



An Efficient Oxidation of 1,4-Dihydropyridines by Hydrogen Peroxide in the Presence of Copper(II) Chloride at Room Temperature

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ABSTRACT

1,4-Dihydropyridines oxidizes to pyridine derivatives by hydrogen peroxide in the presence of Copper(II) chloride as catalyst at room temperature.

Key words: 1, 4-dihydropyridines, Hydrogen peroxide, Copper (II) chloride, Aromatization, Room temperature.

INTRODUCTION

For the first time 1,4-dihydropyridine synthesized by Hantzsch about one century ago. 1,4-Dihydropyridine ring is the common feature for various pharmacological activities such as antitumours¹, antivirals², calcium antagonists³, antidiabetics⁴, and antagonists⁵. 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. Consequently, this aromatization reaction continues to attract the attention of many organic and medicinal chemists for the discovery of many of protocols applicable to a wide range of 1,4-DHPs⁸. Many of the reported oxidation procedures either suffer from KMnO_4 ⁹, CrO_3 ¹⁰, $\text{Bi}(\text{NO}_3)_3$ ¹¹, PCC¹², and so on.

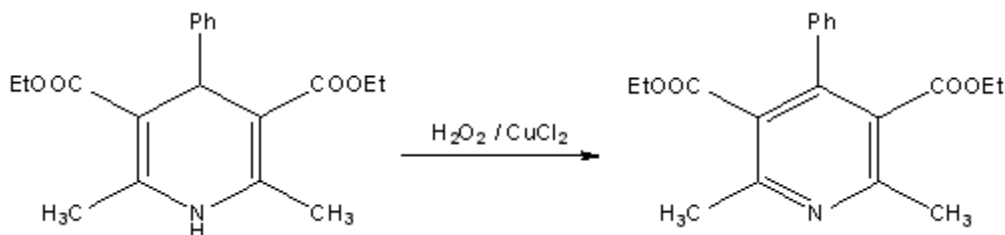
Previously, we have synthesized a number of heterocyclic compounds¹³⁻¹⁷. Although many methods are capable of effecting these oxidations but most of the reported are difficult such as separate from the products, long reaction times and low yields. Therefore, we reported the development of an efficient, a facile method for the aromatization of 1,4-DHPs by hydrogen peroxide in the presence of Copper (II) chloride as catalyst at room temperature (Scheme 1). The hydrogen peroxide¹⁸ was selected as the oxidant and Copper (II) chloride as the catalyst was cheap, environmentally friendly, and easy separation.

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 20 ml ethanol and Copper (II) chloride (1 mmol) was added to this solution and then 0.2 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): 2976, 1723, 1561, 1230, 1100 cm^{-1} ; $^1\text{H NMR}$ (CDCl_3): δ (ppm) = 1.03 (t, 6H, J = 7.5 Hz), 2.66 (s, 6H), 4.03 (q, 4H, J = 7.5 Hz), 7.4-7.8 (m, 5H).

RESULTS AND DISCUSSION

Herein, we report oxidation of 1,4-DHPs by hydrogen peroxide and Copper(II) chloride as

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

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