



Application of NiO Nanoparticle as an Effective Catalyst for Aldol Reaction of Aryl Alkyl Ketones with Aromatic and Heteroaromatic Aldehydes

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ABSTRACT

Nickel oxide (NiO) nanoparticles (NPs) were used as catalyst in aldol reactions of aryl alkyl ketones with aromatic and heteroaromatic aldehydes. NiO NPs were used in low concentration for efficient cross aldol reactions in moderate to good yields. This reported method illustrates several advantages such as environmental friendly reaction conditions, simplicity, short reaction time, easy work up, low ketone to aldehyde ratio, and recyclability of the catalyst.

Keywords: Nickel oxide nanoparticle; Green synthesis; Aldol reaction

1. INTRODUCTION

The aldol products form the backbone of many vital drugs and other bioactive molecules. The frequent occurrence of a β -hydroxyl carbonyl moiety in a variety of natural products has stimulated the development of synthetic methods regarding the preparation of these compounds. Under the classical aldol reaction conditions, however, dimerization, polymerization, and self-condensation also happen. In classical methods, the aldol reactions were performed in the presence of strong acids or bases. In order to do these reactions under mild conditions, some metal ions are used as catalyst or reagent; for example, different complexes of metal ions [1] to [3] with different ligands have been used for aldol reactions. Despite the last success, still applying new catalyst with simplicity in operation and catalyst efficiency for the synthesis of aldol moiety attracts remarkable interest. On the other hand, transition metal and transition metal oxide nano particles are attracting a great deal of attention in almost any scientific field, including catalysis [4] to [6]. Recently, as a type of transition metal oxide, NiO nanoparticle (NPs) has caught more attention due to its novel electronic, magnetic, optical, thermal, and mechanical properties, and the potential applications as a heterogeneous catalyst for various organic transformations. Several reports have shown an amazing level of their efficiency as catalysts in terms of selectivity and reactivity within organic transformations [7] to [12].

Herein, we have used a small amount of NiO NP as catalyst for the synthesis of aldol adducts.