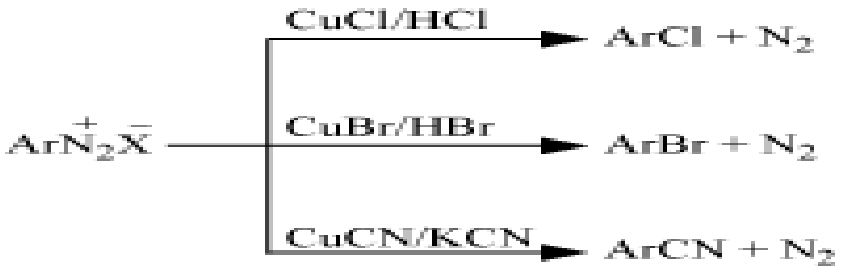
Chemistry Study Materials for Class 12
(NCERT Based Notes of Chapter -10 to 13)
Ganesh Kumar Date:- 20/10/2021

Organic Chemistry – Specific Name Reactions

1. Sandmeyer's Reaction

The Cl, Br and CN nucleophiles can easily be introduced in the benzene ring of benzene diazonium salt in the presence of Cu (I) ion. This reaction is called Sandmeyer's reaction.



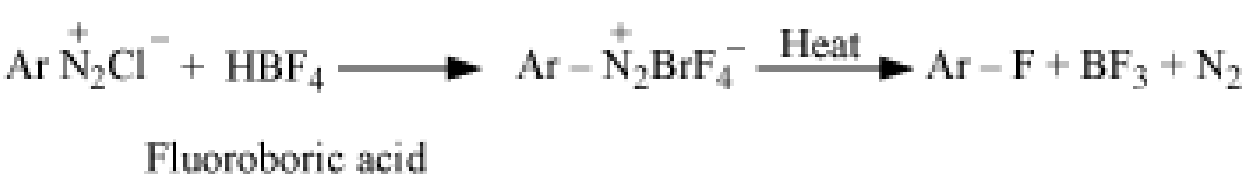
2. Gatterman Reaction

Chlorine or bromine can be introduced in the benzene ring by treating the benzene diazonium salt solution with corresponding halogen acid in the presence of copper powder. This is referred as Gatterman reaction.

Note: The yield in Sandmeyer's reaction is found to be better than Gatterman reaction.

3. Balz-Schiemann Reaction

When arene diazonium chloride is treated with fluoroboric acid, arene diazonium fluoroborate is precipitated which on heating decomposes to yield aryl fluoride.



4. Finkelstein Reaction

Alkyl iodides are often prepared by the reaction of alkyl chlorides/ bromides with NaI in dry acetone. This reaction is known as Finkelstein reaction.

$$R - X + NaI \longrightarrow R - I + NaX \quad (X = Cl, Br)$$

Note: This reaction in forward direction can be favoured by precipitating NaX formed in dry acetone (according to Le Chatelier's principle).

5. Swarts Reaction

Heating an alkyl chloride/bromide in the presence of a metallic fluoride such as AgF, Hg_2F_2, CoF_2 or SbF_3 gives alkyl fluorides. The reaction is termed as Swarts reaction.

Note: Finkelstein Reaction and Swarts Reaction are known as halogen exchange reaction.

6. 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.

$$H_3C{-}X + AgF \longrightarrow H_3C - F + AgX \quad (X = Cl, Br)$$

$$CH_3Br + 2Na + BrCH_3 \xrightarrow{\text{dry ether}} CH_3 - CH_3 + 2NaBr$$

Bromomethane — Ethane

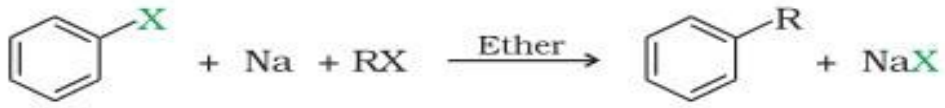
$$C_2H_5Br + 2Na + BrC_2H_5 \xrightarrow{\text{dry ether}} C_2H_5 - C_2H_5$$

Bromoethane — n-Butane

7. Wurtz-Fittig Reaction

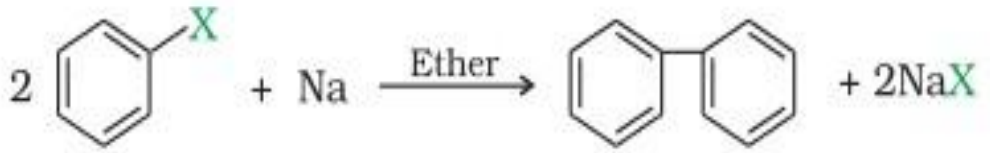
A mixture of an alkyl halide and aryl halide gives an alkylarene when treated with

sodium in dry ether and is called Wurtz-Fittig reaction.



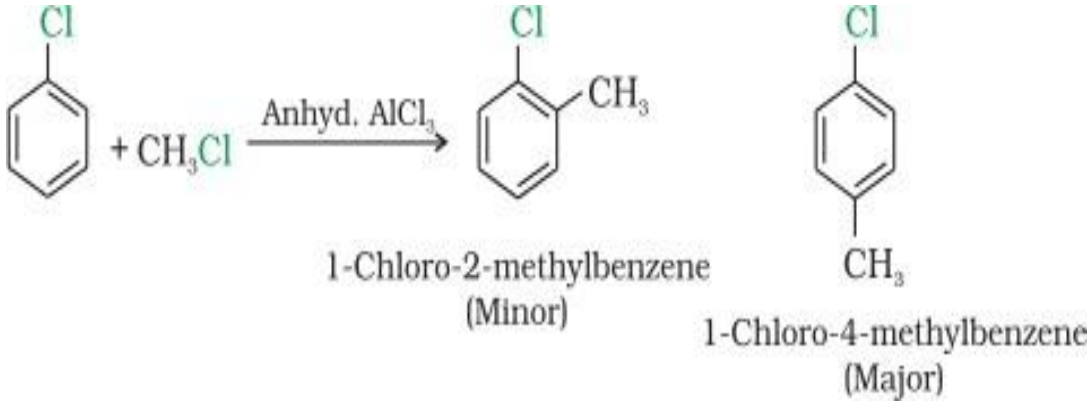
8. Fittig Reaction

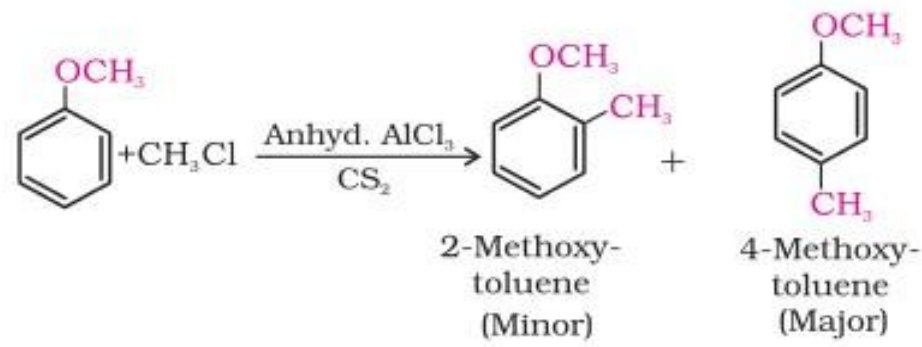
Aryl halides also give analogous compounds when treated with sodium in dry ether, in which two aryl groups are joined together. It is called Fittig reaction.

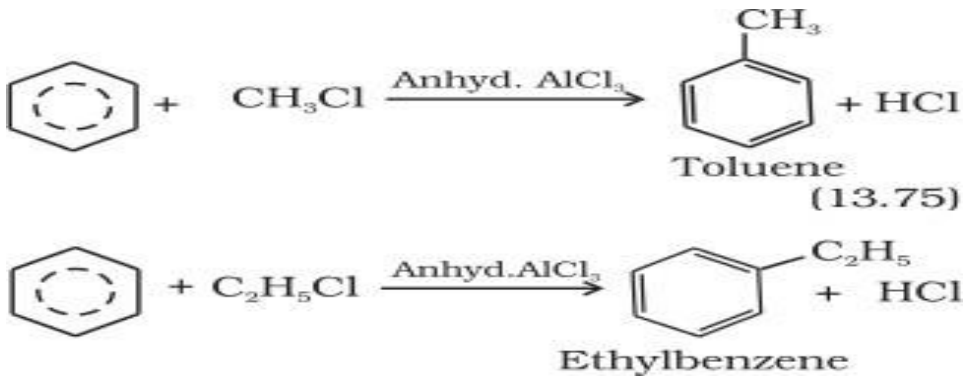


9. Friedel-Crafts alkylation Reaction

When benzene is treated with an alkyl halide in the presence of anhydrous aluminium chloride, alkylbenene is formed.



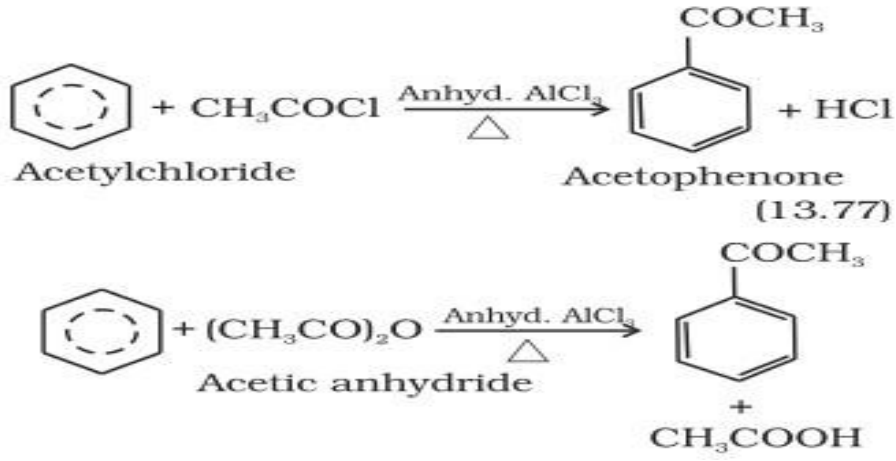




Note: Aromatic carboxylic acids do not undergo Friedel-Crafts reaction because the carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group.

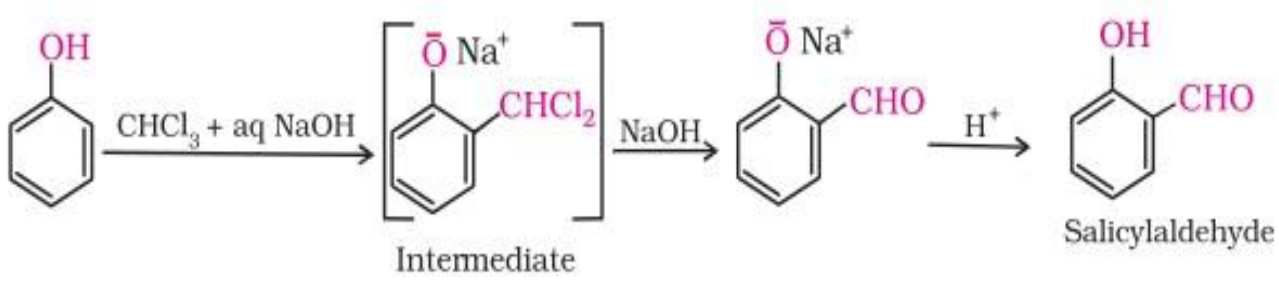
10. Friedel-Crafts acylation reaction

The reaction of benzene with an acyl halide or acid anhydride in the presence of Lewis acids ($AlCl_3$) yields acyl benzene.



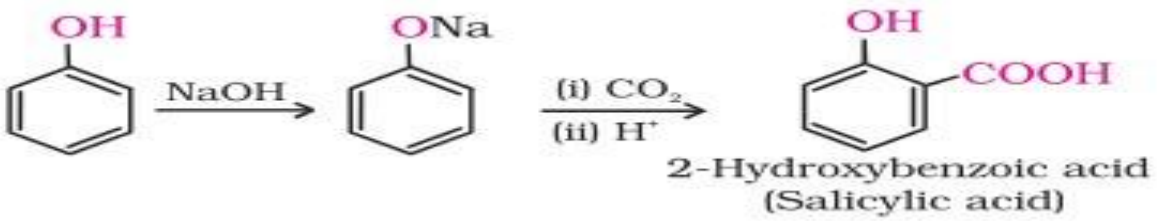
11. Reimer-Tiemann Reaction

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



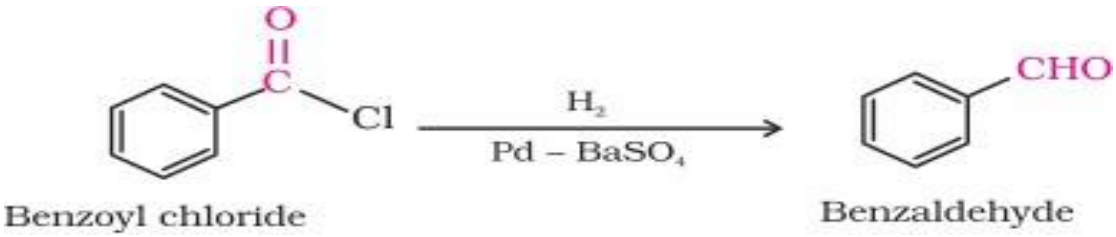
12. Kolbe's Reaction

Phenol with sodium hydroxide gives sodium phenoxide ion which with carbon dioxide in acidic medium results hydroxybenzoic acid (salicylic acid). This is known as Kolbe's reaction.



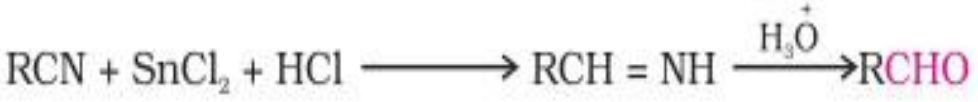
13. Rosenmund's Reduction

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



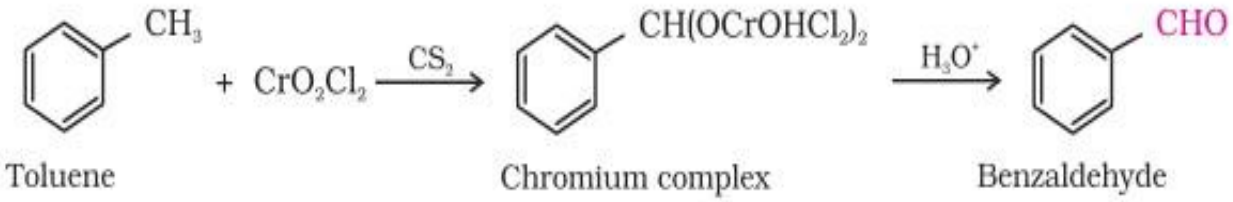
14. Stephen reaction

Nitriles are reduced to corresponding imines with stannous chloride in the presence of hydrochloric acid, which on hydrolysis give corresponding aldehyde. This reaction is called Stephen reaction.



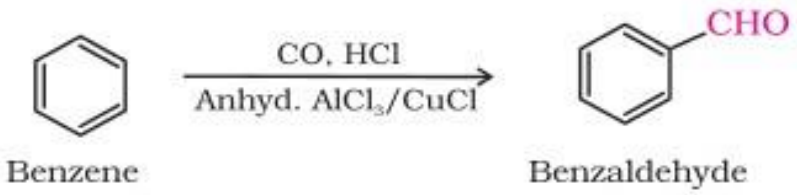
15. Etard reaction

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



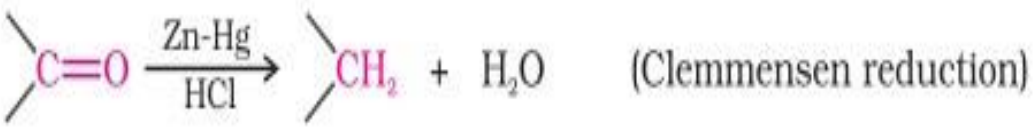
16. Gatterman – Koch reaction

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.



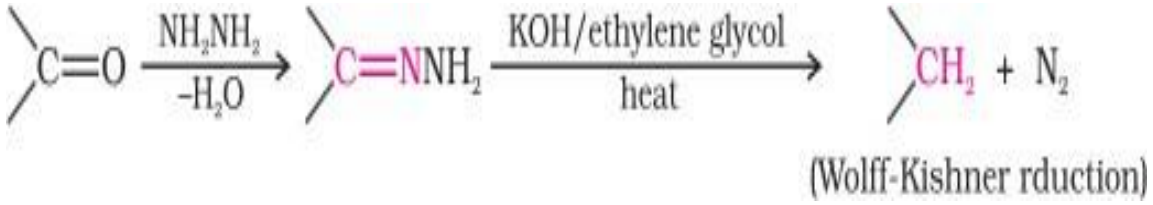
17. Clemmensen Reduction

The carbonyl group of aldehydes and ketones is reduced to CH_2 group on treatment with zinc- amalgam and concentrated hydrochloric acid. This is known as Clemmensen reduction.



18. Wolff Kishner Reduction

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



(Wolff-Kishner rduction)

19.Tollens' test

On warming an aldehyde with freshly prepared ammoniacal silver nitrate solution (Tollens' reagent), a bright silver mirror is produced due to the formation of silver metal. The aldehydes are oxidised to corresponding carboxylate anion. The reaction occurs in alkaline medium.

20.Fehling's test

Fehling reagent comprises of two solutions, Fehling solution A and Fehling solution B. Fehling solution A is aqueous copper sulphate and Fehling solution B is alkaline sodium potassium tartarate (Rochelle salt). These two solutions are mixed in equal amounts before test. On heating an aldehyde with Fehling's reagent, a reddish brown precipitate is obtained. Aldehydes are oxidised to corresponding carboxylate anion. Aromatic aldehydes do not respond to this test.

****