

Synthesis, characterization, and antimicrobial properties of copper nanoparticles

Abstract

Copper nanoparticle synthesis has been gaining attention due to its availability. However, factors such as agglomeration and rapid oxidation have made it a difficult research area. In the present work, pure copper nanoparticles were prepared in the presence of a chitosan stabilizer through chemical means. The purity of the nanoparticles was authenticated using different characterization techniques, including ultraviolet visible spectroscopy, transmission electron microscopy, X-ray diffraction, Fourier transform infrared spectroscopy, and field emission scanning electron microscopy. The antibacterial as well as antifungal activity of the nanoparticles were investigated using several microorganisms of interest, including methicillin-resistant *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Salmonella choleraesuis*, and *Candida albicans*. The effect of a chitosan medium on growth of the microorganism was studied, and this was found to influence growth rate. The size of the copper nanoparticles obtained was in the range of 2-350 nm, depending on the concentration of the chitosan stabilizer.

Keyword: Antimicrobial activity; Aqueous medium; Chemical synthesis; Chitosan; Copper nanoparticles.