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**Studying the surface behavior of some prepared free hydroxyl cationic amphipathic compounds in aqueous solution and their biological activity**

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**Abstract**

Three new cationic amphipathic compounds containing free terminal hydroxyl group with different hydrophobic chain have been laboratory prepared. The chemical structures of the synthesized free hydroxyl cationic surfactants have been confirmed using FTIR and <sup>1</sup>HNMR spectroscopy. Three different techniques have been assigned to estimate the critical micelle concentration of the synthesized free hydroxyl cationic surfactants, which are surface tension, electrical conductivity and UV-Vis spectroscopy and a comparative study has been performed. The surface parameters have been assessed from surface tension measurements at three different temperatures 20, 40 and 60°C. The experimental data clarified that the critical micelle concentration is temperature and hydrophobic dependent. The characteristic critical micelle concentration of the synthesized free hydroxyl amphipathic compounds decreases with raising the solution temperature and with increasing the hydrophobic character. The behavior of the three prepared surfactants is favoring the adsorption at the interface first, then aggregation in the solution bulk forming the micelles according to the thermodynamic calculations. The foaming power, interfacial tension and emulsification stability of the synthesized compounds have been assessed. Furthermore, the antimicrobial activities of the prepared free hydroxyl cationic surfactants with carbonyl and ether groups showed impressive killing action against both bacteria (Gram positive and negative) and fungi.

**Keywords:**

Micellization & Adsorption Thermodynamics; Surface Tension; UV-Vis Spectroscopy; Conductivity; Foaming power; Biological Activity.

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