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## Effect of some prepared surfactants on silver nanoparticles formation and surface solution behavior and their biological activity

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### Abstract

The chemical structure of four synthesized cationic surfactants has been confirmed using FTIR and <sup>1</sup>HNMR spectroscopy. The surfactants are N-benzyl-2-(decanoyloxy)-N-(2-hydroxyethyl)-N-methylethanammonium chloride (MDABC), N-benzyl-2-(dodecanoyloxy)-N-(2-hydroxyethyl)-N-methylethanammonium chloride (MDABL), N-benzyl-2-(tetradecanoyloxy)-N-(2-hydroxyethyl)-N-methylethanammonium chloride (MDABM) and N-benzyl-2-(hexadecanoyloxy)-N-(2-hydroxyethyl)-N-methylethanammonium chloride (MDABP). Silver nanoparticles have been prepared through reduction method using trisodium citrate as reducing agent. The effect of the synthesized surfactant on the morphology and size distribution of the obtained silver nanoparticles has been followed by transmission electron microscope (TEM) and dynamic light scattering (DLS). The prepared surfactant MDABP with longer hydrophobic carbon chain lead to smaller particles size with narrow distribution. The effect of surfactant on the solution behavior has been assessed using surface tension measurements at 20, 40 and 60 °C. The critical micelle concentration was found to decrease with increasing the length of the hydrocarbon chain and the solution temperature. The thermodynamic calculations disclosed the tendency of the surfactant unimers to adsorb at the interface first then aggregates in micelles that means they tend to adsorb before micelle formation. The synthesized cationic surfactants and their silver nanoparticles colloid showed a good antimicrobial effect against fungi and bacteria as well as sulfate reducing bacteria.

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