Chemistry Study Materials for Class 12

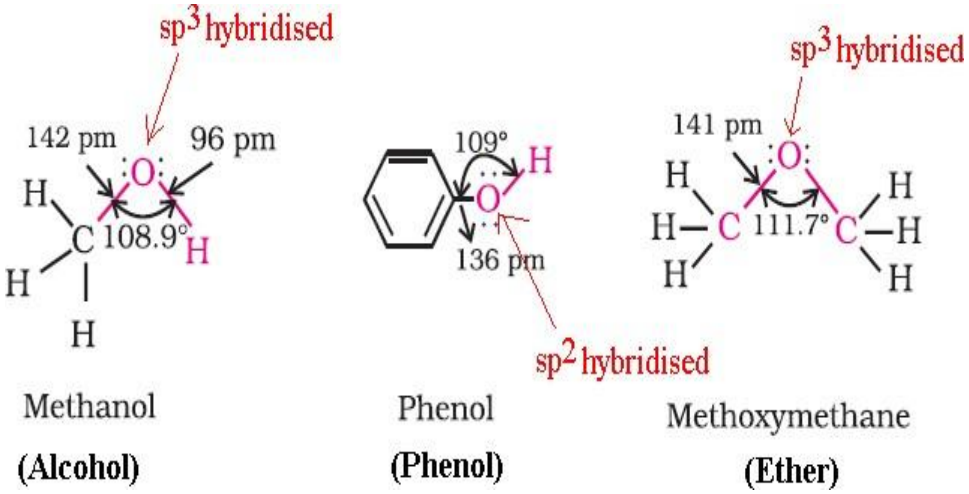
(NCERT Based Notes of Chapter - 11)

Ganesh Kumar Date:- 23/09/2021

Alcohols, Phenols and Ethers

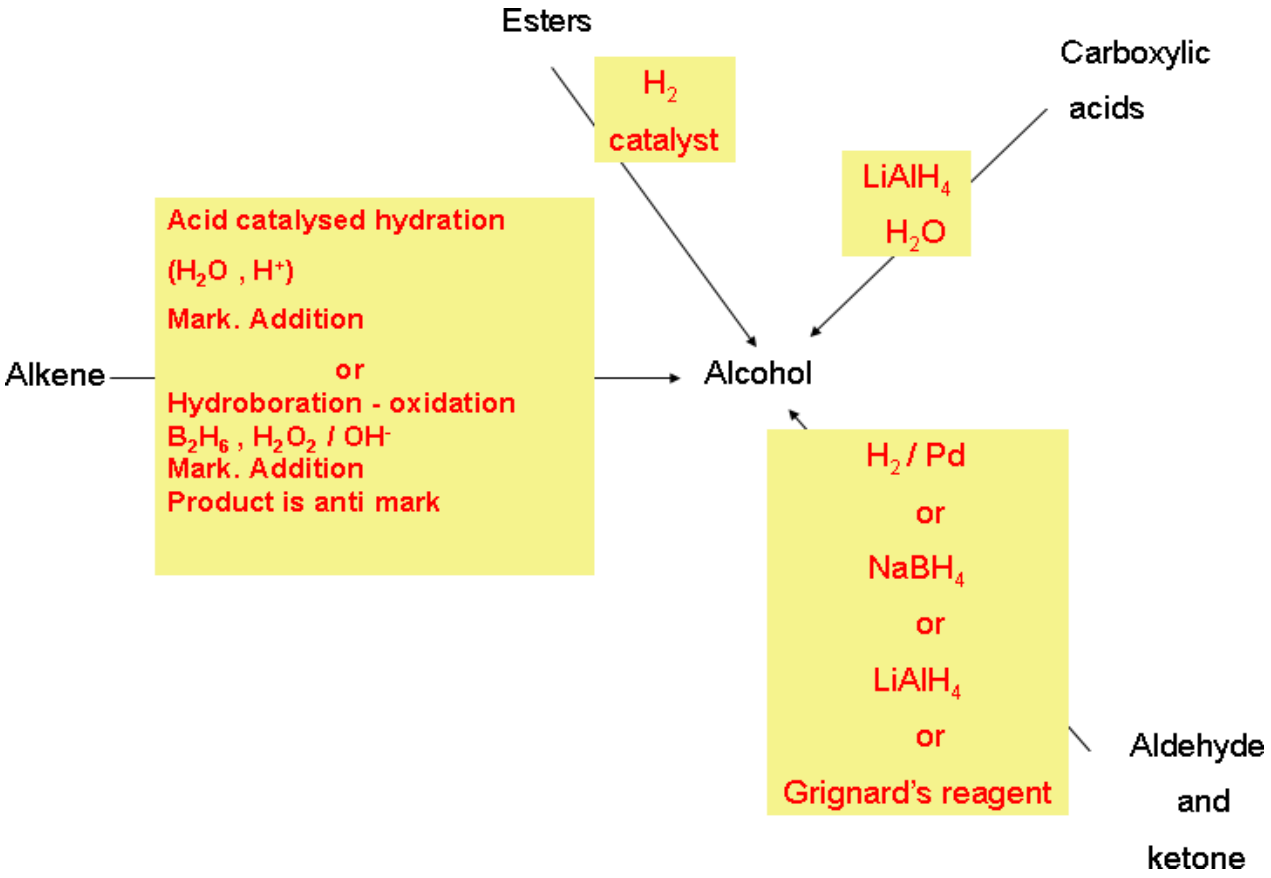
Top Concepts:

1. Structure of alcohols, phenols and ethers:

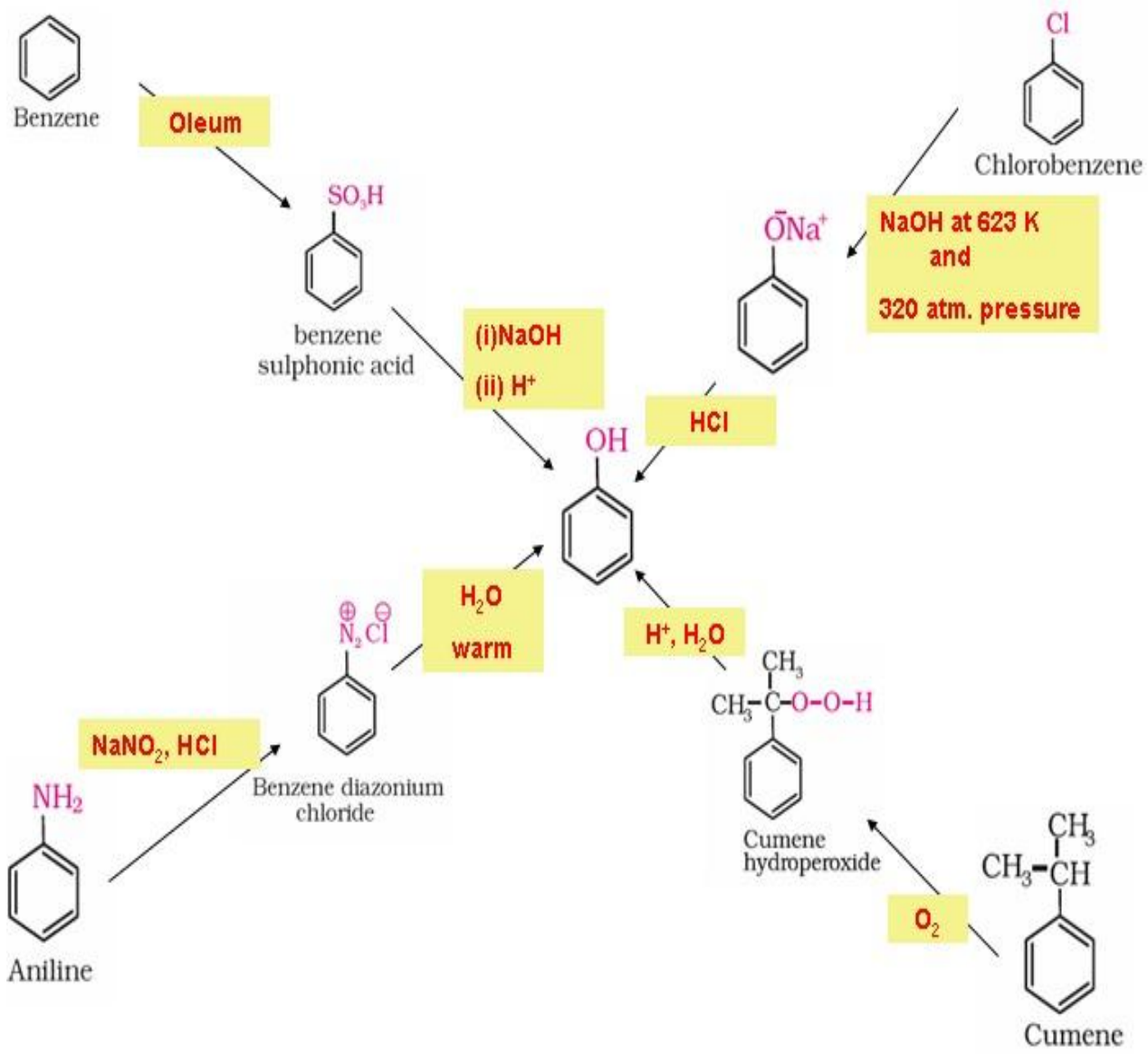


Methanol (Alcohol) | Phenol (Phenol) | Methoxymethane (Ether)

2. Preparation of alcohols:



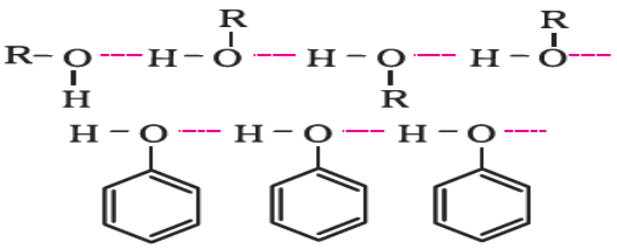
3. Preparation of phenols:

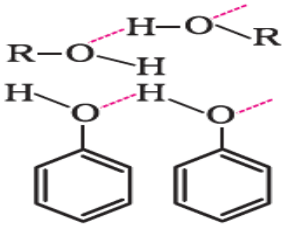


4. Physical properties of alcohols and phenols:

a. Boiling points:

- Boiling points of alcohols and phenols are higher in comparison to other classes of compounds, namely hydrocarbons, ethers, haloalkanes and haloarenes of comparable molecular masses. This is because the –OH group in alcohols and phenols is involved in intermolecular hydrogen bonding.

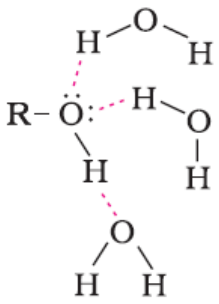




- The boiling points of alcohols and phenols increase with increase in the number of carbon atoms. This is because of increase in van der Waals forces with increase in surface area.
- In alcohols, the boiling points decrease with increase of branching in carbon chain. This is because of decrease in vander Waals forces with decrease in surface area.

b. Solubility:

- Solubility of alcohols and phenols are soluble in water due to their ability to form hydrogen bonds with water molecules.



- The solubility of alcohols decreases with increase in size of alkyl/aryl (hydrophobic) groups.

5. Chemical properties of alcohols:

a. Reactions involving cleavage of O–H bond: Alcohols react as nucleophiles:

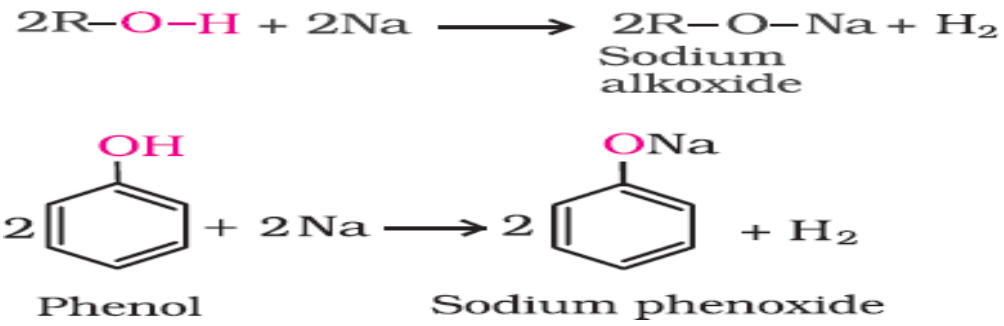
b. Reactions involving cleavage of carbon – oxygen (C–O) bond in Alcohols: Protonated alcohols react as electrophiles:

c. Dehydration

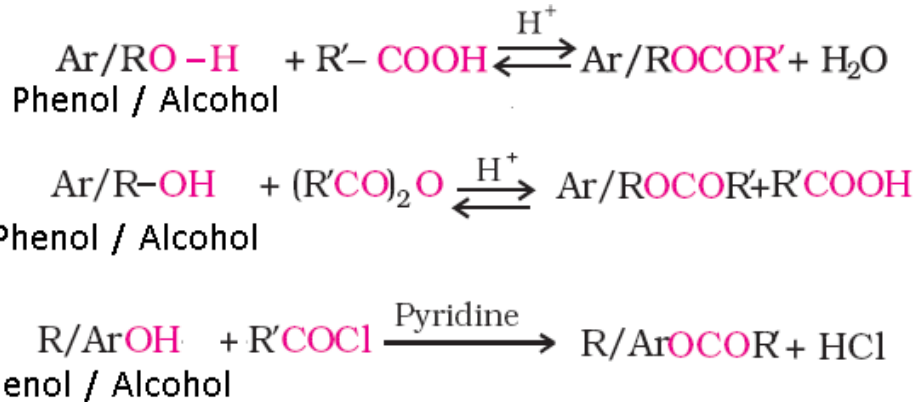
d. Oxidation

6. Reactions of alcohols and phenols involving cleavage of O–H bond:

a. Reaction with metals:



b. Esterification:



7. Reactions of alcohols involving cleavage of carbon – oxygen (C–O) bond:

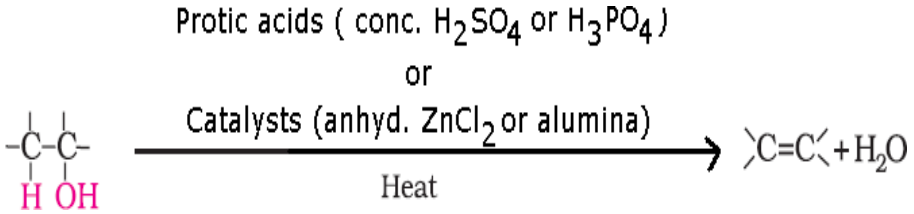
a. Reaction with hydrogen halides: (Lucas reagent-Conc. HCl + $ZnCl_2$)

$$ROH + HX \xrightarrow[ZnCl_2]{\text{conc. HCl}} RX + H\,O$$

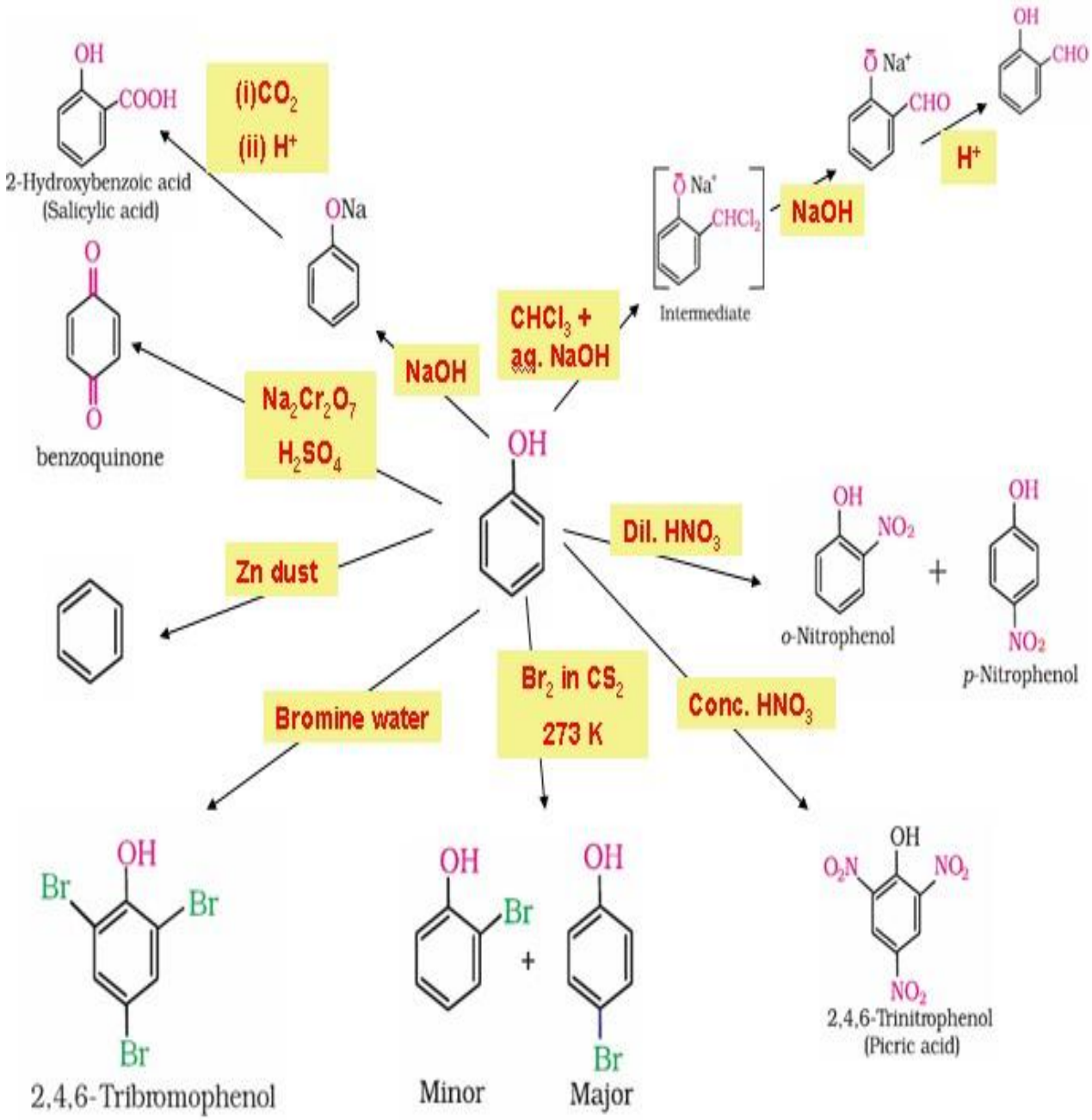
b. Reaction with phosphorus trihalides:

$3\ ROH + PX_3 \rightarrow 3\ R\text{-}X + H_3PO_3$ (X = Cl, Br)

c. Dehydration:



Chemical properties of phenols:



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