

# REMEDICATION OF WATER CONTAMINATED BY BATIK DYES WASTE USING $\text{Fe}_2\text{O}_3$ COMPOSITE ON GRAPHENE OXIDE

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## ABSTRACT

This research aims to (1) determine the effect of variations in the characteristics of the  $\text{Fe}_2\text{O}_3/\text{GO}$  composite for photodegradation of Congo red waste, (2) determine the ability of the  $\text{Fe}_2\text{O}_3/\text{GO}$  composite for photodegradation of Congo red waste, (3) determine the reusability (reuse) of the  $\text{Fe}_2\text{O}_3/\text{GO}$  composite for photodegradation of Congo red waste. Synthesis of  $\text{Fe}_2\text{O}_3/\text{GO}$  using the coprecipitation method.  $\text{Fe}_2\text{O}_3/\text{GO}$  was prepared with the precursor  $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ .  $\text{Fe}_2\text{O}_3/\text{GO}$  is synthesized from various masses of Fe and GO (Graphene Oxide):  $\text{Fe}_2\text{O}_3/\text{GO}$  1:1,  $\text{Fe}_2\text{O}_3/\text{GO}$  2:1, and  $\text{Fe}_2\text{O}_3/\text{GO}$  1:2 with a drying temperature of  $100^\circ\text{C}$  and calcined at a temperature of  $400^\circ\text{C}$  for 2 hours. pH conditioning was carried out by adding  $\text{NH}_4\text{OH}$  70% (Merck) with a certain volume until  $\text{pH} = 11$ . The samples obtained were characterized using UV-Vis, XRD, and SEM-EDS. The samples were then subjected to absorbance and degradation tests in the dark and exposed to visible light. The research results showed that the  $\text{Fe}_2\text{O}_3$  material was successfully embedded in GO using the coprecipitation method and was successfully characterized using UV-Vis, XRD, and SEM-EDS. The XRD results show that there is no peak change before and after  $\text{Fe}_2\text{O}_3$  is applied to GO. SEM-EDS results show that the  $\text{Fe}_2\text{O}_3/\text{GO}$  1:2 composite contains an average of 38.65% Fe atoms; O atoms = 49.795%; and C atoms = 11.555%. UV-Vis results show bandgap Fe = 1.85eV; GO = 2.8eV;  $\text{Fe}_2\text{O}_3/\text{GO}$  1:1 = 1.9eV;  $\text{Fe}_2\text{O}_3/\text{GO}$  2:1 = 1.87eV;  $\text{Fe}_2\text{O}_3/\text{GO}$  1:2 = 2.0eV. The most effective  $\text{Fe}_2\text{O}_3/\text{GO}$  variant for Congo red photodegradation is  $\text{Fe}_2\text{O}_3/\text{GO}$  1:2 with a degradation percentage of 97.75%.  $\text{Fe}_2\text{O}_3/\text{GO}$  1:2 composite has reuseability for Congo red photodegradation of 94.25% (cycle 1); 91.1% (cycle 2); and 89.45% (cycle 3).

Kata Kunci: *congo red, photodegradation,  $\text{Fe}_2\text{O}_3$ , GO, characterization*