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ONE-POT THREE-COMPONENT SYNTHESIS OF 2,3-DIHYDROQUINAZOLIN-4(1*H*)-ONES BY FE_3O_4@SIO_2/SCHIFF BASE COMPLEX OF CU(Π)

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Abstract: Fe_3O_4@SiO_2/Schiff base complex of Cu(Π) efficiently catalyzes condensation reaction of isatoic anhydride, aldehydes, and primary amines or ammonium salts to afford the corresponding 2,3-dihydroquinazolin-4(1*H*)-one derivatives in ethanol under reflux conditions. This method gives notable advantages such as easy work-up, high yields, short reaction times. Also, the aforementioned nanocatalyst can be easily recovered by a magnetic field and reused for subsequent reactions for at least 8 times without noticeable deterioration in catalytic activity.

Keywords: 2, 3-Dihydroquinazolin-4(1*H*)-ones, Isatoic anhydride, One-pot synthesis, Magnetic nanocatalyst, Recyclable catalyst.

1. INTRODUCTION

In recent years, magnetic particles, in particular, have emerged as one the most useful heterogeneous catalysts because of their numerous applications in medicine, biotechnology, and catalysis [1-3]. Fe_3O_4 as a the most commonly used magnetic nanoparticles has been usually used in core-shell structures, which has been covered with silica due to its stability under different conditions and its easy functionalization, for diverse application. The magnetic properties of these heterogeneous catalysts make possible the complete their recovery by means of an external magnetic field [4]. Quinazolinone derivatives are a class of fused heterocycles that have drawn much attention due to their broad range of biological and pharmacological activities, such as antidiabetic [5], anthelmintic [6], antidituric [7], anticonvulsant [8], antibacterial [9], antifungal [10], antitumor [11], anti-inflammatory [12] and antihistaminic [13]. Several methods have been reported for the synthesis of 2,3-dihydroquinazolinones involving use of iodine [14], $Ce(SO_4)$. H_2O [15], $KAl(SO_4)_2.12H_2O$ [16], trifluoro- ethanol [17], $Al(H_2PO_4)_3$ [18], silica bonded *N*-propyl sulfamic acid [19], copolymer-PTSA [20], *p*-TsOH [21] and silica sulfuric acid [22]. However, some of these methodologies have limitations of vigorous conditions, use of expensive catalysts, lengthy procedures, tedious work-up and low yields of product. Therefore, the development of simple, efficient, clean, high-yielding, and environmentally benign protocols using new catalysts for the synthesis of these important compounds is still desirable and is in demand. Herein, we have designed a three-component one-pot synthesis of 2,3-dihydroquinazolin-4(1*H*)-ones. In the course of our work on applications of Fe_3O_4@SiO_2/Schiff base complex of metal ions in organic reactions, we have found that it is an effective promoter for the preparation of mono- and disubstituted 2,3-dihydroquinazolin- 4(1*H*)-ones.

2. EXPERIMENTAL OBSERVATIONS

2.1. General methods

All chemicals and reagents were obtained from Merck and Aldrich and were used without further purification. FT-IR spectra were obtained in the range 400–4000 cm-1 with a Shimadzu FT-IR 8300 spectrophotometer using potassium bromide pellets. The NMR spectra were recorded on a Bruker avance DPX 250 MHz spectrometer in chloroform ($CDCl_3$) using tetramethylsilane (TMS) as an internal reference. Melting points were determined with a Buchi 510 instrument in open capillary tubes and are uncorrected. TLC was performed on silica gel polygram SIL G/UV 254 plates. All yields refer