

# Bentonite Clay Catalyzed One-Pot Four-Component Dakin-West Synthesis of $\beta$ -Acetamido Ketones

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**Abstract:** *An environmentally friendly, highly marketable catalyst such as Bentonite Clay was used to study the one-pot synthesis of  $\beta$ -acetamido ketones in high yields by the multi component condensation of aryl aldehyde, acetyl chloride, acetonitrile, and enolizable ketone. Bentonite Clay worked best as a catalyst. Simple experimental conditions were employed in the process, and the excellent yields and quick reaction durations suggest that it's a highly helpful approach for the large-scale synthesis of  $\beta$ -acetamido ketones*

**Keywords:** heterogeneous catalysis; Bentonite Clay -Dawson; Dakin-West;  $\beta$ -acetamido ketone

## I. INTRODUCTION

Multi component reactions, or MCRs, have become a very effective and potent method for the synthesis of intricate chemical compounds.[1] They are also utilized in the creation of organic chemical libraries and drug discovery libraries.[2] Since the past ten years, a wide variety of synthetic pathways in organic chemistry have been examined by multi component synthetic techniques [3-5]. MCR are effective and extremely affordable reactions that have even been utilized in drug development combinatorial and parallel synthesis using a variety of pharmacologically relevant templates [6, 10]. In organic synthesis, multi component reactions generate complex structures by simultaneously forming two or more bonds, and thus enable the practical, time-saving one-pot combining of more than two building components [11-14]. Among these is the Dakin-West reaction, which is a well-known and very efficient technique for synthesizing several acetamido ketones. Using different catalysts, a new method has been devised for the synthesis of  $\beta$ -acetamido ketones by the MCRs of acetophenone, arylaldehyde, and acetyl chloride in acetonitrile. Many reagents and catalysts, including  $\text{CoCl}_2$ , have been used to study these reactions in great detail. Nine  $\text{FeCl}_3$ , ten  $\text{CeCl}_3 \cdot 7\text{H}_2\text{O}$ , eleven  $\text{Sc}(\text{OTf})_3$ , twelve  $\text{ZrOCl}_2 \cdot 8\text{H}_2\text{O}$ , fourteen  $\text{NaHSO}_4 \cdot \text{H}_2\text{O}$ , fifteen  $\text{Fe}(\text{HSO}_4)_3$ , [15-19] sixteen sulphuric acid supported by silica, seventeen  $\text{H}_3\text{PW}_{12}\text{O}_{40}$ , eighteen Montmorillonite K-10 clay, nineteenth and twentieth amberlyst-15. [20-24]

## II. MATERIALS AND METHODS

Every chemical utilized in the study was acquired from S.D.FINE. Melting points in paraffin and thiles tubes were used to measure the melting points of the produced compounds. Unless otherwise noted,  $^1\text{H}$  NMR spectra were obtained using a Bruker Advance DPX 200/300 MHz spectrometer in  $\text{CDCl}_3$ , with TMS serving as the internal standard. To separate the chemicals in the system, stationary phases consisting of 60 and 120 mesh silica gel were employed.[25-34]

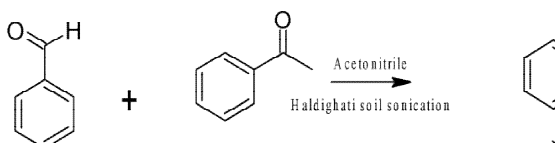
## III. EXPERIMENTAL PROCEDURE

Using bentonite clay as a reagent, we created a new environmentally friendly synthetic approach for the production of  $\beta$  acetamido carbonyl compounds.

General procedure for the synthesis of  $\beta$ - Acetamido ketones using green approach

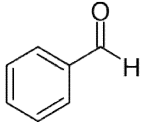

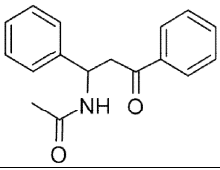
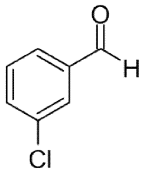

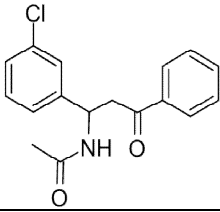
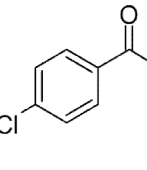

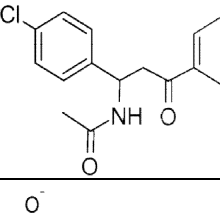
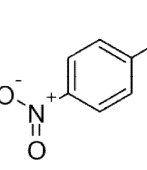

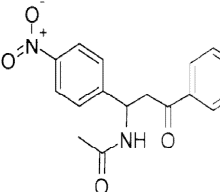
In ten millilitres of acetonitrile, ten mill moles each of ketone and aldehyde are dissolved. As a catalyst, 15 mg of bentonite clay was added to the reaction mixture. Depending on the reactants, the reaction was solicited for three to six hours at 40 0 C. TLC was used to track the reaction's development. Acetonitrile was evaporated in a rotary evaporator following the competition of the reaction to get the crude reaction mixture. This raw mixture was given 10 millilitres of ethyl acetate, which was then added and repeatedly rinsed with water before being collected in a beaker. The organic layer (ethyl acetate layer) was dried over sodium sulfate and evaporated under low pressure to solidify. Using flash column chromatography and silica gel, the chemicals were purified.

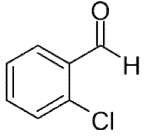

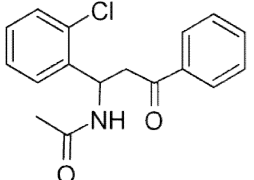
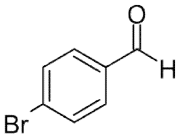

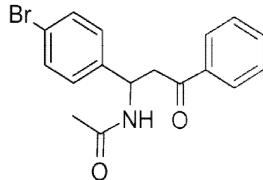
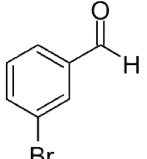

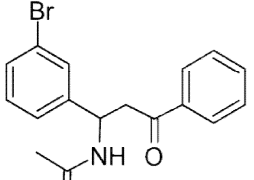
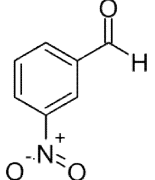

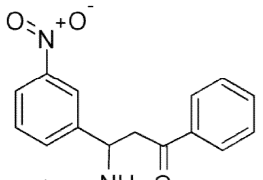
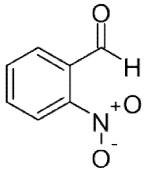

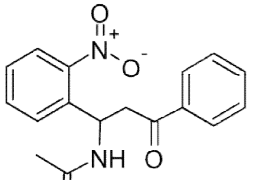
IV. REACTION SCHEME



V. OBSERVATION TABLE 1

For Synthesis of -Acetamido Ketones

Sr. No.	Aldehyde	Ketone	Product	% Yield	Physical Constant <sup>0</sup> C	Reaction Time in hrs
1				82	103	3.2
2				95	105	2.9
3				90	146	3.0
4				95	152	3.0

5				92	133	3.0
6				94	144	3.0
7				96	102	3.1
8				95	140	3.1
9				93	188	3.0

## VI. RESULTS AND DISCUSSION

Step-by-step, the entire reaction was carried out using conventional procedures. Using a green approach, several  $\beta$ -acetamido ketones derivatives were synthesized using bentonite clay as a catalyst. Bentonite Clay, ketone (1 equip.) and aldehyde (1 equip.) in acetonitrile solvent were used to prepare the necessary compounds. The mixture was heated and solicited at 400C for three to six hours. Using optimal reaction conditions, several substituted aldehydes, ketones, and acetonitrile were used to synthesis various variants of  $\beta$ -acetamido ketones. The yields that were attained varied from 85% to 96%. With this green process, you get a higher yield and purity with no by products—just pure product.

## VII. CONCLUSIONS

This study outlined a practical and effective method for producing  $\beta$ -acetamido ketones by utilizing Bentonite Clay, a low-cost, readily available, non-toxic, and environmentally friendly catalyst, in a four-component reaction involving aromatic aldehydes, enolisable ketone, and acetyl chloride in acetonitrile. The current technology has several appealing qualities, including rapid reaction times, good yields, and a straightforward process that is easy to work up. It also has a

lot of potential applications in organic synthesis. It is strongly advised to follow this technique since it is a practical and appealing approach for the large-scale synthesis of  $\beta$ -acetamido ketones.

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