

Synthesis and antimicrobial effects of colloidal silver nanoparticles in chitosan by γ -irradiation

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Abstract: Radiation-induced synthesis of colloidal silver nanoparticles (Ag-NPs) using chitosan (CTS) as a stabiliser and free radical scavenger is feasible and satisfiable to green method. The conversion dose (Ag^+ into Ag^0) was determined by UV-Vis spectroscopy and Ag-NPs size was characterised by transmission electron microscopy. The average diameter of Ag-NPs was smaller than 10nm with narrow size distribution and the colloidal Ag-NPs have good stability for a long time of storage. The effect of several parameters, such as pH, Ag^+ and CTS concentration and molecular weight of CTS on Ag-NPs size was also investigated. Ag-NPs of 7nm exhibited highly antimicrobial effect. The inhibitory efficiency of Ag-NPs for *Staphylococcus aureus* was more than 99.9% at 5 ppm and the effective dose (ED_{50}) of inhibition for *Corticium salmonicolor* was of 27.2ppm. © 2010 Taylor & Francis.

Author Keywords: γ -irradiation; Antimicrobial; Chitosan; Silver nanoparticles

Index Keywords: Anti-microbial effects; Average diameter; Colloidal silver nanoparticle; Effective dose; Free radical scavengers; Good stability; Green method; Narrow size distributions; Radiation-induced synthesis; Silver nanoparticles; Stabiliser; *Staphylococcus aureus*; UV-vis spectroscopy; Chitin; Chitosan; Free radicals; Irradiation; Nanoparticles; pH effects; Scanning electron microscopy; Transmission electron microscopy; Ultraviolet spectroscopy; Silver; chitosan; silver nanoparticle; antifungal activity; antimicrobial activity; article; concentration (parameters); controlled study; *Corticium salmonicolor*; fungus; gamma irradiation; green chemistry; growth inhibition; molecular weight; nonhuman; particle size; pH; priority journal; *Staphylococcus aureus*; storage; transmission electron microscopy; ultraviolet spectroscopy

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