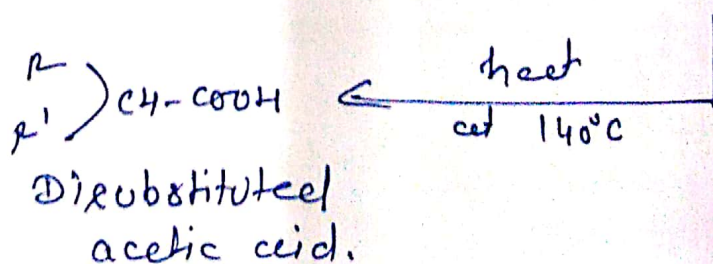
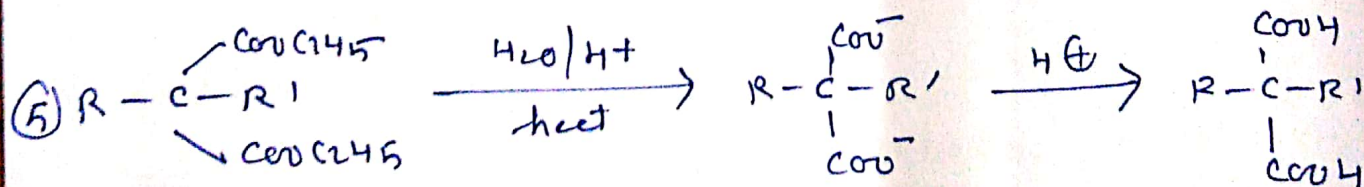
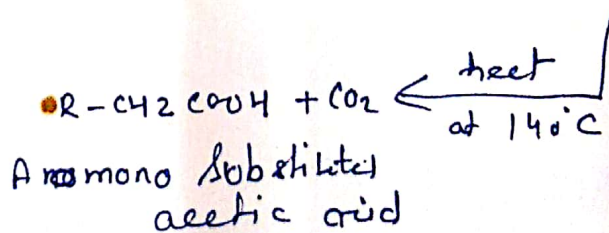
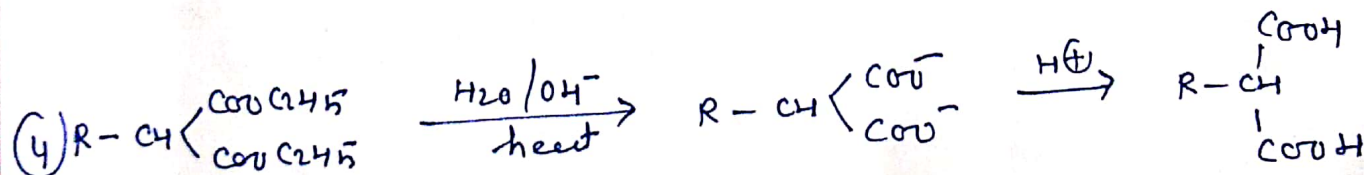
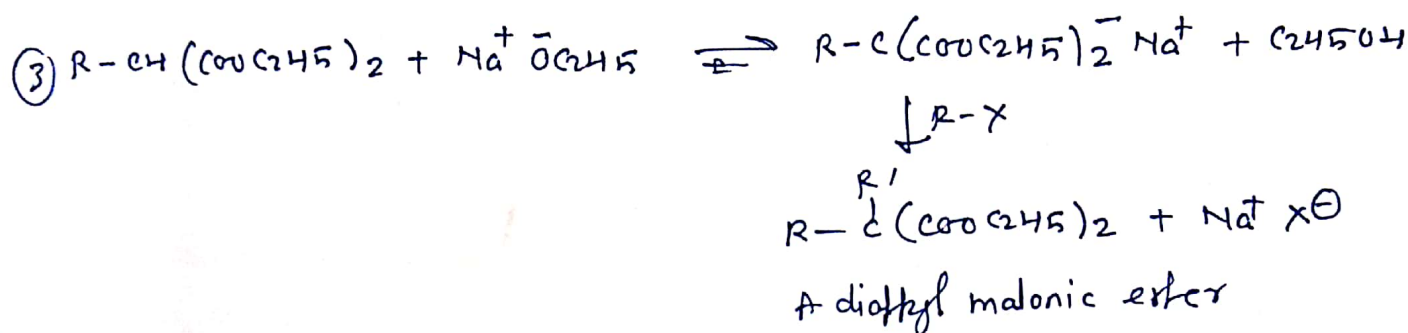
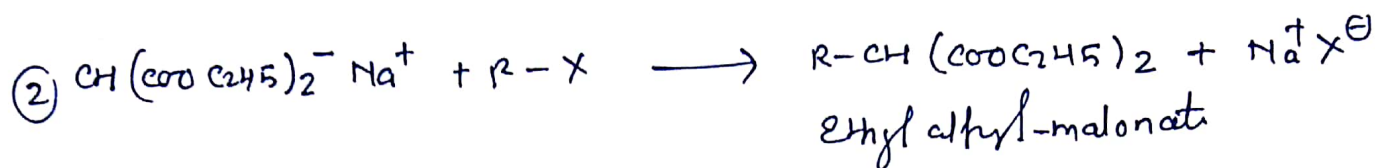
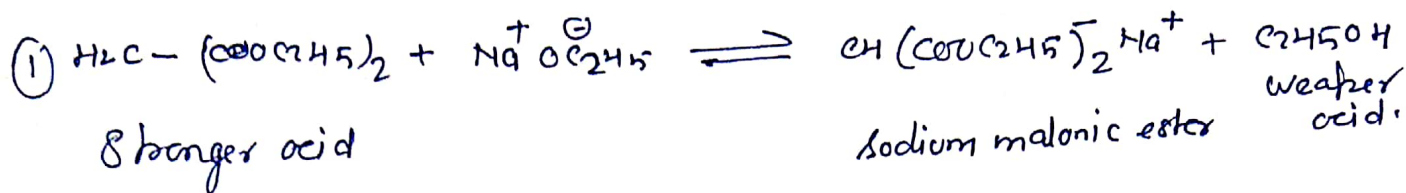
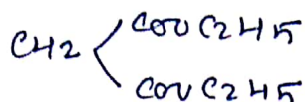
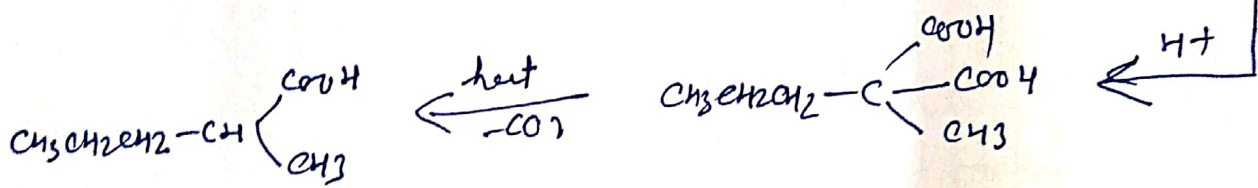
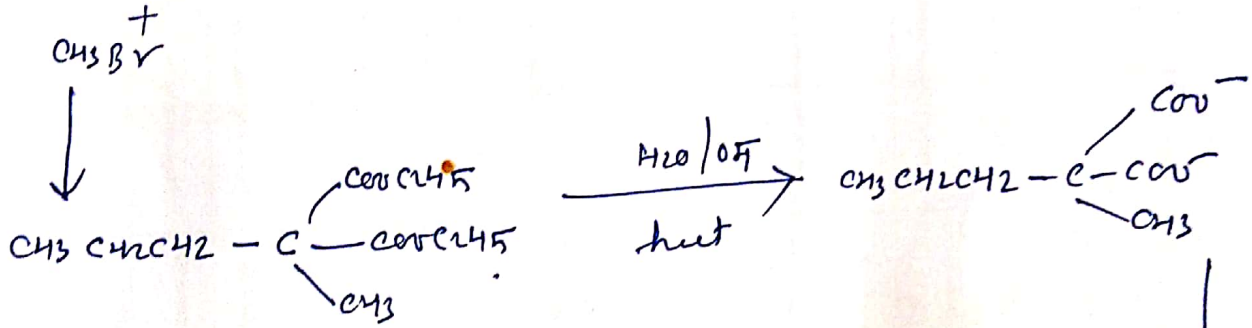
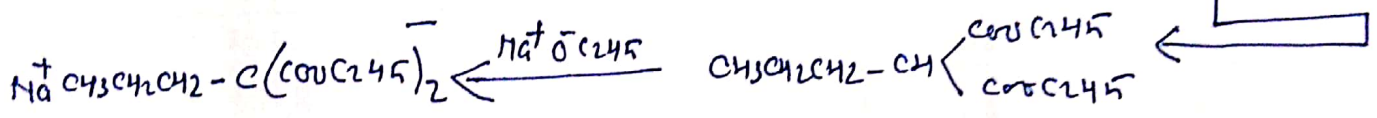
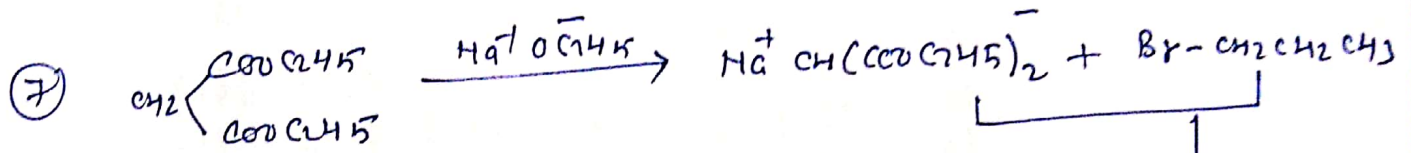
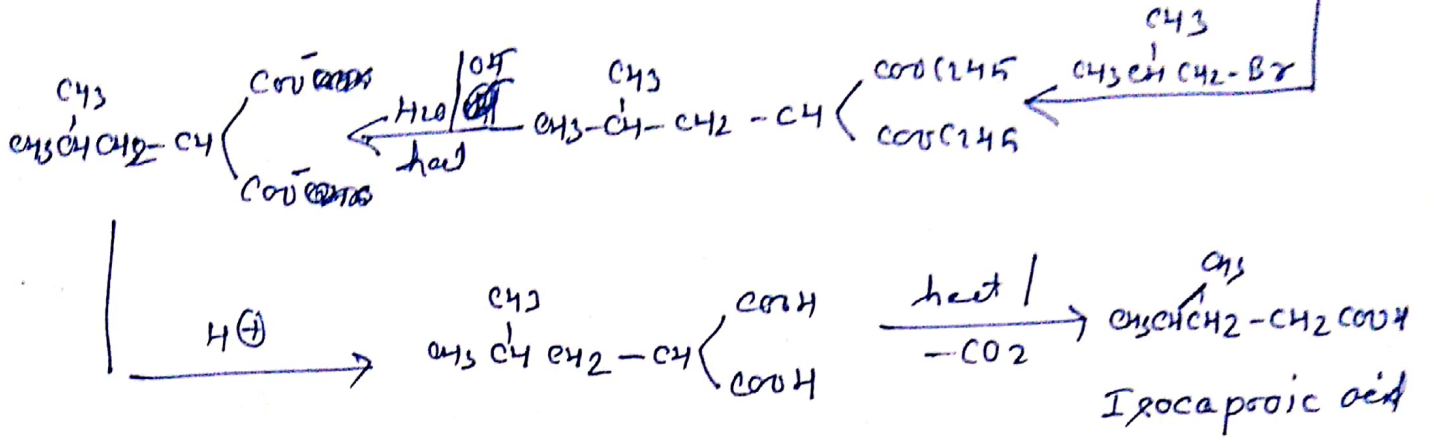
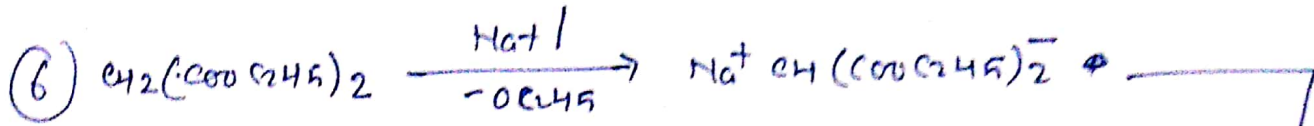


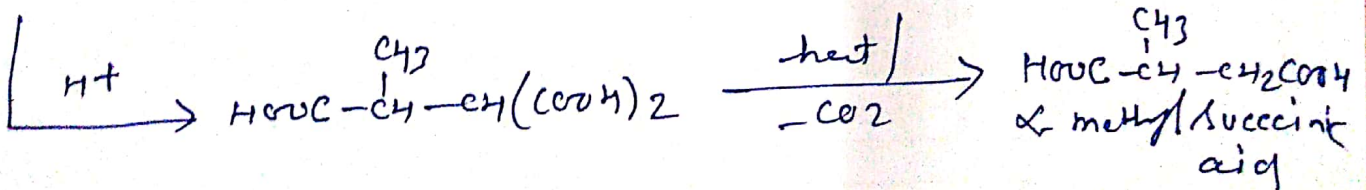
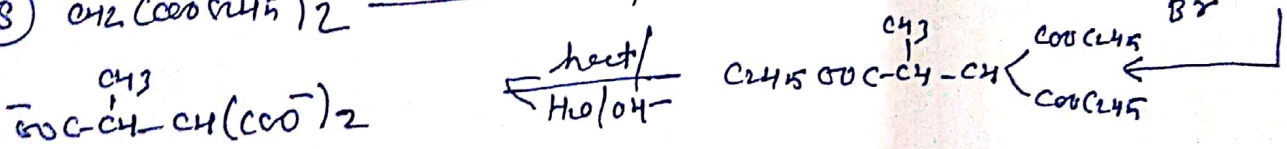
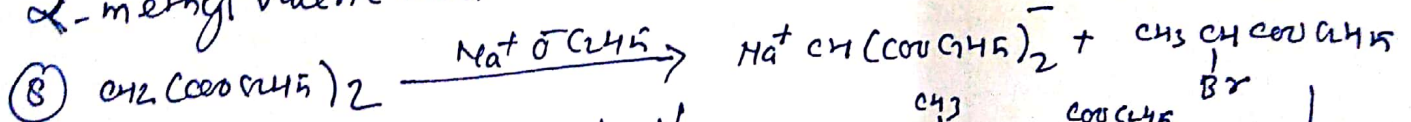
Malonic ester

(1)



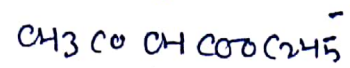
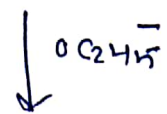
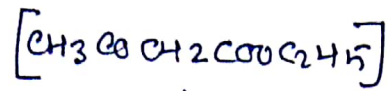


α -methyl valeric acid

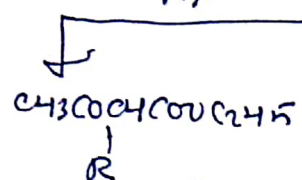


Acetoacetic ester synthesis of ketone

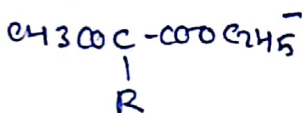
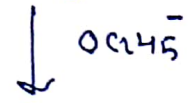
(1)



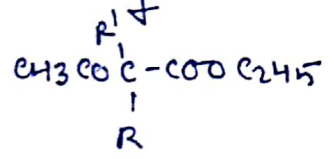
RX



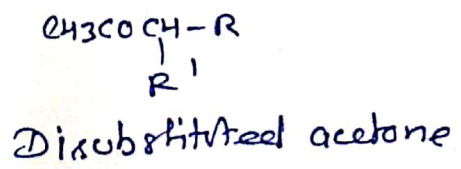
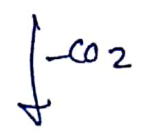
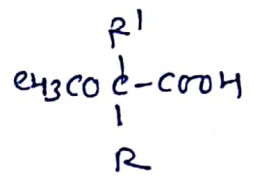
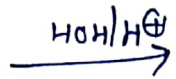
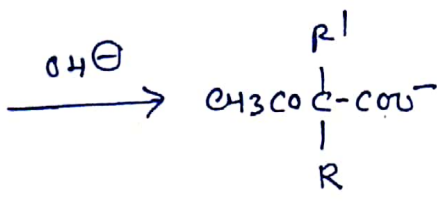
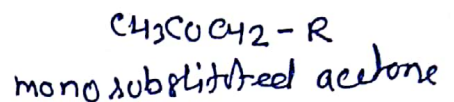
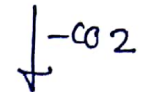
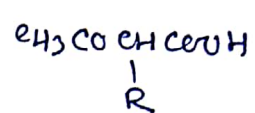
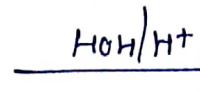
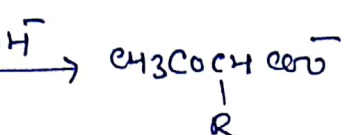
mono alkyl acetoacetic ester



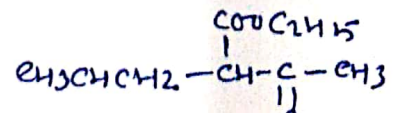
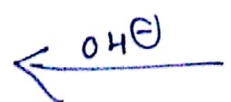
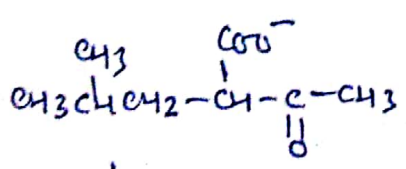
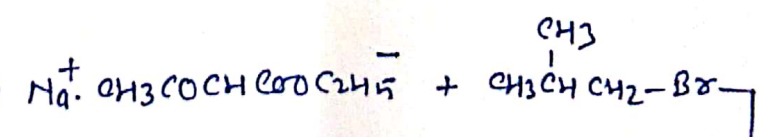
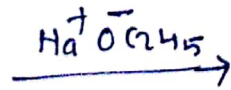
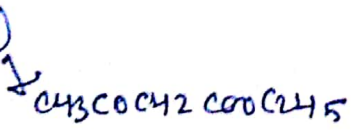
R'-X



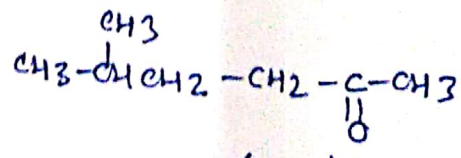
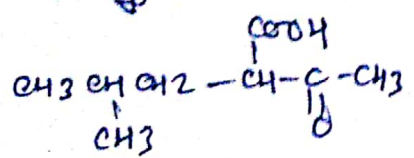
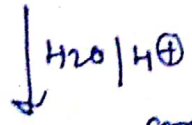
di alkyl acetoacetic ester



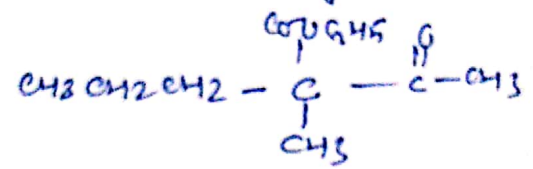
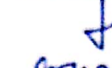
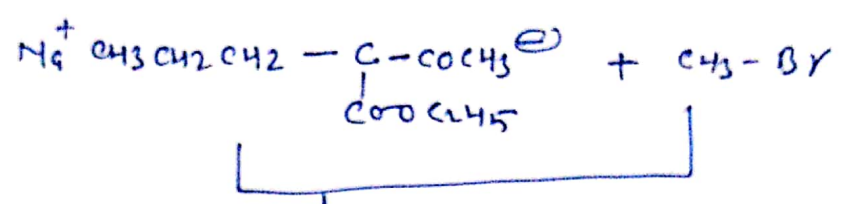
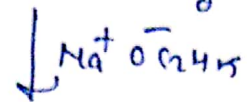
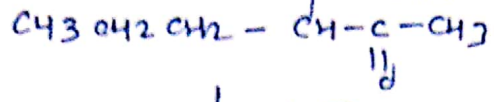
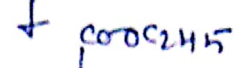
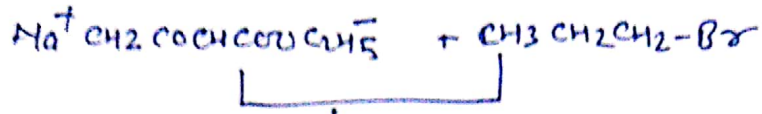
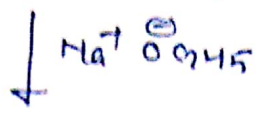
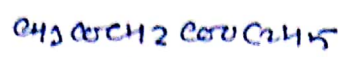
(2)



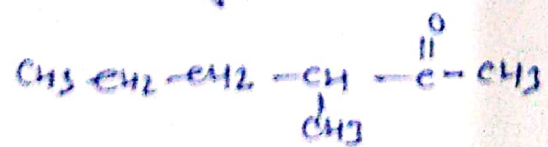
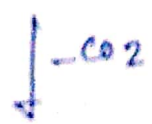
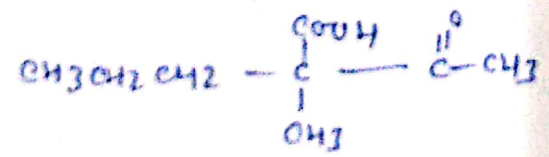
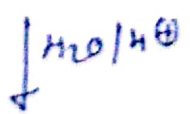
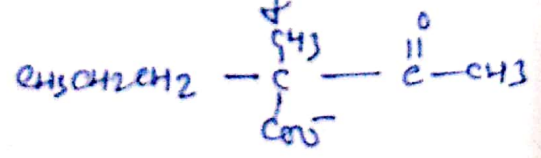
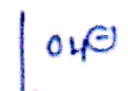
ethyl α-isobutyrate + acetoacetal



5-methyl-2-hexanone

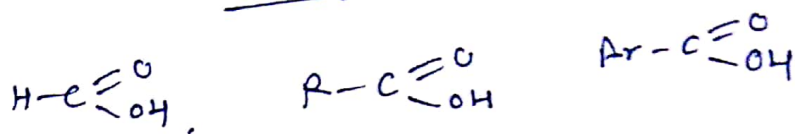


Ethyl α-methyl-α-n-propylacetoacetate

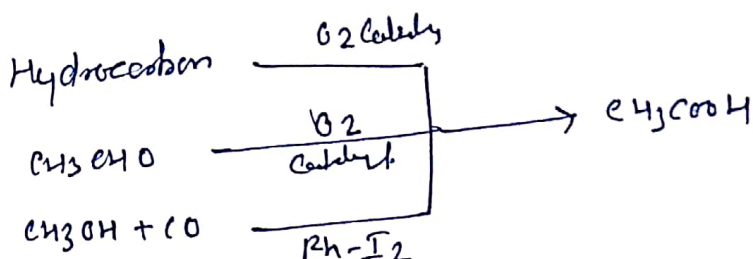
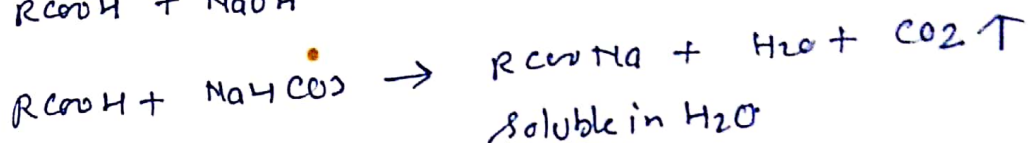
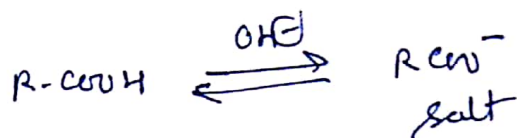


3-methyl-2-hexanone

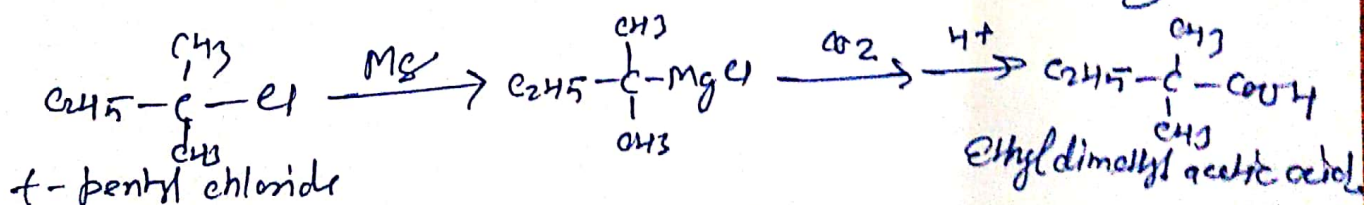
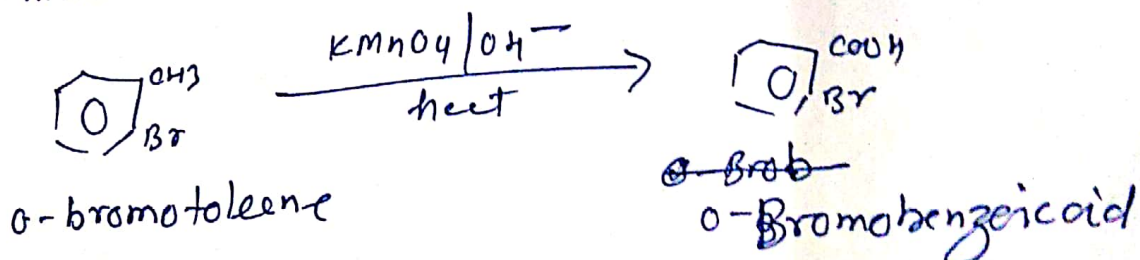
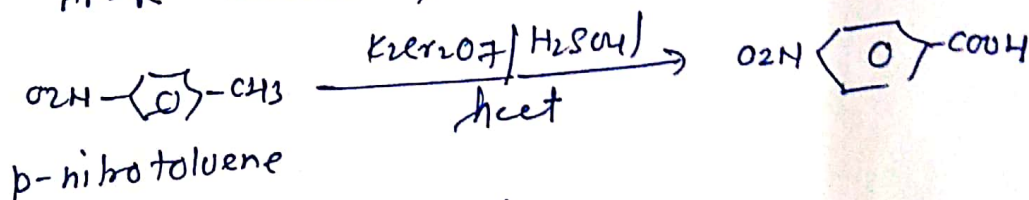
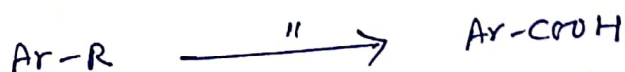
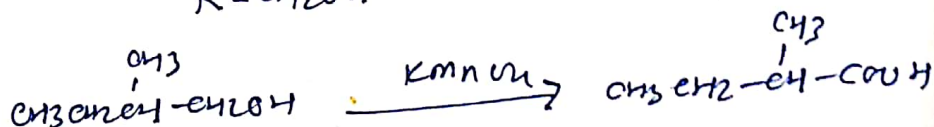
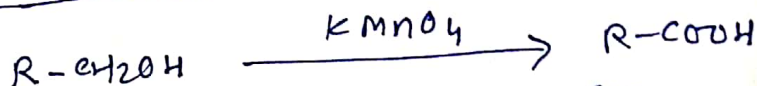
UNIT - IV carboxylic acid

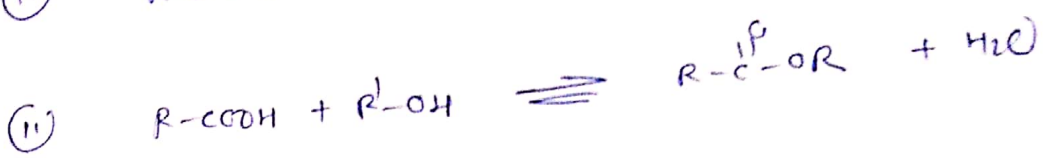
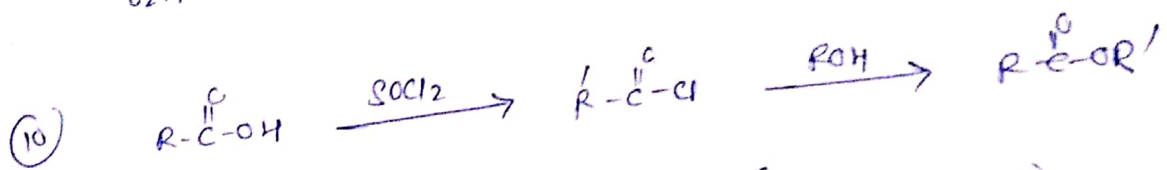
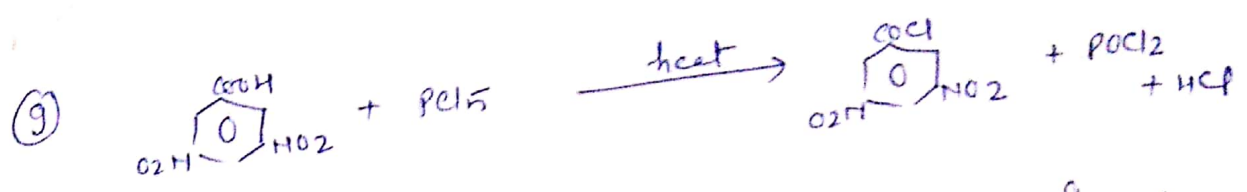
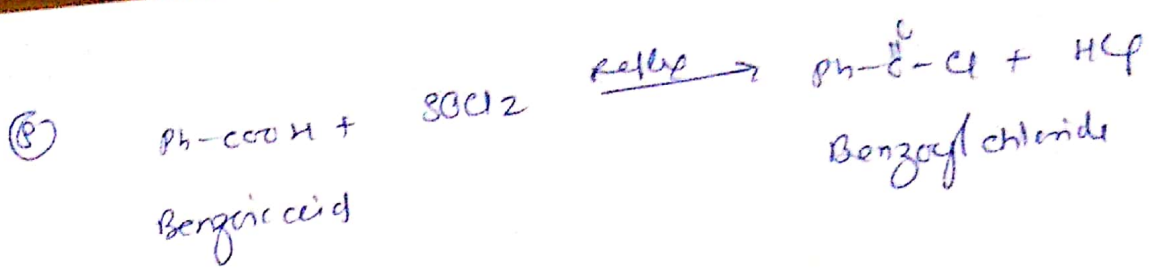


Salt -

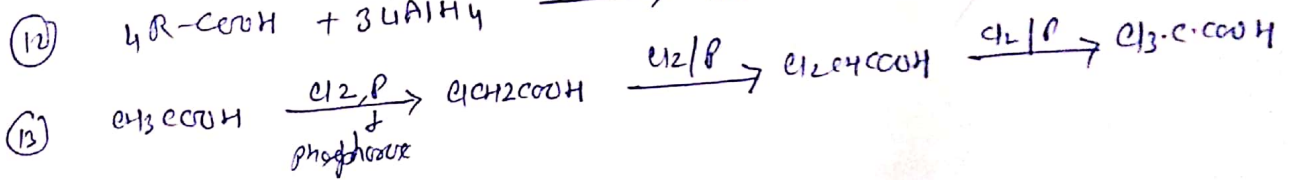
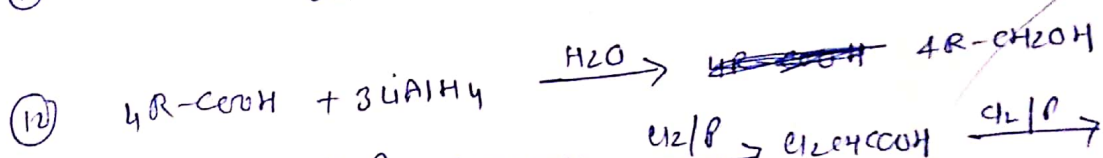
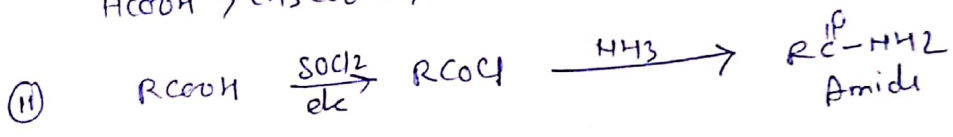
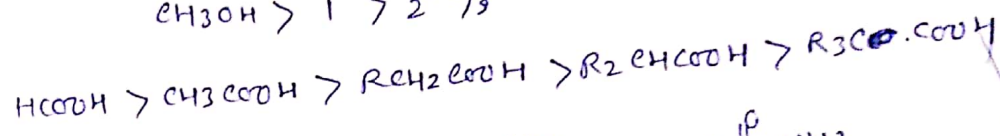
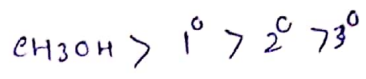


Synthesis of Carboxylic acid -

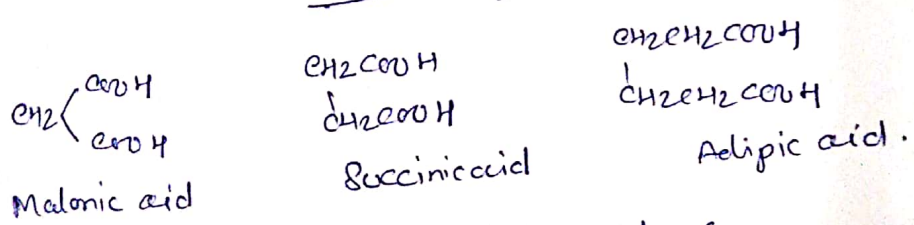




Reactivity in esterification

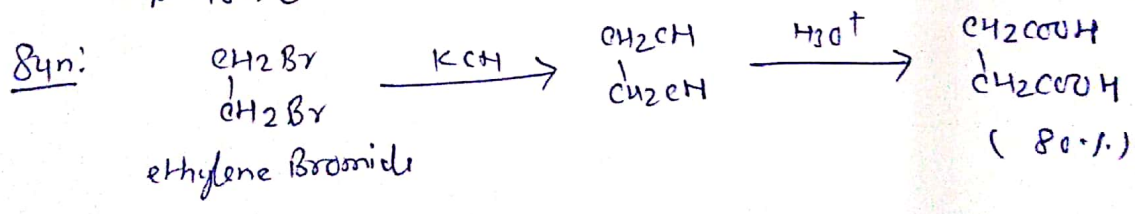


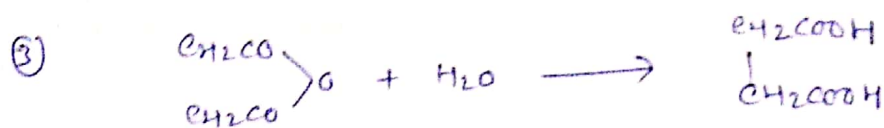
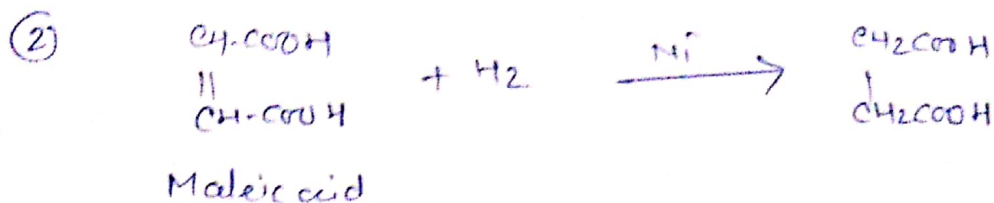
Dicarboxylic acid



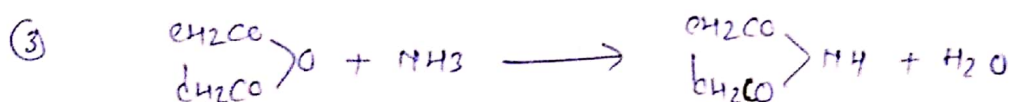
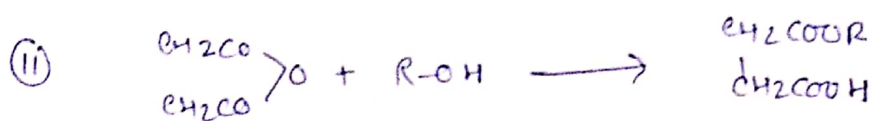
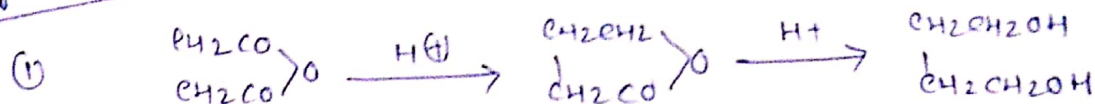
Succinic acid (Butanedioic acid)

m.p. 185°C .

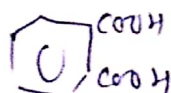




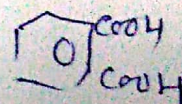
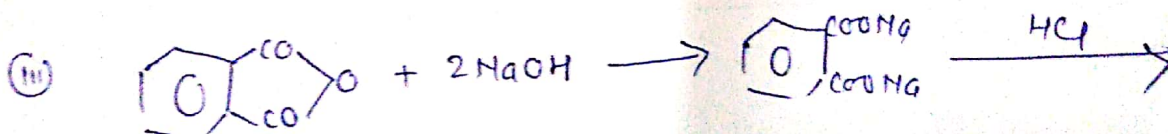
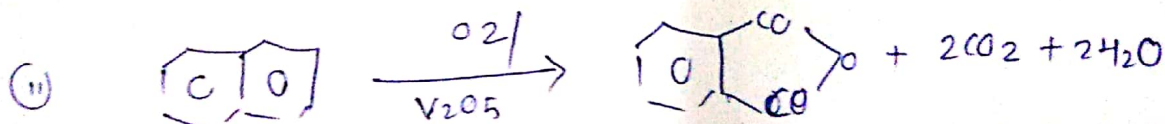
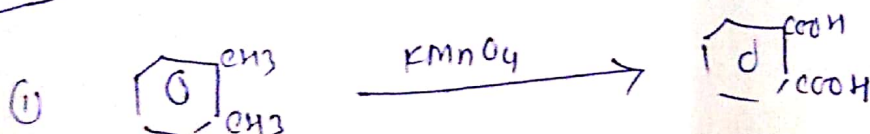
Properties / Rx:

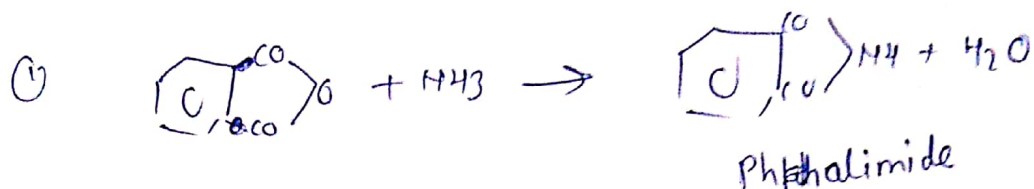


Phthalic Acid
(Benzene-1,2-Dicarboxylic acid)



Synthesis





Lactic Acid

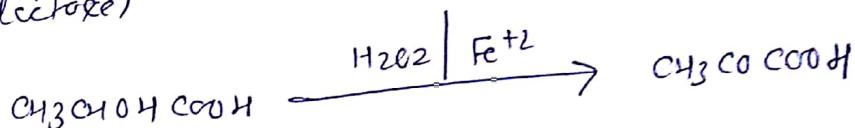
(α -hydroxypropionic acid, 2-hydroxypropanoic acid)

Syn



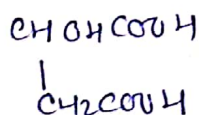
Sugar
(lactose)

prep



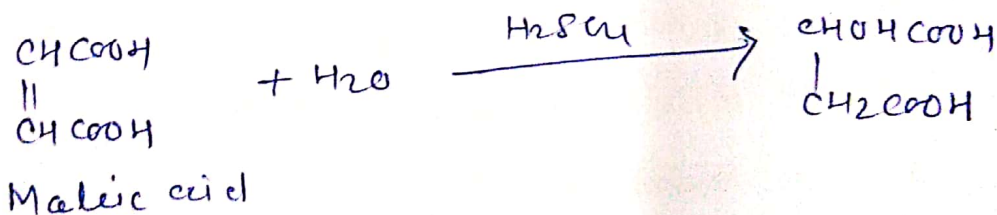
Malic acid

(Hydroxy succinic acid, or hydroxybutanedioic acid)

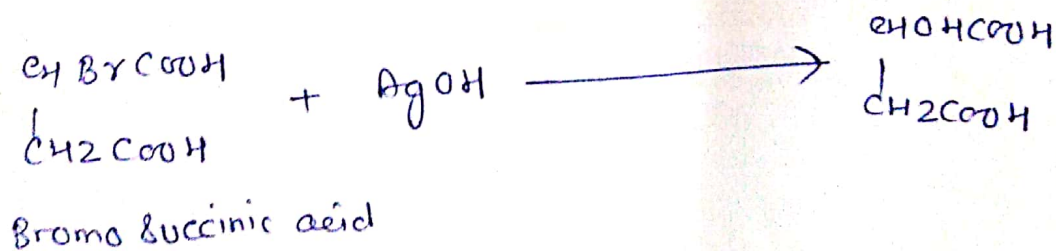


Syn

①

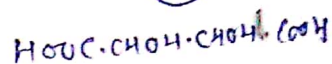


②

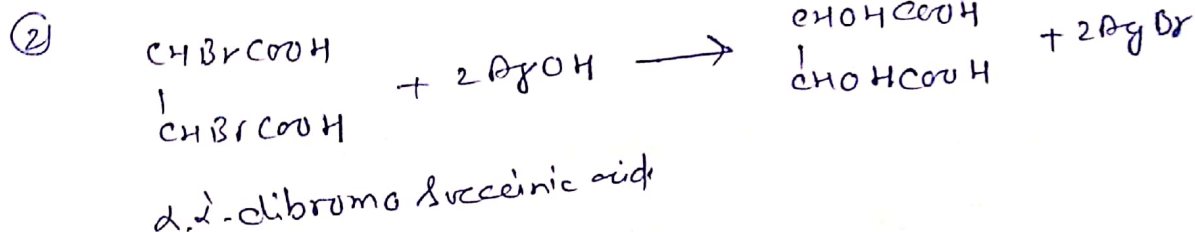
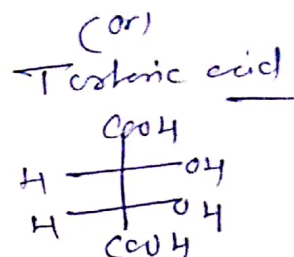
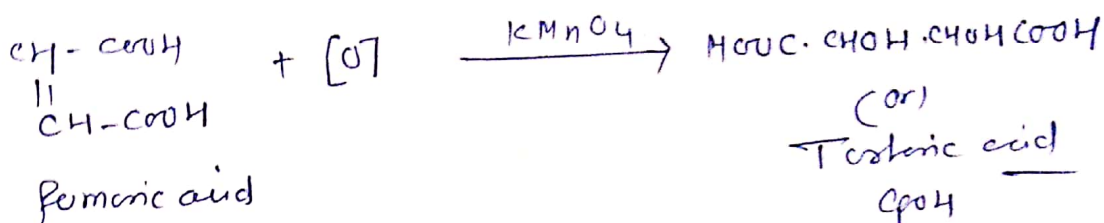


Tartronic acid
(α, α' dihydroxy succinic acid)
(2,3-dihydroxy butanedioic acid)

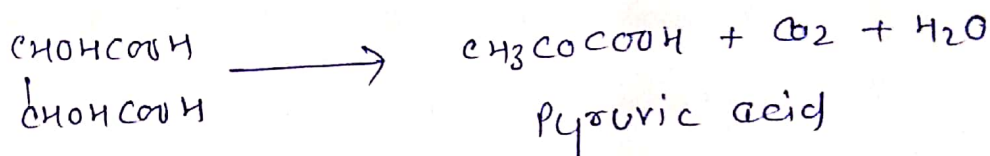
10



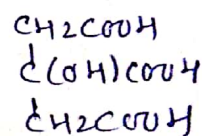
Syn



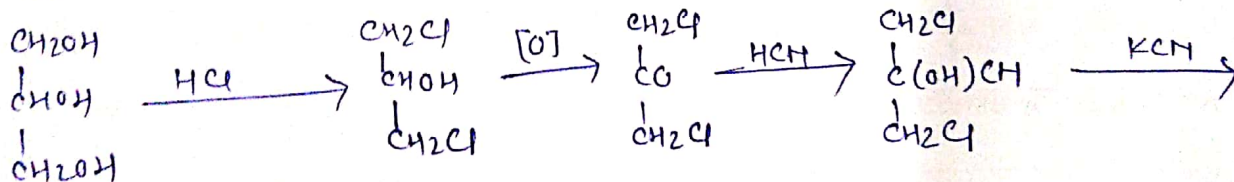
Probestic



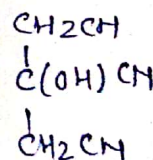
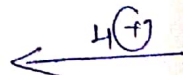
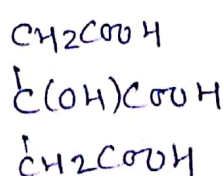
Citric Acid
(β -hydroxytricarboxylic acid)
(2-hydroxypropane-1,2,3-tricarboxylic acid)

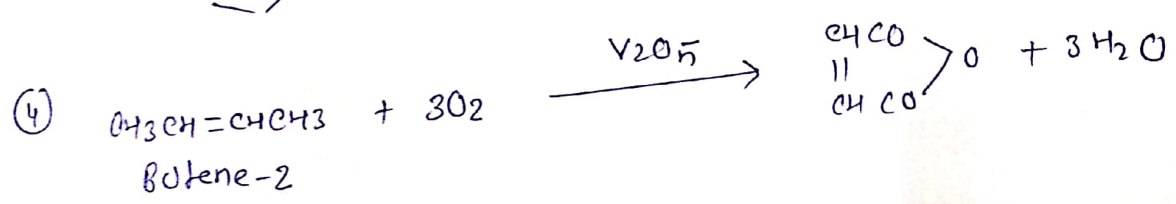
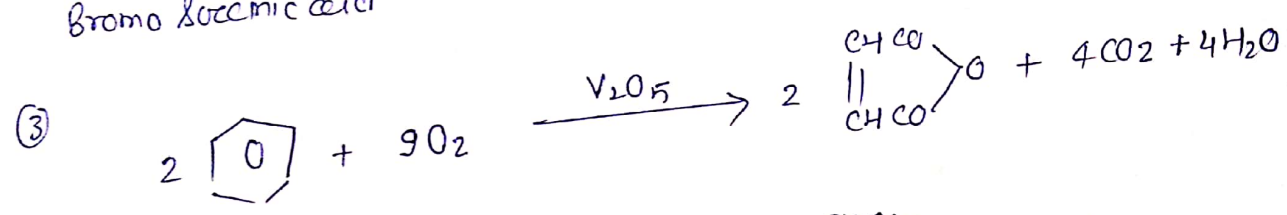
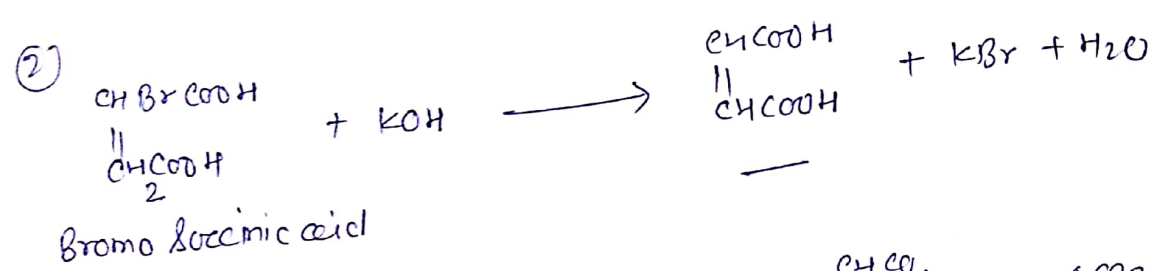
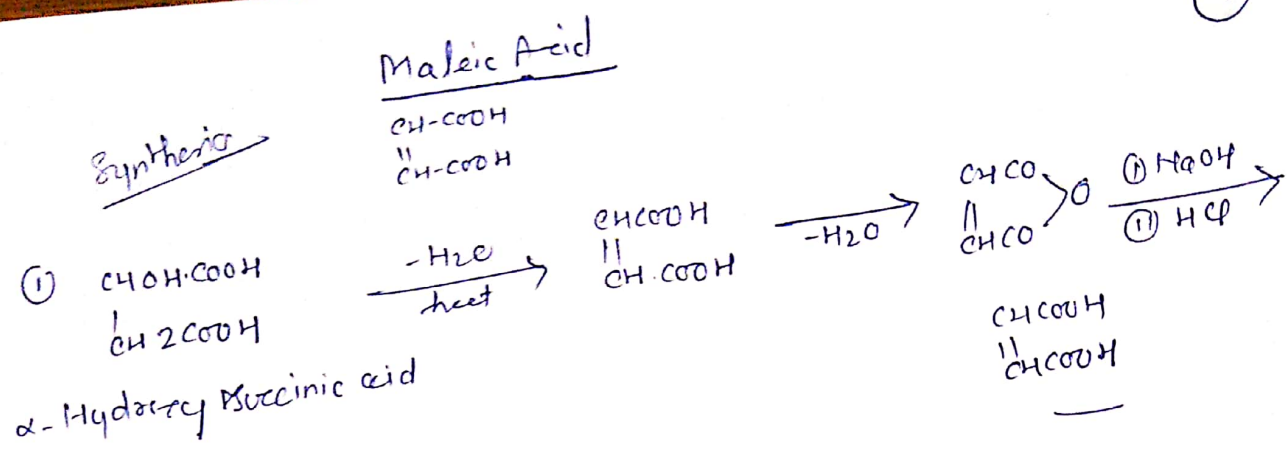


Syn

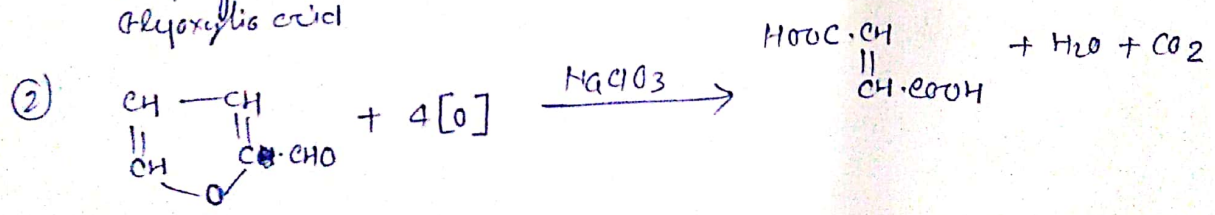
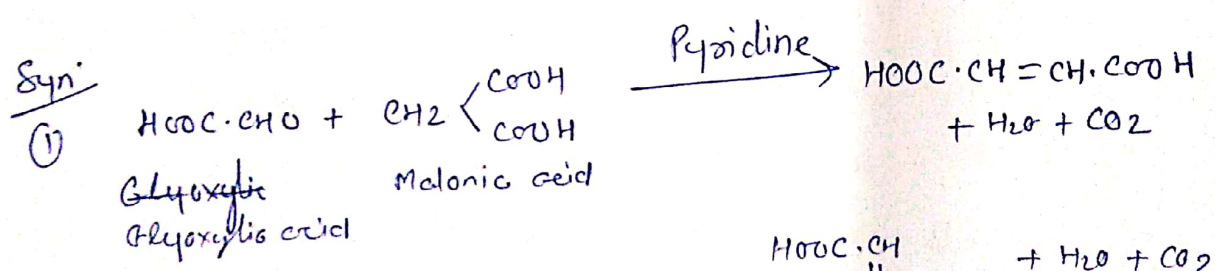
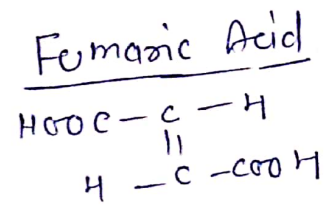


Glycerol



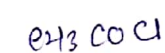
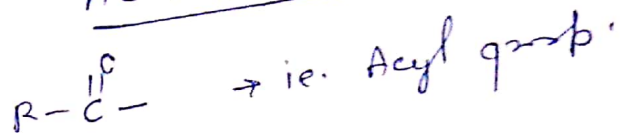


Properties → m.p - 130°C, solid, soluble in water



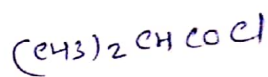
Properties - Solid, m.p. - 28.4°C , slightly soluble in water (12)

Acid or Acyl chloride



Ethanoyl chloride

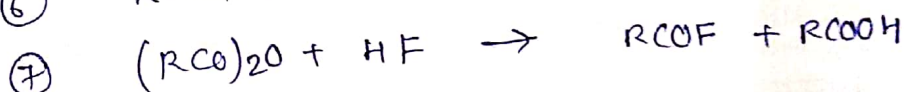
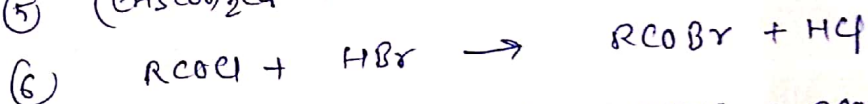
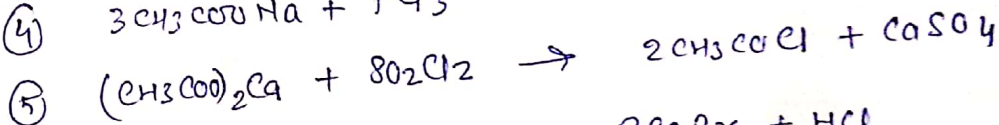
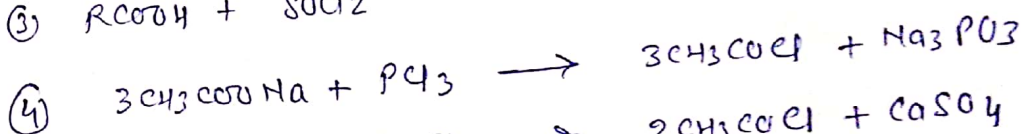
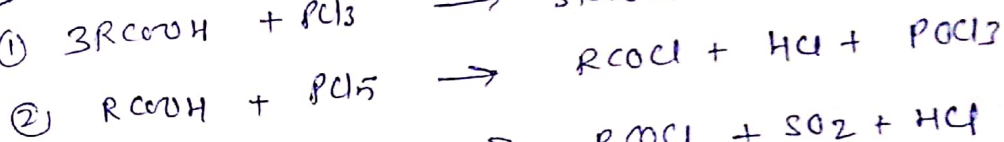
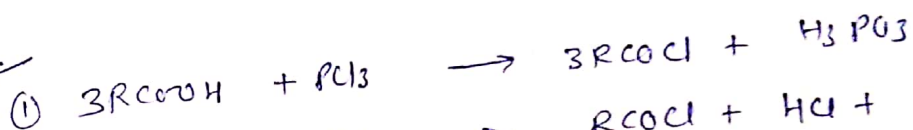
Acetyl chloride



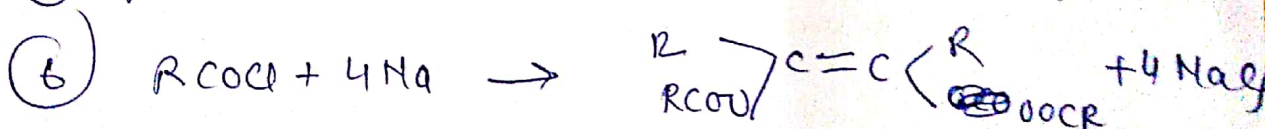
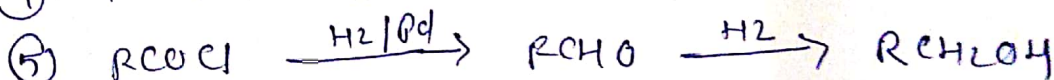
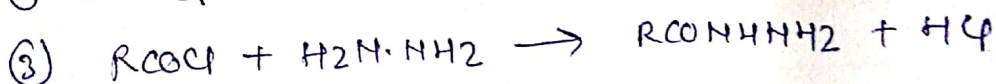
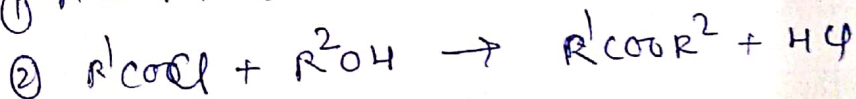
2-methylpropanoyl chloride

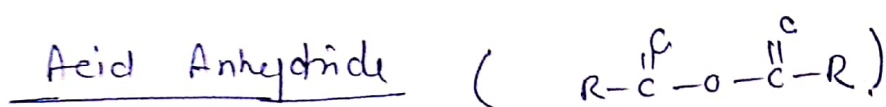
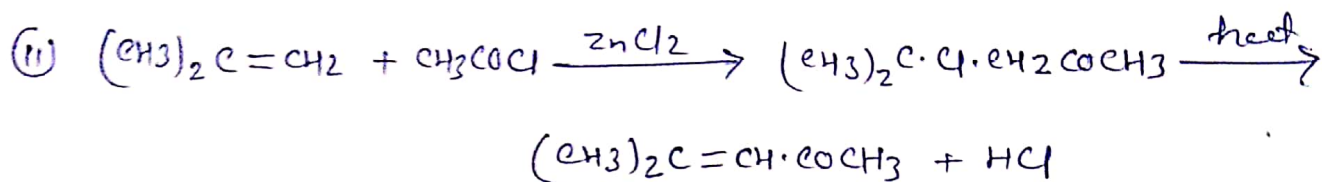
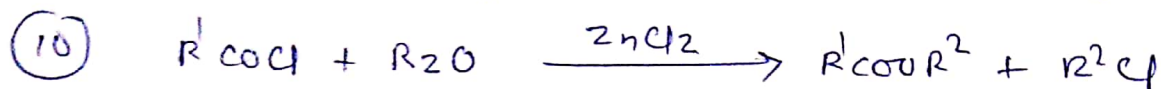
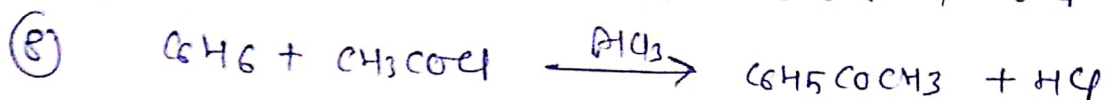
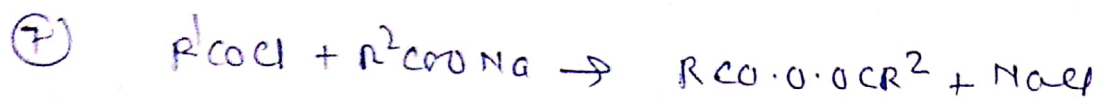
Isobutyryl chloride

Syn:

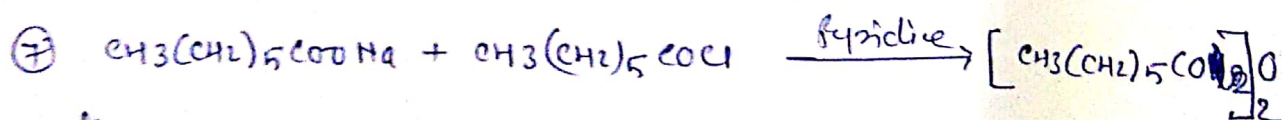
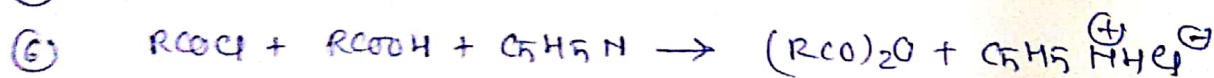
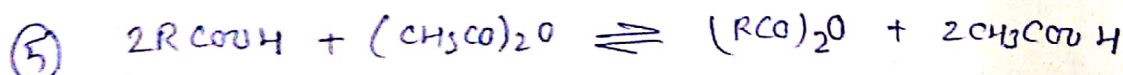
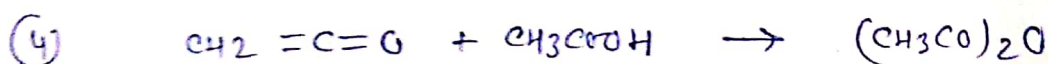
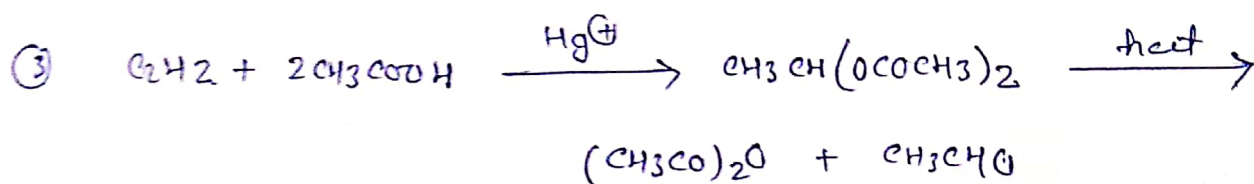
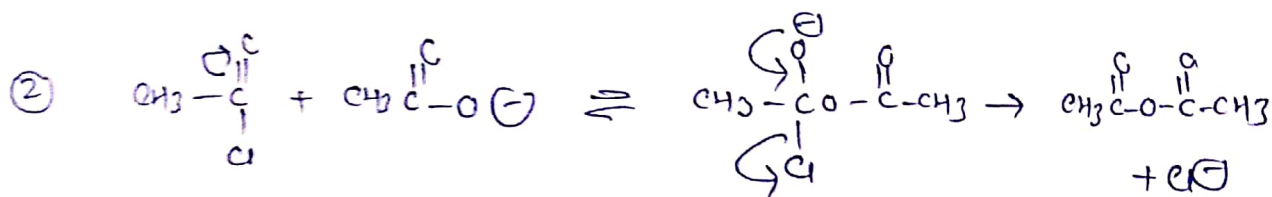
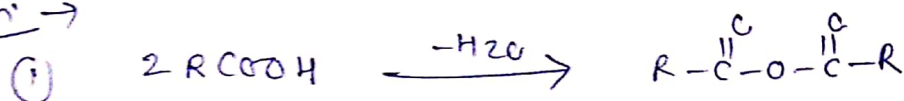


Properties - ~~is~~ liquid, colourless, irritating odour, treated as reagent

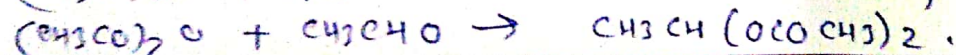
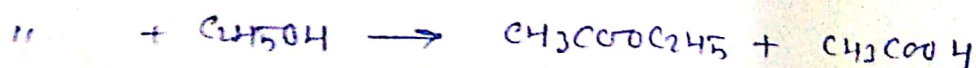


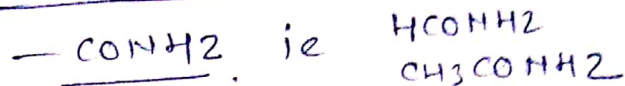


Syn. $\rightarrow$



Properties



Acid AmidesSyn.

- (1) $\text{RCOONH}_4 \rightarrow \text{RCONH}_2 + \text{H}_2\text{O}$
- (2) $\text{RCOOH} + \text{CO}(\text{NH}_2)_2 \rightarrow \text{RCONH}_2 + \text{CO}_2 + \text{NH}_3$
- (3) $\text{RCOCl} + 2\text{NH}_3 \rightarrow \text{RCONH}_2 + \text{NH}_4\text{Cl}$
- (4) $(\text{RCO})_2\text{O} + 2\text{NH}_3 \rightarrow \text{RCONH}_2 + \text{RCOONH}_4$
- (5) $\text{R}^1\text{COOR}^2 + \text{NH}_3 \rightarrow \text{R}^1\text{CONH}_2 + \text{R}^2\text{OH}$
- (6) $\text{R-C}\equiv\text{N} + \text{H}_2\text{O} \xrightarrow{\text{HCl}} \text{RCONH}_2$

Properties.

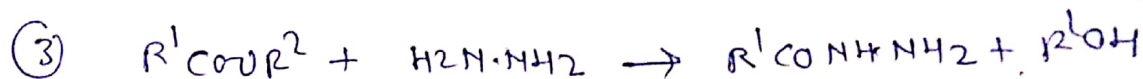
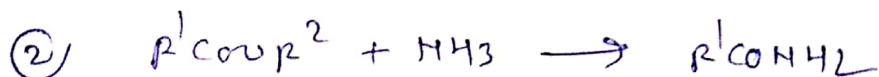
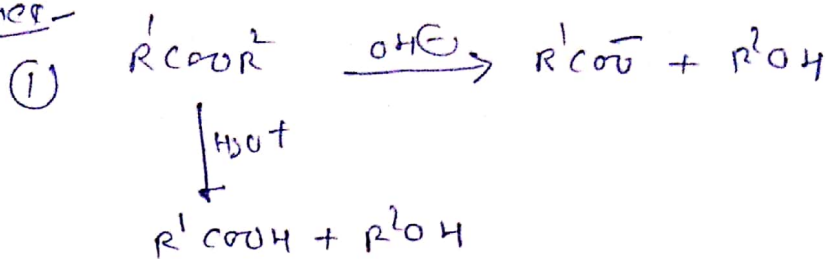
liquid, colourless, soluble in water

- (1) $\text{RCONH}_2 + \text{H}_2\text{O} \rightarrow \text{RCOOH} + \text{NH}_3$
- (2) $2\text{RCONH}_2 + \text{Hg}^0 \rightarrow (\text{RCONH})_2\text{Hg} + \text{H}_2\text{O}$
- (3) $\text{RCONH}_2 \xrightarrow{\text{Na/C}_2\text{H}_5\text{OH}} 2\text{RCH}_2\text{NH}_2 + \text{H}_2\text{O}$
- (4) $\text{RCONH}_2 \xrightarrow{-\text{H}_2\text{O}} \text{RCH}$
- (5) $\text{RCONH}_2 + \text{HNO}_2 \rightarrow \text{RCOOH} + \text{N}_2 + \text{H}_2\text{O}$
- (6) $\text{RCONH}_2 + \text{Br}_2 + 4\text{KOH} \rightarrow \text{RNH}_2 + 2\text{KBr} + \text{K}_2\text{CO}_3 + 2\text{H}_2\text{O}$

Hoffmann.Acid AmidesPrep.

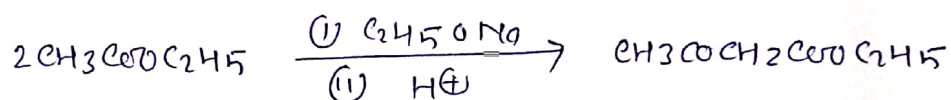
- (i) $\text{R}^1\text{COOH} + \text{R}^2\text{OH} \rightarrow \text{R}^1\text{COOR}^2$
- (ii) $\text{R}^1\text{COCl} + \text{R}^2\text{OH} \rightarrow \text{R}^1\text{COOR}^2 + \text{HCl}$
- (iii) $(\text{R}^1\text{CO})_2\text{O} + \text{R}^2\text{OH} \rightarrow \text{R}^1\text{COOR}^2 + \text{R}^1\text{COOH}$
- (iv) $\text{R}^1\text{COOR}^2 + \text{R}^3\text{Br} \rightarrow \text{R}^1\text{COOR}^3 + \text{R}^2\text{Br}$
- (v) $\text{RCOOH} + \text{CH}_2\text{N}_2 \rightarrow \text{RCOOCH}_3 + \text{N}_2$

Properties-

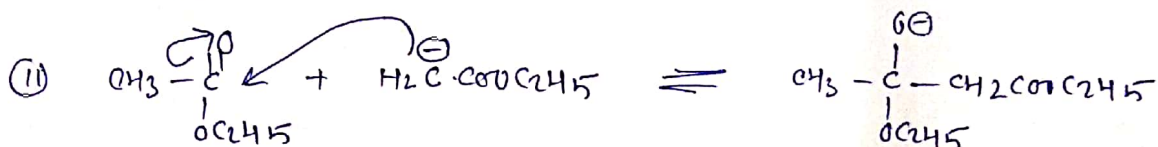
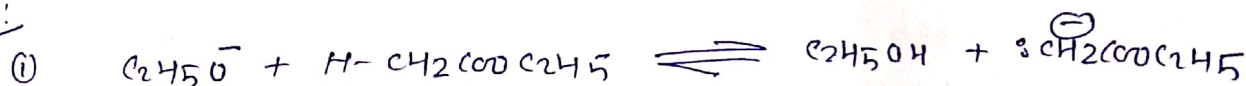


Claisen Condensation

Ester having α -hydrogen on treatment with a strong base e.g. C_2H_5ONa , undergoes self-condensation to produce β -ketoester

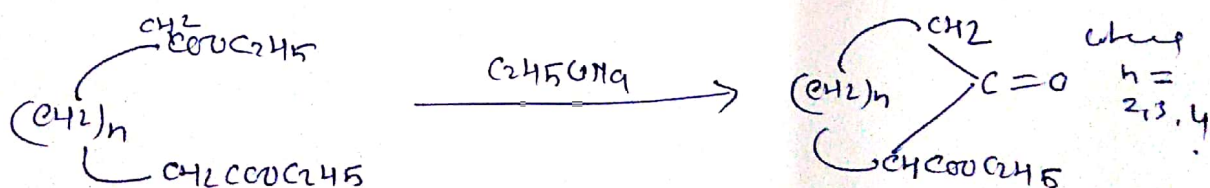


Mech:

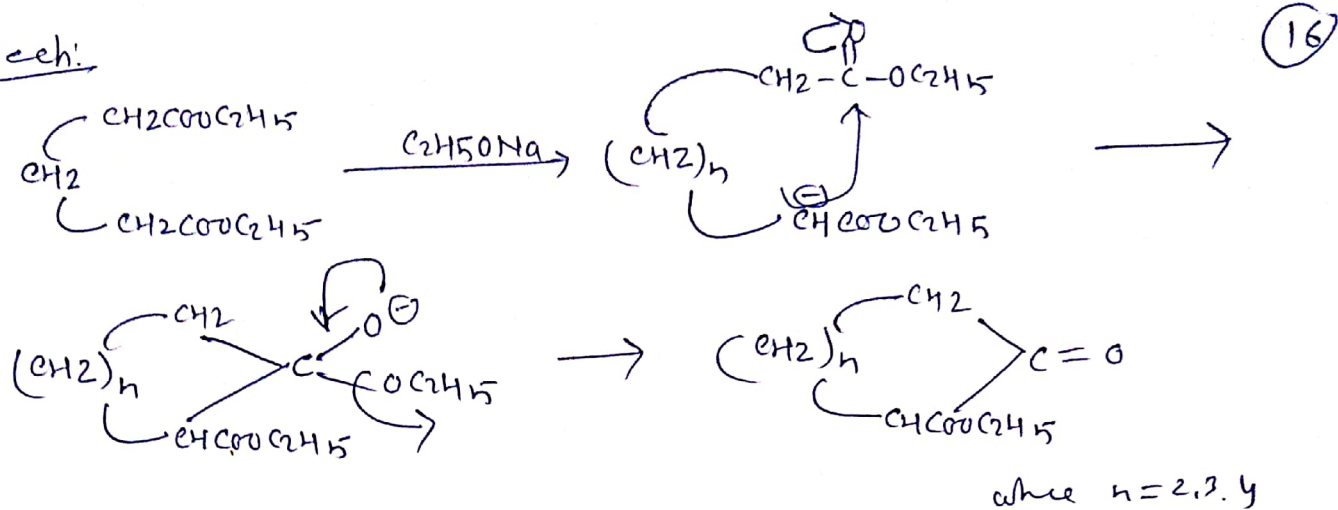


Dieckmann Reaction

Intramolecular Claisen condensation of a dibasic acid is called Dieckmann R.

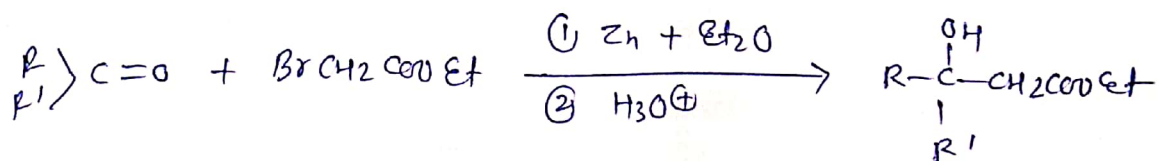


Mech:

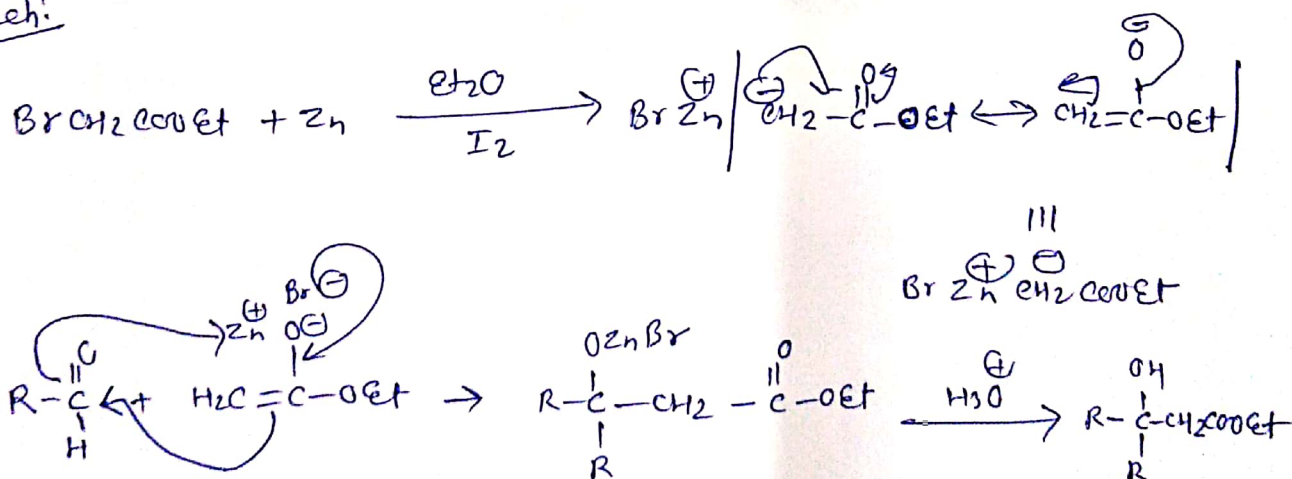


Reformatsky Reaction

Preparation of β -hydroxyesters by the treatment of a reactive organic halide e.g. α -haloester or its vinylog with a carbonyl compound in the presence of zinc metal and subsequent hydrolysis.

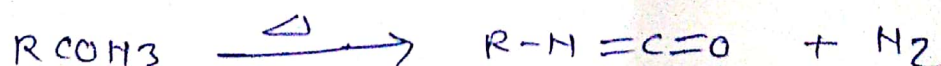


Mech:



Curtius Reaction

It involves the decomposition of acyl azides in the presence of inert solvent (e.g. chloroform, benzene etc.) by gentle heat to produce isocyanates.



Mechanism

(17)

