# CHEMISTRY STUDY MATERIALS FOR CLASS 12 (NCERT Based Notes of Chapter -10 to 13) GANESH KUMAR DATE: 28/11/2020

# **Organic Chemistry – Specific Name Reactions**

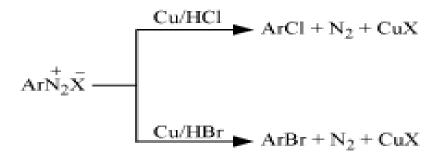
## 1. Sandmeyer's Reaction

The CI, 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.

 $ArN_{2}\bar{X} \xrightarrow{CuCl/HCl} ArCl + N_{2}$   $ArN_{2}\bar{X} \xrightarrow{CuBr/HBr} ArBr + N_{2}$   $CuCN/KCN \longrightarrow ArCN + N_{2}$ 

#### 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.

 $\operatorname{Ar} \operatorname{N}_{2}Cl^{-} + \operatorname{HBF}_{4} \longrightarrow \operatorname{Ar} - \operatorname{N}_{2}\operatorname{BrF}_{4}^{-} \xrightarrow{\operatorname{Heat}} \operatorname{Ar} - \operatorname{F} + \operatorname{BF}_{3} + \operatorname{N}_{2}$ 

Fluoroboric acid

## 4. Finkelstein Reaction

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

 $R - X + NaI \longrightarrow R - I + NaX$ (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.

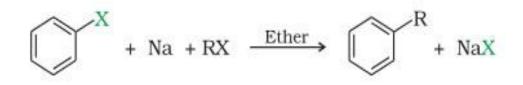
#### 6. Wurtz Reaction

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.

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

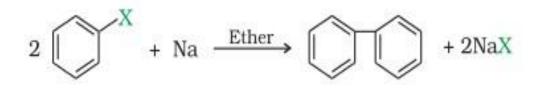
# 7. Wurtz-Fittig Reaction

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.



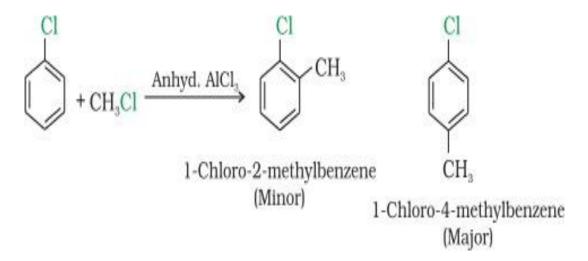
#### 8. Fittig Reaction

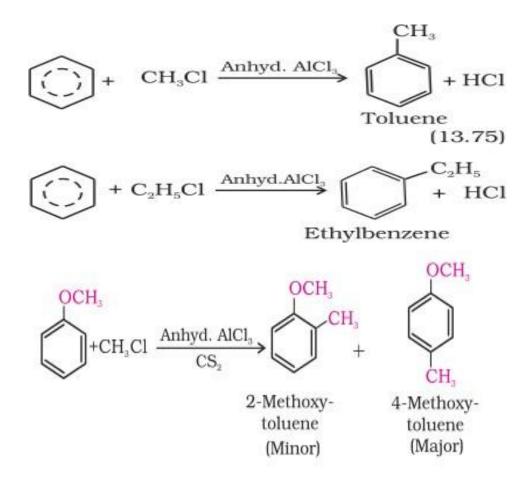
Aryl halides also give analogous compounds when treated with sodium in dry ether, in which two aryl groups are joined together. It is called Fittig reaction.



# 9. Friedel-Crafts alkylation Reaction

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

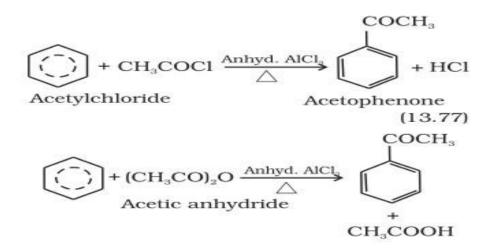




**Note:** Aromatic carboxylic acids do not undergo Friedel-Crafts reaction because the carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group.

#### 10. Friedel-Crafts acylation reaction

The reaction of benzene with an acyl halide or acid anhydride in the presence of Lewis acids (AICI<sub>3</sub>) yields acyl benzene.



\*\*\*\*\*