UTILIZATION OF E-WASTE FOR GREEN SYNTHESIS OF GOLD NANOPARTICLES USING COCONUT WATER

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ABSTRACT

Background: Large volume of electronic wastes (e-wastes) are produced worldwide, posing disposal problem. E-wastes contain precious (gold, silver, palladium) and base (copper, zinc, nickel etc.) metals. In spite of the fact that these particular wastes possess non-renewable and precious metals, most of these still end up in the landfills. In this study, gold was recovered from e-waste and converted into its nano form. **Methods:** Metals were first extracted from e-wastes using nitric acid before gold was dissolved in aqua regia solution. The resulting gold solution was utilized in the synthesis of gold nanoparticles (AuNPs) using mature coconut water as reducing and capping agent. The optimum conditions for the synthesis of AuNPs were determined by varying the ratio of the gold solution and coconut water, reaction pH, and reaction temperature. The AuNPs were characterized by UV-Visible (UV-Vis) Spectroscopy, Fourier Transform Infrared (FTIR) Spectroscopy, and Scanning Electron Microscopy (SEM). **Results:** The extracted gold from e-waste was successfully converted into AuNPs using coconut water, as indicated by the peak at 533.3 nm in the UV-Vis spectrum. The best conditions for the synthesis were found to be (a) 8:2 gold solution: coconut water v/v ratio, (b) without pH adjustment, and (c) at room temperature. The FTIR spectrum of the AuNPs showed peaks consistent with the compounds found in the coconut water. The SEM micrographs revealed that the particles were spherical with an average diameter of 50.772 nm ± 15.968. **Conclusions:** Gold from e-wastes can be extracted and utilized for the green synthesis of AuNPs with the aid of waste coconut water as reducing and capping agent. The findings of this study may serve as basis for the development of technologies for the sustainable management of e-wastes.

Keywords: e-waste, aqua regia, coconut water, gold nanoparticles

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