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Synthesis of Fe_3O_4 nanoparticles by co-precipitation method and study of the solvent effect on morphology and crystallinity of particles

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Iron oxides in nano-scale have exhibited great potential for their applications as catalytic materials, wastewater treatment adsorbents, pigments, flocculants, coatings, gas sensors, ion exchangers, magnetic recording devices, magnetic data storage devices, toners and inks for xerography, magnetic resonance imaging, bioseparation and medicine [1-3]. In this research work, Fe_3O_4 nanoparticles were synthesized by co-precipitation method which Iron oxides were normally precipitated from an aqueous solution of Fe(II)and/orFe(III) salts whit addition of an alkali solution along with suitable ageing time.The formation of Fe3O4 can be performed under below the chemical reaction [4]: $Fe^{+2}+2Fe^{+3}+8OH^{-}\rightarrow Fe(OH)_2+2Fe(OH)_3\rightarrow Fe_3O_4+4H_2O$ The effect of solvent on size, morphology and crystallinity of nanoparticles were investigated. The obtained products were characterized by the variety of methods such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and Scanning electron microscopy (SEM).The size of particles was calculated by Sherrer's formula, and then compared with the size of nanoparticles obtained from sem image .The results from the SEM images, show the formation of spherical nanocrystaline iron oxide with average diameter of 37 nm.

Keywords: Magnetite, Co-precipitation, Nanoparticles, Morphology

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