

Green Synthesis and Characterization of Silver Nanoparticle using Natural Reducing Sugar from Cultivated Banana Peel

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Banana is a typical fruit in Southeast Asia which has value in addition to being a food Source. Agricultural and plantains processing industries generate enormous amount of waste in the form of banana peel. It is renewed that banana peel has several forms of biomass resources exist (such as starch or sugar crops, weeds, and oils plants, etc.) which can utilize for reducing agent in chemical synthesis. Therefore, this research aims to synthesize silver nanoparticles by a green synthesis using an extract derived from cultivated banana peel waste. To explore optional synthesis condition, characterization of synthesized silver nanoparticles (AgNPs) using UV-visible spectroscopy and Fourier transform infrared spectroscopy (FT-IR) were investigated. Besides, reducing sugar quantities of banana peel extract (BPE) was determined using DNS standard addition method. The results revealed that green synthesis of silver nanoparticles (AgNPs) were accomplished using silver nitrate and BPE as the reductant. The optimized conditions for the AgNPs synthesis was a temperature of 60°C, 1.0 mM AgNO₃, and a reactant ratio of 1:2 (AgNO₃ to BPE). UV-Visible spectra demonstrated absorbance at 400 nm and 510 nm corresponding to AgNPs with the particle size in the range of 20-30 nm and 90-100 nm, respectively. Moreover, FTIR spectra revealed the role of functional group in BPE as a reducing agent of silver ions.

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