Carbonyl Compounds :-

$-\overset{\overset{O}{\|}}{C}-$

- Aldehyde
  - $R-CH=O$
  - $H-\overset{\overset{O}{\|}}{C}-H$
- Ketone
  - Sym.
    - $R-\overset{\overset{O}{\|}}{C}-R$ (2°)
  - Unsym
    - $R-\overset{\overset{O}{\|}}{C}-R'$ (2°)

$\overset{}{\underset{}{>}}C=O$ (sp^2)

G.M.P. :-

. From Alkane :-

$R-CH_3 \xrightarrow{MoO_3 \,/\, 300^\circ C} R-CH=O$

. From Alkene :-

$>C=C< \xrightarrow[(2)\ Zn \,/\, H_2O]{(1)\ O_3 \,/\, N_2} >C=O + O=C<$

Ozonolysis

(3) Alkyne :-

(a) Hydration :-

$HC \equiv CH \xrightarrow[H_2O]{1\%\ HgSO_4 / H_2SO_4} \underset{M.K.}{\searrow} H_2C=CH(OH) \rightleftharpoons CH_3-CH=O$

$R-C \equiv CH \xrightarrow{\quad " \quad} R-C(OH)=CH_2 \rightleftharpoons R-C(=O)-CH_3$

(b) HBO Reaⁿ :-

$R-C \equiv CH \xrightarrow[\text{② } H_2O_2 / OH^{\ominus}]{\text{① } B_2H_6 / THF} R-CH_2-CH=O$ (AMK)

$CH_3-C \equiv C-CH_3 \xrightarrow{\quad " \quad} CH_3-CH_2-C(=O)-CH_3$

(4) From Alkyl Halide :-

$R-CHCl_2 \xrightarrow{aq\ KOH} R-CH(OH)_2 \longrightarrow R-CHO$

$R-CCl_2-R' \xrightarrow{aq.\ KOH} R-C(OH)_2-R' \rightarrow R-C(=O)-R'$

$C_4H_8Cl_2\ (A) \xrightarrow{aq\ KOH} (B) \xrightarrow{I_2 / NaOH} (C)$ Yellow ppt

$CH_3-CH_2-CCl_2-CH_3$ $\quad CH_3-CH_2-C(=O)-CH_3$ $\quad CHI_3$

(5) From alcohol

$R-CH_2-OH \xrightarrow{Cu / 300^\circ C} R-CH=O$ (1°)

$R_2CH-OH \xrightarrow{\quad " \quad} R_2C=O$

$CH_3-C(CH_3)_2-OH \xrightarrow{\quad " \quad} CH_3-C(CH_3)=CH_2$

(6) Oxidation of Alcohol

$R-CH_2-OH \xrightarrow{PCC} R-CH=O$

PCC = $C_5H_5NH^{\oplus}\ CrO_3Cl^{\ominus}$

CrO_3 / Acetone / H_2O → Jones Oxidation

$R_2CH-OH \xrightarrow[\text{or PCC or Jones Oxidation}]{K_2Cr_2O_7/H^{\oplus}} R-\underset{\underset{O}{\|}}{C}-R$

$[(CH_3)_3C-O]_3Al$ → Oppenaur Oxidn

All these oxidising agents does not affect C=C.

$CH_3-CH=CH-CH_2-OH \xrightarrow{PCC} CH_3-CH=CH-CHO$

$R-CH_2-OH \xrightarrow{K_2Cr_2O_7/H^{\oplus}} R-CH=O \xrightarrow{[O]} R-\underset{\underset{O}{\|}}{C}-OH$

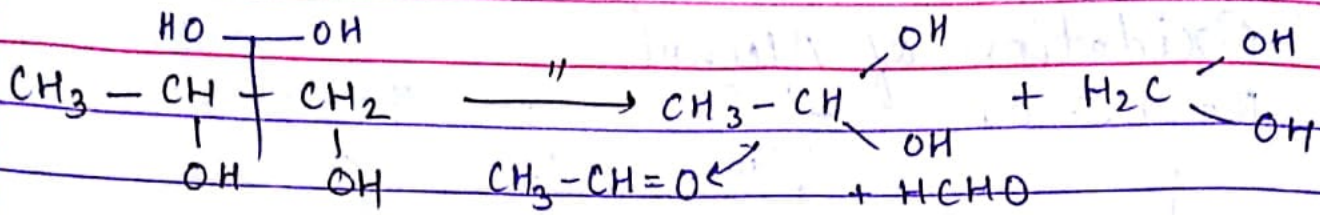
Oxidation by HIO_4 or $(CH_3COO)_4Pb$

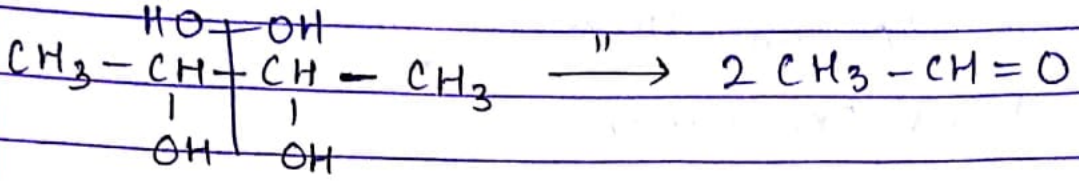
Per Iodic Acid

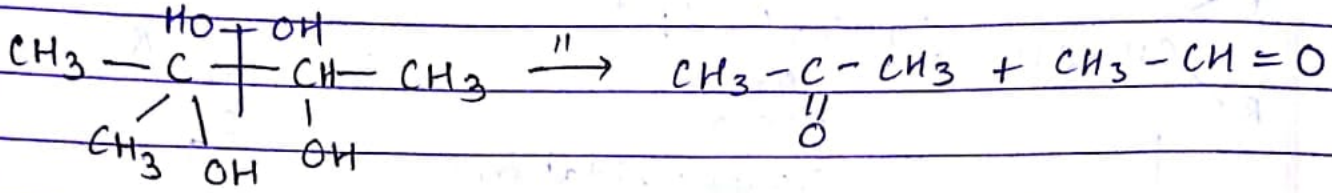
Condn:- ① At least 2-OH gp or 1 OH & $-\underset{\underset{O}{\|}}{C}-$ gp should be +nt at Vicinal carbon.

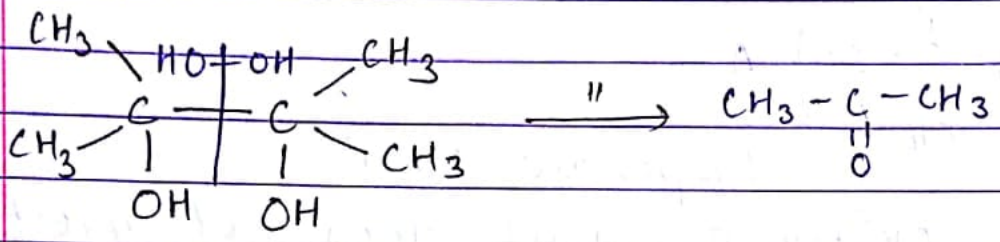
② One HIO_4 breaks one C–C bond and adds one –OH gp to each C.

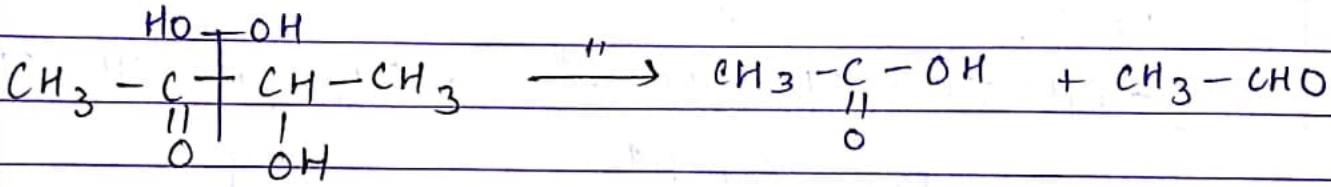
$H_2C(OH)-CH_2(OH) \xrightarrow[\text{or } NaIO_4/H_2SO_4 \text{ or } (CH_3COO)_4Pb]{HIO_4/\Delta} 2\,CH_2(OH) \rightarrow 2\,CHO$

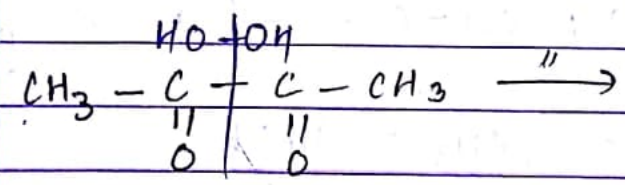


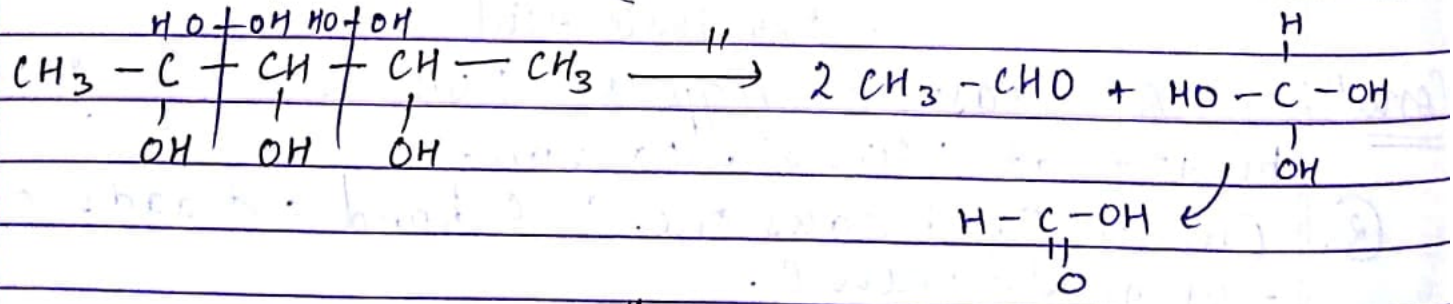


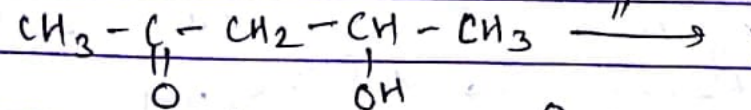


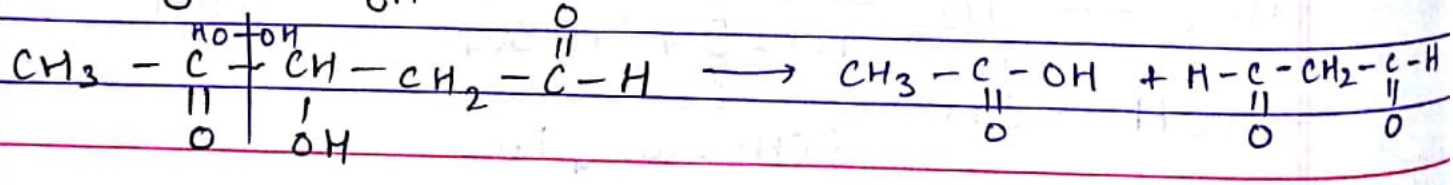


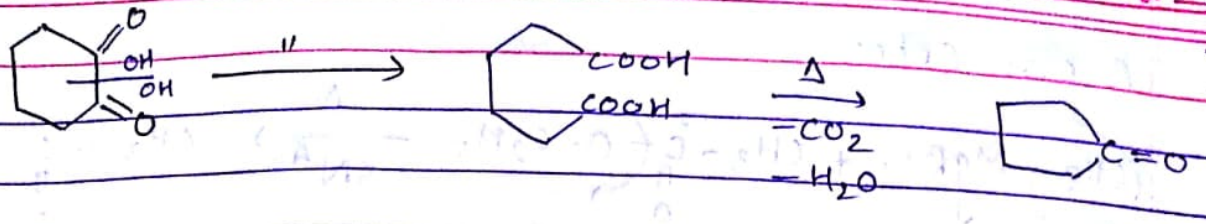








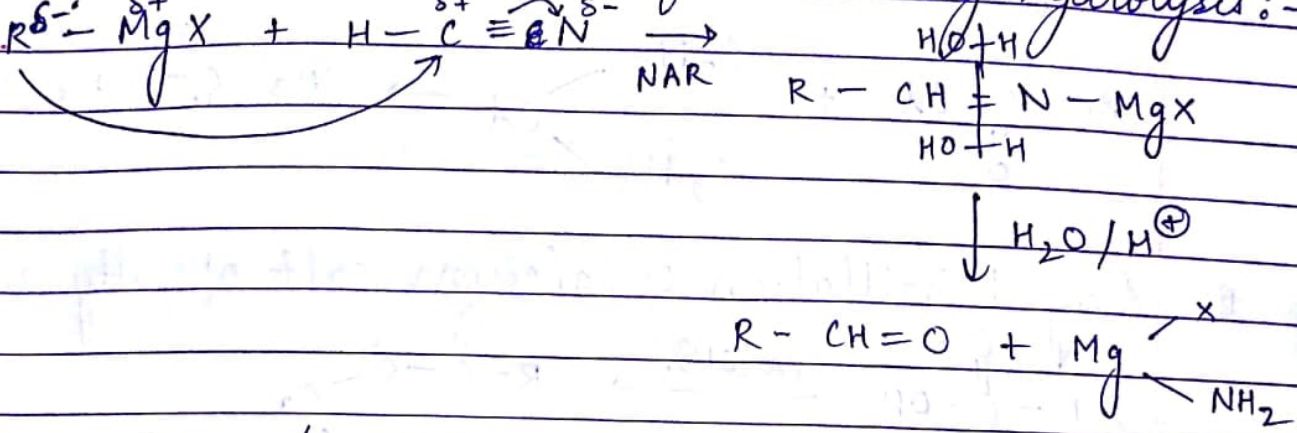




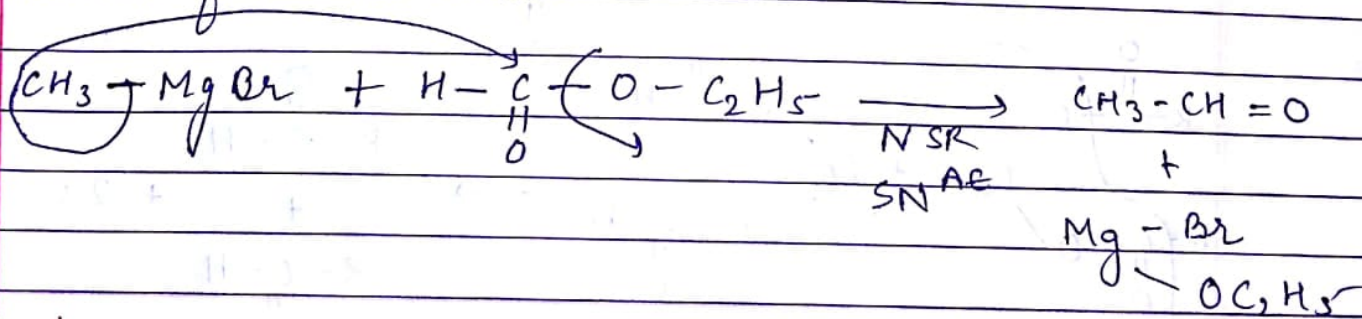
Reacⁿ with G.R. :-

Aldehyde :-

(a) Reacⁿ with H−C≡N followed by hydrolysis :-

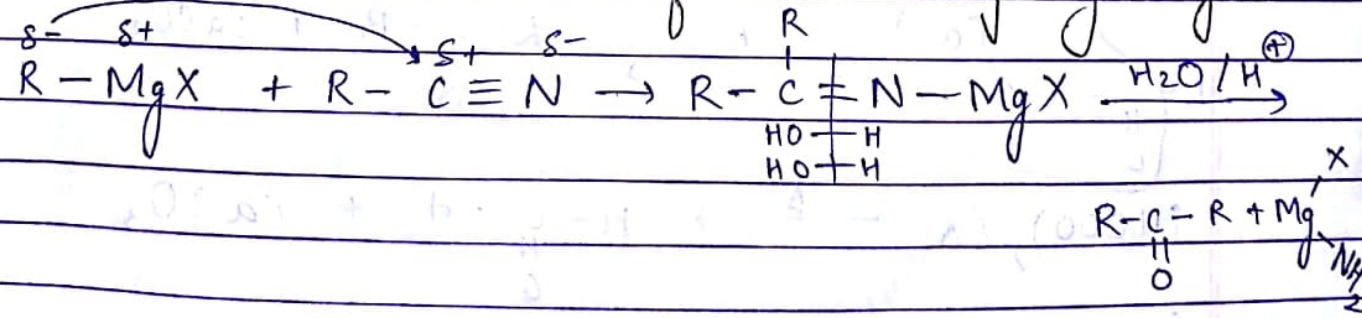


(b) From formate ester

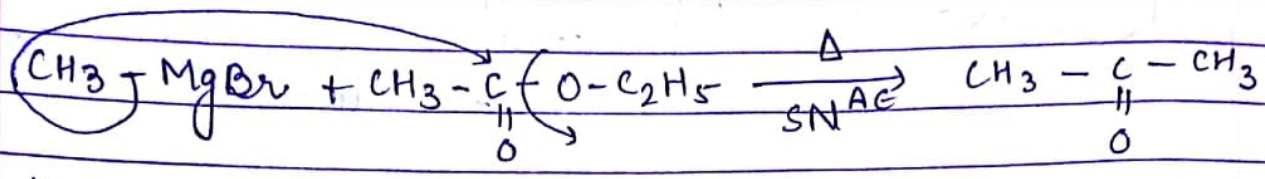


Ketone :-

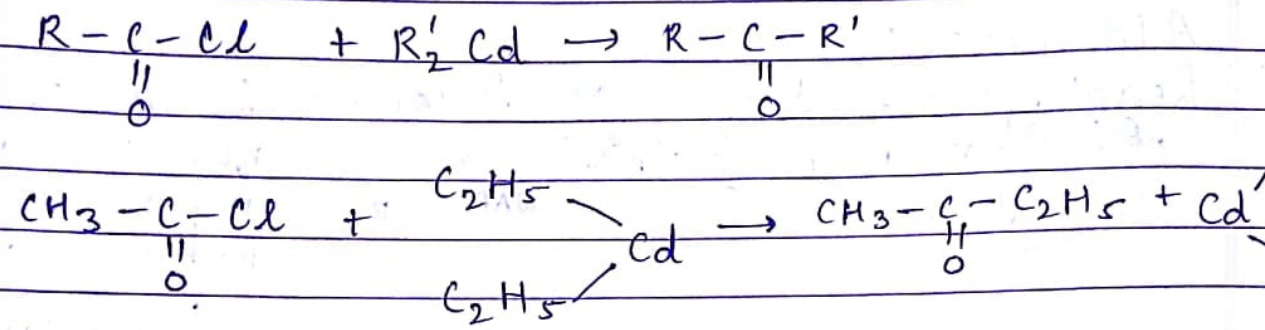
Reacⁿ with R−C≡N followed by Hydrolysis :-



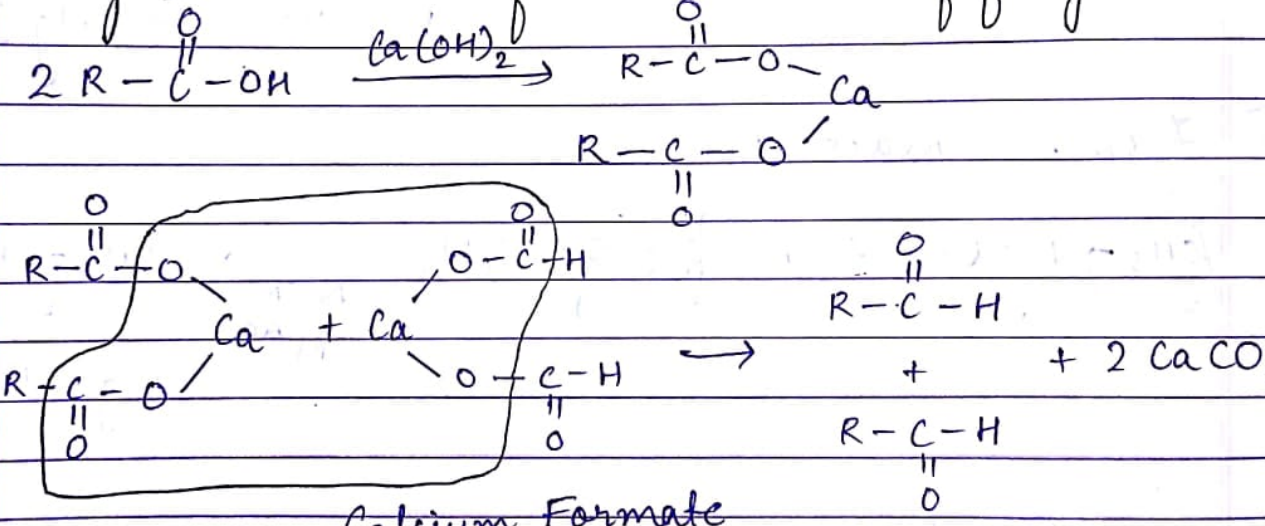
From ester



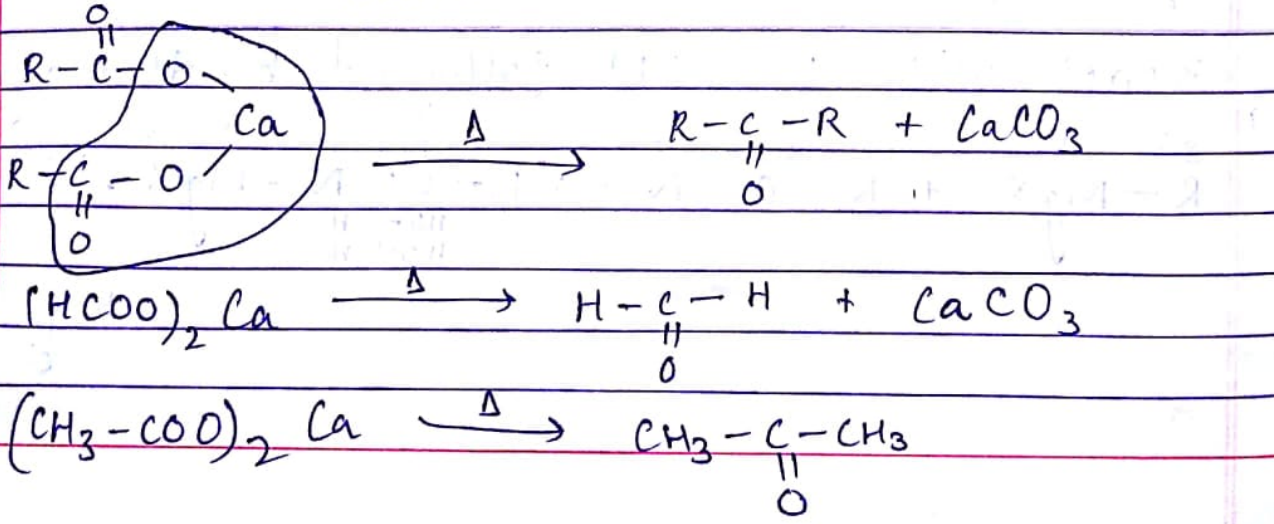
Ketone



8 Dry Distillation of Calcium salt of fatty acids :-

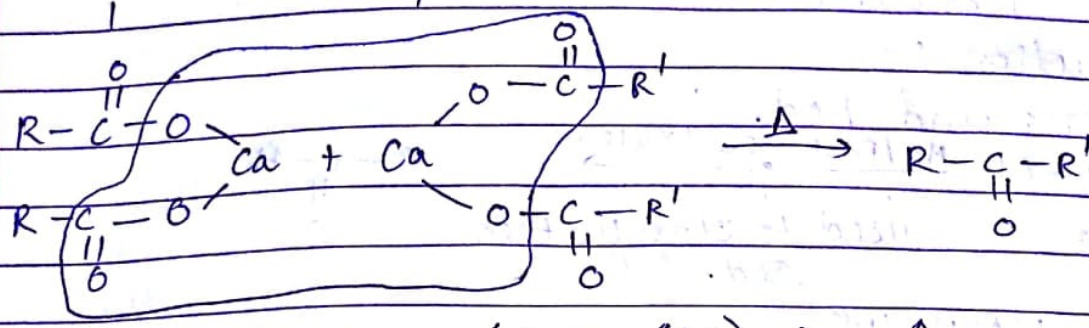


Calcium Formate



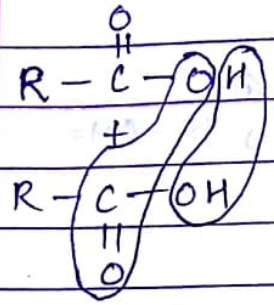
Scanned by CamScanner

$(CH_3COO)_2Ca + (HCOO)_2Ca \xrightarrow{\Delta} CH_3-CH=O$

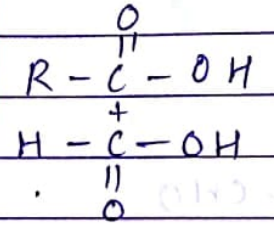


$(CH_3-COO)_2Ca + (C_2H_5COO)_2Ca \xrightarrow{\Delta} CH_3-\underset{\underset{O}{\|}}{C}-C_2H_5$

Decarboxylation of acids with MnO / 300°C

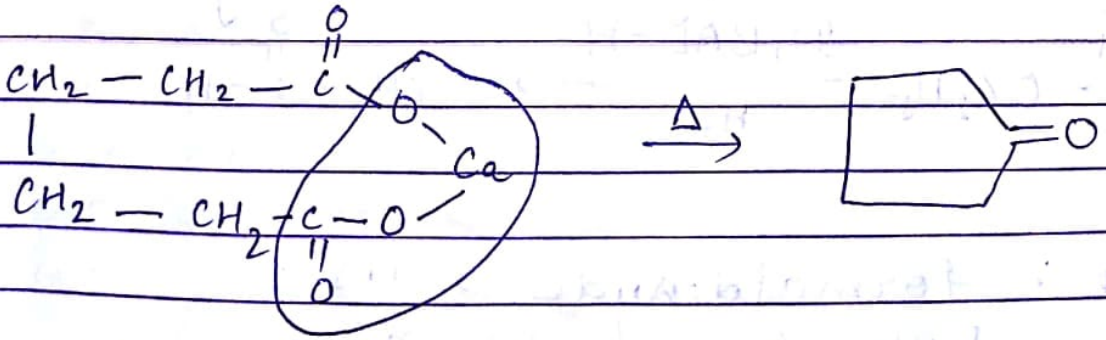


$$R-\underset{\underset{O}{\|}}{C}-R$$



$$R-CHO$$

$$2\ H-\underset{\underset{O}{\|}}{C}-OH \xrightarrow{//} HCHO$$



$R-\underset{\underset{O}{\|}}{C}-CH_2-COOH \xrightarrow{\Delta} R-\underset{\underset{O}{\|}}{C}-CH_3 + CO_2$

β Keto Acid

Reduction :-

Rosenmund Red. :-

$R-\underset{\underset{O}{\|}}{C}-Cl \xrightarrow{H_2/Pd.BaSO_4/Xylene} R-\underset{\underset{O}{\|}}{C}-H$

used to stop further red.

$\downarrow$ $LiAlH_4/H^{\oplus}$, $Na/etOH$, $NaBH_4/OH^{\ominus}$

$R-CH_2-OH$

Stephun Red.

$R-C\equiv N \xrightarrow[2[H]]{① SnCl_2/HCl} R-CH=NH \xrightarrow{H_2O/H^{\oplus}} R-CH=O + NH_3$

$CH_3-C\equiv N \xrightarrow[② H_2O/H^{\oplus}]{① SnCl_2/HCl} CH_3-CH=O$

$R-C\equiv N \xrightarrow[H_2O]{DIBAL-H} R-CHO$

$CH_3-CH_2-CN \xrightarrow[H_2O]{DIBAL-H} CH_3-CH_2-CHO$

DiBAL-H → Diisobutyl Aluminium Hydride.

$CH_3-\underset{\underset{O}{\|}}{C}-OC_2H_5 \xrightarrow[H_2O]{DiBAL-H} CH_3-\underset{\underset{O}{\|}}{C}-H$

State : Formaldehyde → gas
upto C_{11} → liquid
higher → solid

Solubility — Formaldehyde, acetaldehyde, acetone } soluble in water due to H-bond

Solubility $\propto \frac{1}{Mw}$

B.P. $B.P. \propto Mw$

$HCHO < CH_3-CHO < CH_3-CH_2-CH=O < CH_3-\overset{\overset{O}{\|}}{C}-CH_3$

(Mw) (Sym)

B.P. Order: alcohols > Carbonyl > ethers > alkanes

- alcohols: ↑ H-Bonding
- Carbonyl: comp ↓ due polarity of $-\overset{\overset{O}{\|}}{C}-$ bond
- ethers: ↓ less Polar
- alkanes: ↓ non Polar

$CH_3-CH_2-CH_2-CH_2-OH > CH_3-CH_2-CH_2-CHO > CH_3-CH_2-O-CH_2CH_3$

$> CH_3-CH_2-CH_2-CH_2CH_3$

$CH_3-CH_2-OH > CH_3-CHO > CH_3-O-CH_3 > CH_3-CH_2-CH_3$

Chemical Properties :-

1. NAR
2. Other Reac^{n}s
3. Reac^n for aldehyde only
4. Reac^n of ketone only

2. Other Reac^{n}s

ASHA
Date _____ Page _____

Aldol Condensation :- When α-H containing carbonyl substance is treated with dil. alkali like aq NaOH then condensation takes place and aldol pdt is formed. When this aldol pdt is heated with alkaline medium it gets converted into α-β unsaturated carbonyl compds k/n Aldol condensation.

Qu Which of the following give aldol condensation in the of aq. KOH ?

① Formaldehyde ② Benzaldehyde ③ acetaldehyde ④ all

$$CH_3-\underset{H}{CH}=O + CH_2-CH=O \xrightarrow{aq.NaOH} CH_3-\underset{OH}{CH}-CH_2-CHO$$

aldol

$$\xrightarrow{\Delta}$$

$$CH_3-\overset{\beta}{CH}=\overset{\alpha}{CH}-CH=O$$

α-β unsaturated carbonyl sub.

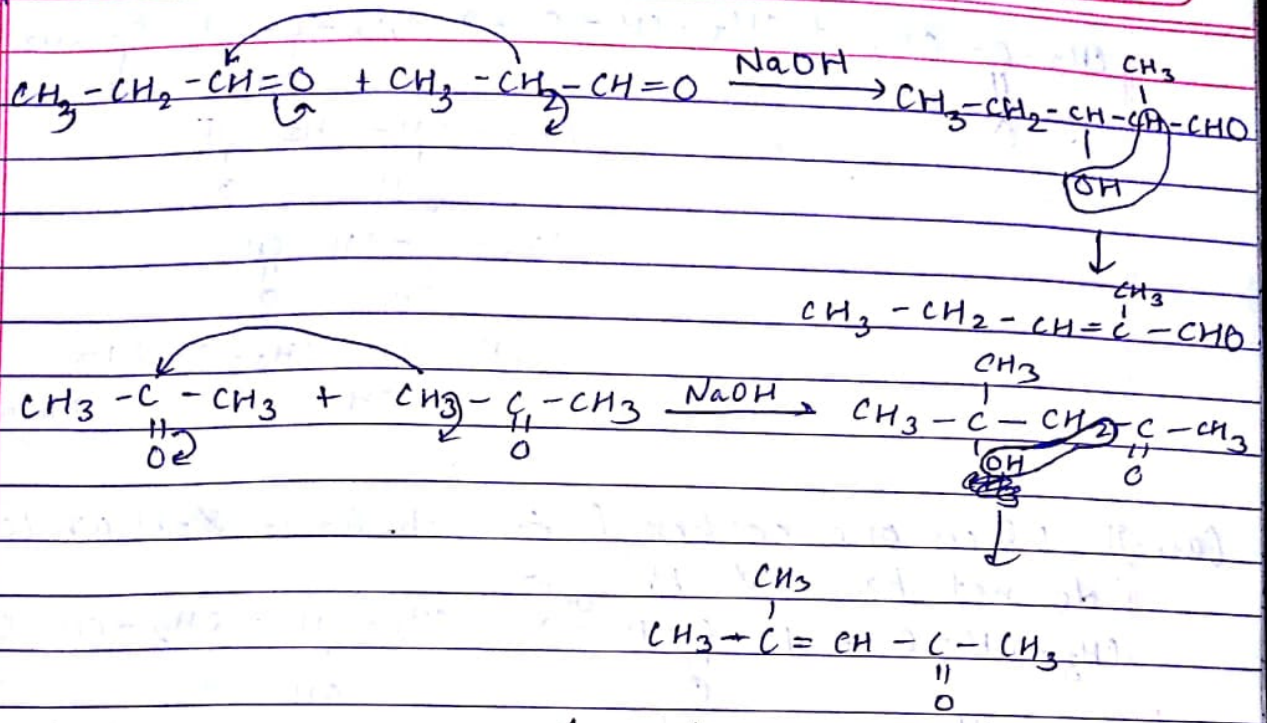
Mech:

$$CH_3-CH=O \xrightarrow[-OH^{\ominus}]{aq.NaOH} \underset{\text{stab. anion by reso}}{CH_2^{\ominus}-CH=O} \rightleftharpoons CH_2=CH-O^{\ominus}$$

$$CH_3-\underset{\underset{O}{\|}}{C}-H + CH_2^{\ominus}-CH=O \rightarrow CH_3-\underset{\underset{:O:}{|}}{CH}-CH_2-CHO$$

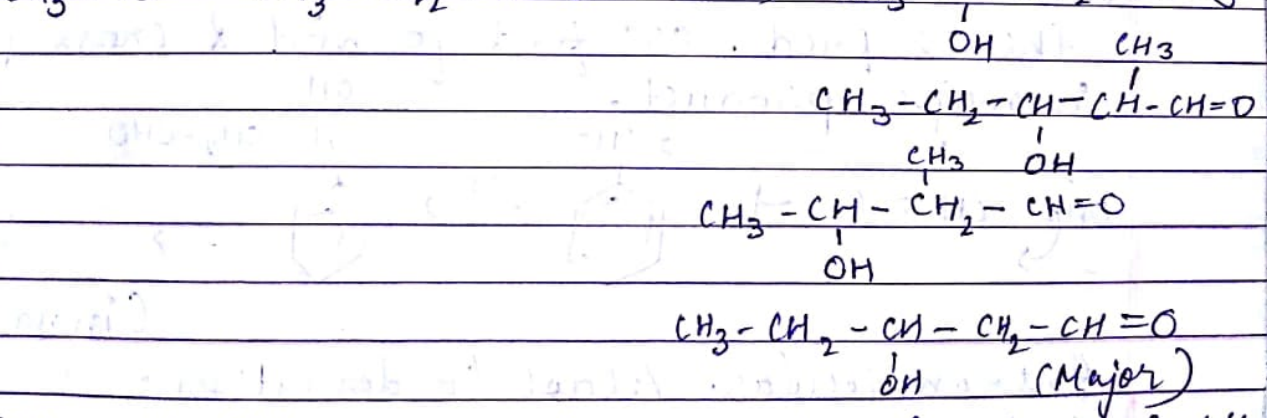
$$CH_3-CH=CH-CHO \xleftarrow{\Delta} CH_3-\underset{OH}{CH}-CH_2-CH=O \xleftarrow{H_2O}$$

aldol



& Cross Aldol condensation :-

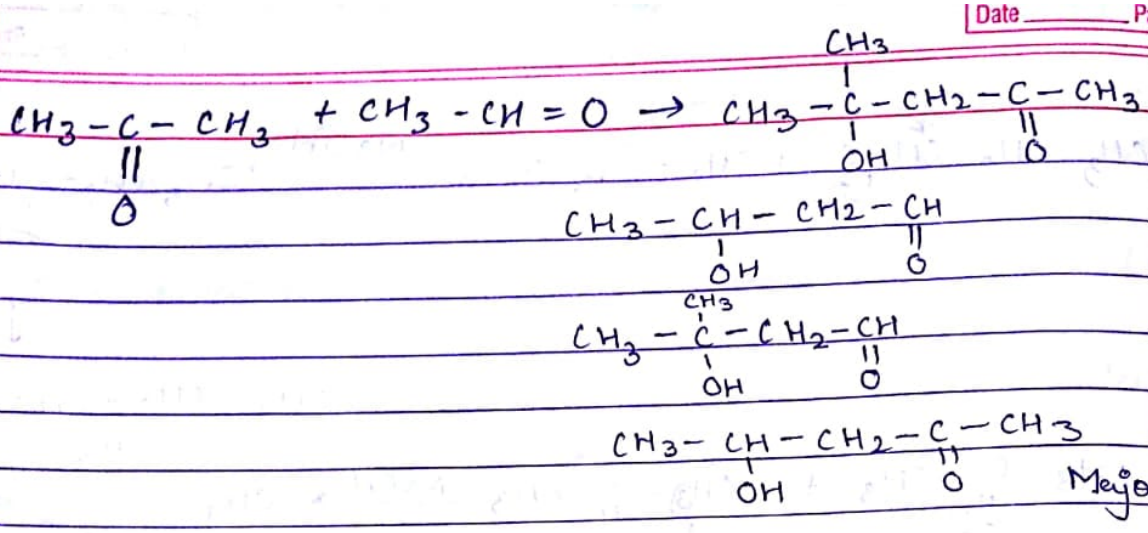
Case-I When both diff. carbonyl sub. have α-H



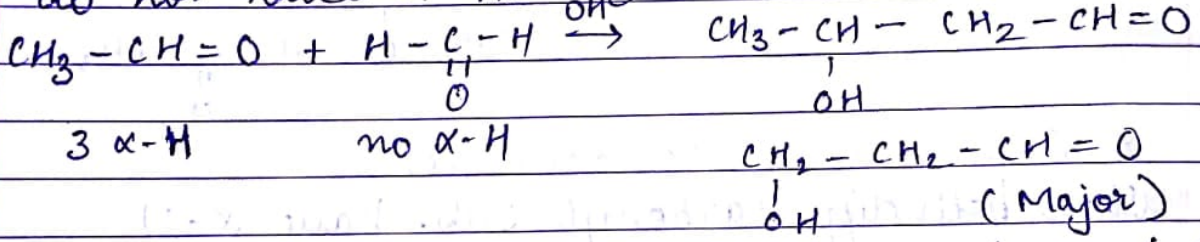
When 2 diff. α-H containing carbonyl sub. react with aq. NaOH then 4 aldol pdt. are form

Self aldol → 2 Cross aldol → 2

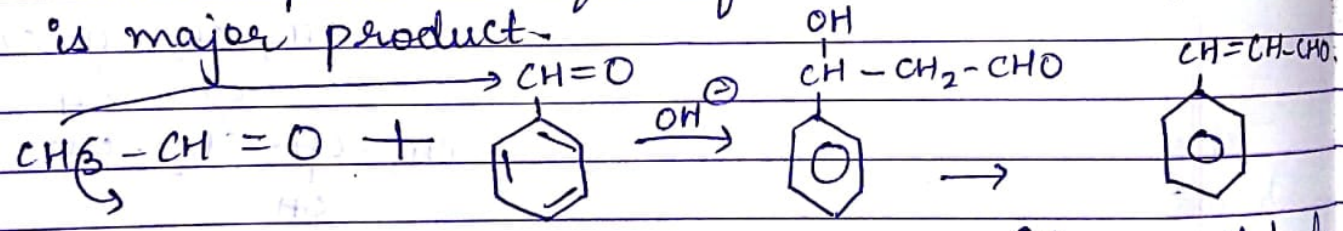
However less sterically hindered cross pdt is major product.



Case-II When one carbonyl ~~co~~ sub. have α-H while other do not have α-H.

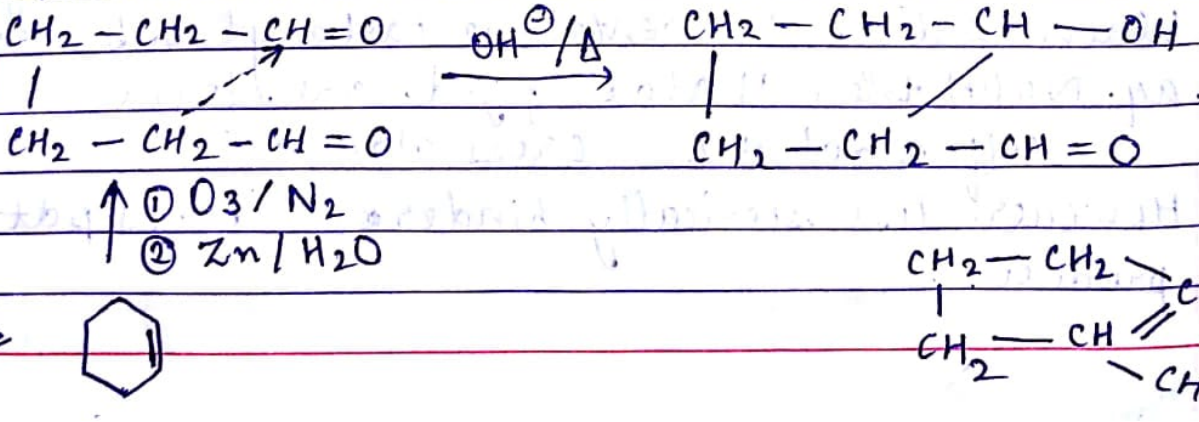


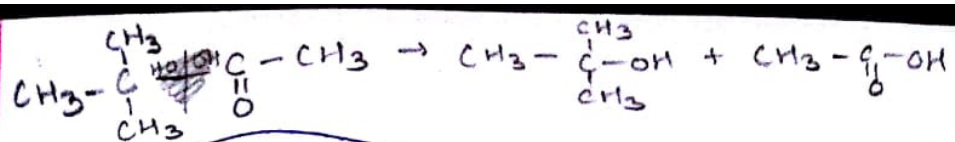
When out 2 carbonyl sub. only one have α-H then 2 prod. are ~~fold~~ formed & cross pdt is major product.

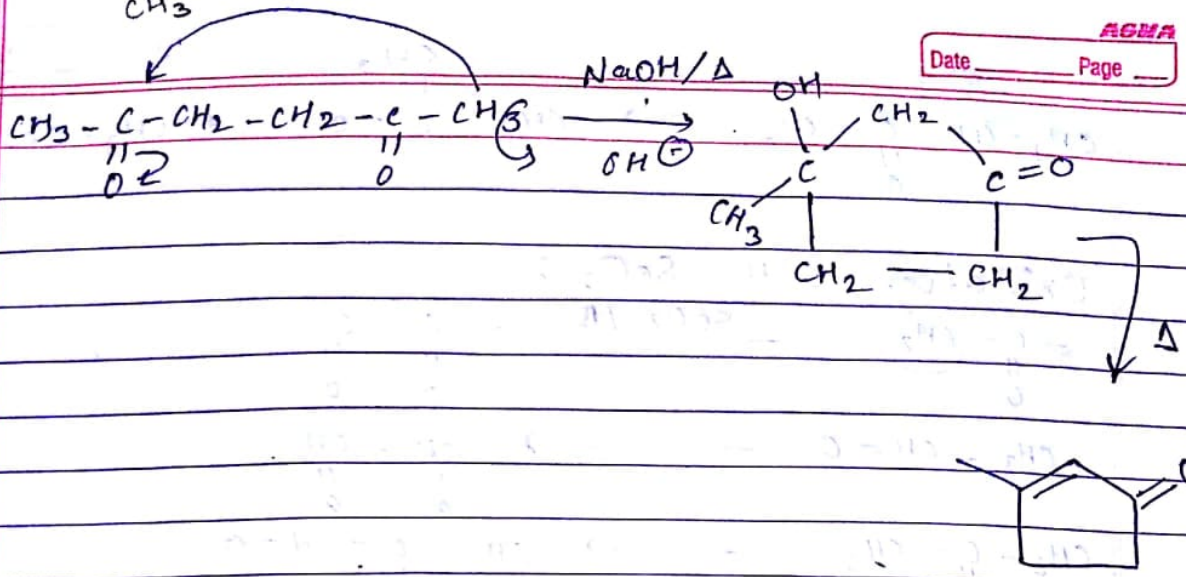


Cinnamaldehyde

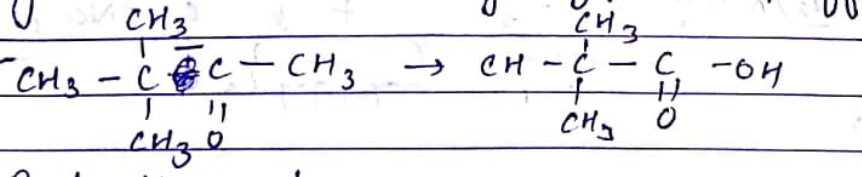
Intramolecular Aldol Condensation :-



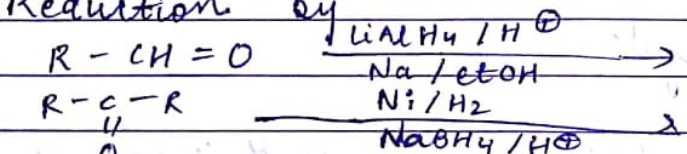




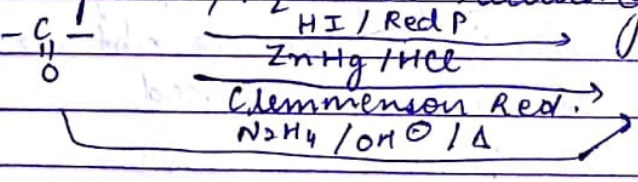
Breaking bond takes place such that $-\overset{O}{\overset{\|}{C}}-$ gp go with small alkyl gp → Popoff's Rule



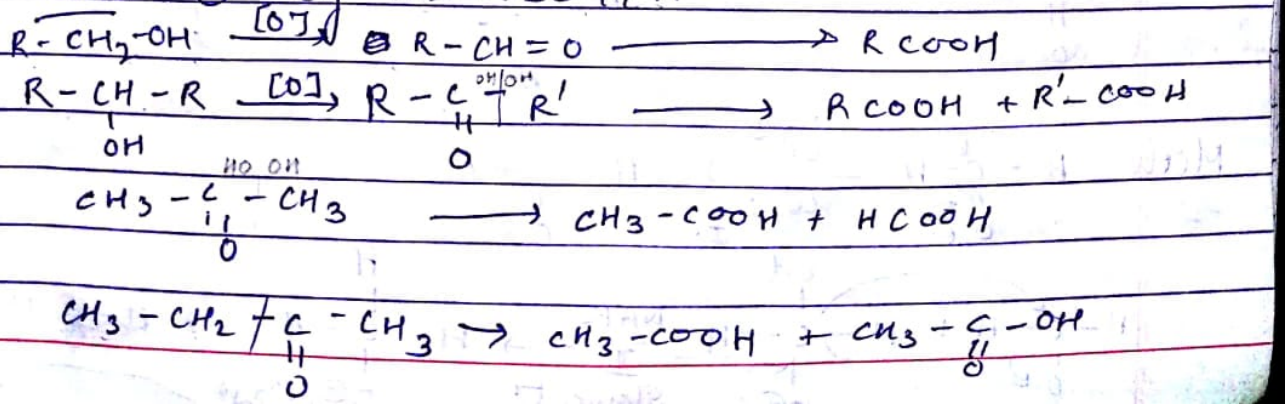
1. Reduction by

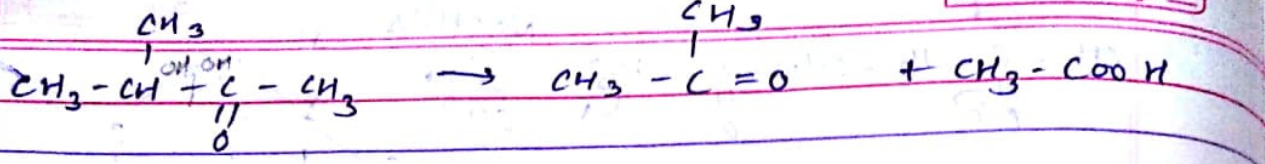


- Except Ni/H_2 other reducing agent does not reduce C=C

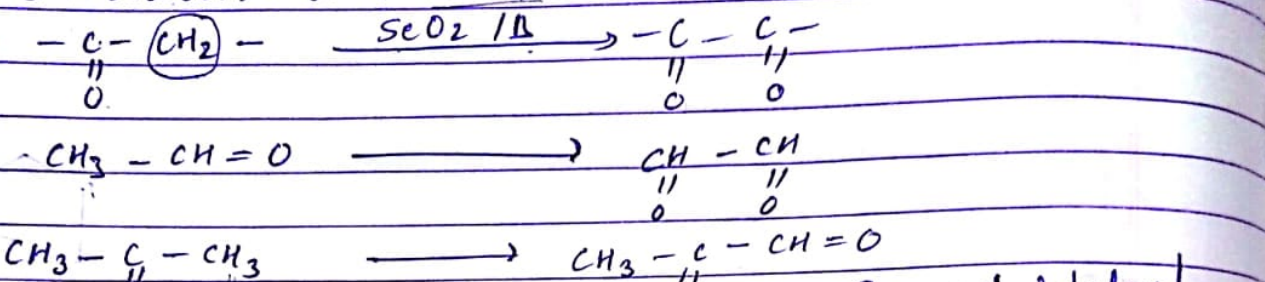


Oxidn @ by $K_2Cr_2O_7/H^{\oplus}$

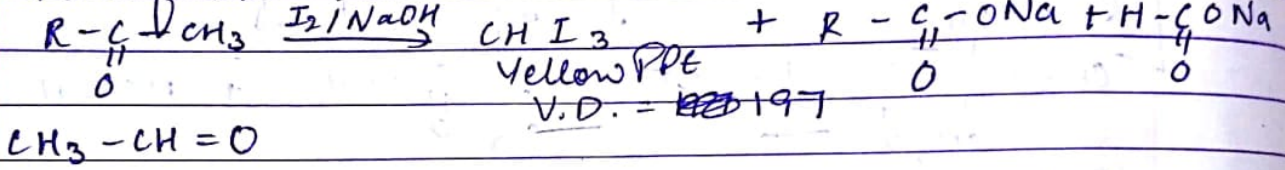




Oxidation with SeO_2 :-



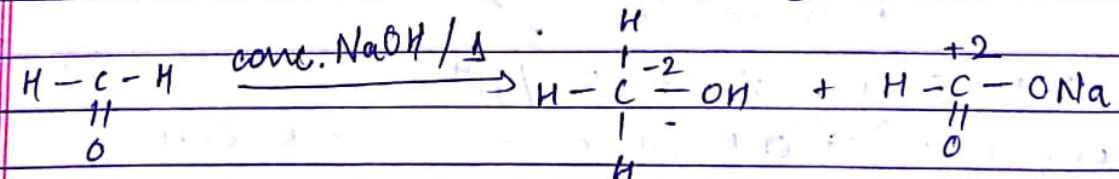
Iodoform Test :-



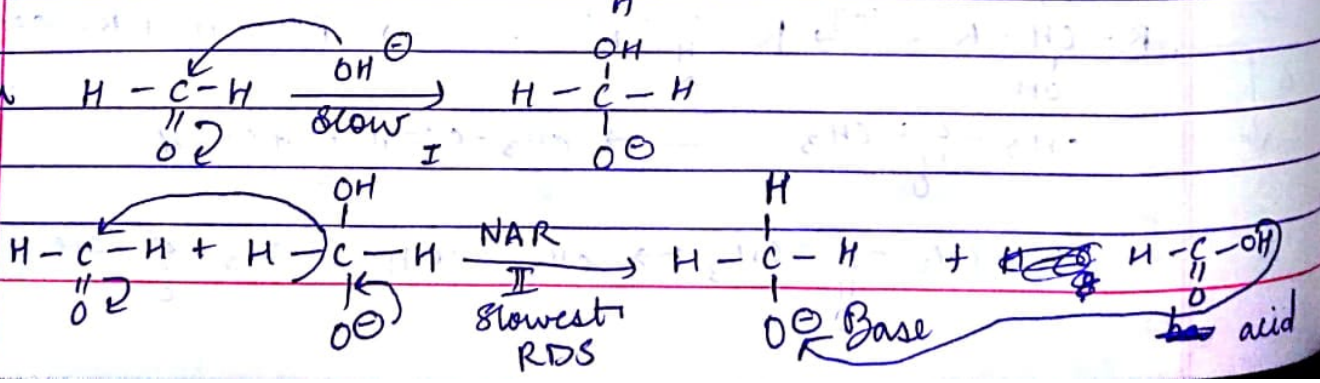
Reaction for Aldehyde

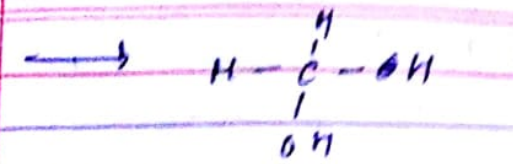
Cannizaro.

~~Ade~~ Aldehyde having no α-H upon treated with conc^n alkali ~~disporp~~ disproportionation takes place & both acid & alcohol are obtained at same time. Reac^n is k/n Cannizaro Red.



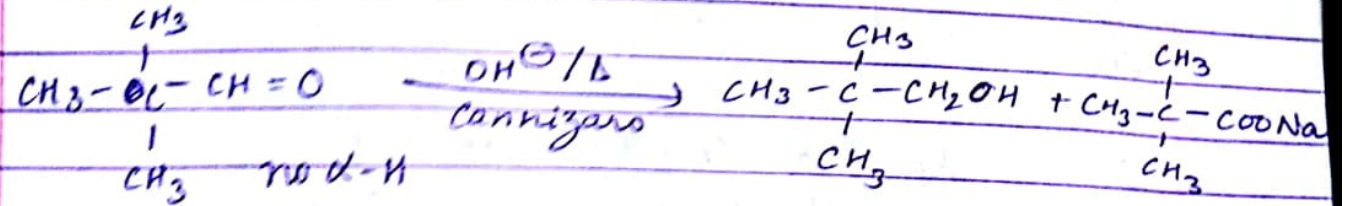
Mech

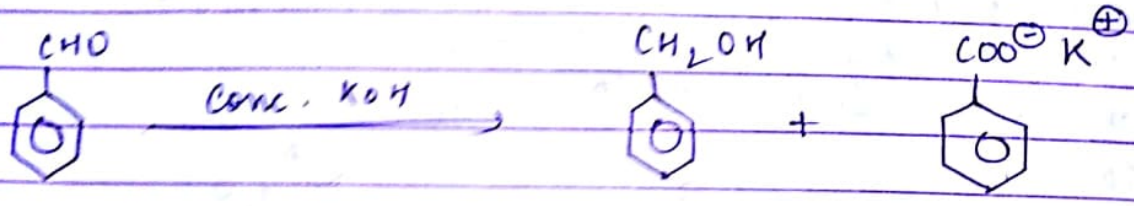


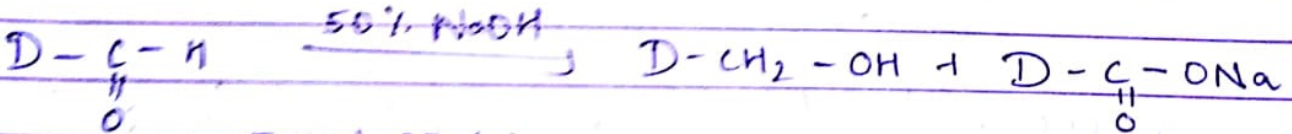


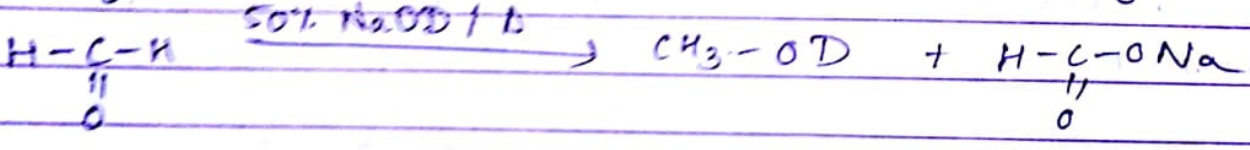
Rate law $\frac{dx}{dt} = [HCHO]^2 [OH^\ominus]^1$

Order Reaⁿ = 3

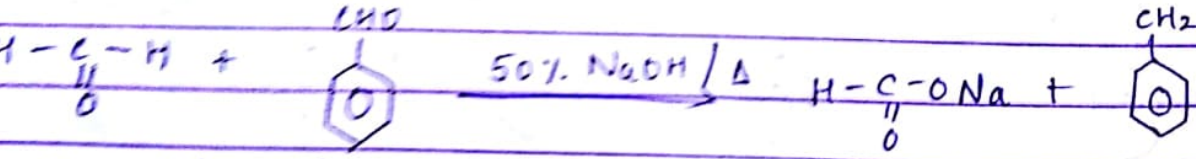




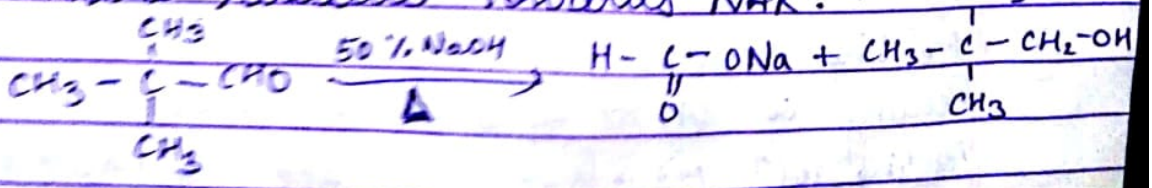




Cross Cannizaro Reaⁿ :-

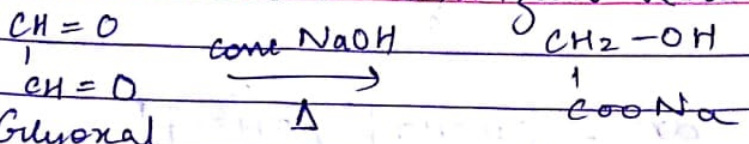


such aldehyde will be aid in cross cannizaro's Reaⁿ which are more reactive towards NAR.



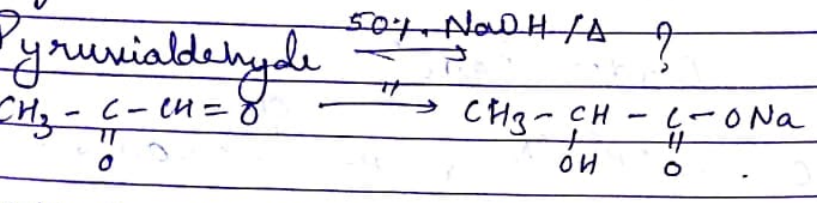
ASNA
Date _____ Page ____

Intramolecular Cannizaro Reaction



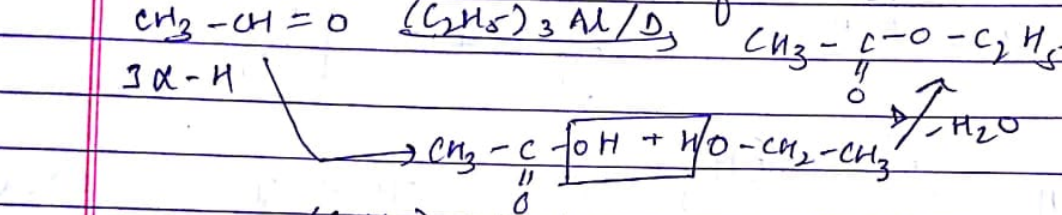
Glyoxal

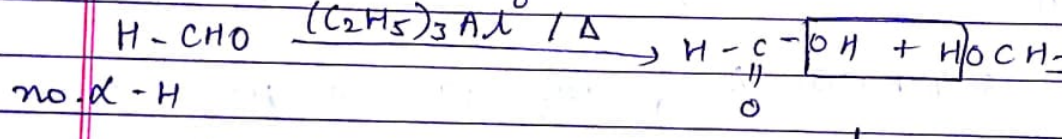
Pyruvialdehyde $\xrightarrow{50\%\ NaOH/\Delta}$?

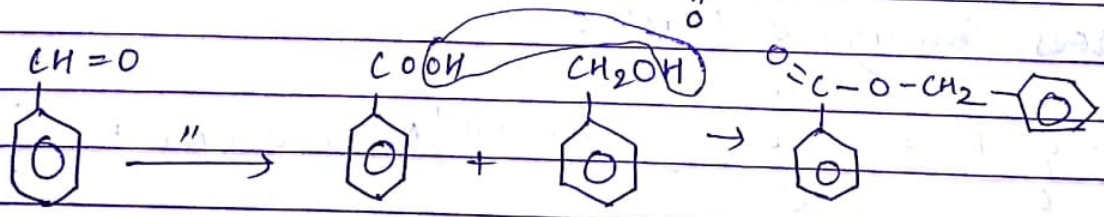


Tischenko Reaction (Modified form Cannizaro Reaction)

When any aldehyde react with Aluminium ethoxide then it will form ester.





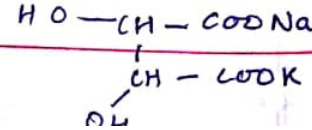


Test for Aldehyde :–

① Fehling sol^n :–

Fehling sol^n (A) → aq. sol^n of $CuSO_4$

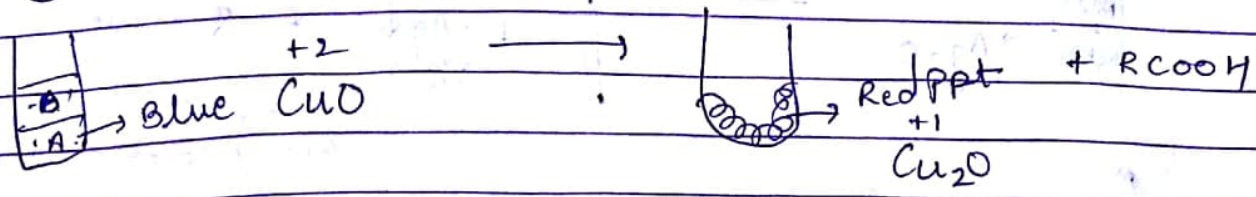
Fehling sol^n (B) + Rochelle salt [aq NaOH + Sod. Pot. tartarte]



→ F.S. & B.S. used to distinguish b/w Aldehyde & ketone.
→ F.S. & B.S. is used to test sugar in urine.

ASHA
Date _____ Page _____

(A) + (B) → F.S. CuO (Blue Color)



Aldehyde except Benzaldehyde give +ve F.S. test while ketone give -ve test becoz Ketone & benzaldehyde cannot be oxidised by F.S.

Benedict Soln :-

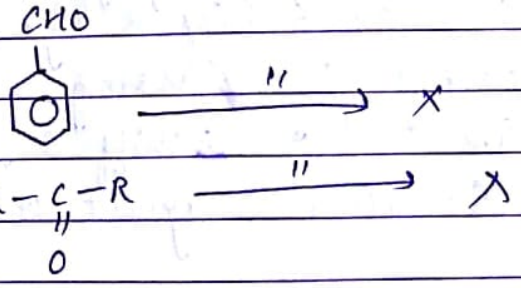
aq $CuSO_4$ soln + Sod. citrate + aq. Na_2CO_3

CuO

$$R-CHO + CuO \longrightarrow Cu_2O + R-\underset{\underset{O}{\|}}{C}-OH$$

Blue — Red ppt

$Cu^{2+} \longrightarrow Cu^{+1}$



All aldehyde except benzaldehyde give +ve Benedict test while ketone give -ve test.

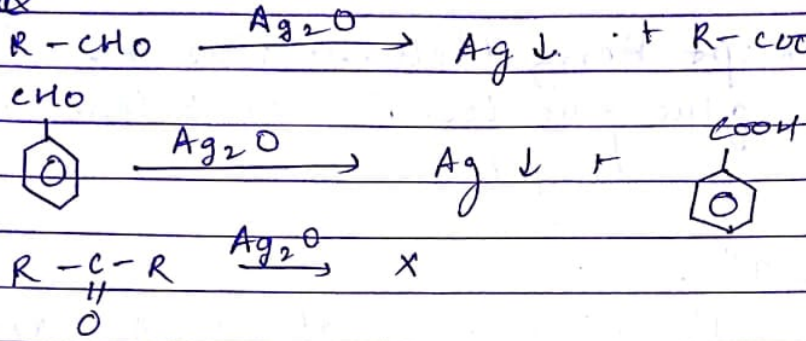
Tollen's Reagent Test :-

T.R. = Ammonical Silver Nitrate

$NH_4OH + AgNO_3$

$[Ag(NH_3)_2]^+ OH^-$

↳ colourless complex Ag_2O



All aldehyde including Benzaldehyde give +ve test with T.R. ~~with K~~ while ketone give -ve test.

Schiff Reagent (Pink) : Dil. soln of Para-Rosanaline Hydrochloride or magneta dye is a pink coloured dyed & K/n as Schiff's Dye. Its pink colour is discharged by passing SO_2 gas & the colourless soln is called Schiff's Reagent Aldehyde reacts with this reagent to store the pink color.

Ques CH_3-CHO & $C_6H_5CH_2-CHO$ can be distinguished by
(1) Benedict Test (2) Idoform Test (3) Tollen's Reagent
(4) Fehling soln Test.

Ques CH_3-CHO & $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$ can not be distinguished by-
(1) Fehling Soln (2) Grignard Reagent
(3) Schiff's Reagent (4) Tollen's Reagent

Date Page

Q. Aldehyde & Ketone are distinguished by
① Fehling sol^ ② H_2SO_4 ③ NH_3 ④ $NaHSO_3$

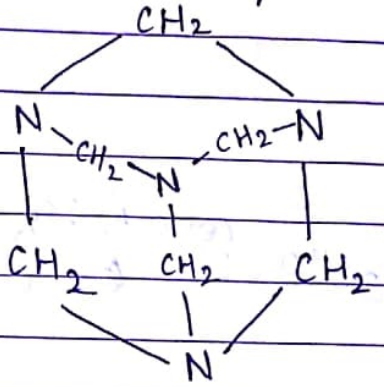
* Reac^ with Ammonia :-

Formaldehyde :-

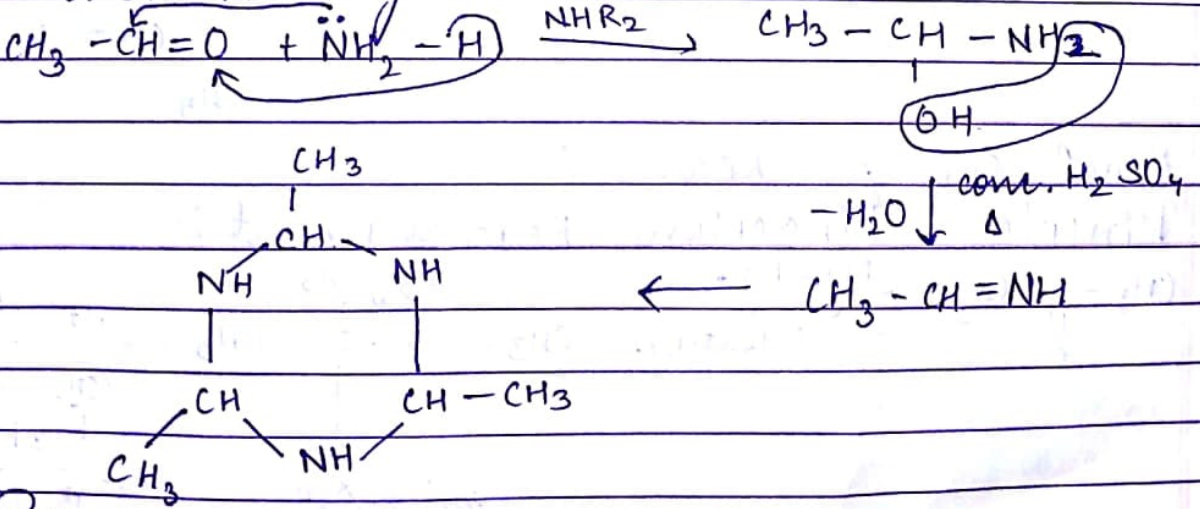
It will give

$$6HCHO + 4NH_3 \longrightarrow (CH_2)_6N_4$$

Hem. Hexamethylene tetramine
or
Urotropine



Other Aldehyde :-



Polymerisation :-

Formaldehyde $\underset{\Delta}{\overset{\text{Evaporation}}{\rightleftharpoons}}$ $(CH_2O)_n.H_2O$

HCHO
Formalin
(40% of HCHO)

Paraformaldehyde (linear polymer)
$n \rightarrow 6-50$
Hydrated white crystal
It shows Reducing Character with T.R.

Not Imp

$n\,HCHO \xrightleftharpoons[\Delta]{conc.\ H_2SO_4} (CH_2O)_n\,H_2O$

Polyoxymethylene

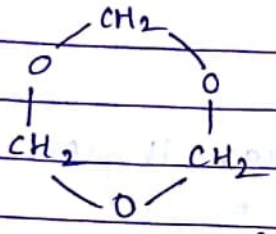
$n > 100$

$3HCHO \xrightarrow{room\ Temp.} (CH_2O)_3$

Metaformaldehyde (Trioxane)

cyclic Polymer (Trioxy methylene)

It doesn't show reducing ch^2 with T.R.

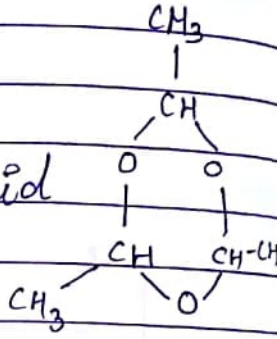


$3\,CH_3CHO \xrightarrow[room\ T.]{conc.\ H_2SO_4} (CH_3CHO)_3$

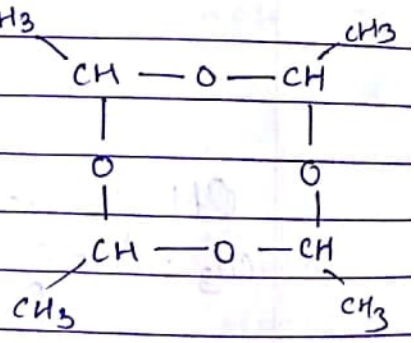
Para acetaldehyde

Pleasant smelling liquid

Hypnotic comp.

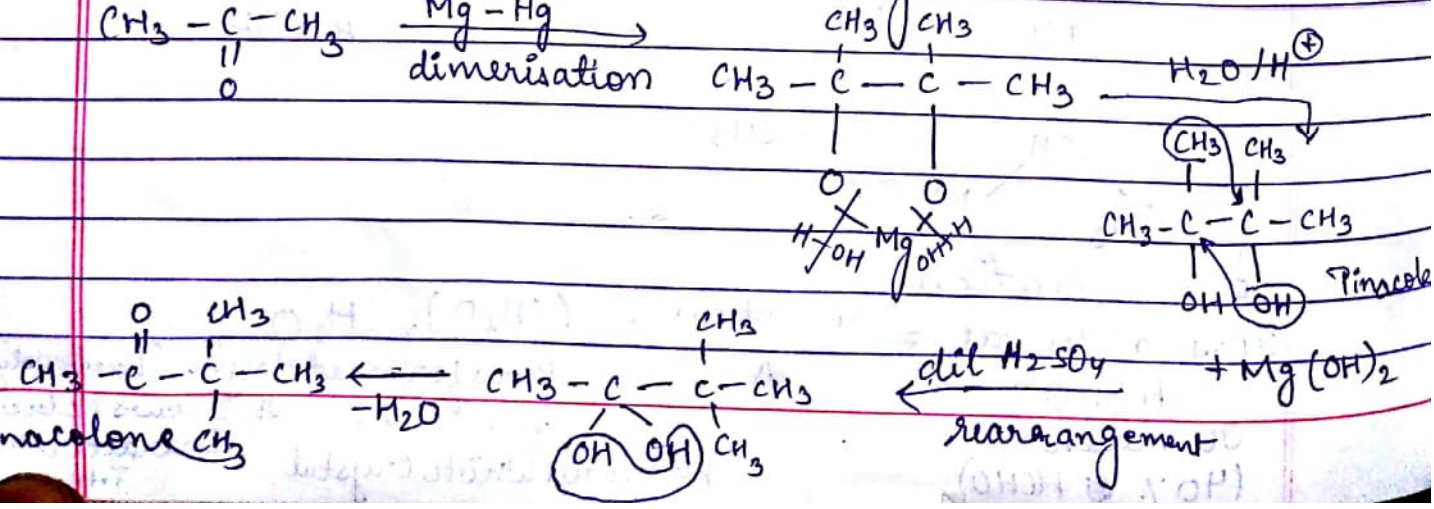


$4\,CH_3CHO \xrightarrow[0°C]{conc\ H_2SO_4} (CH_3CHO)_4$



Reac^2 only for ketone :-

Pincole / Pinacolone Rearrangement :-



Date _____ Page _____

Bayer's Villager Oxidation :-

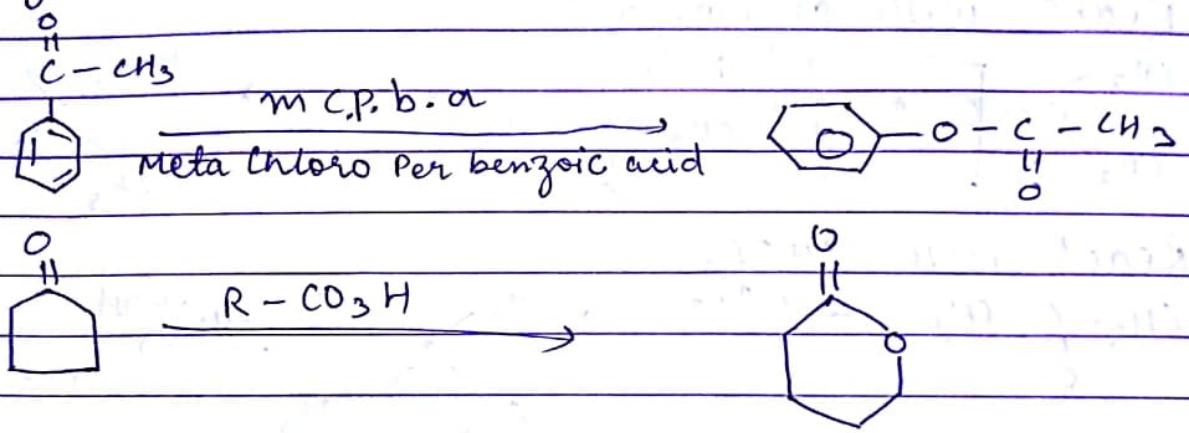
Ketone $\xrightarrow{\text{Per acid}}$ ester

$CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{R-\underset{\underset{O}{\|}}{C}-O-O-H} CH_3-\underset{\underset{O}{\|}}{C}-O-CH_3$

$CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_3 \xrightarrow{H_2O_2}$ $CH_3-O-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$ Minor

$CH_3-\underset{\underset{O}{\|}}{C}-O-CH_2-CH_3$ Major

Migration $H > 3^\circ > Ph > 2^\circ > 1^\circ > CH_3$

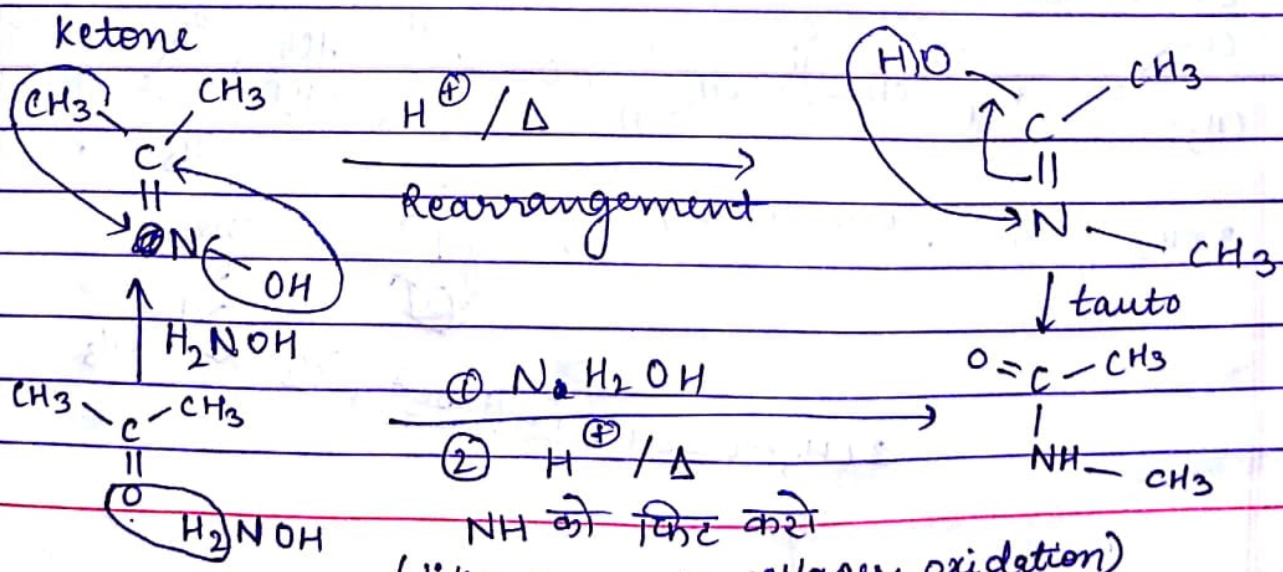


Beakmann Rearrangement :-

Oxime of Ketone $\xrightarrow{H^\oplus/\Delta}$ N-alkyl ~~amine~~ amide

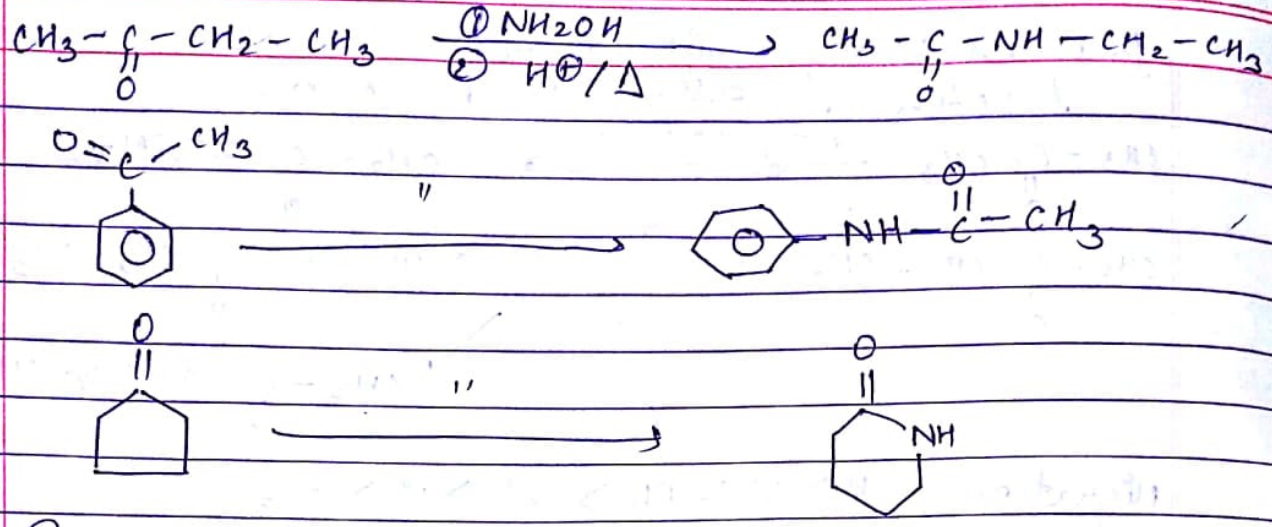
$\uparrow NH_2OH$

Ketone



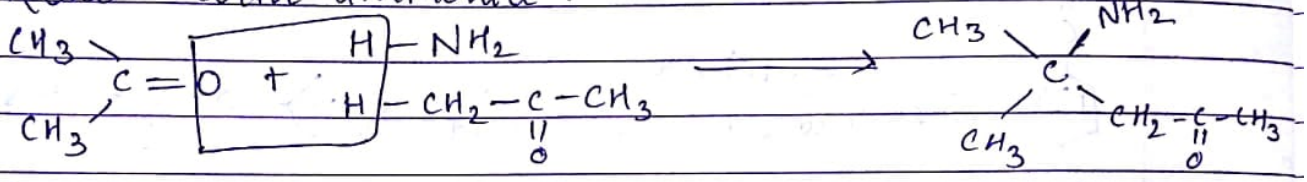
NH को फिर करो

(like Bayer's villager oxidation)

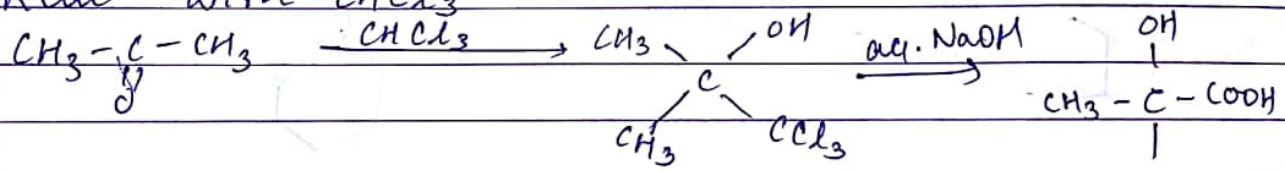


Not gmf

Reac^ with ammonia :—

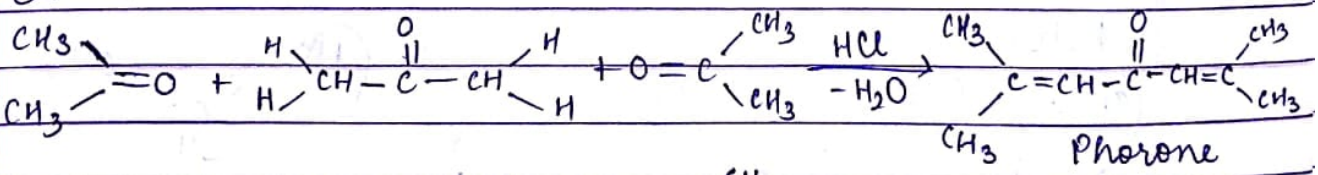


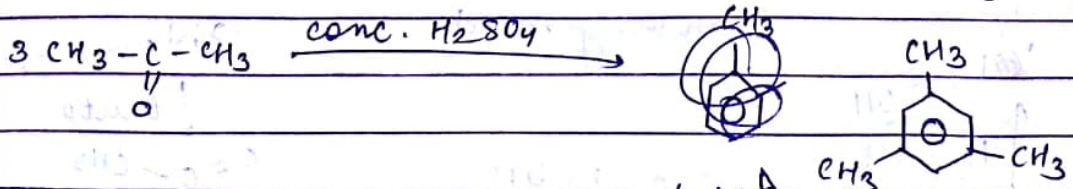
Reac^ with $CHCl_3$



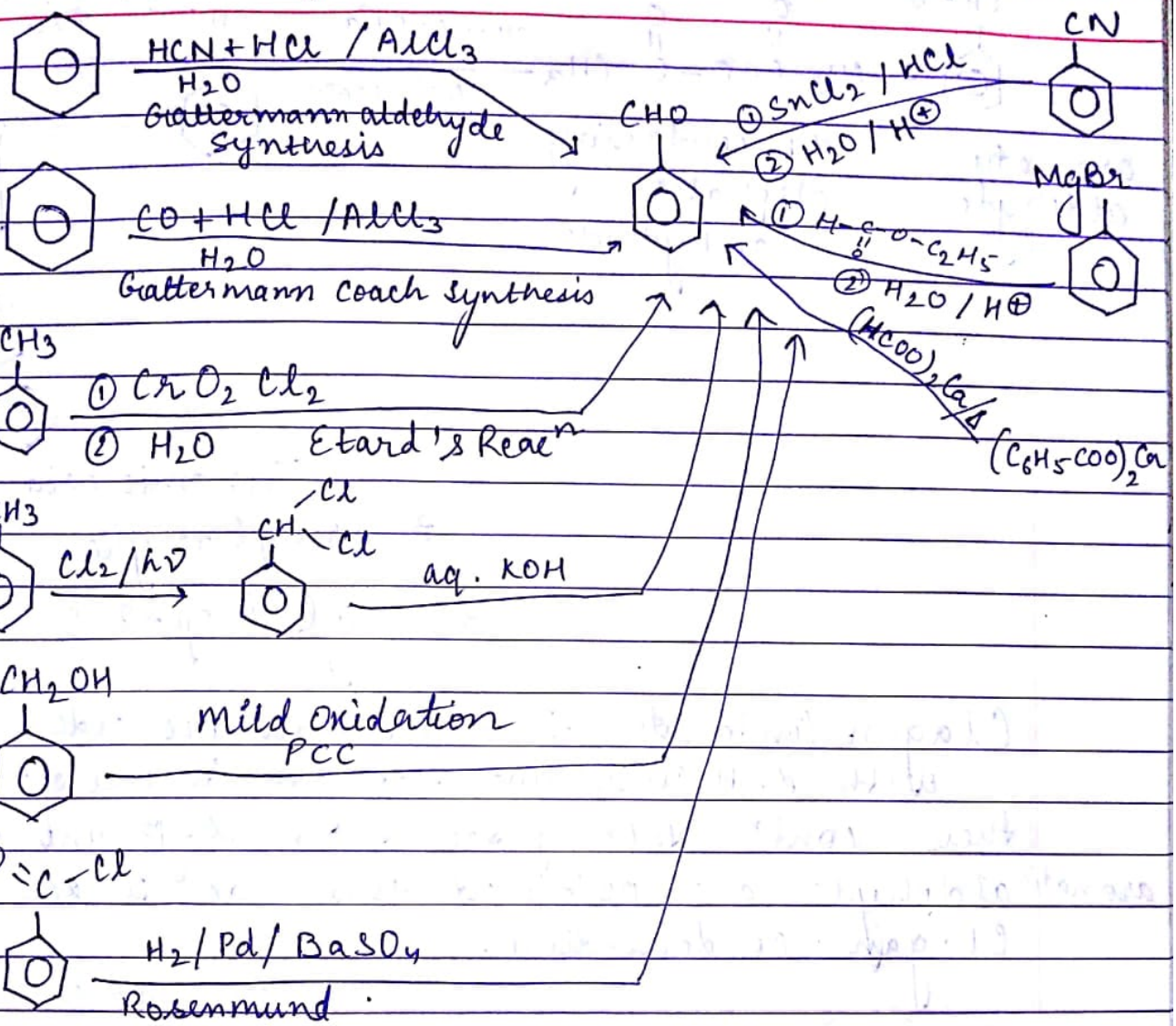
Chloritone
(Sleeping drug)

Condensation



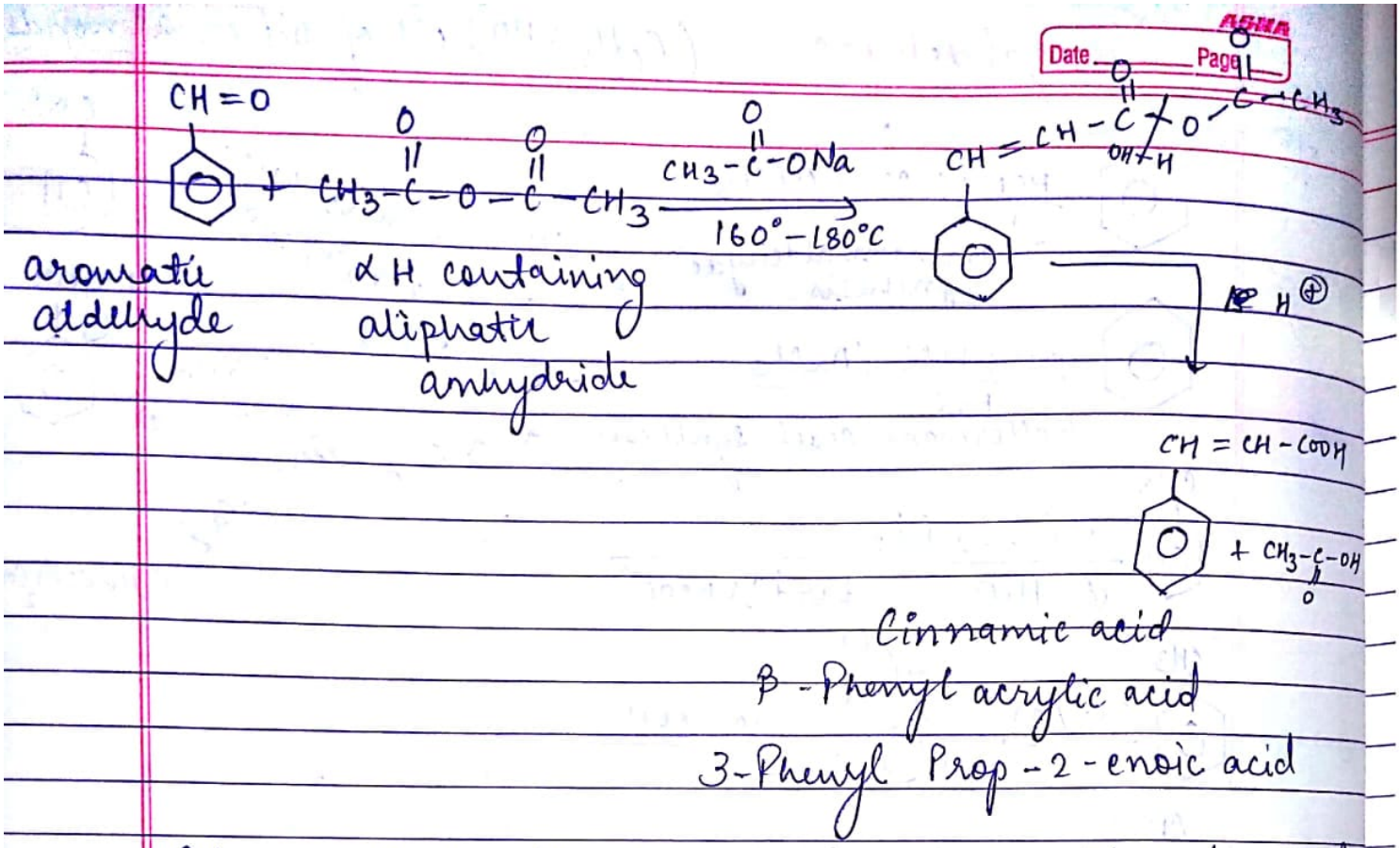


Benzaldehyde :- (C_6H_5CHO) oil of bitter almonds

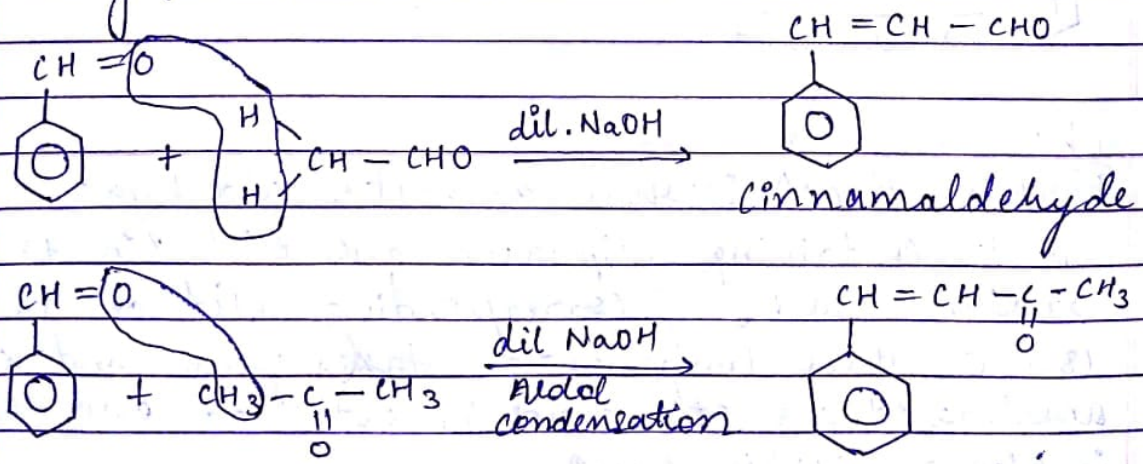


Chemical Properties :-

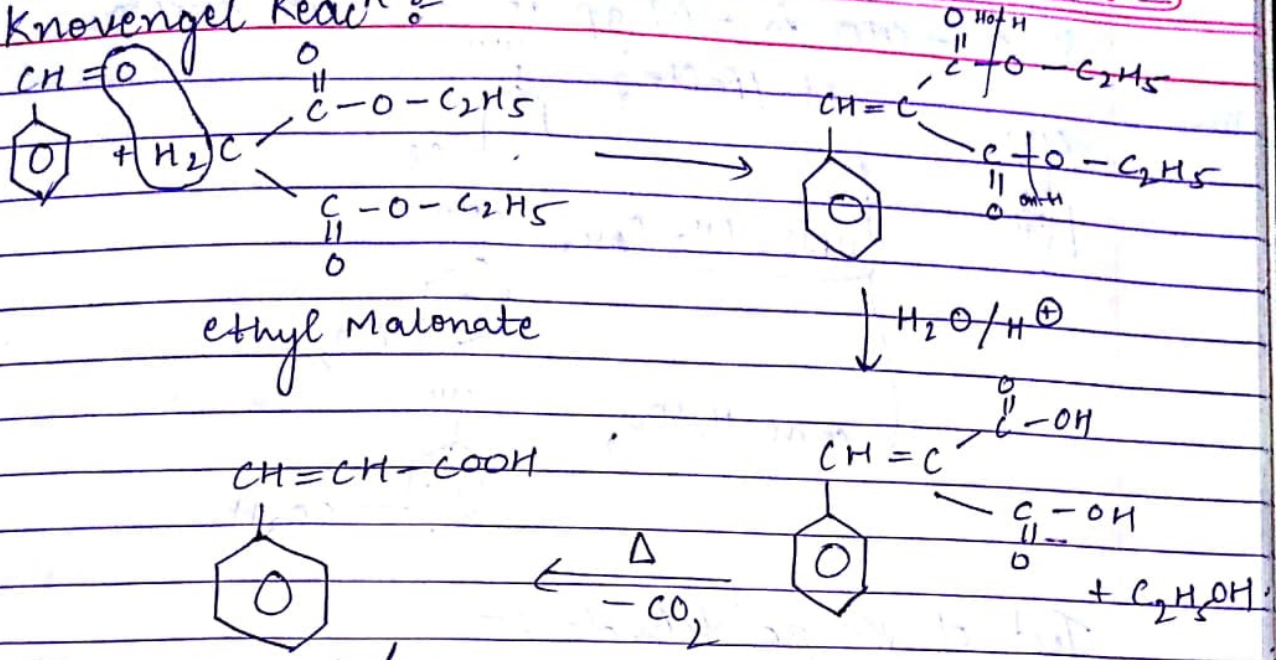
Perkin Reacn : When aromatic aldehyde react with α-H containing aliphatic anhydride in ⁺nce of sodium salt of corresponding acid at 160 to 180°C then condensation takes place and α-β unsaturated aromatic acid is obtained and the reacn is k/n as Perkin Reacn.



Clagan Condensation: When aromatic aldehyde treated with α-H containing aldehyde in the of dil alkali then cond^n takes place then α-β unsaturated aromatic aldehyde are obtained this reac^n is k/n as Clagan condensation.

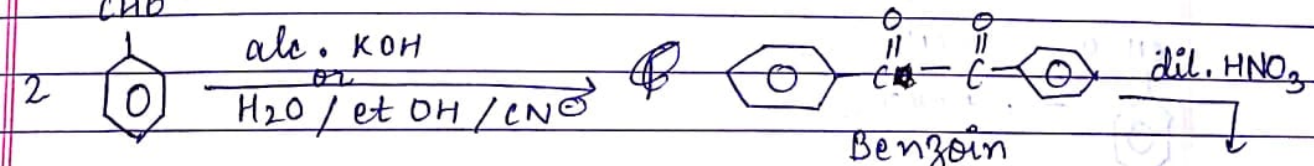


Knoevenagel Reaction :-

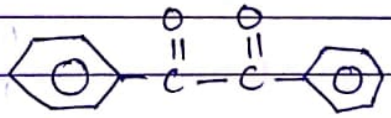


Cinnamic acid

Benzoin Condensation :-

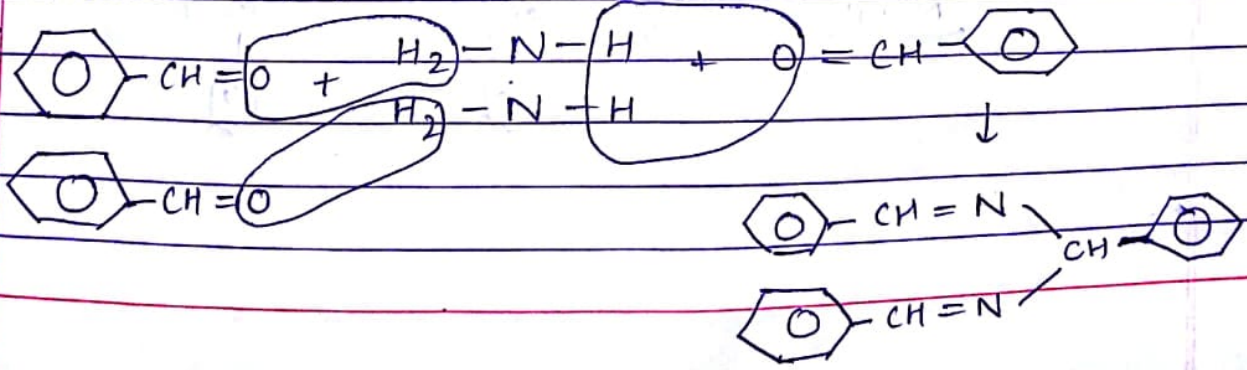


Benzoin



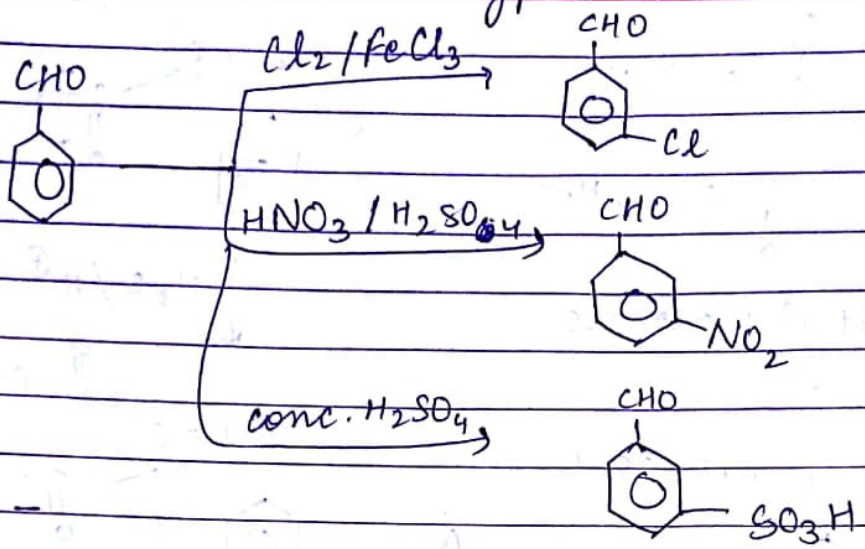
Benzil

Reaction with NH_3



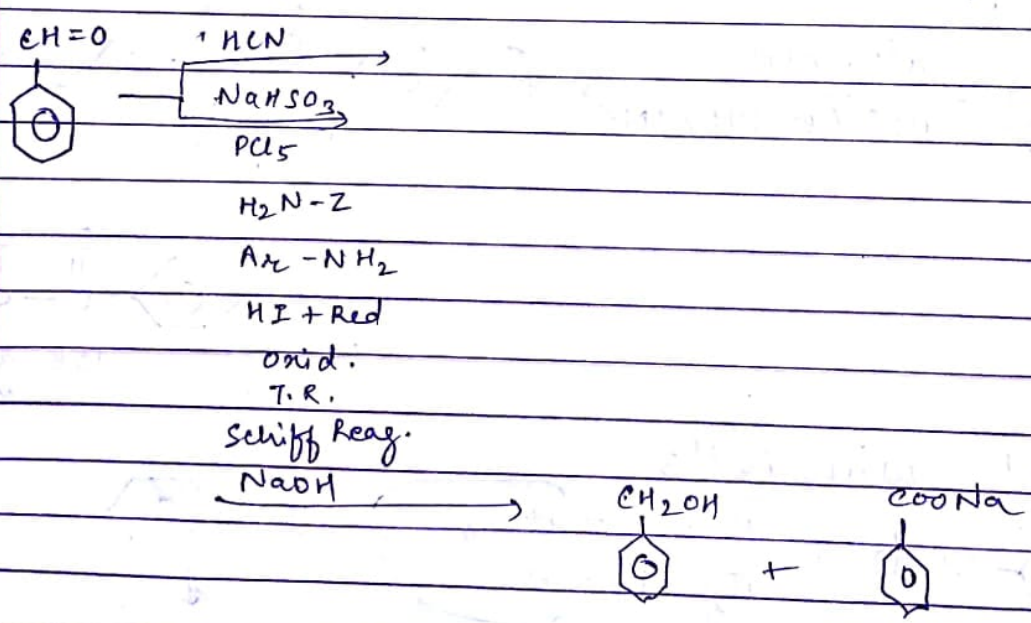
ESR :-

Since -CHO is -M gp so it is M director



Test of Benzaldehyde :-

Benzaldehyde give -ve test with F.S. & B.S. becoz it is undergoes cannizaro reaⁿ in alkaline media while it give +ve test with T.R. & Schiff Reagent



Carboxylic Acid (-COOH)

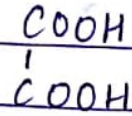
ASHA Date ____ Page ____

G.F. → $C_nH_{2n}O_2$

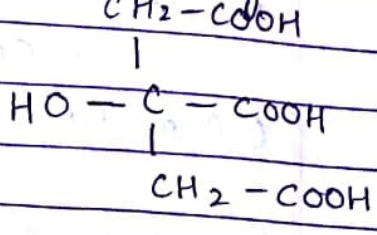
Monocarboxylic

CH_3-COOH

Dicarboxylic

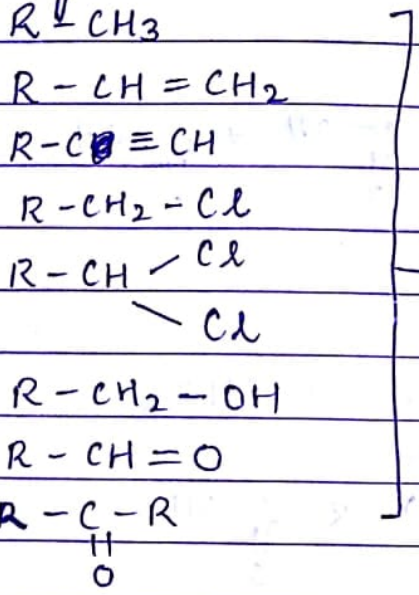


Tricarboxyllic acid

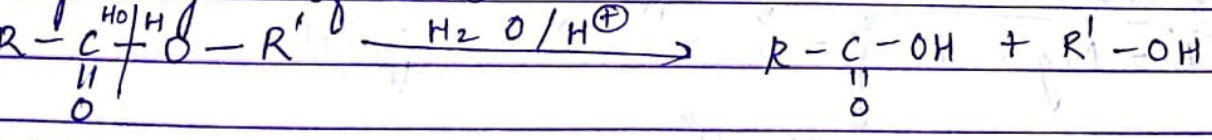


G.M.P. :-

1. **By Oxidation :-**

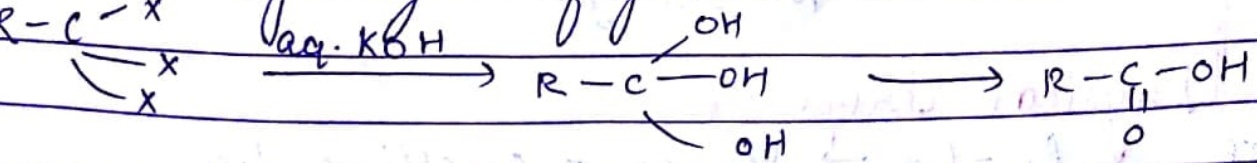


Hydrolysis of ester



Acidic Hydrolysis of cyanide

Alkaline hydrolysis of geminal trihalide :-



Heating of geminal dioic acid

$$R-CH(COOH)_2 \xrightarrow{\Delta} R-CH_2-COOH + CO_2$$

OC or IC

not gmf

Gurbet Reac^n :-

$$R-OH \xrightarrow{CO + BF_3} R-\underset{\underset{O}{\|}}{C}-OH$$

By HIO_4 (Per Iodic Acid)

$$-\underset{\underset{O}{\|}}{C}-\underset{\underset{O}{\|}}{C}- \xrightarrow{HIO_4/\Delta} -\underset{\underset{O}{\|}}{C}-OH + \underset{\underset{O}{\|}}{C}-OH$$

Iodoform Test :-

$$R-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{I_2/NaOH} R-\underset{\underset{O}{\|}}{C}-ONa + CHI_3$$

$$R-\underset{\underset{O}{\|}}{C}-ONa \xrightarrow{H^+} R-\underset{\underset{O}{\|}}{C}-OH$$

With G.R.

$$R-\overset{\delta+}{M}g\overset{\delta-}{X} + \underset{\underset{O}{\|}}{C}=O \xrightarrow{H^+} R-\underset{\underset{O}{\|}}{C}-OH$$

$$CH_3-CH_2-MgX \xrightarrow{CO_2/H^+} CH_3-CH_2-COOH$$

Carboxylation of Alkene :-

$$R-CH=CH_2 \xrightarrow[Ni-Catalyst]{CO+H_2O} R-CH_2-CH_2-COOH$$

Physical Properties :-

State

$C_1-C_3 \rightarrow$ Pungent smelling liq.

$C_4-C_{11} \rightarrow$ Oily butter smelling liq.

ASHA
Date _____ Page _____

higher → waxy solid

B.P. → B.P. $\propto$ Mw. $\propto$ $\frac{1}{\text{Branching}}$

B.P. acid > ester

$CH_3-CH_2-\overset{\overset{O}{\|}}{C}-OH$ > $CH_3-\overset{\overset{O}{\|}}{C}-O-CH_3$

due to H-bonding

B.P. acid > alcohol

$CH_3-\overset{\overset{O}{\|}}{C}-OH$ > $CH_3-CH_2-CH_2-OH$

↳ dimer form due to H-Bonding.

Chemical Properties :-

(A) Reacⁿ due to acidic H :

A.S. $\propto \frac{-M/-I}{+M/+I}$ Revise of G.O.C. I

pKa: $HCOOH$ (3.76) > C_6H_5COOH (4.42) > CH_3COOH (4.7)

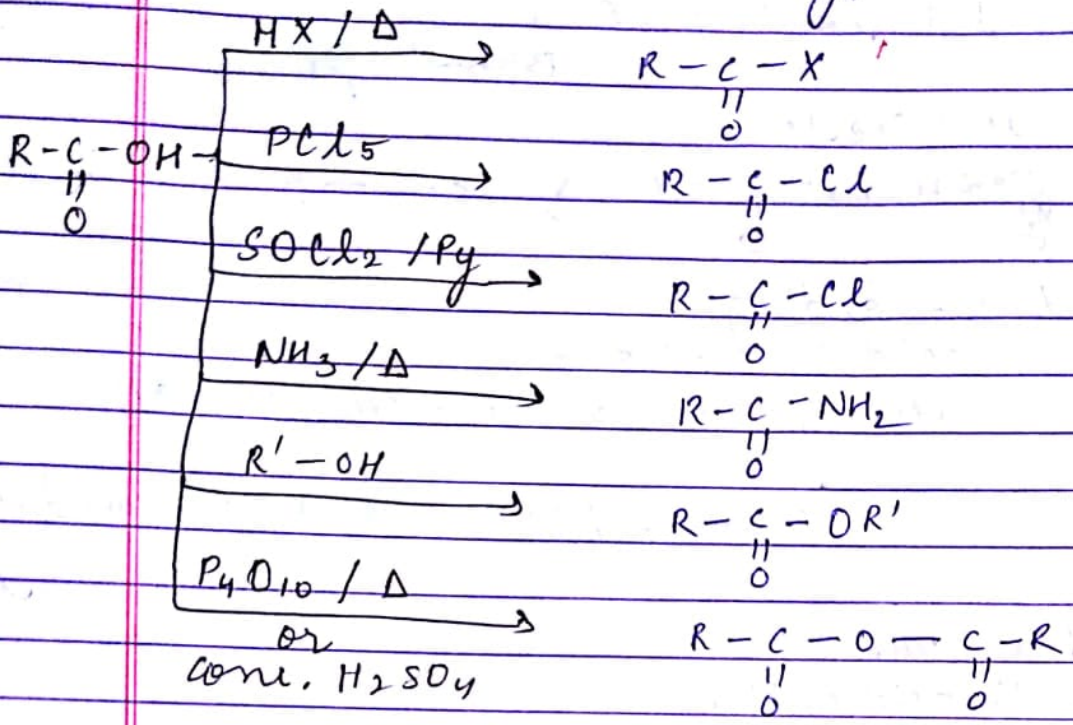
$R-\overset{\overset{O}{\|}}{C}-OH$

- Na → $R-\overset{\overset{O}{\|}}{C}-ONa + H_2\uparrow$
- NaH → $R-\overset{\overset{O}{\|}}{C}-ONa + H_2\uparrow$
- NaOH (neutralisation) → $R-\overset{\overset{O}{\|}}{C}-ONa + H_2O$
- $NaHCO_3$ → $R-\overset{\overset{O}{\|}}{C}-ONa + H_2CO_3$ ↓ $CO_2 + H_2O$

$R-\overset{\overset{O}{\|}}{C}-OH$

- CH_2N_2/Δ → $R-\overset{\overset{O}{\|}}{C}-O-CH_3$
- ① NaOH, ② $Cl-\overset{\overset{O}{\|}}{C}-CH_3$ → $R-\overset{\overset{O}{\|}}{C}-O-\overset{\overset{O}{\|}}{C}-CH_3$
- ① Ag_2O, ② $R'-Cl$ → $R-\overset{\overset{O}{\|}}{C}-O-R'$
- $R'-MgX$ → $R'-H$

Reac^n ~~with~~ due to -OH gp :-



(C) Reac^n due to $-\overset{\overset{O}{\|}}{C}-$ gp

only reduction Reac^n

$$R-\overset{\overset{O}{\|}}{C}-OH \xrightarrow{LiAlH_4 / H^{\oplus}} R-CH_2-OH$$

(D) Reac^n due to -COOH gp

1. Decarboxylation
2. Kolbe Electrolysis
3. HI / Red P
4. Huns Dicker Reac^n (Alkyl halide)

$$CH_3COOAg \xrightarrow{Br_2 / CCl_4} CH_3-Br + AgBr + CO_2$$

(E) V.V.Imp

Reac^n due to alkyl gp

Hell Volhard Zeilinsky Reac^n (HVZ Reac^n)

$R-CH_2-COOH \xrightarrow{X_2/Red\ P}$ $R-\underset{X}{\underset{|}{CH}}-COOH$

α-H containing acid

$X_2 = Cl_2, Br_2$ mainly

$CH_3-COOH \xrightarrow{Cl_2/Red\ P} Cl-CH_2-COOH$

aq. KOH ↓ : $HO-CH_2-COOH$ Glycolic acid

↓ $Cl_2/Red\ P$: CCl_3-COOH

NH_3/Δ : NH_2-CH_2-COOH Glycine, α-amino acid

$CH_3-CH_2-COOH \xrightarrow{Br_2/Red\ P} CH_3-\underset{Br}{\underset{|}{CH}}-COOH$

aq. KOH ↓ : $CH_3-\overset{*}{\underset{OH}{\underset{|}{CH}}}-COOH$ Lactic acid

↓ $Br_2/Red\ P$: $CH_3-\underset{Br}{\underset{Br}{\overset{|}{\overset{|}{C}}}}-COOH$ AIPMT-09

NH_3 : $CH_3-\underset{NH_2}{\underset{|}{CH}}-COOH$

Rea~~c~~ Oxidation :- Oxid^n of carbonylic acid is not possible except Formic acid.

$H-\underset{\underset{O}{\|}}{C}-OH \xrightarrow[\text{or } K_2Cr_2O_7/H^\oplus]{KMnO_4/H^\oplus} HO-\underset{\underset{O}{\|}}{C}-OH \rightarrow CO_2 + H_2O$

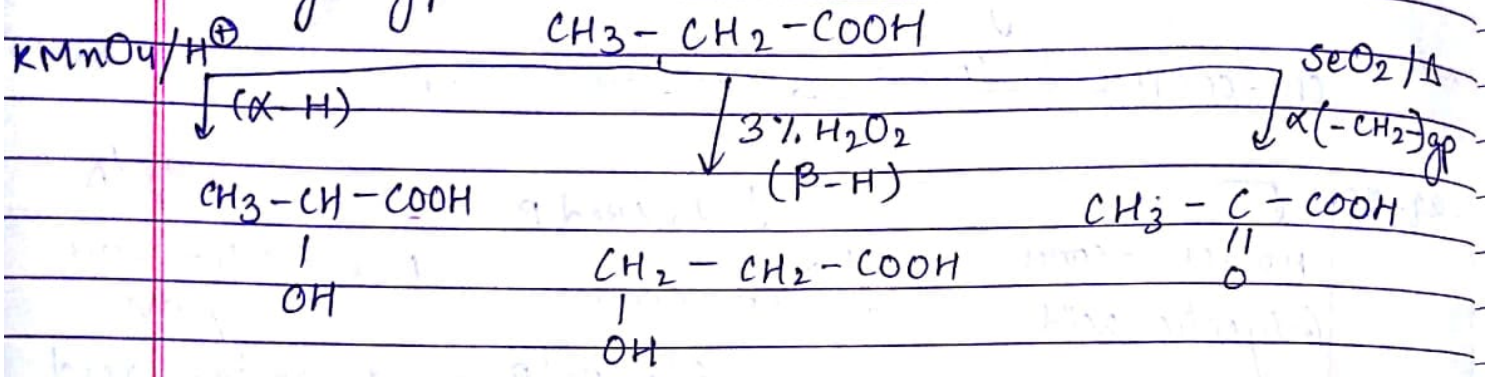
aldehyde gp

carboxylic acid

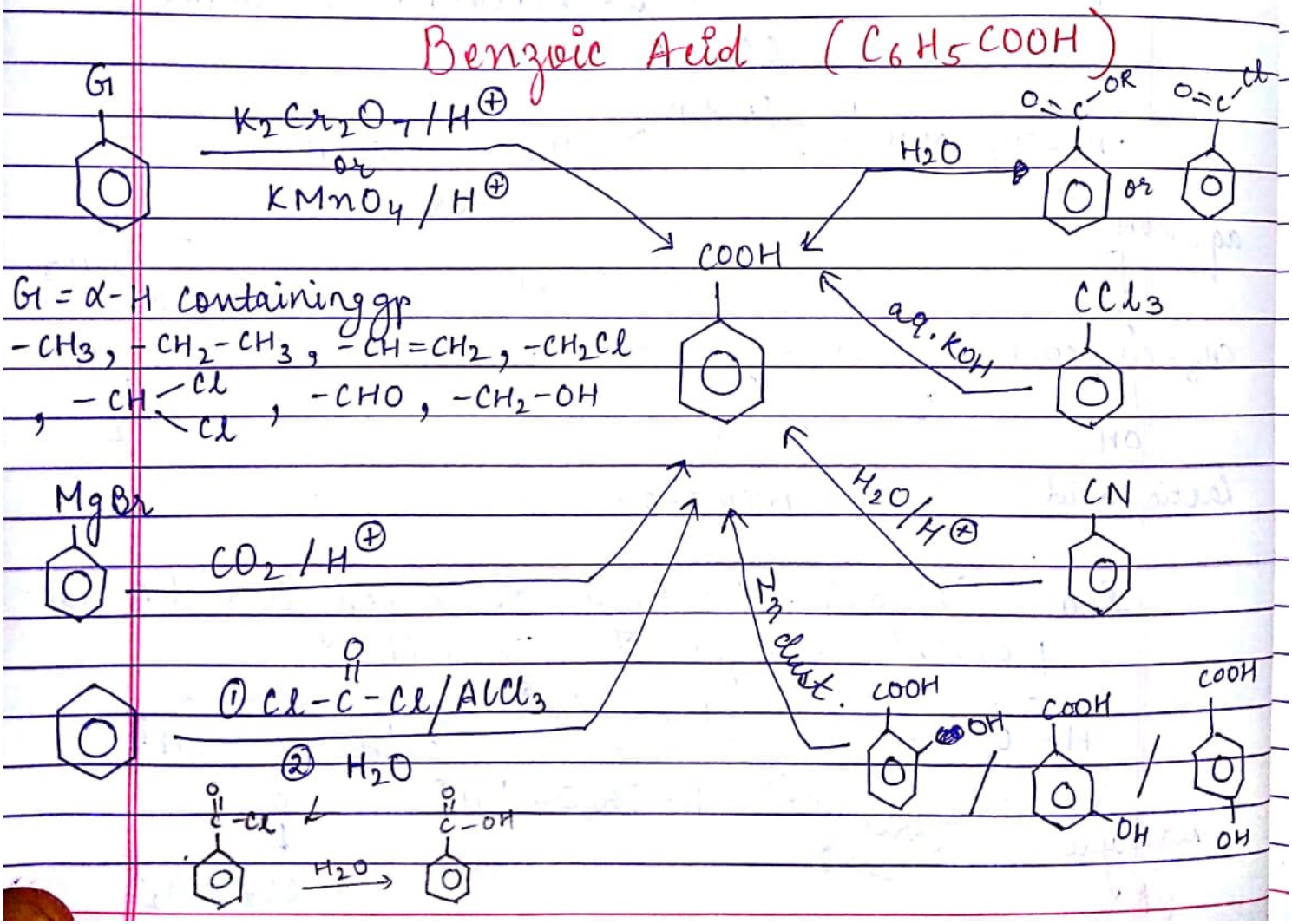
ASHA
Date Page

Note: Only formic give +ve T.R. test & F.S. test becoz -CHO gp is present in it.

Alkyl gp Oxidation

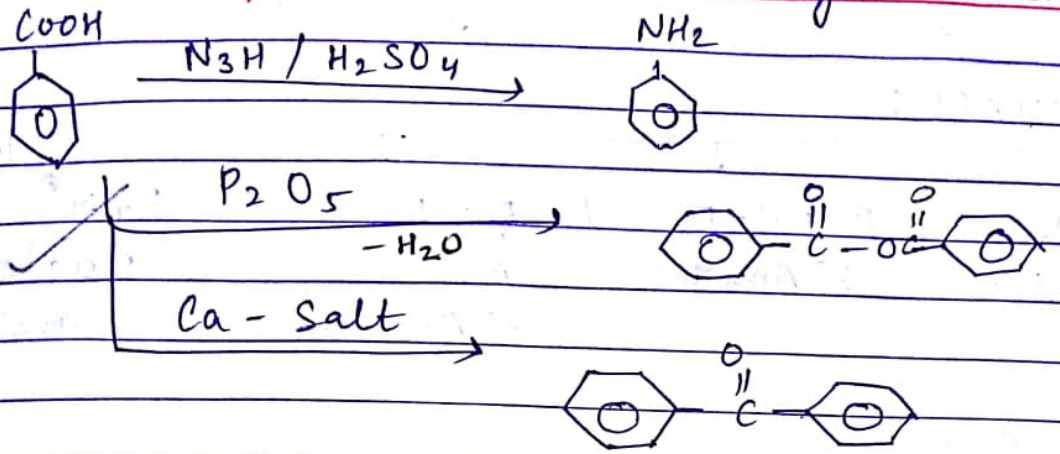


Benzoic Acid (C_6H_5COOH)



ASHA
Date _____ Page ____

Chemical Properties :- same as carboxylic acid



Acid - derivatives → Revise from G.O.C - II