

## Synthesis, characterization and application of zinc oxide nanocomposite for dye removal from textile industrial wastewater

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Dye effluents from textile units with azo compounds, heavy metals viz., Cu, Cd, Zn, Ni and Pb and other highly suspended solids contaminate the environment by releasing toxic and potential carcinogenic substances into the water bodies. Though there are various chemical and physical processes available for removal of such contaminants, their efficiency still needs improvement. In this study, we explored the efficiency of zinc oxide (ZnO) nanocomposites on the removal of dyes from synthetic and textile industrial effluents. ZnO nanoparticles were synthesized by chemical reduction method using zinc nitrate and characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The XRD results have shown the average size of nanoparticles to be ~20 nm. Size and shape of ZnO nanoparticles were confirmed by SEM. ZnO nanocomposite was prepared by incorporating ZnO nanoparticles with chitosan. Under optimum process conditions of initial dye concentration of 600 ppm, the ZnO nanocomposite dosage of 0.9 mg/mL at 30°C and pH 6, ZnO nanocomposite exhibited 99% of dye removal from synthetic and textile industrial effluent. However, process conditions were slightly differed when industrial effluent was used. The results suggested that ZnO nanocomposite could be used as an adsorbent for removal of dyes from industrial wastewater.

**Keywords:** Adsorbent, Chitosan, Nanoparticles, Pollution, Process optimization, Textile dye effluents (TDE), Textile industry

In industrial pollution, textile industries play a major role since they consume oxygen