INTISARI

FOTODEGRADASI METHYLENE BLUE MENGGUNAKAN FOTOKATALIS NANOPARTIKEL MAGNETIK ZnNi-FERRITE/SILIKA

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Aktivitas fotodegradasi zat warna *methylen blue* dengan katalis nanopartikel magnetik $ZnNiFe_2O_4$ dan $ZnNiFe_2O_4/SiO_2$ telah dilakukan. Material $ZnNiFe_2O_4$ disintesis menggunakan metode kopresipitasi. Enkapsulasi silika melalui metode Stöber menggunakan jenis silika TEOS dan Na_2SiO_3 dengan berbagai konsentrasi. Karakterisasi katalis dilakukan melalui XRD, TEM, FTIR, VSM. Citra TEM menunjukkan gumpalan berwarna hitam mengindikasikan adanya partikel $ZnNiFe_2O_4$ sedangkan bagian berwarna abu-abu merupakan SiO_2. Perbedaan jenis silika Na_2SiO_3 dan TEOS yakni ikatan gugus fungsi Si-OH. Ukuran pori-pori Na_2SiO_3 relatif lebih besar dibandingkan silika jenis TEOS. Hasil karakterisasi sifat kemagnetan memperlihatkan terjadi perubahan nilai koersivitas maupun nilai megnetisasi, namun masih bersifat feromagnetik. Seiring dengan penambahan konsentrasi silika, maka energi gap material menjadi berkurang. Hal ini diakibatkan oleh jumlah monomer pada material meningkat dan energi yang diperlukan untuk *fotoexcited* partikel berkurang. Karakterisai akativitas fotokatalis dilakukan dengan menggunakan spektrofotometer Uv-Vis. Hasil aktivitas fotodegradasi *methylen blue* menunjukkan bahwa $ZnNiFe_2O_4/SiO_2$ lebih tinggi dari $ZnNiFe_2O_4$. Sampel $ZnNiFe_2O_4/SiO_2$ memiliki tingkat fotodegradasi tertinggi hingga 96%.

Kata Kunci: Fotokatalis, TEOS, Na_2SiO_3, energi gap, *methylen blue*

ABSTRACT

PHOTODEGRADATION OF METHYLENE BLUE USING ZnNi-FERRITE / SILICA NANOPARTICLE PHOTOCATALYSIS

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Photodegradation activity of methylene blue dyes with catalyst magnetic nanoparticles ZnNiFe2O4 and ZnNiFe2O4/SiO_2 was carried out. $ZnNiFe_2O_4$ material was synthesized using the co-precipitation method. Silica encapsulation through the Stöber method uses various types of silica TEOS and Na_2SiO_3. Catalyst characterization was carried out through XRD, TEM, FTIR, VSM. TEM images show black lumps indicating $ZnNiFe_2O_4$ particles while the gray portion is SiO_2. The difference in the type of silica Na_2SiO_3 and TEOS is the bonding of Si-OH functional groups. The pore size of Na_2SiO_3 is relatively larger than TEOS silica. The results of the characterization of magnetic properties showed changes in coercivity and magnetization values, but they were still ferromagnetic. As silica concentration is increased, the band gap energy material is reduced. This is caused by the number of monomers in the material increases, so the energy needed to photoexcited particles is reduced. The characterization photocatalyst activity was carried out using Uv-Vis spectrophotometer. The results of the methylene blue photodegradation activity showed that $ZnNiFe_2O_4/SiO_2$ was higher than $ZnNiFe_2O_4$. $ZnNiFe_2O_4/SiO_2$ samples has the highest photodegradation rates of up to 96%.

Keywords: Photocatalyst, TEOS, Na_2SiO_3, band gap energy, methylene blue