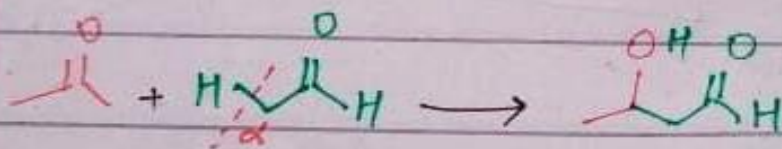
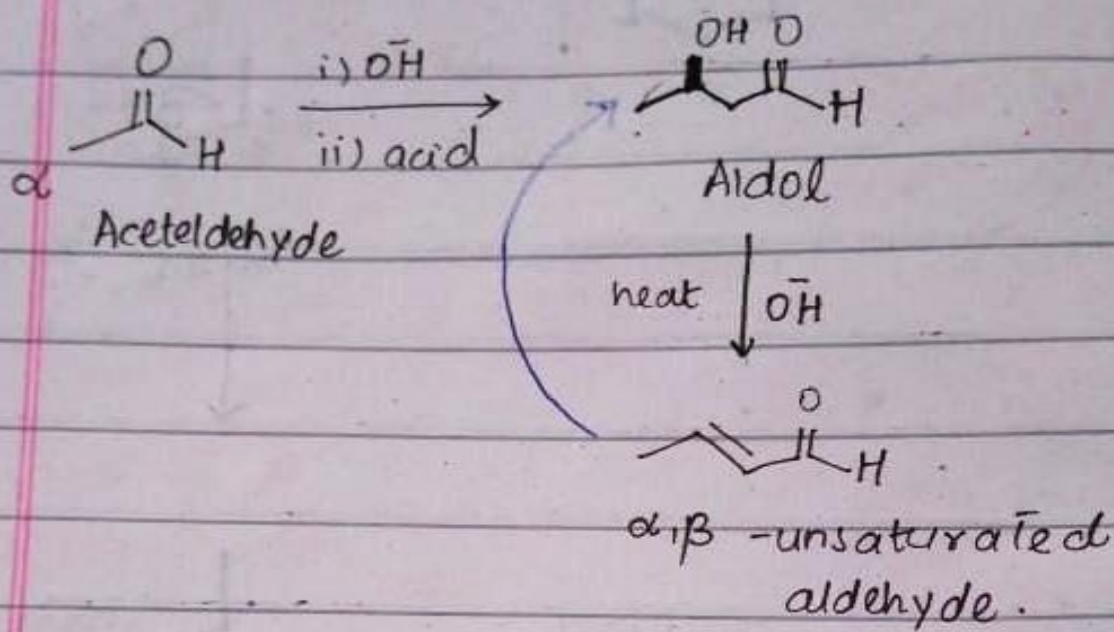
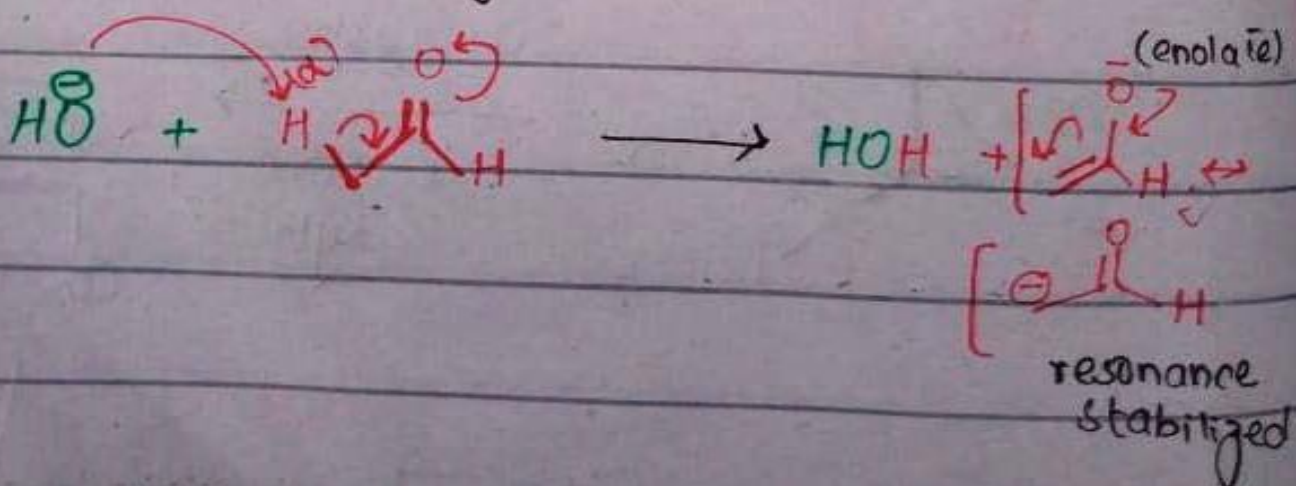


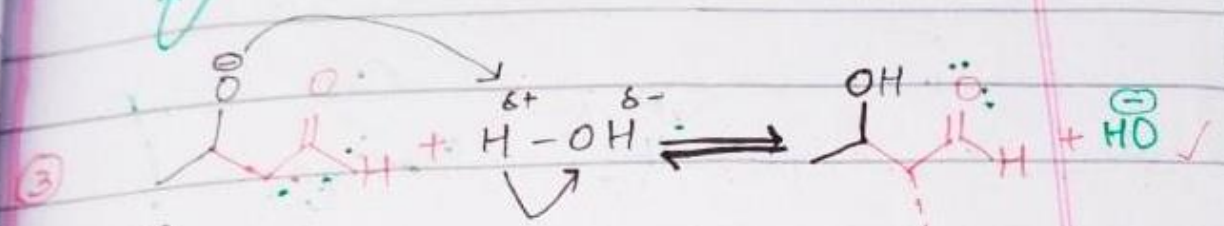
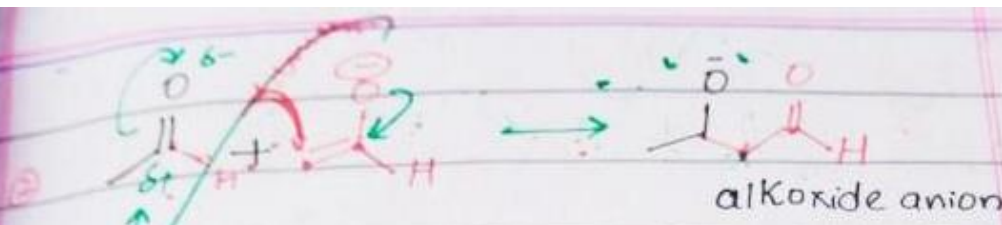
Aldol Condensation



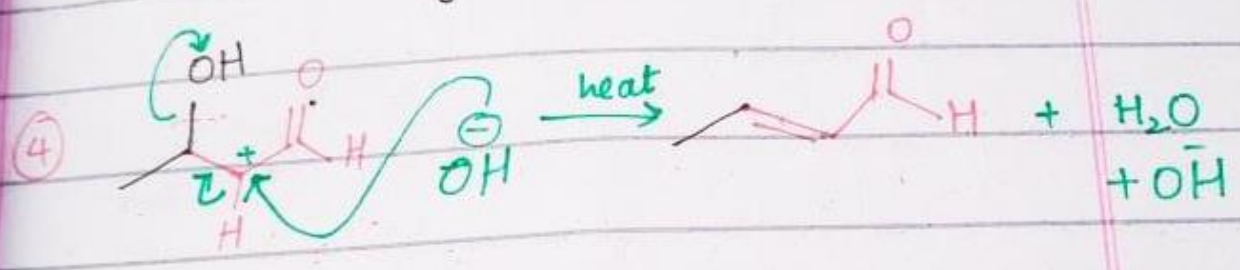
α -hydrogen is necessary for this reaction to occur.

Base-Catalyzed

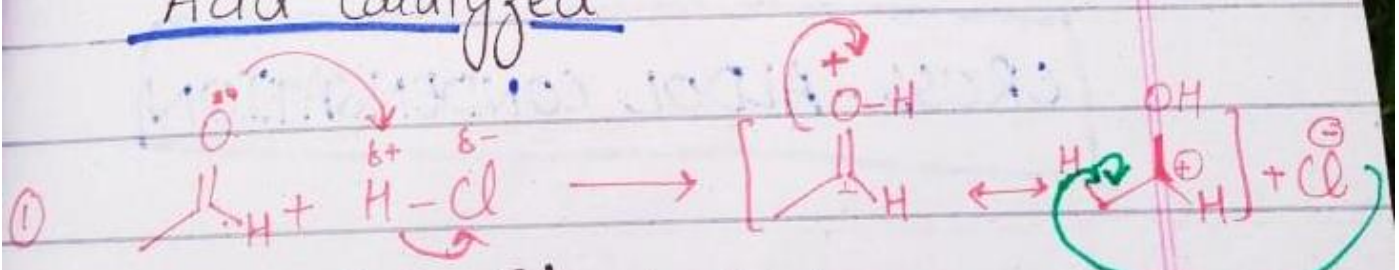




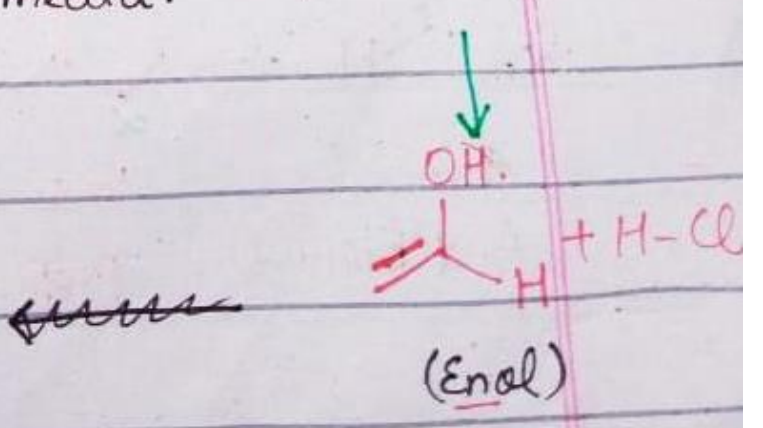
it is a strong nu.

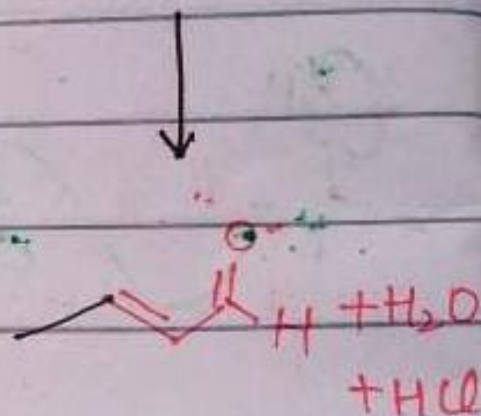
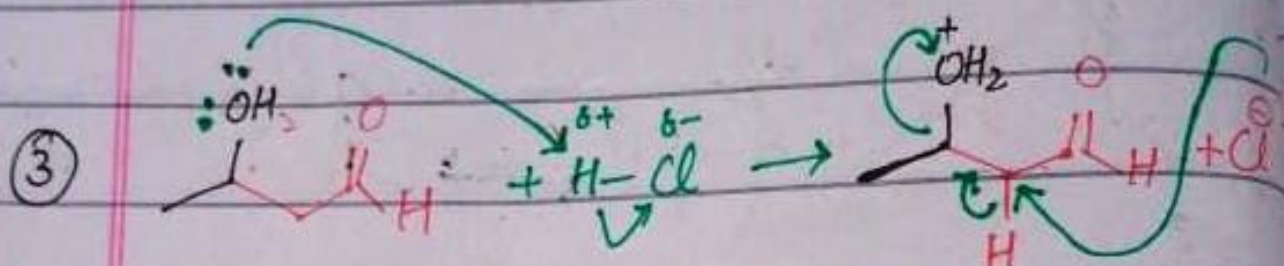
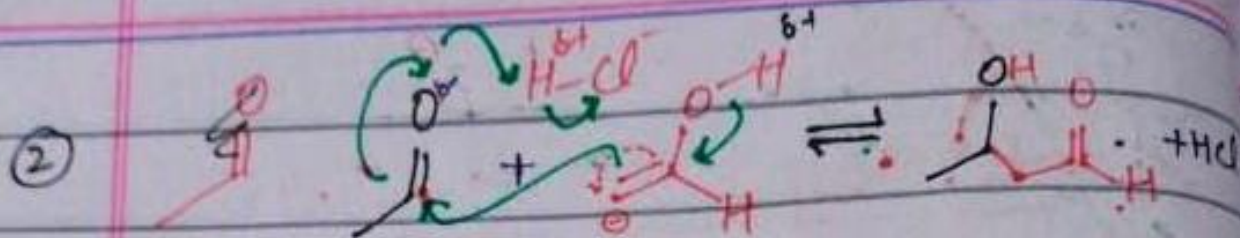


Acid Catalyzed

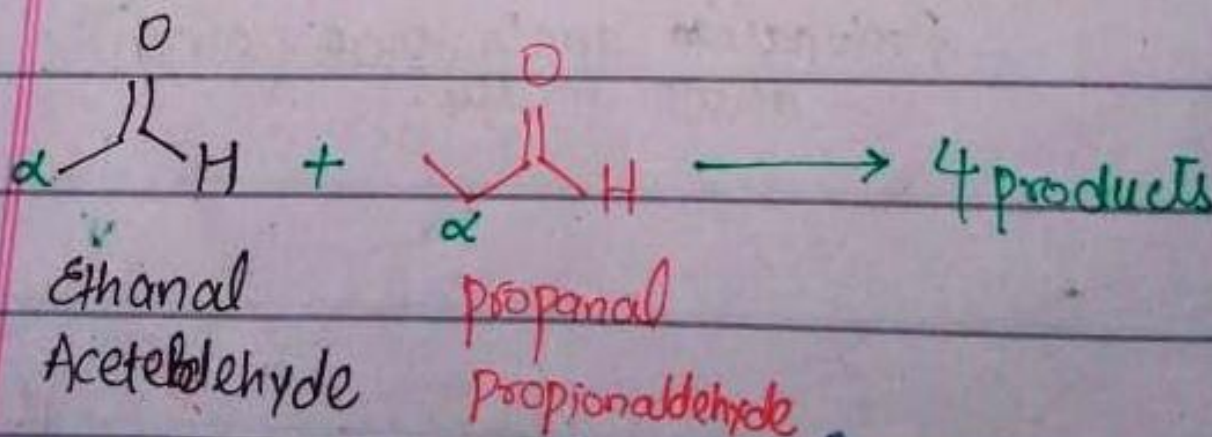


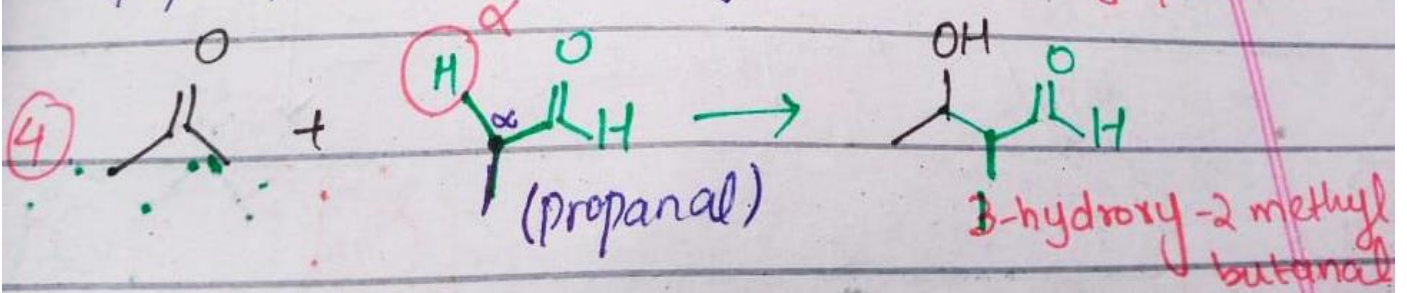
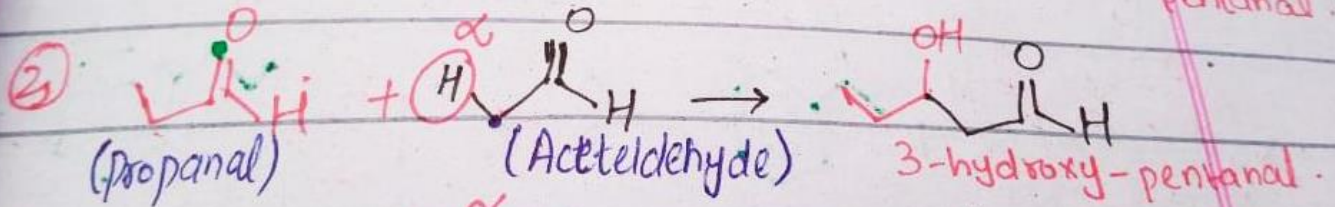
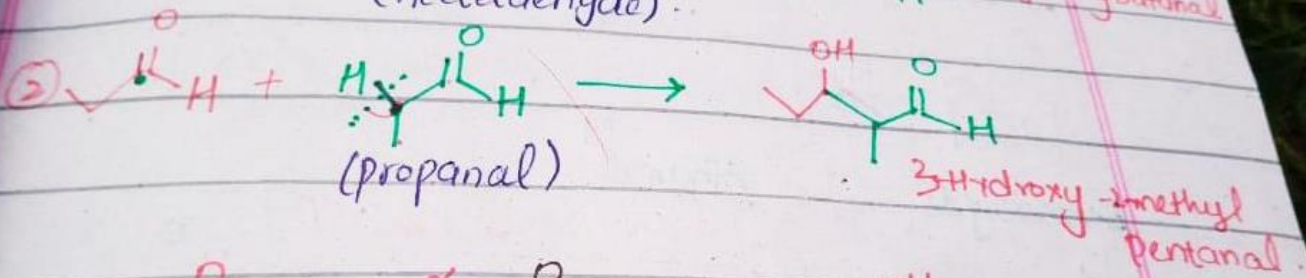
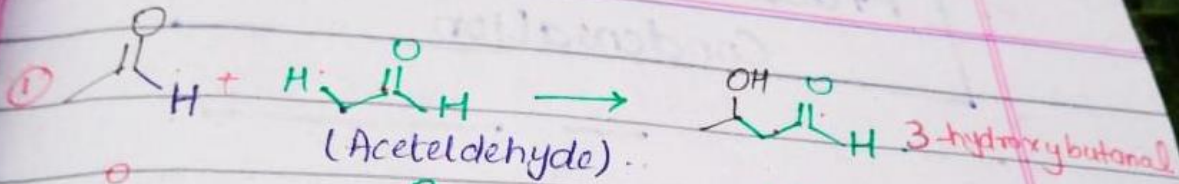
Protonation due to lone pair in acidic media.





CROSS-ALDOL CONDENSATION



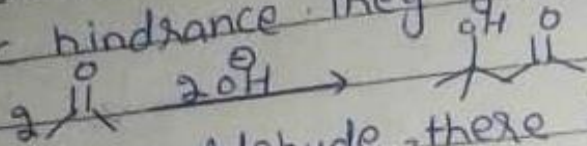


Aldol Condensation:-

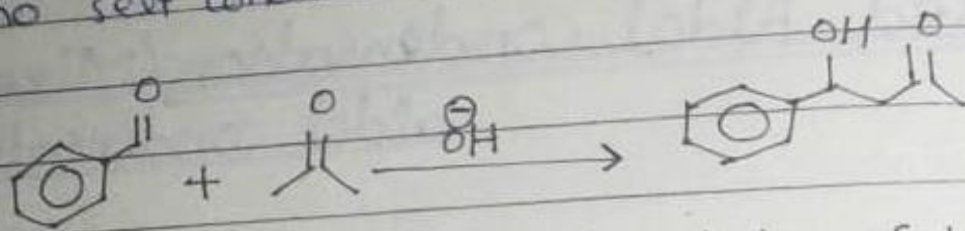
⇒ Practical crossed Aldol Condensation

(i) Using Weak Bases:-

→ Self condensation of ketones is very much difficult. Due to more crowding and steric hindrance. They give poor yield.

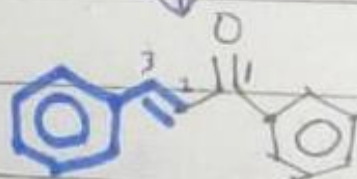
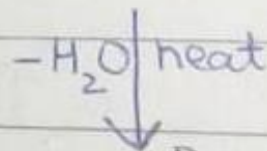
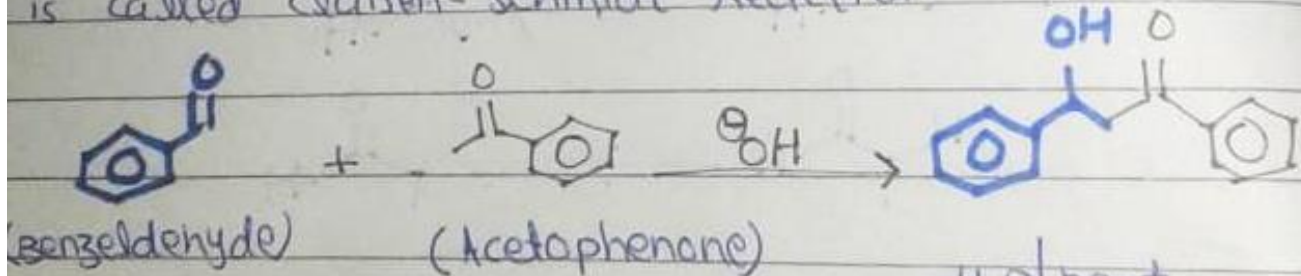


→ An benzaldehyde, there is no α -hydrogens, so, there will not the formation of enolate. Hence no self condensation will occur. is benzaldehyde.



This reaction is called Claisen-Schmidt reaction.

→ The reaction in which one of the reactant is non-enalizable and other reactant is ketone, is called Claisen-Schmidt reaction.



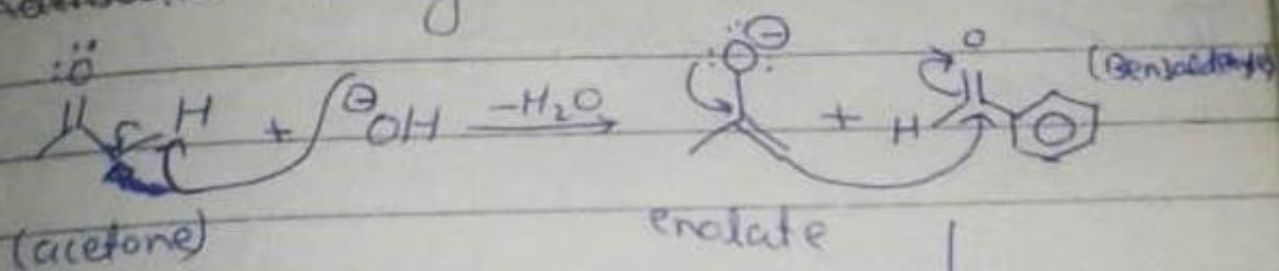
1,3-Diphenyl prop-2-en-1-one
(benzalacetophenone)
(85%)

→ The ketone is added to $\text{LiN}(\text{iPr})_2$, a strong base, which removes an α -hydrogen from the ketone to produce an enolate.

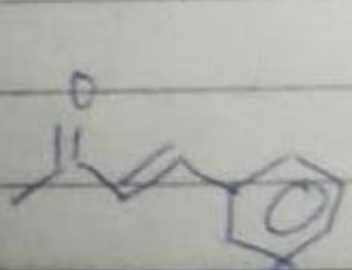
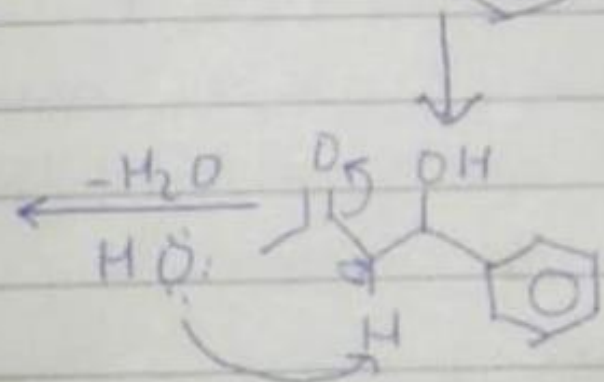
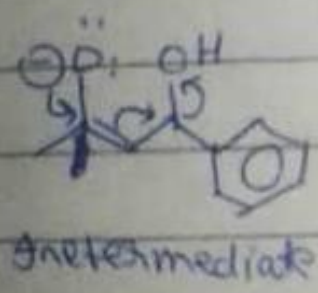
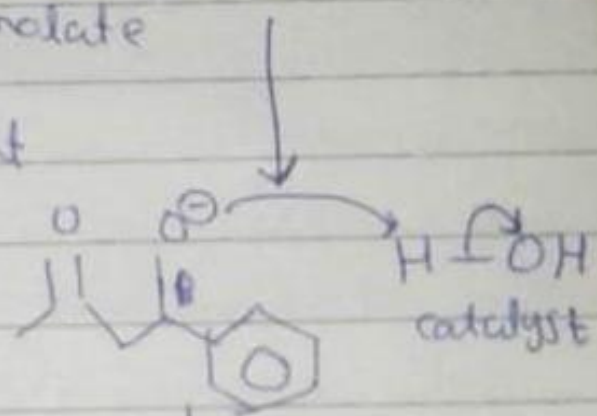
→ The aldehyde is added and the enolate reacts with the aldehyde at its carbonyl carbon.

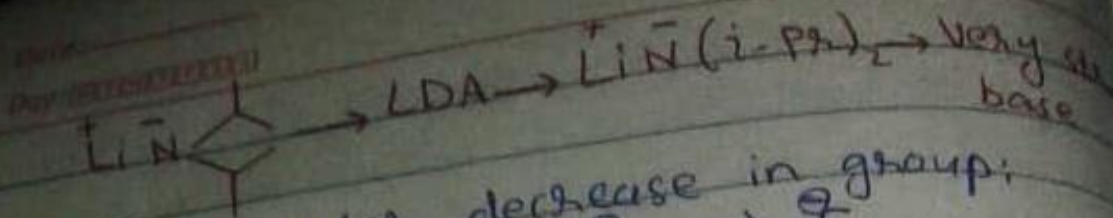
→ An acid-base reaction occurs when water is added at the end, protonating the lithium alkoxide.

Mechanism of practical aldol condensation using weak base:-



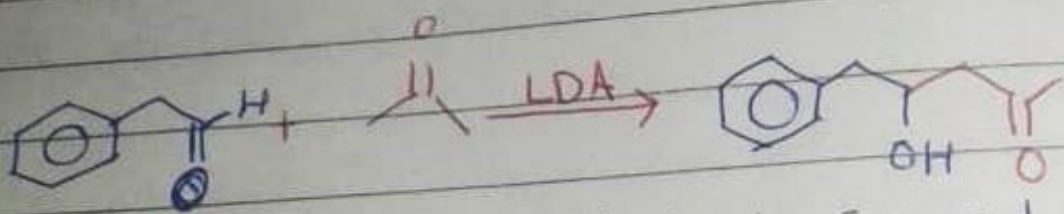
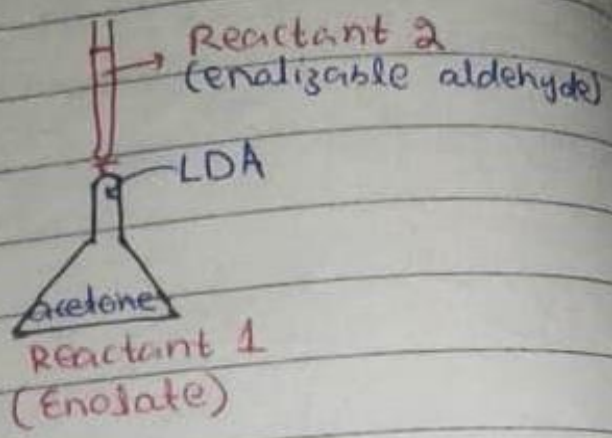
→ A lot of water present in the solution of -ve [O] react with H^+ of water.



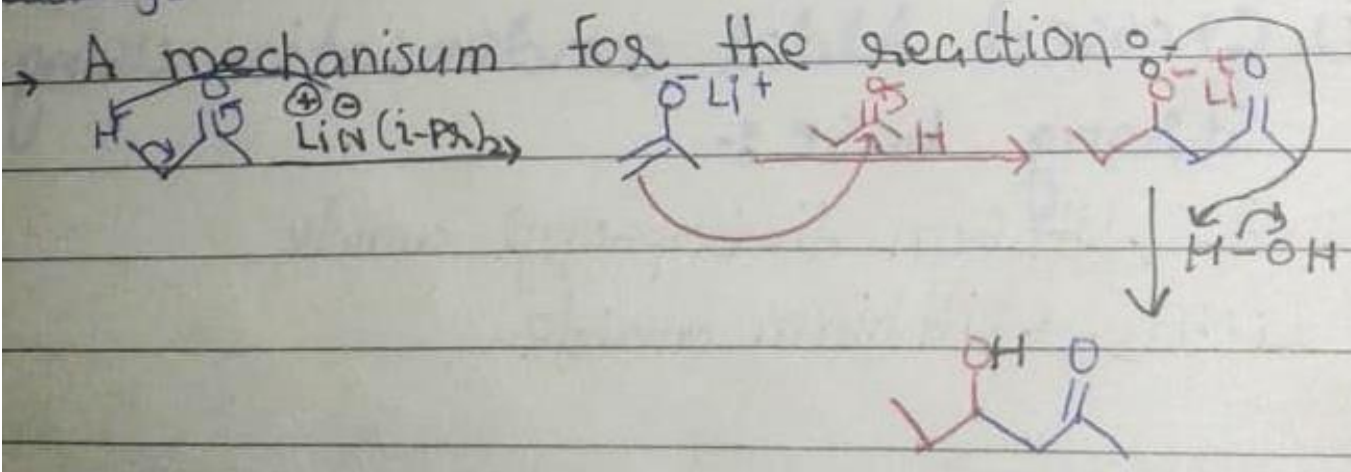


→ Basicity order decrease in group:
 $\text{R}_3\text{C}^- > \text{R}_2\text{N}^- > \text{RO}^- > \text{F}^-$

↓
 Strong base as well as strong nucleophile.

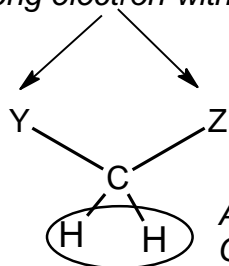


→ In this any one product is formed instead of ~~four~~ ^{three} Enolate of less reactive reactant (acetone) is formed first and then it react with aldehyde.



ACTIVE METHYLENE COMPOUNDS

Strong electron-withdrawing groups

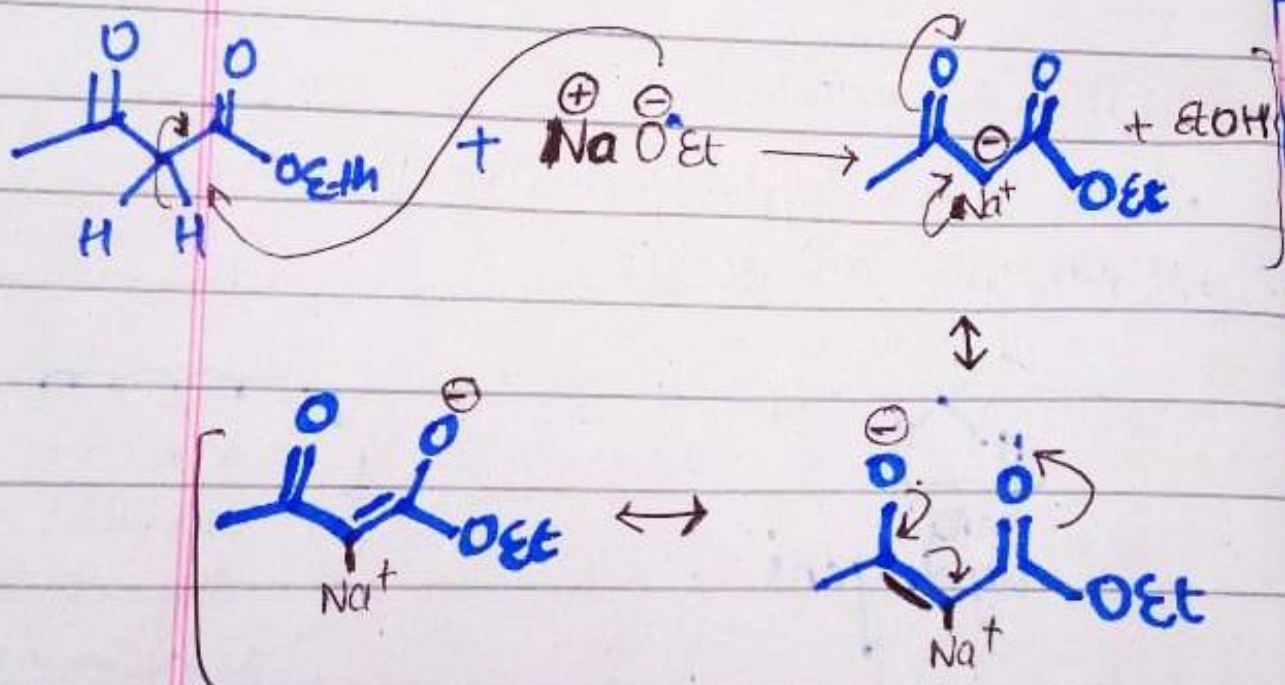


Acidic hydrogens
Can be removed by a base

Acidic nature due to :-

- Strong Electron withdrawing groups makes donation of electrons easily of Hydrogen.
- Anion formed is resonance stabilized (conjugate base)

Acetoacetic Ester

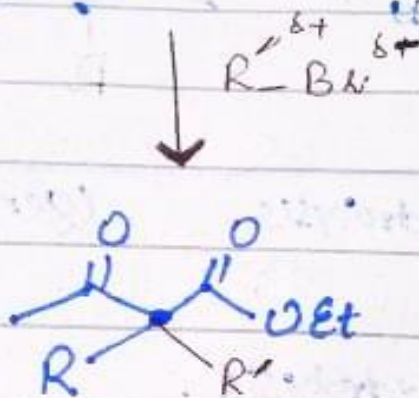
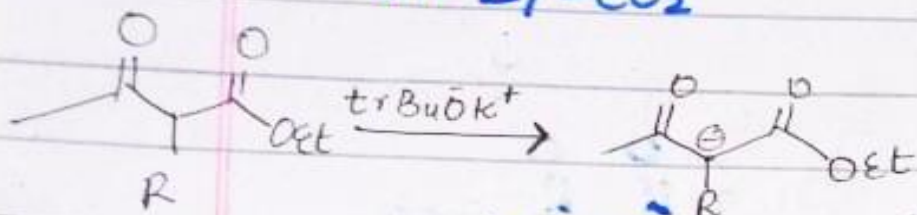


To add another alkyl group

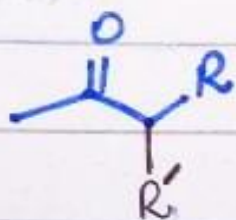
(i) dil NaOH

(ii) H_3O^+

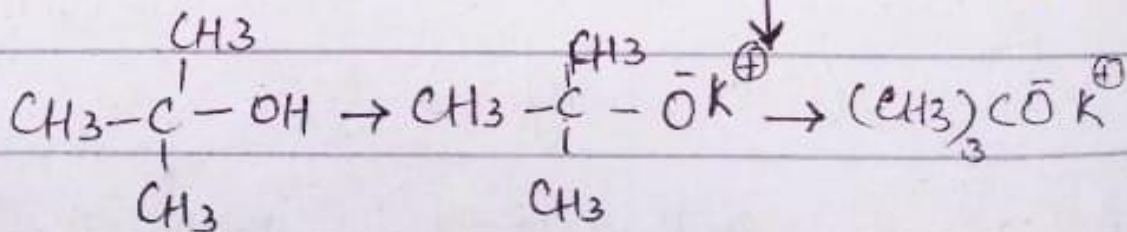
(iii) $\Delta / -CO_2$



(i)
(ii)
(iii)



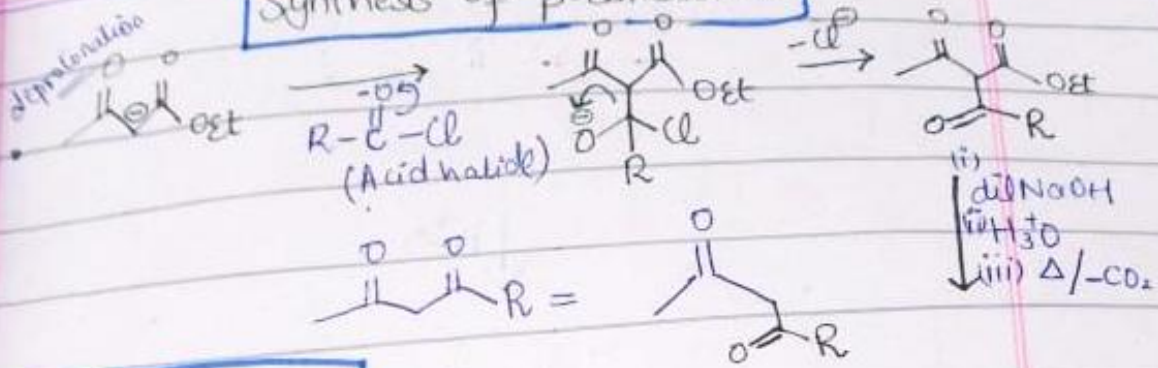
(Strong Base)



Tertiary butoxide)

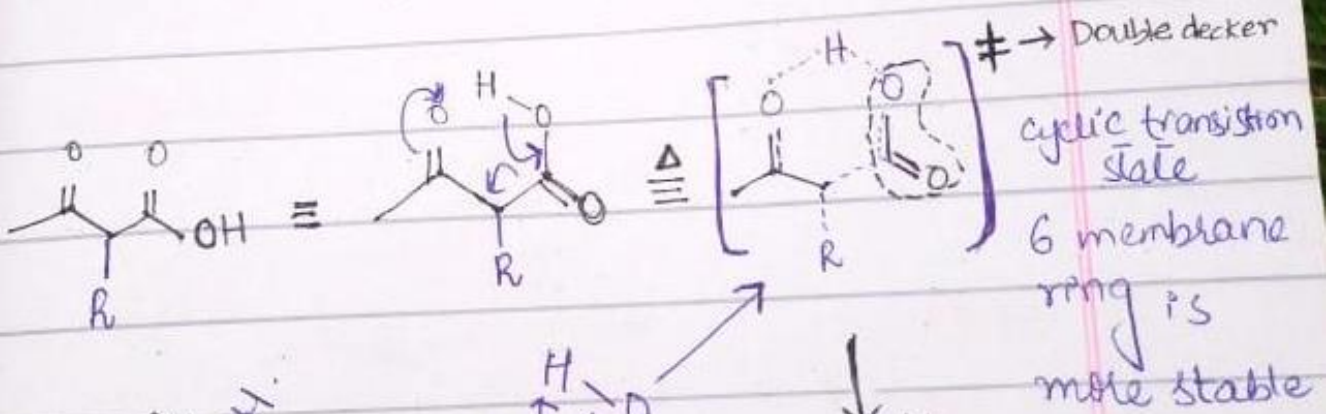
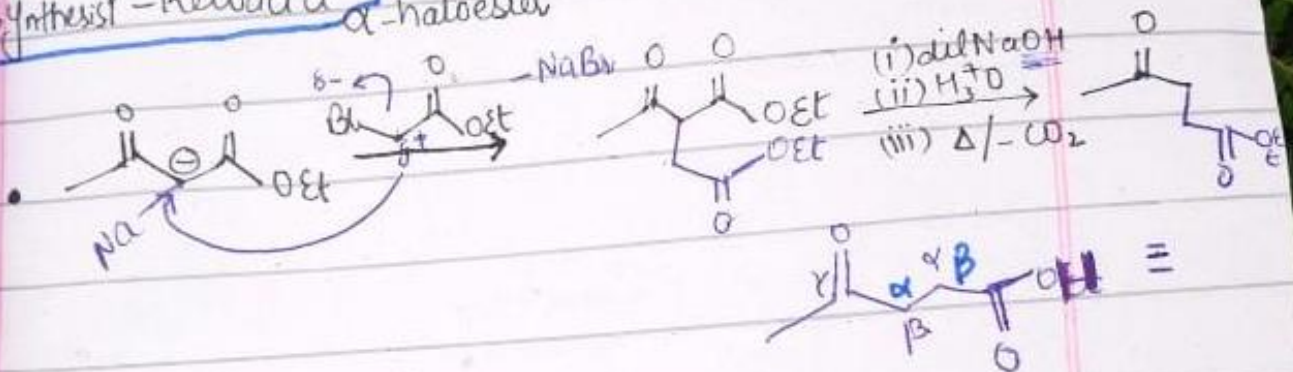
Acetoacetic Ester Synthesis

Synthesis of β -diketone

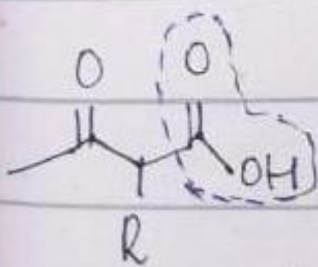


Synthesis of α -ketoacid

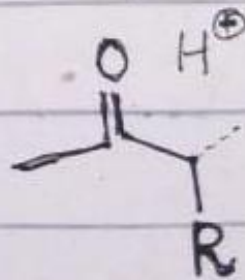
α -haloester



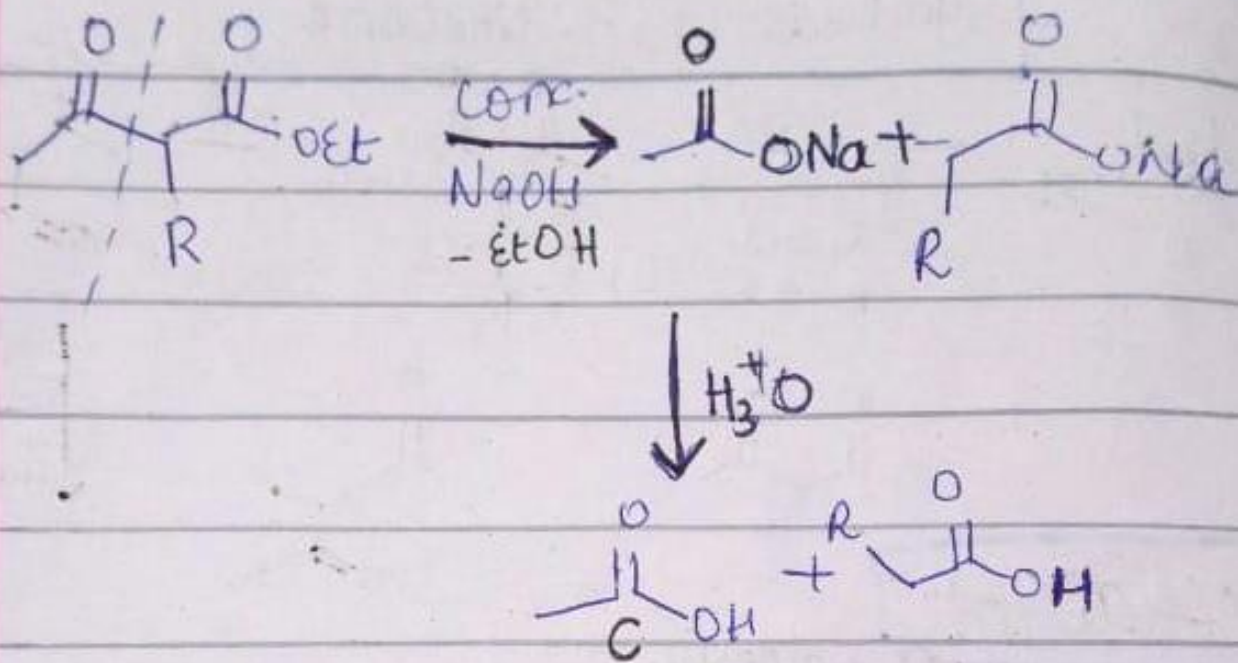
Ketonic cleavage with dil NaOH .



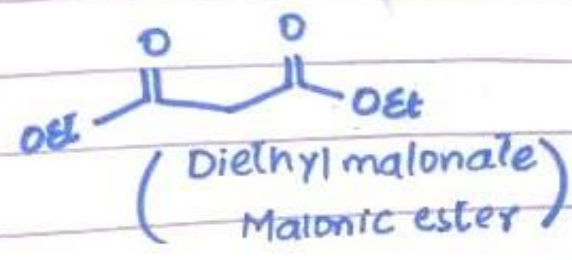
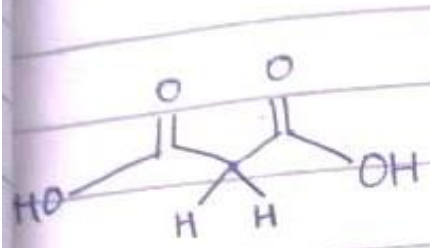
CO_2 can be removed by first group present



Acid Cleavage with conc. NaOH.

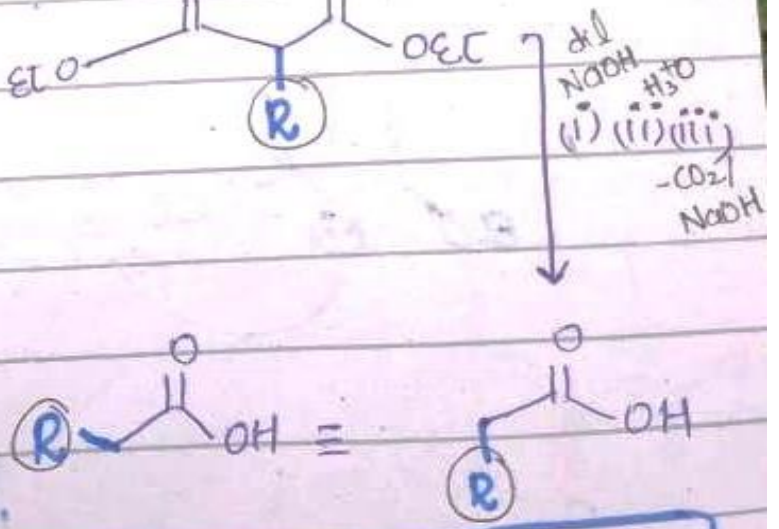
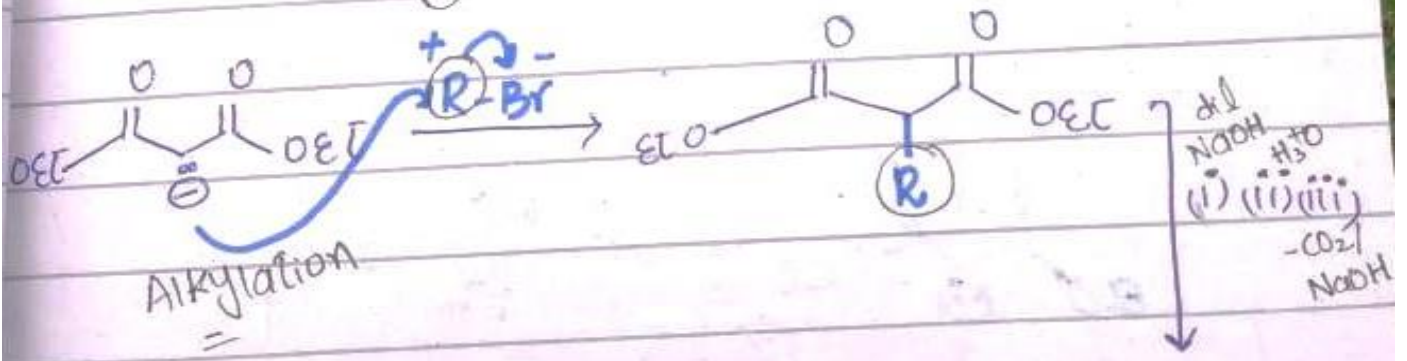
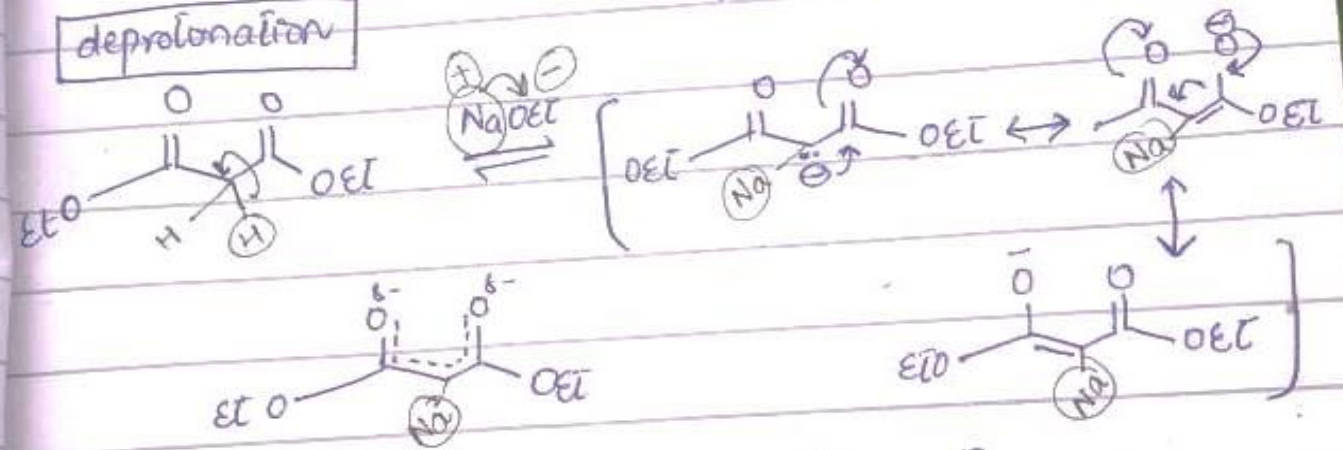


Malonic Ester



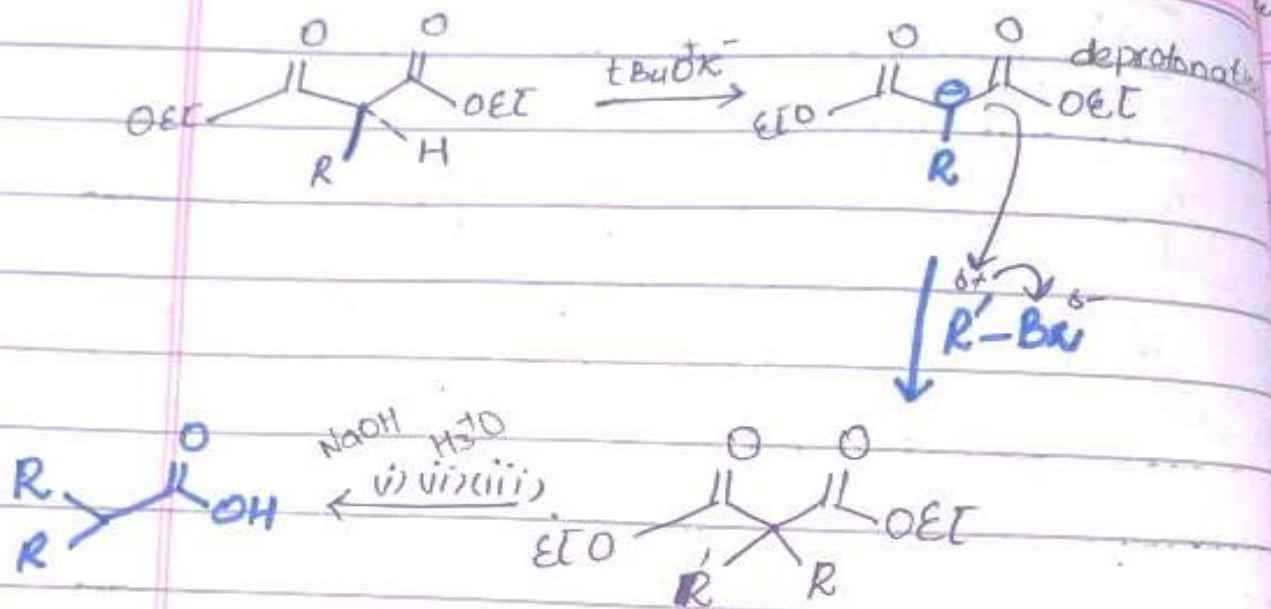
Synthesis of ^{Aliphatic} Mono Carboxylic acid / substituted acids.

deprotonation



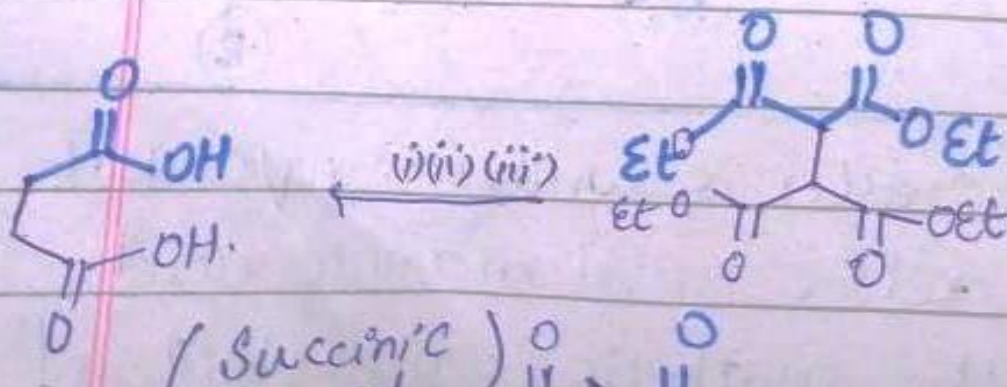
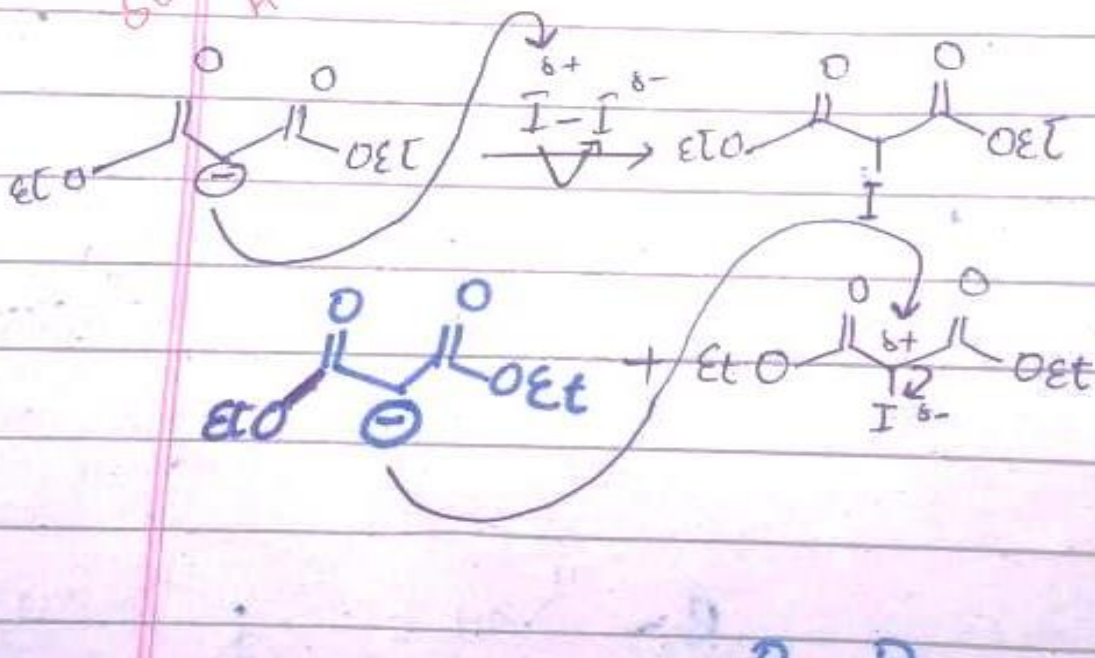
Acetoacetic ester is synthetic equivalent of acetone and malonic acid is the synthetic equivalent of acetic acid.

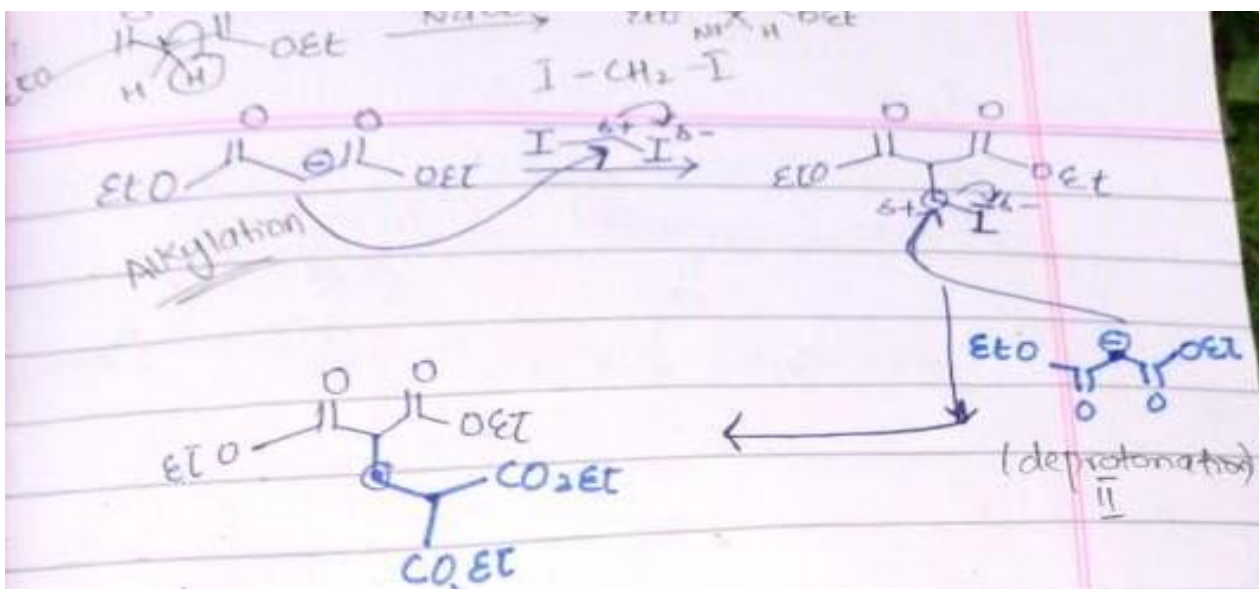
Addition of second alkyl group



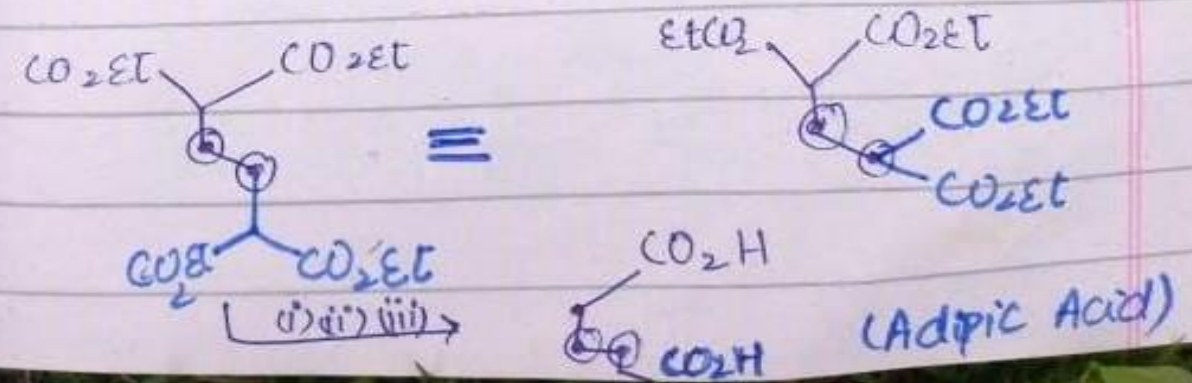
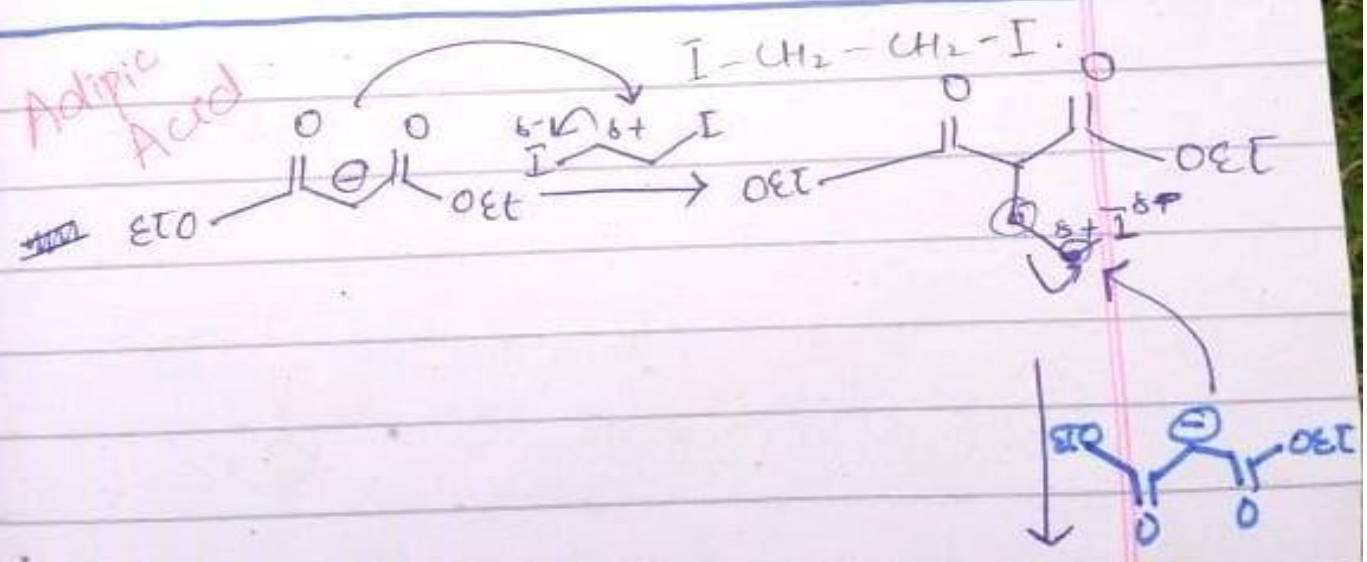
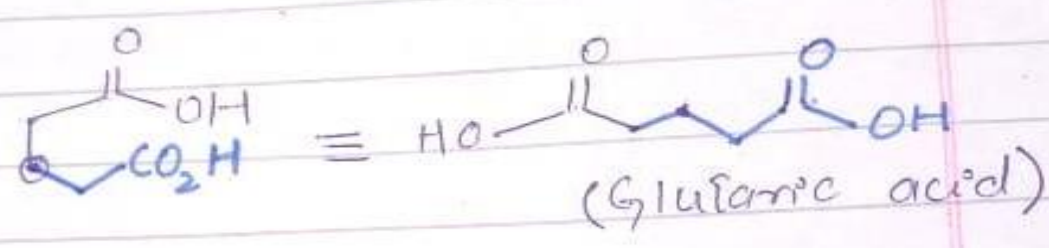
Synthesis of Aliphatic dicarboxylic acids.

Succinic Acid



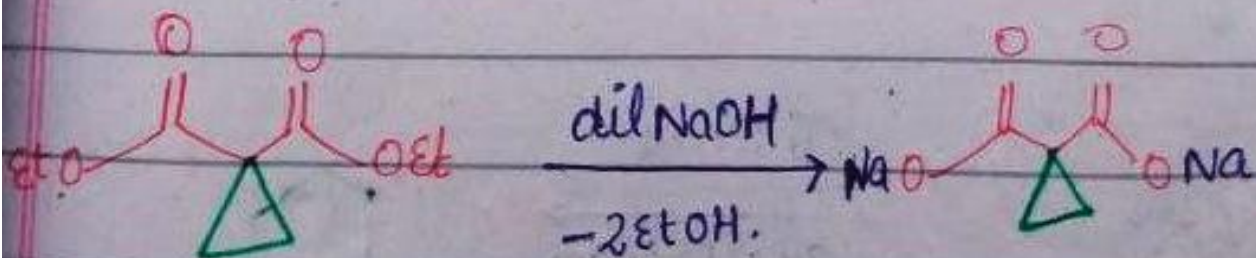
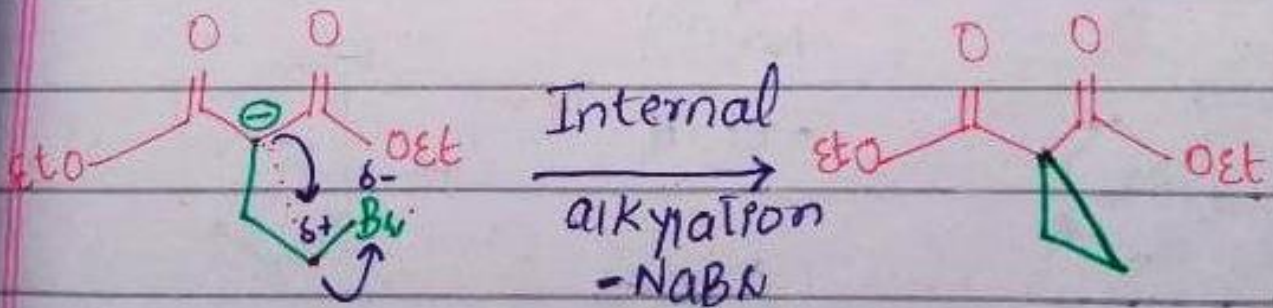
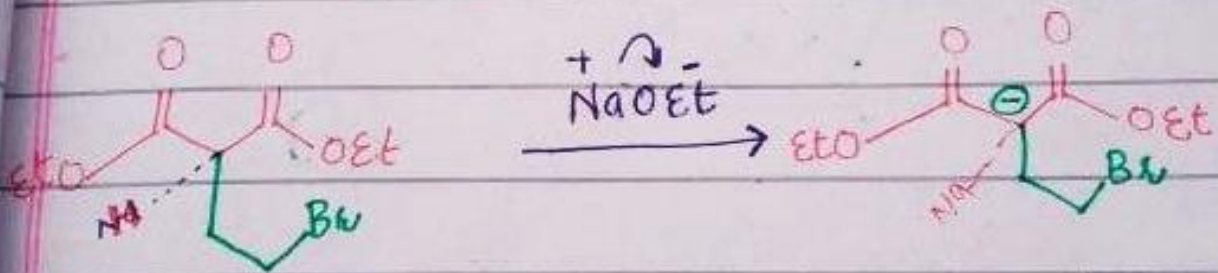
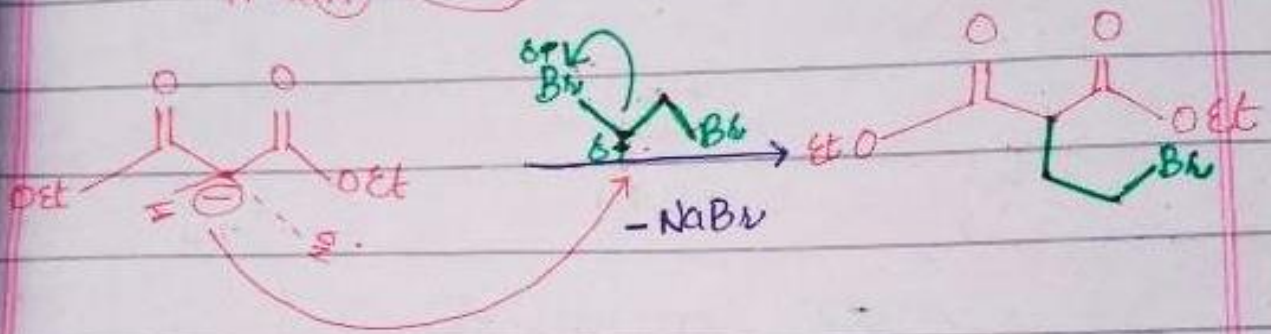
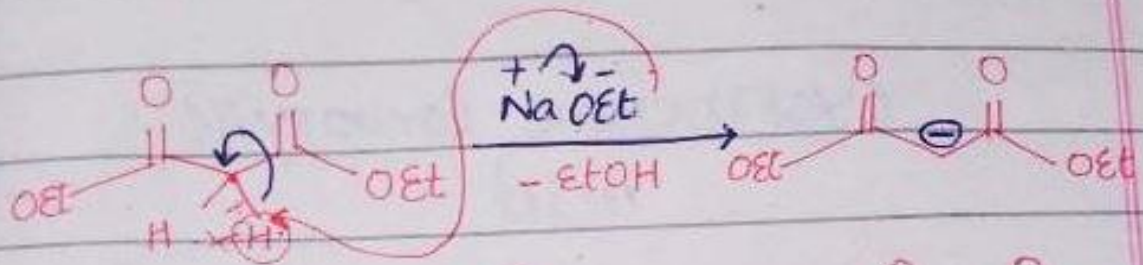


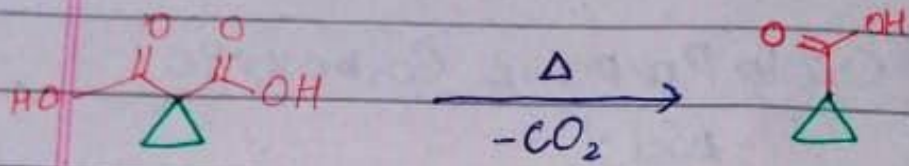
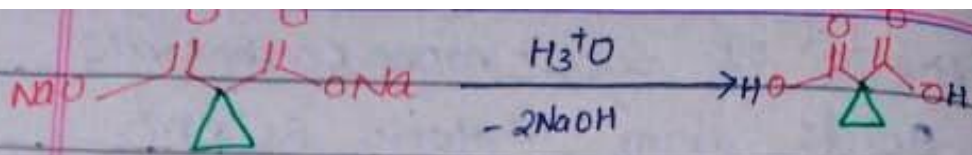
(i) NaOH
 (ii) H_3O^+
 (iii) $\Delta / -\text{CO}_2$



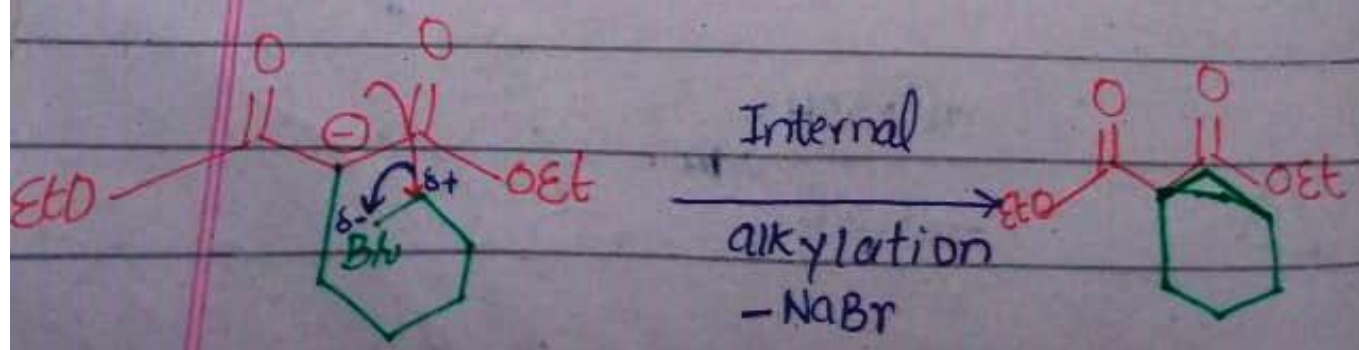
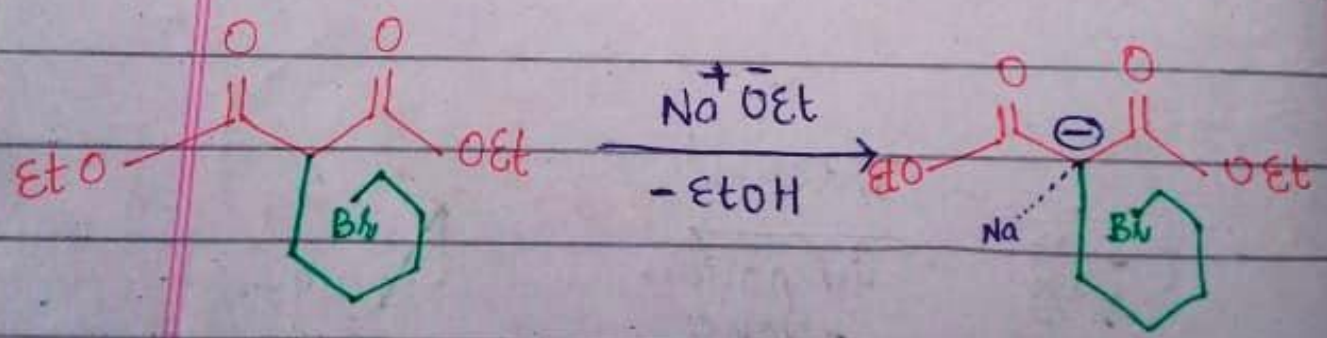
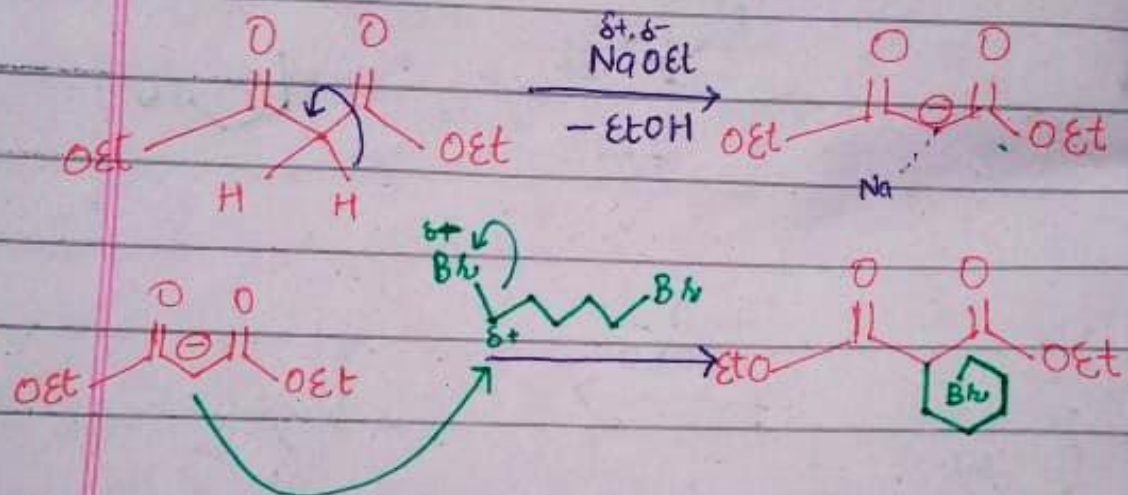
Synthesis of Cyclic mono Carboxylic Acids from Malonic Ester.

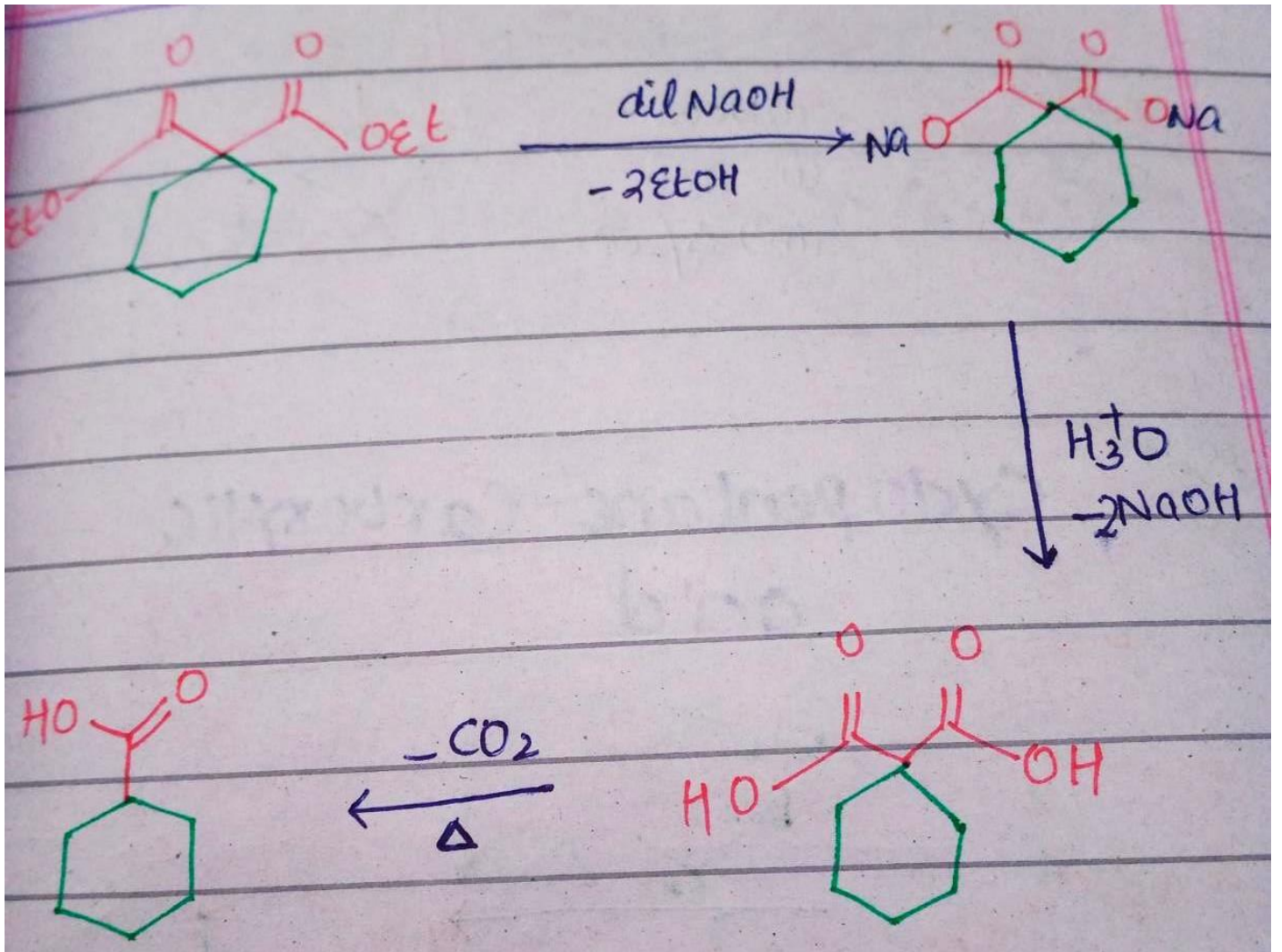
Cyclo Propane Carboxylic Acid





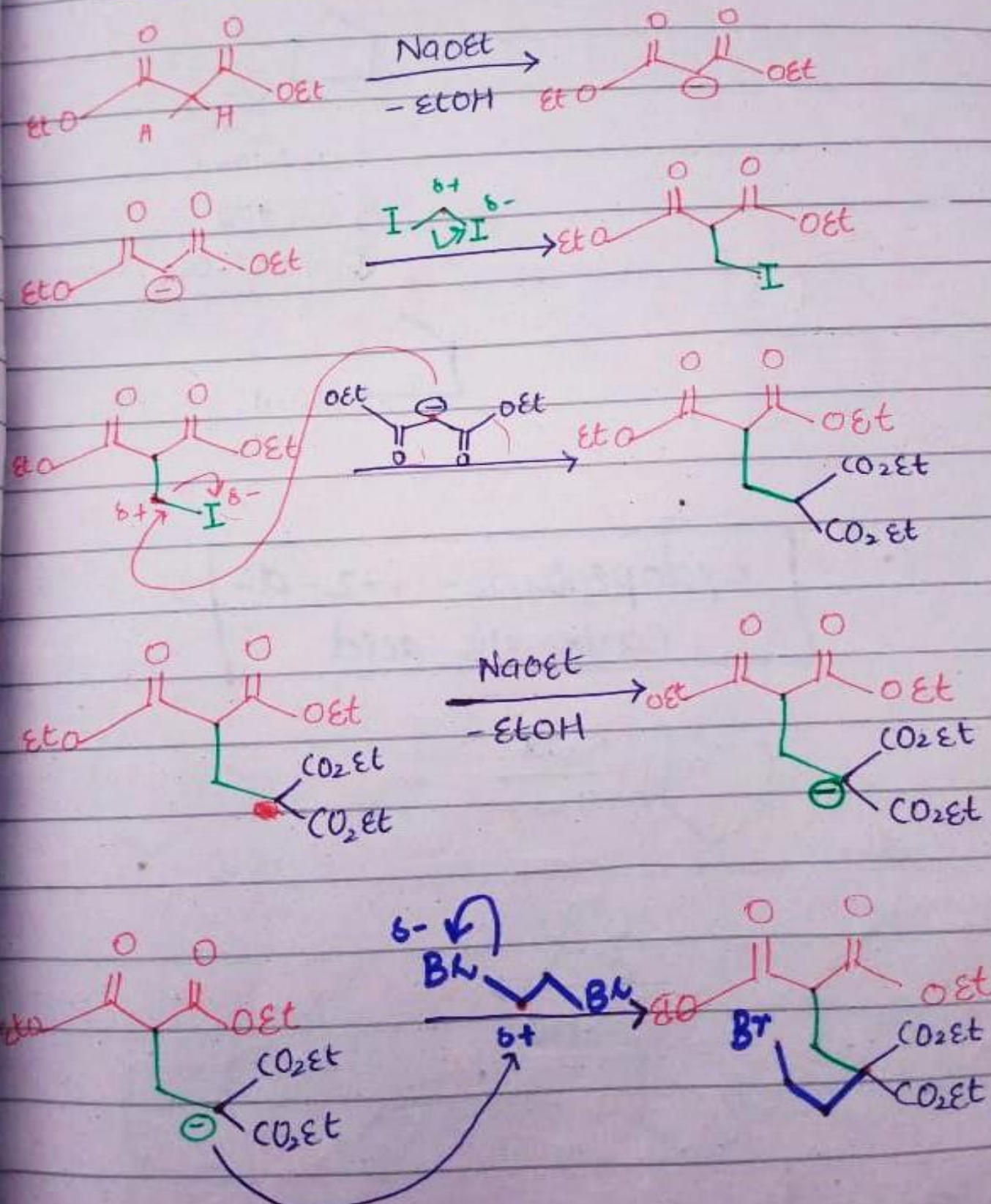
Cyclohexane Carboxylic acid

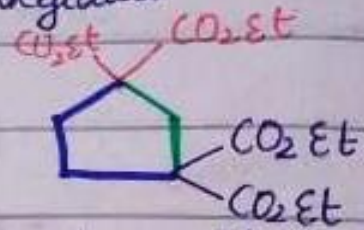
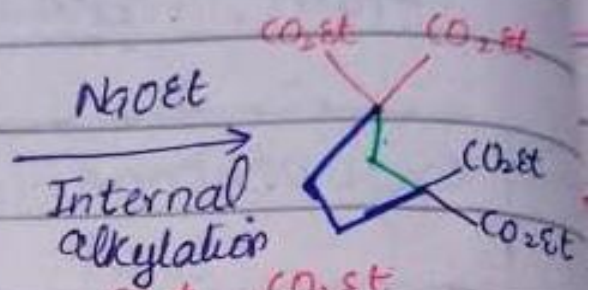
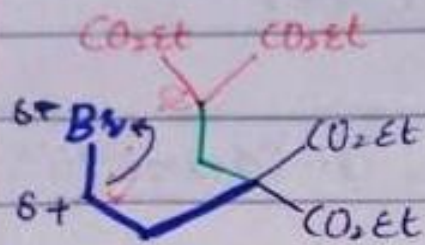




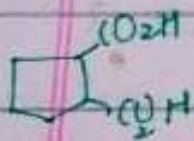
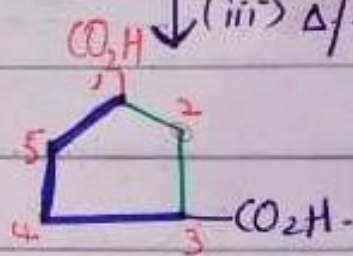
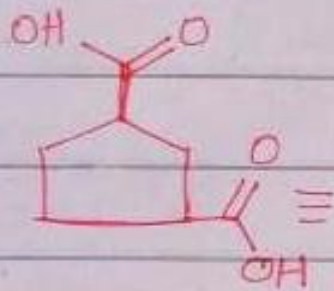
Synthesis from malonic Ester

cyclopentane-1,3-dicarboxylic acid.





- (i) dil NaOH
- (ii) H_3O^+
- (iii) $\Delta / -\text{CO}_2$



cyclopentane-1,2-dicarboxylic acid

