

Brief Inquisition of Photocatalytic Degradation of Azo Dyes by Magnetically Enhanced Zinc Oxide Nanoparticles

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Abstract : This study investigates the efficacy of magnetically enhanced zinc oxide (MZnO) nanoparticles as a photocatalyst in the photodegradation of synthetic dyes, especially azo dyes. This magnetised zinc oxide has been simply fabricated by mechanical mixing through low-temperature calcination. This MZnO has been analysed through several analytical measurements, including FESEM, XRD, BET, EDX, and TEM, as well as VSM analysis which reflects successful fabrication. A high volume of azo dyes was found in industries effluent wastewater. They contribute to serious environmental stability and are very harmful to human health due to their high stability and carcinogenic properties. Therefore, five azo dyes, Reactive Red 120 (RR120), Disperse Blue 15 (DB15), Acid Brown 14 (AB14), Orange G (OG), and Acid Orange 7 (AO7), have been randomly selected to study their photodegradation property with reference to few characteristics, such as number of azo functional groups, benzene groups, molecular mass, and absorbance. The photocatalytic degradation efficiency was analysed by using a UV-vis spectrophotometer, where the reaction rate constant was obtained. It was found that azo dyes were significantly degraded through the first-order rate constant, which shows a higher kinetic constant as the number of azo functional groups and benzene group increases. However, the kinetic constant is inversely proportional to the molecular weight of these azo dyes.

Keywords : nanoparticles, photocatalyst, magnetically enhanced, wastewater, synthetic dyes, azo dyes

Conference Title : ICMSE 2025 : International Conference on Materials Science and Engineering

Conference Location : Zurich, Switzerland

Conference Dates : July 29-30, 2025