

Synthesis of Polyvinyl Alcohol Encapsulated Ag Nanoparticle Film by Microwave Irradiation for Reduction of P-Nitrophenol

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Abstract : Silver nanoparticles have caught a lot of attention because of its unique physical and chemical properties. Silver nanoparticles embedded in polyvinyl alcohol (PVA/Ag) free-standing film have been prepared by microwave irradiation in few minutes. PVA performed as a reducing agent, stabilizing agents as well as support for silver nanoparticles. UV-Vis spectrometry, scanning transmission electron (SEM) and transmission electron microscopy (TEM) techniques affirmed the reduction of silver ion to silver nanoparticles in the polymer matrix. Effect of irradiation time, the concentration of PVA and concentration of silver precursor on the synthesis of silver nanoparticle has been studied. Particles size of silver nanoparticles decreases with increase in irradiation time. Concentration of silver nanoparticles increases with increase in concentration of silver precursor. Good dispersion of silver nanoparticles in the film has been confirmed by TEM analysis. Particle size of silver nanoparticle has been found to be in the range of 2-10nm. Catalytic property of prepared silver nanoparticles as a heterogeneous catalyst has been studied in the reduction of p-Nitrophenol (a water pollutant) with >98% conversion. From the experimental results, it can be concluded that PVA encapsulated Ag nanoparticles film as a catalyst shows better efficiency and reusability in the reduction of p-Nitrophenol.

Keywords : biopolymer, microwave irradiation, silver nanoparticles, water pollutant

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