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{SYNTHESIS AND CHARACTERIZATION OF INDIUM VANADATE ($InVO_4$) LOADED ON SILVER PHOSPHATE (Ag_3PO_4) FOR PHOTOREDUCTION OF RHODAMINE B (RhB) USING IMPREGNATION METHOD}

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This Final Year Project entitled "**Synthesis and Characterization of Indium Vanadate ($InVO_4$) loaded on Silver Phosphate (Ag_3PO_4) for Photoreduction of Rhodamine B (RhB) using Impregnation Method)"** was submitted by Putri Dayana Batriesya binti Abdul Hanif in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF INDIUM VANADATE ($InVO_4$) LOADED ON SILVER PHOSPHATE (Ag_3PO_4) FOR PHOTOREDUCTION OF RHODAMINE B (RhB) USING IMPREGNATION METHOD

This research investigates the synthesis and characterization of an Indium Vanadate ($InVO_4$) loaded on Silver Phosphate (Ag_3PO_4) composite photocatalyst for the efficient degradation of Rhodamine B (RhB) under visible light. The study addresses the environmental risks of RhB, a persistent, toxic, and potentially carcinogenic dye, while overcoming the limitations of pristine Ag_3PO_4 and $InVO_4$, such as rapid charge carrier recombination and photocorrosion. Using the impregnation method, $InVO_4/Ag_3PO_4$ (InAP) composites were successfully synthesized with various weight loadings. Physicochemical characterization via X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), and Field Emission Scanning Electron Microscopy (FESEM) confirmed high crystallinity and the uniform dispersion of $InVO_4$ on the Ag_3PO_4 surface. Notably, FTIR analysis revealed a slight shift of the In–O vibration band from 406 cm^{-1} to 413 cm^{-1} in the composite samples, indicating strong interfacial interactions between $InVO_4$ and Ag_3PO_4. (UV-Vis/DRS) further indicated that the optimal composite possessed the narrowest bandgap for enhanced light absorption. Photocatalytic performance tests revealed that a 5 wt.% $InVO_4$ loading (5 InAP) was the most effective ratio, achieving a maximum degradation efficiency of 96% for 10 mg/L of RhB within the experimental duration. The efficiency followed a volcano-shaped trend, declining at higher loadings due to a "shielding effect," and decreased as the initial dye concentration increased due to active site saturation. Mechanistic studies using scavengers confirmed that the degradation process is primarily driven by photogenerated electron (e^-) and hydroxyl radicals (•OH) within a well-designed type-II heterojunction system. These findings demonstrate that the $InVO_4/Ag_3PO_4$ composite is a stable and high-performance photocatalyst suitable for treating dye-contaminated industrial wastewater.

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