# Organic name reactions

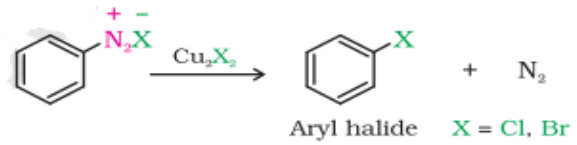
## 1. Finkelstein reaction


Prepration of alkyl iodides by the reaction of alkyl chlorides/ bromides with NaI in dry acetone is known as Finkelstein reaction.

## 2. Swarts reaction

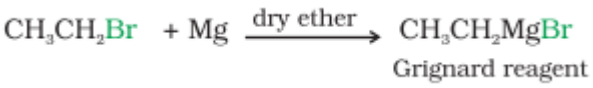

Prepration of alkyl fluorides by the reaction of alkyl chlorides/ bromides with metallic fluoride such as AgF, $Hg_2F_2$ , $CoF_2$ or $SbF_3$ is known as Swarts reaction.

## 3. Sandmeyer's reaction




Treatment of freshly prepared diazonium salt with cuprous chloride or cuprous bromide results in the replacement of the diazonium group by –Cl or –Br is known as Sandmeyer's reaction.

## 4. Grignard Reagent Formation




Grignard reagent is obtained by the reaction of haloalkanes with magnesium metal in dry ether.

## 5. Wurtz reaction

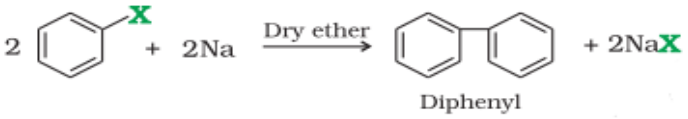



Alkyl halides react with sodium in dry ether to give hydrocarbons containing double the number of carbon atoms present in the halide. This reaction is known as Wurtz reaction.

## 6. Wurtz-Fittig reaction


A mixture of an alkyl halide and aryl halide gives an alkylarene when treated with sodium in dry ether and is called Wurtz-Fittig reaction.

## 7. Fittig reaction




Aryl halides also give analogous compounds when treated with sodium in dry ether, in which two aryl groups are joined together. It is called Fittig reaction.

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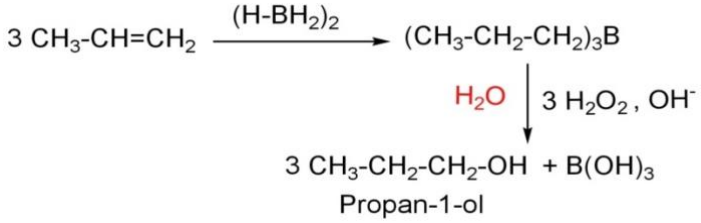
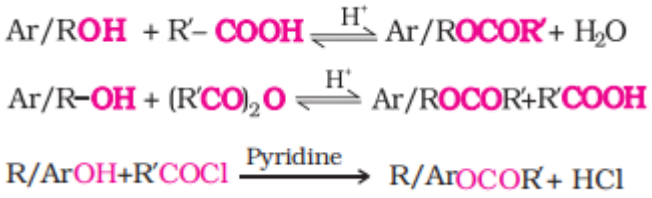
## 8. Hydroboration–oxidation




Diborane $(BH_3)_2$ reacts with alkenes to give trialkyl boranes as addition product. This is oxidised to alcohol by hydrogen peroxide in the presence of aqueous sodium hydroxide.

## 9. Esterification




Esterification : Alcohols and phenols react with carboxylic acids, acid chlorides and acid anhydrides to form esters

## 10. Acetylation


The introduction of acetyl ($CH_3CO$) group in alcohols or phenols is known as acetylation.

Acetylation of salicylic acid produces aspirin. Aspirin possesses analgesic, antiinflammatory and antipyretic properties

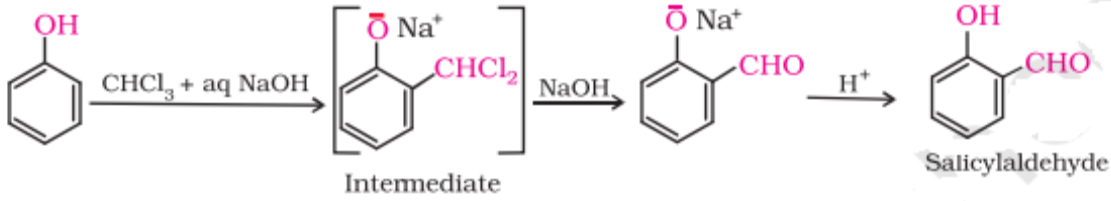
## 11. Kolbe's reaction


The electrophilic aromatic substitution of Phenoxide ion with carbon dioxide (a weak electrophile ) to give ortho hydroxybenzoic acid is called Kolbe reaction.

Phenoxide ion is more reactive than phenol.

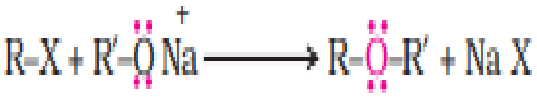
## 12. Reimer-Tiemann reaction

On treating phenol with chloroform in the presence of sodium hydroxide, a –CHO group is introduced at ortho position of benzene ring. This reaction is known as Reimer - Tiemann reaction.




Reactive intermediate: Dichlorocarbene ($:CCl_2$) an electrophile.

## 13. Williamson synthesis




An alkyl halide reacts with sodium alkoxide to produce symmetrical and unsymmetrical ethers is called Williamson synthesis .
The reaction involves $SN^2$ attack of an alkoxide ion on primary alkyl halide.

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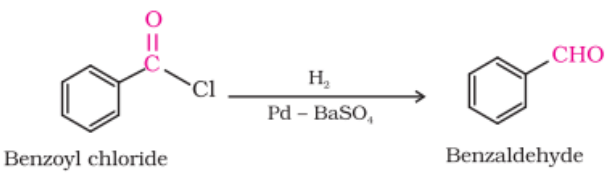
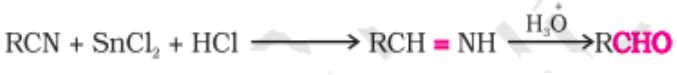
## 14. Rosenmund reduction



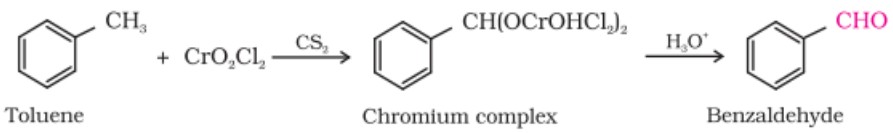

Acyl chloride (acid chloride) is hydrogenated over catalyst, palladium on barium sulphate. This reaction is called Rosenmund reduction.

## 15. Stephen reaction



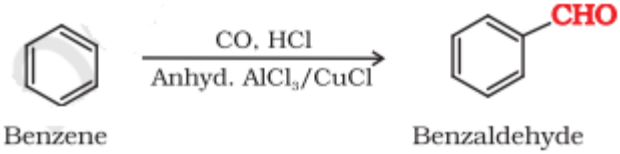

Nitriles are reduced to corresponding imine with stannous chloride in the presence of hydrochloric acid, which on hydrolysis give corresponding aldehyde.

## 16. Etard reaction




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

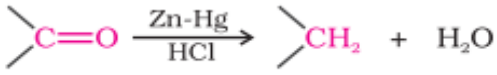
## 17. Gatterman – Koch reaction




When benzene or its derivative is treated with carbon monoxide and hydrogen chloride in the presence of anhydrous aluminium chloride or cuprous chloride, it gives benzaldehyde or substituted benzaldehyde.

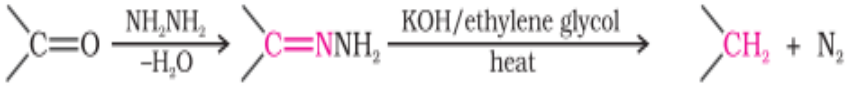
This reaction is known as Gatterman-Koch reaction.

## 18. Clemmensen reduction




The carbonyl group of aldehydes and ketones is reduced to $CH_2$ group on treatment with zinc amalgam and concentrated hydrochloric acid is called clemmensen reaction / reduction.

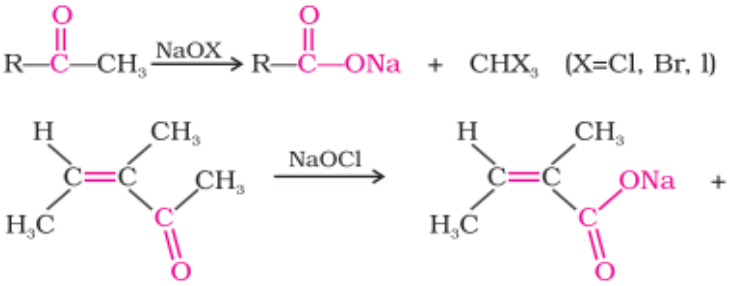
## 19. Wolff-Kishner reduction




The carbonyl group of aldehydes and ketones is reduced to $CH_2$ group on treatment with with hydrazine followed by heating with sodium or potassium hydroxide in high boiling solvent such as ethylene glycol.

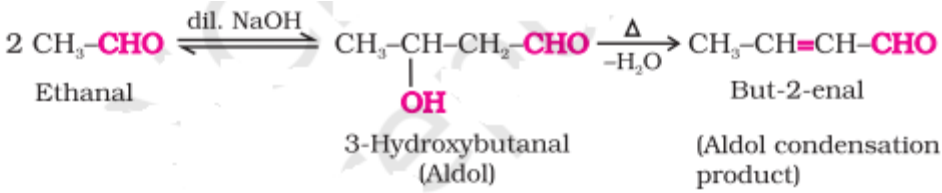
## 20. Haloform reaction

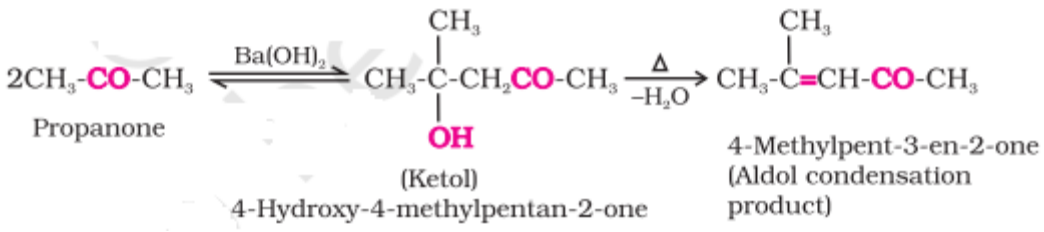
The methyl group is converted to haloform. It is used for detection of $CH_3CO$ group or $CH_3CH(OH)$ group which produces $CH_3CO$ group on oxidation.




Aldehydes and ketones having at least one methyl group linked to the carbonyl carbon atom (methyl ketones) are oxidised by sodium hypohalite to sodium salts of corresponding carboxylic acids having one carbon atom less than that of carbonyl compound.

## 21.a) Aldol reaction b) Aldol condensation

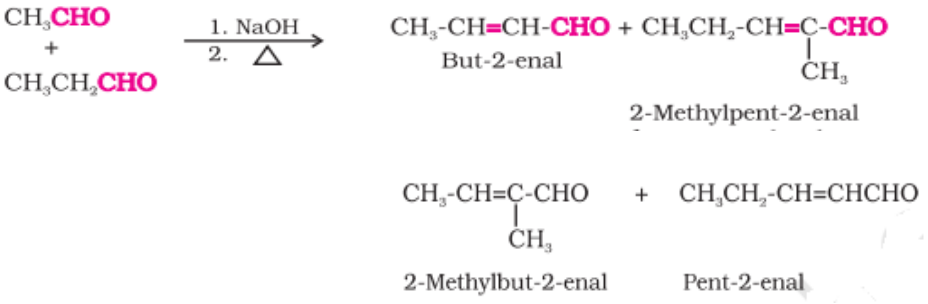



Aldehydes and ketones having at least one **α**-hydrogen undergo a reaction in the presence of dilute alkali as catalyst to form **β**-hydroxy aldehydes (aldol) or **β**-hydroxy ketones (ketol), respectively. This is known as Aldol reaction.

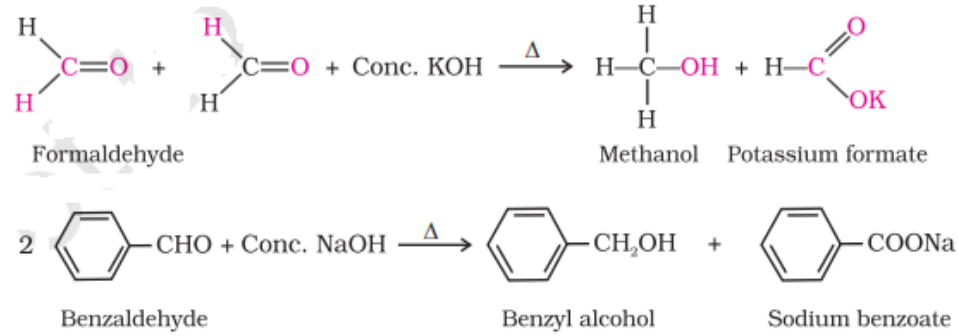
The aldol and ketol readily lose water to give **α**,β-unsaturated carbonyl compounds which are aldol condensation products and the reaction is called Aldol condensation.

## 22. Cross aldol condensation



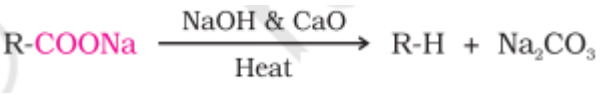

When aldol condensation is carried out between two different aldehydes and / or ketones, it is called cross aldol condensation. If both of them contain α-hydrogen atoms, it gives a mixture of four products.

## 23. Cannizzaro reaction



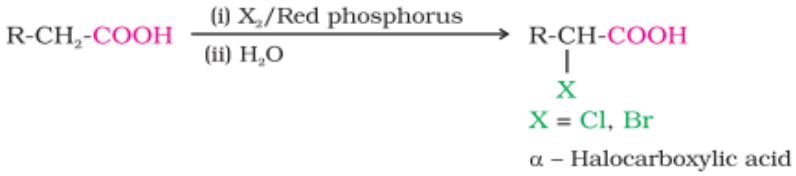

Aldehydes which do not have an α -hydrogen atom, undergo self oxidation and reduction (disproportionation) reaction on heating with concentrated alkali.
One molecule of the aldehyde is reduced to alcohol while another is oxidised to carboxylic acid salt.

## 24. Decarboxylation




Carboxylic acids lose carbon dioxide to form hydrocarbons when their sodium salts are heated with sodalime (NaOH and CaO in the ratio of 3 : 1). The reaction is known as decarboxylation.

## 25. Hell-Volhard-Zelinsky ( HVZ ) reaction




Carboxylic acids having an α -hydrogen are halogenated at the α-position on treatment with chlorine or bromine in the presence of small amount of red phosphorus to give α-halocarboxylic acids. The reaction is known as Hell-Volhard-Zelinsky reaction.

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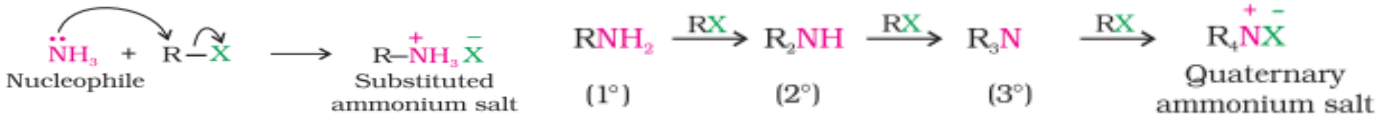
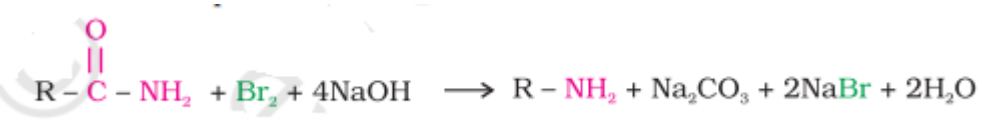
## 26. Ammonolysis

The process of cleavage of the C–X bond by ammonia molecule is known as ammonolysis.



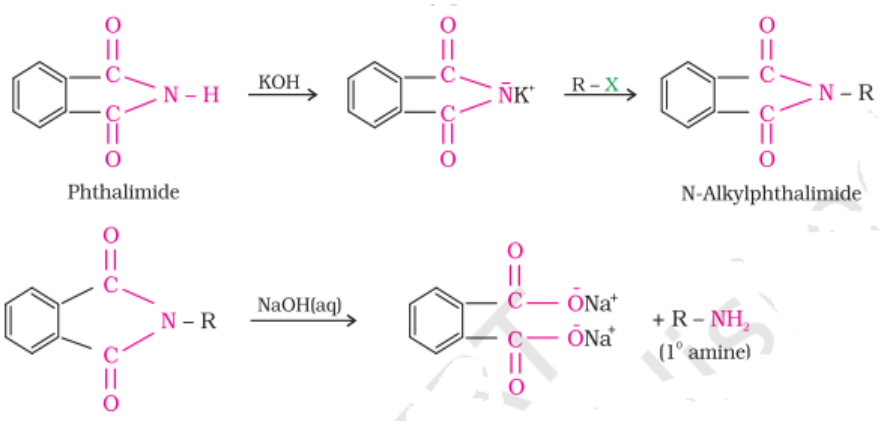

## 27. Hoffmann bromamide degradation reaction




The amine so formed contains one carbon less than that present in the amide .

It is preparation of primary amines by treating an amide with bromine in an aqueous or ethanolic solution of sodium hydroxide . Migration of an alkyl or aryl group takes place from carbonyl carbon of the amide to the nitrogen atom .

## 28. Gabriel phthalimide synthesis




Gabriel synthesis is used for the *preparation of primary amines.*

Aromatic primary amines cannot be prepared by this method because aryl halides do not undergo nucleophilic substitution with the anion formed by phthalimide.

## 29. Benzoylation

$$\underset{\text{Methanamine}}{CH_3NH_2} + \underset{\text{Benzoyl chloride}}{C_6H_5COCl} \rightarrow \underset{\text{N – Methylbenzamide}}{CH_3NHCOC_6H_5} + HCl$$

Amines reacts with benzoyl chloride ($C_6H_5COCl$). This reaction is known as benzoylation.

## 30. Carbylamine reaction / isocyanide test ( Test for primary amines.)

$$R{-}NH_2 + CHCl_3 + 3KOH \xrightarrow{\text{Heat}} R{-}NC + 3KCl + 3H_2O$$

Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form isocyanides or carbylamines which are foul smelling substances. Secondary and tertiary amines do not show this reaction.

## 31. Diazotisation : **The conversion of primary aromatic amines into diazonium salts is known as diazotisation.**

$$C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273\text{–}278K} C_6H_5\overset{+}{N_2}\overset{-}{Cl} + NaCl + 2H_2O$$

Due to its instability, the diazonium salt is not generally stored .

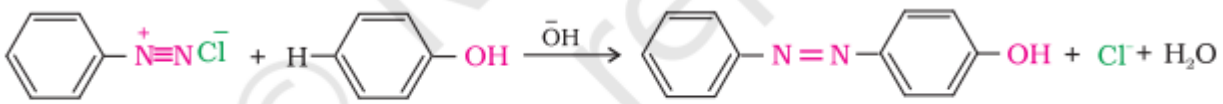
## 32. Gatterman reaction

$$ArN_2X \xrightarrow{Cu/HCl} ArCl + N_2 + CuX$$
$$ArN_2X \xrightarrow{Cu/HBr} ArBr + N_2 + CuX$$

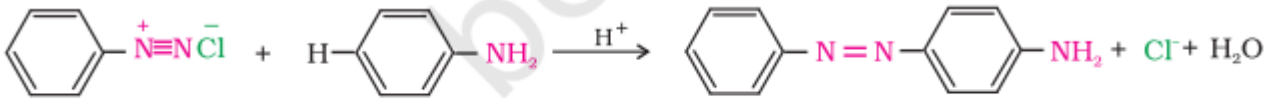
Chlorine or bromine can be introduced in the benzene ring by treating the diazonium salt solution with corresponding halogen acid in the presence of copper powder. This is referred as Gatterman reaction. The yield in Sandmeyer reaction is found to be better than Gattermann reaction.

## 33. Coupling reactions

When benzenediazoniumchloride is treated with phenol or aniline , p-hydroxyazobenzene (orange dye ) or p-aminoazobenzene ( yellow dye ) is obtained . This electrophilic substitution reaction is called coupling reaction.




*p*-Hydroxyazobenzene (orange dye)




*p*-Aminoazobenzene
(yellow dye)