Karakterisasi sifat struktur, sifat optis, dan uji aktivitas katalitik dari nanokomposit zno/cuo dalam mendegradasi pewarna organik methylene blue = Structural optical characterization and catalytic activity test of zno cuo nanocomposites on the degradation of the organic dye methylene blue

Hesni Adila Shabrany, author

Abstrak

Nanokomposit ZnO/CuO dengan lima variasi molar ZnO:CuO (1:3, 1:1, 1:0.5, 1:0.3, dan 1:0.1) telah disintesis dengan menggunakan metode sol-gel. Pengukuran X-ray Diffraction (XRD), Energy Dispersive X-Ray (EDX), Field Emission Scanning Electron Microscopy (FESEM), nitrogen adsorption spectroscopy, Electron Spin Resonance (ESR), dan UV-Visible spectroscopy dilakukan untuk mengindentifikasi struktur, morfologi, luas permukaan, resonansi ion-ion, dan nilai celah energi dari nanokomposit. Aktivitas katalitik dari nanokomposit ZnO/CuO diuji dibawah pemaparan cahaya visible, ultraviolet, ultrasonik, dan gabungan antara visible/UV dengan ultrasonik dalam mendegradasi larutan pewarna methylene blue (MB). Hasil aktivitas katalitik dari nanokomposit ZnO/CuO menunjukkan aktivitas photosonocatalytic mempunyai performa lebih baik dibandingkan aktivitas photocatalytic dan sonocatalytic. Penambahan beberapa scavenger menunjukkan hole merupakan spesies aktif yang berperan paling penting dalam mekanisme katalitik.

<hr>ZnO/CuO nanocomposites with five different ZnO:CuO ratios (1:3, 1:1, 1:0.5, 1:0.3 and 1:0.1) were prepared using sol-gel method. X-ray Diffraction (XRD), Energy Dispersive X-Ray (EDX), Field Emission Scanning Electron Microscopy (FESEM), nitrogen adsorption spectroscopy, Electron Spin Resonance (ESR) and UV-Visible spectroscopy were employed to investigate the structural, morphology, surface area, ions resonance and energy band gap of nanocomposites. The catalytic activity of ZnO/CuO nanocomposites were tested under visible light, ultraviolet light, ultrasound irradiation and the combination of visible/UV light with ultrasound irradiation on the degradation of methylene blue (MB) aqueous solution. The observed catalytic activity of nanocomposites shows that photosonocatalytic has better performance than photocatalytic and sonocatalytic activity. The addition of scavengers suggested that holes are the most important active species in the catalytic mechanism.