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Synthesis and characterization of amino glucose-functionalized silica-coated $NiFe_2O_4$ nanoparticles: A heterogeneous, new and magnetically separable catalyst for the solvent-free synthesis of 2,4,5–trisubstituted imidazoles, benzo*[d]*imidazoles, benzo*[d]* oxazoles and azo-linked benzo*[d]*oxazoles

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Abstract

Amino glucose-functionalized silica-coated $NiFe_2O_4$ nanoparticles ($NiFe_2O_4$@SiO_2@amino glucose) were chemically synthesized and characterized by transmission electron microscope (TEM), X-ray diffraction (XRD), thermal gravimetric analysis (TGA), energy dispersive X-ray analysis (EDX), vibrating sample magnetometer (VSM), Zetasizer and Fourier transform infrared spectroscopy (FT-IR) instruments. $NiFe_2O_4$@SiO_2@amino glucose supply an environmentally friendly procedure for the synthesis of 2,4,5-trisubstituted imidazoles through one-pot multicomponent condensation of benzil or benzoin, ammonium acetate with aryl aldehydes and for the synthesis of benzoxazoles using condensation reaction of 2-aminophenol with aryl aldehydes under solvent free condition. In the other study, this synthesized magnetically reusable catalyst was introduced as a new avenue for the synthesis of