



SYNTHESIS AND ANTIBACTERIAL ACTIVITY OF CHALCONE DERIVATIVES

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Abstract : Chalcones have a keto ethylenic moiety [CO-CH=CH], which makes them desirable species. Several pharmacological effects, including anti-bacterial, anti-fungal, anti-proliferative, and anti-malarial qualities, are attributed to the reactive, unsaturated carbonyl group present in these compounds. Chalcones are part of the phenolic flavonoid class, which includes a wide variety of natural substances. The necessity for more study to thoroughly investigate the therapeutic applications of chalcones for the treatment of different illnesses is emphasised by this review. A great deal of variation has been provided by changes in these structures, which has been helpful in the creation of novel therapeutic medicines with increased potency and decreased toxicity. Index Terms: phenolic compounds of the flavonoid class, keto ethylenic moiety, and chalcones.

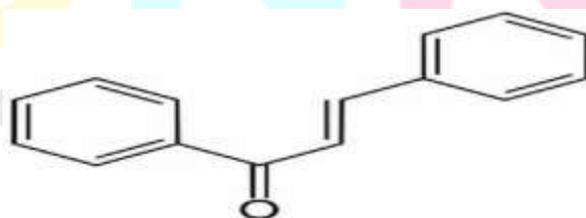
IndexTerms –Chalcones,alpha,beta unsaturated ketones.

INTRODUCTION

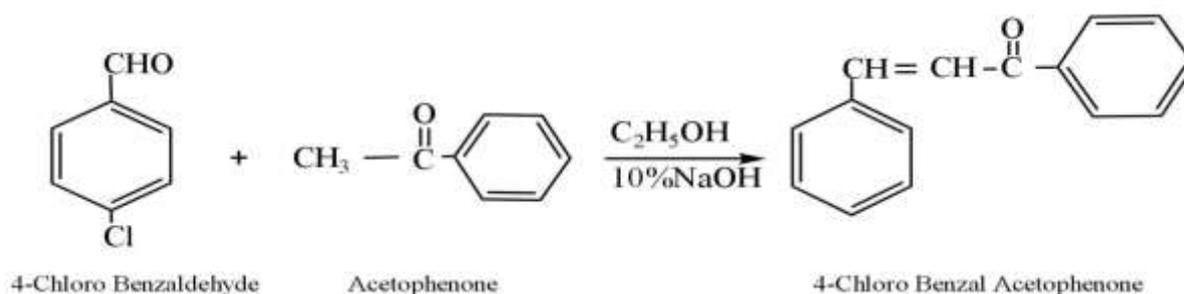
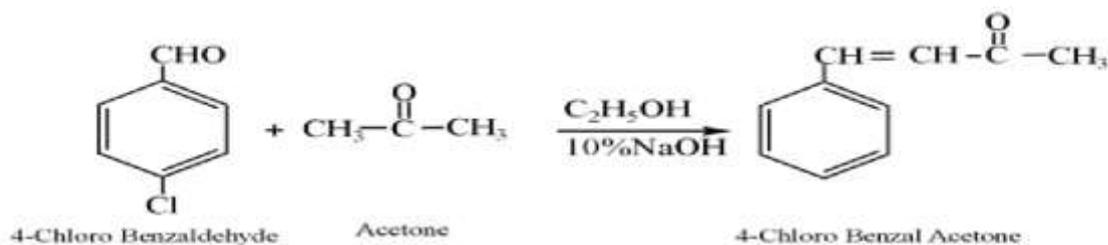
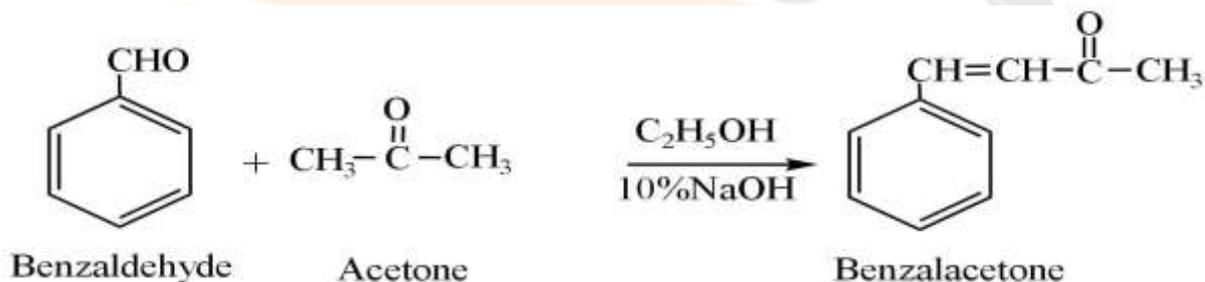
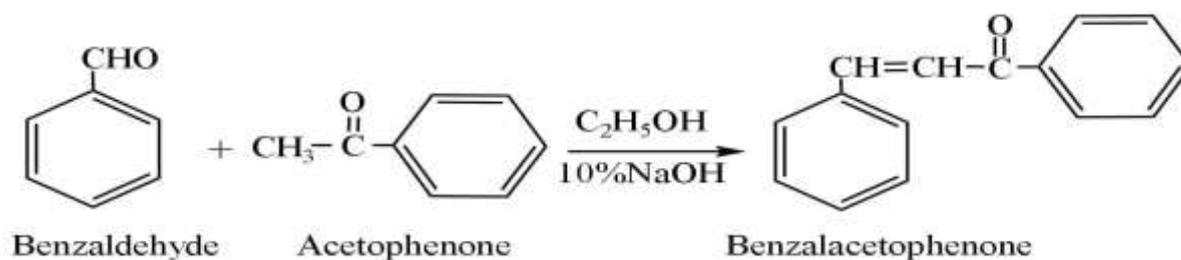
We refer to chalcones as unsaturated ketones. It was Kostanecki and Tamborl that gave the name Chalcones^[1]. Benzyl acetophenone or benzylidene acetophenone are other names for chalcones. An aliphatic three-carbon chain connects two aromatic rings in chalcones. Trans-1,3-diaryl-2-propane-1-ones, or chalcones, are unsaturated ketones with two aromatic rings and the ketoethylenic group (CO-CH=CH-). Chalcones have a fully delocalised in electron system on both benzene rings and conjugated double bonds.^[2]Chalcones are utilised to create heterocyclic compounds and undergo a variety of chemical processes. With the right quantity of condensing agent present, aromatic aldehydes can be treated with aryl ketones to create a variety of chalcone derivatives.^[3]

A variety of biosynthetic routes employ chalcones as the first intermediate structure in the synthesis of aurones, isoflavanoids, and flavanoids. In the twenty-first century, a noteworthy portion of medicinal chemistry research has been devoted to studying chalcones, both natural and synthesised.^[4]

OBJECTIVES:



- 1.To synthesize the title compounds, chalcone derivatives by using claisensmith condensation Reaction.
- 2.To compare Percentage yield of different chalcone derivatives.
- 3.To characterize all the synthesized compounds by analytical method.
- 4.To evaluate the title compounds for anti bacterial activity

SCHEMES:**Scheme 1:****Scheme 2:****Scheme 3:****Scheme 4:****Scheme's Procedure:****Scheme 1:**

1gm of 4-chloro benzaldehyde is taken in a beaker and it is dissolved in 3.5ml of ethanol. In another beaker add 0.83ml of acetophenone and 2.1ml of sodium hydroxide and stir it. Add the aldehyde solution dropwise to the acetophenone solution during the stirring process. The stirring is done with the help of magnetic stirrer in ice cold conditions. The temperature is maintained constant throughout the procedure. Reaction mixture was kept in freezer for 6 hrs and it was filtered, recrystallized from ethanol and dried.

Scheme 2:

1gm of 4-chloro benzaldehyde is taken in a beaker and it is dissolved in 3.5ml of ethanol. In another beaker add 5.1ml of acetone and 2.8ml of sodium hydroxide and stir it. Add the aldehyde solution dropwise to the acetone solution during the stirring process. The stirring is done with the help of magnetic stirrer in ice cold conditions. The temperature is maintained constant throughout the procedure. Reaction mixture was kept in freezer for 6 hrs and it was filtered, recrystallized from ethanol and dried.

Scheme 3:

1gm of benzaldehyde is taken in a beaker and it is dissolved in 3.5ml of ethanol. In another beaker add 1.2ml of acetone and 2.1ml of sodium hydroxide and stir it. Add the aldehyde solution dropwise to the acetone solution during the stirring process. The stirring is done with the help of magnetic stirrer in ice cold conditions. The temperature is maintained constant throughout the procedure. Reaction mixture was kept in freezer for 6 hrs and it was filtered, recrystallized from ethanol and dried.

Scheme 4:

1gm of benzaldehyde is taken in a beaker and it is dissolved in 3.2 ml of ethanol. In another beaker add ml o1.98ml of acetophenone and 2.1ml of sodium hydroxide and stir it. Add the aldehyde solution dropwise to the acetophenone solution during the stirring process. The stirring is done with the help of magnetic stirrer in ice cold conditions. The temperature is maintained constant throughout the procedure. Reaction mixture was kept in freezer for 6 hrs and it was filtered, recrystallized from ethanol and dried.

COLUMN CHROMATOGRAPHY USES :

By taking use of the different affinities that chemical compounds have for a stationary phase inside a column, column chromatography is used to separate and purify chemicals. Applications for this adaptable method can be found in a number of disciplines, such as chemistry, biology, and pharmaceuticals, for jobs like separating active chemicals, purifying substances, and evaluating combinations.^[5]

Separating mixtures: Depending on how the components interact with the stationary and mobile phases, column chromatography can separate complex mixes.^[6]

Diastereomer and geometrical isomer separation: Compounds with various atom spatial configurations can be separated using column chromatography.^[7]

Separating active ingredients: Plant extracts can have their active chemicals separated from other components using column chromatography.^[8]

Impurities are eliminated in order to provide a more uniform sample of the target substance.^[9]

THIN LAYER CHROMATOGRAPHY USES:

Thin-layer chromatography (TLC) is used to monitor reactions, identify and separate various compounds within a mixture, and assess a substance's purity. It is a flexible method that is employed in many disciplines, including forensic science, chemistry, and pharmaceuticals.^[10]

TLC separates mixture components according to their varying affinities for the mobile phase (a solvent) and the stationary phase (often silica gel). This makes it possible to identify specific compounds using their retention factor (Rf) values, which are different for every chemical.^[11]

Reaction Monitoring: By monitoring the elimination of starting materials and the emergence of new products, TLC can be used to monitor the development of a reaction.^[12]

TLC ensures adherence to laws and quality control requirements by assisting with the identification and measurement of colors, sweeteners, and preservatives in food items.^[13]

A stationary phase and a mobile phase are the two phases used in thin layer chromatography (TLC). The mobile phase is a solvent or solvent combination that passes through the stationary phase, which is a thin layer of adsorbent material (such as alumina or silica gel) deposited on a plate.^[14]

ANTIBACTERIAL ACTIVITY :

Anti-bacterial activity of 4 –chlorobenzalacetophenone:

Organism	Type of organism	Concentration	Zone of inhibition		Anti Bacterial activity
E.coli	Gram -ve	10 ug/ml	Standard (Amikacin)	(2.2 mm)	Yes
E.coli	Gram -ve	10 ug/ml	Test (Drug)	(1.6mm)	Yes

Anti-bacterial activity of 4-chloro Benzalacetone:

Organism	Type of organism	Concentration	Zone of inhibition		Anti Bacterial activity
E.coli	Gram -ve	10 ug/ml	Standard (Amikacin)	(2.2 mm)	Yes
E.coli	Gram -ve	10 ug/ml	Test (Drug)	Nil	No

Anti-bacterial activity of benzalacetophenone:

Organism	Type of organism	Concentration	Zone of inhibition		Anti Bacterial activity
E.coli	Gram -ve	10 ug/ml	Standard (Amikacin)	(2.2 mm)	Yes
E.coli	Gram -ve	10 ug/ml	Test (Drug)	Nil	No

Anti-bacterial activity of benzalacetone:

<u>Organism</u>	<u>Type of organism</u>	<u>Concentration</u>	<u>Zone of inhibition</u>		<u>Anti Bacterial activity</u>
<u>E.coli</u>	<u>Gram -ve</u>	<u>10 ug/ml</u>	<u>Standard</u> <u>(Amikacin)</u>	<u>(2.2 mm)</u>	<u>Yes</u>
<u>E.coli</u>	<u>Gram -ve</u>	<u>10 ug/ml</u>	<u>Test</u> <u>(Drug)</u>	<u>Nil</u>	<u>No</u>

CONCLUSION:

- The chalcone derivatives were synthesized by the claisen Schmidt condensation process.
- The progress and purity of these products is verified by TLC (thin layer chromatography) method later with column chromatography.
- The synthesized product (4-chloro benzalacetone, 4- chlorobenzalacetophenone, Benzalacetone, Benzalacetophenone) are tested against various bacterial strains to examine its anti bacterial activity.
- The mentioned product has shown moderate growth and the zone of inhibition and MIC (Minimum inhibitory concentration) is observed as 27.21%.
- An optimum yield of different synthesized products are observed as :-
 - 4-chloro benzalacetophenone :- 44.76%
 - 4-chloro benzalacetone :- 57.46%
 - Benzalacetone :- 71.53%
 - Benzalacetophenone :- 48.46%

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