

REMEDIATION OF WATER CONTAMINATED BY BATIK DYES WASTE USING Fe_2O_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°C and calcined at a temperature of 400°C for 2 hours. pH conditioning was carried out by adding NH_4OH 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 Fe_2O_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 Fe_2O_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 reusability for Congo red photodegradation of 94.25% (cycle 1); 91.1% (cycle 2); and 89.45% (cycle 3).

Kata Kunci: *congo red, photodegradation, Fe_2O_3 , GO, characterization*