

THE POTENTIAL OF RICE HUSK WASTE TO SYNTHESISE ZINC OXIDE NANOPARTICLES AND ASSESSMENT TO THE ANTIBACTERIAL ACTIVITIES

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Abstract. In the past decade, open-air burning of rice husks has negatively impacted the environment and human health, particularly in developing and underdeveloped nations. Consequently, the present study established a sustainable and environmentally friendly method of manufacturing zinc oxide nanoparticles (ZnO NPs) from *Oryza sativa* rice husks using different concentrations of the precursor. The ZnO NPs obtained were analysed with an ultraviolet-visible (UV-Vis) spectrophotometer, which revealed a characteristic ZnO NPs band at 410 nm. Based on Debye–Scherrer's equation, the ZnO NPs crystallites had a mean size of 20 nm. The Fourier-transform infrared (FTIR) spectra of the ZnO NPs were determined within the 400 cm⁻¹ to 4000 cm⁻¹ range. The peak at 487 cm⁻¹ indicated that a Zn-O bond was formed. A developed material further evaluated the antibacterial effectiveness of ZnO NPs against four harmful bacteria, demonstrating a moderate level of effectiveness. The findings indicated that all the tested bacteria exhibited heightened susceptibility to ZnO NPs at a higher concentration of 250 µg/mL.

Keywords: rice husk waste, *Oryza sativa*, zinc oxide, nanoparticles, antibacterial activity.