

Preparation of Superparamagnetic Functionalized Magnetite Nanoparticles for Magnetically Separable Catalysis

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Abstract : Superparamagnetism has accelerated the research and use of more economical and ecological magnetically separable catalysts due to their more efficient isolation by response to an applied magnetic field. Magnetite nanomaterials coated by SiO₂ shell have received a great deal of focus in the last decades as it provides high stability and also easy further surface functionalization depending upon the application. In this protocol, Fe₃O₄ magnetic nanoparticles have been synthesized by co-precipitation combined with sonication method. Further, Fe₃O₄ superparamagnetic nanoparticles have been functionalized by various moieties to serve as efficient catalysts for multicomponent reactions. The functionalized nanoparticles were characterized by techniques like Fourier transform infrared spectroscopy (FT-IR), transmission electron microscopy (TEM), scanning electron microscopy (SEM), vibrating sample magnetometer (VSM), thermogravimetric analysis (TGA), Brunauer-Emmett-Teller (BET) surface area analysis. The as prepared nanocatalysts can be reused for several times without any significant loss in its activity. The utilization of magnetic nanoparticles as catalysts for this reaction is one approach i.e. green, inexpensive, facile and widely applicable.

Keywords : functionalized, magnetite, multicomponent reactions, superparamagnetic

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