

**18TH ELECTRONIC CONFERENCES ON SYNTHETIC
ORGANIC CHEMISTRY**

PAPER PRESENTED IN MICROWAVE SECTION

ENTITLED ON

**“CALCIUM OXIDE CATALYZED SYNTHESIS OF
CHALCONE UNDER MICROWAVE CONDITION”**

By

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MERITS OF MICROWAVE REACTION

- Short Reaction time
- Easy workup procedure
- No side product
- Solvent free reaction condition
- High yield

COMPARISON BETWEEN MICROWAVE REACTION AND TRADITIONAL METHODS

Microwave Reaction

- Particular reaction take place
- No side product formed
- Short reaction time
- Isolation of product is easy
- Solvent free, High yield

Traditional Methods

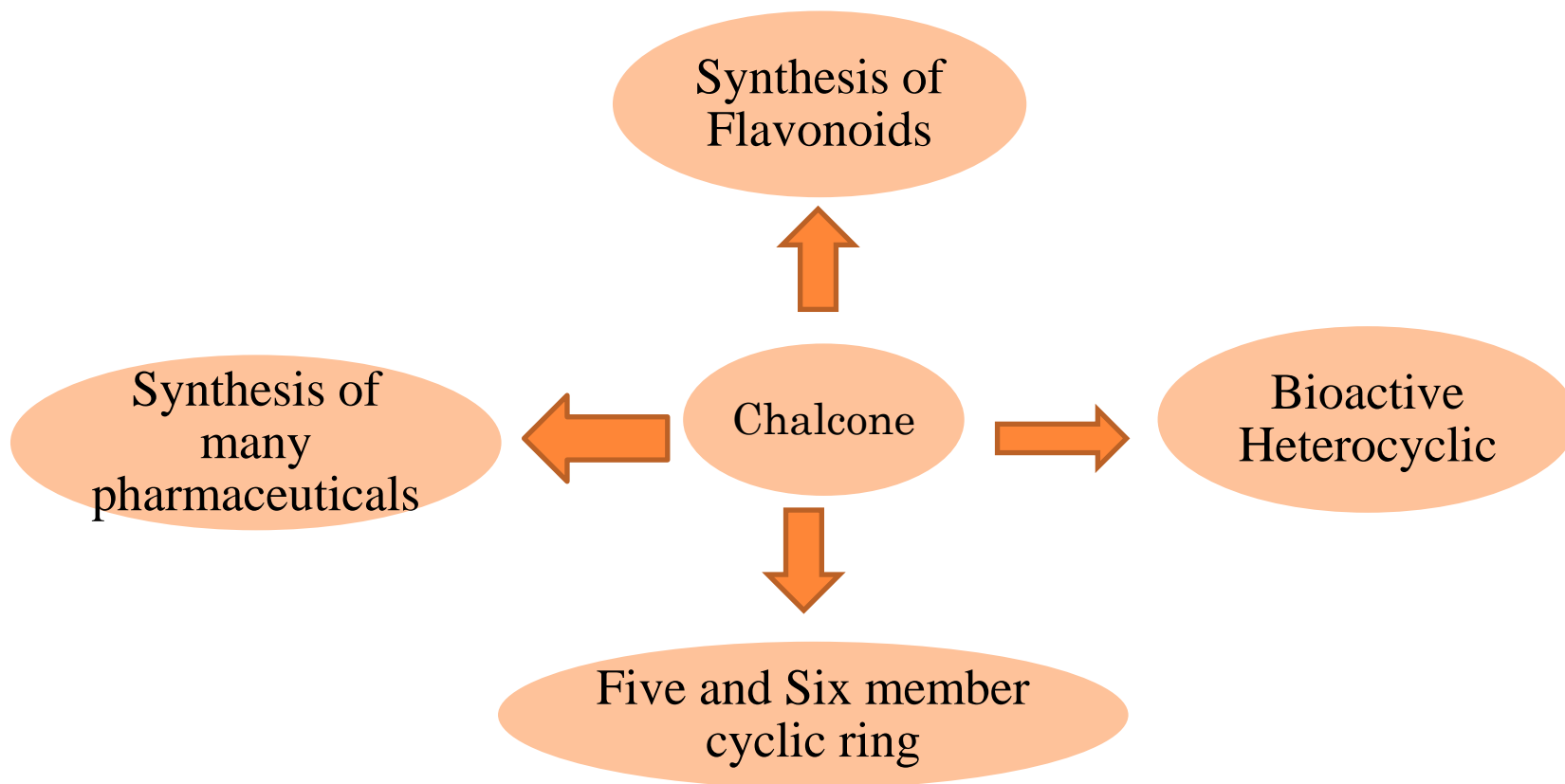
- Unwanted reaction take place
- Side products formed
- Long reaction time
- Isolation of product is tedious process , require lot of solvent for extraction
- Solvent is required and some times yield is low

CHALCONES

BIOLOGICAL IMPORTANCE OF CHALCONES

- Chalcones shows following important biological property
- 1. Antimalarials
- 2. Anti AIDS
- 3. Anti viral
- 4. Anti-inflammatory
- 5. Anticancer
- 6. Antibacterial
- 7. Antituberculosis
- 8. Antioxidants
- 9. Antileishmanials

CHALCONES AS SYNTHON FOR BIOACTIVE MOLECULES



METHODS FOR SYNTHESIS OF CHALCONES

- Chalcones are synthesised by following methods
- 1. Acid or Base catalyzed Claisen Schmidt condensation reaction
- 2. $\text{BF}_3 \cdot \text{OEt}_2$
- 3. Suzuki coupling
- 4. Julia-Kocienski olefination

ACID OR BASE CATALYZED CLASIEN SCHMIDT CONDENSATION REACTION

- Following different acids or bases are used
- Acids used are AlCl_3 , dry HCl , $\text{Zn}(\text{bpy})(\text{OAc})_2$, TiCl_4 , $\text{Cp}_2\text{ZrH}_2/\text{NiCl}_2$, and RuCl_3
- Bases used are NaOH , KOH , LiOH , $\text{Ca}(\text{OH})_2$, $\text{Ba}(\text{OH})_2$, Magnesium t-butoxide, Potassium carbonate, Alumina, MgO , Calcinated hydrotalcites, KF /natural phosphate
- These methods suffer from drawbacks like expensive catalyst, drastic reaction condition, longer reaction time, low yield
- Hence there is scope to develop new methods in which these demerits are removed.

CALCIUM OXIDE AS A GREEN SOLID BASE CATALYST

- Calcium oxide is green solid base catalyst due to following reasons
- 1. Calcium oxide is a white crystalline solid with a melting point of 2572°C
- 2. It is also uses to control pollution from power plants and remove phosphates from sewage
- 3. Calcium oxide is found in soil and it does not show any toxic effect as well as its occurrence in nature not affect on environment, stable at high temperature and water stable, no flammable, explosive or oxidizing properties

RESULT AND DISCUSSION

- First, we studied Claisen-Schmidt condensation reaction between benzaldehyde and acetophenone in the presence of calcium oxide as solid support.
- Benzaldehyde and acetophenone was dissolved in ethanol was added on calcium oxide to adsorbed after evaporating ethanol and we got free flowing powder.
- The resulting powder was exposed to microwave irradiation at 400W at power level 2 and progress of the reaction was monitored by TLC using (2:8) ethyl acetate and pet ether for an interval of 1minute and after 4 minute we observed that reaction proceed in the forward direction and formation of a new product.

- To indentify the structure of new product, after completion of reaction we workup the reaction mixture by adding 20mL ice cold water and neutralization with Conc. HCl, solid was precipitated. Solid was filtered on suction pump and wash with 20mL water, afforded crude product.
- The crude product purified by recrystallization from ethanol afforded pure product. The structure of the pure product was confirmed by spectroscopic method and spectral data match with chalcone.
- Next we decided to optimize reaction condition; we vary the amount of calcium oxide 10, 20, 40 mol% , 1:1 and 1:2 catalyst. It was found that 1:1 catalyst showed a maximum yield in short time interval. There was no reaction when condensation was carried out without calcium oxide which indicates that catalyst is necessary for the condensation reaction even under microwave conditions.

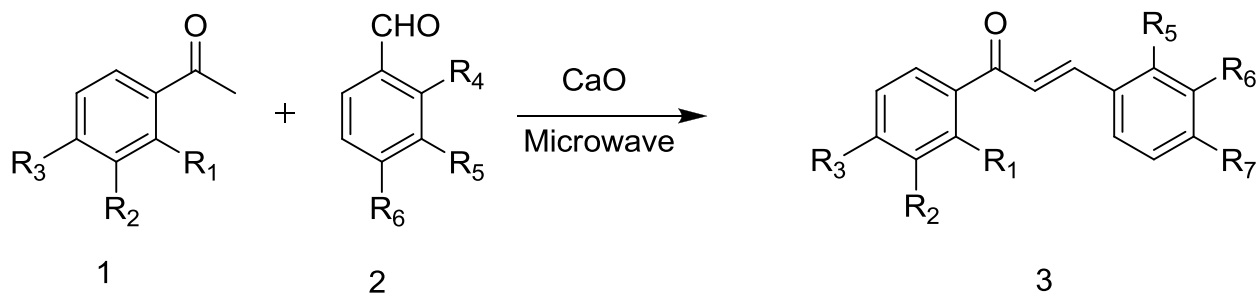


Figure 2 Synthesis of Chalcone under microwave condition using Calcium oxide as a catalyst

- We synthesized different 15 chalcones with electron donating as well as electron withdrawing group both on ketone and aldehyde
- Yield in the rang between 57-88 %
- As usual electron withdrawing groups present on aldehyde and ketone proceeds very smoothly to afford chalcone in good yield; while substituent present on ortho-position gave a moderate yield due to steric effect.

CONCLUSION

- Here, in this study we report facile, solvent free ecofriendly synthesis of chalcone under microwave condition. The merits of this method is avoid use of solvent, inexpensive and easily available catalyst, method is applicable to base sensitive functional group, easy work up and purification procedure, high yield short reaction time.

THANK YOU