Karakterisasi dan peningkatan fotokatalitik coupled-nanomaterial oksida besi dan titanium dioksida yang disintesis dengan metode sol-gel = Characterization and photocatalytic enhancement of iron oxide and titanium dioxide coupled-nanomaterials synthesized by sol-gel method / Sarah Arifiyanti

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Abstrak

Nanopartikel oksida besi dan coupled-nanomaterial oksida besi dan titanium dioksida dengan tiga variasi rasio molar telah disintesis dengan metode sol-gel. Keseluruhan sampel dikarakterisasi dengan pengukuran X-Ray Diffraction, Energy Dispersive X-Ray, Fourier-Transform Infrared, Field Emission Scanning Electron Microscopy, Vibrating Sample Magnetometer, dan UV-Visible Spectroscopy. Coupled-nanomaterial menunjukkan sifat feromagnetik, mempunyai morfologi spherical-like dan terdiri atas fase dan struktur kristal tunggal dari oksida besi magnetite dan titanium dioksida anatase dengan kehadiran unsur Fe, Ti dan O dalam bentuk ikatan Ti-O-Ti, Ti-O-O dan Fe-O-Fe. Perolehan aktivitas fotokatalitik optimum yang berbeda pada kondisi basa untuk pemaparan dengan cahaya ultraviolet dan cahaya visible berhubungan dengan nilai celah energi coupled-nanomaterial. Peran aktif hole dalam aktivitas fotokatalitik coupled-nanomaterial mendegradasi methylene blue tidak berbeda untuk pemaparan dengan cahaya ultraviolet maupun visible.

<hr>Iron oxide nanoparticles, iron oxide and titanium dioxide coupled-nanomaterials with three variation molar ratio were synthesized by sol-gel method. All samples were characterized by X-Ray Diffraction, Energy Dispersive X-Ray, FourierTransform Infrared, Field Emission Scanning Electron Microscopy, Vibrating Sample Magnetometer, and UV-Visible Spectroscopy measurements. The coupled-nanomaterials show ferromagnetic behavior, have spherical-like morphology and consist of individual crystal structure and phase of magnetite iron oxide and anatase titanium dioxide with the presence of Fe, Ti and O elements in the form of Ti-O-Ti, Ti-O-O dan Fe-O-Fe bonds. Different optimum photocatalytic activities under alkaline conditions with ultraviolet and visible light irradiation are associated with the value of the coupled-nanomaterials energy gap. Hole's active role on photocatalytic activities of methylene blue degraded by the coupled-nanomaterials is no different for both kinds irradiations of ultraviolet and visible light.