

Silver Nanoparticles: A simple large scale synthesis, growth behavior and their catalytic activity

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This article presents a simple large-scale synthesis of silver nanoparticles in an aqueous-phase using a multifunctional polymer. The silver nanoparticles have been synthesized by reacting aqueous solutions of AgNO_3 and polyethyleneimine at 50 °C. The experimental conditions such as reaction temperature, pH, and relative ratio of polymer to silver precursor were found to be critical in the formation, stabilization, reaction time and morphology of synthesized nanoparticles. Transmission electron microscopy (TEM), and UV-vis spectroscopy results revealed that spherical silver nanoparticles with sizes of around 8 nm were synthesized by coalescence and reshaping of small size silver aggregates. X-ray analysis confirmed the formation of face-centered cubic (FCC) metallic silver. Furthermore, silver nanoparticles showed effective catalytic activity in the NaBH_4 reduction of 4-nitrophenol to 4-aminophenol.