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Effect of Gemini Surfactant (16-6-16) on the Synthesis of Silver Nanoparticles: A Facile Approach for Antibacterial Application

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Abstract

In this report, we describe the effect of Gemini surfactants 1, 6-Bis (N, N-hexadecyldimethylammonium) adipate (16-6-16) on synthesis, stability and antibacterial activity of silver nanoparticles (AgNPs). The stabilizing effect of Gemini surfactant and aggregation behavior of AgNPs was evaluated by plasmonic property and morphology of the AgNPs were characterized by UV-visible spectroscopy, Dynamic Light Scattering (DLS), X-ray diffraction (XRD), High resolution transmission electron microscopy (HRTEM) and Energy dispersive X-ray analysis (EDX) techniques. Interestingly, the formation of quite mono-dispersed spherical particles was found. Apart from the stabilizing role, the Gemini surfactant has promoted the agglomeration of individual AgNPs in small assemblies whose Plasmon band features differed from those of the individual nanoparticles. The antibacterial activity of the synthesized AgNPs on Gram-negative and Gram-positive bacterium *viz.*, *E. coli* and *S. aureus* was carried out by plate count, growth kinetics and cell viability assay. Furthermore, the mechanism of antibacterial activity of AgNPs was tested by Zeta potential and DLS analysis, to conclude that surface charge of AgNPs disrupts the cells causing cell death.

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