Comparative Analysis of Gemini and Mono Surfactants Based on Tridecanoic Acid and Ethane-1,2-Diamine

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Abstract:

The primary goal of this work was to synthesize mono and Gemini-type compounds that were produced when tridecanoic acid and ethane-1,2-diamine reacted in two distinct ratios. Each of their individual attributes was assessed through a comprehensive comparison analysis. The structural validity of the obtained products was verified by the use of infrared (IR) and ultraviolet (UV) spectroscopy. By assessing the surface activity and electrical conductivity of the produced compounds, several important physical properties parameters such as Critical Micelle Concentration (CMC), surface pressure (πCMC), maximal adsorption (Γmax), minimum surface area for one molecule surfactant were found. In addition, electrical conductivity data was used to compute the Gibbs free energy of micellization and adsorption. Important details on the characteristics of the produced materials were provided by these measurements. Additionally, the study evaluated the surfactants' ability to petrodispersing and petrocollecting in water basins with varying salinities. By dividing the oil film's initial surface area by its surface area both before and after the surfactant was applied, the petrocollecting coefficient (K) was calculated. The petrodispersing percentage (Kd), which represents the level of surface cleaning attained, was obtained from this computation. This diverse approach sought to elucidate the performance and adaptability of the compounds under different conditions in order to give a thorough grasp of the potential uses of the produced compounds.

Keywords:

surfactant, tridecanoic acid, ethane-1,2-diamine, oil spills.