



Cu [(L)proline]₂ as a Novel Catalyst for Synthesis of 1, 4-Dihydropyridines

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(Received: November 20, 2012; Accepted: December 17, 2012)

ABSTRACT

We introduce Cu [(L)proline]₂ as a Novel Catalyst, cheap, environmentally friendly, and easy separation for Synthesis of 1, 4-Dihydropyridines under solvent-free condition. IR spectra Confirms formation complex of Cu [(L)proline]₂.

Key words: 1, 4-dihydropyridines, solvent-free, Cu [(L) proline]₂.

INTRODUCTION

1, 4-Dihydropyridine ring is the common feature for various pharmacological activities such as antitumours¹, antivirals², calcium antagonists³, antidiabetics⁴, and antagonists⁵. Recently a number of articles have published on the synthesis of 1, 4-dihydropyridines⁶⁻¹². Heterogeneous catalysts have gained and have been widely used as a stable and an efficient catalyst for synthesis of organic compound.

Herein, we report an efficient and convenient catalyst for the synthesis of DHPs from ethyl acetoacetate, benzaldehyde, and ammonium acetate using Cu [(L)proline]₂ as catalyst (Scheme 1). Once the reaction goes to completion, the catalyst can be filtered, washed with warm ethanol, and reused without decrease in activity.

Previously, we have synthesized a number of heterocyclic compounds¹³⁻¹⁸. Although many methods are capable of affecting these synthesis but most of the reported are difficult such as separate from the products, long reaction times and low yields. Zn [(L)proline]₂ has been used previously as a catalyst for synthesis of organic compound¹⁹.

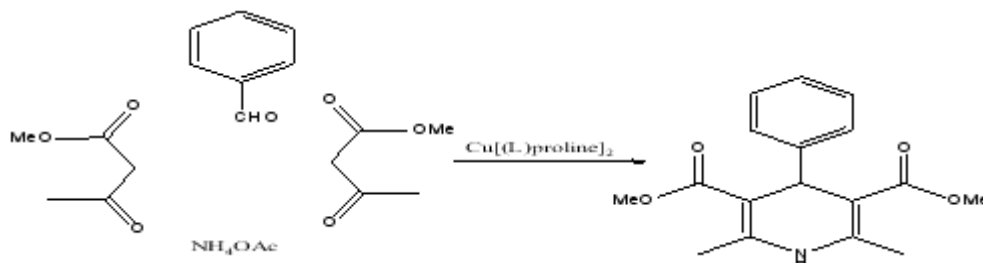
Therefore, we reported the development of an efficient, a facile method, solvent-free and green synthesis for 1,4-DHPs by Cu [(L)proline]₂ as catalyst (Scheme 1). There is Cu [(L)proline]₂ as the catalyst were cheap, environmentally friendly, and easy separation.

General Procedure for the Preparation of the Cu[(L)proline]₂

A mixture of Triethylamine (1 ml) and L-

proline (4 mmol) in methanol (10 ml) was added. After solubilization with heat, reaction mixture was stirred for 10 min and Copper (II) acetate (2 mmol)

was added. A white precipitate was readily formed and after 45 min it was collected by filtration to give the desired complex. IR spectra confirm formation



Scheme 1:

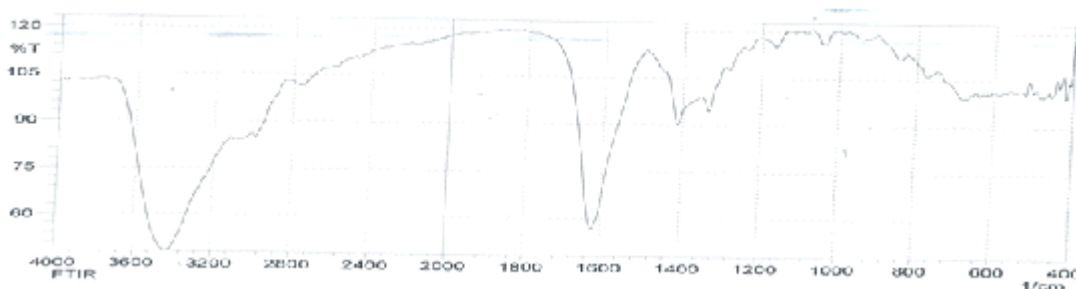


Fig. 1: IR spectra for L-proline

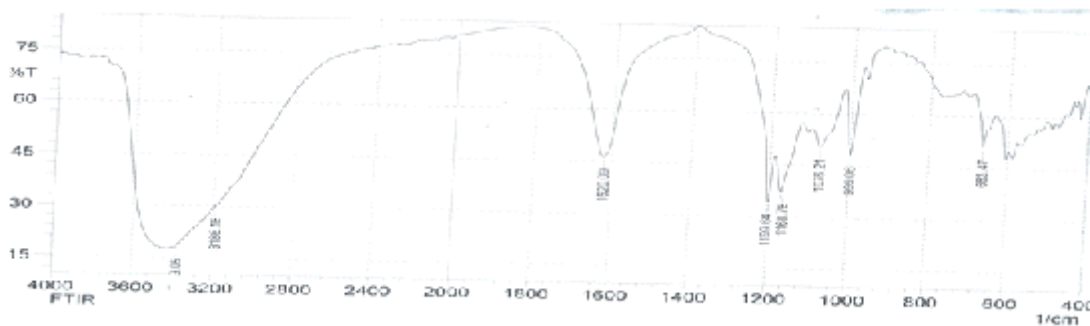


Fig. 2: IR spectra for Copper (II) acetate



Fig. 3: IR spectra for $\text{Cu}[(\text{L})\text{proline}]_2$

of Cu [(L)proline]₂. IR spectra fig 1 is for L-proline, IR spectra fig 2 is for Copper(II) acetate and IR spectra fig 3 is for Cu [(L)proline]₂. Comparison of the spectra shows that loss some of signals and picks is sign for formation complex of Cu [(L)proline]₂.

General Procedure for the Preparation of diethyl 2,6-dimethyl-4-phenylpyridine-3,5-dicarboxylate

A mixture of ethyl acetoacetate (2 mol), benzaldehyde (1 mol) and ammonium hydroxide (1 mol) and Cu[(L)proline]₂ (% 10) in methanol (20 ml) was refluxed for 1h. The obtained solid was filtered; the solid was washed with water and recrystallized using absolute ethanol.

Spectral data for diethyl 2,6-dimethyl-4-phenylpyridine-3,5-dicarboxylate

Yellow crystals, Yield 94%, IR (KBr, cm⁻¹)

v: 3385, 3044, 2968, 1743. ¹H NMR (400MHz, CDCl₃) δ: 1.33 (t, 6H, 2CH₃, J= 7.1 Hz), 2.31 (s, 6H, 2CH₃), 4.21 (q, 4H, 2CH₂O, J= 7.1 Hz), 4.87 (s, 1H, CH), 7.22-7.55(m, 5H, H_{arom}) 8.35 (s, 1H, NH).

RESULTS AND DISCUSSION

Herein, we report Cu[(L)proline]₂ as catalyst that could provide an efficient, cheap, environmentally friendly, easy separation, high yield, green synthesis, solvent-free and simple route for the synthesis of 1,4-DHPs.

ACKNOWLEDGEMENTS

We gratefully acknowledge the financial support from the Research Council of Tonekabon Branch Islamic Azad University.

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