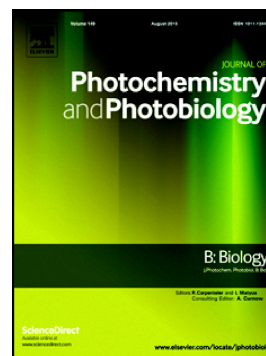


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Catalytic reduction of 4-nitrophenol and Photo inhibition of *Pseudomonas aeruginosa* using Gold nanoparticles as photocatalyst

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Abstract: A simple, green method is described for the synthesis of Gold (Au) nanoparticles (NPs) using *Cotoneaster horizontalis* extract as a phyto-reducer and capping agent with superior photo inhibition activity against *Pseudomonas aeruginosa*. Different from the other methods used elevated temperatures for nanoparticles synthesis, the novelty of our method lies in its energy saving process and fast synthesis rates (~5 min for AuNPs), and its potential to tune the nanoparticles size and afterward their catalytic activity. The starch, fatty acid and reducing sugars present in the extract are mostly responsible for repaid reduction rate Au⁺³ ions to AuNPs. Strong Plasmon resonance (SPR) of AuNPs was observed at 560 nm, which indicates the formation of gold nanoparticles. Uv-visible spectroscopy, high resolution transmission electron microscope (HRTEM) and energy dispersion X-ray diffraction (XRD) were performed to find out the formation of AuNPs. Proficient reduction of 4-nitrophenol (4-NP) into 4-aminophenol (4-AP) in the presence of AuNPs and NaBH₄ was observed and was found to depend upon the nanoparticle size or the extract concentration. The AuNPs was also evaluated for antibacterial against *P. aeruginosa*. Before transferred it into antibacterial activity, it placed under visible light for 120 min. The same experiment was performed in dark as control medium. The photo irradiated AuNPs was observed to be more effective against *P. aeruginosa*. The result showed that diameter of zone of inhibition of visible light irradiated AuNPs against *P. aeruginosa* was 17 (± 0.5) and in dark was 8 (± 0.4) mm.

Keywords: *Cotoneaster horizontalis*, Green method, Gold nanoparticles, Chemocatalytic activity, Photocatalytic activity

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