Sintesis dan Karakterisasi Material Mangan Ferit ($MnFe_2O_4$ dan $MnFe_2O_4$/NGP) untuk Aplikasi Fotokatalis dan Sonokatalis dalam Mendegradasi Methylene Blue = Synthesis and Characterization of Manganese Ferrite ($MnFe_2O_4$ and $MnFe_2O_4$ / NGP) Materials for Photocatalyst and Sonocatalyst Applications in Degradation of Methylene Blue

Lendi Larici, author

Abstrak

Nanokomposit $MnFe_2O_4$/NGP dengan variasi 5, 10, dan 15 wt.% digunakan untuk sebagai katalis untuk mendegradasi methylene blue pada proses fotokatalitk dan sonokatalitik. $MnFe_2O_4$ dan $MnFe_2O_4$/NGP 5, 10, 15 wt.% disintesis dengan menggunakan metode hydrothermal. Impuritas dan fase lain tidak ditemukan pada pengukuran x-ray diffraction (XRD) dan x-ray fluorescence (XRF). Keberadaan NGP terkonfirmasi dari pengukuran XRD, thermogravimetric analysis (TGA), spektroskopi Raman, dan x-ray photoelectron spectroscopy (XPS). Penambahan luas sampel spesifik seiring bertambahnya NGP dikonfirmasi melalui pengukuran Brunauer-Emmet Teller (BET). Morfologi dari $MnFe_2O_4$ yang menyerupai persegi dan cenderung berkumpul didapat dari pengukuran transmission electron microscopy (TEM). Katalis memiliki kemampuan degradasi yang lebih baik pada proses photocatalytic dengan cahaya tampak dibanding cahaya UV. Kondisi sistem terbaik dari katalis untuk mendegradasi methylene blue adalah pada dosis katalis 0.2 g/L, konsentrasi H_2O_2 8 mL, dan pH 13. Penambahan NGP pada $MnFe_2O_4$ terbukti meningkatkan kemampuan degradasi methylene blue. Katalis juga terbukti memiliki stabilitas yang tinggi setelah digunakan sebanyak lima kali. Spesies aktif dari katalis pada proses fotokatalitik dan sonokatalitik adalah hidroksil radikal.
......$MnFe_2O_4$/NGP nanocomposites with variations of 5, 10, and 15 wt.% were used as catalysts to degrade methylene blue in the photocatalytic and sonocatalytic processes. $MnFe_2O_4$ and $MnFe_2O_4$/NGP 5, 10, 15 wt.% were synthesized using the hydrothermal method. Impurities and other phases were not found in x-ray diffraction (XRD) and x-ray fluorescence (XRF) measurements. The presence of NGP was confirmed by XRD measurements, thermogravimetric analysis (TGA), Raman spectroscopy, and x-ray photoelectron spectroscopy (XPS). The increase in specific sample area as NGP increases was confirmed by Brunauer-Emmet Teller (BET) measurements. The morphology of $MnFe_2O_4$ which resembles a square and tends to congregate was obtained from transmission electron microscopy (TEM) measurements. The catalyst has better degradation ability in photocatalytic processes with visible light than UV light. The best system conditions for the catalyst to degrade methylene blue were at a catalyst dose of 0.2 g / L, 8 mL H_2O_2 concentration, and a pH of 13. The addition of NGP to $MnFe_2O_4$ was proven to

increase the degradation ability of methylene blue. The catalyst has also been shown to have high stability after being used five times. The active species of catalyst in photocatalytic and sonocatalytic processes are hydroxyl radicals