QOID SYAUQI SYAHID BIN MOHAMMED

AS245 FSG

UiTM 2024

COMPARISON STUDY ON PT DECORATED BISMUTH TUNGSTATE GRAPHITIC CARBON NITRIDE UNDER BATCHWISE AND ONE STEP PREPARATION TECHNIQUES FOR PHOTODEGRADATION OF RR4 DYE

QOID SYAUQI SYAHID BIN MOHAMMED

BACHELOR OF SCIENCE (Hons.)
APPLIED CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA

AUGUST 2024

Fakulti Sains Gunaan

SUBMISSION FOR EVALUATION
FINAL YEAR PROJECT 2 - RESEARCH PROJECT

Comparison Study on Platinum decorated Bismuth Tungstate Graphitic Carbon Nitride under Batchwise and One Step Preparation techniques for Photodegradation of RR4 dye

Name	:	Qoid Syauqi Syahid Bin Mohammed
Student ID	:	2021888386
Program	:	AS 245
Course code	:	FSG 671
Mobile Phone	:	
E-mail	:	qoidsyauqi@gmail.com

Approval by Main Supervisor :

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name	:	Prof Ts Dr Mohd Azlan Bin Mohd Ishak
Date	:	26th July 2024
Turnitin Similarity %	:	22 %
Signature	:	

Prof. Ts. Dr. Mohd Azlan Mohd Ishak
Faculty of Applied Sciences
Universiti Teknologi MARA, Perlis Branch
02600 Arau, Perlis, Malaysia

ABSTRACT

COMPARISON STUDY ON PLATINUM DECORATED BISMUTH TUNGSTATE / GRAPHITIC CARBON NITRIDE UNDER BATCHWISE AND ONE-STEP PREPARATION TECHNIQUE FOR PHOTODEGRADATION OF RR4 DYE

The fabrication of Z-Scheme heterojunction comprising photocatalysts Bi_2WO_6 & g-C_3N_4 doped with platinum was successfully synthesized by two distinctive methods; batchwise & one-step to degrade model pollutant, RR4 dye. In batchwise method, Bi_2WO_6 is combined with g-C_3N_4 prior incorporating platinum into the composite. Whereas, for one-preparation technique Bi_2WO_6 is calcined first with platinum before the construction of z-scheme heterojunction with g-C_3N_4. RR4 were used as model pollutant to measure the photocatalytic performance of pt-Bi_2WO_6/g-C_3N_4. Characterization study employing FTIR, UV-Vis spectra, FESEM-EDX and XRD was conducted to characterized the composite. Based on the FTIR analysis aromatic C-N stretching vibration mode is detected in the region of 1200–1750 cm^{-1}. In addition, intense sharp peak appear around 810 cm^{-1} is attributed to the breathing mode striazine units of CN. Further, in UV-Vis analysis, pristine Bi_2WO_6 has an absorption edge of approximately detected at 443 nm, which corresponds to a band gap of approximately 2.6 eV. The absorption edge of pure g-C_3N_4 was at about 457 nm, corresponding to the band gap of 2.8 eV. The fabrication of heterojunction of the composite results in gradual red-shift and the introduction of platinum results in even lower the band gap energy. The crystallinity size of the prepared photocatalysts was determined by XRD diffraction where Scherrer equation is applied to calculate the size magnitude In XRD, the diffraction angle of Bi_2WO_6 exhibits at 28.6º, 33.1º, 47.4º, 56.2º ,59.1º,69.2º and 78.8º and these diffraction angle also can be seen in the other composite. All of the modified and unmodified Bi_2WO_6/g-C_3N_4 have shown photocatalytic degradation efficiency up to 50% and the composite prepared by the means of one step offers the outstanding performance achiving 80% photodegradation activity of RR4 dye.

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