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A New Material MgO/SBA-15 for the Synthesis of pyrano[3,2-c]chromenes Derivatives †

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Abstract: A rapid and hight efficient one-pot approach to synthesize pyrano[3,2-c]chromenes derivatives is used via multicomponent reaction of three compounds which are aromatic aldehyde, malononitrile and 4-hydroxycoumarin in the presence of a new material MgO/SBA-15 as a catalyst. The present method is a reaction under mild conditions namely solvent-free in short time at room temperature process, easy isolation of product and nanoparticle catalyst with excellent yields.

Keywords: MgO/SBA-15; multicomponent reaction; pyrano[3,2-c]chromenes

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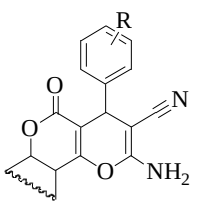
1. Introduction

The use of environmentally begign reagent and solvants as well as efficient and cleanly reusable catalysts represents one of the more poweful green chemical technology procedures. nanoparticul catalyst have attracted considerable attention as eco-freindly solvents, catalysts and reagents in organic transformation, because we can recover it after each use and study its degradability potencial to intervene in other reactions[1,2].

In recent years, Pyrano[3,2-c]chromenes heterocyclic system has proved to be one of the most active synthetic product a broad spectrum of biological activities including[3], spasmolytic, diuretic, anticoagulant, anticancer, and antianaphylactic activity [4]. Moreover, they have been used as cognitive enhancers, for the treatment of neurodegenerative diseases,antitumors and antimicrobial among the investigated heterocycles. [5].

the result of this work shows the synthesis of a series of two families of pyranochromene derivatives following a condensation reaction, and using a more environmentally friendly method, with several advantages such as high efficiency and selectivity, operational simplicity, low costs, and reduced pollution.



R= H, Cl, F, NO_2, OMe,....

Figure 1. Structure of pyrano[3,2-c]chromenes.

2. Results and Discussion

The synthesis process was carried out in a multi-component one pot reaction with heterogeneous materials. Different protocols were also tested by modifying the reaction time and temperature, as well as the solvents used in order to optimize the reaction condition.

In order to develop suitable conditions respecting the criteria of green chemistry, we have established a new protocol for the synthesis of [pyrano3,2-c] chromene based on a nanoparticulate catalyst which MgO supports on SBA 15 in the presence of water and ethanol (1/1) as solvent. the reaction mixture is brought to room temperature for a duration which varies between 20–40 min.

Table 1. The synthesis of a few compound **1–3**.

Compound	R_1	Time (min)	Yield (%)
1	H	30	90
2	Cl	20	95
3	F	25	93

3. Experimental Procedure:

Compounds **1**,**2**,**3** synthesized in table above using**:** aromatic aldéhyd (0.01 mol), maloninitrile (0.01 mol),4-hydroxycoumarin(0.01 mol), and MgO/SBA15 (0.01 mol) in H_2O (1 mL) and EtOH (1 mL) in appropriate solution. the mixture reaction was string under heating condition within a time varying between 20–40 min, After completion of the reaction which was monitored by TlC. The reactionnel system was cooled to room temperature. The formed solid after cooling was collected by filtration, washed with water and aqueous ethanol and purified by approbriate solvent.

After completing the model reaction, the crude product was isolated by filtration. The calatyst was recovered by evaporating the solvent and washing with ether, in the model reaction, the catalyst was recycled five time and reused

4. Conclusions

In conclusion, we have developed a simple, fast, Efficient green method for the catalytic synthesis of multiple [pyrano3,2-c] chromene by organic small molecules, The reaction conditions used are very mild due to the fact that the reaction yields obtained are excellent. The method used does not involve the use of volatile organic solvents, therefore it is an environmentally friendly process.

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