

PHOTODEGRADATION OF METHYLENE BLUE USING PHYTO-MEDIATED SYNTHESIS OF SILVER NANOPARTICLES: EFFECT OF CALCINATION TREATMENT

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Abstract

In this study, discrete Ag⁰ nanoparticles (10–30 nm) were synthesized by a simple electrochemical method in *Cymbopogon nardus* leaves extract as a medium. The leaves extract remarkably reduce the Ag ion to produce Ag⁰ nanoparticles without any agglomeration. Its crystallinity, morphology, and functional characteristics were analyzed by using X-ray diffractometer, transmission electron microscope, and Fourier-transform infrared spectrometer, respectively. The characterization results verified that *Cymbopogon nardus* leaves extract containing flavanoids plays an important role in reducing the Ag⁰ nanoparticles in the electrochemical cell. The activity of the synthesized Ag⁰ nanoparticles was tested on a photodegradation of methylene blue (MB). The calcined Ag⁰ nanoparticles give higher degradation percentage of MB (92%) as compared to the uncalcined Ag⁰, operating in pH 5, with a reaction time of 180 min, at 30°C, using 0.02 g L⁻¹ of catalyst dosage and 10 mg L⁻¹ of MB initial concentration. A reusability study showed that the catalyst was still stable after five subsequent reactions. The results provide strong evidence to support the potential use plant-based extracts to synthesize nano-sized photocatalyst that can be used to treat organic pollutants such as MB.

Keywords: Silver Nanoparticles; *Cymbopogon Nardus*; Electrochemical; Photodegradation; Methylene Blue

Area of research: