Rekayasa Katalis CuO-nanoleaf/?-Al2O3 Untuk Sintesis Senyawa p-Aminofenol Dari p-Nitrofenol = Synthesize Catalyst of CuO-nanoleaf/-Al2O3 For Produce p-Aminophenol From p-Nitrofenol

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Abstrak

Katalis CuO dengan struktur nanoleaf berhasil dikomposit pada penyangga -Al2O3 yang disintesis dengan metode wet chemical dengan etilen glikol sebagai bahan penstabil nanostruktur. Komposit CuO-nanoleaf/-Al2O3 memiliki aktivitas katalitik yang menjanjikan untuk reaksi sintesis senyawa p-Aminofenol (PAF) dari p-Nitrofenol (PNF). Komposit CuO-nanoleaf/-Al2O3 telah dikarakterisasi menggunakan Field Emission Scanning Electron Microscopy-Energy Dispersive Spectroscopy (FESEM-EDS), X-Ray Diraction (XRD), Transmission Electron Microscopy (TEM), dan N2 adsorpsi-desorpsi. Hasil karakterisasi FESEM-EDS dan TEM menunjukkan bahwa morfologi CuO adalah berbentuk nanoleaf yang menempel diatas permukaan penyangga -Al2O3 serta kom-posisi unsur Cu, Al dan O pada komposit. Pola puncak difraktogram XRD menunjukkan adanya fasa kristal CuO monoklinik dan fasa Al2O3 dalam komposit. Disisi lain, hasil karakterisasi N2 adsorpsi-desorpsi menunjukkan bahwa komposit CuO-nanoleaf/-Al2O3 memiliki luas permukaan spesifik yang tinggi yakni 140,19 m2/g. Berdasarkan hasil uji sintesis PAF dari PNF, komposisi CuO dalam katalis yang optimal adalah 5% dengan kondisi operasi yang optimum adalah dengan loading katalis 5 g/L, suhu reaksi 30 oC dan konsentrasi reaktan kurang dari 3.000 ppm dengan waktu reaksi 12 menit. Suhu optimum saat proses kristalisasi PAF adalah suhu 8 oC dengan yield 85,65% dan kemurnian 78,36%. Selain itu, kristal PAF telah dikarakterisasi menggunakan Fourier Transform Infra-Red (FT-IR) dan Ultra Performance Liquid Chromatography-Mass Spectrometer (UPLC-MS). Hasil karakterisasi menunjukkan bahwa sampel PAF memiliki spektra FT-IR yang serupa dengan spektra FT-IR PAF standar dan berat molekul 109,12 g/mol.

.....The CuO catalyst with nanoleaf structure was successfully composited on -Al2O3 surface which was synthesized by wet chemical and ethylene glycol as a nanostructure stabilizer. The CuO-nanoleaf/-Al2O3 composite has promising catalytic activity in the synthesis of p-Aminophenol (PAF) from p-Nitrophenol (PNF). The CuO-nanoleaf/-Al2O3 was characterized using Field Emission Scanning Electron Microscopy-Energy Dispersive Spectroscopy (FESEM-EDS), X-Ray Diffraction (XRD), Transmission Electron Microscopy (TEM), and N2 adsorption-desorption. The results of FESEM-EDS and TEM characterization results showed the morphology of CuO with nanoleaf structure attached into the surface of the -Al2O3 and the elemental composition of Cu, Al and O was identified in the composite. The XRD pattern shows the crystalline of monoclinic CuO phase and Al2O3 phase in the composite. The N2 adsorption-desorption characterization showed that CuO-nanoleaf/-Al2O3 had a high specific surface area of 140.19 m2/g. Based on the results of the synthesis of PAF from PNF, the optimal composition of CuO in the catalyst was 5% under optimum operating conditions with a catalyst loading of 5 g/L, a reaction temperature of 30oC and a reactant concentration of less than 3000 ppm with a reaction time of 12 minutes. In the PAF crystallization process, the crystallization temperature of 8oC could produce PAF crystals with a yield of 85.65% and a purity of 78.36%. In addition, PAF crystal was characterized using Fourier Transform Infra-Red (FT-IR) and Ultra Performance Liquid Chromatography-Mass Spectrometer (UPLC-MS). The characterization

results showed that PAF sample had a FT-IR chromatogram similar to the PAF standard and the PAF synthesized was identified as having a molecular weight of 109.12 g/mol.