymers with different alkyl chain (octyl, dodecyl and hexadecyl), and they are labeled (ALGOB, ALGDB and ALGHB), respectively. The chemical structure was confirmed using FTIR and ¹HNMR spectroscopy. The behavior of the synthesized polymeric cationic surfactants in aqueous solution has been determined at three temperature 25, 45 and 65 °C depending on surface tension and conductivity measurements. The emulsion stability, interfacial tension and foaming power of the synthesized cationic surfactant were studied. The efficiency of the ALGOB, ALGDB and ALGHB inhibitor against the corrosion of mild steel in the aggressive solution (1.0 M HCl) were evaluated gravimetrically at various temperatures 25, 40, 55 and 70 °C. The corrosion inhibition efficiency (η) has been increased with the elongation of the hydrocarbon chain length and with raising the solution temperature. The maximum η achieved was equal to 92.6 for the synthesized polymeric surfactant ALGHB at temperature 70 °C. The adsorption villamill isotherm is the best isotherm describing the adsorption of ALGOB, ALGDB and ALGHB polymeric surfactant on the mild steel surface. The electrochemical study of the behavior of the synthesized polymeric surfactants outlined that they behave as mixed type inhibitor (Tafel curves) and thickness of the adsorbed layer on the steel surface increase as the double layer capacitance decrease (Impedance study). The prepared polymeric surfactants showed good activity against some common G (+ ve) and G (- ve) bacteria as well as Fungi.

Keywords: Alginate Cationic Polymeric Surfactants; Surface Parameters; Steel Corrosion; Emulsion stability; Biological Activity.

1. Introduction

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