

Studi pengaruh copper oxide terhadap karakterisasi dan aktivitas fotokatalitik nanohybrid Fe₃O₄/TiO₂/CuO = Influence of copper oxide on characterization and photocatalytic activity of Fe₃O₄/TiO₂/CuO nanohybrids

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Abstrak

Nanohybrid iron oxide titanium dioxide copper oxide dengan tiga variasi molar 1 1 1 1 3 1 dan 1 5 1 telah disintesis menggunakan metode sol gel Pengukuran X Ray Diffraction XRD Field Emission Scanning Electron Microscopy FESEM Energy Dispersive X rays EDX UV Vis Spectroscopy dan Vibrating Sample Magnetometer VSM digunakan untuk menentukan sifat struktur morfologi nilai energy gap optik dan sifat magnetik dari sampel nanohybrid Pengujian aktivitas fotokatalitik sampel nanohybrid dilakukan dengan mengamati degradasi warna methylene blue MB dibawah pemaparan cahaya ultraviolet dan tampak Hasil menunjukkan keberadaan copper oxide seiring dengan peningkatan rasio molar titanium dioxide mempengaruhi aktivitas fotokatalitik nanohybrid Nanohybrid dengan rasio molar 1 5 1 menunjukkan aktivitas fotokatalitik yang paling baik untuk pemaparan dengan cahaya ultraviolet sedangkan untuk pemaparan dengan cahaya tampak didapatkan dengan rasio molar 1 1 1 Selain itu fotokatalis nanohybrid dapat dipisahkan setelah proses reaksi menggunakan magnet eksternal Penambahan scavenger menunjukkan hole memiliki peranan penting dalam proses degradasi methylene blue

.....Iron oxide titanium dioxide copper oxide nanohybrids with three different molar ratios 1 1 1 1 3 1 and 1 5 1 were successfully prepared by sol gel method X Ray Diffraction XRD Field Emission Scanning Electron Microscopy FESEM Energy Dispersive X rays EDX UV ndash Vis spectroscopy and Vibrating Sample Magnetometer VSM techniques were employed to determine the structure morphology optical gap energy and magnetic properties of the as prepared samples Photocatalytic examination of the nanohybrids was carried out using aqueous solution of methylene blue MB under ultraviolet and visible light irradiation The results demonstrate that the increase molar ratio of titanium dioxide and the addition of copper oxide to iron oxide titanium dioxide cooper oxide has remarkable influence on the photocatalytic activity The nanohybrids with 1 5 1 molar ratio has superior activity in degradation of MB under ultraviolet light while under visible light the maximum degradation is reached by sample with molar ratio 1 1 1 Furthermore the photocatalysts can be separated from the reaction system simply by applying an external magnetic Active species on photocatalytic activity were investigated by measuring the photocatalytic degradation in the presence of scavenger The results suggested that holes play the most important role in degradation of methylene blue.