Chemistry Study Materials for Class 12

(NCERT Based Notes of Chapter - 11)

Ganesh Kumar Date:- 15/10/2020

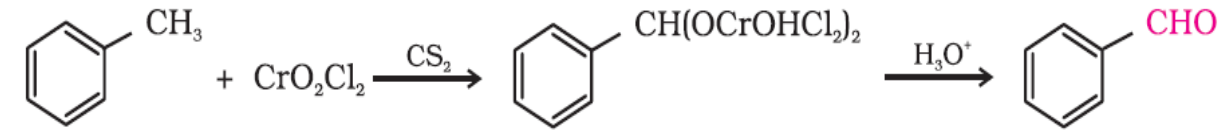
Aldehyde, Ketones and Carboxylic Acid

Preparation of Aromatic aldehydes:

1. By oxidation of methylbenzene:

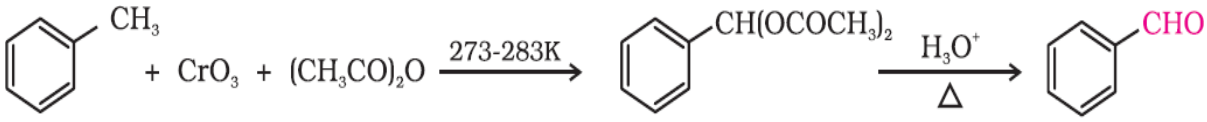
Methyl benzenes when oxidised by using mild oxidising agents like chromyl chloride (CrO_2Cl_2) or chromic oxide (CrO_3) in acetic anhydride, we get benzaldehyde.

Chromyl chloride oxidises methyl group to a chromium complex, which on hydrolysis gives corresponding benzaldehyde. This reaction is called ***Etard reaction***.



Toluene — Chromium complex — Benzaldehyde

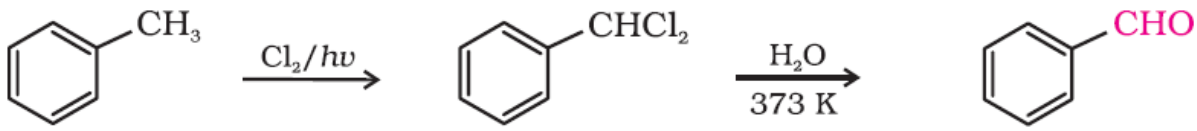
On treating with chromic oxide in acetic anhydride, methyl benzene is converted to benzylidene diacetate which on acidification gives benzaldehyde.



Benzaldehyde

2. By side chain chlorination followed by hydrolysis:

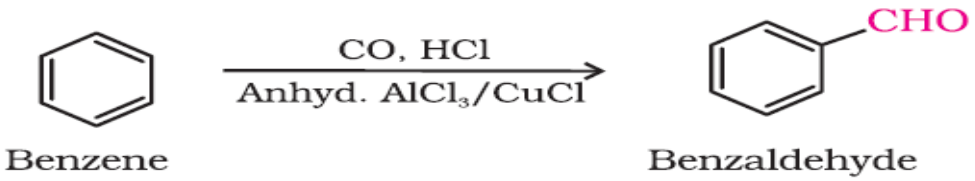
Side chain chlorination of toluene gives benzal chloride, which on hydrolysis gives benzaldehyde. This method is used for the manufacture of benzaldehyde.



Toluene — Benzal chloride — Benzaldehyde

3. By Gatterman – Koch reaction:

When benzene is treated with carbon monoxide and hydrogen chloride in the presence of anhydrous aluminium chloride or cuprous chloride, we get benzaldehyde. This reaction is known as Gatterman-Koch reaction.



Preparation of Ketones

1. **From acyl chlorides**: Acid chlorides react with dialkylcadmium, we get ketones. Dialkyl cadmium is prepared by the reaction of cadmium chloride with Grignard reagent.

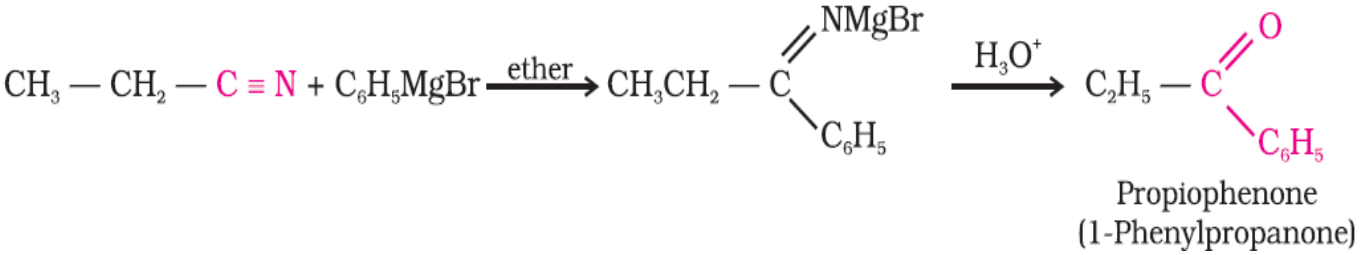
$$2\ R\text{-}MgX + CdCl_2 \longrightarrow R_2Cd + 2Mg(X)\ Cl$$

Grignard reagent

$$2\ R'\text{-}COCl + R_2Cd \longrightarrow 2\ R'\text{-}CO\text{-}R + CdC_{l2}$$

Acid chlorides Ketone

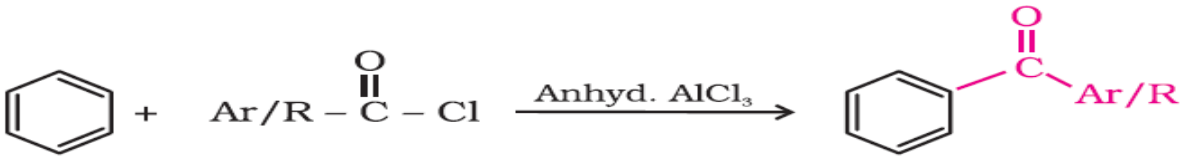
2. **From nitriles**: Nitriles add Grignard reagent followed by hydrolysis gives ketones.



Propiophenone
(1-Phenylpropanone)

3. From benzene or substituted benzenes [*Friedel – Crafts acylation reaction*]

When benzene or substituted benzene is treated with acid chloride (R-COCl) in the presence of anhydrous aluminium chloride, we get a ketone. This reaction is known as ***Friedel-Crafts acylation reaction***.



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