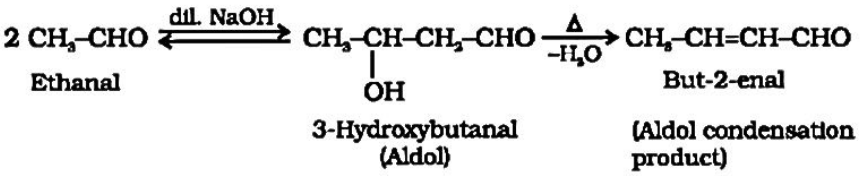
Organic Chemistry

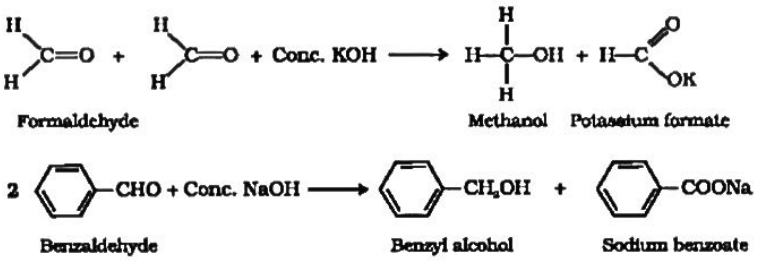
Name Reactions

1. Aldol Condensation: condensation between two molecule of an aldehyde or a ketone having atleast one α-hydrogen atom to form a β-hydroxyaldehyde or a β-hydroxyketone is known as aldol condensation.



Aldol condensation takes place in presence of dil base.

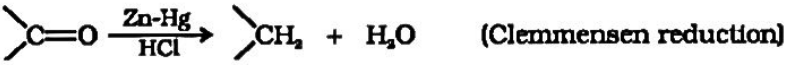
2. Cannizzaro Reaction: The disproportionation (self-redox) of aldehydes lacking α-hydrogen atom (as C_6H_5CHO, HCHO, $R_3C.CHO$ etc.) in presence of strong base to form salt of an acid & a primary alcohol is known as Cannizzaro reaction.



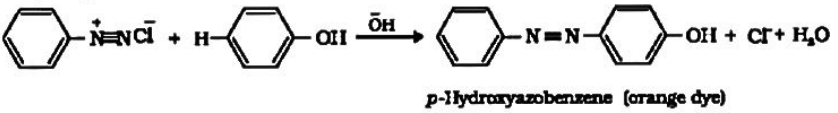
3. Carbylamine test: When a primary amine is heated with alcoholic caustic potash and chloroform, an offensive smelling compound called carbylamine (alkyl or arylisocyanide) is formed.

4. Claisen Condensation: The self condensation of ester containing α-hydrogen atom in the presence of an alkoxide (C_2H_5ONa) to give a β-ketoester is called Claisen condensation. Eg. Two molecule of ethylacetate condenses together to form ethyl β-ketobutanoate.

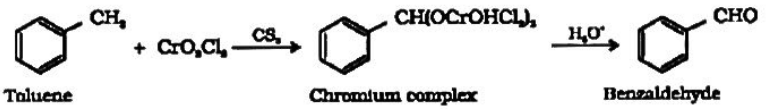
5. Clemmension Reduction: The reduction of >C=O group to methyl group (>CH2) with amalgamated zinc and conc. HCl is known as Clemmension reduction.



6. Coupling Reaction: The reaction in which a diazonium salt condenses with an aromatic compound having an electron rich group eg, aniline, phenol or their derivatives to form an azo compound (Ar-N=N-Ar) is termed as coupling reaction.



7. Etard Reaction: Chromyl chloride (CrO_2Cl_2) oxidizes methyl group to a chromium complex, which on hydrolysis gives corresponding benzaldehyde. It is called Etard reaction.



8. Esterification Reaction: Reaction of an alcohol with a carboxylic acid in the presence of a small quantity of conc.H_2SO_4 to form an ester is called esterification.

$$RCOOH + R'OH \underset{}{\overset{H^+}{\rightleftharpoons}} RCOOR' + H_2O$$

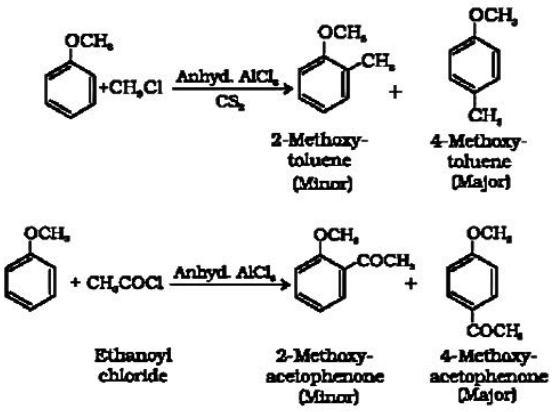
Esterification process is generally reversible.

9. Finkelstein Reaction: Alkyl iodides can be prepared by the reaction of alkyl chlorides/ bromides with NaI in dry acetone.

$$R\text{–}X + NaI \longrightarrow R\text{–}I + NaX$$

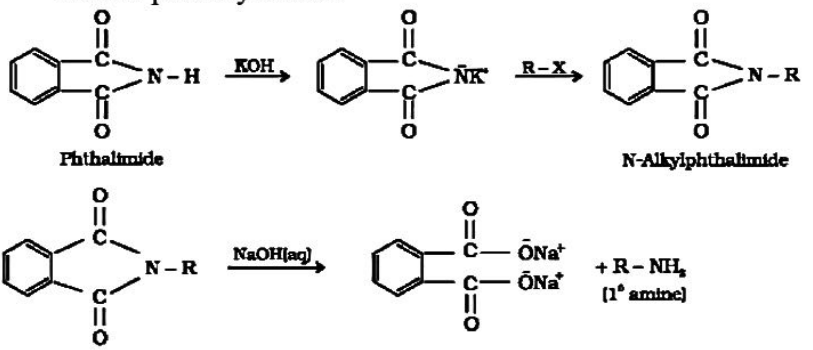
X=Cl, Br

10. Friedel-Craft Reaction: Introduction of an alkyl (-R) or an acyl (RCO-) group in to the benzene ring of an aromatic compound in the presence of of a lewis acid catalyst (eg.anhydrous aluminium chloride or Zinc chloride) is called as Friedel-Craft reaction).



Introduction of an acyl group (RCO-) is called acylation.

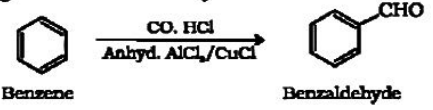
11. Gabriel pthalimide synthesis: This method is used to prepare primary amine. The various steps involved are:
   i) pthalimide is treated with alcoholic solution of KOH to form potassium pthalimide.
   ii) The potassium salt is treated with an alkylhalide.
   iii) The product N-alkyl phthalimide is hydrolysed with dilute HCl to form a primary amine.



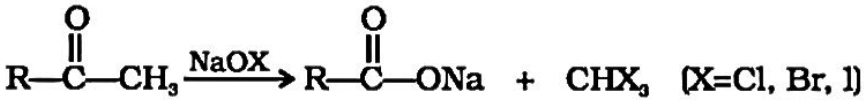
12. Gattermann Reaction: Gattermann reaction is used for obtaining chlorobenzene or bromobenzene from benzenediazonium chloride by treating it with Cu/HCl or Cu/HBr respectively.

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

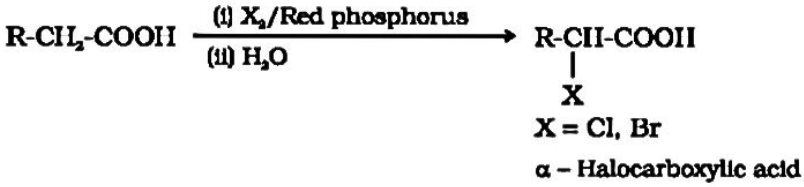
13. Gattermann-Koch Reaction: When benzene or its derivative is treated with carbon monoxide and HCl in the presence of anhydrous aluminium chloride or CuCl, it gives benzaldehyde or substituted benzaldehyde.



14. Iodoform test: The compound containing methyl group bonded to carbonyl group (CH3-CO-) or (CH3-CH.OH-) reacts with aquous NaOH and iodine solution gives yellow ppt of Iodoform.

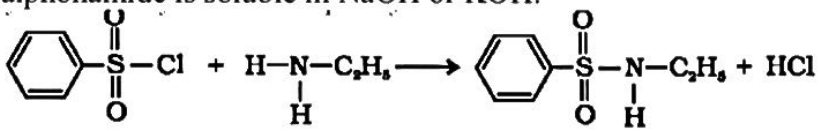


15. Hell-Volhard-Zelinsky Reaction: When aliphatic carboxylic acid containing α-hydrogen are reacted with chlorine or bromine in presence of small amount of red phosphorous, the corresponding α-haloacids are obtained.



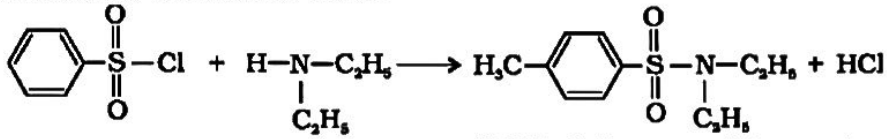
16. Hinsberg Test: Hinsberg test is employed to distinguish primary, secondary and tertiary amine. The reagent used in this test is benzene sulphonyl chloride. The tests are:

a) Primary amine:- It gives sulphonamide with hinsberg reagent, this sulphonamide is soluble in NaOH or KOH.



N-Ethylbenzenesulphonamide
(soluble in alkali)

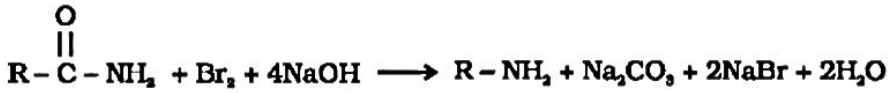
B) Secondary amine:-With hinsberg reagent,it forms sulphonamide, which is insoluble in NaOH or KOH.



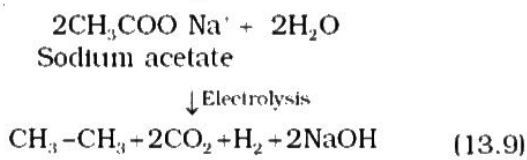
N,N-Diethylbenzenesulphonamide

C) Tertiary amine:- Tertiary amine do not react with hinsberg reagent ,because it is not having replaceable hydrogen.

17. Hoffmann-Bromamide Reaction: When an amide is heated with bromine and an alkali, a primary amine containing one carbon less than the amide is obtained. This reaction is called Hoffmann-Bromamide reaction. This reaction is very useful for converting a higher homologue to next lower one.

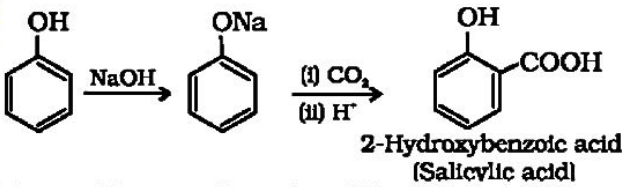


18. Kolbe's-Electrolysis process: Preperation of higher a;kanes by the electrolysis of sodium or potassium salt of lower fatty acids is called Kolbe's electrolysis reaction.



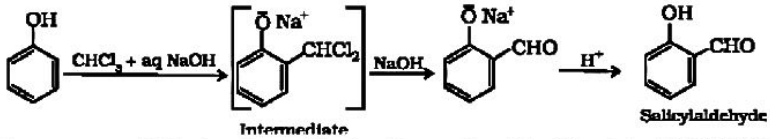
(13.9)

19. Kolbe,s Schmith process: This reaction gives the method for fixation of CO_2 in the benzene ring.Sodium phenoxide on heating that 120-140^{0}C under 4-7 atm pressure with CO_2 gives sodium salicylate which on reaction with dil.HCl gives salicylic acid(2-hydroxy benzoic acid).



2-Hydroxybenzoic acid
(Salicylic acid)

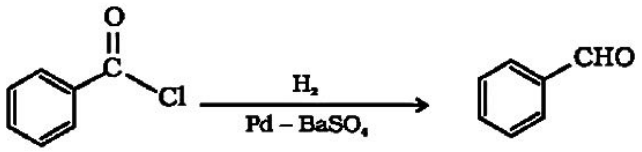
20. Riemer-Tiemann Reaction: The reaction of pheonal with chloroform or carbon-tetrachloride in the presence of aqueos alkali at 340k followed by hydrolysisof the resulting product gives salicyldehyde and salicylic acid respectively.



Intermediate

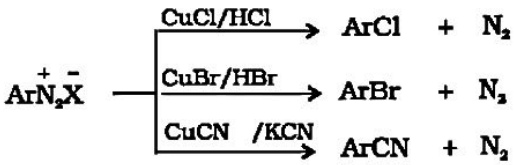
Salicylaldehyde

21. Rosenmund Reduction: Reduction of acid chloride (RCOCl)to the corresponding aldehyde with hydrogen using Pd/BaSO4 as catalyst is known as rosenmund reaction.Here Pd/BaSO4 used as negative catalyst and prevent further reduction to alcohol.

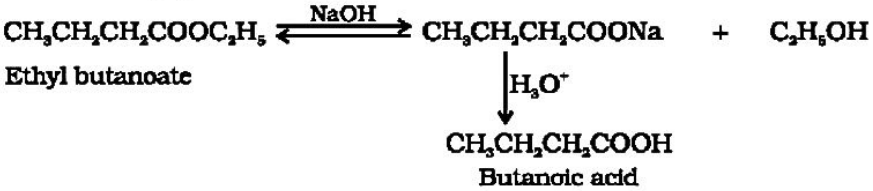


Benzoyl chloride Benzaldehyde

22. Sandmayer Reaction: The convesion of benzene diazonium salt into halogen of cyano derivative of the parent aromatic hydrocarbon by treating it with a mixture containing the corrsponding salt and the acid is called sandmeyer reaction.



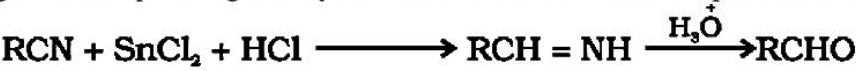
23. Saponification Process: Hydrolysis of esters in the presence of an alkali is known as saponification.In this process sodium salt of fattyacids(commonly called as soaps)are obtained.



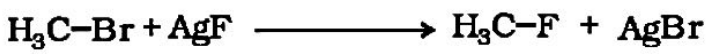
Ethyl butanoate

Butanoic acid

24. Stephen Reaction: Nitriles can be reduced to corresponding imine with stannous chloride in the presence of hydrochloric acid, which on hydrolysis give corresponding aldehyde. This reaction is called Stephen reaction.



25. Swart's reaction: The synthesis of alkyl fluorides is accomplished by heating an alkyl chloride/ bromide in the presence of a metallic fluoride such as AgF,Hg_2F_2 etc.



26. Williamson's synthesis: In williamson synthesis,when an alkoxide or a phenoxide is made to react with an alkyl halide,an ether is obtained.In this method,haloarenes can not be used for the preparation of alkyl-aryl ethers because of the low reactivity of aryl halides.