

ABSTRACT

Rapid industrial development, particularly the textile industry, has resulted in side effects in the form of increased water pollution, one of the main causes is dye waste. Crystal violet (CV) is a frequently used dye. Having carcinogenic and resistance characteristic is the cause of crystal violet can pose a threat to both aquatic ecosystem and humans. One method that can be used to solve this issue is photocatalysis. Studies on the utilization of semiconductors are currently underway. NiO is classified as a p-type semiconductor with a wide band gap energy around 3.6 eV- 4 eV which has good conductivity and perform good stability, Precipitation method is used for NiO synthesis due to its simplicity to use and effectiveness when producing large sample quantities. The requirement of doing precipitation method is having base as a precipitating agent. This study aims to obtain NiO by performing the precipitation method, doing the characterization analysis of the formed NiO using FTIR, XRD, and UV-Vis DRS. Last step is doing the determination of photocatalytic ability of NiO to degrade crystal violet (CV). The synthesis of NiO needs NaOH and KOH as a base precipitating agent. First variation uses NaOH and second variation uses KOH. Results from synthesized NiO with both base precipitating agent then being characterized using Fourier Transform Infrared (FTIR), X-Ray Diffraction (XRD), and UV-Vis Diffuse Reflectance Spectroscopy (UV-Vis DRS). The results from these analysis would perform the characteristics of each fabricated NiO. FTIR analysis shows that both NiO-Na and NiO-K contain Ni-O bond. XRD analysis shows both NiO-Na and NiO-K crystallite size with value respectively 26.59 nm and 21.74 nm. UV-Vis DRS analysis showed band gap energy value of both NiO-Na and NiO-K with the values respectively 3.71 eV and 3.51 eV. Optimal photocatalytic degradation of crystal violet by NiO achieved using NiO-K photocatalyst for 60 minutes with 30 mg mass of photocatalyst dose at concentration of 10 ppm. Reaction rate constant is obtained with 0.0265 min^{-1} and indicates that NiO photocatalytic activity follows a first-order reaction.

Keywords : NiO, Precipitation, Crystal Violet, and Photocatalysis.