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“GREEN-SYNTHESIS OF ZnO NANOSTRUCTURES USING AQUEOUS LEAVES EXTRACT OF *ROSA INDICA*: PHOTOCATALYTIC UNDER SOLAR LIGHT IRRADIATION”

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Abstract. Background: Recent studies have demonstrated a dramatic escalation in global water consumption, with an approximate 600% increase over the past century. Due to the expansion of textile, there is a release of synthetic organic dye effluents, which are contributing to the deterioration of water quality, rendering it unsuitable for potable use, posing significant threats to both human health and aquatic ecosystems. Notably, the textile sector alone utilizes approximately. 100,000 metric tons of dyes annually, with approximately 15% of these chromophonic compounds being inappropriately discharged into aquatic environments and surface water systems. Green-synthesised zinc oxide (ZnO) has emerged as a competitive photocatalyst due to its superior electron mobility.

Methodology, result, and conclusion Here, the facile route is applied to synthesise zinc oxide nanoparticles (NPs) utilising 100 ml of the bio-components of aqueous leaf extract of *Rosa indica*. The crystalline nature of the synthesised ZnO NPs was analysed by XRD; Fourier transform spectroscopy was used to confirm the functional group purity; however, the calculated band gap energies of ZnO NPs 2.75 eV, respectively. To examine the photocatalytic activity, 0.1 g/L of synthesized ZnO NPs was immersed in 100 mL of 10 ppm MG, BCB dye solutions. Moreover, the ZnO NPs displayed 80% and 90 % photodegradation of MG and BCB dye under 180 min of sunlight exposure which is attributed to its reduced band gap. The first order apparent rate constants (k) of 0.02143 and 0.0158 min for MG and BCB, respectively, and their half-life were found to be 32.34 and 43.87 min.