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Synthesis, structural and magnetic studies of Cu substituted cobalt ferrite nanomaterials annealed at 750°C

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Abstract : *Cu substituted cobalt ferrite nanomaterials, $Cu_x Co_{1-x} Fe_2O_4$; $x=0.01, 0.03, 0.05, 0.07$ and 0.09 , were prepared using chemical based Citrate precursor method. The precursor was annealed at temperature 750°C. The annealed powders were characterized using X-ray diffraction (XRD) and Vibrating sample magnetometer. XRD study shows that the synthesized samples are of cubic spinel structure. Sharp changes were observed in particle size, lattice constant, magnetization and coercivity with the increasing Cu-content.*

Key words: *Cu-Co Ferrite Nanomaterials, Particle size, Magnetic properties.*

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Introduction :

Synthesis and study of spinel nanoferrites have been intensively pursued in last two decades because of their special magnetic and electrical properties (Reed 1991; Said et al 2007). Magnetic Nano ferrites have a wide range of applications in biomedical, magnetic ferrofluid, microwave absorption, repulsive suspension for levitated railway systems, gas sensing capabilities, etc. (Sugimoto 1980; Ishino and Narumiya 1987). Also, Co ferrite has been used for magnetic and/or digital recording applications in audio as well as video tapes (Ishino and Narumiya 1987; Kumar Vinod et al 2008). Further, it is believed that the magnetic properties are strongly dependent on particle size. More over the magnetic properties of ferrite nanoparticles get influenced by the method of synthesis, substitution of divalent ions and process parameters even though the common diagnostic tools such as XRD show similar crystalline structure (Singh Rakesh Kumar et al, 2011). In recent years the development of a number of synthetic procedures to produce ferrites at nanomaterial scale has received considerable