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FINAL YEAR PROJECT 2

GREEN SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES USING LABISIA PUMILA EXTRACT WITH DPPH ANTIOXIDANT ASSAY

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This Final Year Project entitled "**Green Synthesis And Characterization Of Silver Nanoparticles Using Labisia Pumila Extract With Dpph Antioxidant Assay"** was submitted by Muhammad Irwanhadidie bin Ismail in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

GREEN SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES USING *LABISIA PUMILA* EXTRACT WITH DPPH ANTIOXIDANT ASSAY

This study investigated the green synthesis of silver nanoparticles (AgNPs) using *labisia pumila* extract as a natural reducing and stabilizing agent and evaluated their physicochemical characteristics and antioxidant activity. The synthesis process was carried out using an eco-friendly approach without the use of hazardous chemicals. The formation of AgNPs was initially confirmed by a visible colour change from pale yellow to dark brown, indicating the reduction of Ag^{+} ions to metallic Ag^{0}. The synthesized AgNPs with different silver loadings (0.5%, 1.0%, 2.0%, and 5.0%) were characterized using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES), Fourier-Transform Infrared Spectroscopy (FTIR), Field Emission Scanning Electron Microscopy (FESEM), and X-Ray Diffraction (XRD). FTIR analysis confirmed the involvement of phenolic, hydroxyl, and carbonyl functional groups from *labisia pumila* in the reduction and stabilization of AgNPs. FESEM results showed that the 2.0% Ag loading produced well-distributed nanoparticles with minimal agglomeration compared to lower and higher Ag concentrations. XRD analysis revealed the crystalline nature of the AgNPs with a face-centered cubic structure. The average crystallite size estimated using the Scherrer equation ranged from approximately 9–30 nm, increasing with silver loading. Among all formulations, the 2.0% Ag sample exhibited optimal crystallinity with controlled crystallite growth. The antioxidant activity of the optimized 2.0% AgNPs was evaluated using the DPPH free radical scavenging assay. The results showed significant antioxidant activity across all tested concentrations, indicating strong free radical scavenging potential. Overall, the findings demonstrate that *Labisia pumila*-mediated AgNPs, particularly at 2.0% Ag loading, possess favorable structural properties and antioxidant activity, highlighting their potential for future biomedical applications of antioxidant-based therapies.

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