

**A COMPARISON STUDY OF THE GRAPHITIC CARBON NITRIDE  
COUPLED TiO<sub>2</sub> PREPARED BY USING TITANIA PRECURSOR AND  
DEGUSSA P25 TiO<sub>2</sub> UNDER PHOTOCATALYTIC DEGRADATION OF  
METHYLENE BLUE AND REACTIVE RED 4 DYES.**

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**Final Year Project Report Submitted in  
Partial Fulfilment of the Requirements for the  
Degree of Bachelor of Science (Hons.)  
Chemistry with Management in the Faculty of  
Applied Sciences  
Universiti Teknologi MARA**

**JANUARY 2023**

This Final Year Project entitled “**A comparison study of the graphitic carbon nitride coupled TiO<sub>2</sub> by using titania precursor and Degussa P25 TiO<sub>2</sub> under photocatalytic degradation of methylene blue and reactive red 4 dyes**” was submitted by Zawani binti Ab Wahab in partial fulfilment of the requirements for the Bachelor of Science (Hons.) Chemistry with Management, in the Faculty of Applied Sciences, and was approved by

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Date: 16 FEBRUARY 2023

## ABSTRACT

### **A COMPARISON STUDY OF THE GRAPHITIC CARBON NITRIDE COUPLED TiO<sub>2</sub> PREPARED BY USING TITANIA PRECURSOR AND DEGUSSA P25 TiO<sub>2</sub> UNDER PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE AND REACTIVE RED 4 DYES.**

In this study, two different preparations of graphitic carbon nitride / titanium dioxide (g-C<sub>3</sub>N<sub>4</sub>/TiO<sub>2</sub>) photocatalysts were prepared by using two different titania precursors (tetrabutyl ortotitanate (TBOT) and Degussa P25) with 1, 2, and 5 wt% of graphitic carbon nitride using in situ sol gel hydrothermal method. The photocatalytic activity of prepared samples was measured under methylene blue (MB) and reactive red 4 (RR4) dyes using 55-Watt fluorescent lamp. 2 wt.% g-C<sub>3</sub>N<sub>4</sub> incorporated with TiO<sub>2</sub> using TBOT as precursor (2% g-C<sub>3</sub>N<sub>4</sub>/TiO<sub>2</sub>) gave the highest photocatalytic degradation rates among the other photocatalysts under MB and RR4 dyes at 0.0321 and 0.0651 cm<sup>-1</sup>, respectively. While, 2 wt.% g-C<sub>3</sub>N<sub>4</sub> incorporated with TiO<sub>2</sub> using P25 as precursor (2% g-C<sub>3</sub>N<sub>4</sub>/P25) gave the highest photocatalytic degradation rates among the other photocatalysts under MB and RR4 dyes at 0.0337 and 0.0553 cm<sup>-1</sup> respectively. This study shows that two different optimum k values were observed under two types of sample's precursors. The g-C<sub>3</sub>N<sub>4</sub>/TiO<sub>2</sub> gave high k value in RR4 dye while g-C<sub>3</sub>N<sub>4</sub>/P25 give high k value in MB dye. The different photocatalytic performance is due to the differential point of zero charge (pzc) analysis were *ca.* 4.6 and 6.2 for 2% g-C<sub>3</sub>N<sub>4</sub>/TiO<sub>2</sub> and 2%g-C<sub>3</sub>N<sub>4</sub>/P25, respectively. The FTIR and XRD analyses showed that the samples exhibit all the peaks for g-C<sub>3</sub>N<sub>4</sub> and TiO<sub>2</sub> which indicates the presence both compounds in the prepared samples. The morphology of the prepared samples was elucidated via FESEM shows the graphitic carbon nitride successfully dispersed on the TiO<sub>2</sub>. It shows that the 2% composite of g-C<sub>3</sub>N<sub>4</sub>/TiO<sub>2</sub> has smallest particle size and also largest specific surface area which can leads to the increasing of dispersion and diffusion of electron between photocatalyst and dyes.

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