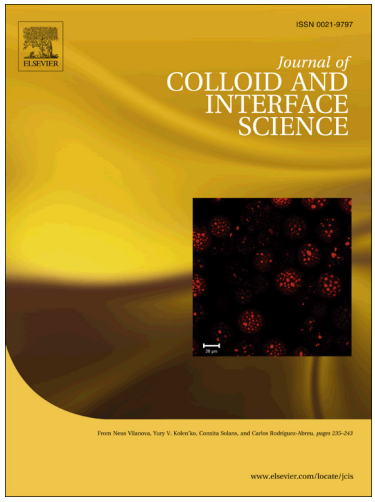

Efficient catalytic hydration of cyanamides in aqueous medium and in the presence of Naringin sulfuric acid or green synthesized silver nanoparticles by using Gongronema latifolium leaf extract

Zahra Issaabadi, Mahmoud Nasrollahzadeh, S. Mohammad Sajadi

PII: S0021-9797(17)30512-X
DOI: http://dx.doi.org/10.1016/j.jcis.2017.04.095
Reference: YJCIS 22307

To appear in: *Journal of Colloid and Interface Science*

Received Date: 20 March 2017
Revised Date: 25 April 2017
Accepted Date: 30 April 2017

Please cite this article as: Z. Issaabadi, M. Nasrollahzadeh, S. Mohammad Sajadi, Efficient catalytic hydration of cyanamides in aqueous medium and in the presence of Naringin sulfuric acid or green synthesized silver nanoparticles by using Gongronema latifolium leaf extract, *Journal of Colloid and Interface Science* (2017), doi: http://dx.doi.org/10.1016/j.jcis.2017.04.095

Efficient catalytic hydration of cyanamides in aqueous medium and in the presence of Naringin sulfuric acid or green synthesized silver nanoparticles by using *Gongronema latifolium* leaf extract

Zahra Issaabadi,[a] Mahmoud Nasrollahzadeh[a,b,*] and S. Mohammad Sajadi[c]

[a]*Department of Chemistry, Faculty of Science, University of Qom, Qom 3716146611, Iran*

[b]*Center of Environmental Researches, University of Qom, Qom, Iran*

[c]*Department of Petroleum Geoscience, Faculty of Science, Soran University, PO Box 624, Soran, Kurdistan Regional Government, Iraq*

ABSTRACT

In this paper, a novel, efficient and green method for the preparation of Naringin sulfuric acid (NSA) as a Brønsted acid organocatalyst and silver nanoparticles (Ag NPs) by using *Gongronema latifolium* leaf extract as a reducing and stabilizing agent is introduced. The catalysts were characterized using the powder XRD, SEM, EDS, TEM, UV-Vis and FT-IR spectroscopy. Afterward, the catalytic activity of synthesized NSA and Ag NPs were investigated for the synthesis of *N*-monosubstituted ureas via the hydration of cyanamides in aqueous medium. All products were obtained in good to excellent yields. These methods provided several advantages such as shorter reaction time, simpler work-up and higher yield.

Keywords: Gongronema latifolium; Greener pathways; Naringin sulfuric acid; brønsted acid; organocatalyst; silver nanoparticles; *N*-monosubstituted

1. Introduction

N-Monosubstituted ureas are a very important class of organic compounds found in many natural products [1-4]. They have tremendous applications in several research fields like biological chemistry, synthetic organic chemistry and agrochemical industry [1-4].

[*]Corresponding author. Tel.: +98 25 32850953; Fax: +98 25 32103595.

E-mail address: mahmoudnasr81@gmail.com (M. Nasrollahzadeh).