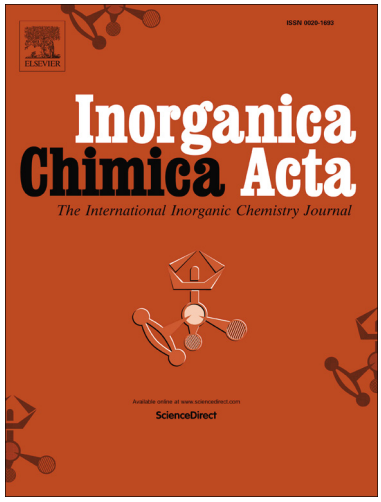

Research paper

Synthesis and characterization of magnetically separable Fe_3O_4@AHBA@Ni(0) [AHBA = 3-amino-4-hydroxybenzoicacid] nanocatalyst: applications for carbonyl hydrogenation and alcohol oxidation

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Synthesis and characterization of magnetically separable Fe_3O_4@AHBA@Ni(0) [AHBA = 3-amino-4-hydroxybenzoicacid] nanocatalyst: applications for carbonyl hydrogenation and alcohol oxidation

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ABSTRACT

A simple, facile and convenient practical method has been developed for the preparation of a magnetically separable nanocatalyst, Fe_3O_4@AHBA@Ni(0) [AHBA = 3-amino-4-hydroxybenzoicacid]. The synthesized nanocatalyst was characterized by electron microscopy techniques (SEM, TEM with EDX), Power X-Ray Diffraction (PXRD), Fourier transform infrared spectroscopy (FT-IR) and solid state UV-Vis spectroscopy techniques. X-Ray photoelectron spectroscopy (XPS) study and time of flight secondary ion mass spectroscopy (TOF-SIMS) study unambiguously prove the presence of nickel(0) on the surface of Fe_3O_4. The surface area of prepared catalyst has been achieved 330 m^2 g^{-1} from BET surface area analysis. This catalyst exhibits appreciable activity towards carbonyls reduction and alcohols oxidation by changing the reaction conditions. The salient feature of the present protocol is that the catalyst can be separated simply through an external magnetic field and recycled for several times without any significant deterioration in its activity. Moreover, ambient reaction conditions, easy workup process, extensive substrate scope and cost effectiveness are some of the other wonderful features of this procedure that make it cheap and sustainable.

Key words: Magnetic nanoparticles, Nickel(0), Catalysis, Recyclable, Oxidation, Reduction

1. Introduction

The field of nanoparticles has invited appreciable success because they have tremendous potential to serve as catalysts owing to their active surface and interfacial atom effect, easy recovery and reusability.[1-4] But unsupported nanoparticles are often unstable, and agglomeration is frequently unavoidable during the reactions.[5] Thus, to overcome this