

**MICROWAVE-INDUCED BISMUTH NITRATE-CATALYZED PECHMAN  
REACTION UNDER SOLVENTLESS CONDITION**

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**Abstract:**

Microwave-induced bismuth nitrate-catalyzed Pechman reaction for the synthesis of 4-substituted-coumarins has been developed in the absence of any solvent.

**Keywords:** Microwave, Pechman Reaction, Coumarin

**Introduction:**

Bicyclic coumarins are important compounds. Bismuth nitrate-catalyzed microwave-induced reaction has been used to prepare these types of compounds in the absence of solvent.

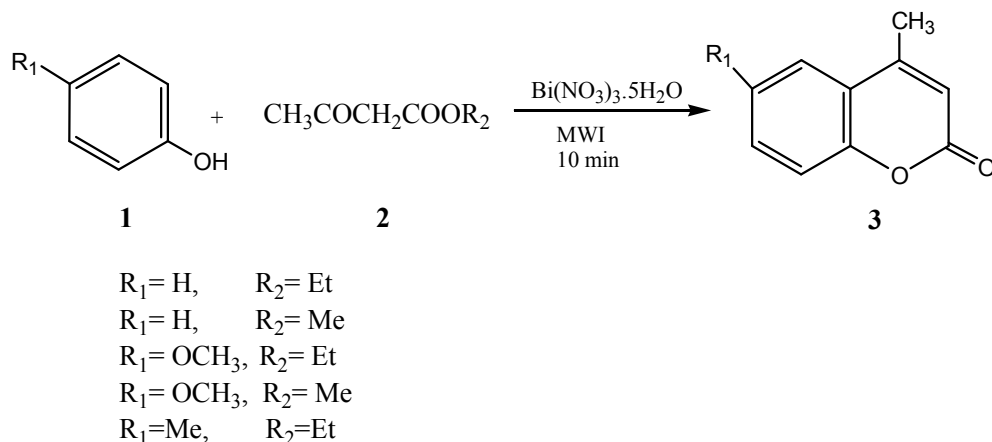
**Results and Discussion:**

Pechman reaction is the most important reaction for the synthesis of coumarin.<sup>1</sup> Acidic reagents have been used to perform the cyclization reaction between phenol and an active dicarbonyl compound. In previous publications, we demonstrated a few bismuth nitrate-catalyzed reactions.<sup>2</sup> In continuation of our research on bismuth nitrate-catalyzed reactions and microwave-induced method we report a facile Pechmann reaction toward a few coumarins.<sup>3</sup>

The reaction of phenol (**1**) and ethyl acetoacetate (**2**) in the presence of 5 mol% bismuth nitrate-in the absence of solvent was performed in a domestic microwave oven for 8-10 minutes. This reaction produced coumarin **3** in 80-85% yields (**Scheme 1**). Substituted phenol and methyl acetoacetate can also be used with success.

This method is simple and mild compared to the other available methods for the synthesis of these types of compounds. This reaction produced product **3** without microwave irradiation. Simple heating the reaction mixture (80 °C) in the presence of bismuth nitrate afforded the product. However more time (1h) was needed for complete consumption of starting compounds. No reaction took place in absence of bismuth nitrate. The use of organic solvents (THF and ETOH) had retarded the reaction. But, the product **3** was formed in comparable yield after heating the reactants in the presence of bismuth nitrate for 4h when ETOH or THF was used as the solvent.

### Scheme 1:



**Conclusion:** A simple microwave-induced environmentally benign procedure has been developed for the preparation of coumarin following Pechman method.

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