Green Synthesis of Silver Nanoparticles Using Thunbergia Grandiflora Flower Extract and Its Catalytic Action in Reduction of Congo Red Dye

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Abstract

Developing an eco-friendly approach for metallic nanocatalyst synthesis is important in nanoremediation research. The current study reports, a rapid, environmentally-friendly, and low cost production of silver nanoparticles from silver nitrate using the aqueous extract of *Thunbergia grandiflora* flowers and their use for the catalytic degradation of a hazardous Congo red dye. The UV-Visible spectral analysis confirmed the formation of silver nanoparticles by its characteristic surface plasmon resonance peak observed at 430 nm. SEM analysis resulted in the formation of spherical shaped nanoparticles. The EDX spectrum displayed the presence of elemental silver at 3.1 keV. The XRD analysis showed a sharp peak at 38.31° indicating the presence of (1 1 1) lattice plane. The FTIR analysis showed prominent peaks in the flower extract corresponding to the specific functional groups which involved synthesis and stabilization of nanoparticles. The DLS analysis revealed that the synthesized nanoparticles are less than 100 nm size. A negative zeta potential of – 24.5 mV implied the negative surface charges of the nanoparticles. The synthesized silver nanoparticles displayed excellent catalytic effectiveness in the reduction of carcinogenic azo dye (Congo red) which is a highly toxic environmental organic pollutant. The nanoparticles show excellent catalytic activities and follow pseudo-first-order kinetics. This finding may pave the way for the development of new nanocatalysts for remediation of organics.