

# Synthesis, Characterization of Magnetic Iron Oxide Nanoparticles and its Toxicity Assessment in Tilapia fingerlings

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**Abstract:** Nowadays, the most recent advances in nanoscience and nanotechnology are widely used in a variety of industries, including pharmaceuticals, medicine, electronics, robotics, and tissue engineering. The current study focuses on the chemical synthesis of Magnetic Iron Oxide Nanoparticles, Followed by characterization using UV-visible spectrometry, FTIR, SEM, and EDS. Toxicity tests were performed on fresh water fish Tilapia (*Oreochromis mosambicus*) fingerlings exposed to as synthesized Magnetic  $Fe_3O_4$  NPs  $LC_{50}$  concentration of  $Fe_3O_4$  NPs were 12.45 mg/L for 96 hrs and sub-lethal  $LC_{10}$  concentrations (10 ppm and 20 ppm) for 96 hours. When compared to controls, treated groups showed significant changes in biochemical indicators such as protein and catalase activity after 96 hours, which may be related to  $Fe_3O_4$  NPs in fish muscles. The cause of nanoparticle toxicity is attributed to their own specific characteristics of greater surface-to-volume ratio, chemical composition, size, and dosage, body retention, and organ specific toxicity. The comprehensive data can provide the important empirical parameters as well as recent field developments. The extensive data is able to provide both the crucial empirical aspects and the most recent advancements in this field.

**Keywords:**  $Fe_3O_4$  NPs, Characterization, toxicity, Fish and Biochemical test

