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Glutamic acid as an Efficient Catalyst for Synthesis of Dihydropyrimidinones

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ABSTRACT

A simple, efficient protocol for the one-pot Biginelli condensation reaction of aromaticaldehydes, β-ketoesters and urea employing glutamic acid as a novel catalyst is described.

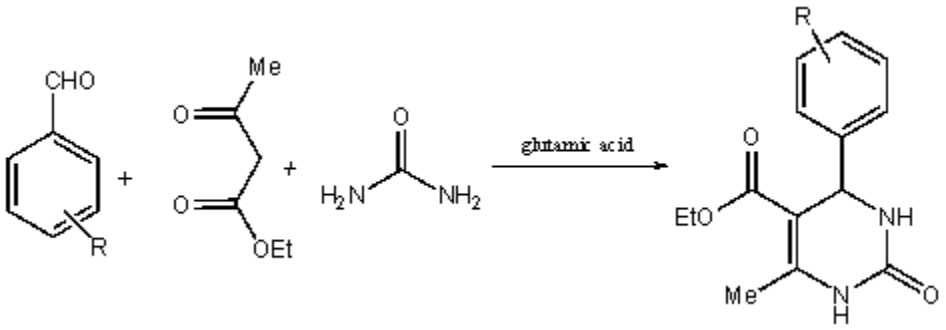
Key words: Glutamic acid, Biginelli reaction, Dihydropyrimidinones, One-pot

INTRODUCTION

Over the last decade, the multi-stage reactions (MCRs) became more popular. Multi-step synthesis to produce massive amounts of waste, according to the isolation of the complex, toxic and hazardous solvent at each step. So, MCRs will discovered, economically and environmentally friendly. Due to numerous advantages, these heavy compound molecules synthesized by the reaction of small molecule. Biginelli reaction is one of MCR that considerable attention recently[1].

Dihydropyrimidinones (DHPMs) and their derivatives, as well as heterocyclic units in the field of natural and synthetic organic chemistry due to their wide range of biological and therapeutic properties such as anti-inflammatory, anti-tumor, anti-viral and anti-bacterial activities[2-3]. Recently, DHPM appropriate analogue functionalized gland known as the integral backbone of several calcium channel blockers, antihypertensive agents, and receptor antagonists have emerged. In addition, several alkaloids containing the dihydropyrimidine core unit have been isolated from marine sources also show interesting biological properties[4]. The most straightforward method for the synthesis DHPMs first reported by Biginelli more than 100 years ago, it consisted of three one-pot condensation of benzaldehyde, ethyl acetoacetat and urea under strongly acidic conditions[5]. However, these reactions often require harsh conditions and long reaction time and low efficiency can. Aliphatic and aromatic aldehydes, especially when used to replace for synthesis Dihydropyrimidinones (DHPMs).

Although numerous methods are capable of affecting these synthesis has been previously reported[6-16]. Glutamic acid has been used previously as a catalyst for synthesis of organic compound[17], Previously, we have synthesized a number of heterocyclic compounds[18-27]. Herein we report glutamic acid a new catalyst for the synthesis of DHPMs at one pot reaction, environmentally friendly with high yields and easy separation (Scheme 1).



Scheme 1:

General Procedure for the Preparation of ethyl 1,2,3,4-tetrahydro-6-methyl-2-oxo-4-phenylpyrimidine-5-carboxylate

A mixture of ethyl acetoacetate (1 mol), benzaldehyde (1 mol) and urea (1 mol) and glutamic acid (0.05 $_g$) with 10 ml acetonitrile was refluxed for 1 h. All reactions were monitored by TLC and the obtained solid was filtered, the solid was washed with water and recrystallized using absolute ethanol.

$yield: (89\%),\ mp\ 202-205\ ^0C$

$FT-IR\,(KBr\ disc): 3425, 3215, 2890, 1718, 1644;\ cm^{-1}.$

RESULTS AND DISCUSSION

Herein, we report glutamic acid as catalyst which could provide an efficient, environmentally friendly, easy separation, high yield and simple route for the synthesis of DHPMs.

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