

**SINTESIS TiO₂-AgNP SECARA SONIKASI
DAN UJI AKTIVITAS FOTOKALITIKNYA TERHADAP
DEGRADASI BIRU METILEN**

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INTISARI

Telah dilakukan sintesis TiO₂-AgNP secara sonikasi dan uji aktivitas fotokatalitiknya terhadap zat warna biru metilen. Tujuan penelitian ini adalah mengetahui pengaruh kadar perak (Ag) dalam menggeser serapan cahaya fotokatalis menuju daerah sinar tampak serta menguji aktivitas fotokatalitik TiO₂-AgNP terhadap degradasi zat warna biru metilen. Material TiO₂-AgNP dihasilkan dari campuran serbuk TiO₂ Merck dan AgNO₃ sebagai sumber Ag dengan variasi perbandingan 0,5%, 2 % dan 5% b/b. TiO₂-AgNP hasil sintesis dikarakterisasi menggunakan spektrofotometer FTIR (*Fourrier Transform Infra Red*), XRD (*X-Ray Diffraction*), DRUV-Vis (*Diffuse Reflectance Ultraviolet-Visible*), SEM-EDX (*Scanning Electron Microscope-Energy Dispersive X-Ray*) dan TEM (*Transmission Electron Microscope*).

Berdasarkan hasil XRD, penambahan perak nanopartikel (AgNP) pada semikonduktor TiO₂ mengakibatkan terjadinya penurunan intensitas puncak *anatase*. Hasil DRUV-Vis menunjukkan semua material fotokatalis TiO₂-AgNP variasi penambahan Ag mengalami pergeseran serapan ke daerah sinar tampak dengan energi celah pita paling (E_g) paling sempit dimiliki oleh fotokatalis dengan penambahan Ag 0,5% yaitu 2,59 eV. Ion Ag⁰ yang masuk ke dalam TiO₂ dibuktikan dengan terdeteksinya Ag pada hasil SEM-EDX. Hasil TEM menunjukkan bahwa fotokatalis memiliki distribusi diameter 51-100 nm. Hasil uji degradasi biru metilen menunjukkan material TiO₂-AgNP 5% memiliki aktivitas paling baik pada radiasi sinar tampak (87,06%). Secara keseluruhan, reaksi fotodegradasi biru metilen mengikuti kinetika orde kedua semu Ho dan McKay di bawah sinar tampak.

Kata kunci: TiO₂-AgNP, fotodegradasi, biru metilen

SYNTHESIS OF TiO₂-AgNP BY SONOCHEMICAL METHOD AND ITS APPLICATION FOR METHYLENE BLUE DEGRADATION

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ABSTRACT

Preparation of TiO₂-AgNP by sonochemical and its testing as a photocatalyst for methylen blue degradation have been investigated. The aims of this research are to evaluate the role of Ag for enhancing visible light absorption of photocatalyst and examining their photocatalytic activity toward methylen blue degradation. TiO₂-AgNP has been obtained from TiO₂ Merck and AgNO₃ 0.5; 2; 5% w/w. The photocatalysts were characterized by using FTIR (Fourier Transform Infra Red), XRD (X-Ray Diffraction), DRUV-Vis (Diffuse Reflectance-Ultraviolet-Visible), SEM-EDX (Scanning Electron Microscope-Energy Dispersive X-Ray) and TEM (Transmission Electron Microscope).

Based on the XRD results, addition of Ag to the photocatalyst caused decreasing of anatase intensity peaks. DRUV-Vis results showed that light absorption of TiO₂-AgNP photocatalysts with various of Ag were shifted to visible light region with the smallest band gap energy (E_g) of 2.59 eV which obtained by Ag 0,5%. Ag⁰ ion has been successfully into TiO₂ that confirmed by the detection of Ag on the SEM-EDX. TEM results showed that the particle size of TiO₂-AgNP was 51-100 nm. The photocatalyst has the ability to photodegrade methylen blue with precentage yield 87.06 % under visible light radiation. The photodegradation of methylen blue by the photocatalyst in this research followed type of Ho and McKay pseudo second orde kinetics under visible light radiation.

Keywords: TiO₂-AgNP, photodegradation, methylene blue