

# Organic Chemistry

## Condensation Reaction

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**Selective Organic Name Reaction**

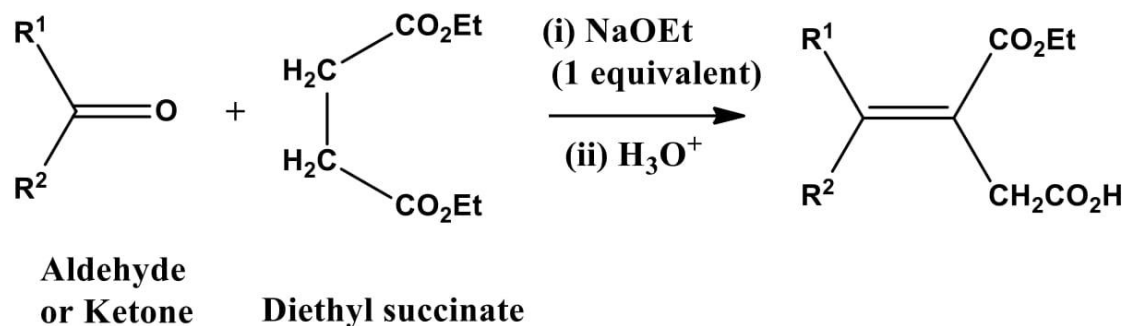
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# CONDENSATION

- **STOBBE CONDENSATION**

# STOBBE CONDENSATION

- The formation of alkylidene succinic acids or their monoesters by the base-initiated condensation of carbonyl compounds with dialkyl succinate is called the Stobbe condensation.
- One mole of metal alkoxide is required per mole of carbonyl compound and ester, and the primary product is the salt of the half-ester.
- Succinic esters react much better than the others. One of the ester group is hydrolysed in the course of the reaction.



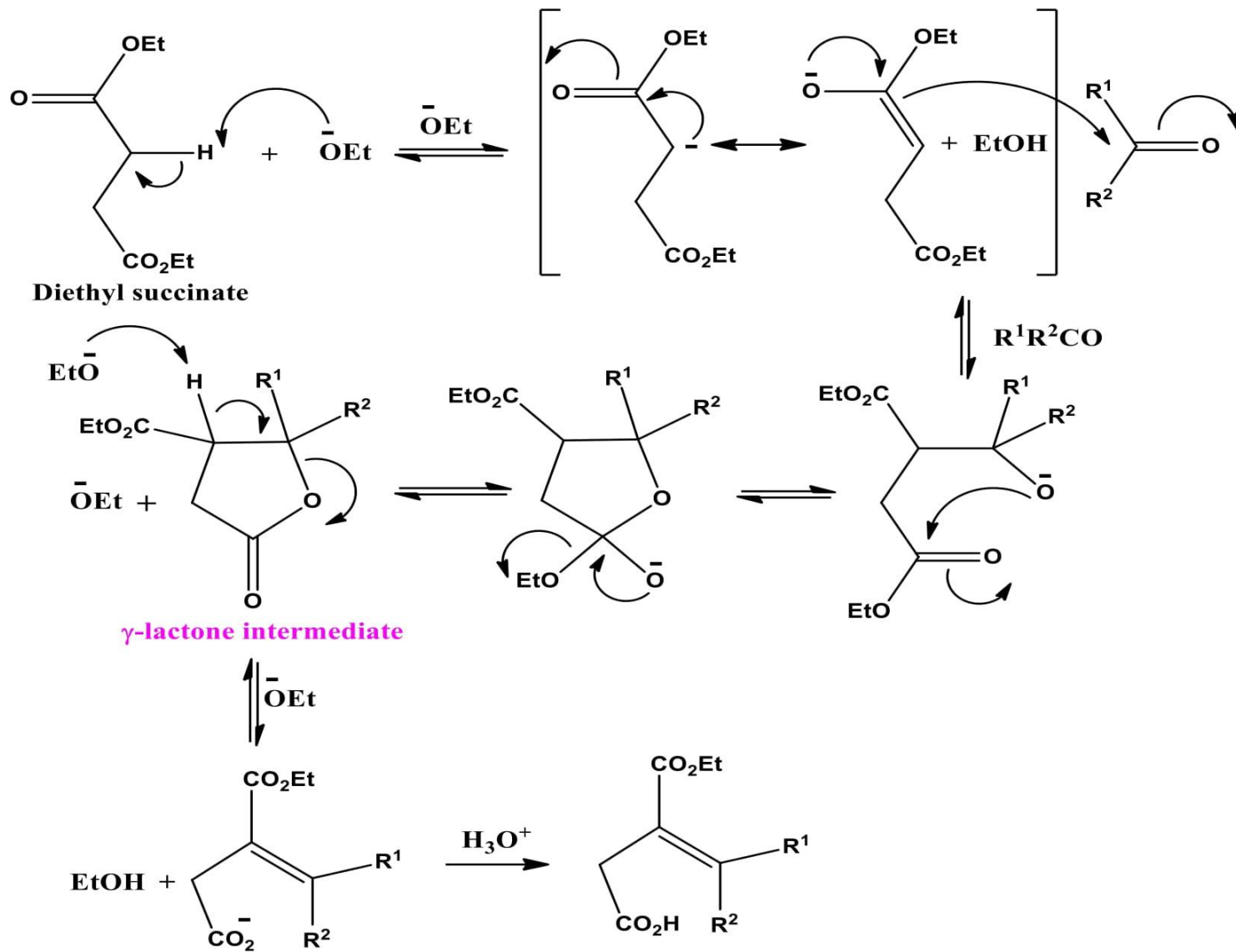
## GENERAL FEATURES

- Different types of carbonyl compounds can be used in this reaction. The  $R^1$  and  $R^2$  components in  $R^1R^2CO$  may be H, alkyl, aryl,  $CH(R)CN$ , etc.
- Varieties of bases are used in this reaction. It may be  $KOt$ -Bu, NaH, NaOEt, Na metal,  $NaCPh_3$ . Solvents like ether, ethyl alcohol and tertiary butyl alcohol are commonly used.
- The diesters used are succinic esters and their substituted derivatives, but certain  $\alpha,\omega$ -diesters that do not undergo competitive Dieckmann condensation can also participate in Stobbe condensation.
- When symmetrical carbonyl compounds are used in the condensation, only one alkene stereoisomer is formed, but unsymmetrical ketones afford a mixture of *E/Z*-isomers.
- Under basic conditions, self condensations (aldol type) amongst the carbonyl compounds is possible and lowers the yield of Stobbe condensation.

# MECHANISM

- The Stobbe condensation starts with the abstraction of  $\alpha$ -hydrogen of the succinate ester by the base to produce an ester-enolate that in *situ* undergoes an aldol type reaction with the carbonyl compound to form a  $\beta$ -alkoxy ester intermediate.
- This is then followed by intramolecular acyl substitution to give a  $\gamma$ -lactone intermediate which undergoes ring-opening and concomitant double bond formation upon deprotonation involving the alkoxide ion.
- The mechanism involves the formation of a cyclic (lactone) intermediate.
- Under certain conditions, the intermediate lactone compound can be isolated.

# MECHANISM



Thank You!

