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IN-SITU PREPARATION AND CHARACTERISATION OF Pt-Bi_2WO_6/g-C_3N_4 AND PHOTODEGRADATION STUDY ON METHYLENE BLUE

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ABSTRACT

IN-SITU PREPARATION AND CHARACTERISATION OF Pt-Bi_2WO_6/g-C_3N_4 AND PHOTODEGRADATION STUDY ON METHYLENE BLUE

This research focuses on synthesizing Pt-Bi_2WO_6/g-C_3N_4 (PBCN) to propose a Z-scheme mechanism for enhance degradation efficiency. Platinum (Pt) was incorporated as an electron mediator between bismuth tungstate (BWO) and graphitic carbon nitride (g-CN). Characterization techniques including XRD, FTIR, UV-Vis DRS, and FESEM-EDX to confirm the structural, morphological, and optical properties of the synthesized material. XRD analysis verified the improved crystallinity of the PBCN (14.4058nm), with no impurity peaks observed. FTIR spectra of PBCN confirmed the presence of functional groups from both parents material, indicating successful heterojunction formation. FESEM-EDX revealed a stacked plate-like morphology with uniform distribution of Pt, Bi, W, C, N, and O elements, supporting the successful integration of Pt and good interfacial contact between the components. UV-Vis DRS analysis showed enhanced visible light absorption and a band gap of 2.77 eV for PBCN, suitable for visible-light-driven photocatalysis. Photocatalytic experiments were conducted under visible light irradiation using methylene blue (MB) and methyl orange (MO) as model pollutants representing cationic and anionic dyes respectively. The results revealed that PBCN exhibited significantly higher degradation efficiency for MB (88.84%) than MO (12.1%), primarily due to favourable electrostatic interactions and molecule structure of the dyes themselves. Recyclability tests demonstrated the catalyst's stability and sustainability over five degradation cycles. Overall, this study presents PBCN as a promising and reusable photocatalyst with possible Z-scheme mechanism, applicable for future study in wastewater treatment.

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