



Synthesis of bis coumarinyl methanes using of potassium 2-oxoimidazolidine-1,3-diide as a novel, efficient and reusable catalyst

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ABSTRACT

At first, potassium 2-oxoimidazolidine-1,3-diide (POImD) was prepared of stirring a mixture of imidazolidin-2-one, KOH and H₂O overnight. Then, Potassium 2-oxoimidazolidine-1,3-diide was used as a green, novel, fast, efficient and mild catalyst for the synthesis of bis coumarinyl methanes via a one-pot reaction of one equivalent of various aromatic aldehydes and two equivalents of 4-hydroxycoumarin at room temperature in aqueous media. All reactions are performed in the absence of organic solvent in high to excellent yield during short reaction time. The procedure was readily conducted and affords remarkable advantages such as simple work-up, green media and eco-friendly procedure. The catalyst was recovered and reused. Apart from the mild conditions of the process and its excellent results, the simplicity of product isolation and the possibility to recycle the catalyst offer a significant advantage. To the best of our knowledge this is the first report on synthesis of POImD. All of synthesized compounds were characterized by IR, ¹H and ¹³C NMR spectroscopy and elemental analyses.

1. Introduction

Coumarin constitutes one of the great classes of natural compounds. In the well-known family of coumarins, dimeric coumarins (bis coumarins) occupy an interesting position. Although some types of these compounds could be extracted from plants [1] and interest in its chemistry because of its fitness as pharmaceutically activities. Coumarin has been reported to serve as anti-microbial [2], anti-cancer [3], anticoagulant [4], anti-inflammatory [2] agents. These biological activities of coumarins raised our interest in synthesizing some new coumarins.

Water has a unique media in chemistry and is one of the best solvents, owing to its features such as being eco-friendly, clean, green, nontoxic, non-flammable, safe, low-cost and readily available in organic transformations. Also, the use of aqua media not only diminishes the risk entailed in the use of organic solvents but also improves the rate of many chemical

reactions [5-8].

2. Results and Discussion

In continuation of our research for the green synthesis of the spread of neat and efficient procedures for the synthesis of organic and pharmaceutical compounds [9-14], an solvent free, facile and efficient procedure was introduced for the synthesis of bis coumarinylmethane by the POImD catalyzed reaction of two equivalent of 4-hydroxycoumarins and one equivalent of synthesized aldehyde.

Although, synthesis of bis coumarins using catalysts and ionic liquids such as SO₃H-functionalized benzimidazolium cation[15], [bmim]BF₄[16], [MIM(CH₂)₄SO₃H][HSO₄][17], sulfonic acid-functionalized pyridinium chloride[18], choline chloride-oxalic acid [19], RuCl₃·nH₂O[20] and NaHSO₄/SiO₂/Indion 190 resin [21] was reported, However, most of these reported methods suffer from