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ENVIROCAT EPZG AS A HETEROGENEOUS CATALYST FOR THE SYNTHESIS OF 3,3-DISUBSTITUTED OXINDOLES

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ABSTRACT
Synthesis of 3,3-Disubstituted Oxindoles was achieved by one-pot multicomponent condensation of isatin, malononitrile and indole in presence of Envirocat EPZ-G as a heterogeneous environmental friendly catalyst. This is an environmentally benign method and reusability of the catalyst is beneficial over the others.
Keywords: Oxindoles, EPZ-G and Enviro Catalyst.

INTRODUCTION

The multicomponent protocol has great applicability as an environmentally benign synthesis. It has minimization of steps, atom economy, high yield, minimization of waste, cost-effective natural availability, high thermal stability and reusability.[1-9] In recent years research has started great attention towards the development of multicomponent organic synthesis by using inorganic material[10]. EPZ-G is one of the versatile inorganic materials that act as an enviro catalyst with heterogeneous and acidic properties owing to the properties EPZG as Lewis acid[11] reported in the different transformations such as synthesis of nitro olefins[12], silylation of alcohols[13], methoxylation of alcohols[14], aldoximes to nitriles[15], and Tosylhydrazonea[16].In this protocol, we have reported a method of 3,3-Disubstituted Oxindoles synthesis using EPZG catalyst as an environmentally benign protocol.

It involves Knoevenagel condensation followed by Michael addition. Many reports have shown that Knoevenagel condensation of aldehyde or ketone with malononitrile was catalyzed by the base, but recently ZnCl2[17], Bismuth Nitrate[18] and Maxican bentonitrile[19] EPZ-G[20] were successfully used as an acid catalyst. This prompted as to develop a new strategy of synthesis of 3,3-Disubstituted Oxindoles by Knoevenagel condensation followed by Michael addition.

3,3-Disubstituted Oxindoles is biologically active compounds[21-25] present in many natural products[26-29]Most of the biologically active compounds[30-31] have based on indole skeleton.3,3-Disubstituted Oxindoles carry quaternary carbon atom and multiple functional groups that are strong intermediate which helps during the preparation of biologically active compounds[32] such as anti-HIV[33], anti-tumor[34-37], anti-malarial[38], anti-microbial[39], anti-tubercular[40-41], and antimalarial.[42] To capture these opportunities chemists play a great role in developing of green synthesis of 3,3-Disubstituted Oxindoles.[43-48]

EXPERIMENTAL

Various substituted isatin and Isatin derivatives (Sigma-Aldrich), malononitrile ((Sigma-Aldrich), indole and its derivatives (Himedia) were uses as received without purification. IR spectra were recorded on FT-IR -7600 Lambda Scientific Spectrometer. NMR spectra were recorded on a Bruker AC 400 MHz spectrometer in DMSO D_6 using tetramethylsilane as an internal standard material.

General Procedure

In a 25ml round, bottom flask mixture of isatin (1mmol), malononitrile (1mmol), indole (1mmol) and 30mg EPZG catalyst was refluxed in 5mL water: ethanol (v/v 70:30) solvent system at about 80^0C for the desired

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