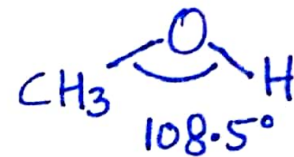


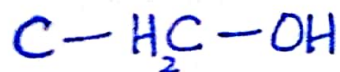
ALCOHOL (R-OH)

- F.G:- Hydroxyl group (-OH)
O \rightarrow sp^3 hybridized

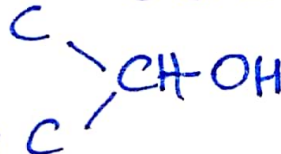


• Monohydric Alcohol

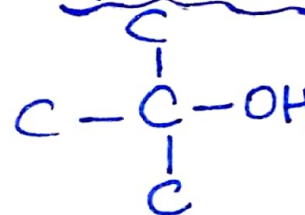
Primary



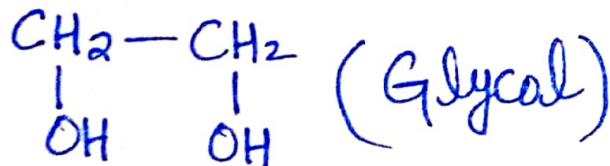
Secondary



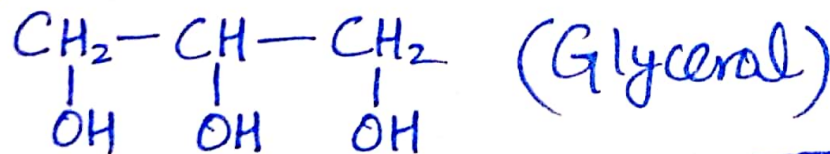
Tertiary



• Dihydric Alcohol



• Trihydric Alcohol



• General Formula



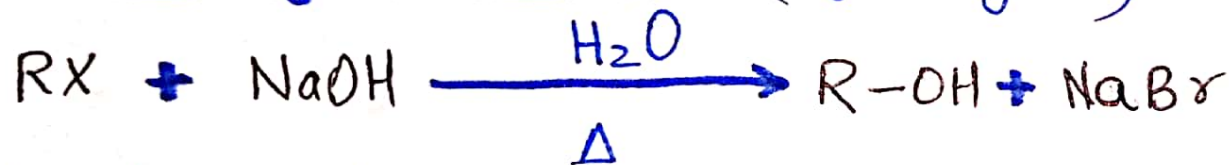
PREPARATION OF ALCOHOL

1. From Alkene: (Hydration)



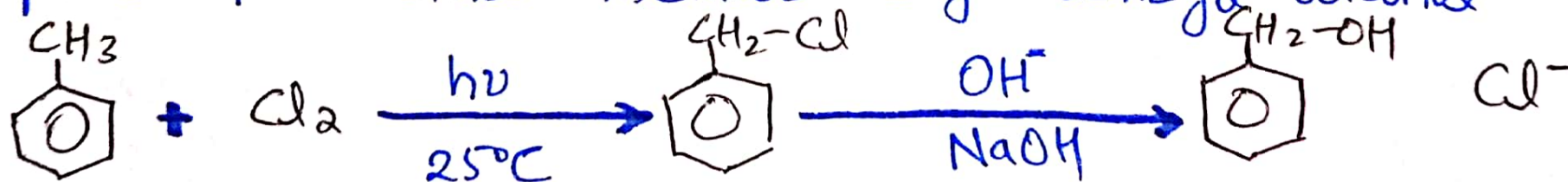
- Markovnikov addition.

2. From alkyl halide: (Hydrolysis)

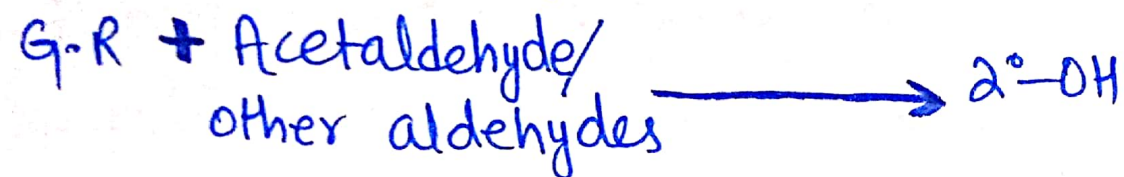
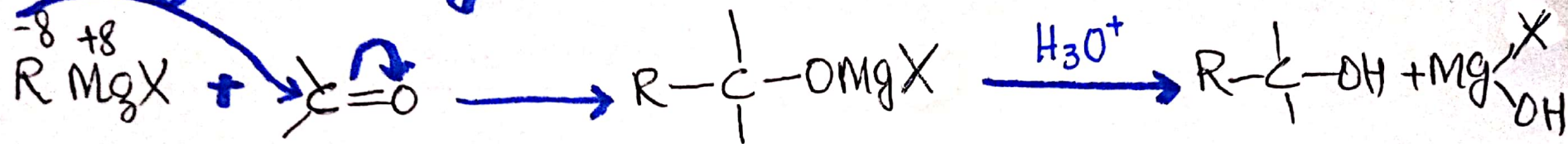


- Not of much practical use because Alcohols are more readily available than alkyl halide.

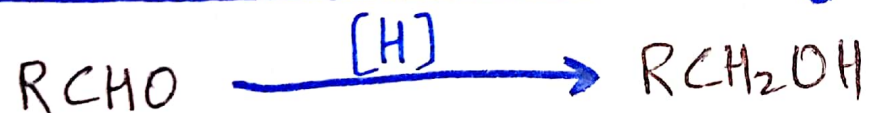
Importance — to prepare those alcohols than cannot be prepared from other methods e.g benzyl alcohol



3. Grignard synthesis



4. Reduction of carbonyl compounds:

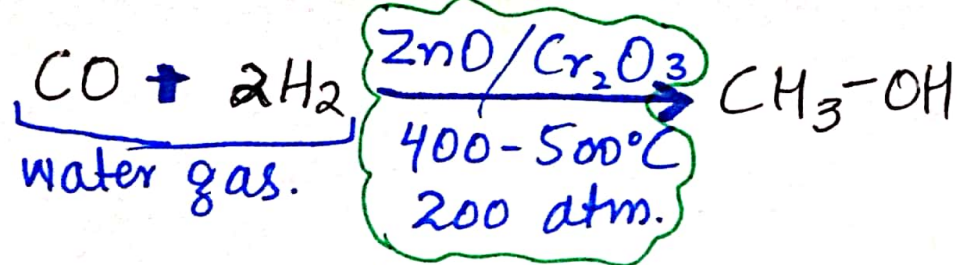


Reagents: Ni or Pd or Pt, 200°C, P (3-20 atm)

or LiAlH₄ or NaBH₄.

↳ do not reduce =, ≡, ester, amide

4. From Water gas (Preparation of methanol)



5. From Carbohydrate (Fermentation)

• Preparation of ethanal.

• 25-35°C

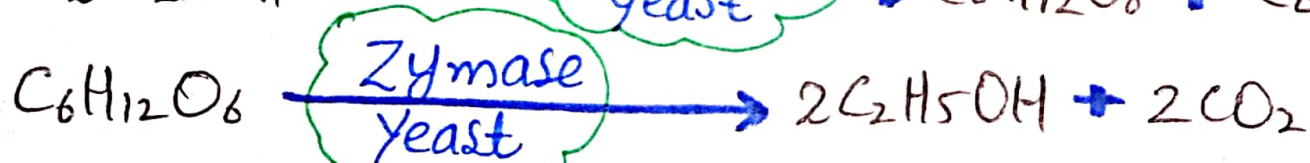
A. From Molasses:

→ Residue obtained after crystallization of sugar.

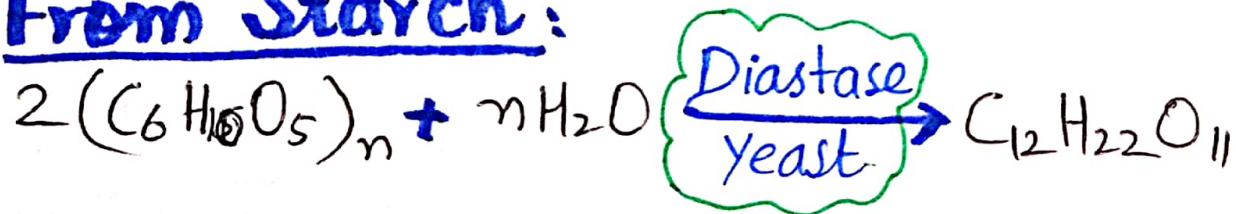
• Proper aeration

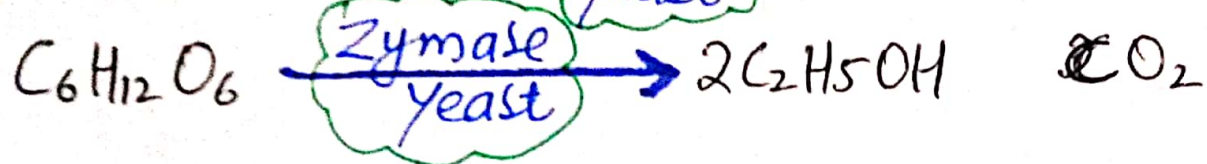
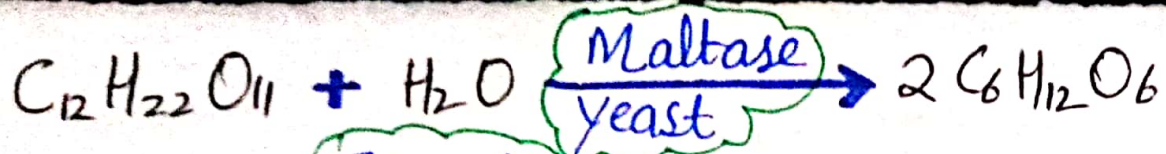
• Dilution of solution

• Absence of preservative



B. From Starch:





- Alcohol obtained = 12%, never exceed 14%.
- Distilled and distilled again \rightarrow Rectified spirit (95%)

Absolute Alcohol (100%) \xleftarrow{CaO}

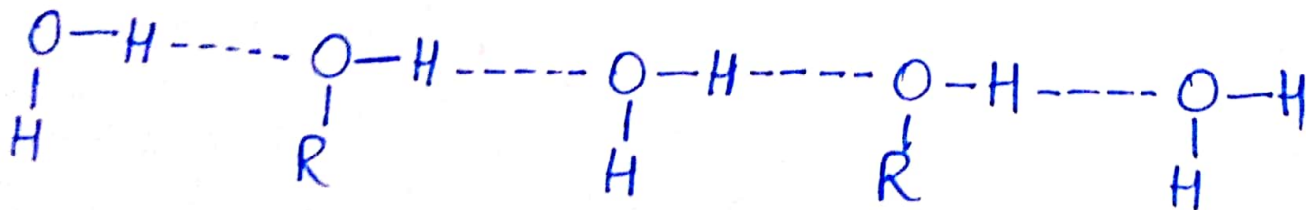
- Alcohol denatured by Pyridine, Acetone, 10% methanol.

PHYSICAL PROPERTIES

Soluble in water — due to H-bonding (Lower Alcohols)

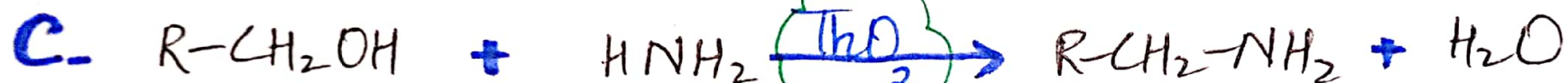
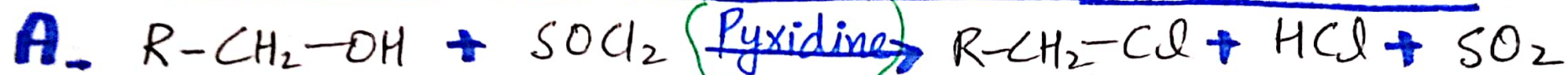
Lower alcohols Sweet smell, burning taste, colourless liquid.

M.P°, B.P° higher than corresponding alkanes.



CHEMICAL REACTIONS

1. Reaction in which C-O bond breaks:



● Order of Reactivity $3^\circ-OH > 2^\circ-OH > 1^\circ-OH$

● Intermediate = Carbocation.

2. Reaction in which O-H bond breaks:

Alcohol behaves as acid

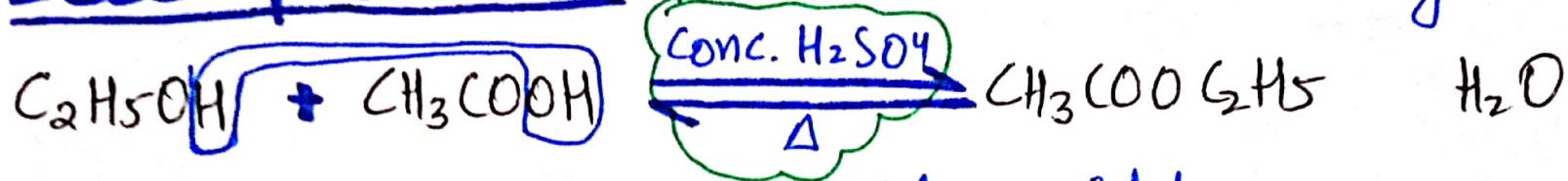
● Order of Reactivity



A. Reaction with metal:

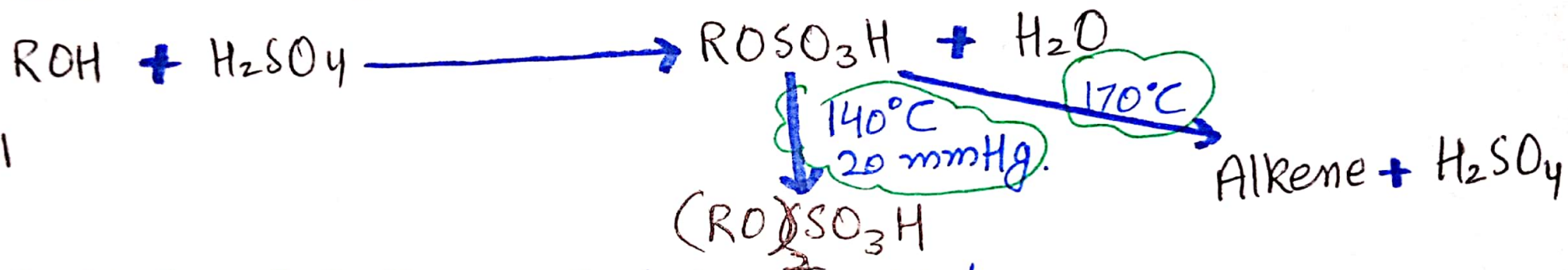


B. Esterification: Reaction with carboxylic acid.



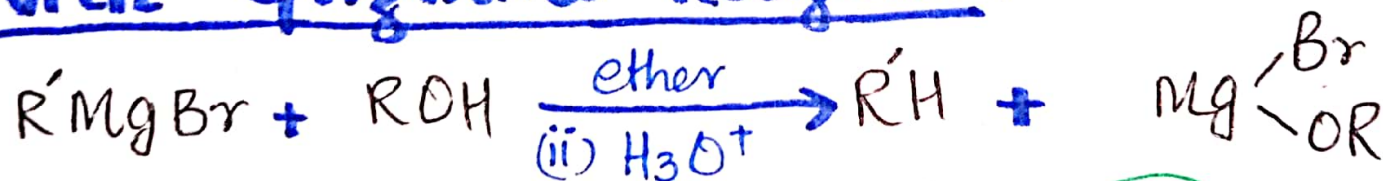
- Only 1°-OH gives reasonable yield.

C. With Inorganic Acid: (with H_2SO_4 or H_3PO_4)



- Diethyl sulphate — ethylating agent.

d. With Grignard Reagent:



3. Dehydration: $CH_3-CH_2-OH \xrightarrow[180^\circ C]{\text{conc. } H_2SO_4} CH_2=CH_2 + H_2O$

(Low T, conc. alcohol) $2 CH_3CH_2OH \xrightarrow[140^\circ C]{\text{conc. } H_2SO_4} CH_3CH_2O-CH_2CH_3 + H_2O$

4. Oxidation :-

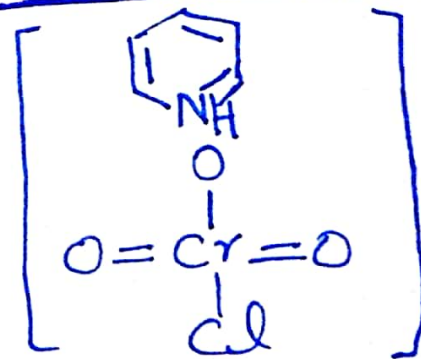
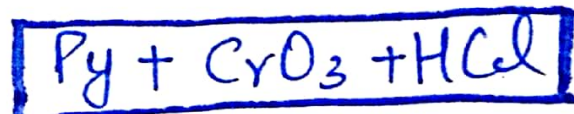
- Reagents used. Acid dichromate ($\text{H}_2\text{SO}_4 / \text{K}_2\text{Cr}_2\text{O}_7$)



- Jones Reagent = CrO_3 and H_2SO_4 in aq. acetic acid.
↳ does not oxidize double bond

- PCC (Pyridinium chlorochromate)
($1^\circ\text{-OH} \rightarrow \text{Aldehyde}$)

- Adkin's catalyst = $\text{CuO} \cdot \text{Cr}_2\text{O}_3$



Tests for Distinction b/w 1°, 2° and 3°

1. CrO₃ in aq. H₂SO₄

- 1° and 2° decolorizes orange-red color.
- 3°-OH do not.

2. Lucas Test

HCl in the presence of ZnCl₂

- 3°-OH immediately forms oily layer of R-Cl.
- 2°-OH in 5-10 mins " " " "
- 1°-OH on heating " " " "

3. Iodoform Test: I₂/NaOH

- Ethanol and 2°-OH with OH at C-2 form yellow ppt. of iodoform (CHI₃)

Uses of Methol

- Solvent for oil, paint etc.
- Antifreeze in engines.
- Denaturing of alcohol.

Uses of Ethanol

- Solvent
- Drink
- Fuel
- Pharmaceutical preparation
- Preservative for biological specimens