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Synthesis, Characterization, and Magnetic Behavior of Cobalt-Ferrite Nanoparticles under Variant Temperature Conditions

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Wet chemical method was applied for the synthesis of cobalt-ferrite nanoparticles. The physicochemical properties were investigated by number of analytical techniques. TGA revealed the thermal stability of synthesized cobalt-ferrite nanoparticles. X-ray diffraction studies displayed the nanoparticles crystalline nature. Structure of cobalt-ferrite nanoparticles was confirmed via infrared spectroscopy by manifesting Co and Fe ions absorption peaks. Morphological studies showed synthesis of nanoparticles of cobalt-ferrite by employing field emissions scanning electron microscopy. The magnetic properties of cobalt-ferrite nanoparticles were investigated by vibrating sample magnetometer (VSM). The X-ray photoelectron spectroscopy studies confirmed the synthesis of cobalt-ferrite by displaying the oxidation of Co as Co²⁺ and Fe as Fe³⁺, respectively. The VSM results revealed that the magnetic characteristics of cobalt-ferrite nanoparticles were completely changed by the variation of temperature.

Keywords: ferrite nanoparticles, VSM, temperature effect, magneton number, anisotropy constant.