Preparation of Fe_3O_4@SiO_2-Go catalyst and its application for expeditious synthesis of spirooxindole derivatives

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Multicomponent reaction of cyclic 1,3-diketones, isatin and malononitrile in water in the presence of graphene oxide decorated Fe_3O_4@ SiO_2 (Fe_3O_4@SiO_2-Go) catalyst leads to the wide range of spirooxindole derivatives in high to excellent yields. Easy preparation, recovery, and eco-friendliness of the catalyst, avoiding the use of any hazardous solvent, shorter reaction time and straightforward work-up procedure consist the remarkable advantages of this protocol.

***Keywords*: magnetic graphen oxide, heterogeneous catalyst, multicomponent reaction**

INTRODUCTION

Multicomponent reactions*(*MCRs) are defined as one-pot reactions in which more than two starting materials incorporate to form a product[1.]

The heterocyclic spirooxindole ring system is a widely distributed structural framework present in a several pharmaceuticals and natural products[2].

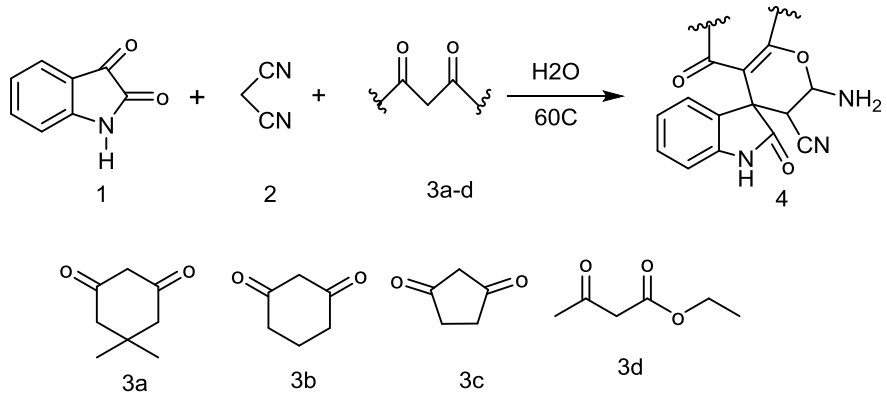
Graphene oxide (GO), the oxidation product of graphene containing hydroxyl, epoxide and carboxylic acid functional groups, is hydrophilic and cheerfully disperses in aqueous solution to form a stable suspension[3.]

The development of magnetic graphen oxide catalysts for organic synthesis continue to be one of the most challenging topics in modern synthetic organic chemistry because it provides the most efficient way to approach the synthesis of compounds with high yields in short times as well as graphene oxide (GO) has attracted interest as a new carbocatalyst[4.]

This prospective study was designed to investigate the use of Functionalized graphene oxide in by the class of spirooxindole compounds [5,6].

RESULT AND DISSCUSION:

Functionalized graphene catalyst (5mg) was added to a mixture of isatin (1mmol),malononitrile(1mmol),1,3-diketones(1mmol),in H2O(3ml) and the resulting mixture was stirred at 60 C . Upon completion, monitored by TLC, the filtered and isolated solid product was washed with warm water and cool DMS , and then dried under reduced pressure to obtain **4** . The catalyst was recovered by filtration and washed.



Schem1.

To investigate the efficiency and applicability of this catalyst in the three-component synthesis of spirooxindole compounds, the reaction was extended to other substituted 1,3-cyclohex-anedione at 60 C in H2O (Table 2). The best result is obtained for the condensation of dimedone(1 mmol), isatin(1 mmol) and malononitrile after 15minutes in 95% yields(Table1, entry1).

Table 1
synthesis of compound **4** from malononitrile , 1,3-dicarbonyl compound, and isatin

Entry	1,3diketon	Time(min)	Yeild(%)
1	3a	15	95
2	3b	25	93
3	3c	20	90
4	3d	35	85

CONCLUSION:

In summary, we have prepared megnetic nanocatalyst and applied in the synthesis of 4H-chromen reaction . The catalyst serves many advantages such as inexpensive, non-toxic catalyst, high catalytic efficiency, short reaction times, straightforward work-up. This procedure will therefore be of general use and interest to the synthetic chemistry study.

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