SYNTHESIS OF ZnS/Ag_3PO_4 BASED PHOTOCATALYST USING IMPREGNATION METHOD FOR PHOTODEGRADATION OF RHODAMINE B

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ABSTRACT

SYNTHESIS OF ZnS/Ag_3PO_4 BASED PHOTOCATALYST USING IMPREGNATION METHOD FOR PHOTODEGRADATION OF RHODAMINE B

The rapid industrialization has intensified the environmental burden of synthetic dye pollutants, particularly Rhodamine B (RhB), a common but hazardous dye used in various industries. This study addresses the photodegradation of RhB through the synthesis of a ZnS/Ag_3PO_4 composite photocatalyst via the impregnation method. The research emphasizes the unique coupling of zinc sulfide (ZnS), an n-type semiconductor with high reduction potential, and silver phosphate (Ag_3PO_4), a material with excellent visible-light absorption, to enhance photocatalytic efficiency. This research provides a promising pathway for developing cost-effective, efficient, and sustainable photocatalysts for environmental remediation. The physical and chemical properties of ZnS loaded on Ag_3PO_4 were analyzed using FTIR, FESEM and UV-vis/DRS techniques. The performance on photodegradation of RhB were determine as followed: pure ZnS (69%), pure Ag_3PO_4 (81%), 5 ZAP (81%), 10 ZAP (94%), 15 ZAP (86%). 10 ZAP was denoted as highest performance compared to other photocatalysts due to well dispersed of ZnS on Ag_3PO_4 as well as lowest bandgap which enhance the photodegradation of RhB. Then, 10 ZAP was carried out for other parameters such as catalyst dosage, concentration of RhB and the effect of scavenger. The result shows the highest performance at concentration of RhB at 10 mg/L, catalyst dosage at 0.025 g L^{-1} and the main species in this reaction was photogenerated hydroxyl radicals absorbed in the bulk solution ($\bullet OH_{bulk}$) based on the scavenger study Overall, the ZnS on Ag_3PO_4 successfully contribute on photodegradation of RhB under visible light.

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