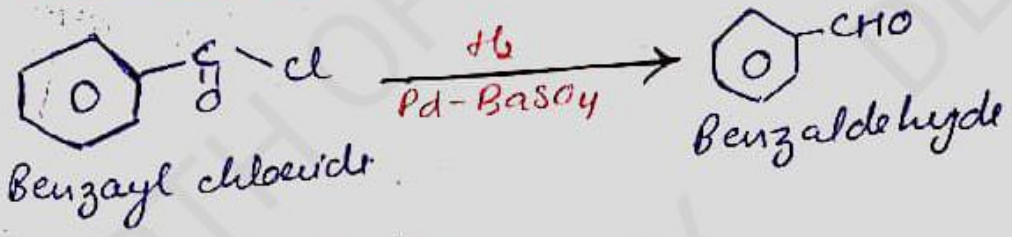
Preparation of Aldehyde

1. By hydration of Alkynes

Ethyne + H_2O $\xrightarrow[HgSO_4]{H_2SO_4}$ Acetaldehyde ($CH_3-\overset{O}{\overset{\|}{C}}-CHO$)

• All other alkynes gives ketone in this rxn.

2. Rosenmund Reduction



Benzoyl chloride → Benzaldehyde

3. Stephen Reaction

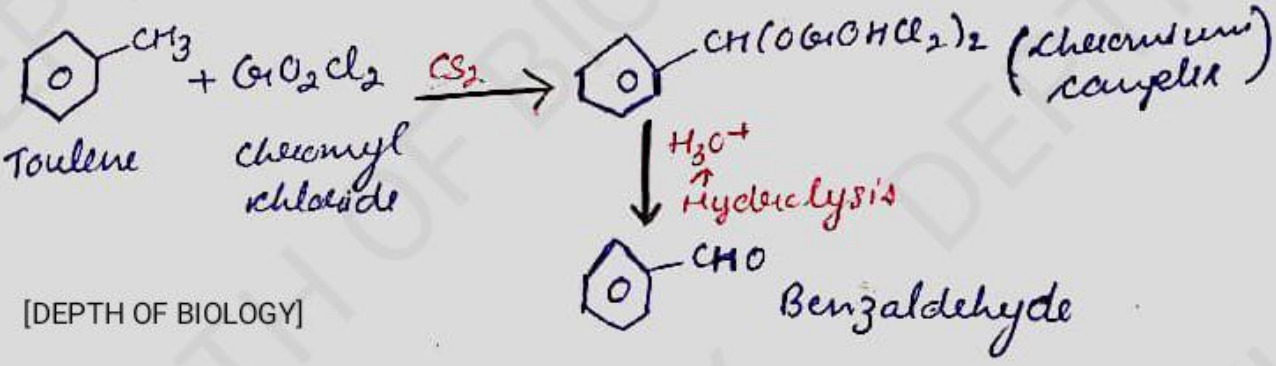
$RCN + SnCl_2 + HCl$ → $RCH=NH$ (Imine) → $R-CHO$ (Aldehyde)

4. From Ester

$H_3C-(CH_2)_9-\overset{O}{\overset{\|}{C}}-OC_2H_5$ $\xrightarrow[H_2O]{DIBAL-H}$ $CH_3(CH_2)_9-\overset{O}{\overset{\|}{C}}-H$

DIBAL-H → Diisobutyl aluminium.

5. Preparation of Aromatic Aldehyde "ETARD Rxn"



Toulene — chromyl chloride → Benzaldehyde

6. By Gatterman-Koch Rxn

Benzene → Benzaldehyde

Prepration of Ketone

1. From Acyl chloride.

$$2R-Mg-X + CdCl_2 \longrightarrow R_2Cd + 2Mg(X)Cl$$

GR.

$$2R'-\underset{\underset{O}{\|}}{C}-Cl + R_2Cd \longrightarrow 2R'-\underset{\underset{O}{\|}}{C}-R + CdCl$$

Acid chloride, dialkyl cadmium → Ketone

2. From Nitriles

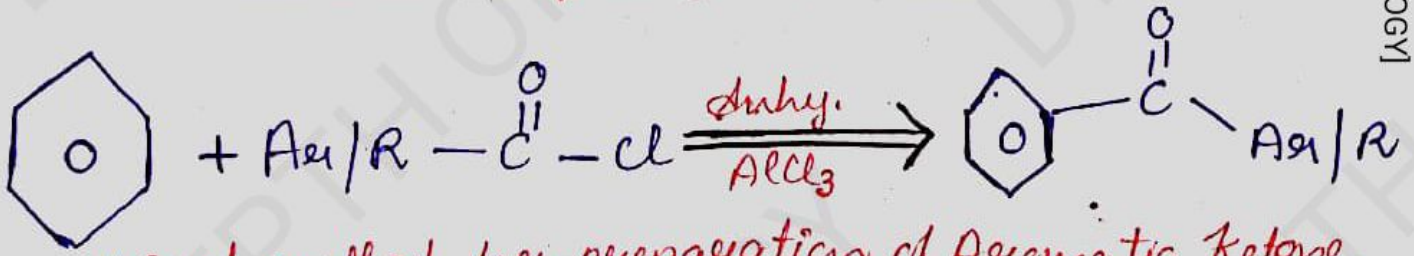
$$H_3C-CH_2-C\equiv N + C_6H_5MgBr \xrightarrow{\text{Ether}} CH_3-CH_2-C(=NMgBr)-C_6H_5$$

$$\xrightarrow{H_3O^+} O=C(C_6H_5)-C_2H_5$$

Propiophenone

3. From Benzene or Substituted Benzene

"Friedal Craft Acylation Rxn"



* Good method for preparation of Aromatic Ketone.

Reactions of Aldehyde and Ketone

1. Reduction to Alcohol.

A/K $\xrightarrow[LiAlH_4 \text{ (as well as catalytic } H_2)]{NaBH_4}$ P.S/A

2. Clemmensen Reduction

$$\underset{H}{\overset{H}{\diagdown}}C=C \xrightarrow[HCl]{Zn-Hg} CH_2 + H_2O$$

3. Wolf-kishner Reduction

$$>C=O \xrightarrow[-H_2O]{NH_2-NH_2} >C=NH_2 \xrightarrow[\text{ethylene glycol.}]{\Delta,\ KOH} >CH_2 + N_2$$

4. al $\xrightarrow{[O]}$ oic.

Aldehydes are easily oxidised into Carboxylic acid. But ketone generally oxidise into vigorous conditions ie. Strong oxidising agent and elevated temp.

5. Tollen's Test (mild [O] agent)
Rxn occures in Alkaline medium

$$RCHO + 2[Ag(NH_3)_2] + 3OH^- \xrightarrow[\text{silver nitrate}]{\text{ammonical}} RCOO^- + 2Ag\downarrow + 2H_2O + 4NH_3$$

Tollen's reagent.

6. Fehling Test

$$R\text{-}CHO + 2Cu^{+2} + 5OH^- \xrightarrow{[O]^s} RCOO^- + Cu_2O + 3H_2O$$

dark blue — Red brown ppt

Aromatic Aldehyde does not respond in this test.