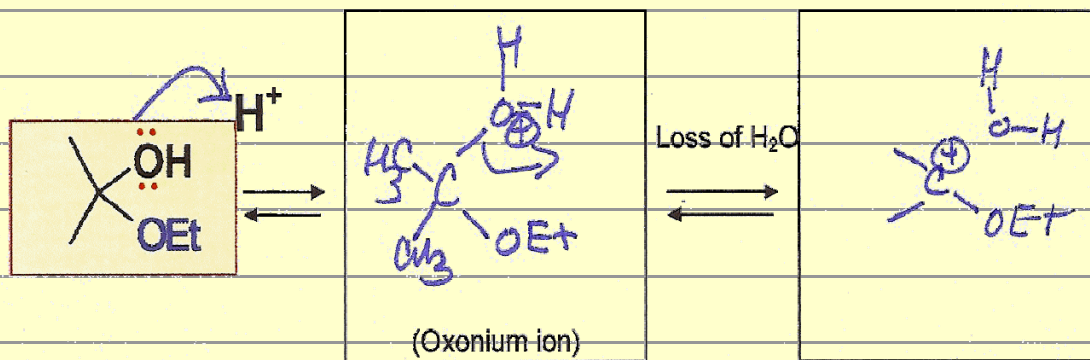
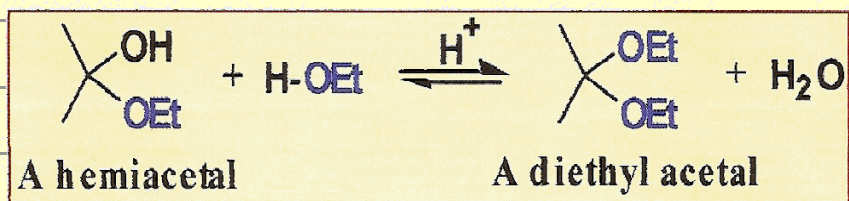
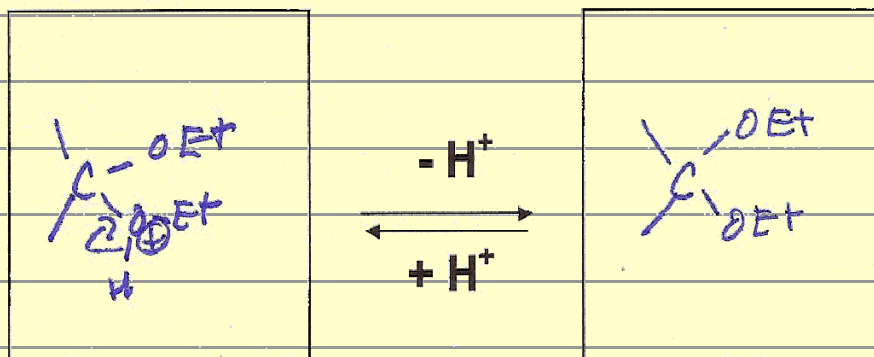
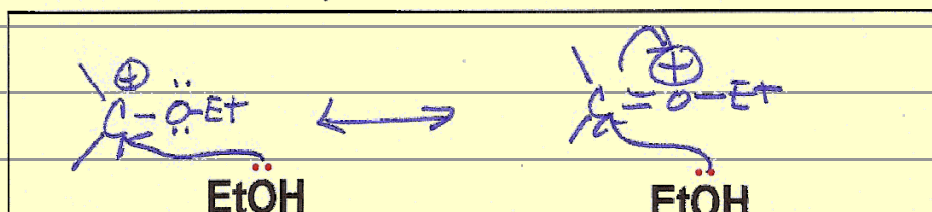


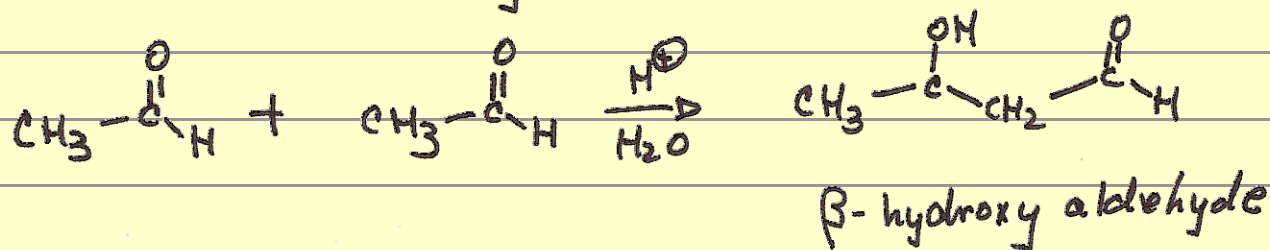
Acetal Formation (acidic conditions)



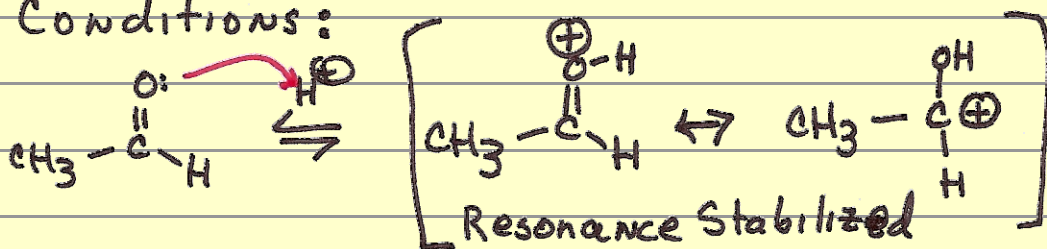
◆ Protonated Hemiacetal



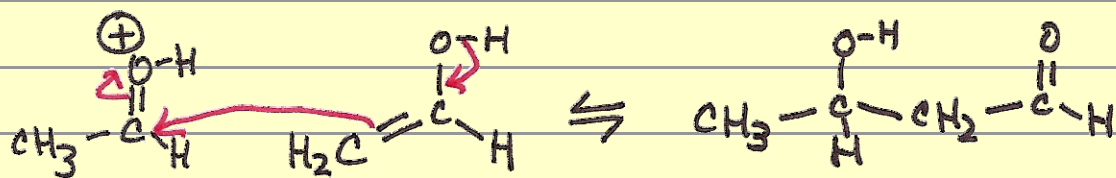
Aldol Condensation (acidic conditions)

Typical Aldol Condensation:
(same Carbonyl)

Acidic Conditions:

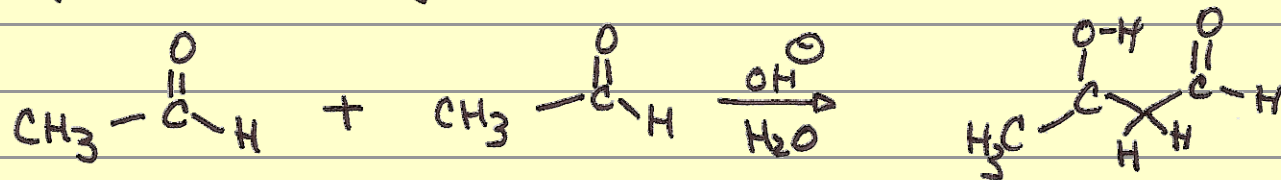


Note: this is the protonated carbonyl, which serves as the Electrophile

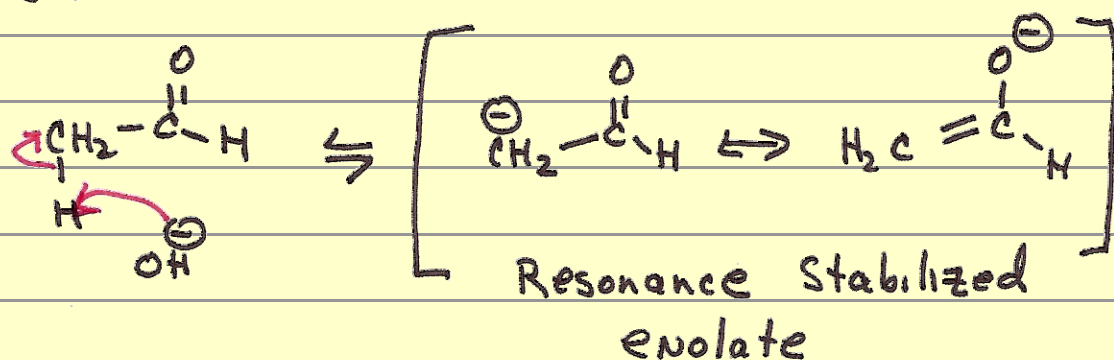


Note: this is the enol form of the carbonyl - it is the nucleophile

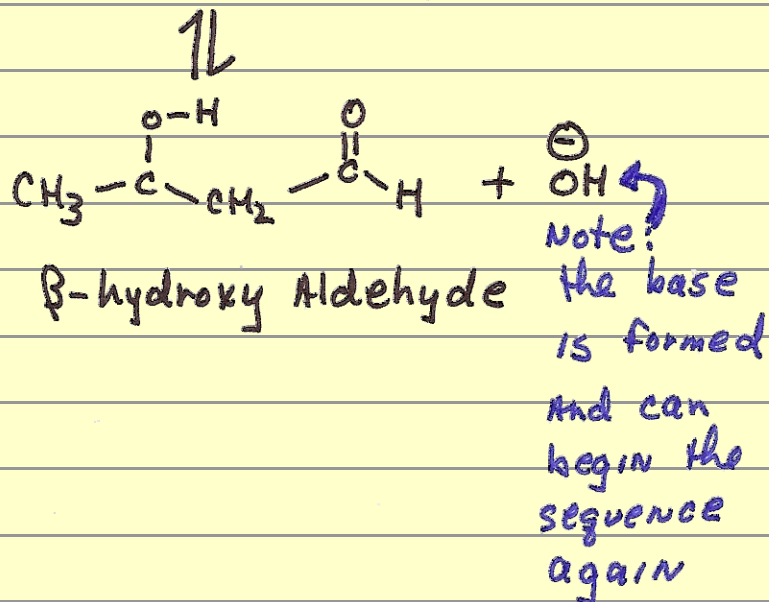
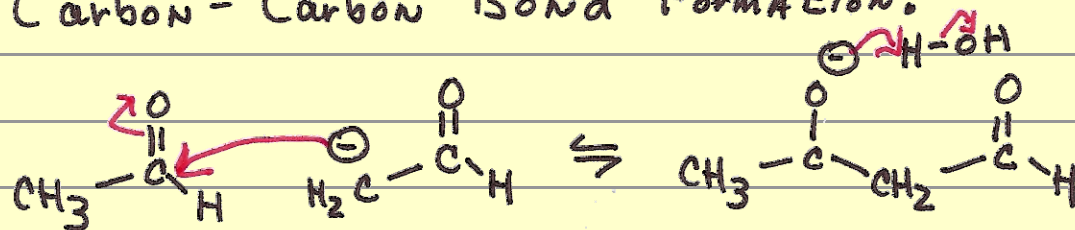
Aldol Condensation (basic conditions)

Typical Aldol Condensation:
(Same Carbonyl) β -hydroxycarbonyl

Basic Conditions:

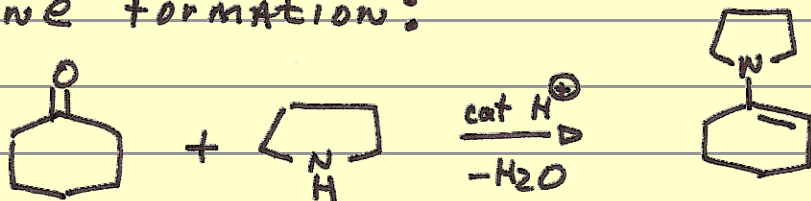


Carbon-Carbon Bond Formation:

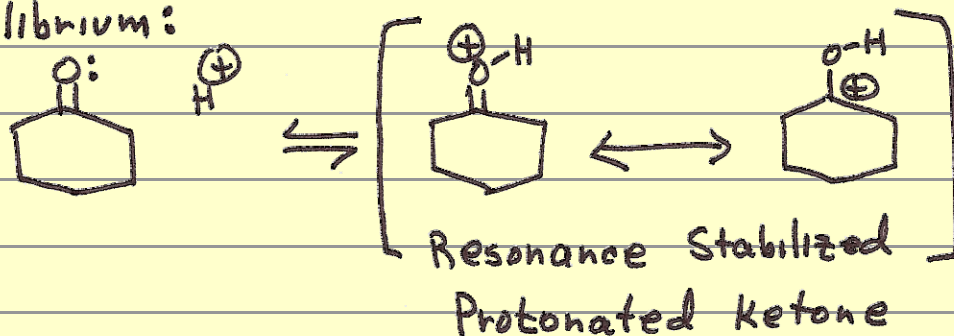


Enamine formation (2° Amine with a carbonyl)

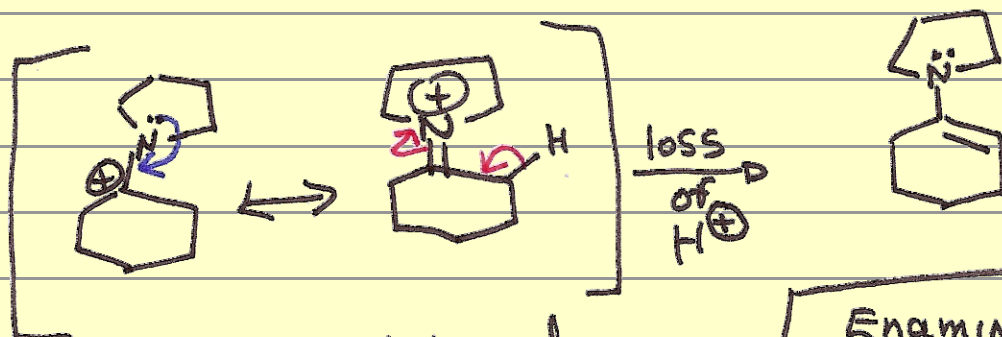
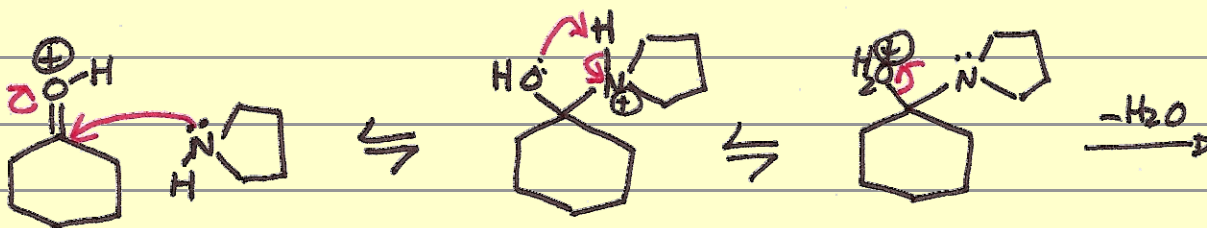
Enamine formation:



Equilibrium:

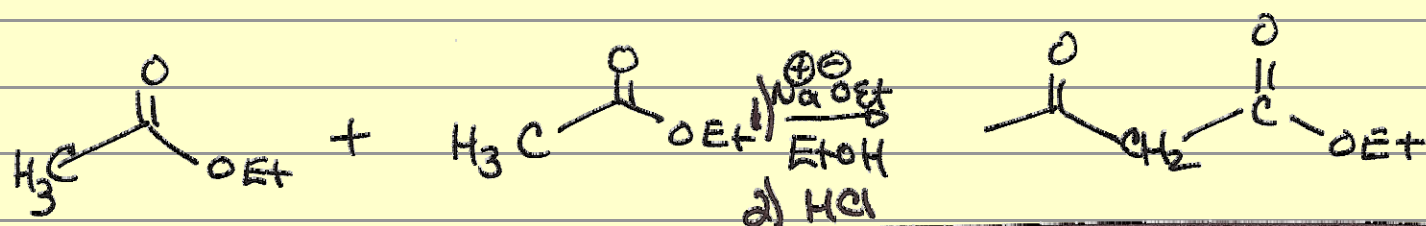


Nucleophilic Attack of 2° Amine (pyrrolidine)

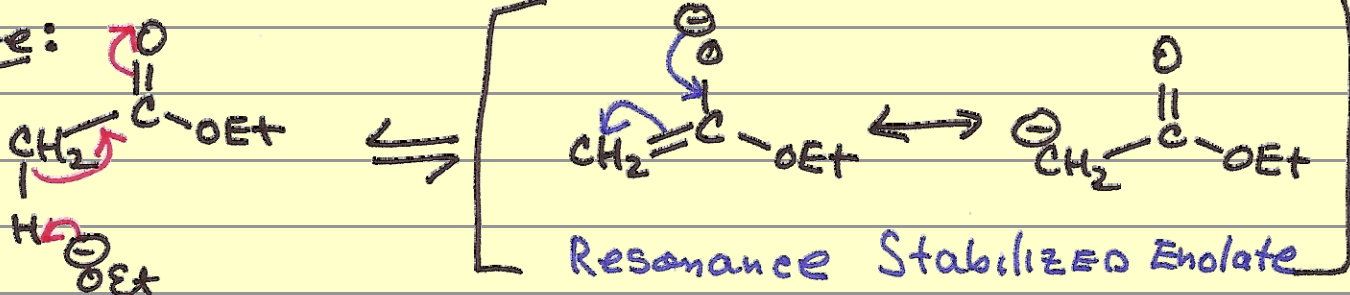
Resonance Stabilized
IMINIUM ION

Enamines are stable products - many are liquids & can be distilled

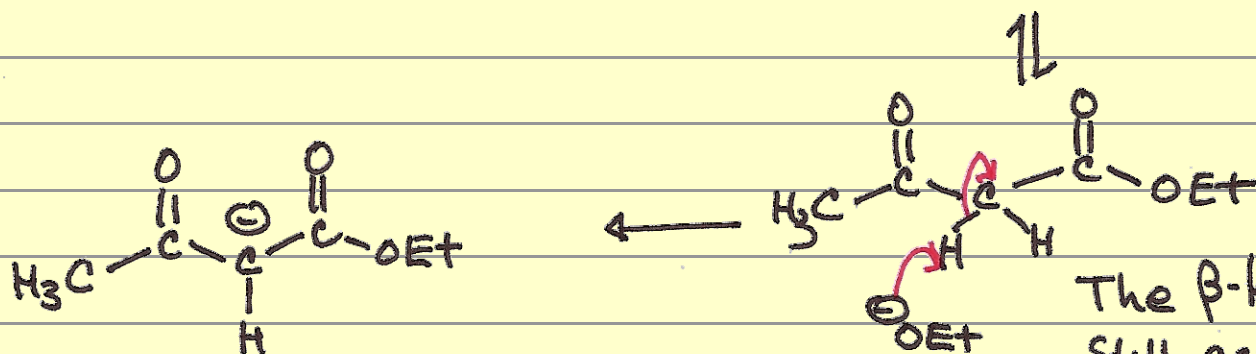
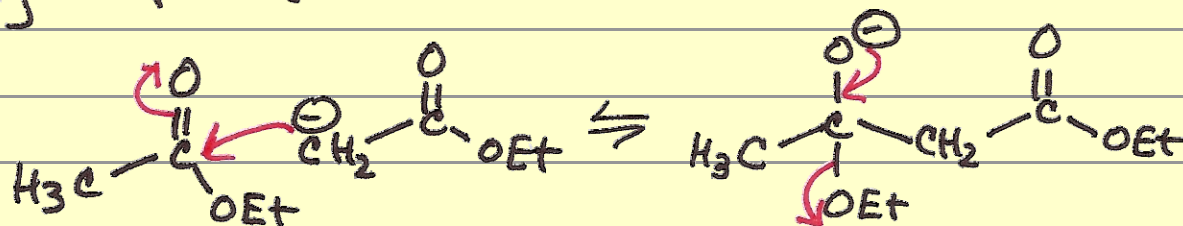
The Claisen Condensation



Enolate:

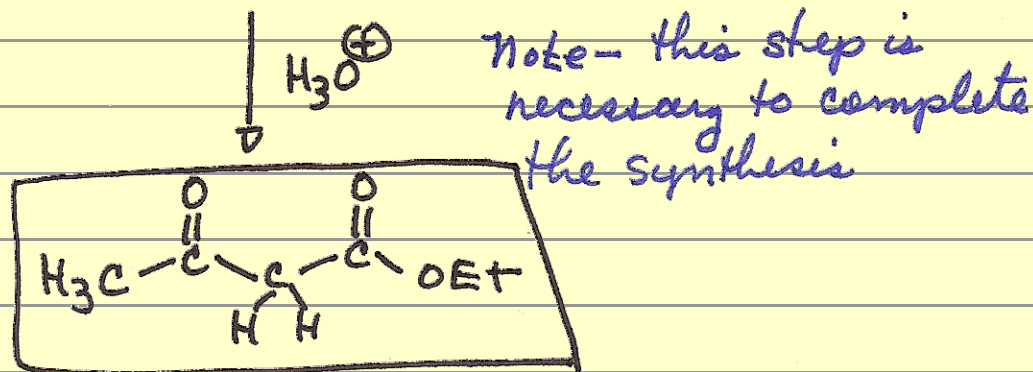


Key Step: (C-C Bond formation)

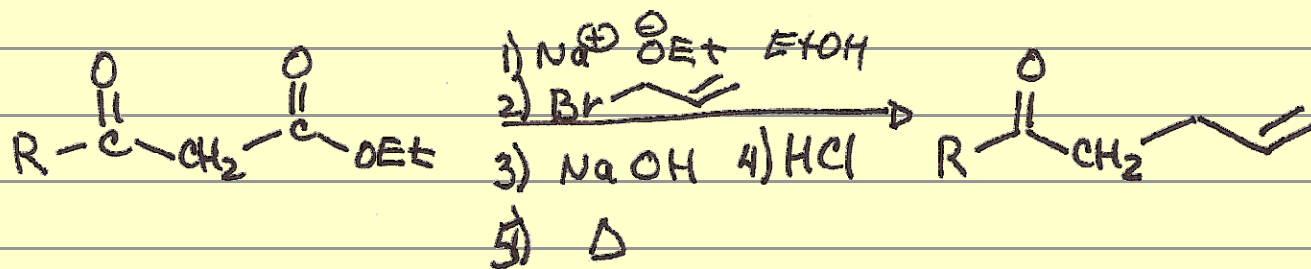


Resonance Stabilized Anion

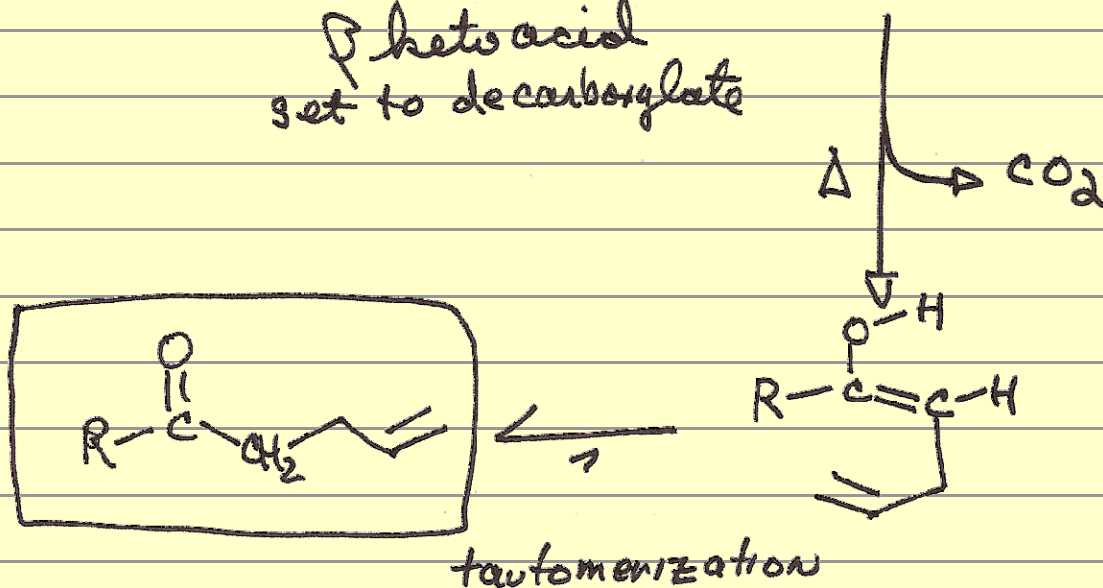
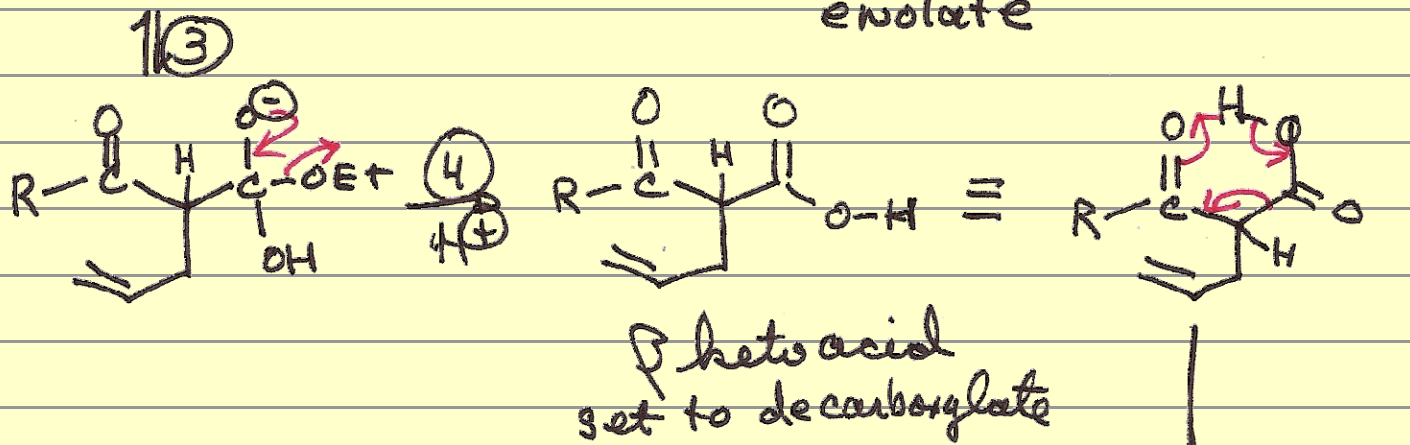
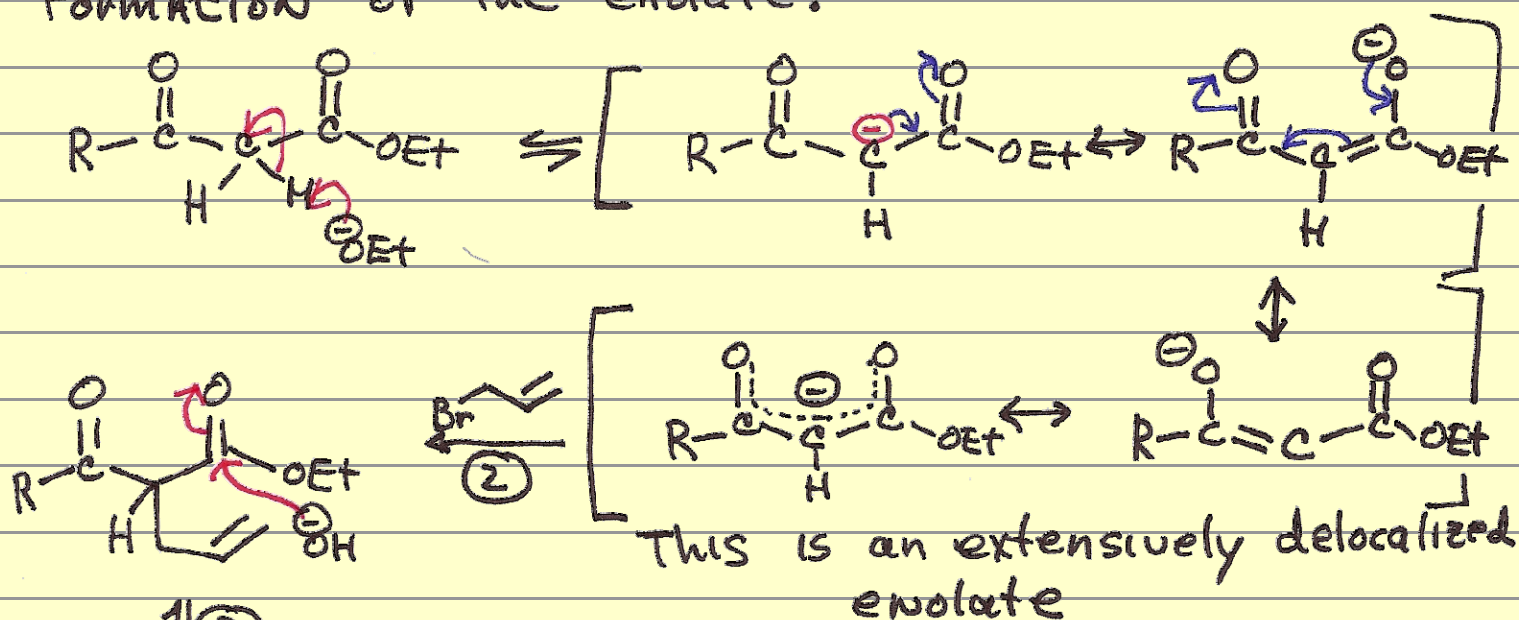
The β -keto ester is still acidic & the base deprotonates



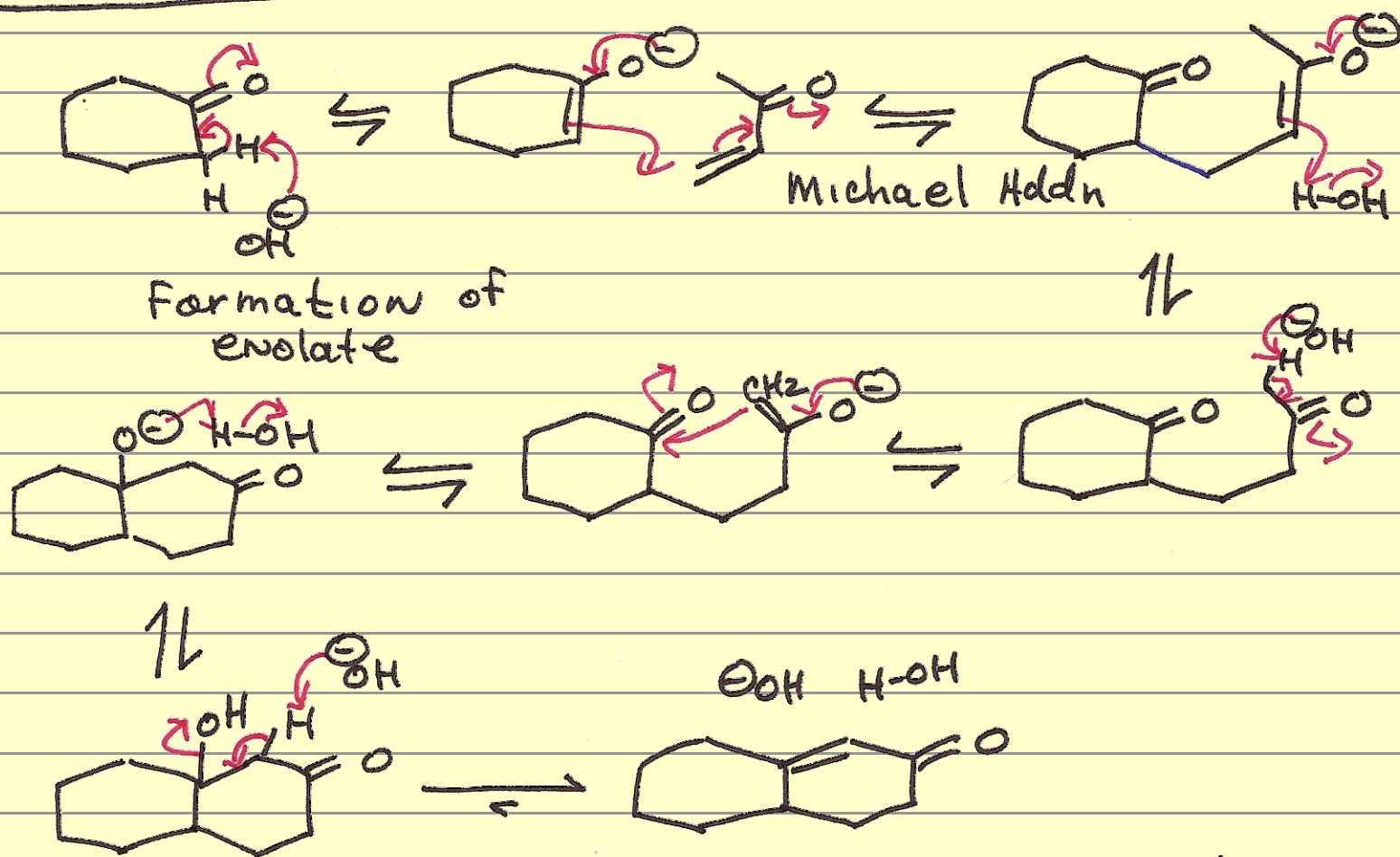
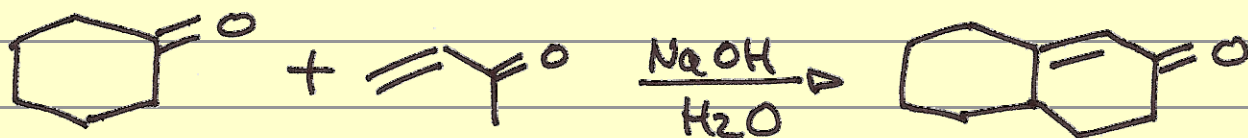
Preparation of Ketones via β -keto esters



Formation of the enolate:



The Robinson Ring Annulation

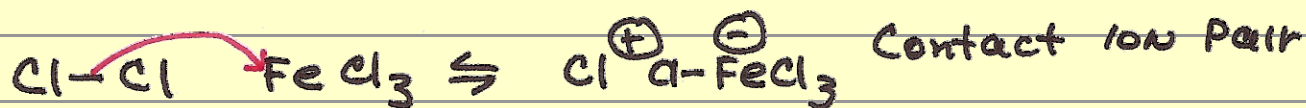


Equilibrium lies towards
 the enone product
 (Conjugation energy helps
 drive the formation of product)

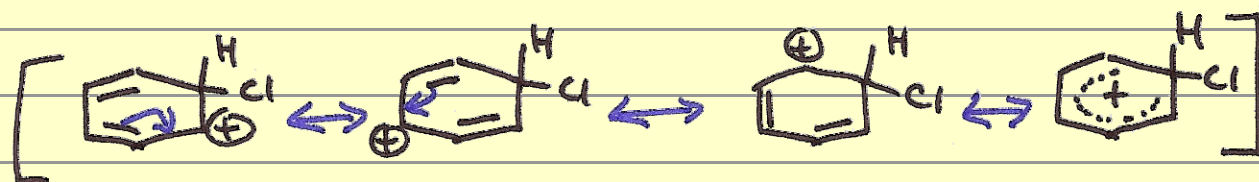
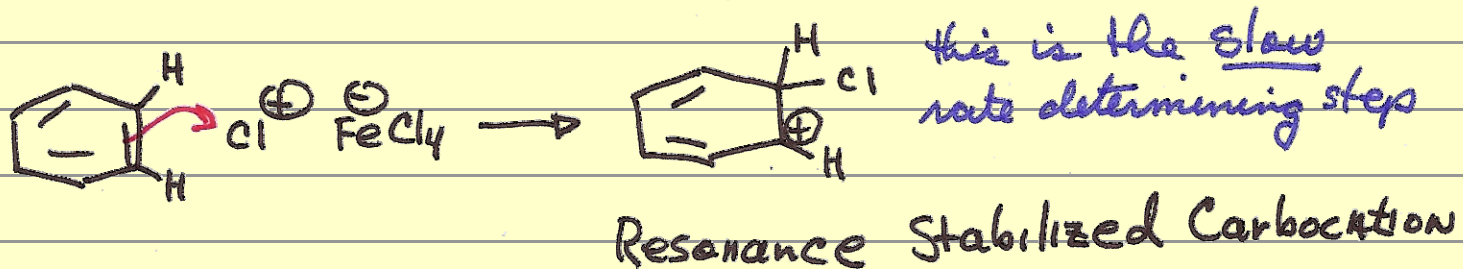
Electrophilic Aromatic Substitution

Chlorination

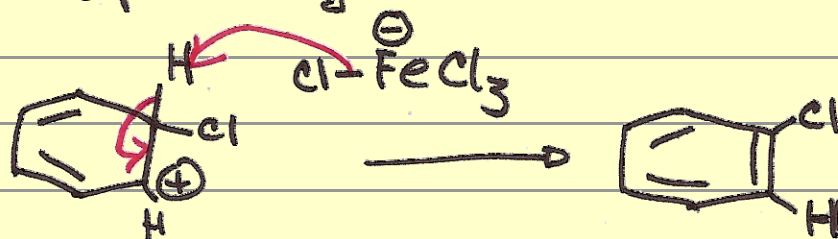
Generate the Electrophile:



Attack of the Aromatic System upon the Electrophile



Loss of a proton gives the aromatic system again



H-Cl

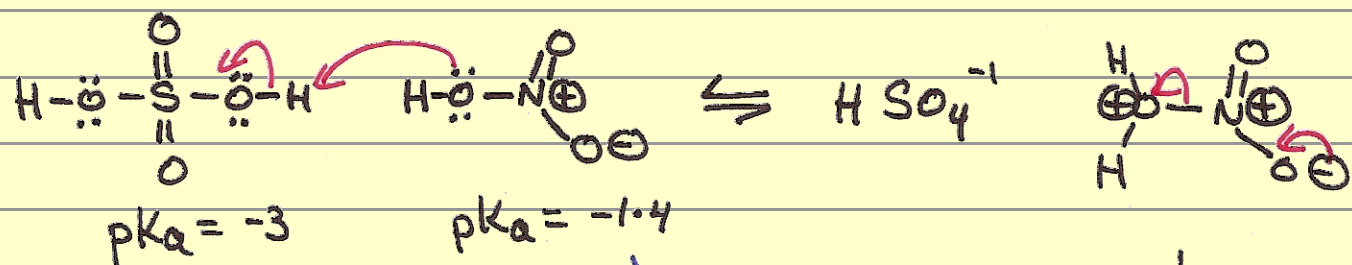
FeCl₃

Note: the catalyst is regenerated

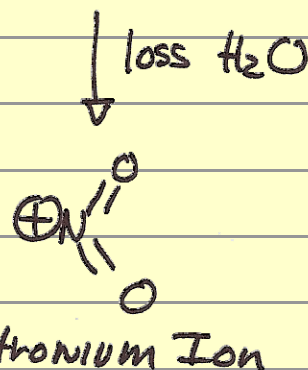
Electrophilic Aromatic Substitution

Nitration

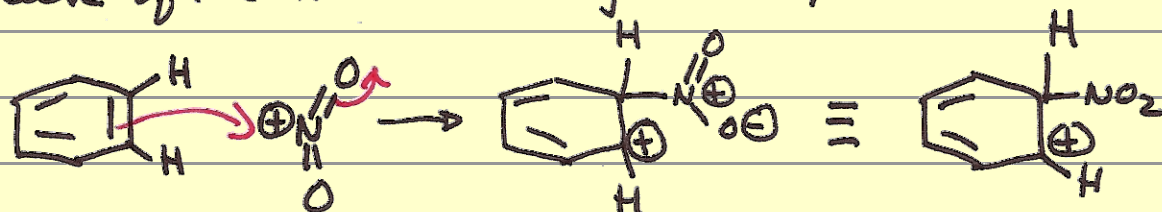
Generate the Electrophile:



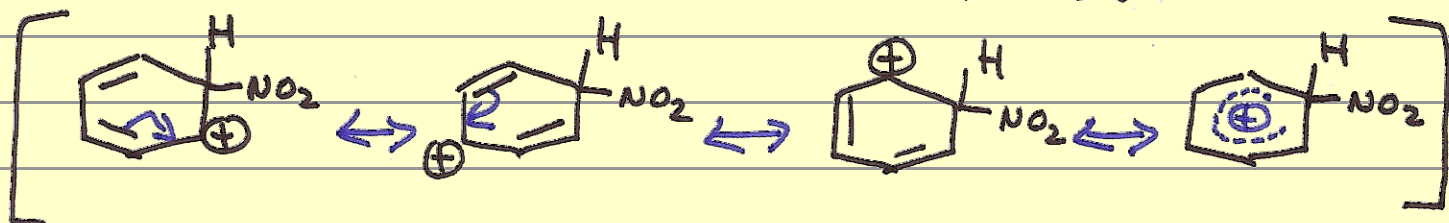
(Unusual Reaction - Acid protonating another Acid)



Attack of the Aromatic System upon the Electrophile



Resonance Stabilized Carbocation



Loss of a proton gives the aromatic system

