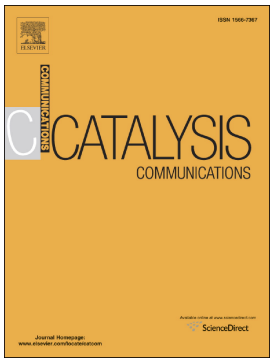

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PII: S1566-7367(16)30449-6
DOI: doi: 10.1016/j.catcom.2016.12.004
Reference: CATCOM 4873

To appear in: *Catalysis Communications*

Received date: 8 August 2016
Revised date: 22 November 2016
Accepted date: 2 December 2016

Please cite this article as: Manuchehr Rezaei, Kamal Amani, Kamran Darvishi , One–pot green catalytic synthesis of primary amides in aqueous medium by CuII–immobilized silica–based magnetic retrievable nanocatalyst. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Catcom(2016), doi: 10.1016/j.catcom.2016.12.004

One–pot green catalytic synthesis of primary amides in aqueous medium by Cu^{II}–immobilized silica–based magnetic retrievable nanocatalyst

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Abstract

In order to develop a new nanocatalyst, a copper–birhodanine derivative complex crafted onto Fe_3O_4@SiO_2 nanoparticle [abbreviated as Fe_3O_4@SiO_2–Ligand–Cu(II)] was synthesized and their structure characterized by different physicochemical techniques such as FT–IR, FE–SEM, XRD, EDX, TGA, AGFM, and ICP. This new magnetic nanoparticle revealed high catalytic performance for one–pot green synthesis of primary amides from aldehydes and $NH_2OH.HCl$ in water as a green solvent. The effects of catalyst amounts, reaction temperature, various bases and type of solvent on catalytic activity were also investigated. The catalyst was retrieved eight times without significant loss of its catalytic activity.

Keywords: magnetic nanoparticle; organic–inorganic hybrid nanocatalyst; heterogeneous catalysis; birhodanine derivative; Cu^{II}–immobilized MNPs; primary amides

1. Introduction

Most of the homogenous catalytic processes are employed for the production of bulk and fine chemicals. Attempts have been made to maintain the activity and selectivity of homogeneous catalysts by efficient anchoring of the homogeneous metal complex on "*solid supports*" and "*heterogenization*" of homogeneous catalytic systems [1].

To overcome problems associated with leaching of active catalytic molecules or deactivation of surface active sites of the solid support, it was necessary to find other catalytic systems with facile separation and reusability. In past two decades, green chemistry has been developed because of its capability of avoiding the formation of toxic and hazardous chemicals. Nanotechnology has a major role in green chemistry catalysis developments. These efficient nanosized materials, due to their