

Synthesis and Characterization of Cobalt Zinc Ferrites by Coprecipitation Method

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Abstract: Nanotechnology includes the development of man-made or engineered particles and molecular structures that have dimensions in the nanometer range (typically between 1-100nm in at least one dimension). Cobalt ferrite nano powder was obtained by coprecipitation method using NaOH. The metal chlorides such as zinc chloride, cobalt chloride and ferric chloride were used as source materials. The metal chloride to NaOH ratio was taken as 1:4 i.e. (300ml:1200ml). The pH of formed substance was maintained at 5. The prepared powder of cobalt Ferrite was used for characterization and investigation of structural and magnetic properties. X-ray diffraction (XRD) analysis and Fourier Transform Infrared (FTIR) were carried out to study the structural and magnetic properties respectively. The structural characterization of Zinc Cobalt Ferrite nanoparticles were done by XRD. The spinel structure and crystalline water absorption of $\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$ nanoparticles were studied by using FTIR. The coprecipitation method requires high temperature and more time. The size and properties of spinel ferrites nanoparticles are greatly depend upon pH, heating of compound, stirring time and speed, metal ferrite to fuel ratio (NaOH) etc. Ferrites are ferromagnetic oxides consisting of ferrite XRD. oxide and metal oxide Ferrites are ferromagnetic oxides consisting of ferric oxide and metal oxide. Ferrites are divided into three classes- hexagonal ferrite, spinel ferrite and garnet ferrite. In the last ten years research on Nano size spinel ferrite has been considerably increase due to their superior properties and applications in new fields like magnetic drug delivery, biomedical applications, etc. Among the different spinel ferrites Cobalt Zinc ferrite ($\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$) with inverse spinel structure has high electrical properties, high magnetic properties, good mechanical properties and chemical stability.

Keywords: Coprecipitation method, Cobalt Zinc Ferrite ($\text{Co}_{1-x}\text{Zn}_x\text{Fe}_2\text{O}_4$), Spinel Ferrite, FTIR.

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