

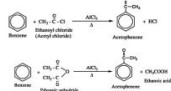




**17. Fermentation Reaction**  
The process of decomposition of complex organic compounds into simple ones (sugars) of oxygen produced by yeast as catalyst is called fermentation. Fermentation process is widely used to manufacture ethyl alcohol from carbohydrates.



**18. Friedel-Crafts alkylation**  
The process of substituting an alkyl group into benzene ring in presence of Lewis acid is called Friedel-Crafts alkylation. When benzene is treated with acid halides or acid anhydrides in presence of Lewis acid like  $\text{AlCl}_3$  or  $\text{FeCl}_3$ , alkyl benzenes (Aromatic hydrocarbons) are formed.



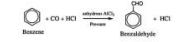
**19. Friedel-Crafts acylation**  
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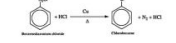
**20. Friedel-Crafts alkylation**  
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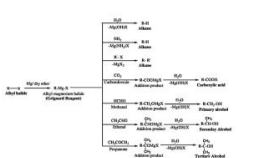
**21. Gatterman-Koch alkylidyne carbonyl reaction**  
When benzene is treated with mixture of  $\text{CO}$  and  $\text{HCl}$  in presence of anhydrous  $\text{AlCl}_3$  under pressure, benzaldehyde is formed. This reaction is called Gatterman-Koch reaction.



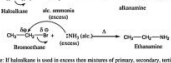
**22. Gatterman Reaction**  
When benzene is treated with  $\text{CO}$  and  $\text{HCl}$  in presence of  $\text{FeCl}_3$  or  $\text{FeBr}_3$ , chlorobenzene or bromobenzene is formed.



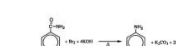
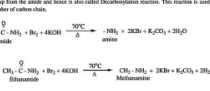
**23. Grignard's Reaction (synthesis of alcohol and carboxylic acids)**  
Alkyl magnesium halide ( $\text{RMgX}$ ) or aryl magnesium halide ( $\text{ArMgX}$ ) are commonly known as Grignard Reagents. They are prepared by reacting alkyl halides or aryl halides with magnesium metal in presence of dry ether.



**24. Hoffmann's Ammonolysis**  
When halobenzene is treated with alcoholic  $\text{NH}_3$  in sealed tube, primary amine is formed.



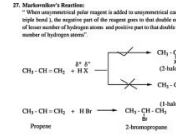
**25. Hoffmann's Bromamide Reaction**  
When amide is treated with bromine and  $\text{NaOH}$  or  $\text{KOH}$  solution above  $70^\circ\text{C}$ , amine with one less carbon will be formed or converted to the parent compound. Such reaction is called Hoffmann's bromamide reaction or Hoffmann's hypobromamide reaction. This reaction involves the removal of carbonyl ( $\text{C}=\text{O}$ ) group from the amide and hence is also called De-carbonylation reaction. This reaction is used to determine the number of carbon chain.



**26. Iodobenzene Reaction**  
Alcohol containing  $\text{m-CH}_3$  group when treated with  $\text{aq. NaOH}$  and  $\text{I}_2$  at around  $70^\circ\text{C}$ , yellow ppt of iodobenzene ( $\text{C}_6\text{H}_5\text{I}$ ) with characteristic hospital smell is obtained.



**27. Markovnikov's Reaction**  
When unsymmetrical polar reagent is added to unsymmetrical carbon-carbon multiple bond (i.e. double or triple bond), the negative part of the reagent goes to that double or triple bonded carbon atom which consists of more number of hydrogen atoms and positive part to that double or triple bonded carbon atom having greater number of halogen atoms.



**28. Meilau Reduction**  
When nitro is reduced by using  $\text{Sn}/\text{HCl}$  or  $\text{Fe}/\text{HCl}$ , primary amine is formed.



