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Green synthesis of zinc oxide nanoparticles: Exploring catalytic and antibacterial potential

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The design a nano-catalytic system by using green route has been a significant challenge to researchers. Recently the biosynthesized metal, and metal oxide nanoparticles are being used as heterocyclic and recyclable catalysts in the area of organic catalysis. Notably, the extract derived from *Thevetia peruviana* (*T. peruviana*) flowers has been employed in Zinc Oxide nanoparticles (ZnO NPs) synthesis. Phytochemicals present in *T. peruviana* flowers act as a stabilizing agent and $ZnSO_4.5H_2O$ is used as a precursor for the synthesis of ZnO NPs. The structural and optical properties of the green synthesized ZnO NPs have been studied using UV–Visible spectrum, Fourier Transform Infrared Spectroscopy (FT-IR), X-ray diffraction (XRD), Field Emission-Scanning Electron Microscopy (FE-SEM), EDX, High Resolution-Transmission Electron Microscope (HR-TEM) and Selected Area Diffraction (SAED). The significant antibacterial activity of ZnO NPs has been checked against pathogenic bacterial strains namely Gram $^{+}$ve bacteria (*Staphylococcus aureus*) and Gram $^{-}$ve bacteria (*Escherichia coli*) and it has been concluded that the ZnO NPs have a good ability to resist microbes. Furthermore, the synthesis of Xanthene with excellent yield using ZnO NPs as a catalyst in aqueous media at room temperature is reported.

Keywords: ZnO NPs, Biosynthesis, *Thevetia peruviana*, Xanthene, Antibacterial activity