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Synthesis of cobalt ferrite nanoparticles via chemical precipitation as an effective photocatalyst for photo Fenton-like degradation of methylene blue

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ABSTRACT

In this work, the synthesis and characterization of cobalt ferrite nanoparticles ($CoFe_2O_4$ NPs) were carried out. The characterization studies confirmed that the synthesized particles were determined to be magnetic $CoFe_2O_4$ NPs in nanoscale and cubic spinel structure. The Brunauer–Emmett–Teller specific surface area of mesoporous $CoFe_2O_4$ NPs was determined to be 145.03 m^2/g. The photo Fenton-like degradation ability of $CoFe_2O_4$ NPs was also evaluated and the results demonstrated that the synergistic effect of combining of Co and Fe_2O_4 enabled $CoFe_2O_4$ NPs to become the promising photo Fenton-like catalyst for degradation of methylene blue (MB) from aqueous solutions. At the optimum experimental conditions (3.0 of initial pH, 25 mM of H_2O_2 concentration, 50 mg/L of initial dye concentration, and 0.25 g/L of catalyst concentration), 18.29% chemical oxygen demand removal and 99.75% color removal were achieved after the photo Fenton-like degradation of MB in the presence of $CoFe_2O_4$ NPs heterogeneous catalyst with near-UV radiation.

Keywords: Cobalt ferrite nanoparticles; Fenton-like; Heterogeneous catalyst; Methylene blue; Photo degradation

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