

# Sintesis dan karakterisasi nanokomposit $MgFe_2O_4$ dan $MgFe_2O_4/NGP$ untuk degradasi limbah pewarna methylene blue melalui proses photocatalytic = Synthesize and characterization of nanocomposite $MgFe_2O_4$ and $MgFe_2O_4/NGP$ for methylene blue degradation by photocatalytic process.

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## Abstrak

Pada studi ini, saya menggunakan metode fotokatalitik untuk mendegradasi limbah cat pewarna organik dalam limbah air menggunakan  $MgFe_2O_4$  dan  $MgFe_2O_4$ -nanographene ( $MgFe_2O_4/NGP$ ) nanopartikel.  $MgFe_2O_4$  dan  $MgFe_2O_4/NGP$  (mengandung persentase NGP yang bervariasi) disintesis melalui metode hidrotermal. Kedua bahan ini digunakan sebagai katalis dalam proses fotokatalitik mendegradasi limbah organik Methylene-Blue dalam solusi cair, dibawah radiasi cahaya merah. Karakteristik dari sample ( $MgFe_2O_4$  &  $MgFe_2O_4/NGP$ ) dilakukan menggunakan X-ray Diffraction, Raman Spectroscopy, UVVIS Spectroscopy, XRF, TGA, BJH, XPS, TEM, HRTEM, SAED, EDX dan BET. Hasil dari penelitian ini menunjukkan bahwa  $MgFe_2O_4/NGP$  mempunyai kemampuan fotokatalitik yang lebih baik dibandingkan dengan  $MgFe_2O_4$ . Efek dari konsentrasi NGP (wt%) untuk mendegradasi MB didiskusikan. Spesies aktif dalam proses fotokatalitik juga dipelajari melalui scavenger test.

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In the current study, we use the photodegradation method for the removal of organic dye molecule in wastewater using  $MgFe_2O_4$  and  $MgFe_2O_4$ -nanographene platelets ( $MgFe_2O_4/NGP$ ) nanoparticles.  $MgFe_2O_4$  and  $MgFe_2O_4/NGP$  (containing various amounts of NGP) were synthesized using the hydrothermal method. Both of them used as a catalyst for photocatalytic degradation of methylene blue (MB), i.e. our organic dye in aqueous solution under red light irradiation. Characteristics of our samples ( $MgFe_2O_4$  &  $MgFe_2O_4/NGP$ ) were characterized using X-ray diffraction, Raman Spectroscopy, UVVIS Spectroscopy, XRF, TGA, BJH, XPS, TEM, HRTEM, SAED, EDX, and BET. The result of our work showed that  $MgFe_2O_4/NGP$  mostly have a better photocatalytic performance compared to pure  $MgFe_2O_4$ . The effect of NGP concentration (wt%) on the photocatalytic degradation of MB was discussed. Active species who'd take effect on the photocatalytic process was also studied by the scavenger test.