

## Synthesis and characterization of magnetic nanoparticles obtained by co-precipitation

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Magnetic nanoparticles are widely used on biomedical and dental applications by having low cytotoxicity and biocompatibility [1]. The present research is aimed at the synthesis of magnetic iron oxide nanoparticles, magnetite (Fe<sub>3</sub>O<sub>4</sub>) and the characterization of these nanoparticles synthesized by co-precipitation method from solution of sodium hydroxide (NaOH) and iron sulfate (FeSO<sub>4</sub>) under processor ultrasound. At the end of the synthesis of the nanoparticles, one part was washed with solution of hydrochloric acid (HCl) and another part with methanol (P.A), with the aim of analyzing the difference in the final properties of the nanoparticles. The final material, after being washed and dried, resulted in a dark powder that responded to an external magnetic field (magnet). Structural and magnetic properties were investigated using X-Ray diffraction (XRD), FT-IR spectroscopy, Zeta potential and Field emission gun-scanning electron microscopy (FEG-SEM). The nanoparticles that were washed with the HCl solution showed the best final properties, confirming the obtainment of magnetite. The nanoparticles washed with methanol did not present magnetite characteristics. The average crystallite size of magnetite calculated using the Scherrer equations were between 17 nm and 20 nm. The size and morphology of the nanoparticles were determined by FEG-SEM. The magnetite nanoparticle showed spinel-structure surface and average measured size obtained by Image J was 120 ± 30 nm. Thus, in this study, magnetic particles were obtained in nanometric dimensions that are promising for biomedical applications.

[1] H. El Moussaoui, T. Mahfoud, S. Habouti, K. El Maalam, M. Ben Ali, M. Hamedoun, O. Mounkachi, R. Masrour, E.K. Hlil and A. Benyoussef. *Journal of Magnetism and Magnetic Materials*, **405** (2016) 181.