Sintesis nanokomposit Al2O3/NiFe2O4 yang dipreparasi dengan ekstrak daun jarak pagar (jatropha curcas l.) sebagai katalis reduksi 4-nitroanilin = Synthesis of Al2O3/NiFe2O4 nanocomposite prepared by jarak pagar (jatropha curcas l.) leaf extract as catalyst for 4-nitroaniline reduction

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Abstrak

Pada penelitian ini, sintesis nanopartikel Al2O3, nanokomposit Al2O3/NiO, nanokomposit Al2O3/Fe2O3, dan nanokomposit Al2O3/NiFe2O4 telah berhasil dilakukan melalui metode green synthesis. Sintesis dilakukan menggunakan ekstrak daun jarak pagar (Jatropha curcas L.) sebagai agen penghidrolisa (sumber basa) dan penstabil (capping agent). Spektrofotometer UV--Vis, FTIR, XRD, PSA, SEM--EDX, dan TEM digunakan untuk mengkarakterisasi hasil sintesis material. Karakterisasi XRD menunjukkan bahwa nanokomposit Al2O3/NiFe2O4 memiliki struktur inverse spinel kubik dengan distribusi ukuran partikel sebesar 58,77 nm melalui karakterisasi PSA dan rata--rata ukuran sebesar 11,75 nm melalui karakterisasi TEM. Aktivitas katalitik dari Al2O3 termodifikasi NiFe2O4 diamati dalam reaksi reduksi 4--nitroanilin oleh NaBH4 dan menghasilkan persentase reduksi sebesar 93,92% selama 60 menit waktu reaksi. Perhitungan reaksi reduksi 4--nitroanilin dengan katalis Al2O3/NiFe2O4 menunjukkan bahwa reaksi mengikuti kinetika pseudo orde dua.

.....In this study, synthesis of Al2O3 nanoparticles, Al2O3/NiO nanocomposite, Al2O3/Fe2O3 nanocomposite and Al2O3/NiFe2O4 nanocomposite were succesfully conducted using green synthesis method. The synthesis was conducted using Jatropha curcas L. leaf extract as hydrolizing agent as well as capping agent. UV--Vis spectrophotometer, FTIR, XRD, PSA, SEM--EDX and TEM were used to characterize the synthsized materials. The characterization of XRD showed that Al2O3/NiFe2O4 nanocomposite has inverse cubic spinel structure with particle size distribution of and average size of 11,75 2O3 modified NiFe2O4 was observed in the reduction of 4--nitroaniline by NaBH4. Then, it resulted in 93,92% of reduction percentage for 60 minutes. Calculation of 4--nitroaniline reduction using Al2O3/NiFe2O4 catalyst shows that the reaction follows pseudo second order kinetics.