

Green synthesis of GO-ZnO nanocomposite and ultrasound assisted application of the same for AZO dye adsorption

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Reactive azo dyes appearing in almost all streams of wastewater reportedly possess carcinogenic and mutagenic properties and are often biorecalcitrant in nature. In recent years, the process of adsorption has received much significance as one of the most efficient, easy to operate and cost effective procedures implemented for treatment of effluents containing different types of dyes. The present study was performed to investigate the potential of Graphene oxide (GO) – Zinc oxide nanocomposites as an inexpensive, convenient and non-toxic adsorbent for removal of Methylene blue (MB) from solution. The zinc oxide nanoparticles (ZnO NPs) used in this study was synthesized in a green route from leaf extracts of basil (*Ocimum tenuiflorum*). The adsorption phenomenon was catalyzed by ultrasound to achieve higher rates of removal in significantly reduced time. The process was optimized using Response Surface Methodology for obtaining highest dye removal efficiency and analyzed in terms of varying experimental conditions, kinetics, thermodynamics and isotherms as well. Approximately 99.87% removal of upto 120 ppm dye was achieved in 6 min using only 0.75 g L⁻¹ GO-ZnONP nanocomposite as adsorbent. Characterization of this nanocomposite (using Electron Microscopy and Fourier Transform Infrared Spectroscopy) depicted changes in the surface morphology and chemical properties of the adsorbent resulting from MB uptake. Antibacterial properties of the GO-ZnONP nanocomposite was also determined and found to be higher than its individual components. Results indicated that the fabricated adsorbent was highly efficient and may be investigated further for treatment of real effluents.

Biography:

Priya Banerjee is a Ph.D. fellow at the Department of Environmental Science, University of Calcutta, Kolkata, India. After completion of her masters from the Department of Environmental Science, University of Calcutta, she had worked in many reputed institutes at Kolkata, India and has successfully published all work performed so far in national and international journals. She has also participated in several national and international conferences (oral and poster) and was awarded twice for best poster. Her present research focusses on synthesis, characterization and application of graphene oxide based nanocomposites for efficient treatment of dye-rich wastewater.