Synthesis of 1, 4-Dihydropyridine Derivatives using Fe \([\text{L-proline}_2]\) as Catalyst

ABBAS BIDRAM*, FARHAD HATAMJAFARI and ALI DORYEH

Department of Chemistry, Faculty of Science, Islamic Azad University-Tonekabon Branch, Tonekabon, Iran.
*Corresponding author E-mail: abbas.bidram@yahoo.com

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ABSTRACT

A mixture of ethyl acetoacetate, benzaldehyde and ammonium acetate and in the presence of Fe \([\text{L-proline}_2]\) were converted to 1,4-dihydropyridines with good yields. IR spectra confirms formation complex of Fe \([\text{L-proline}_2]\).

Key words: 1, 4-dihydropyridines, ammonium acetate, ethyl acetoacetate, Fe \([\text{L-proline}_2]\).

INTRODUCTION

Chemical dihydropyridine reported by arthur hantzsch from 1882 years, he compounded \(\gamma\)-ketoester, aldehyde and ammohia that lead to forms of 1,4-dihydropyridines where as reported many advantages of 1,4-dihydropiridin, and at this time identify as importance and vital in treatment of calcium antagonists\(^1\), antitumours\(^2\), antidiabetics\(^3\), antagonists\(^4\) and antivirals\(^5\). Recently a number of articles have published on the synthesis of 1, 4-dihydropyridines\(^6-13\). Heterogeneous catalysts have gained and have been widely used as a stable and an efficient catalyst for synthesis of organic compound.

We have synthesized of DHPs from ethyl acetoacetate, benzaldehyde, and ammonium acetate using Fe \([\text{L-proline}_2]\) 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 compounds\(^14-19\). Although numerous methods are capable of affecting these synthesis has been previously reported. Zn \([\text{L-proline}_2]\) has been used previously as a catalyst for synthesis of organic compound\(^20\).

The comparison of IR spectra shows that in IR L-prolin spectra seeing NH And OH spectra, and was deleted Thes spectra in Fe \([\text{L-proline}_2]\) Catalysors, and shows The Complex was formed between Fe and L-prolin, and in fact complex is similar To Zn \([\text{L-proline}_2]\).
Therefore, we reported the development of an efficient, facile method and green synthesis for 1, 4-DHPs by Fe \([(L)\text{proline}]_2\) as catalyst (Scheme 1). There is Fe \([(L)\text{proline}]_2\) as the catalyst were environmentally friendly, and easy separation.

**General Procedure for the Preparation of the Fe \([(L)\text{proline}]_2\)**

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 ferrous sulfate (2 mmol) was added. A white precipitate was readily formed and after 1 hour it was collected by filtration to give the desired complex. IR spectra confirm formation of Fe \([(L)\text{proline}]_2\). IR spectra fig 1 is for L-proline, IR spectra fig 2 is for ferrous sulfate and IR spectra fig 3 is for Fe \([(L)\text{proline}]_2\). Comparison of the spectra shows that loss some of signals and picks is sign for formation complex of Fe \([(L)\text{proline}]_2\).

**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 acetate (1 mol) and Fe \([(L)\text{proline}]_2\) (% 10) in ethanol (20 ml) was refluxed for 1.5 h. The obtained solid was filtered; the solid was washed with water and recrystallized using absolute ethanol.

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**Fig. 1: IR spectra for L-proline**

**Fig. 2: IR spectra for ferrous sulfate**
Spectral data for diethyl 2, 6-dimethyl-4-phenylpyridine-3, 5-dicarboxylate

Yellow crystals. Yield 91%. IR (KBr, cm\(^{-1}\))

\(\nu\): 3405, 3012, 2955, 1728. \(^1\)H NMR (400MHz, CDCl\(_3\)) \(\delta\): 1.25 (t, 6H, 2CH\(_3\), J = 7.4 Hz), 2.55 (s, 6H, 2CH\(_3\)), 4.45 (q, 4H, 2CH\(_2\)O, J = 7.4 Hz), 5.11 (s, 1H, CH), 7.23-7.80 (m, 5H, Harom) 8.88 (s, 1H, NH).

RESULTS AND DISCUSSION

Herein, we report Fe [(L)proline\(_2\)] as catalyst that could provide an efficient, environmentally friendly, easy separation, high yield, green synthesis and simple route for the synthesis of 1,4-DHPs.

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REFERENCES


