



SINTESIS Fe₃O₄/TiO₂-Ag DAN UJI AKTIVITASNYA SEBAGAI FOTOKATALIS

Fadlian Noor
13/347254/PA/15183

INTISARI

Sintesis fotokatalis Fe₃O₄/TiO₂-Ag telah berhasil dilakukan. Sintesis dilakukan secara bertahap yaitu sintesis Fe₃O₄ menggunakan metode sonokopresipitasi, kemudian pelapisan TiO₂ melalui proses sol-gel, dan dilanjutkan modifikasi permukaan TiO₂ dengan nanopartikel perak (Ag). Hasil sintesis material dikarakterisasi dengan spektrofotometri *Fourier Transform Infrared* (FT-IR), *X-Ray Diffraction* (X-RD), *Scanning Electron Microscopy-Energy Dispersive X-ray* (SEM-EDX), *Transmission Electron Microscopy* (TEM), *Specular Reflectance Ultra Violet-Visible* (SR UV-Vis) *spectrophotometry*. Pengujian aktivitas fotokatalis Fe₃O₄/TiO₂-Ag untuk degradasi metilen biru dalam air dilakukan melalui sistem *batch* dalam reaktor tertutup pada paparan sinar UV dan tampak.

Hasil penelitian menunjukkan bahwa material fotokatalis Fe₃O₄/TiO₂-Ag berbentuk partikel bulat dengan ukuran partikel sebesar 12,3 nm dan responsif pada daerah serapan sinar tampak. Nilai Energi celah pita fotokatalis Fe₃O₄/TiO₂-Ag dengan rasio berat Ag/TiO₂ 0, 1, 3, 5, dan 8 % secara berturut-turut sebesar 3,11; 2,93; 2,88; 2,82; 3,02 eV. Degradasi metilen biru dalam air 5 ppm terkatalisis 5 mg Fe₃O₄/TiO₂-Ag 5 % pada pH 10 dan waktu reaksi 120 menit sebesar 73,3 dan 34,2% berturut-turut pada paparan sinar tampak dan UV.

Kata Kunci: fotokatalis, metilen biru, perak, TiO₂



SYNTHESIS OF Fe_3O_4/TiO_2-Ag AND ITS ACTIVITY TEST AS PHOTOCATALYST

Fadlian Noor
13/347254/PA/15183

ABSTRACT

Synthesis of Fe_3O_4/TiO_2-Ag photocatalyst has been performed. The synthesis was carried out in several stages; synthesis of Fe_3O_4 by sonoprecipitation method, next coating TiO_2 by sol-gel process, then modification of the surface TiO_2 by nanoparticle silver (Ag). The characterization was conducted by infrared spectrophotometry, X-Ray Diffraction (X-RD), Scanning Electron Microscopy-Energy Dispersive X-ray (SEM-EDX), Transmission Electron Microscopy (TEM), Specular Reflectance Ultra Violet-Visible (SR UV-Vis) spectrophotometry. The activity test of Fe_3O_4/TiO_2-Ag photocatalyst was evaluated by batch system for degradation methylene blue in water on using closed reactor with UV and visible irradiation.

The result showed that Fe_3O_4/TiO_2-Ag photocatalyst shaped sphere particle with a size of 12.3 nm and enhanced under visible light absorption. The band gap energy of Fe_3O_4/TiO_2-Ag photocatalyst with Ag/ TiO_2 weight ratio of 0, 1, 3, 5, and 8% were: 3.11; 2.93; 2.88; 2.82; 3.02 eV, respectively. Degradation of methylene blue solution 5 ppm catalyzed by 5 mg Fe_3O_4/TiO_2-Ag 5% at a pH of 10 and with the reaction time of 120 minutes gave the percentage of degradation were 73.3 and 34.2 % under visible and ultraviolet irradiation, respectively.

Keywords: methylene blue, photocatalyst, silver, TiO_2