



Aromatization of 1,4-Dihydropyridines by Hydrogen Peroxide in the Presence of Nano-Fe₂O₃ at Room Temperature

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ABSTRACT

Hydrogen peroxide readily oxidizes 1, 4-dihydropyridine derivatives in high yields in the presence of nano-Fe₂O₃ as catalyst at room temperature.

Key words: Nano-Fe₂O₃, 1, 4-dihydropyridines, Hydrogen peroxide, Aromatization.

INTRODUCTION

Chemistry of 1,4-dihydropyridine in 1882 with Arthur Hantzsch reports the γ -keto ester, aldehydes and ammonia can be combined to form 1,4-Dihydropyridine is was developed. 1, 4-Dihydropyridine ring is the common feature for various pharmacological activities such as antagonists¹, antidiabetics², calcium antagonists³, antivirals⁴, and antitumours⁵. Aromatization of 1,4-dihydropyridines (1,4-DHPs) to pyridine derivatives the principal metabolic in biologically activity NADH redox processes⁶, an efficient route for synthesis of pyridine derivatives are oxidation of 1,4-DHPs⁷. Many of the reported oxidation procedures either suffer from chromium (VI) oxidants⁸, CrO₂⁹, SnCl₄¹⁰, Pb(OAc)₄¹¹, K₂S₂O₈¹², an so on.

Previously, we have synthesized a number of heterocyclic compounds¹³⁻¹⁸. Although many

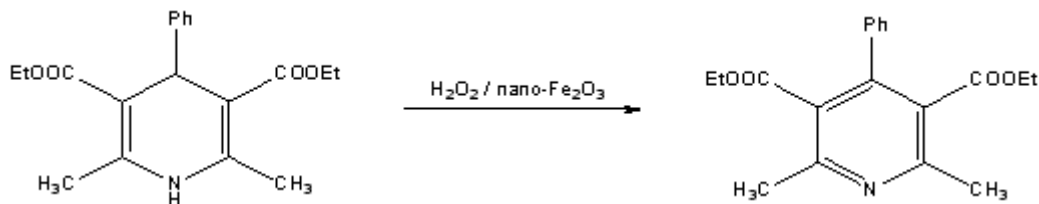
methods are capable of effecting these oxidations but most of the reported are difficult such as separate from the products, long reaction times and low yields. Therefore, we reported the development of an efficient, a facile method for the aromatization of 1, 4-DHPs by hydrogen peroxide in the presence of nano-Fe₂O₃ as catalyst at room temperature (Scheme 1). The hydrogen peroxide was selected as the oxidant¹⁹⁻²⁰ and nano-Fe₂O₃ as the catalyst was cheap, environmentally friendly, simple route and easy separation at room temperature.

General procedure for oxidation of Diethyl 1, 4-dihydro-2,6-dimethyl-4-phenylpyridine-3,5-dicarboxylate

Diethyl 1,4-dihydro-2,6-dimethyl-4-phenylpyridine-3,5-dicarboxylate (1 mmol) was dissolved in 10 ml acetonitrile and nano-Fe₂O₃ (10 mol%) was added to this solution and then 0.3 ml hydrogen peroxide 30% was added in portions over

30 min at room temperature along with stirring of the reaction mixture. The progress of the reaction was monitored by TLC. After recrystallization of the

product in ethanol, 96% yield of diethyl 2, 6-dimethyl-4-phenylpyridine-3, 5-dicarboxylate was obtained.



Scheme 1:

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

Pale yellow solid; m.p.: 60-62 °C (Ref. [19], 60–61 °C); FT-IR (KBr): 2988, 1718, 1575, 1212, 1145 cm⁻¹; ¹H NMR (CDCl₃): δ (ppm) = 1.12 (t, 6H, *J* = 6.9 Hz), 2.48 (s, 6H), 4.09 (q, 4H, *J* = 6.9 Hz), 7.25-7.6 (m, 5H).

CONCLUSIONS

In research we report oxidation of 1,4-DHPs by hydrogen peroxide and nano-Fe₂O₃ as

catalyst was used to pyridine derivatives (Scheme 1), which could provide an efficient, cheap, high yield, environmentally friendly, easy separation and simple route at room temperature for the oxidation of 1,4-DHPs to pyridine derivatives.

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