PHYSICOCHEMICAL AND PHOTOCATALYTIC STUDIES OF ZNO-SUPPORTED INDONESIAN KAOLINITE (ZNO/KAOLINITE) FOR METHYL VIOLET PHOTO-OXIDATION

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ABSTRACT

Research on preparation of photocatalyst of zno-supported onto Indonesian Kaolinite (ZnO/Kaolinite) and photocatalytic activity for methyl violet photo-oxidation has been conducted. ZnO/Kaolinite was prepared by impregnation method utilizing zinc acetate as ZnO precursor and kaolinite sample obtained from Bangka Belitung province, Indonesia. Physicochemical study of the photocatalyst was conducted by x-ray diffraction (XRD), gas sorption analyzer and scanning electrone microscope-energy dispersive x-ray (SEM-EDX). Furthermore, photocatalytic activity of the material was evaluated in a bacth photo-oxidation system of methyl violet degradation. The results showed that prepared ZnO/Kaolinite demonstrated superior and high stable photocatalytic performance in the photooxidation system. The prepared ZnO/Kaolinite is a simply prepared, recovered and reused for advance application of dye wastewater treatment.

Keywords: ZnO, Photocatalyst, Kaolinite, Dye degradation

1. INTRODUCTİON

Photocatalysis is one of popular techniques for dye-containing wastewater treatment. Many photocatalysts were applied for certain dye degradation, and in order to enhance photocatalyst activity and its reusability, immobilization of photocatalytic active material in a solid support(Lathasree et al., 2004)(Fatimah and Sopia, 2017). In this research, immobilization of ZnO in a clay material: kaolinite was conducted. Physicochemical characterization of prepared photocatalyst was performed by using x-ray diffraction (XRD), gas sorption analyzer (GSA), scanning electrone microscope-energy disspersive x-ray (SEM-EDX), and the photocatalytic activity was tested in methyl violet photodegradation.

2. MATERIALS AND METHODS

Materials: Kaolinite was obtained from Sukabumi, West Java, methyl violet was purchased from PT. from Merck-Millipore (Germany).

Material Perparation: ZnO/Kaolinite was prepared by dispersing zinc acetate in kaolinite solid followed by calcination.

Physicochemical study of the adsorbent was conducted by x-ray diffraction (XRD), gas sorption analyzer and scanning electrone microscope-energy dispersive x-ray (SEM-EDX). Furthermore, photocatalytic activity of the photocatalyst was evaluated in a bacth reactor of methyl violet degradation. The kinetics of photocatalytic degradation was evaluated by spectrophotometric analysis of treated solution.

3. RESULTS AND DISCUSSION

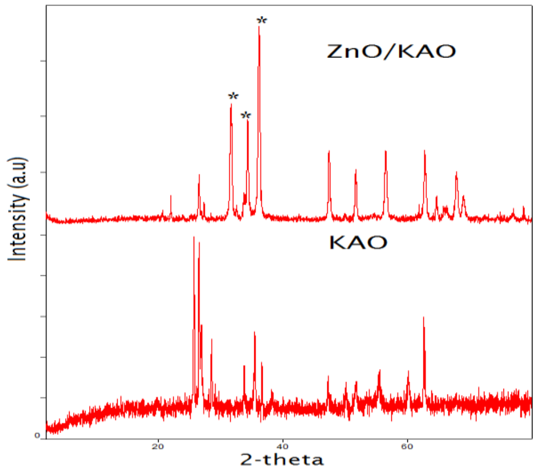

Figure 2. UV-Vis Spectra of Treated Solution

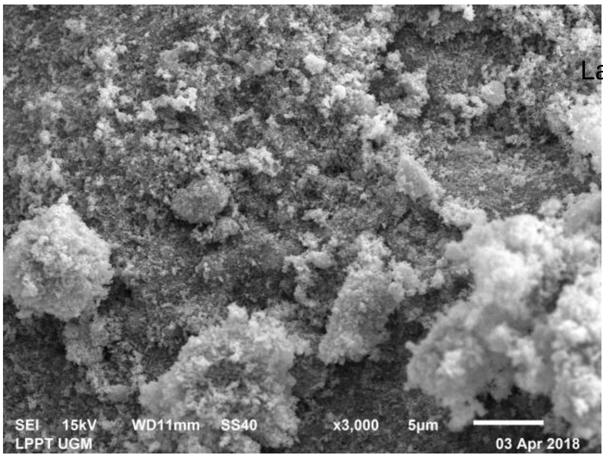

Figure 2. SEM Profile of ZnO/Kaolinite

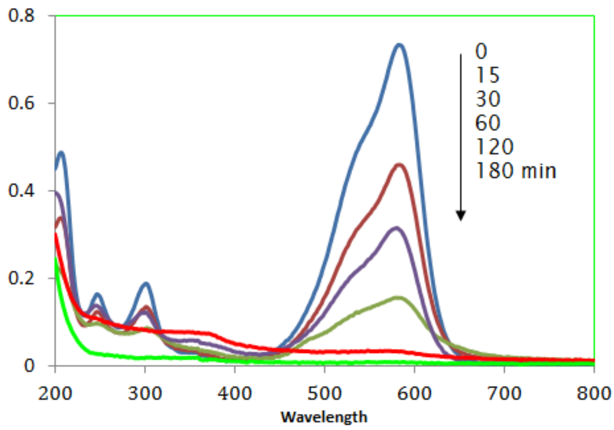

Figure 3. UV-Vis Spectra of Treated Solution

XRD pattern shows the attached ZnO as shown by reflections at at 2θ = 31.67°, 34.31°, 36.14°, 47.40°, 56.52°, 62.73°, 66.28°, 67.91°, 69.03°, and 72.48°(Akhtar et al., 2012). The photocatalytic degradation mechanism was revealed by the reduction of MV spectra along increasing time of treatment and the shift of maximum wavelength at lower region as indication of methylation of the MV.

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