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SILVER AND ZINC NANOPARTICLES BIOSYNTHESIS USING LAUREL EXTRACT AND INVESTIGATION OF THE PHOTOCATALYTIC PROPERTIES

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Abstract. Metal nanoparticles that are widely studied in optoelectronics, catalysis, medicine, and sensors offer remarkable optical and electronic properties. To address the cost and environmental concerns associated with their synthesis, this study employs an environmentally friendly method using *Laureus nobilis* extract to produce silver and zinc nanoparticles, which are prominent in nanotechnology. This study includes investigations of factors such as reaction time, $AgNO_3$/laurel ratio, $Zn(Ac)_2 \cdot H_2O$/laurel ratio and temperature in nanoparticle biosynthesis to optimize the process. The next stage was set to evaluate the photocatalytic performance of these nanoparticles, specifically against the methylene blue dye under dark and UV light conditions. Parameters such as pollutant decomposition, degradation rate, catalyst stability, and nanoparticle recovery were analysed. Structural characterization of the obtained nanoparticles was performed using UV-Vis, FTIR, SEM, and XRD techniques. The photocatalytic results showed significant degradation percentages for LB-AgNP (silver nanoparticles synthesized with *Laureus nobilis* extract) (97.5%) and LB-ZnNP (zinc nanoparticles synthesized with *Laureus nobilis* extract) (90.9%). LB-ZnNP showed superior performance. Therefore, LB-AgNP and LB-ZnNP are promising photocatalysts for water purification and the elimination of toxic organic pollutants.

Keywords: biosynthesis, silver, zinc, nanoparticle, photocatalysis, laurel extract.

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