



Use of Packed Bed Photocatalyst and Sun Light Radiation for the Removal of Emerging Contaminant Dyes from Water

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Abstract : Wastewater containing dyes pollutants has gained more attention due to its mass discharge, high toxicity and low biodegradation. The degradation of synthetic dyes is difficult because of their complex aromatic structure. Therefore, efficient and cost-effective treatment processes of this pollutants family need to be developed. The present study aims to develop a new photoreactor for the degradation of dyes pollutants in water. A fixed bed photocatalytic reactor incorporating ZnO catalyst and UV from sun light radiation was used for the study of its performance in photocatalytic destruction of tartrazin contaminant. Results from this work provided essential information needed towards the construction and operation of a fixed bed photocatalytic reactor. Specifically, we have evaluated the improvement of photocatalytic activity using Zinc oxide fixed bed for the total pollutant removal. It was found that the photocatalytic oxidation reaction follows the pseudo-first order model. The photodegradation ratio reaches 96% after 300 min of solar radiation. Although the UV energy gives improved efficiency in degradation of dyes, solar irradiation could appear as a substitute cost effective light source because of its abundance and the fixed bed coating of photocatalyst may resolve the problems of leaching and separation.

Keywords: Advanced oxidation technology; heterogeneous photocatalysis; emerging contaminants, Indigo Carmin, Zinc oxide, fixed bed photoreactor.