

ABSTRAK

SINTESIS KOMPOSIT ZnO DAN *SILICONE OIL* SEBAGAI FOTOKATALIS UNTUK MENDEGRADASI METILEN BIRU

Komposit hidrofobik dengan sifat fotokatalitik dengan stabilitas tinggi dan permukaan *self-cleaning* dibuat dengan menggabungkan semikonduktor ZnO dengan polimer hidrofobik *silicone oil*. Komposit hidrofobik ini mampu menghilangkan limbah zat warna secara sinergi melalui adsorpsi dan degradasi fotokatalitik. Penelitian ini diawali dengan sintesis ZnO menggunakan metode presipitasi dengan pemberian getaran ultrasonik. Sintesis ZnO dilakukan berdasarkan data sekunder penelitian Nia (2019). Selanjutnya dilakukan sintesis komposit ZnO/*silicone oil* dengan bantuan sinar UV. Sintesis dilakukan dengan variasi massa dari *silicone oil* terhadap ZnO yaitu pada 1:1, 2:1, dan 4:1. ZnO didispersikan dalam kloroform dan dicampurkan dengan *silicone oil*. Dalam sintesis komposit dilakukan penyinaran sinar UV untuk memicu terjadinya pencangkakan *silicone oil* terhadap permukaan ZnO. Hasil analisis PSA menunjukkan distribusi ukuran partikel ZnO sebesar 206 nm. Hasil karakterisasi SEM komposit ZnO/*silicone oil* menunjukkan adanya lapisan *silicone oil* yang melapisi ZnO. Uji aktivitas fotokatalis komposit ZnO/*silicone oil* menunjukkan peningkatan degradasi berbanding lurus dengan lamanya waktu penyinaran. ketiga variasi komposit ZnO/ *silicone oil* waktu 60 menit diperoleh nilai % degradasi diatas 90% yaitu 98,1668%; 96,7908%; 98,7088%. Diperoleh aktivitas fotodegradasi paling baik pada komposit ZnO/*silicone oil* 4:1. Penurunan konsentrasi metilen biru melalui adsorpsi oleh komposit ZnO/*silicone oil* menghasilkan nilai % adsorpsi tertinggi pada komposit ZnO/*silicone oil* 2:1 sebesar 65,2074%. Uji efektivitas penggunaan kembali fotokatalis komposit ZnO/*silicone oil* yang dilakukan sebanyak 3 kali menunjukkan stabilitas yang baik dengan degradasi diatas 90%.

Kata-kata kunci: fotokatalis; *grafting*; ZnO; *silicone oil*; metilen biru.

ABSTRACT

SYNTHESIS OF ZnO COMPOSITE AND SILICONE OIL AS A PHOTOCATALYST OF METHYLENE BLUE DEGRADATION

Hydrophobic composites with photocatalytic properties with high stability and self-cleaning surfaces are made by combining ZnO semiconductors with hydrophobic polymer silicone oil. This hydrophobic composite is able to synergistically remove dye waste through adsorption and photocatalytic degradation. This research begins with the synthesis of ZnO using the precipitation method by giving ultrasonic vibrations. Synthesis of ZnO was carried out based on secondary data from research by Nia (2019). Then the ZnO composite / silicone oil was synthesized with the help of UV light. The synthesis was carried out by varying the mass of silicone oil against ZnO at 1:1, 2:1, and 4:1. ZnO was dispersed in chloroform and mixed with silicone oil. In the composite synthesis, UV irradiation was carried out to trigger silicone oil grafting to the ZnO surface. The results of the PSA analysis showed that the ZnO particle size distribution was 206 nm. The results of SEM characterization of ZnO/silicone oil composites showed a layer of silicone oil coating ZnO. The photocatalytic activity of ZnO / silicone oil composites showed that the degradation increase was directly proportional to the length of exposure time. The three variations of ZnO / silicone oil composites took 60 minutes to obtain percent degradation value above 90%, namely 98,1668%; 96,7908%; 98,7088%. The best photodegradation activity was obtained in ZnO / silicone oil composites 4:1. The decrease in the concentration of methylene blue through adsorption by the ZnO /silicone oil composite resulted in the highest percent adsorption value in the ZnO/silicone oil 2:1 composite of 65,2074%. The reuse effectiveness of ZnO / silicone oil composite photocatalyst which was carried out 3 times showed good stability with degradation above 90%.

Keywords: photocatalyst; grafting; ZnO; silicone oil; methylene blue.