

ABSTRACT

Photocatalysis is one of the efforts that can be made to overcome the problems of the aquatic environment due to the waste of organic pollutants such as methylene blue. Methylene blue is a cationic textile dye with a complex aromatic structure that can absorb light and is toxic. This study aims to synthesize and determine the characteristics of ZnO/CuO/GO composites using FTIR, XRD, and DRS-UV. Analyze the effectiveness of ZnO/CuO/GO reaction kinetics in photocatalytic methylene blue degradation. Modification of ZnO/CuO with the addition of graphene oxide as a support material was carried out to increase photocatalytic efficiency and slow down electron-hole recombination. This research includes the synthesis of ZnO CuO by the precipitation method, GO by the modified Hummers method, and composite synthesis by sonication treatment. The next step is to characterize the FTIR, XRD, and DRS-UV of the synthesized products. Photocatalysis testing under UV light was carried out with time variations (30, 60, 90, 120, and 150 minutes) and methylene blue concentrations (20, 30, 40, 50, and 60 ppm). The result obtained from this research is a grayish ZnO/CuO/GO composite with a yield of 98,76%. The analysis showed the presence of O-H ($3371,90\text{ cm}^{-1}$), C-O ($1108,11\text{ cm}^{-1}$), Zn-O (456 cm^{-1}), Cu-O (598 cm^{-1}) and an average crystallite size of 52.609 nm. Composite formation decreased the band gap to 3,03 eV. The best degradation percentage effectiveness was obtained at 60 ppm methylene blue concentration of 84,979% with UV irradiation for 150 minutes. The results of the kinetics calculation follow the first-order kinetics model with a reaction rate constant of $0,0109\text{ min}^{-1}$.

Keywords: ZnO/CuO/GO, photocatalysis, methylene blue, sonication