

Photocatalytic degradation of azo-dye under sunlight with different types of sonochemically synthesized ZnO nanoparticles - A comparative study

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Wastewater from the industries like textile, leather and paper is often contaminated with dye pollutants. Though azo-dyes are banned in developed countries, the directive is not totally implemented in the developing countries. Various techniques have been developed over the years to remove the dye-pollutant from wastewater. Advanced Oxidation Processes (AOPs) involving the generation of hydroxyl radical is one of such techniques which breaks down the organic pollutant to carbon dioxide and water. Fenton and photo-Fenton oxidation reaction, O_3/UV , H_2O_2/UV are some of the AOPs. Among the AOPs, semiconductor photocatalysis involves a catalyst and a source of energy for excitation of the same. In tropical countries like India, solar energy can be employed as the source of energy in photocatalytic degradation of dyes to make the process economically attractive and environmentally benign. In the present research, we have used three varieties of ZnO nanoparticles, sonochemically synthesized in our laboratory, for photocatalytic degradation of Trypan Blue, a dis-azo dye (CI no.23850), under sunlight. It was observed that the initial rates of oxidative degradation were different with different types of nano-ZnO particles. Their performance as photocatalyst have also been compared with the procured ZnO nanoparticles as well as with laboratory grade bulk ZnO particles. The reactor was a batch one and the residual concentration of dye was monitored at different time intervals with a UV-vis spectrophotometer. The degradation was monitored by COD analysis. The reactions followed Langmuir-Hinshelwood-Hougen-Watson equation and the rate parameters with different varieties of semiconductors have been compared.

Biography

Mr. Prantik Banerjee has completed his Masters in Environmental Science at the age of 25 years from the University of Calcutta in the year 2008. He is appointed as Senior Research Fellow (by the Council for Scientific and Industrial Research, India) in the Dept. of Chemical Engineering, University of Calcutta and registered as a PhD student in the Dept. of Environmental Science in the same university. He has publications in both peer-reviewed journals and as conference proceedings and is also involved as a reviewer with an Elsevier published journal.

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