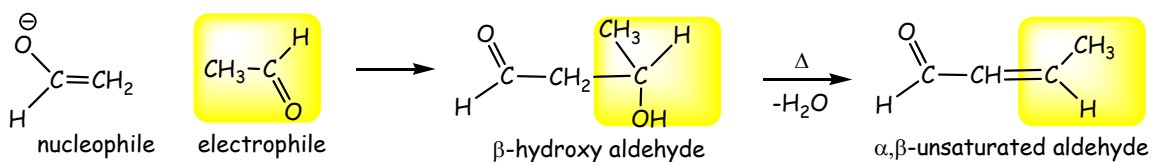
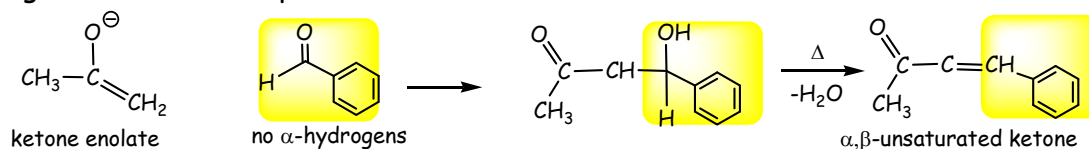


Aldol Condensation- aldehyde (or ketone) enolate condenses with aldehyde (or ketone):

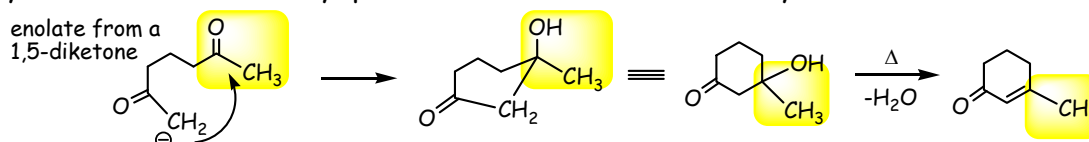


The nucleophile can be a ketone enolate or aldehyde enolate and the electrophile (shaded) can be an aldehyde or ketone.

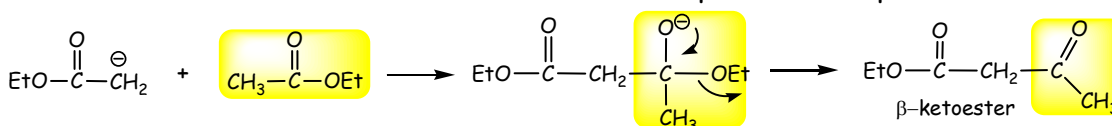
- **Crossed Aldol- Condensation** between two different carbonyls. The component without α -hydrogens is the electrophile:



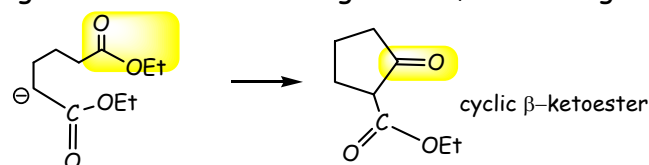
- **Aldol Cyclizations-** A dicarbonyl produces an enolate and carbonyl in the same molecule:



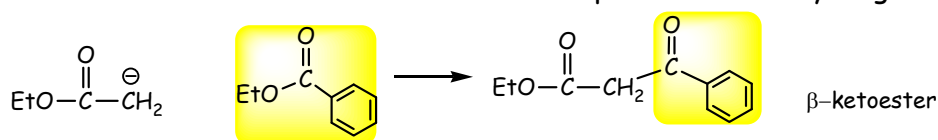
Claisen Condensation- Similar to Aldol condensation except the nucleophile is an ester enolate:



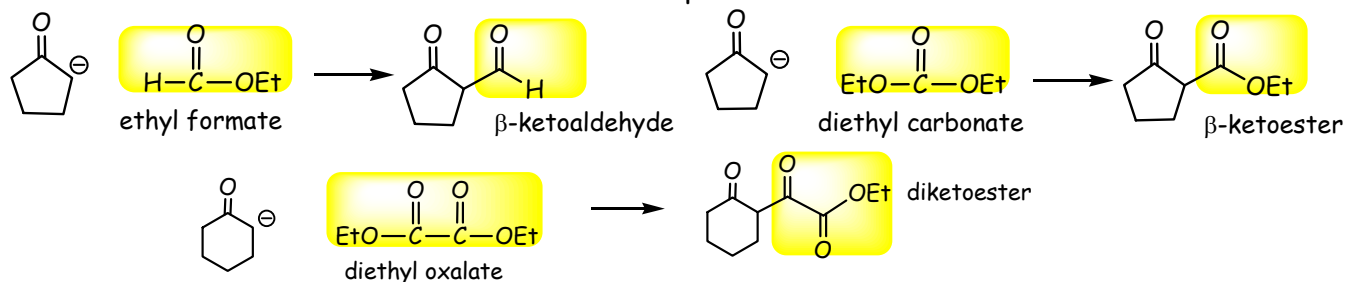
- **Dieckmann Cyclization-** Internal Claisen condensation similar to Aldol cyclization. A 1,6 diester gives a 5-membered ring and a 1,7 diester gives a 6-membered ring:

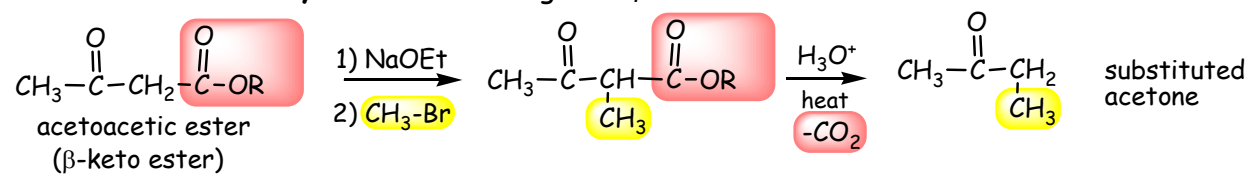
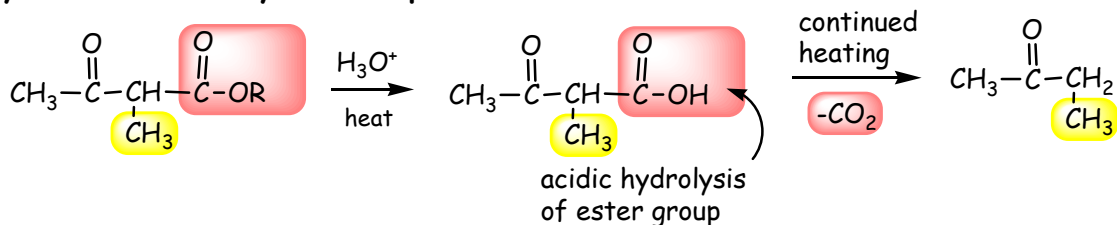
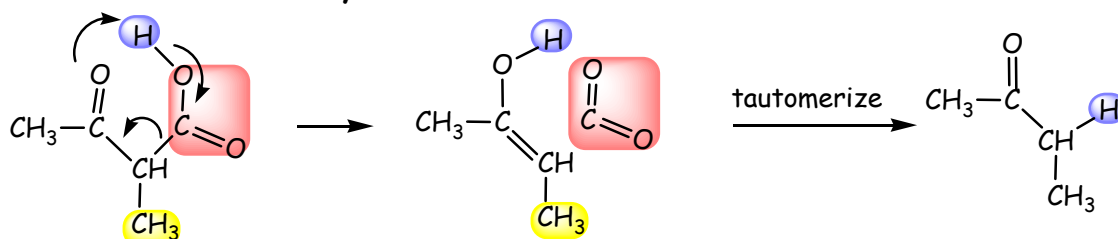
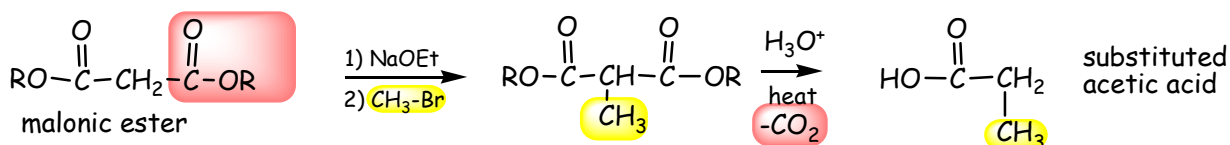
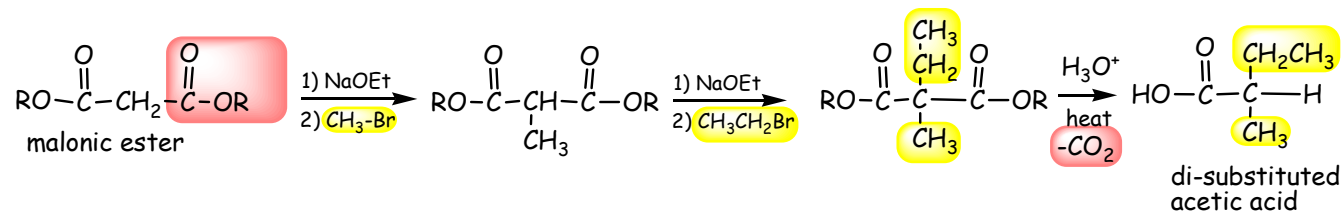
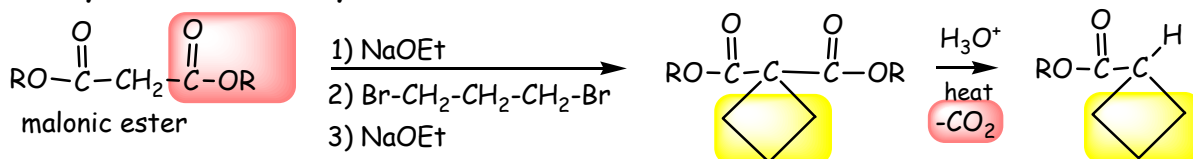


- **Crossed Claisen-** Similar to crossed Aldol- Electrophile has no α -hydrogens:



- **Variations on Crossed Claisen-** ketone enolate and ester condensation. Esters, carbonates, formates and oxalates are common electrophiles:



β -dicarbonyl enolates- Acetoacetic Ester Synthesis and Malonate Ester synthesis**Acetoacetic Ester Synthesis-** starting with β -keto ester to make substituted acetone:**Hydrolysis and decarboxylation steps:****Mechanism of decarboxylation:****Malonate Ester synthesis-** alkylation of enolate followed by decarboxylation gives substituted acetic acids:**Two successive alkylations:****Useful for cycloalkane carboxylic acids:****Michael Reaction-** 1,4 addition across the double bond of α,β -unsaturated carbonyl: