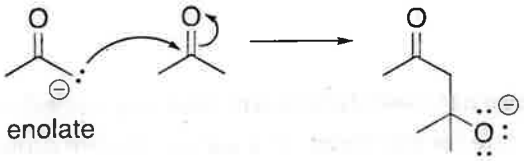
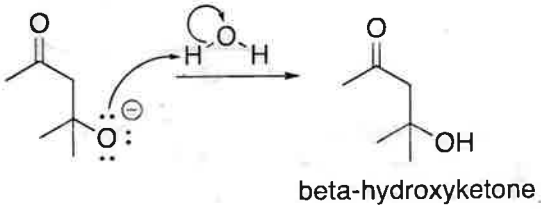
Carbonyl Condensation Reactions

Aldol Condensation Reactions:

Aldol Addition

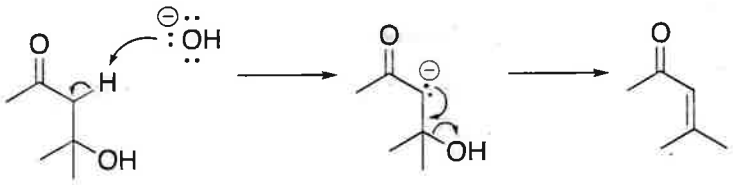
- Formation of an enolate from an aldehyde or ketone treated with basic conditions such as NaOH
- The α-carbon of the enolate (nucleophile) attacks the carbonyl group.
- Removal of the negative charge is achieved via protonation from water.
- An -OH group is placed at the beta position, forming a β-hydroxyketone. The reaction is called ***aldol*** addition.



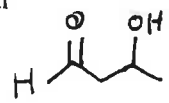


Aldol Condensation

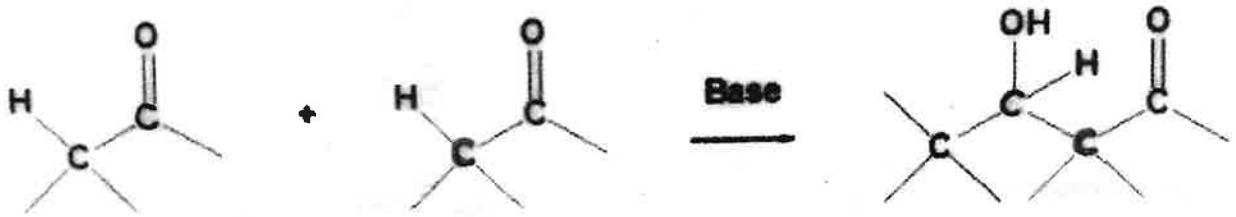
- When the reaction proceeds all the way with heat, the -OH group gets eliminated forming a double bond conjugated with the carbonyl group, known as an α,β-unsaturated ketone. The reaction is called an aldol ***condensation.***



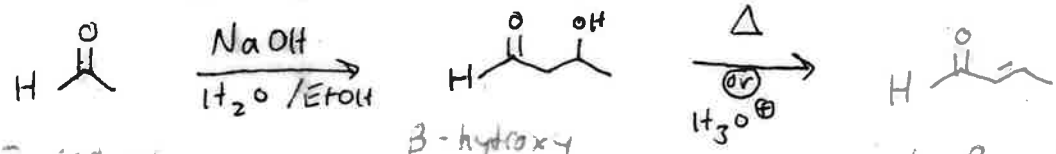
CH. 23 Carbonyl Condensation Reactions

- **Aldol (aldehyde alcohol)** – used to describe specific compound 3-hydroxybutanal and to describe β-hydroxy aldehydes in general
  - 3-hydroxybutanal = 

General Aldol Reaction



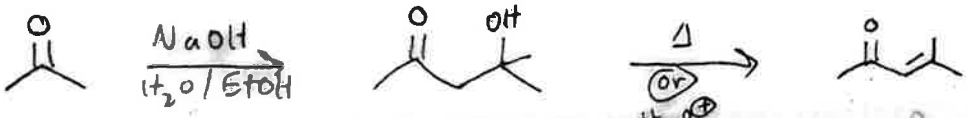
I.) Aldol Reaction Examples



I carbonyl (aldehyde)

β-hydroxy aldehyde

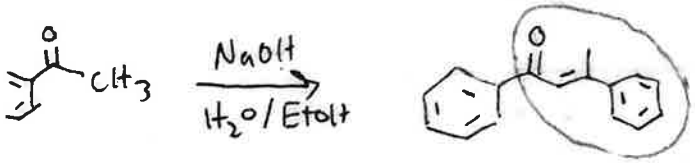
α, β-unsaturated aldehyde



I Carbonyl (ketone)

β-hydroxy ketone

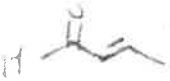
α, β-unsaturated ketone



1st I carbonyl (ketone)

★ if product has extented conjugation E1 cB (conjugate base) mechanism is very easy to do

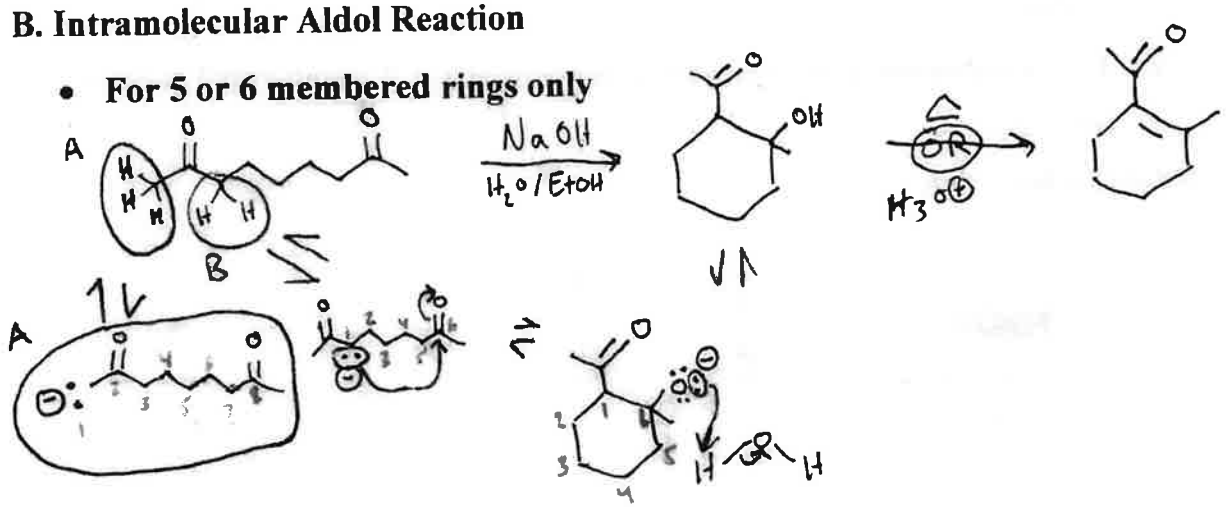
↓

anything more than 

so more than 2 double bonds

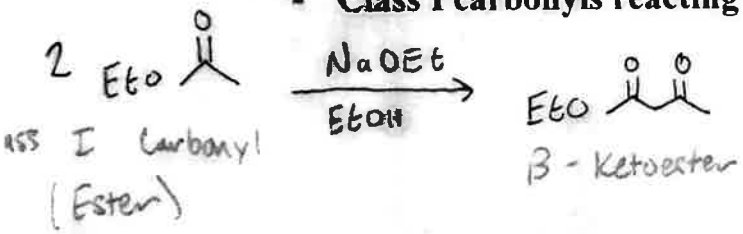
B. Intramolecular Aldol Reaction

- **For 5 or 6 membered rings only**

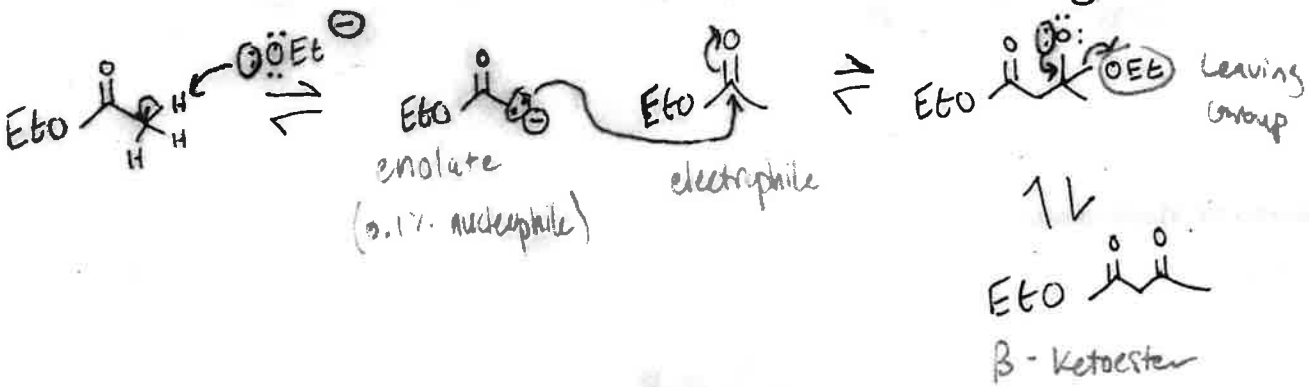


II.) Claisen Reaction (Claisen Condensation)

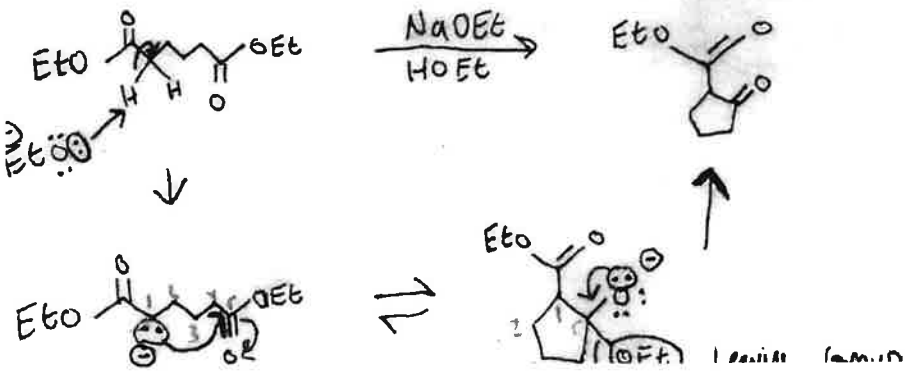
- **Class I carbonyls reacting with themselves**



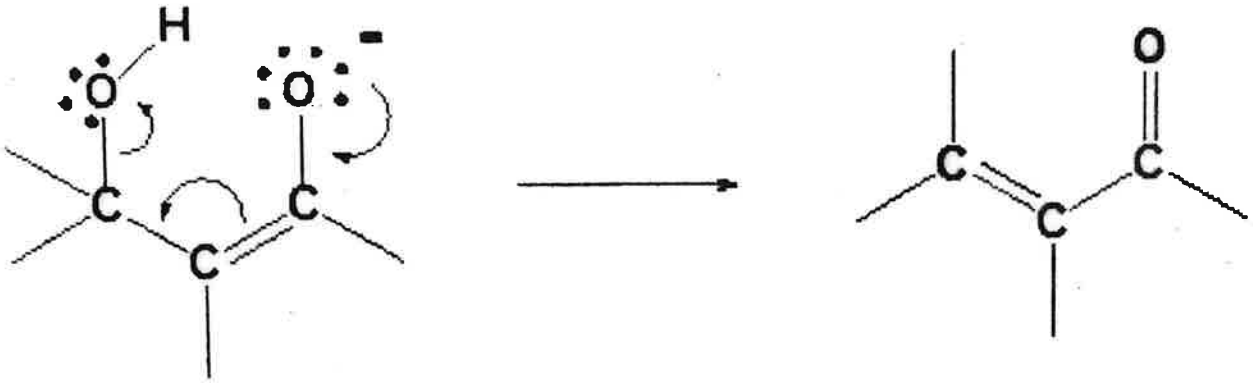
Mechanism



A. Intramolecular Claisen = Dieckmann Reaction

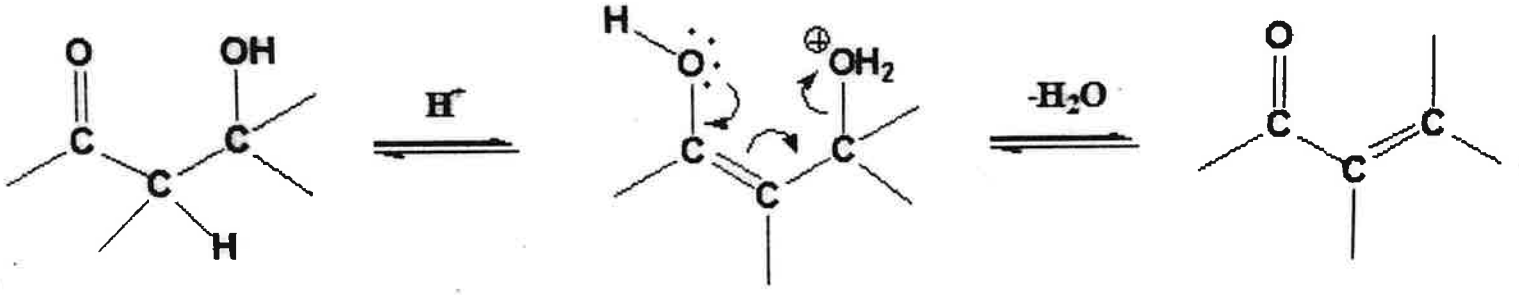


2: Form enone



cid Catalyzed Mechanism

- Enol is formed and hydroxy group is protonated
- Water expelled by either E1 or E2
- Double bond always forms in conjugation with carbonyl



mple Reaction:

