

A simple chemical route for the synthesis of γ -Fe₂O₃ nano-particles dispersed in organic solvents via an iron-hydroxy oleate precursor

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A simple chemical route is developed to generate maghemite (γ -Fe₂O₃) nano-particles, dispersed in organic solvents via a thermal decomposition of an iron-hydroxy oleate precursor. An iron-hydroxy oleate precursor was generated by chemical reaction of mixed iron nitrate and oleic acid in ethanol with 30% NH₃ solution. The precursor thus obtained was suspended in hexadecane and then mixed with necessary quantity of oleic acid at room temperature with constant stirring and is further heated to 220°C/2h to convert it in to γ -Fe₂O₃ nano-particles. The iron-hydroxy oleate molecular precursor and γ -Fe₂O₃ nano-particles are characterized using various techniques like DTA/TGA, IR, XRD, Vibrating sample magnetometer (VSM), TEM, and EDAX. The characterization results indicated that γ -Fe₂O₃ nano-particles (size 6-15 nm) are obtained by a thermal decomposition of an iron-hydroxy oleate precursor and possess spherical shape. These particles remained dispersed state in organic solvent due to capping action of oleate molecules. The results are quite reproducible and γ -Fe₂O₃ nano-particles can also be dispersed in another organic solvent.