THE EFFECT OF REVOLUTION PER MINUTE (RPM) ON IRON OXIDE NANOPARTICLES (Fe_3O_4NPS) SYNTHESIS THROUGH DIRECT OXIDATIVE ALKALINE HYDROLYSIS

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ABSTRACT

Iron oxide nanoparticles are useful particles in many fields such as medical, biomedical and environmental applications. The nature, sizes, purity and composition of these nanoparticles plays important role in their applications especially in biomedical application. This allows for the efficient use of the unique properties of iron oxide nanoparticles for analysis. This paper reports the effect of revolution per minute on the synthesis of iron oxide nanoparticles through oxidative alkaline hydrolysis of iron salt (iron II sulphate). X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM) were used in the analysis of the nanoparticles. The result shows that increase revolution per minute decreases the iron oxide nanoparticles sizes (Fe_3O_4 Nps) with the smallest particle size of 50 nm at 1500 rpm and biggest size of 74 nm for the control sample (without rpm). The nanoparticles from TEM analysis have cubic structure at constant salt concentration of 0.035M. And no significant change in the composition of the nanoparticles synthesized at 200 rpm and the control was observed aside change in their particle size. Nanoparticles synthesized at high revolution per minute of 500 and 1500 rpm showed traces of hematite (α-Fe_2O_3) and iron oxy hydroxide (γ-FeOOH) as impurities mixed with iron oxide nanoparticles.

Keywords: Iron oxide nanoparticles; X-ray diffraction, X-ray photoelectron spectroscopy, Revolution per minute, Transmission electron microscopy.