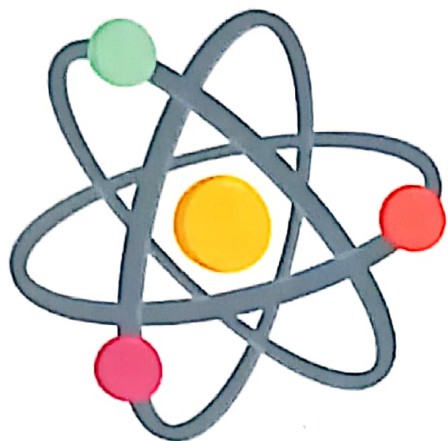


VICTORY ZONE

CLASSES

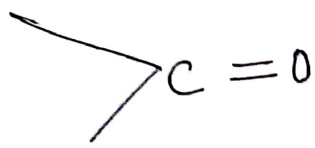


CHEMISTRY

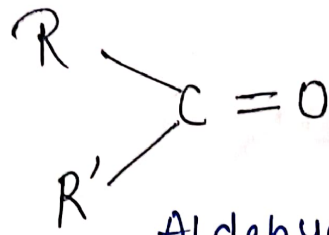


CLASS :- XII

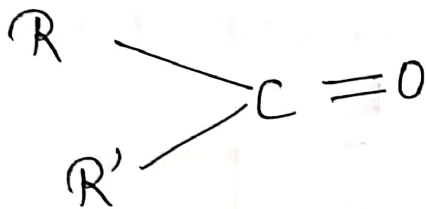
Aldehyde, Ketone & Carboxylic Acid.



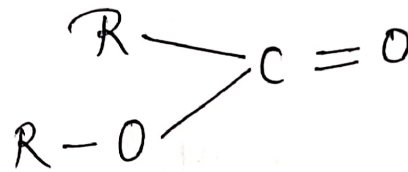
Carbonyl group



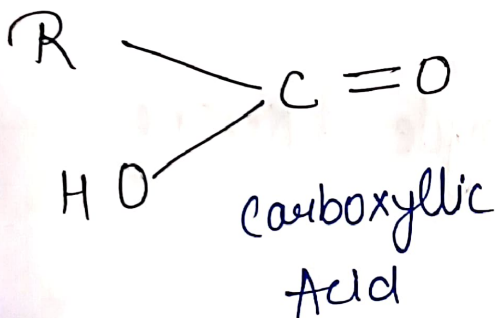
Aldehyde



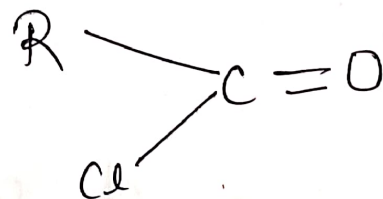
Ketone



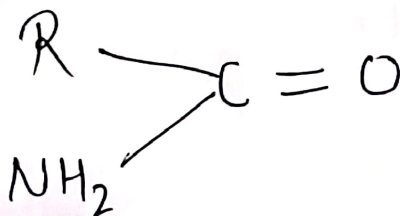
Ester



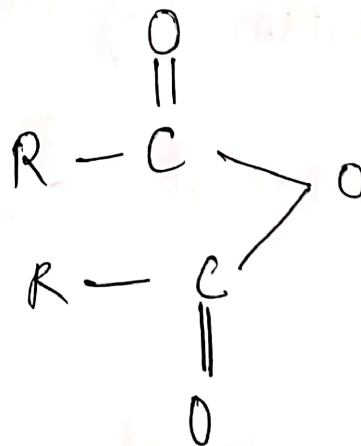
carboxylic
Acid



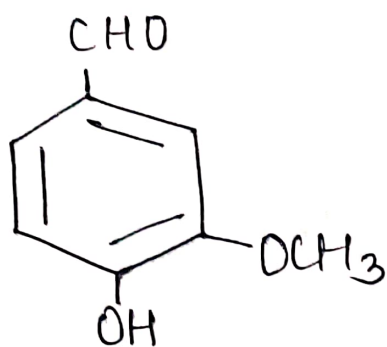
Acyl chloride



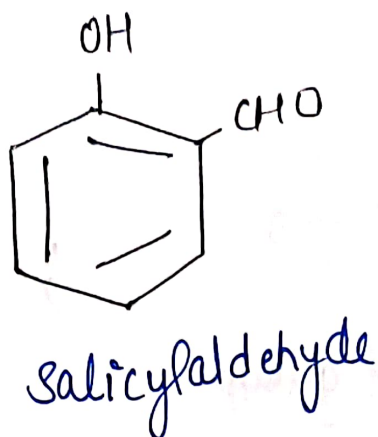
Amide



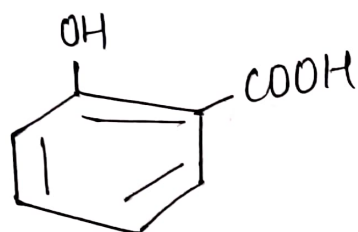
Acid anhydride



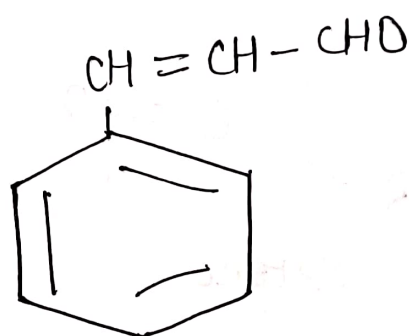
Vanilline



Salicylaldehyde



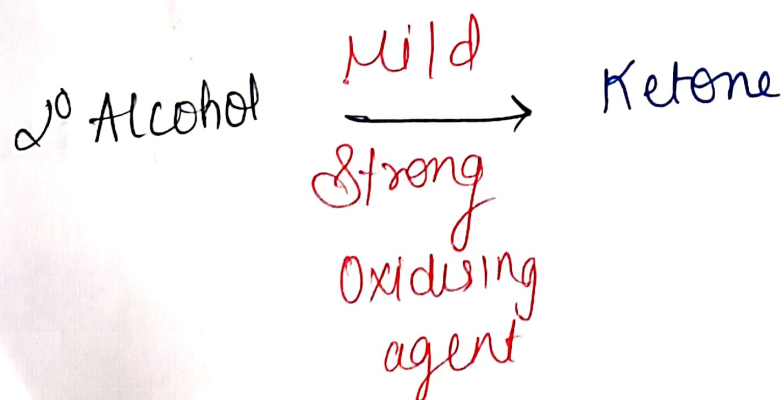
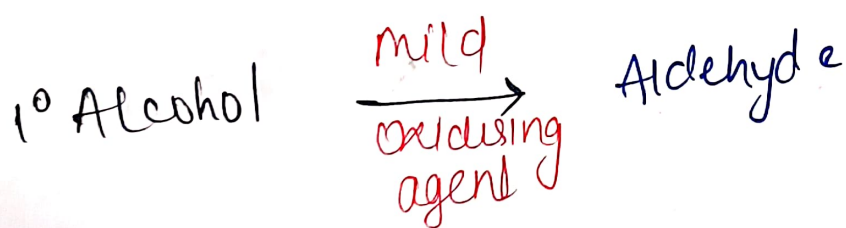
Salicylic acid



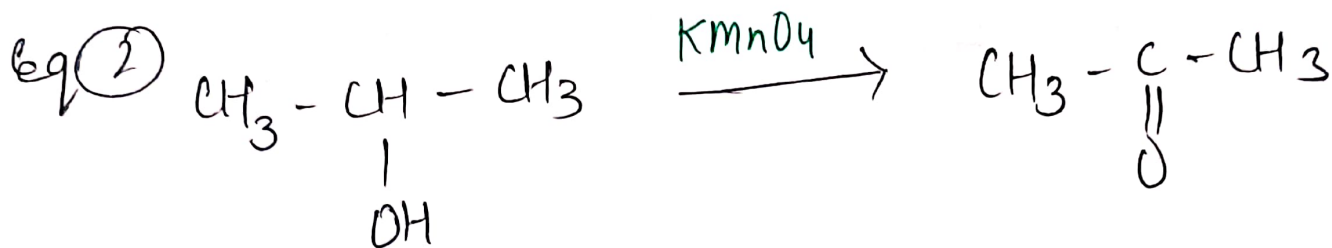
Cinnamaldehyde

Preparation of Both Aldehyde & Ketone

(1) Oxidation of Alcohol

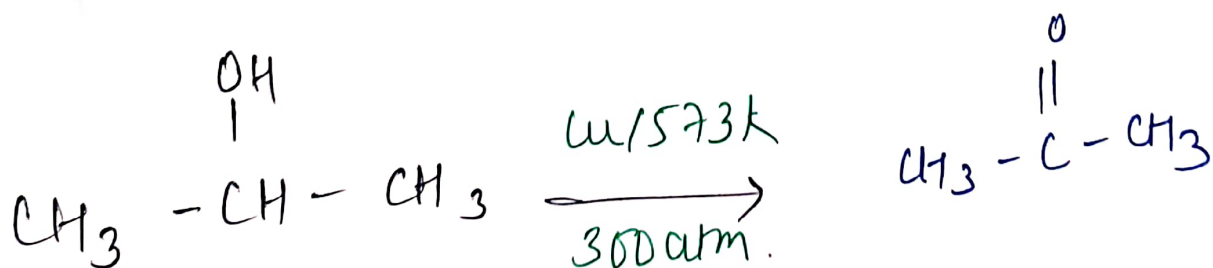
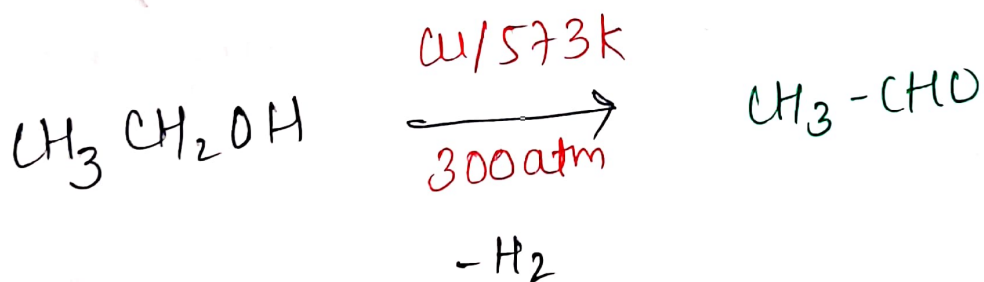


eg - ①

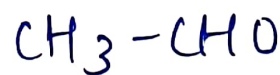
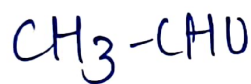
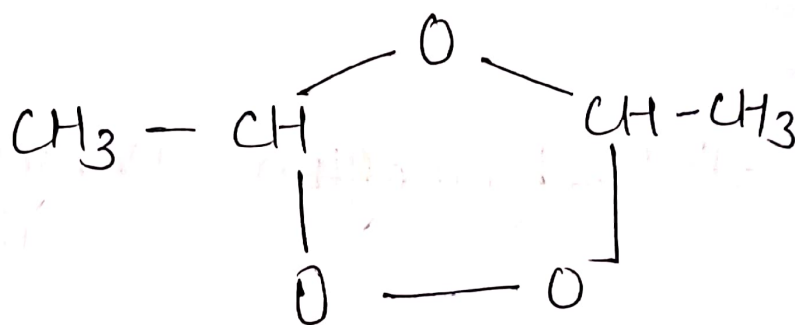
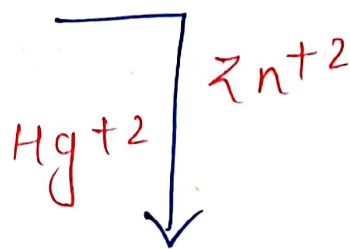
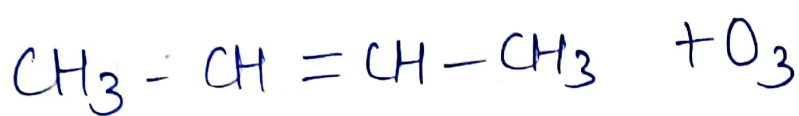
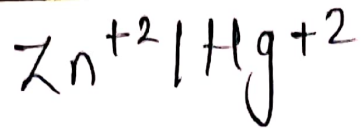


~~Dehydration~~ Dehydrogenation Rxn of alcohol

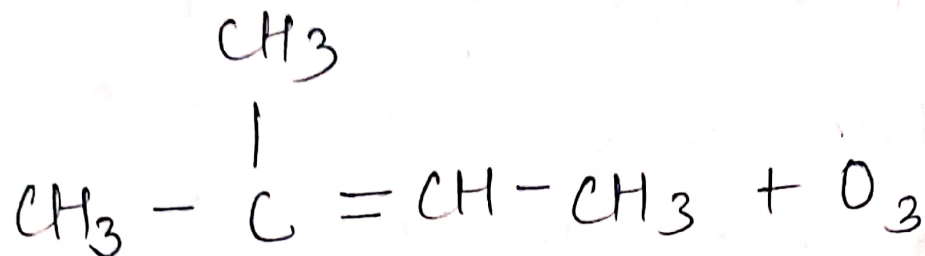
Removal of H_2 metal with High Temperature
 Cu, Zn



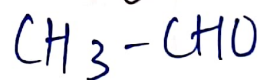
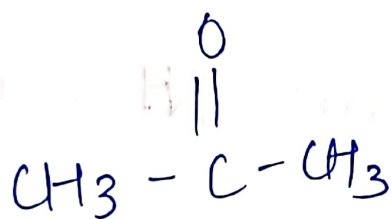
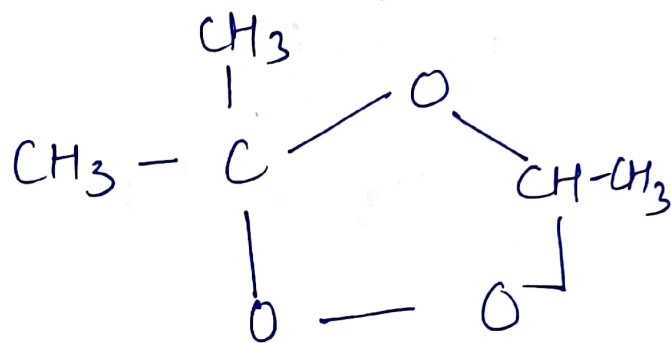
③ Ozonolysis
of Alkene



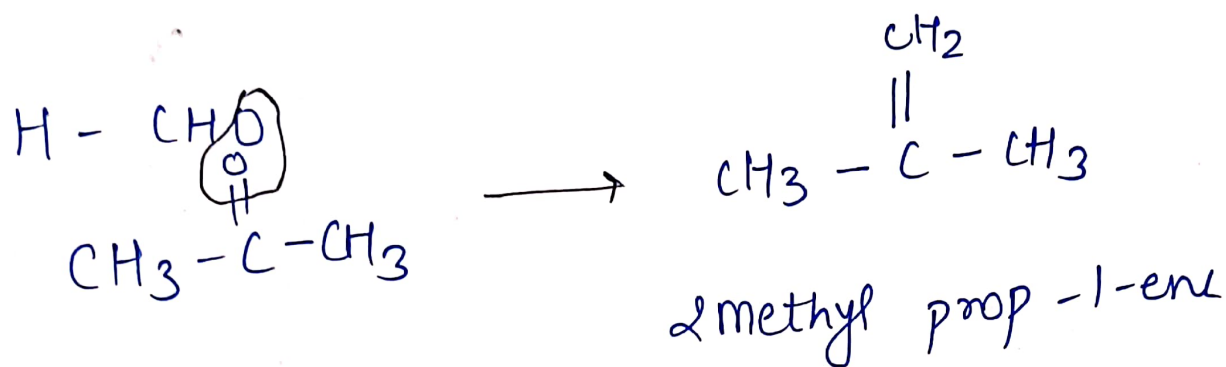
②



Zn

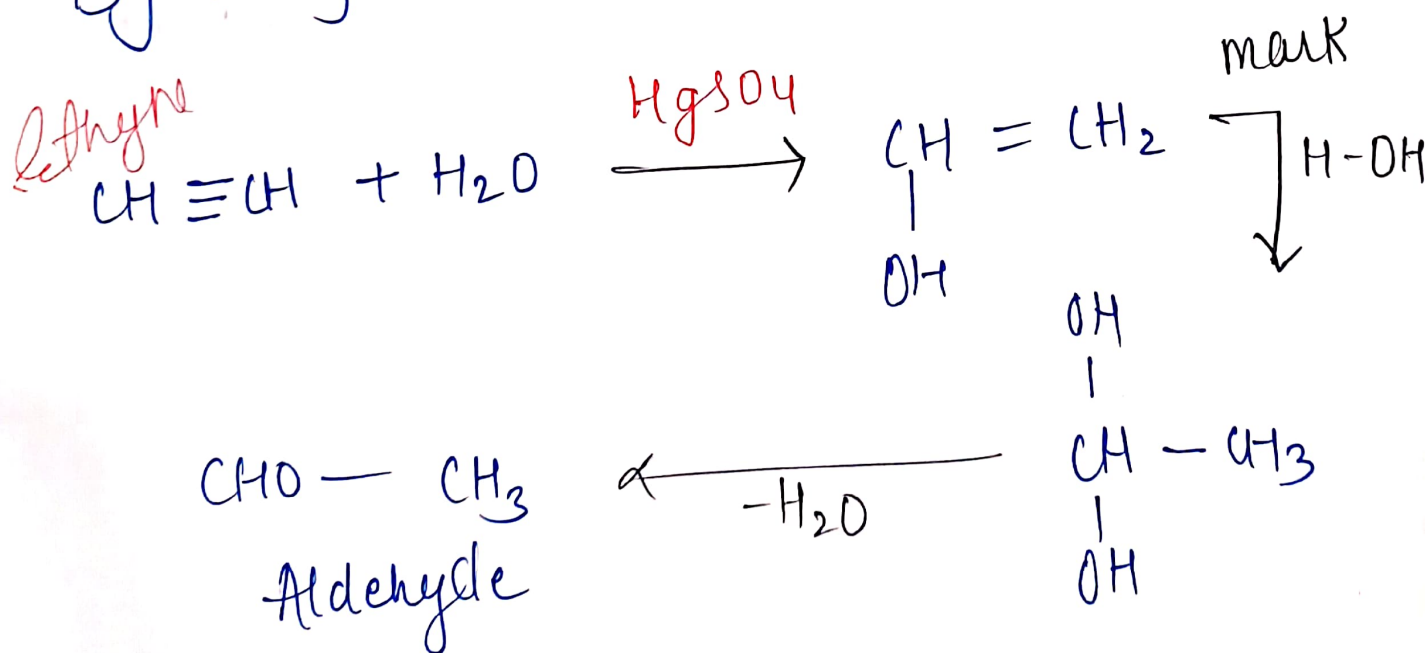


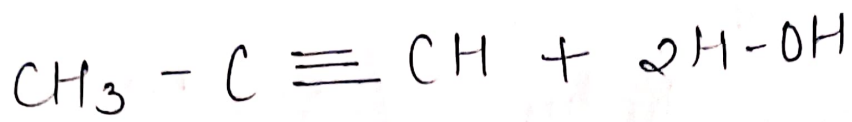
Ques. 1 An alkene formaldehyde and acetone when its react with O_3 with Zn what is the IUPAC Name of that Alkene?



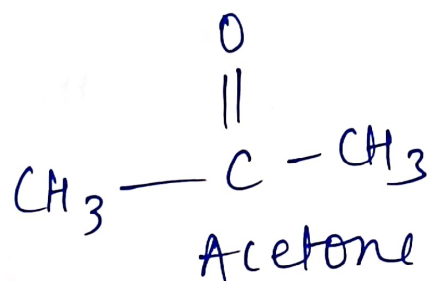
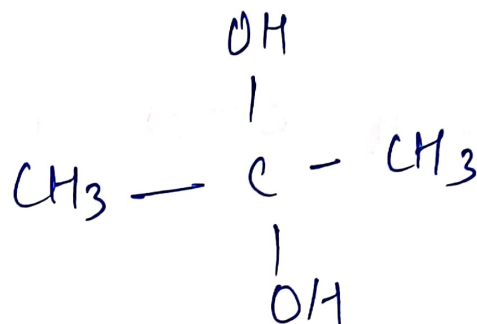
(4) Hydration of Alkynes $[HgSO_4, Hg^{+2}, H_2SO_4]$

By using mark addition





HgSO₄
mark

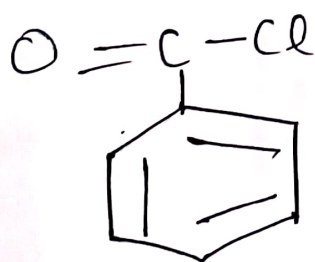


-H₂O

25 Stars

Preparation of only Aldehyde.

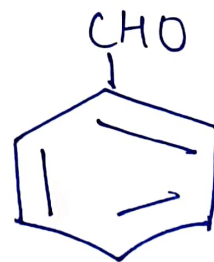
1) Rosenmund Reduction / Reaction



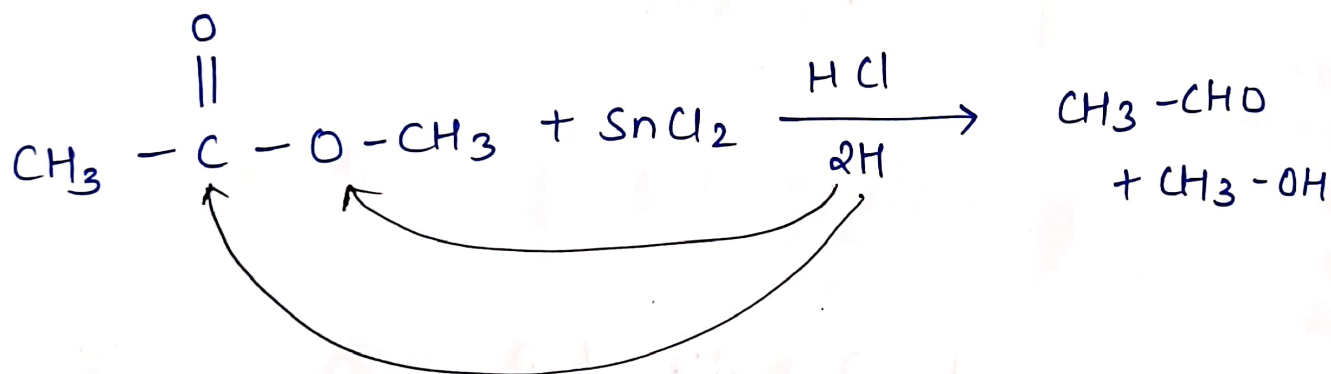
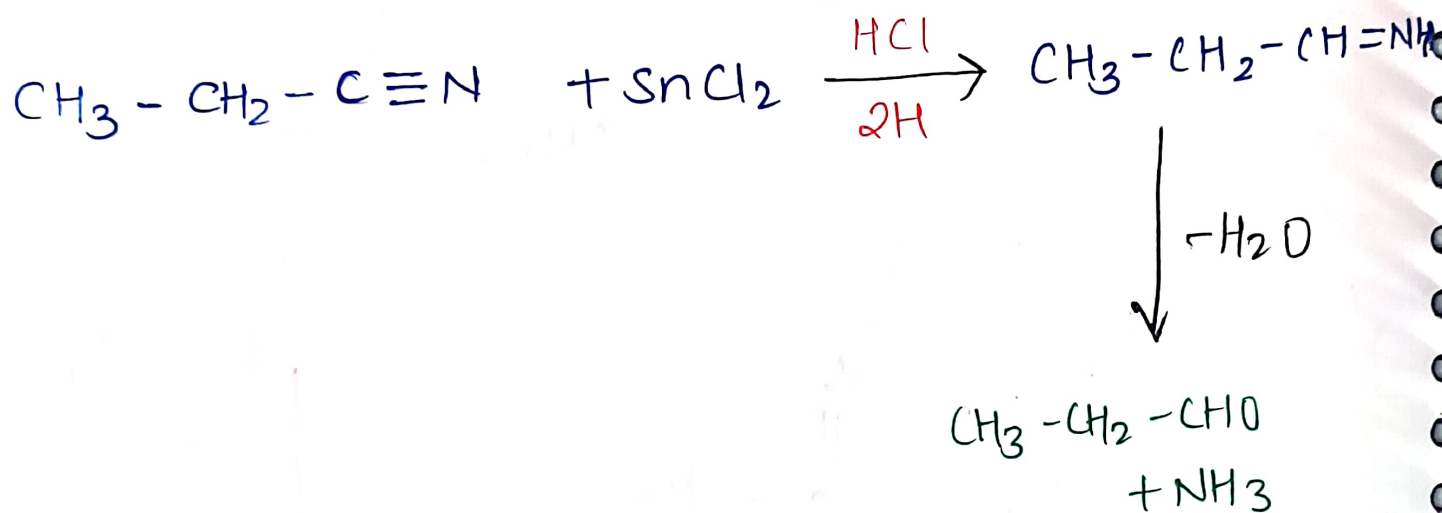
+ H₂

Pd-BaSO₄

→

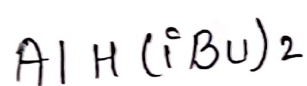
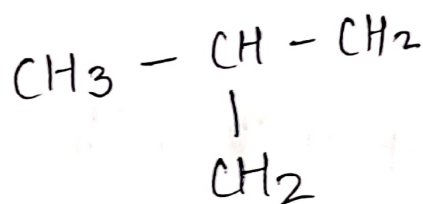
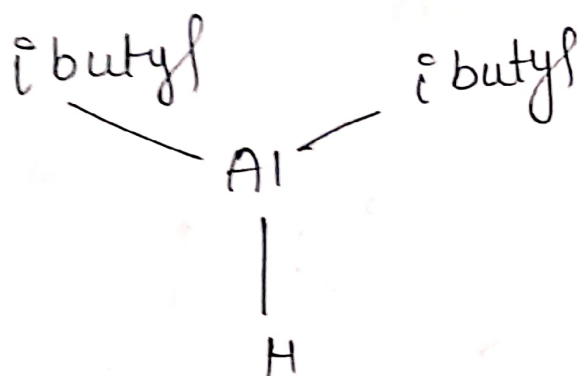


Preparation of
Stephen Reduction/ Reaction
(Nitriles/ester)
cyanide

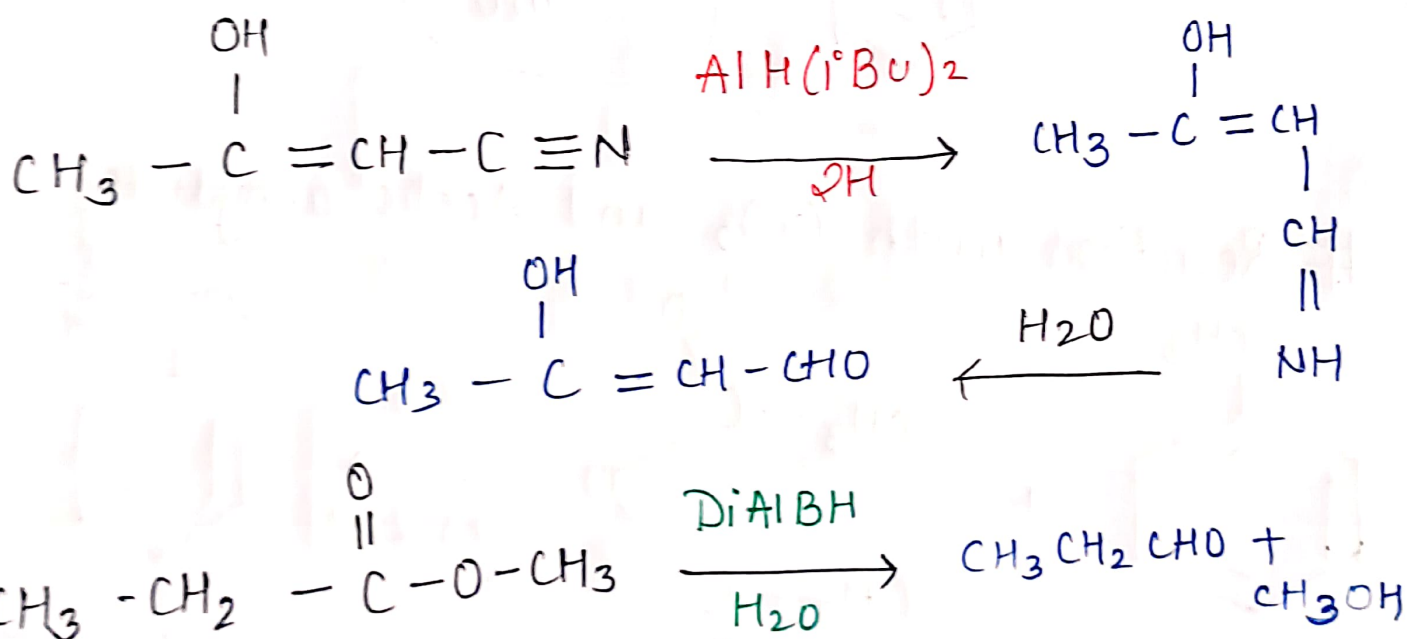


Alternative DiBAlH

Di isobutylaluminium hydride

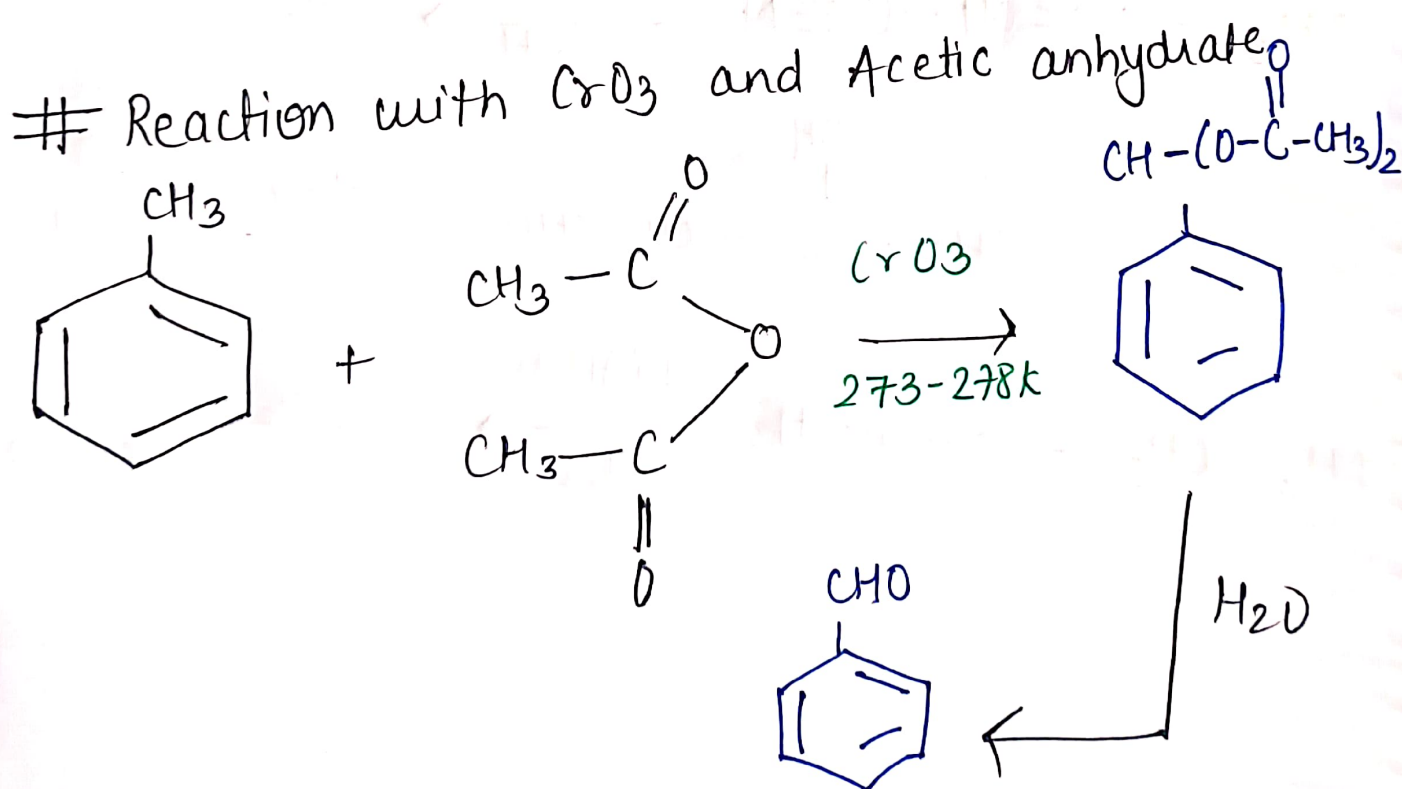
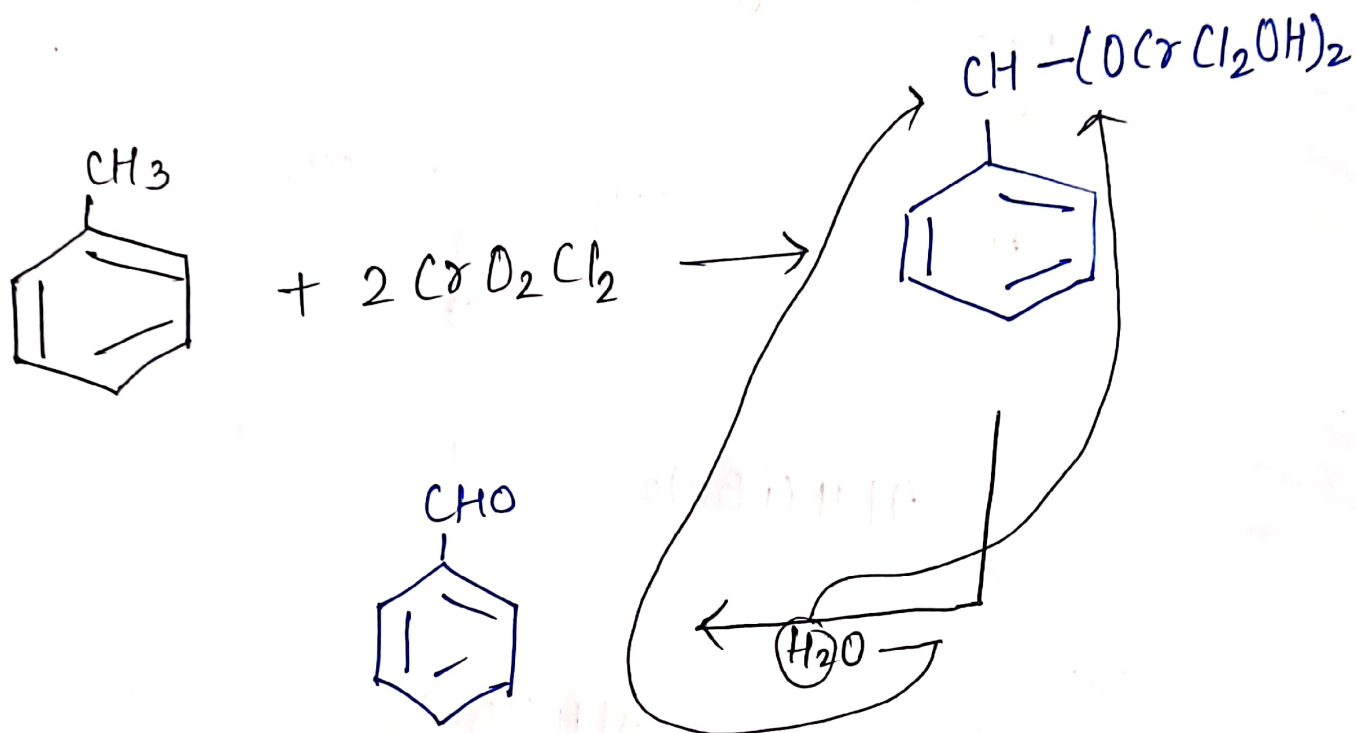


2H - frequent give Hydrogen

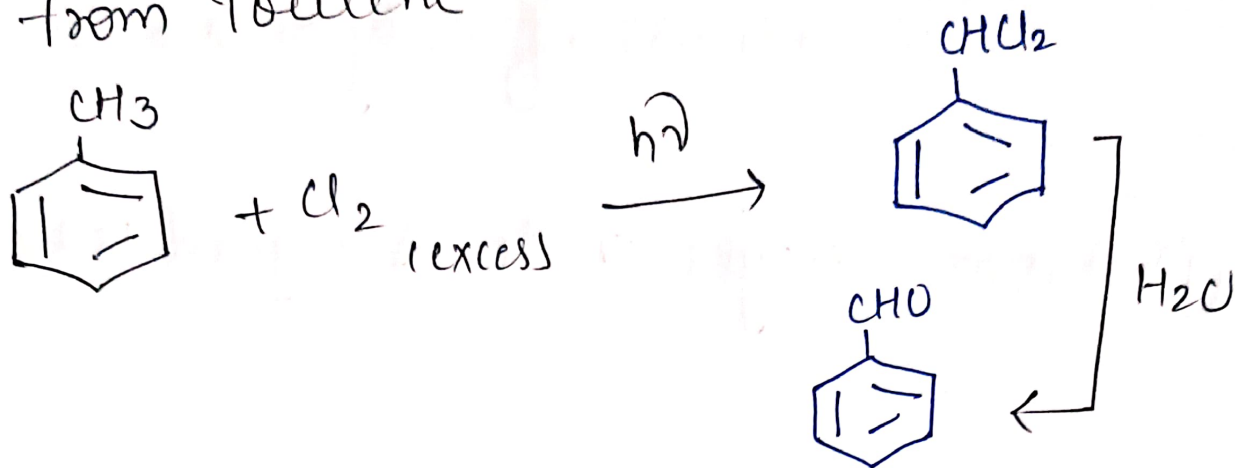


25 Stars

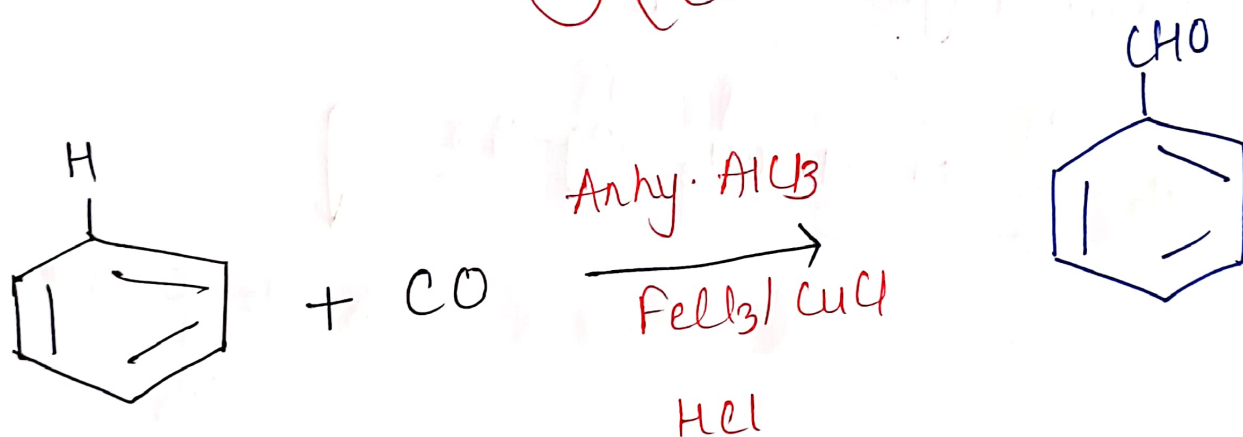
Etard Reaction



(5) from Toluene

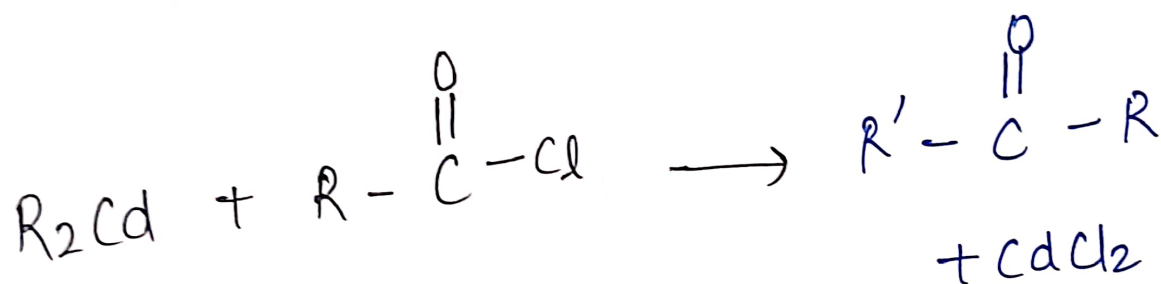
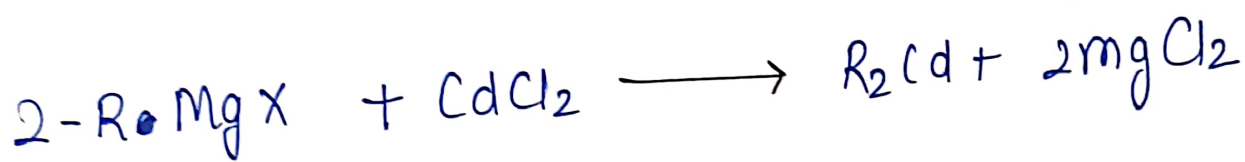


6 Gatterman-Koch Reaction

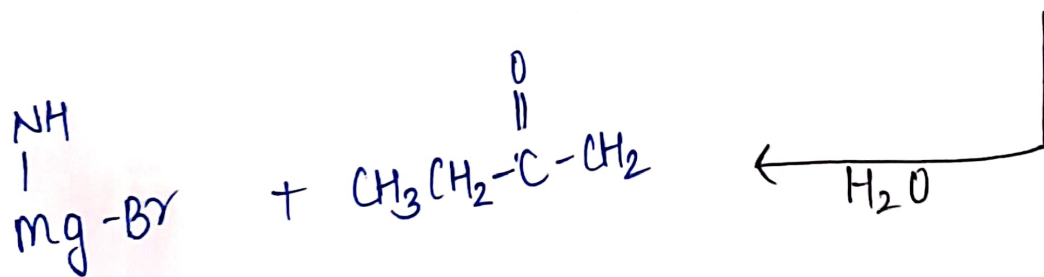
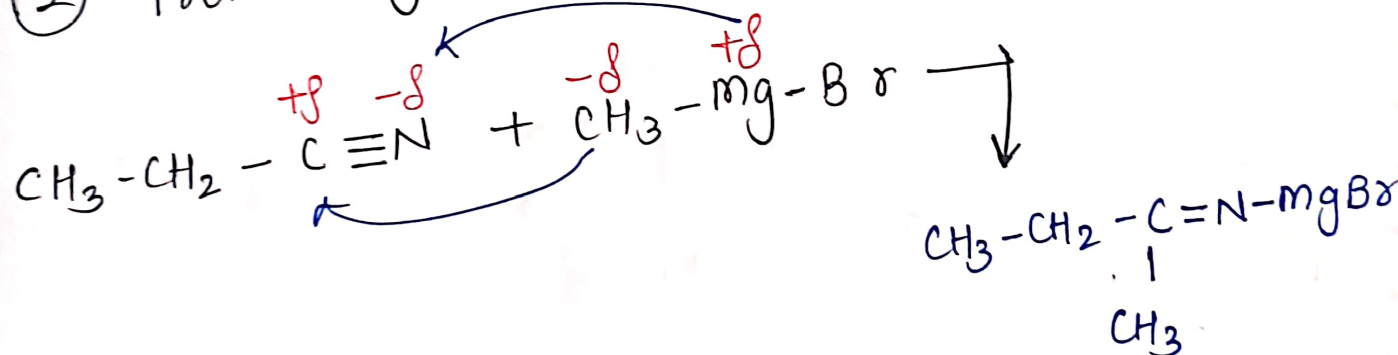


Preparation of only Ketone

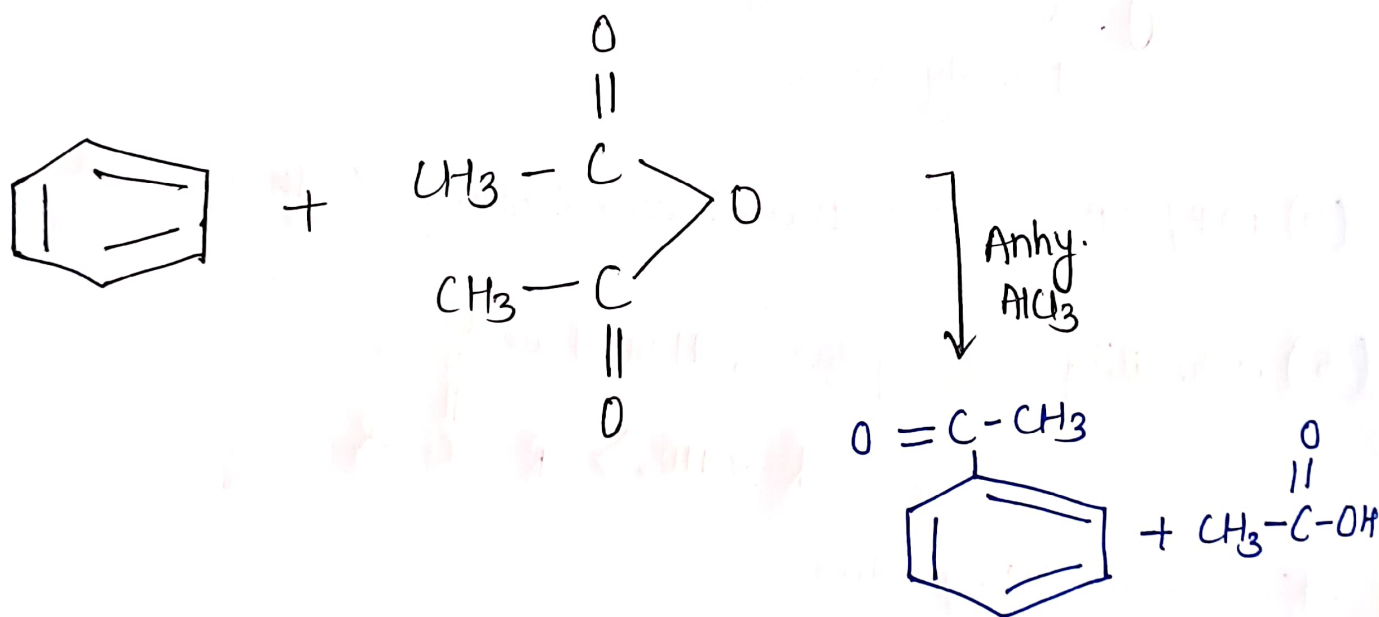
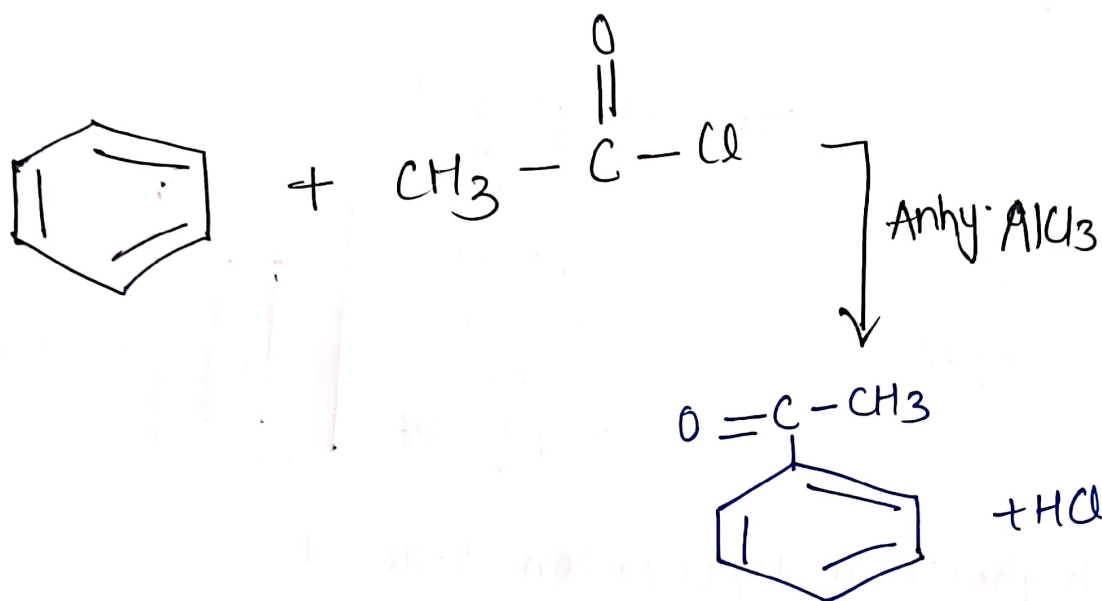
① From Acyl chloride & Grignard Reagent



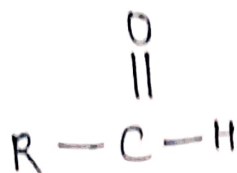
② From Grignard Reagent & Nitriles



③ Electrophilic Substitution Reaction
Friedel Craft Acylation Rxn



Physical Properties of Aldehyde & Ketone



(1) State

HCHO - gas

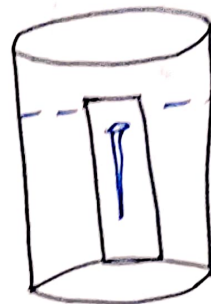
C₂ - C₄ - liquid

(2) Smell pungent

5% HCHO

+ 95% water

Disinfectant



→ formalin

(3) Density higher than Hydrocarbon & Alcohol

Density $\propto$ mw

(4) mp / bp

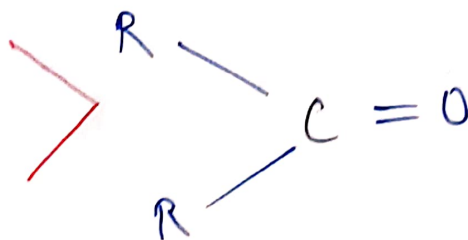
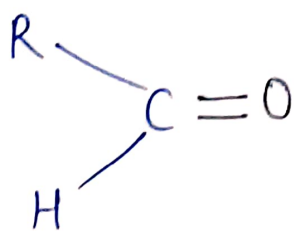
HC < ether < Ketone < Aldehyde < Alcohol < acid

(5) Solubility

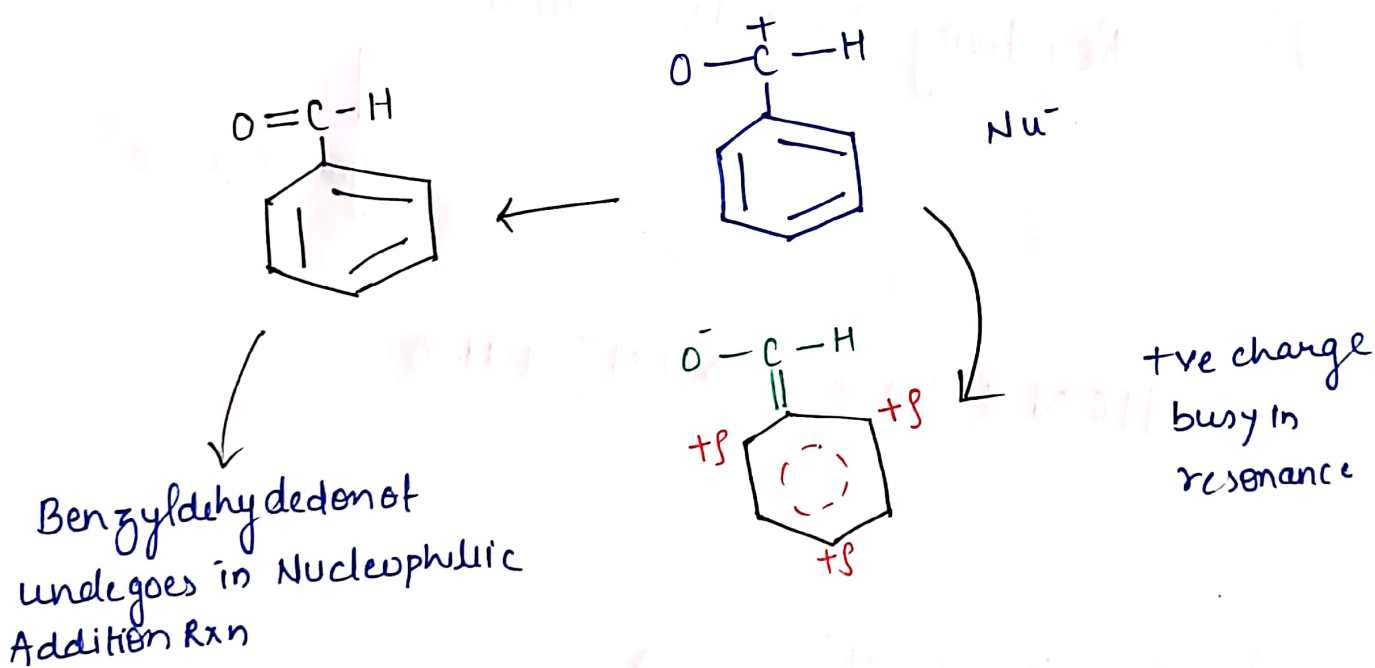
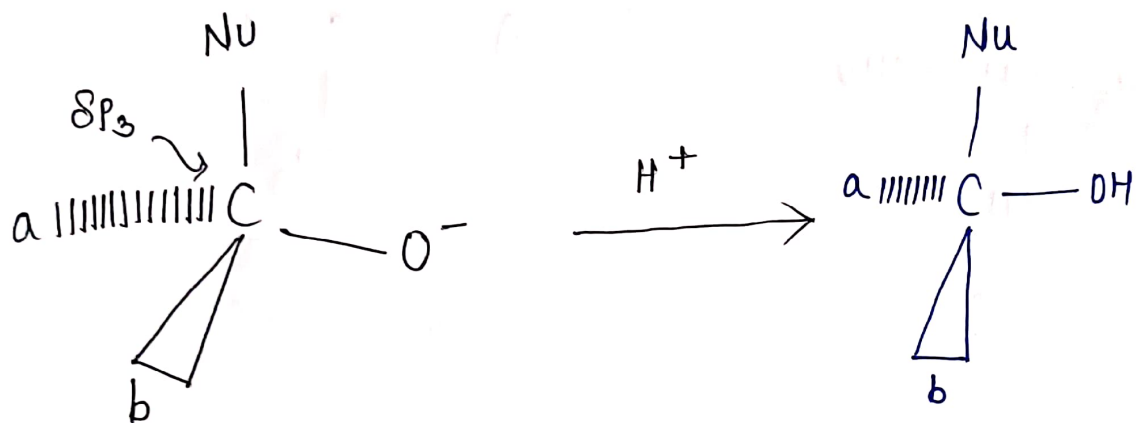
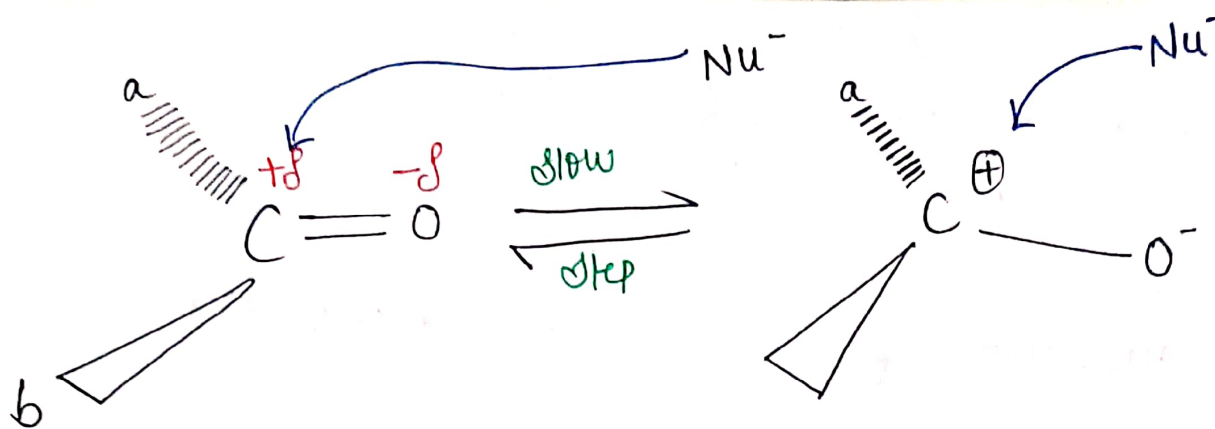
less polar, H bond weak



* Chemical Properties



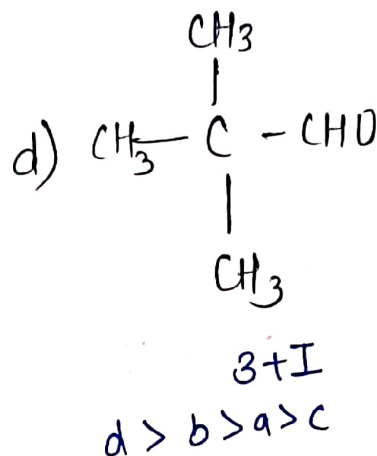
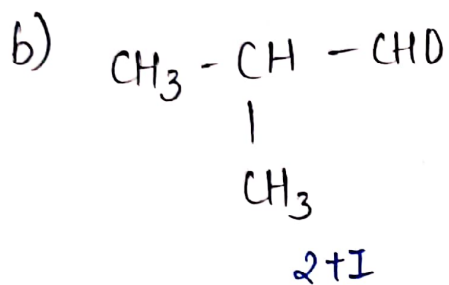
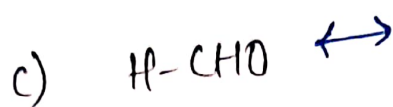
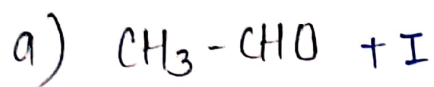
Due to Steric Hindrance



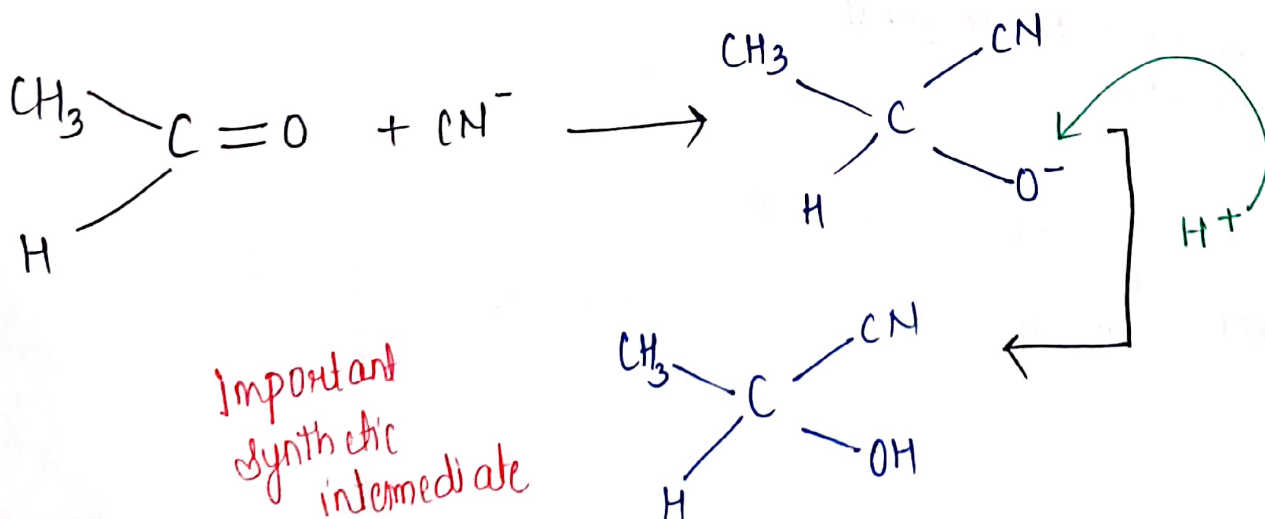
Aldhyde > Ketone > Benzaldehyde

BCO₂ intermediate are carbocation $\propto \frac{+I}{-I}$ $\propto \frac{+m}{-m}$

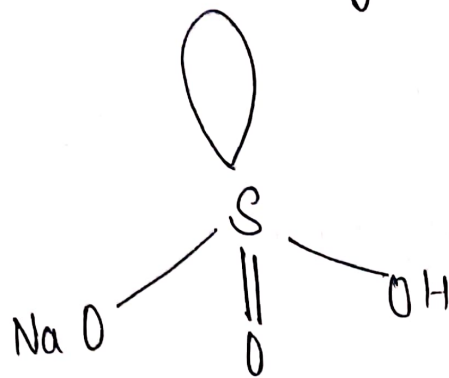
Order of Reactivity of NAR u -



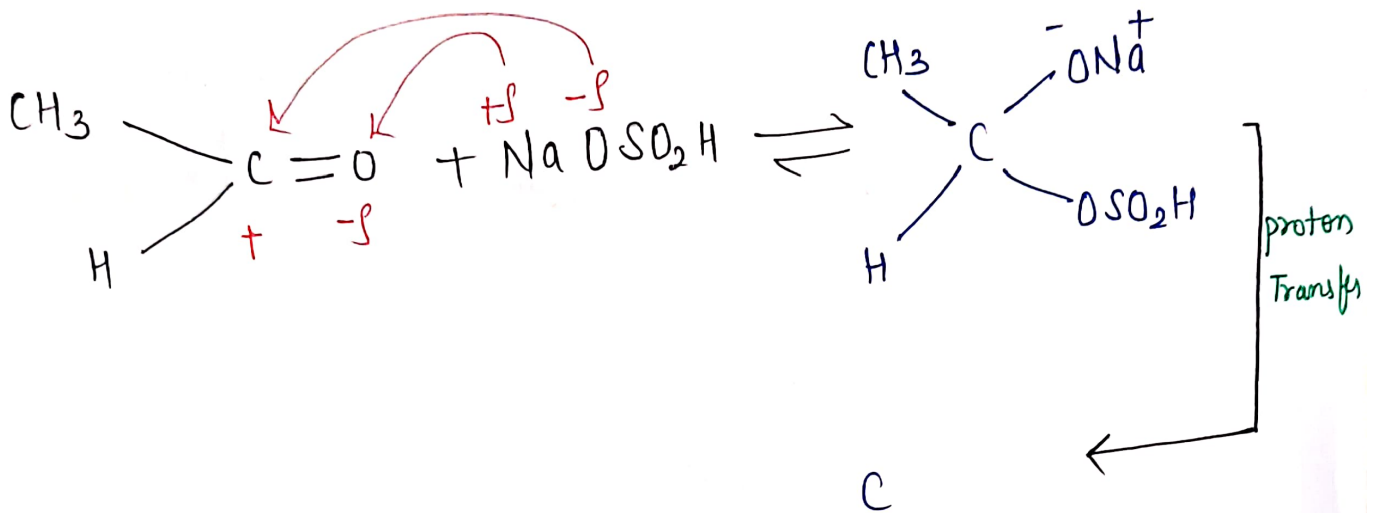
eg ① Reactivity towards -HCN Nitriles
↓
cyanohydrine



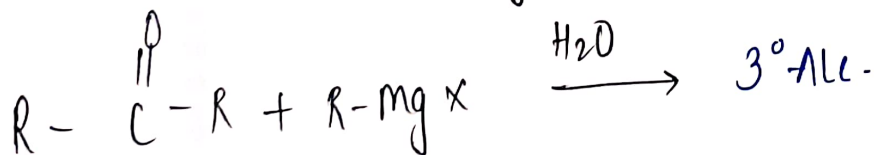
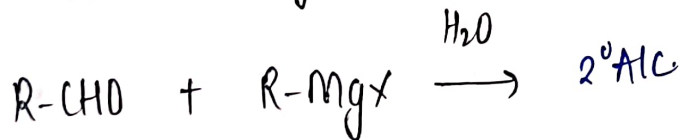
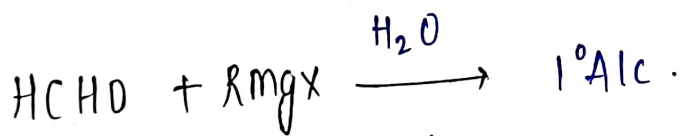
Rxn with Sodium hydrogensulphite.



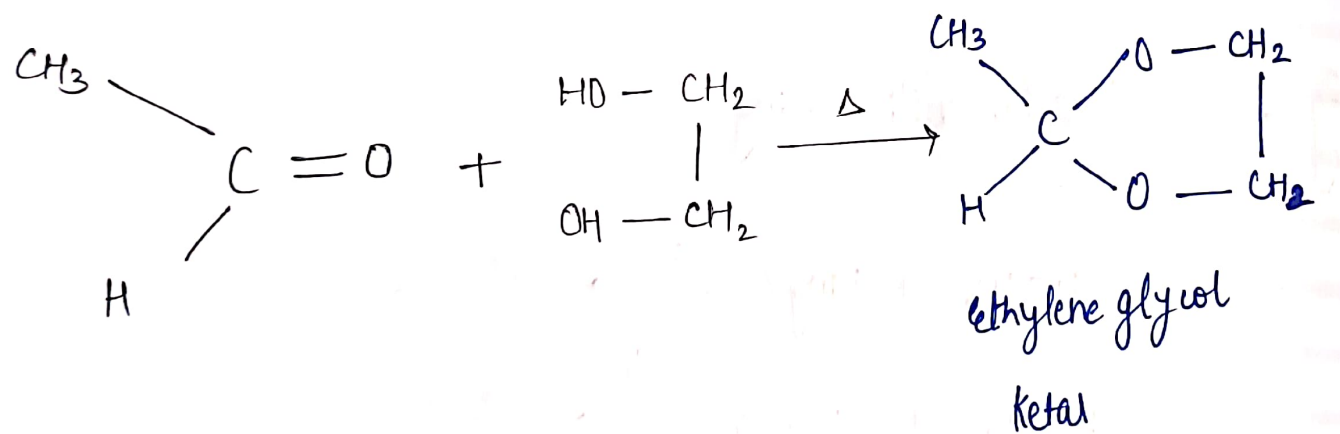
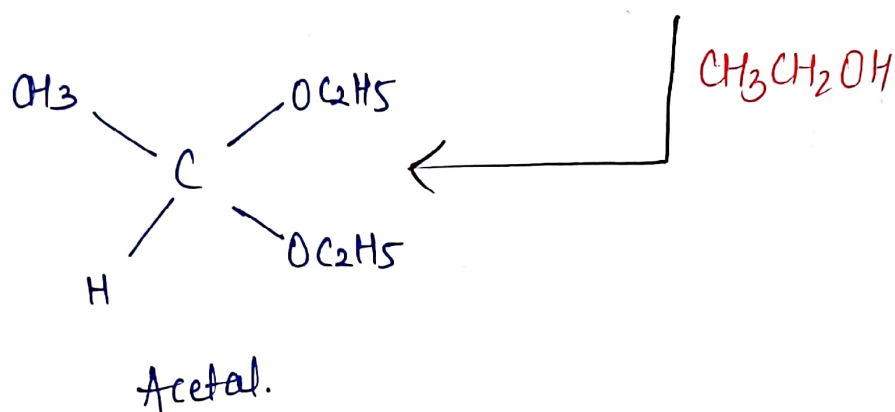
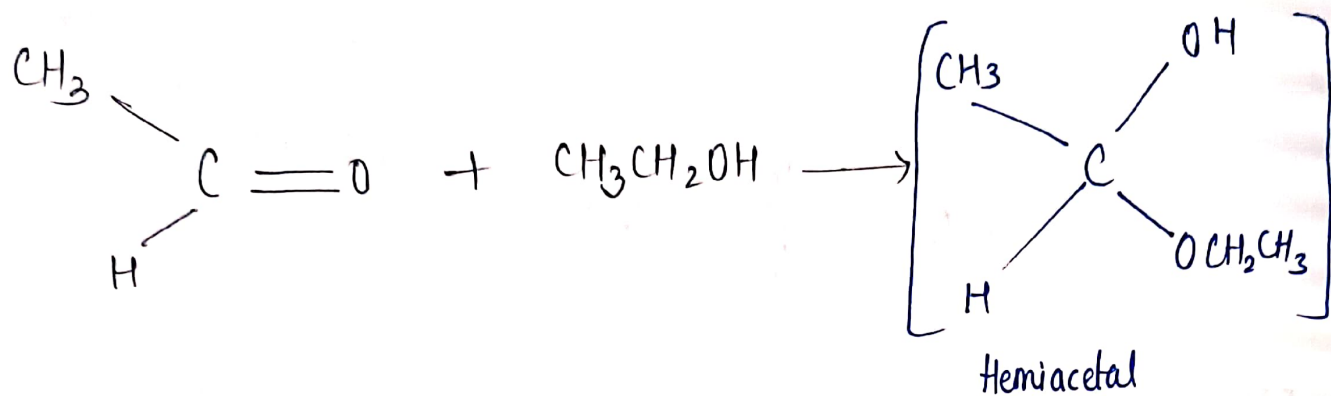
Use for purification of Aldehyde.



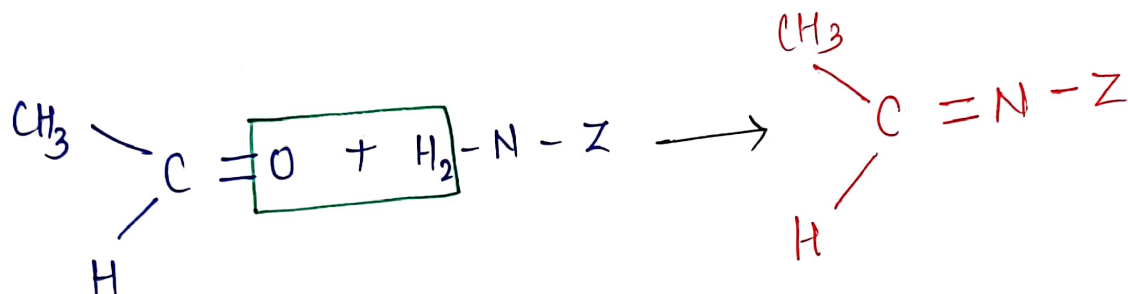
Eg ③ Reaction with $R-Mg-X$



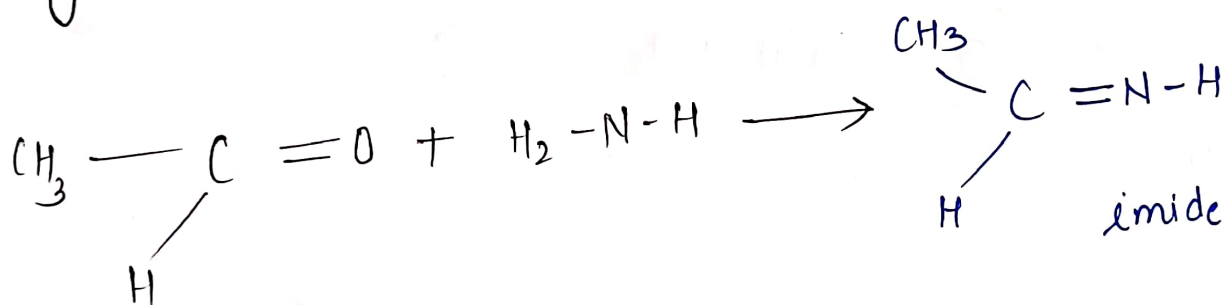
Eq (4) Addition of Alcohol



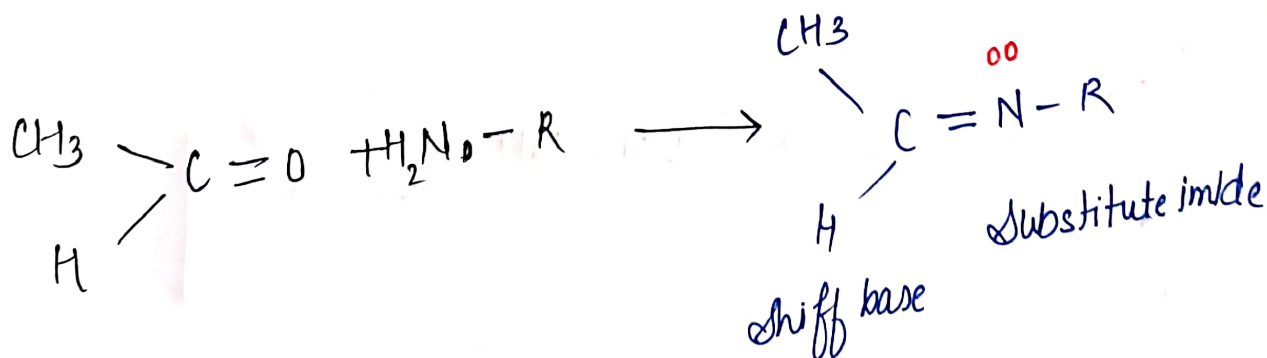
eg. Reaction with Ammonia & its Derivatives



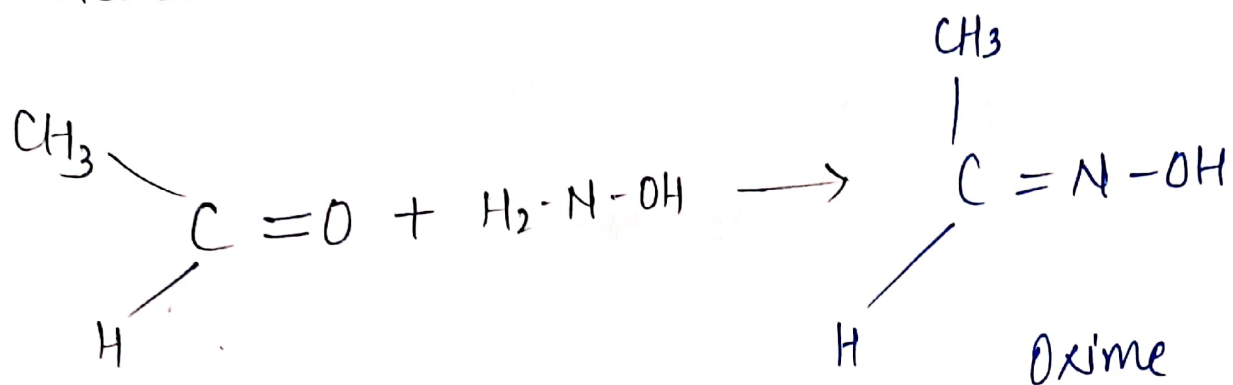
eg. Rxn with NH_3 ammonia



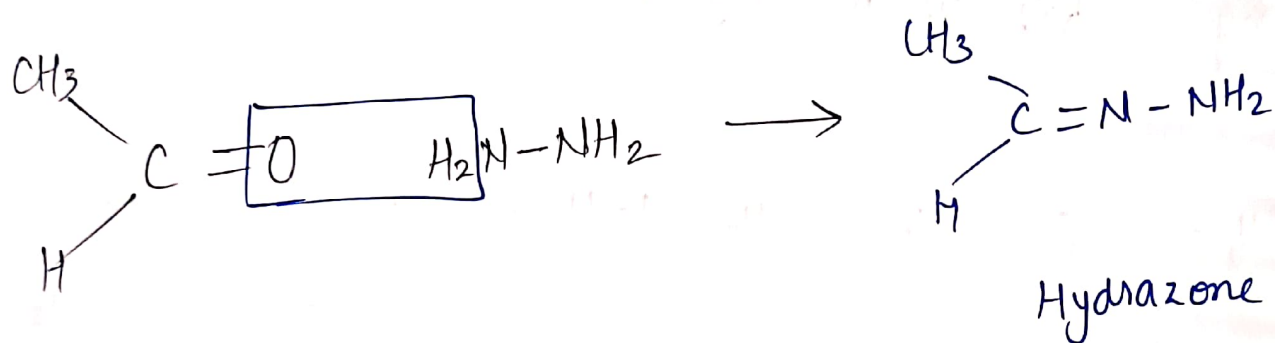
(b) Reaction with Amide $\text{R} - \text{NH}_2$



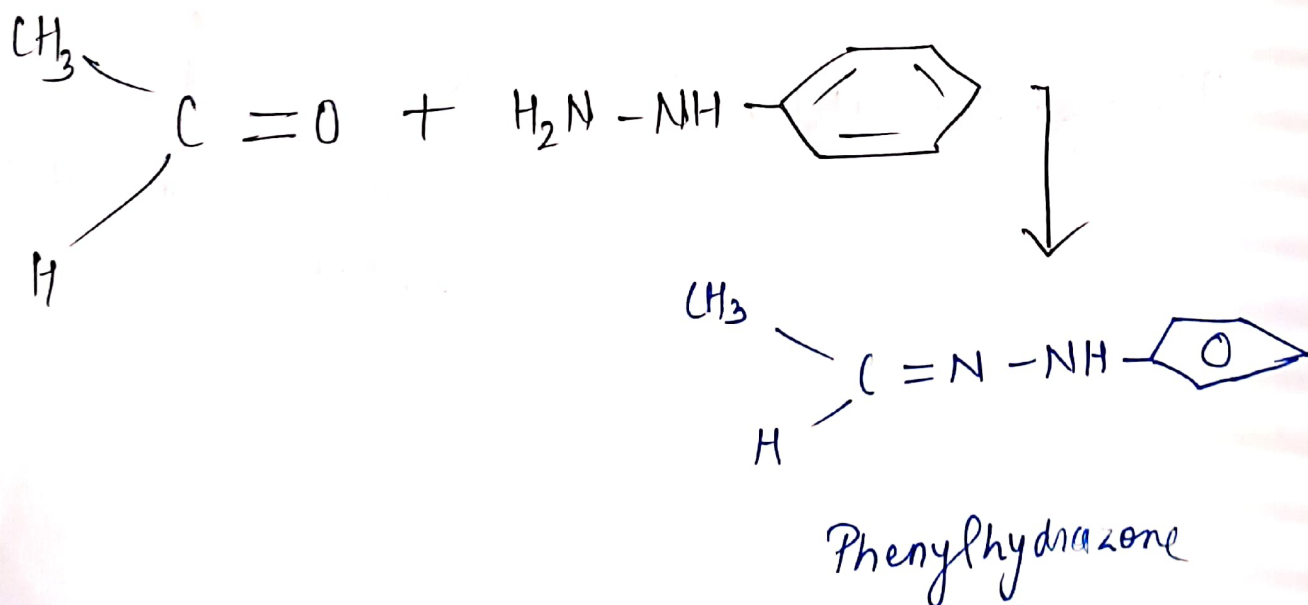
Reaction with $\text{NH}_2\text{-OH}$ (Hydroxylamine)



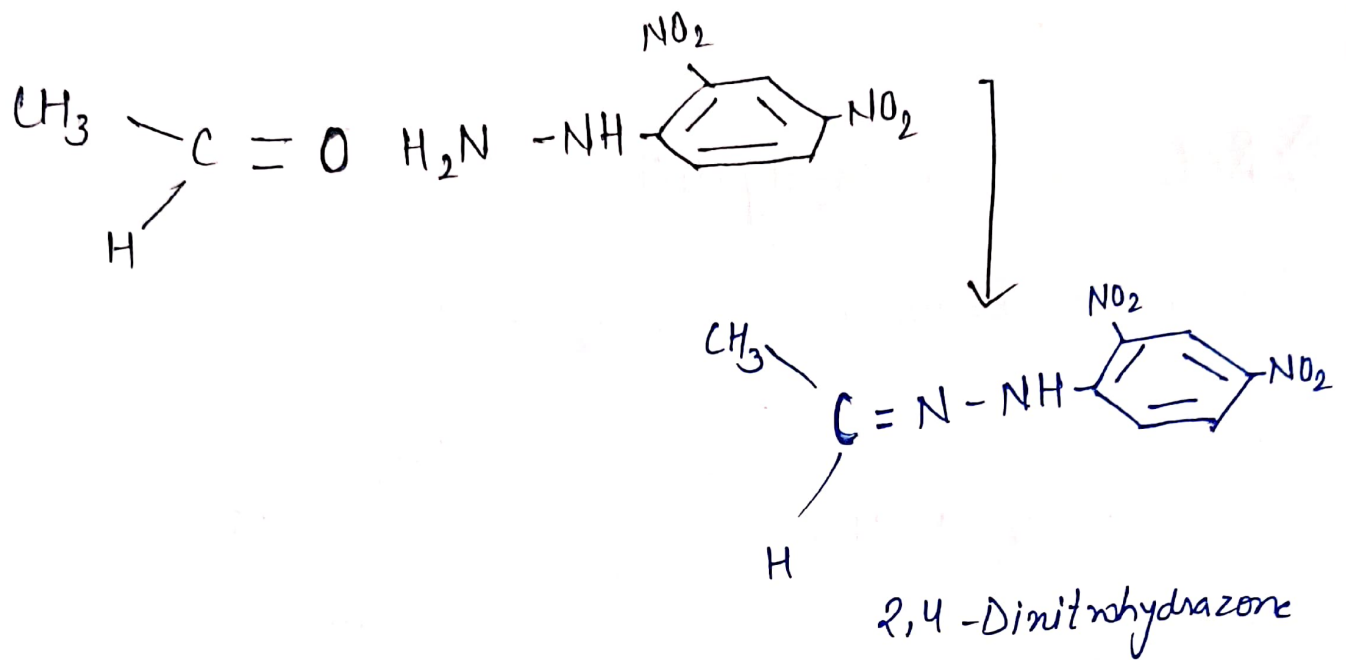
Reaction with hydrazine $\text{NH}_2\text{-NH}_2$



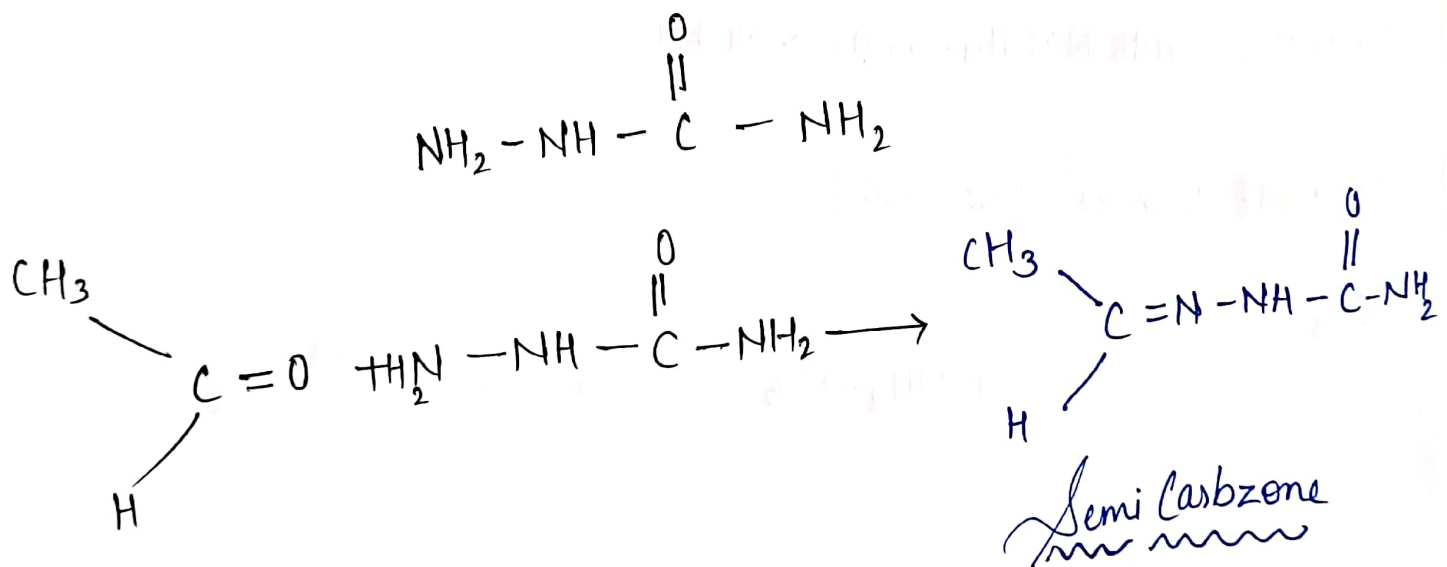
Reaction with Phenylhydrazine $[\text{C}_6\text{H}_5\text{-NH-NH}_2]$



Reaction with 2,4-Dinitrohydrazine



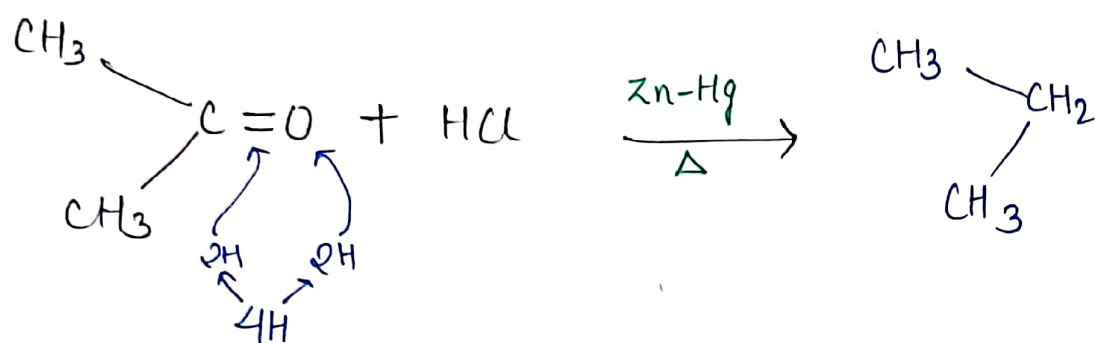
Reaction with Semi Carbazide



Reduction

1) Reduction with Zn-Hg/HCl

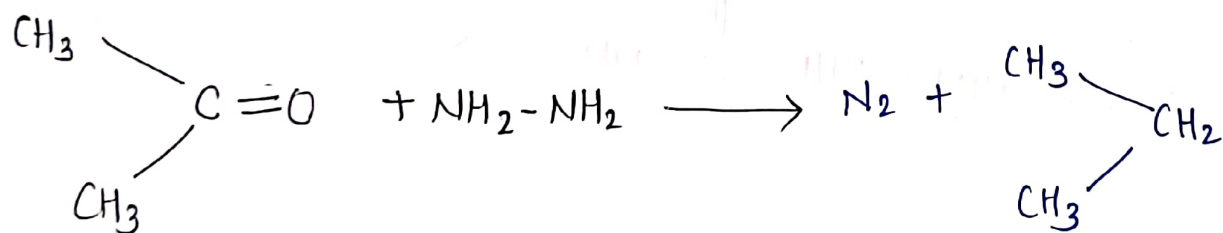
Clemmensen Reduction $\text{ZnCl}_2 - \text{HgCl}_2$



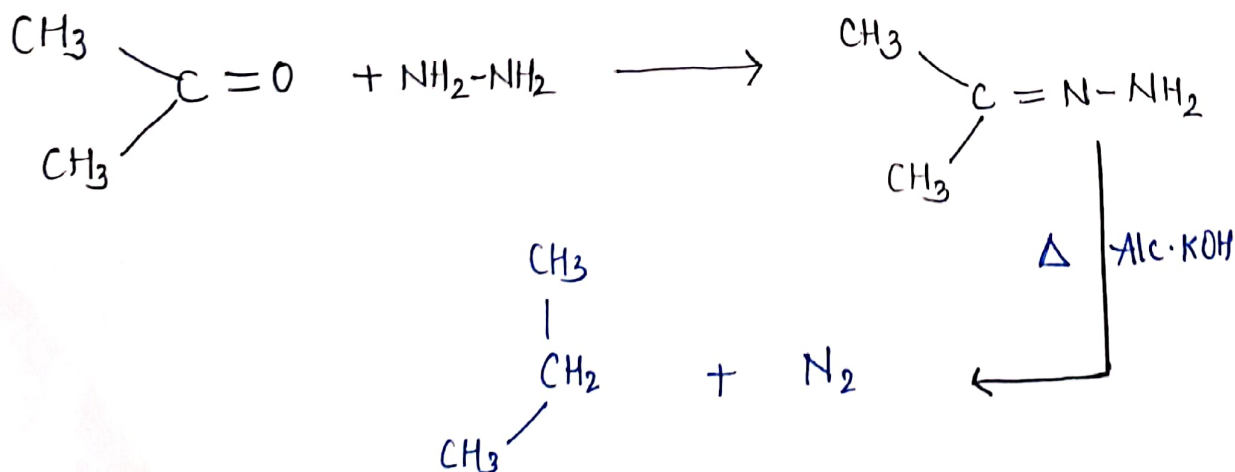
(2) Reduction with $\text{LiAlH}_4 \rightarrow 4\text{H} \rightarrow \text{Alkanes}$

Reduction with $\text{NaBH}_4 \rightarrow 2\text{H} \rightarrow \text{Alcohol}$

(3) Wolf Kishner $[\text{NH}_2-\text{NH}_2]$



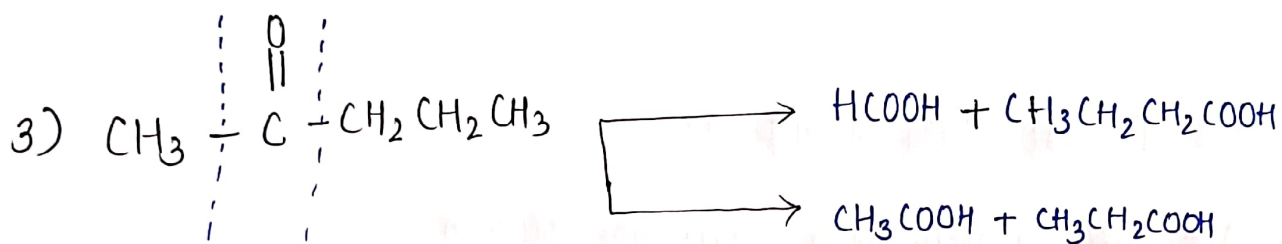
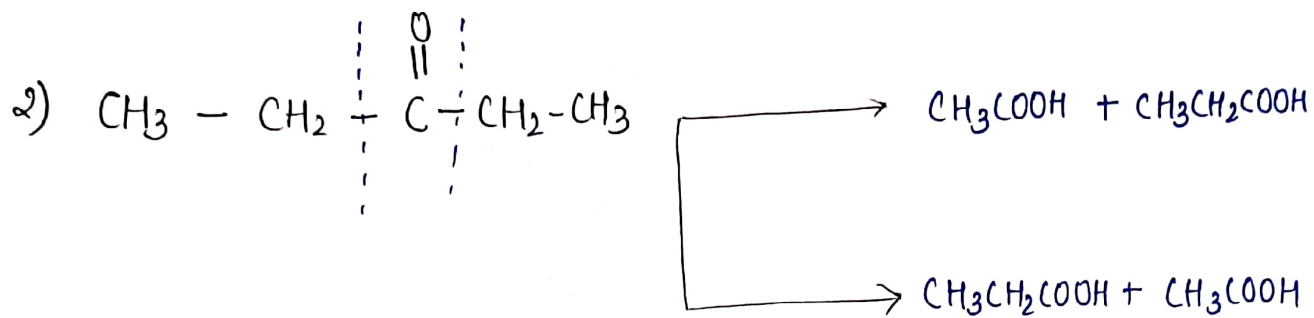
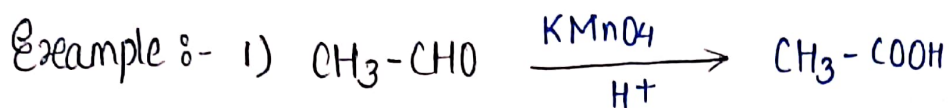
Two Step Process



Oxidation

Aldehyde $\rightarrow$ Acid

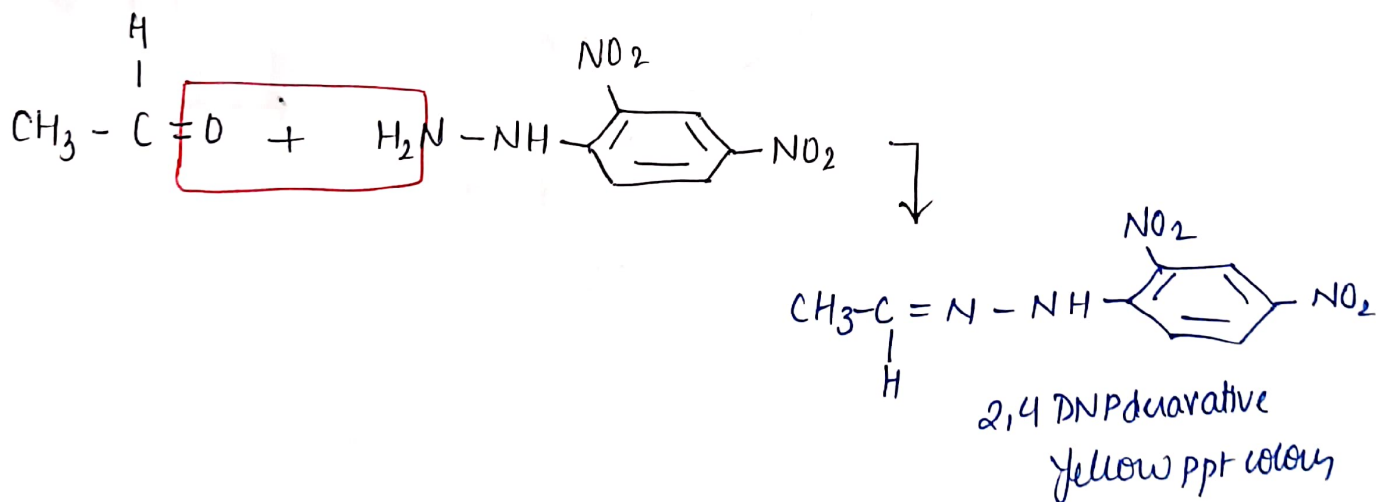
Ketone $\rightarrow$ 2 Acid different



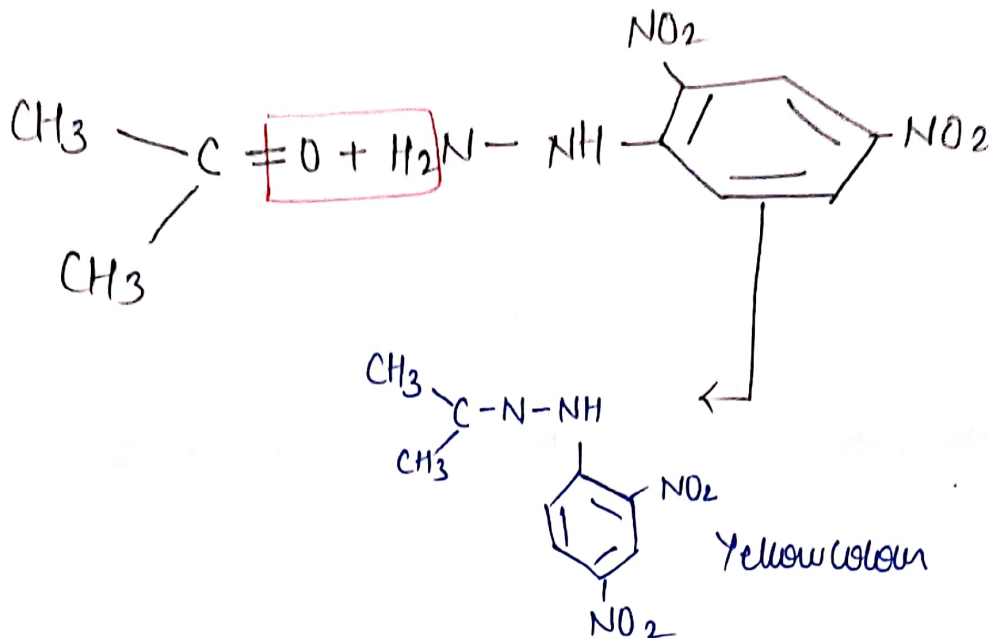
Test of Aldehyde and Ketone

① 2,4 DNP Test - yellow colour ppt

$\rightarrow$ Both Aldehyde and Ketone

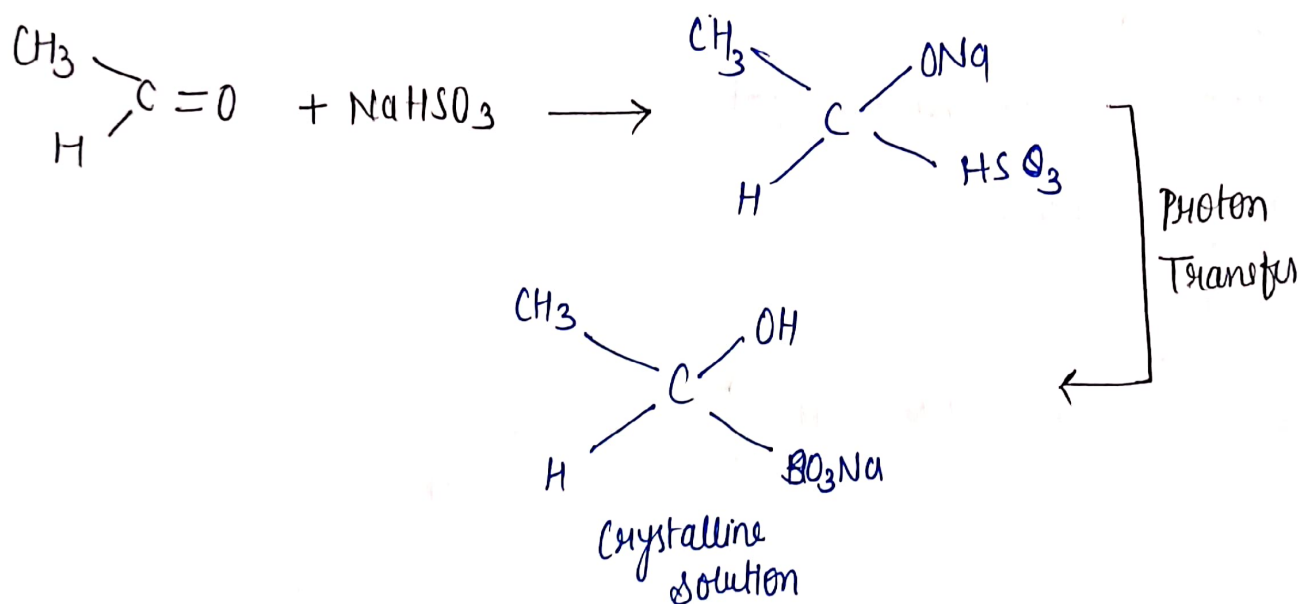


Eg



(2) NaHSO₃ Test solution Bisulphate Test

→ Test of Aldehyde and ketone both Crystalline solution



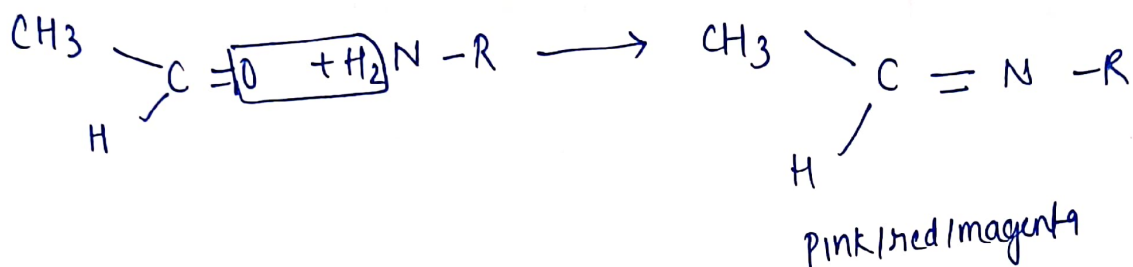
(3) Schiff Test (Schiff Base)

Dilute solution of
p-rosaniline hydrochloride

→ Reaction with R-NH₂

→ Test of only aldehyde

→ Pink, red, magenta → SO₂ gas evolve green brown colour



(4) Fehling Test

Fehling A
aqueous CuSO₄

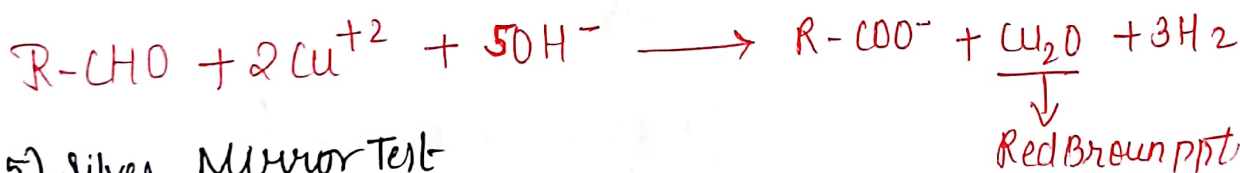
Fehling B

potassium sodium tartrate / Rochell Salt

→ Non aromatic aldehyde

→ Formic acid also gives this Test

→ color - red brown ppt



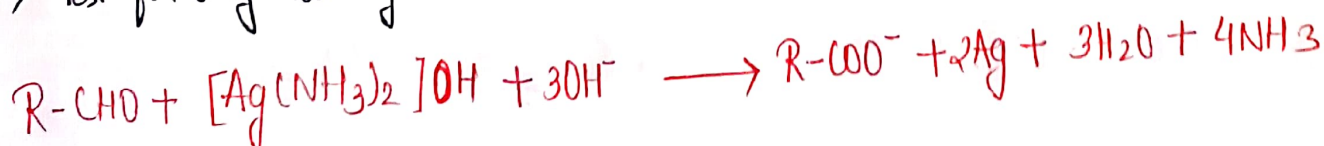
(5) Silver Mirror Test

Tollen Test

→ Tollen Reagent [Ag(NH₃)₂]OH

→ colour Reagent silver colour ppt

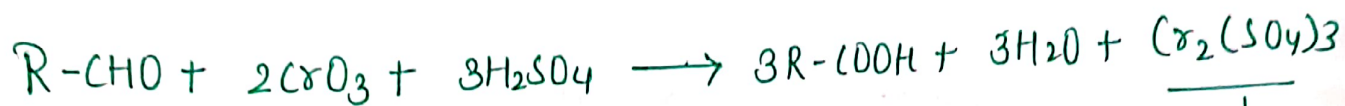
→ Test for only aldehyde.



(6) Chromic Acid Test

→ Test for confirm aldehyde

→ green colour → $\text{CrO}_3 + 3\text{H}_2\text{SO}_4$

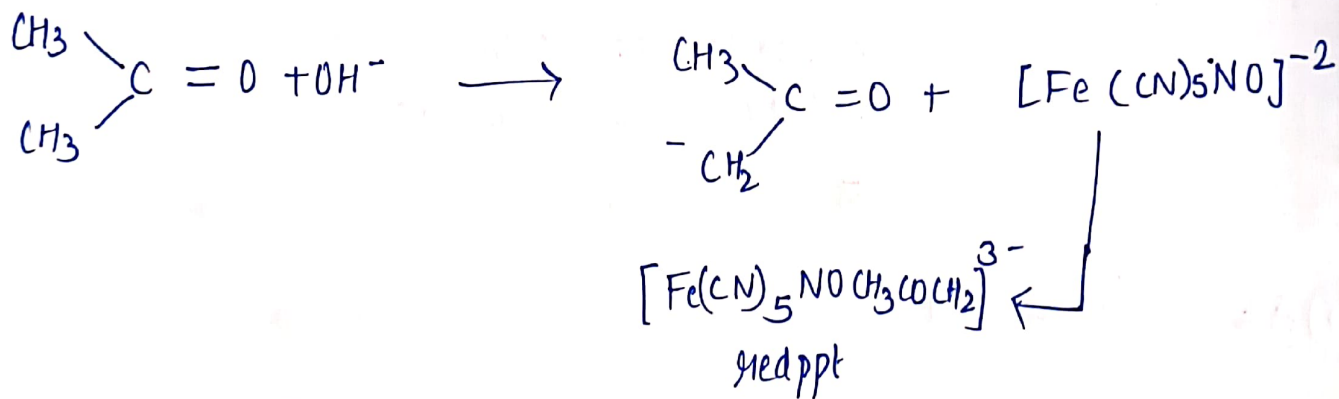


Blue colour ppt ← green colour solution

(7) Sodium Nitroprusside Test

→ Test of Ketone → $[\text{Fe}(\text{CN})_5\text{NO}]^{2-}$ → Basic medium

→ red colour

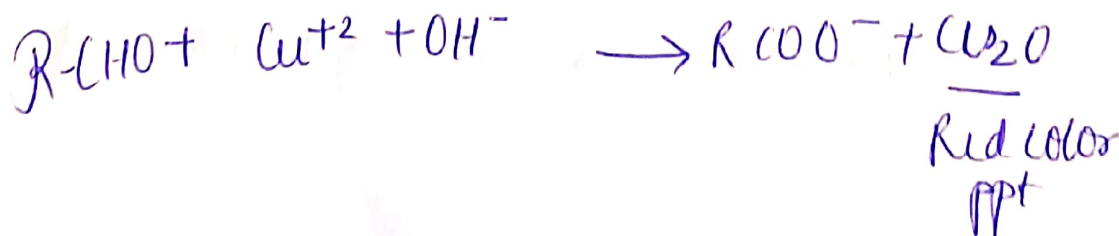


(8) Benedict Test

→ Test of only aldehyde

→ CuSO_4 + Sodium citrate + NaOH

→ colour Cu_2O [cuprous oxide + Red colour]



(9) Haloform Test

—(CH₃)— only free methyl can give this Test

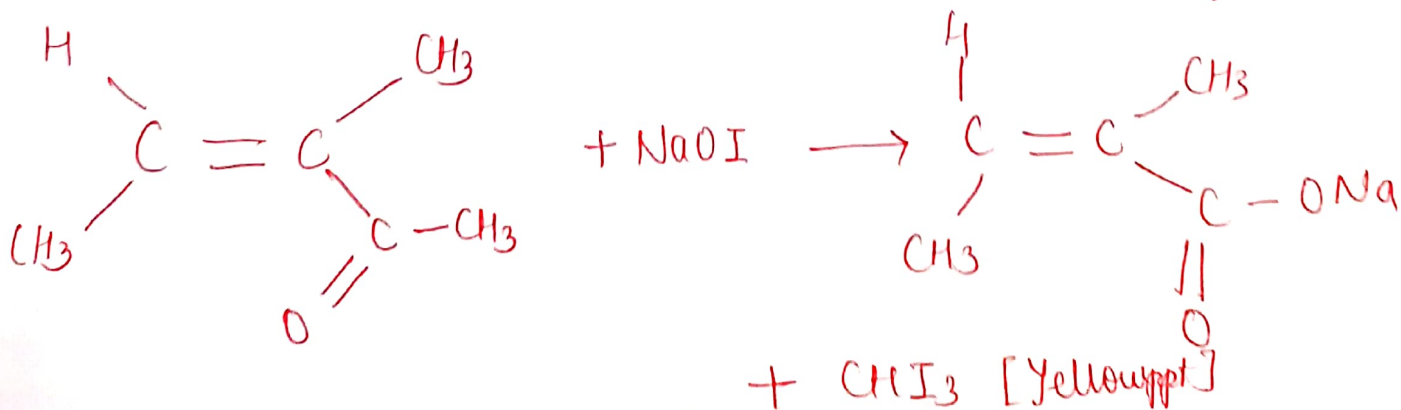
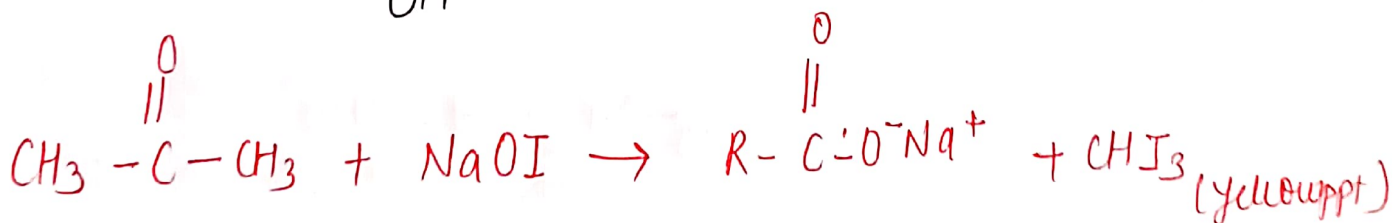
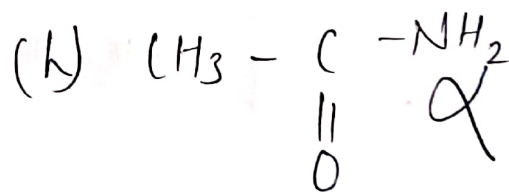
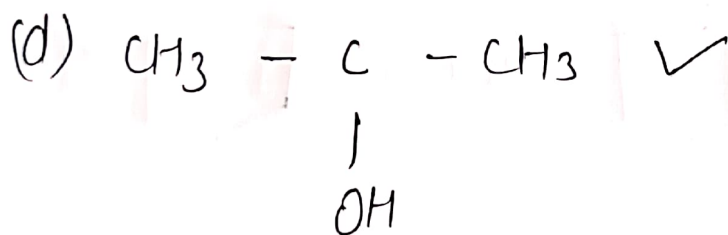
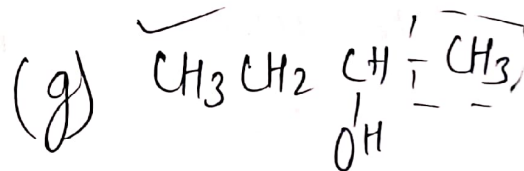
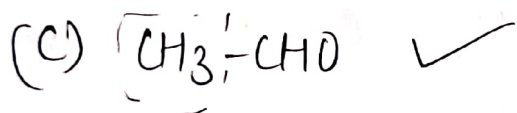
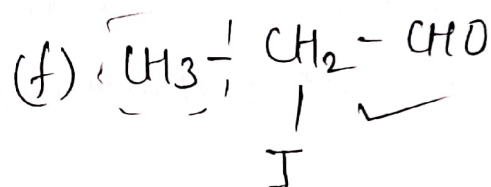
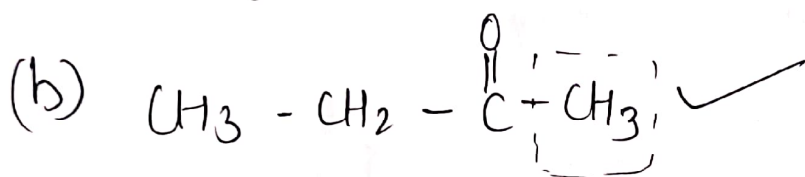
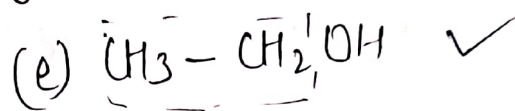
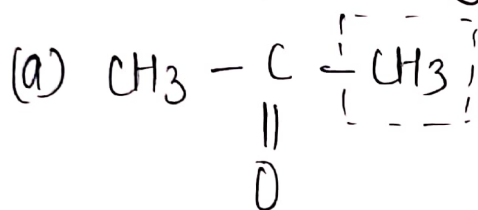
(1) CHCl₃ Chloroform [colorless liquid]

(2) CHBr₃ Bromoform [Brown color liquid]

(3) CHI₃ Iodoform [Yellow solid ppt]

→ Reagent (NaOI)

Q which following compounds can give Haloform Test



Reaction Due to α Hydrogen

① Nucleophilic addition Reaction

② Reduction

③ Oxidation

④ Reaction due to α H

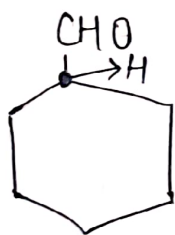
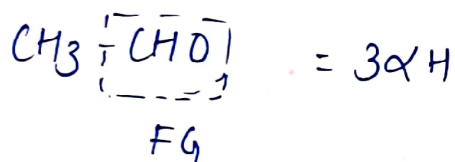
⑤ Other Reaction

Reaction due to α Hydrogen

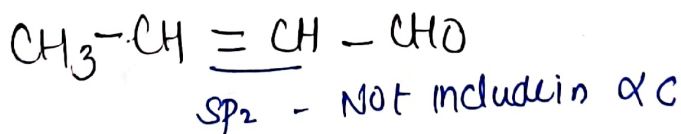
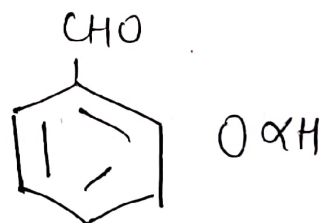
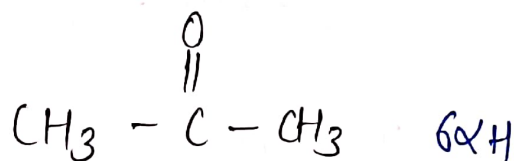
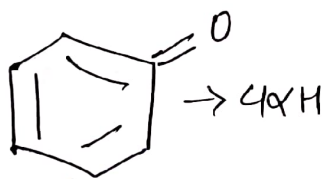
→ dil. NaOH / Strong base

→ α Hydrogen Aldehyde / Ketone

Ca(OH)₂
Ba(OH)₂
KOH



$\alpha\text{H} = 1$



① Aldol Reaction $\rightarrow$ β hydroxy Aldehyde

$\searrow$ Aldol condensation [enal]
product

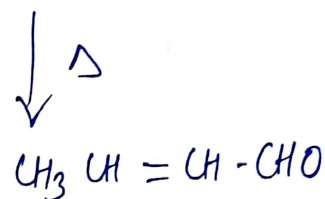
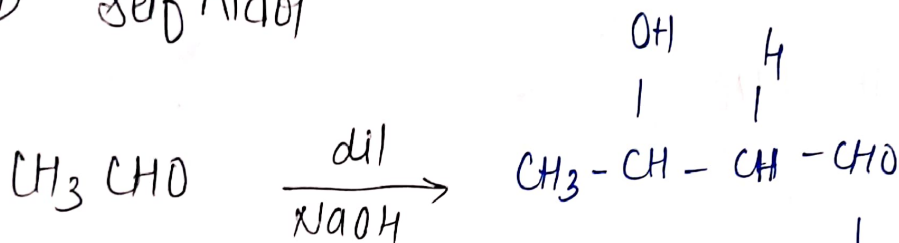
$-H_2O$ [α, β elimination]

② ketol Reaction $\rightarrow$ β Hydroxy ketone

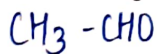
Ketol Condensation
product

$-H_2O$ α, β
[enone]

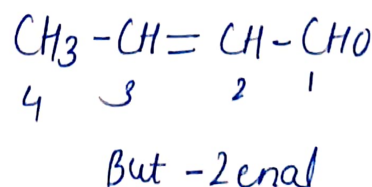
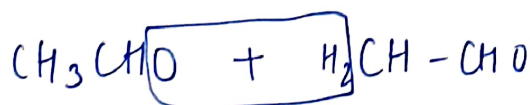
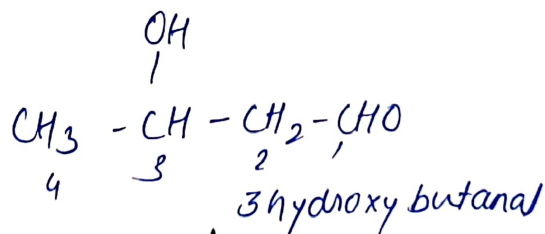
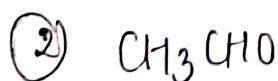
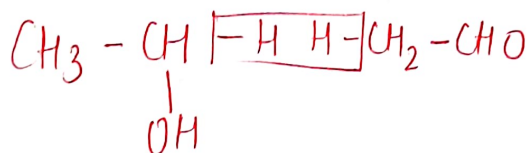
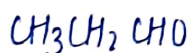
eg. ① Self Aldol

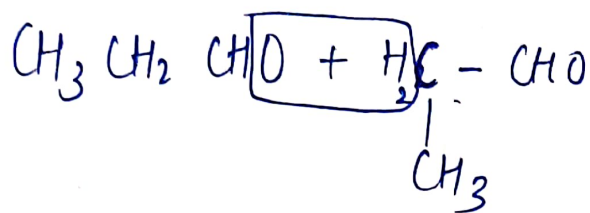
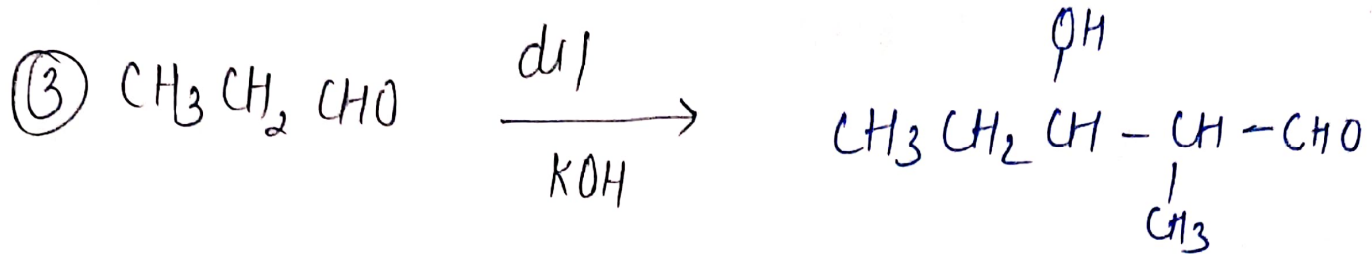


Rough

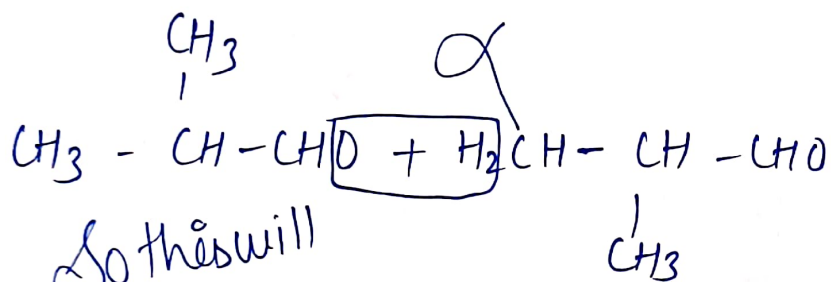
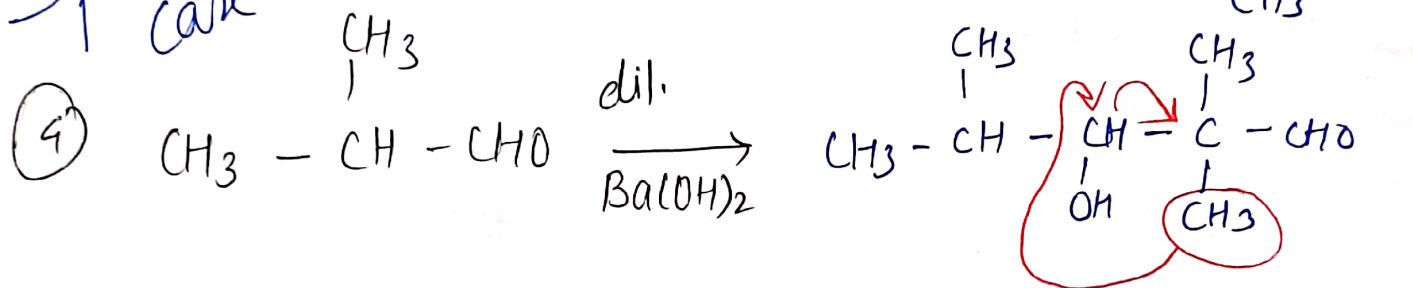


$\downarrow$ Reduction

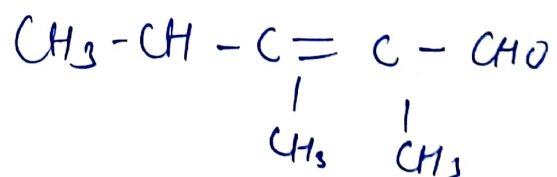
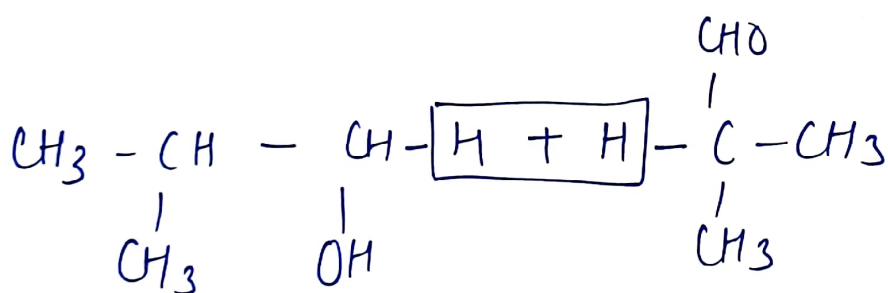
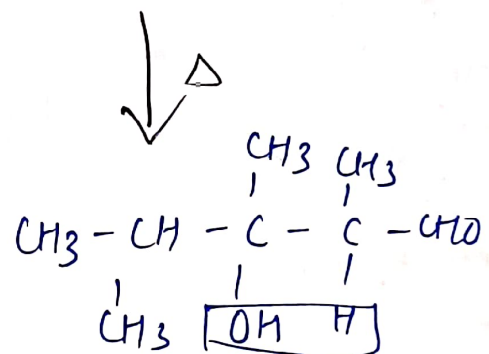




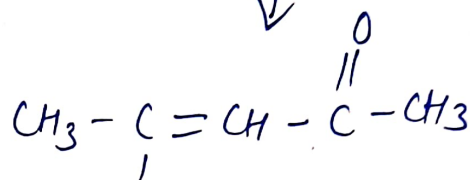
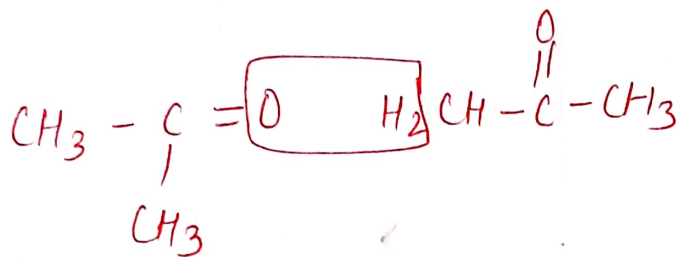
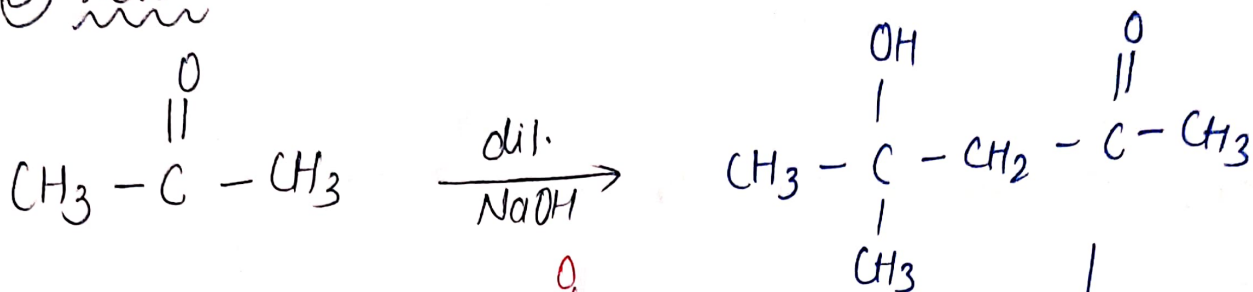
Special case



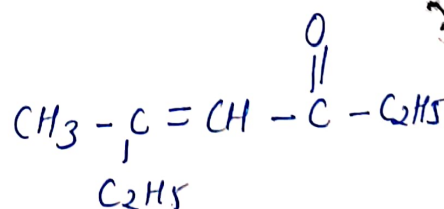
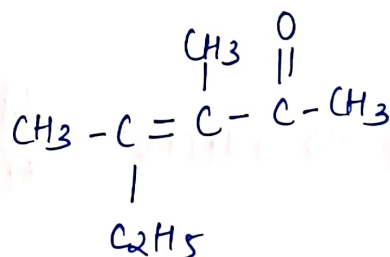
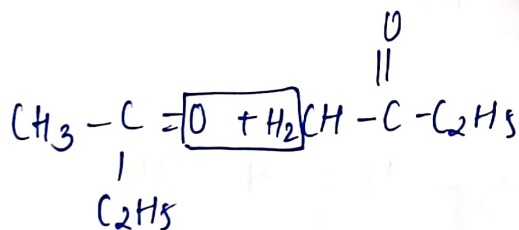
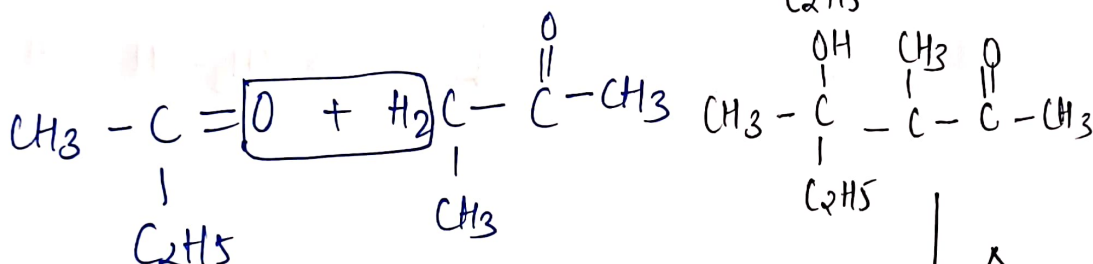
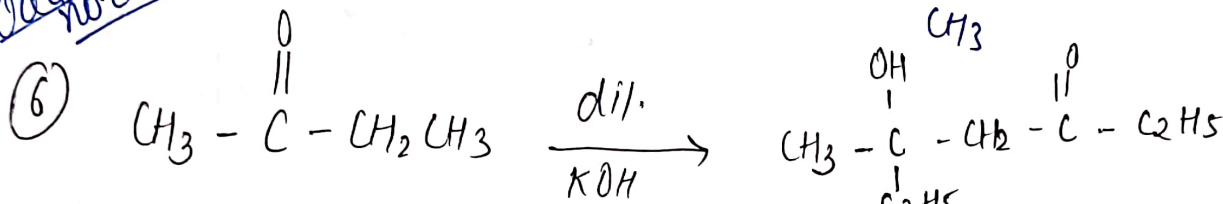
So this will not be done



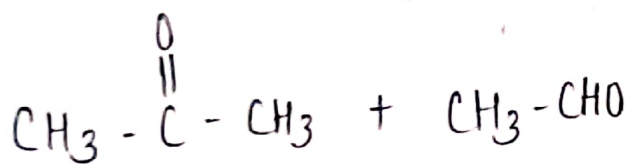
⑤ Ketol



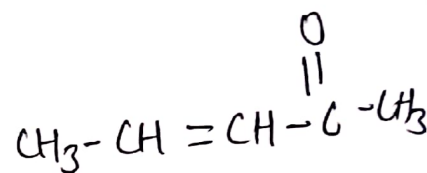
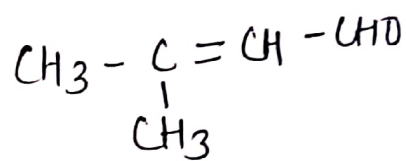
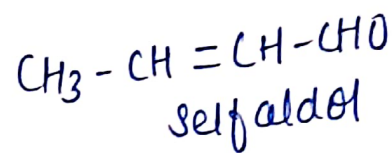
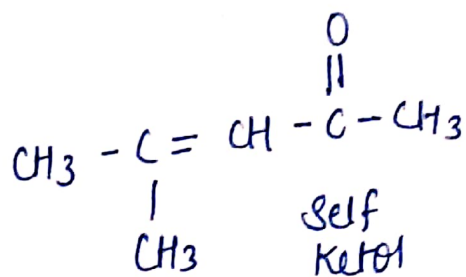
odd no. carbon



Cross Aldol / Ketol

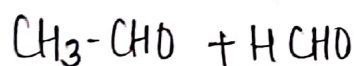


dil. NaOH

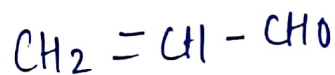
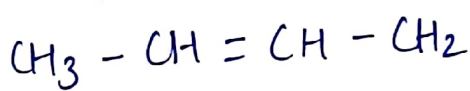


Imp

α H present + NO α Hydroge

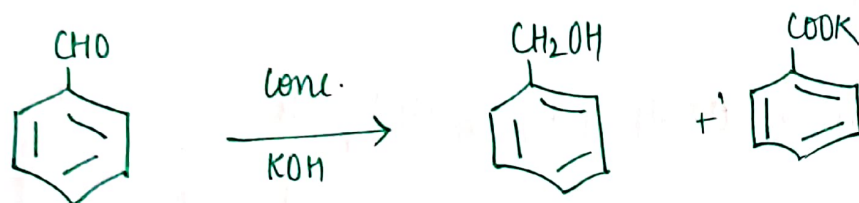
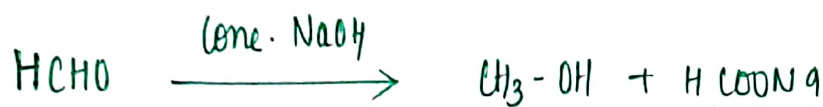


dil
KOH

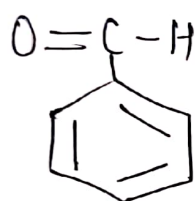


Other Reaction - No α Hydrogen present

Cannizzaro Reaction $\rightarrow$ $\text{Con KOH} / \text{NaOH} / \text{Ba(OH)}_2$

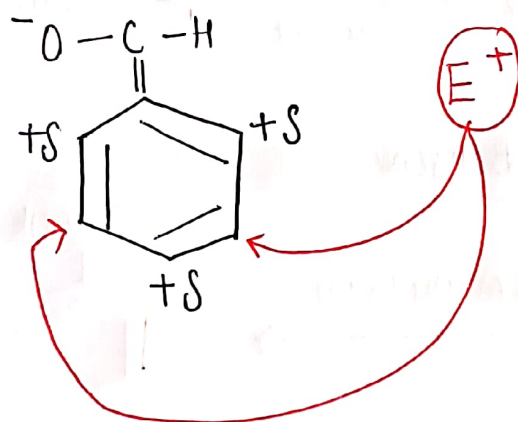


* Electrophilic Substitution Reaction

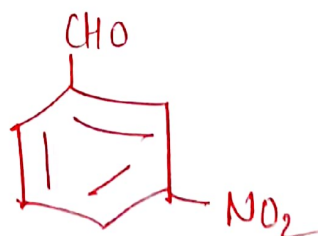
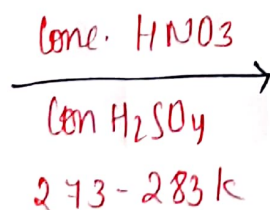
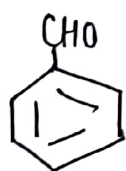


(-M) are deactivation
E S Reaction

They are aldehyde and ketone



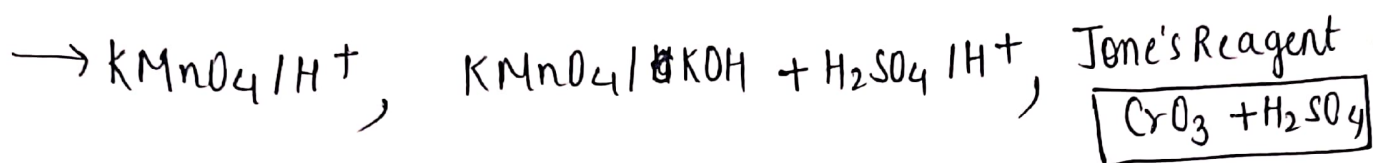
Nitration



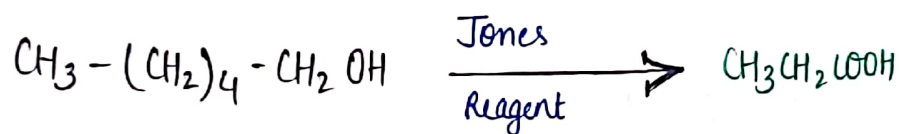
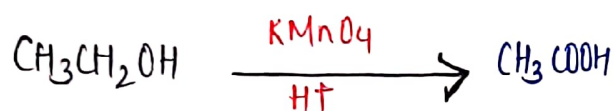
m-Nitro benzaldehyde

Carboxylic Acid

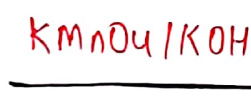
Methods of preparation



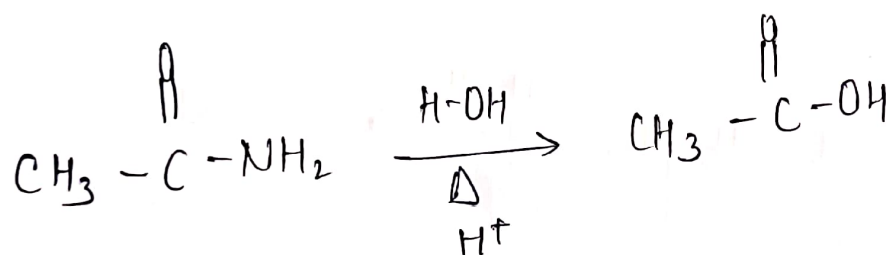
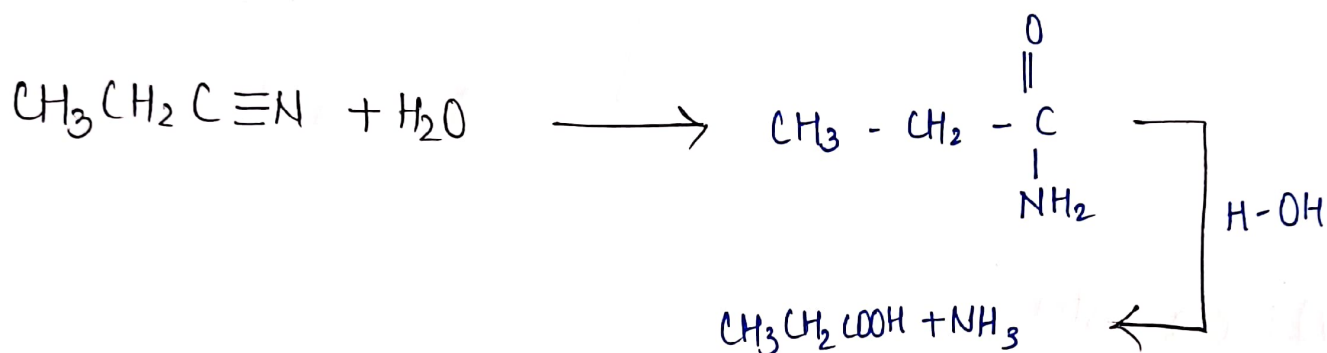
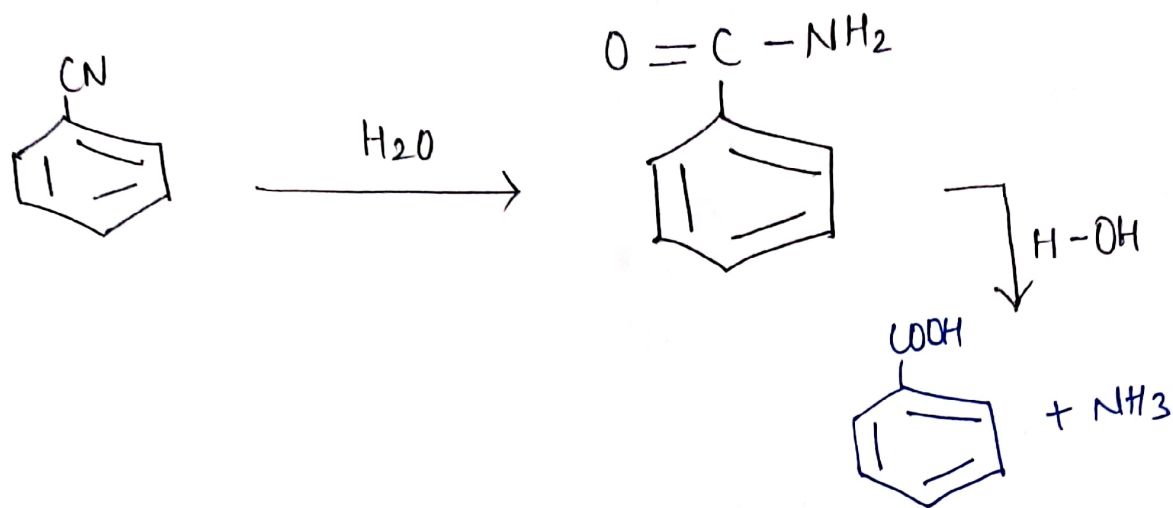
(1) From Alcohol



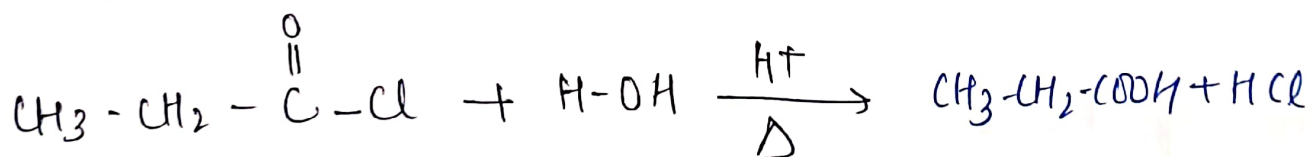
(2) From Alkyl Benzene



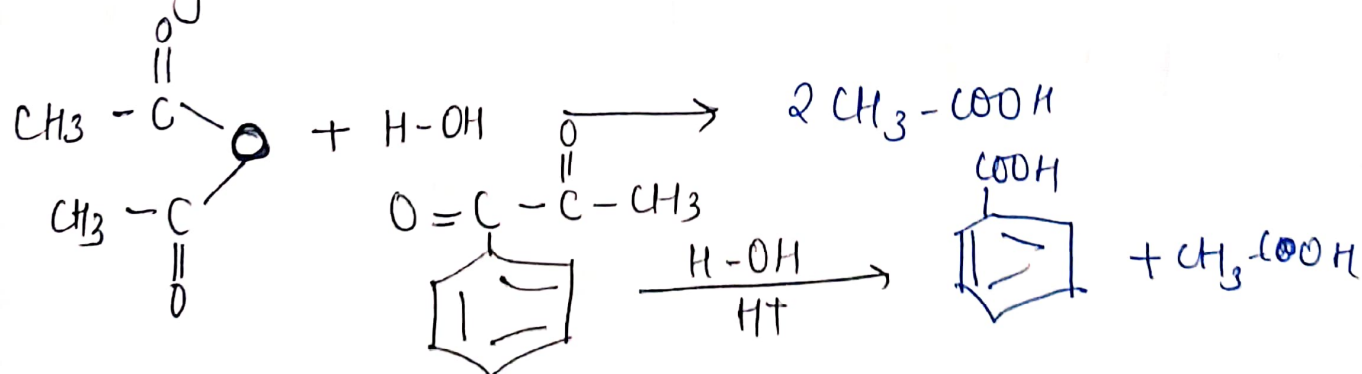
(3) Nitriles/Amides.



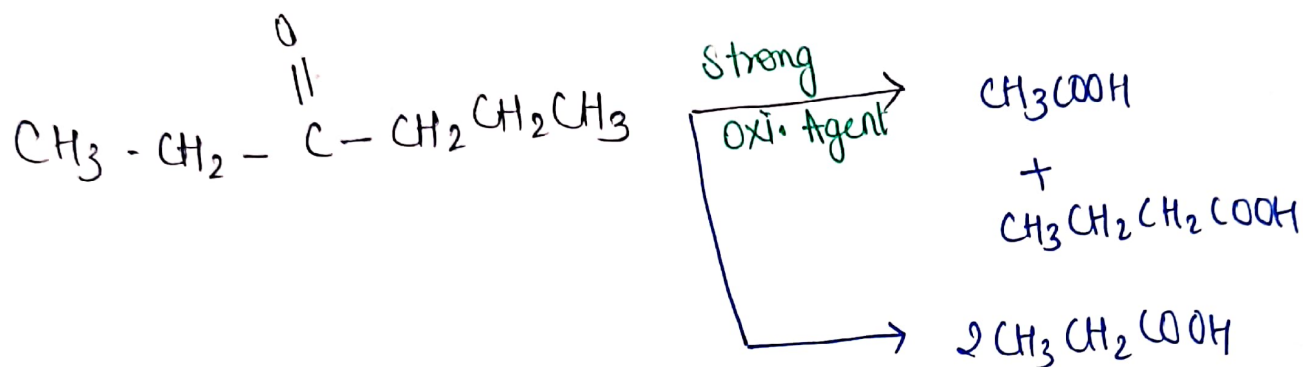
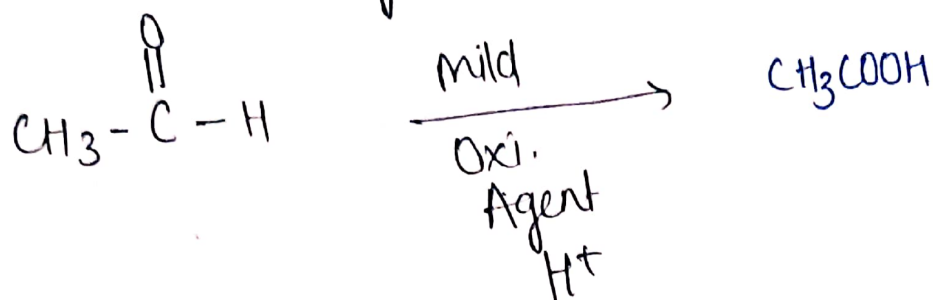
(4) From Acyl chloride



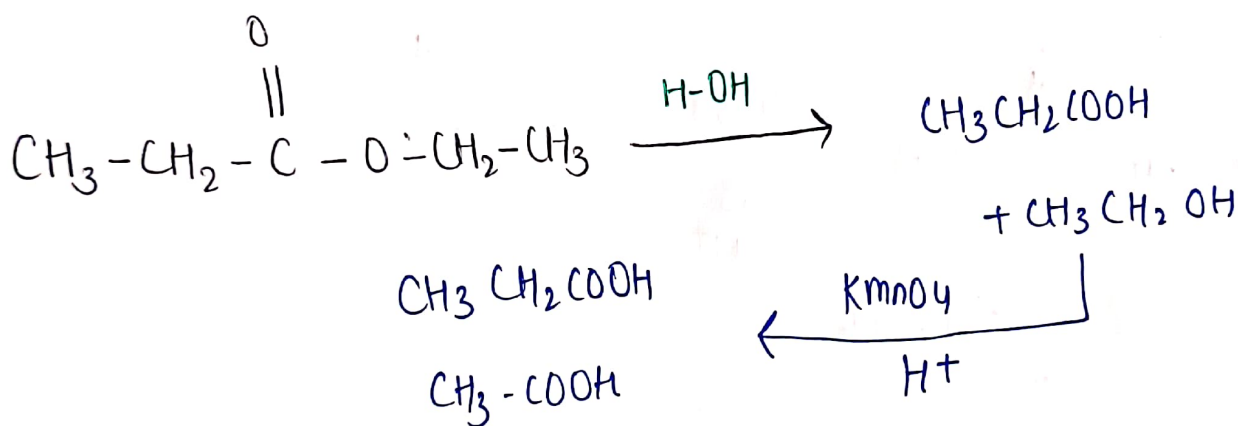
(5) From Anhydride



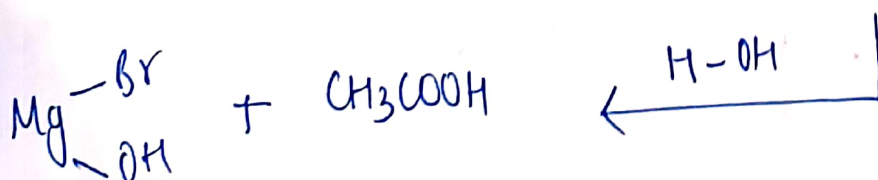
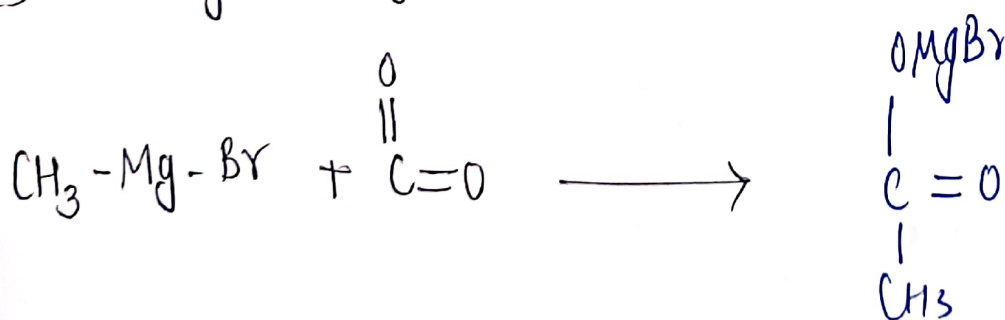
(6) From Aldehyde/ketone



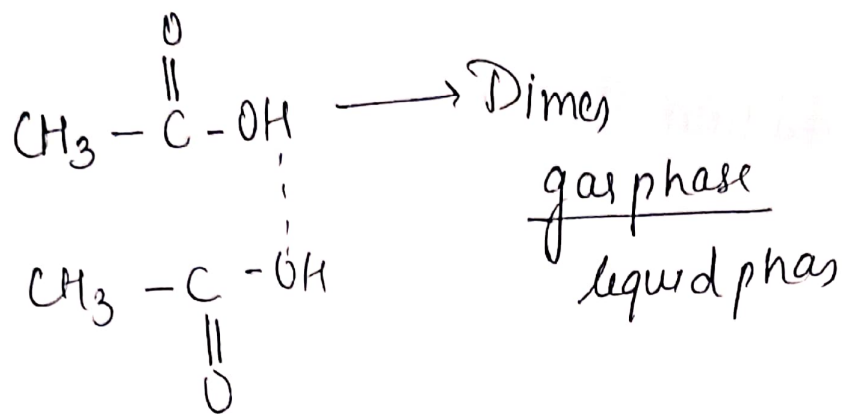
(7) From Ester



(8) From Grignard Reagent



Physical Properties



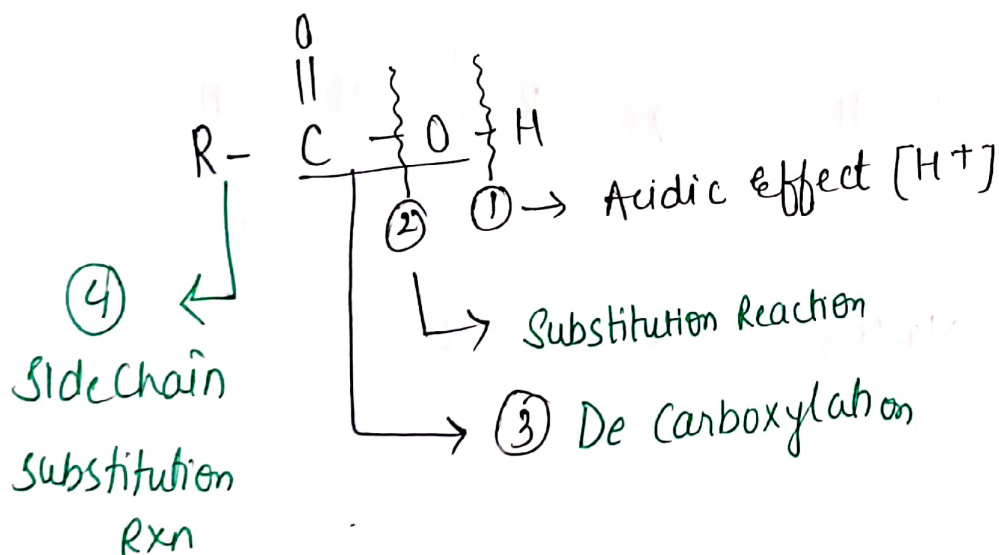
melting point | Boiling point | freezing point

alcohol < acid
2 C 2 C

Solubility $\propto$ H bond

Alcohol < Acid

Chemical Properties



Reaction due to α -hydrogen

1) Nucleophilic addition Reaction

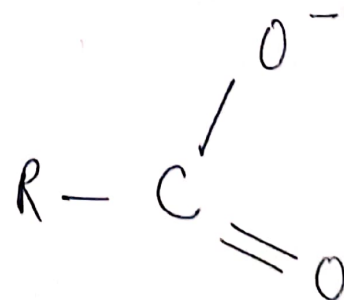
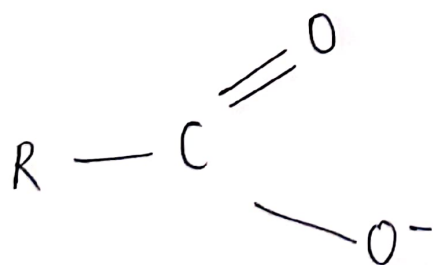
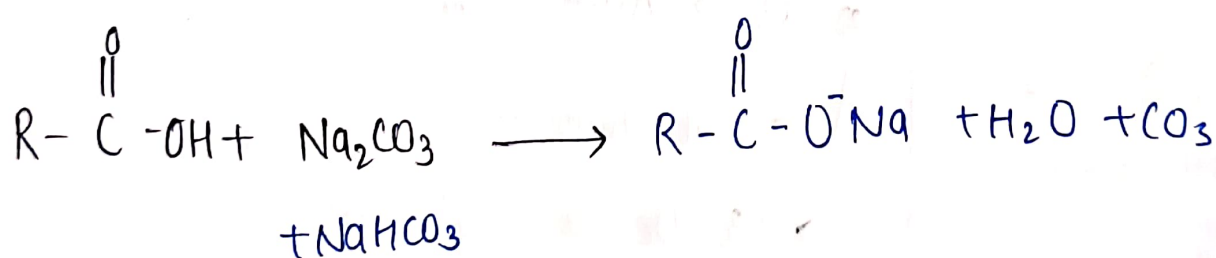
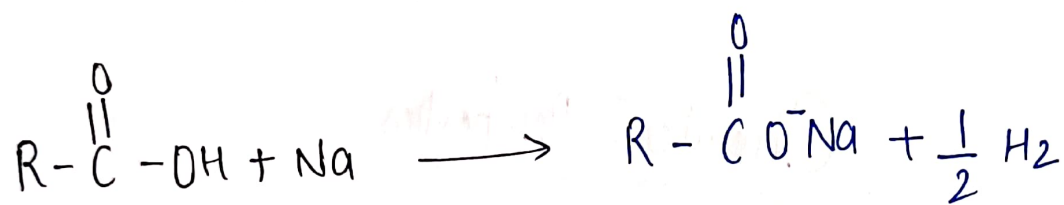
2) Reduction

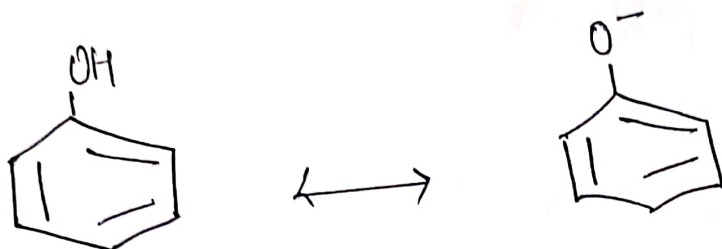
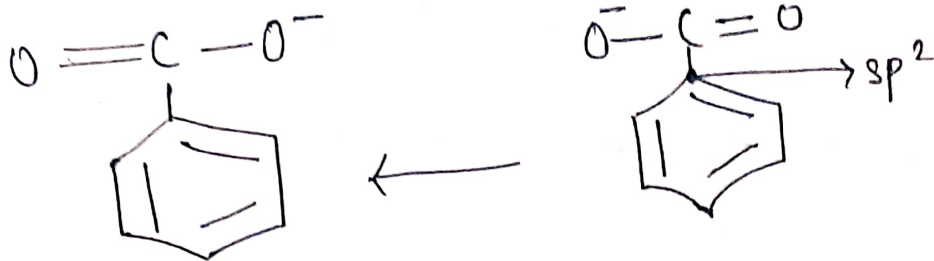
3) Oxidation

4) Reaction due to α -H

5)

① Acidic effect of carboxylic Acid

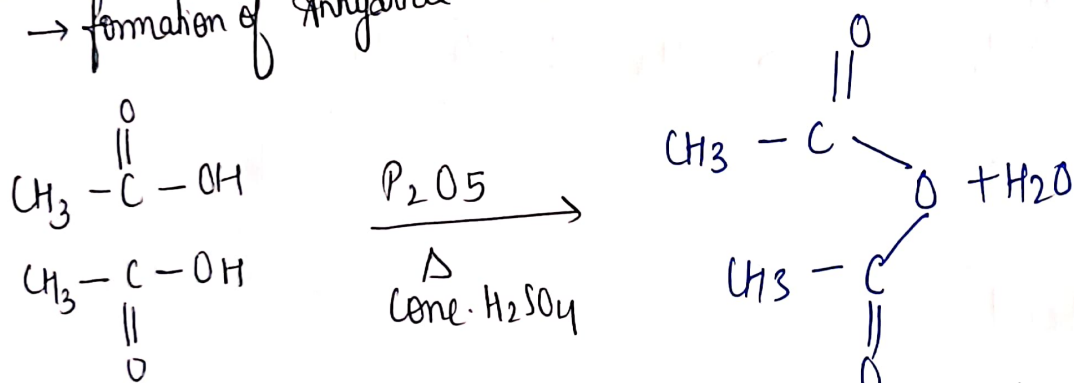




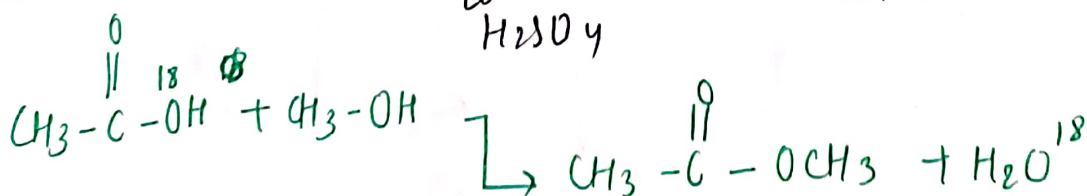
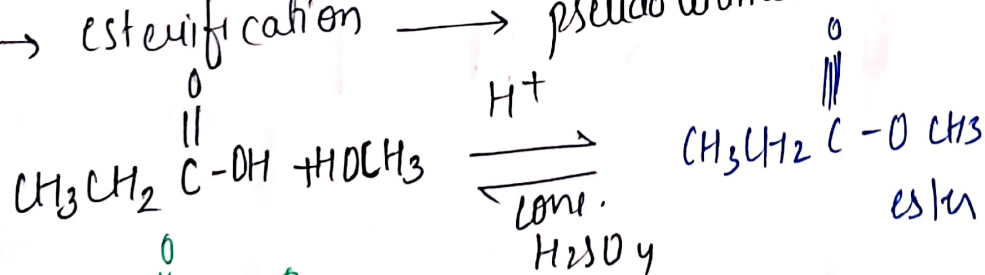
- Phenol is more acidic than alcohol
- Benzoic acid is more acidic than aliphatic acid

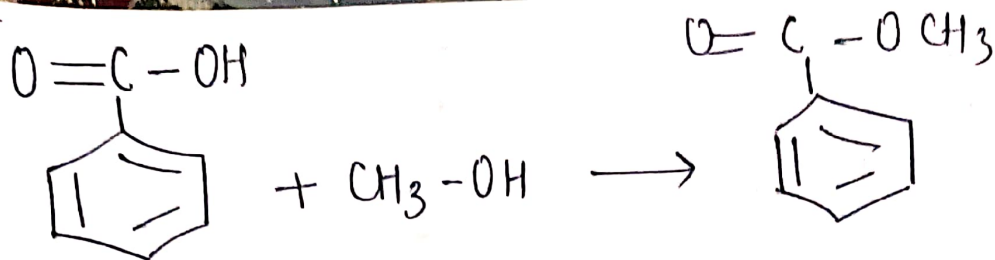
* Reaction of Bond fission of OH group

→ formation of Anhydride

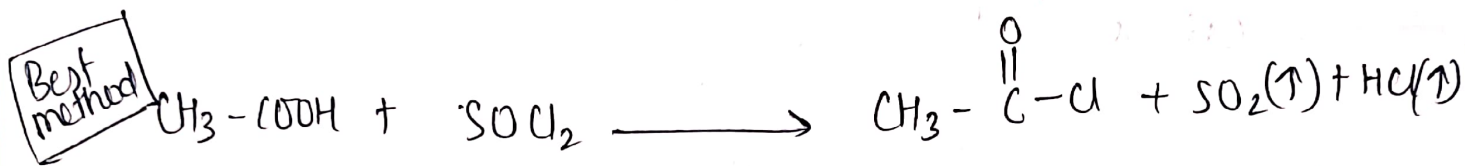
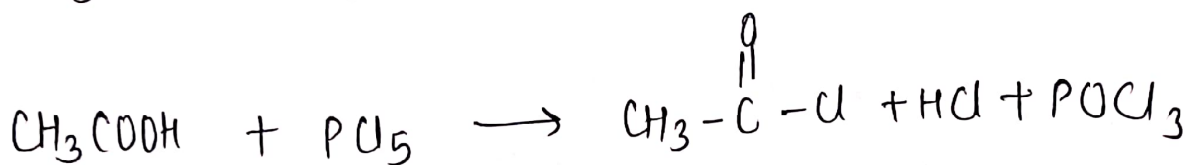
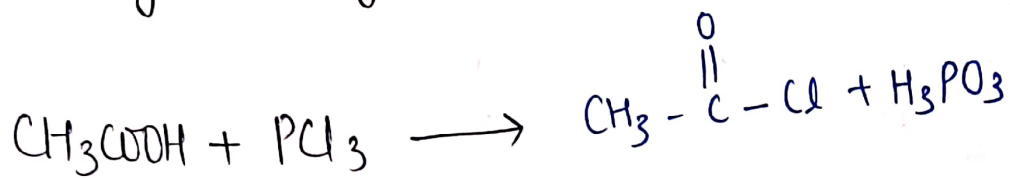


→ esterification → pseudo unimolecular reaction

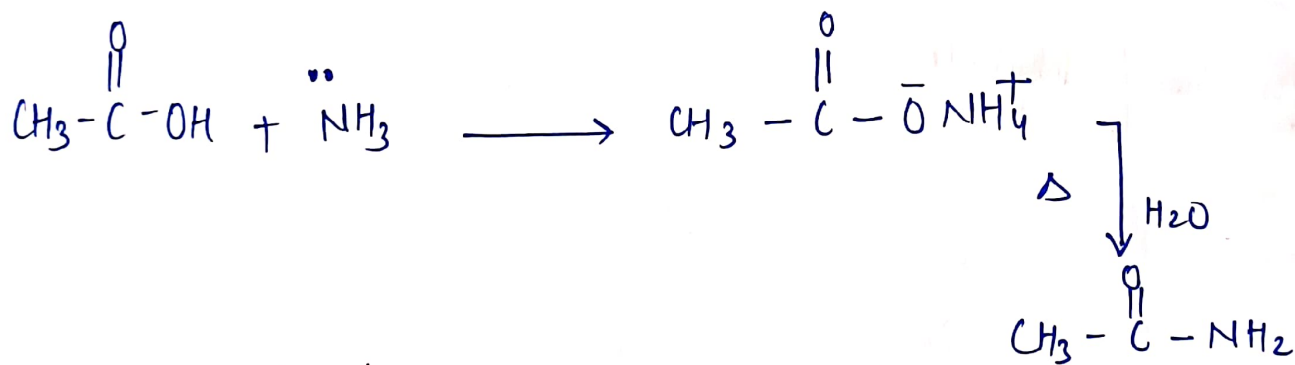




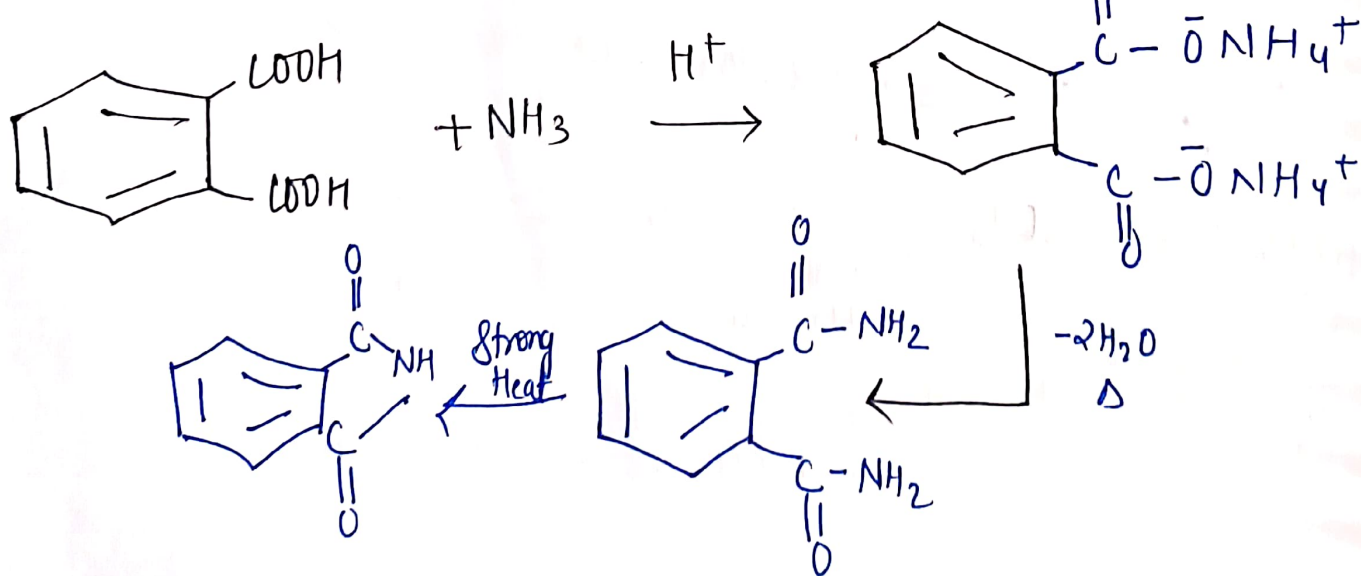
(3) Acylation Acylchloride



(4) Amide formation

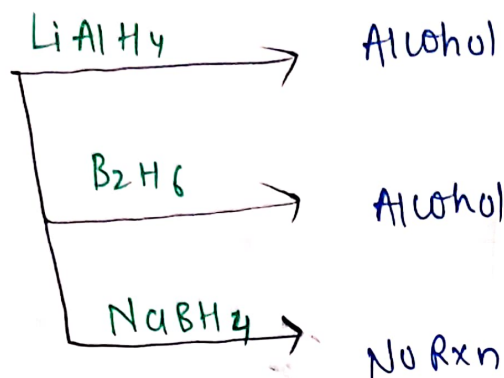


Phthalic Acid



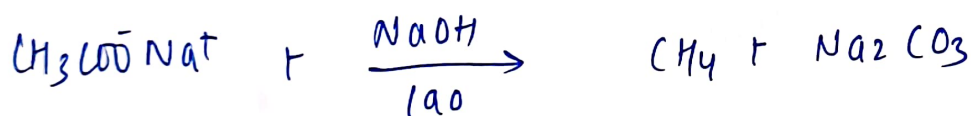
Reaction Involve - COOH group

Reduction
Acid

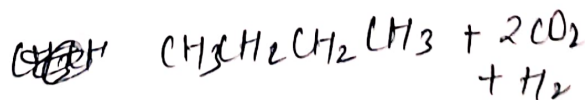
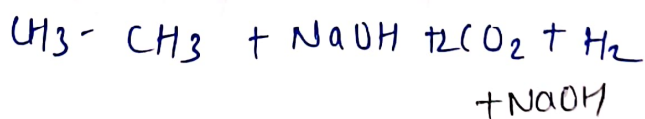
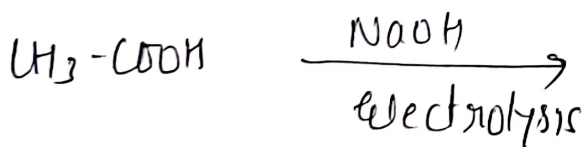


Decarboxylation Rxn

(a) with Soda lime



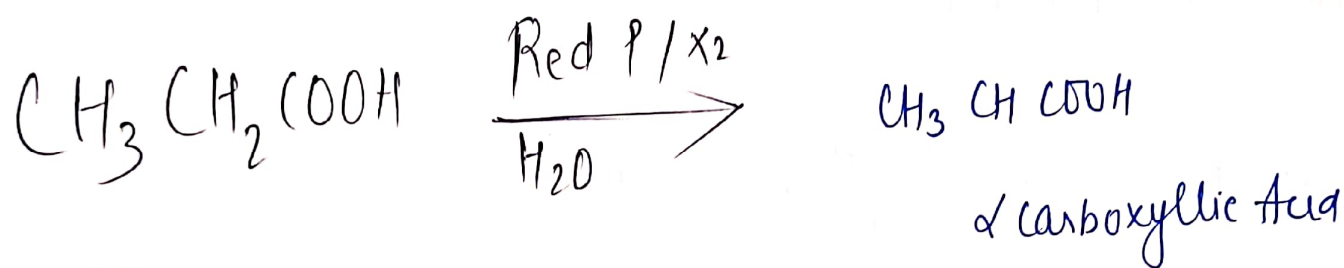
Kolbe's electrolysis



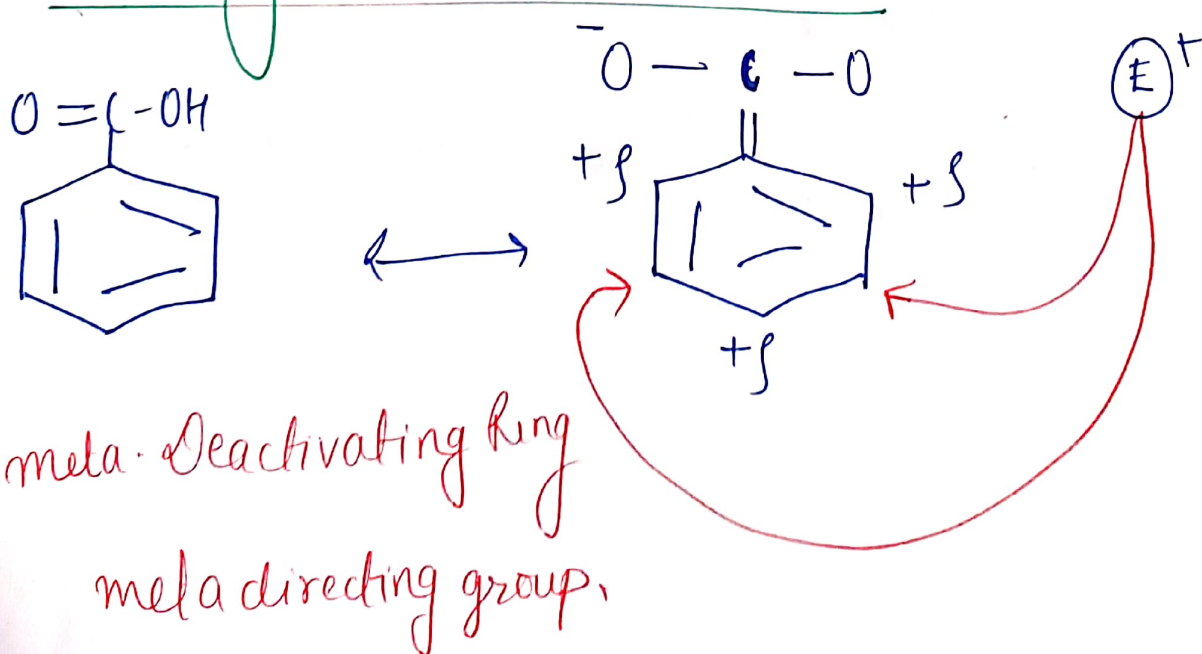
Side Chain Reaction

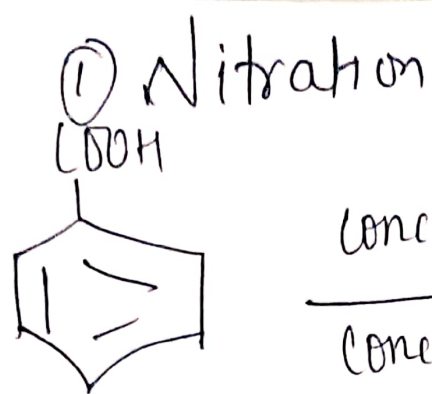
Hell Volard Zeleny Reaction

Replacement of Cl_2/Br_2



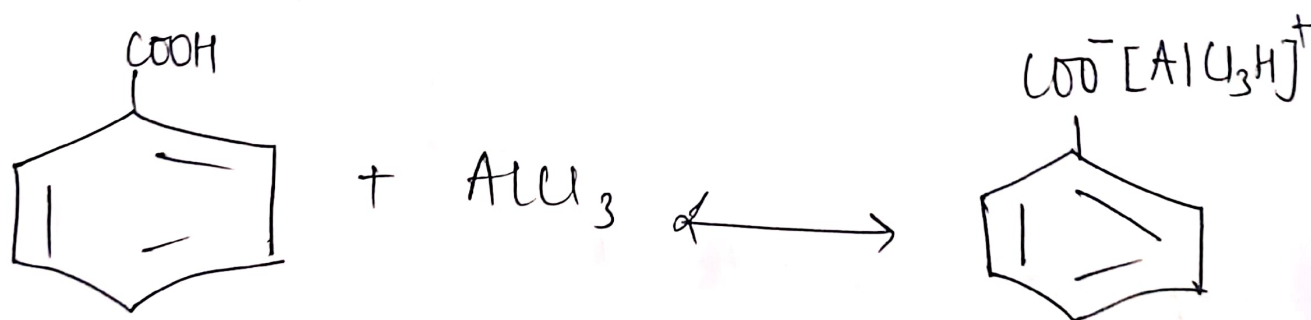
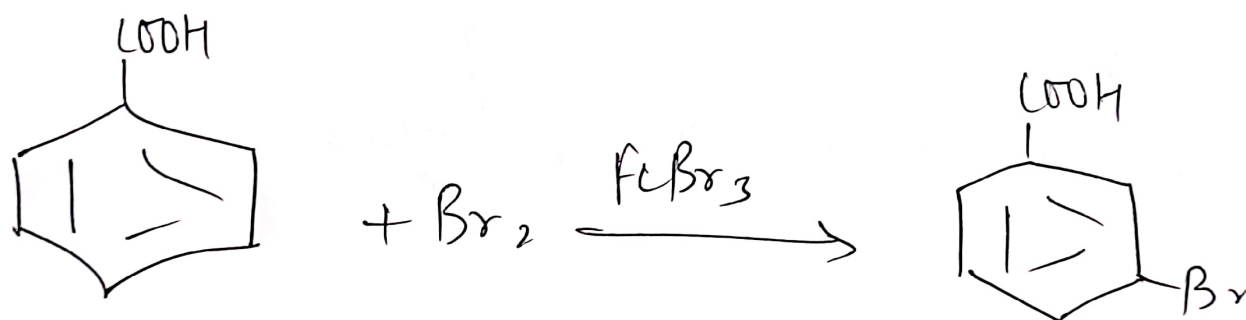
Ring Reaction





$E^+ - NO_2^+$
major - Meta.

② Halogenation



No needal Craft Reaction / Acylation
or
Alkylation