

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 *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 successfully 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 synthesized 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 nm. The catalytic activity of Al₂O₃ 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.