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Synthesize $Ni_{0.1}Cu_{0.1}Zn_{0.8}Fe_2O_4$ nanoparticles by gel-auto combustion and microwave-assisted methods and investigation their photocatalytic activity

Fatemeh Masoomi,[a] Mahboubeh Rabbani*

[a]*Department of Chemistry, Faculty of Chemistry Sciences, Iran University of science and technology, Tehran, Iran*

[*] *E-mail: M_Rabani@iust.ac.ir*

Over the past few decades, magnetic nanoparticles have been considered by many researchers due to their unique physicochemical, magnetic and optical properties and extensive applications in the field of biomedical (such as magnetic resonance imaging (MRI), drug delivery system and magnetic hyperthermia), catalysis, information technology, telecommunication and environmental remediation, destruction of organic pollutants, etc [1,4]. In this work, it has been attempted to synthesize $Ni_{0.1}Cu_{0.1}Zn_{0.8}Fe_2O_4$ by both gel-auto combustion [5] and microwave-assisted [6] methods and productions were characterized by types of spectroscopic analyses, involved XRD, IR, DRS, SEM, EDS, VSM and UV-Vis spectra. The effect of samples were investigated on absorbtion and destruction of methyl orange at three different concentrations (5, 10 and 15 ppm ppm). The average crystalline size of MNPs synthesized by gel-auto combustion and MW-assisted, obtained by x-ray diffraction analysis and were 77.9 and 44.1 nm, respectively. The hysteresis magnetization curves exhibit the saturation magnetic values which, were 20.64 and 52.89 (emu/g) for MNPs obtained by gel-auto combustion and MW-assisted, respectively. Finally, both ferrites showed high absorption of methyl orange dye in water under UV-Vis irradiation (λ> 400 nm) but that sample obtained by MW-assisted method had better functional [2].

Keywords: Magnetic Nanoparticles, Photocatalyst, Gel-auto combustion, Microwave-assisted.

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