

12TH STANDARD **CHEMISTRY**

ORGANIC NAME REACTIONS & IUPAC NOMENCLATURE



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**“YOU CANNOT CHANGE YOUR
FUTURE, BUT YOU CAN CHANGE
YOUR HABITS, AND SURELY YOUR
HABITS WILL CHANGE YOUR
FUTURE”**

- Dr. A.P.J. ABDUL KALAM

JJ TUITION CENTRE

INJAMBAKKAM, CHENNAI – 600115

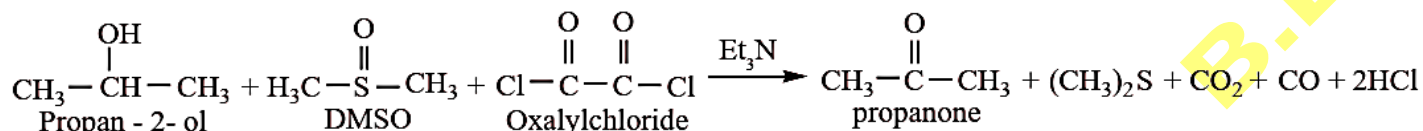
STD: 12TH

CHEMISTRY

ORGANIC NAME REACTIONS

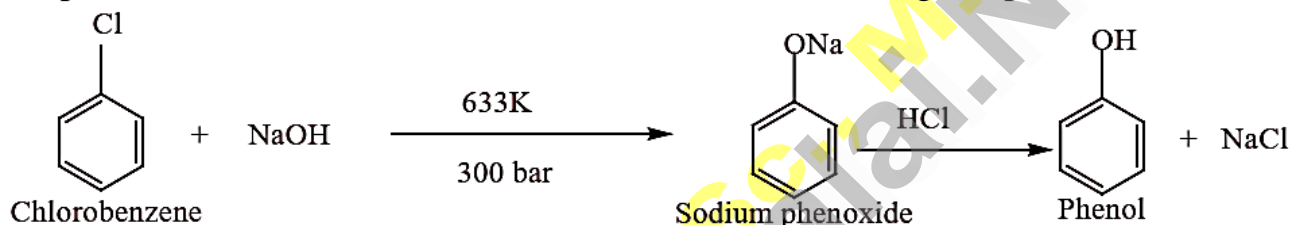
SWERN OXIDATION:

In this method, dimethyl sulfoxide (DMSO) is used as the oxidising agent, which converts alcohols to ketones / aldehydes. In this method an alcohol is treated with DMSO and oxalyl chloride followed by the addition of triethylamine.



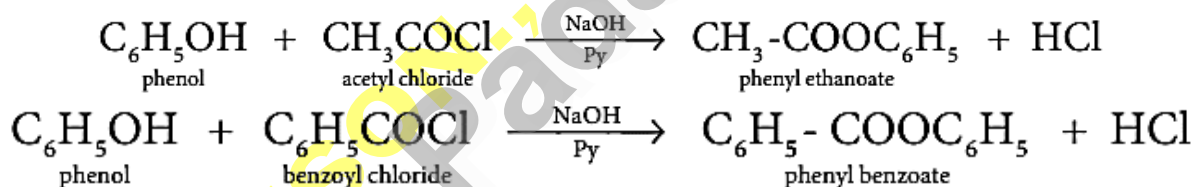
DOWS PROCESS:

When Chlorobenzene is hydrolysed with 6-8% NaOH at 300 bar and 633K in a closed vessel, sodium phenoxide is formed which on treatment with dilute HCl gives phenol.

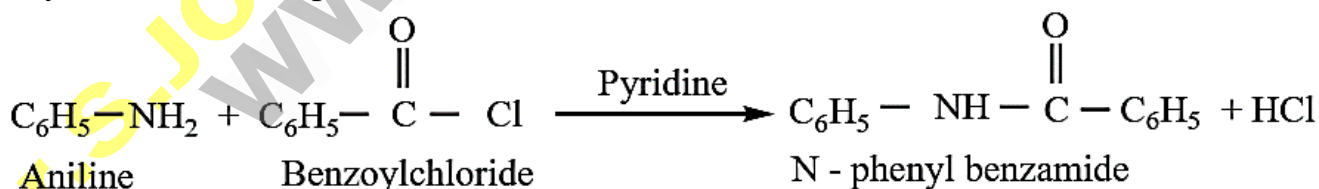


SCHOTTEN-BAUMANN REACTION:

Phenol on treatment with acid chlorides gives esters. The acetylation and benzylation of phenol are called Schotten-Baumann reaction.

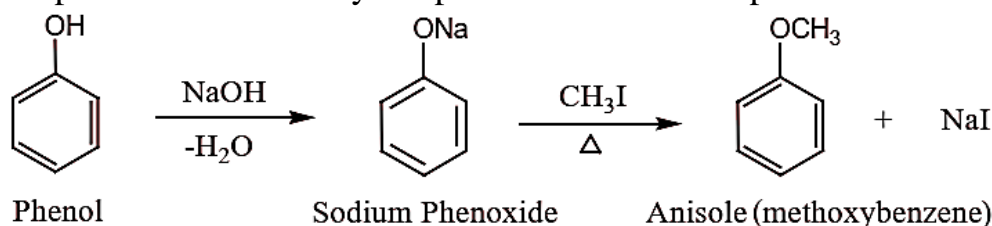


Aniline reacts with benzoylchloride ($\text{C}_6\text{H}_5\text{COCl}$) in the presence of NaOH to give N –phenyl benzamide. This reaction is known as Schotten – Baumann reaction. The acylation and benzylation are nucleophilic substitutions.



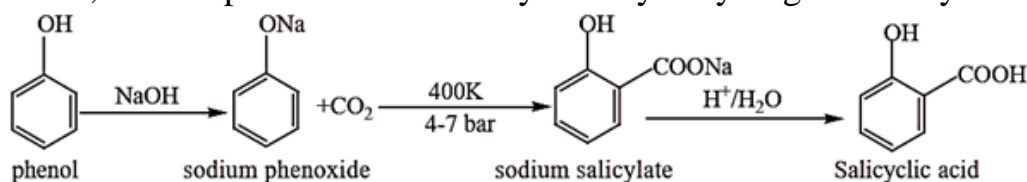
WILLIAMSON ETHER SYNTHESIS:

An alkaline solution of phenol reacts with alkyl halide to form phenyl ethers. The alkyl halide undergoes nucleophilic substitution by the phenoxide ion in the presence of alkali.



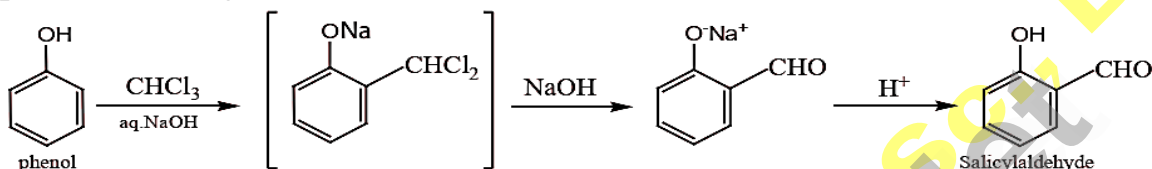
KOLBE'S (OR) KOLBE'S SCHMIT REACTION:

In this reaction, phenol is first converted into sodium phenoxide which is more reactive than phenol towards electrophilic substitution reaction with CO_2 . Treatment of sodium phenoxide with CO_2 at 400K, 4-7 bar pressure followed by acid hydrolysis gives salicylic acid.



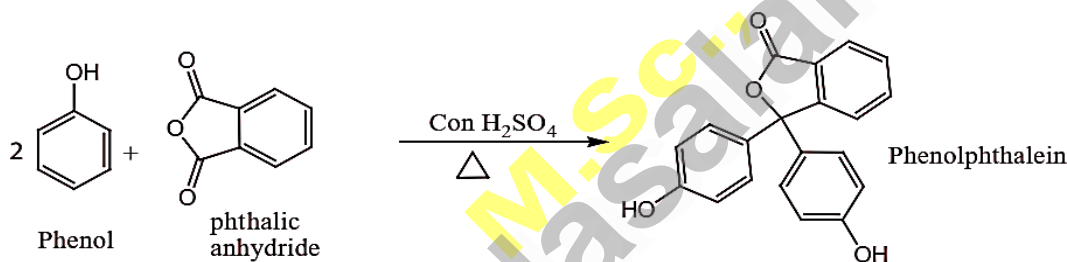
RIEMER – TIEMANN REACTION:

On treating phenol with $\text{CHCl}_3/\text{NaOH}$, a $-\text{CHO}$ group is introduced at ortho position. This reaction proceeds through the formation of substituted benzal chloride intermediate.



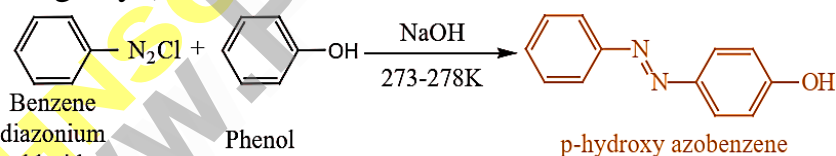
PHTHALEIN REACTION:

On heating phenol with phthalic anhydride in presence of $\text{con. H}_2\text{SO}_4$, phenolphthalein is obtained.

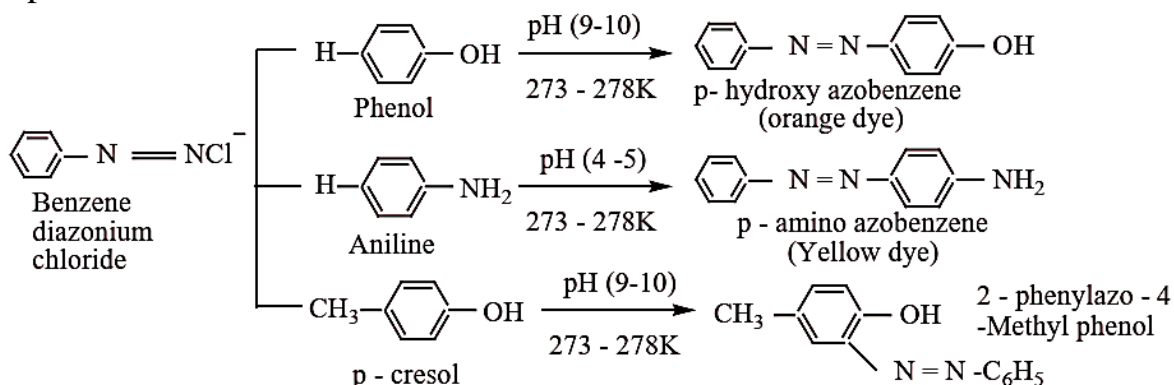


COUPLING REACTION:

Phenol couples with benzene diazonium chloride in an alkaline solution to form p-hydroxy azobenzene (a red orange dye).

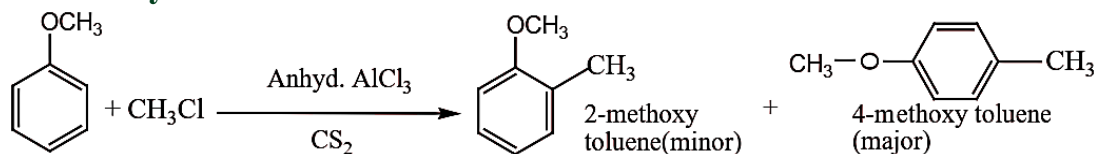
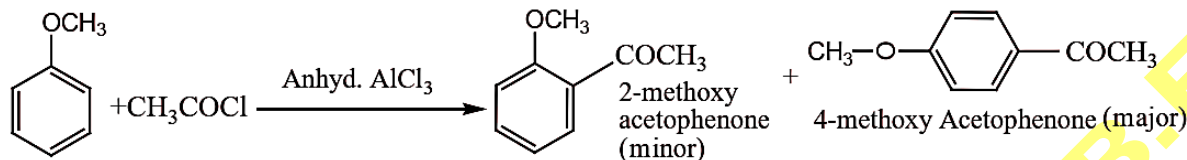


Benzene diazonium chloride reacts with electron rich aromatic compounds like phenol, aniline to form brightly coloured azo compounds. Coupling generally occurs at the para position. If para position is occupied then coupling occurs at the ortho position. Coupling tendency is enhanced if an electron donating group is present at the para – position to $-\text{N}_2^+\text{Cl}^-$ group. This is an electrophilic substitution.

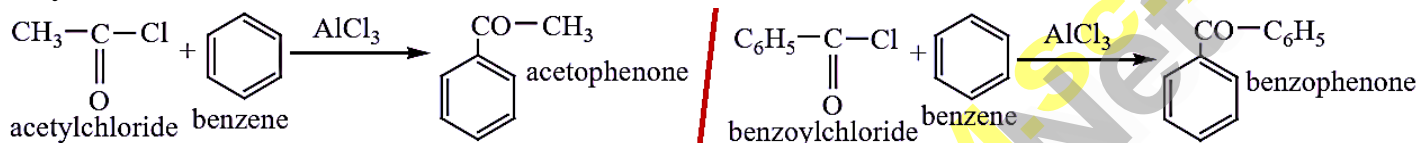


FRIEDEL CRAFT'S REACTION:

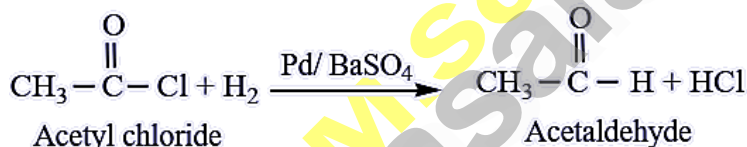
Anisole/Benzene undergoes Friedel Craft's reaction in presence of anhydrous AlCl_3 as a catalyst.

Friedel Craft's Alkylation**Friedel Craft's Acylation**

It is the best method for preparing alkyl aryl ketones or diaryl ketones. This reaction succeeds only with benzene and activated benzene derivatives.

**ROSENMUND REDUCTION:**

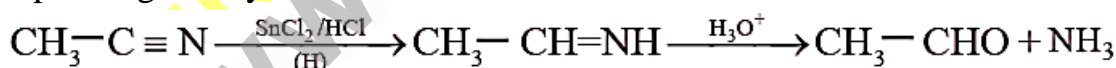
Aldehydes can be prepared by the hydrogenation of acid chloride, in the presence of palladium supported by barium sulphate. This reaction is called **Rosenmund reduction**.



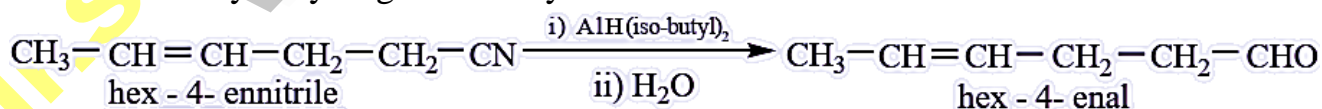
In this reaction, barium sulphate act as a catalytic poison to palladium catalyst, so that aldehyde cannot be further reduced to alcohol. **Formaldehyde and ketones cannot be prepared by this method.**

STEPHEN'S REACTION:

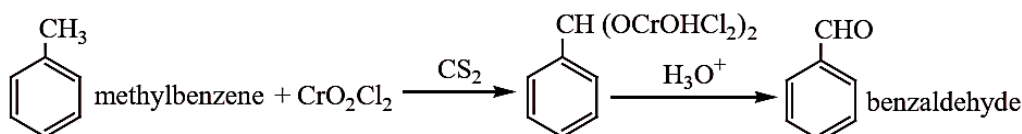
When alkylcyanides are reduced using SnCl_2/HCl , imines are formed, which on hydrolysis gives corresponding aldehyde.

**SELECTIVE REDUCTION OF CYANIDES:**

Diisobutyl aluminium hydride (DIBAL-H) selectively reduces the alkyl cyanides to form imines which on hydrolysis gives aldehydes.

**ETARD REACTION:**

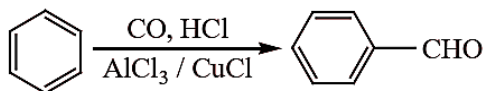
Side chain oxidation of toluene and its derivatives by strong oxidising agents such as KMnO_4 gives benzoic acid. When chromylchloride is used as an oxidising agent, toluene gives benzaldehyde. This reaction is called **Etard reaction**. Acetic anhydride and CrO_3 can also be used for this reaction.



Oxidation of toluene by chromic oxide gives benzylidene diacetate which on hydrolysis gives benzaldehyde.

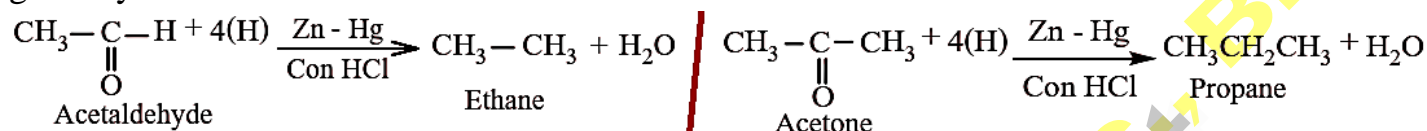
GATTERMANN – KOCH REACTION:

This reaction is a variant of Friedel – Crafts acylation reaction. In this method, reaction of carbon monoxide and HCl generate an intermediate which reacts like formyl chloride.



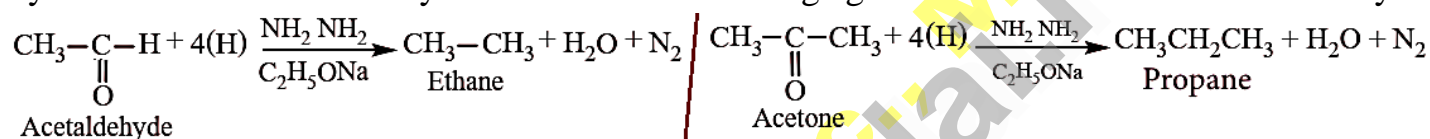
CLEMMENSEN REDUCTION:

Aldehydes and Ketones when heated with zinc amalgam and concentrated hydrochloric acid gives hydrocarbons.



WOLF KISHNER REDUCTION:

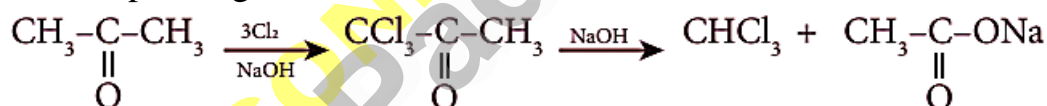
Aldehydes and Ketones when heated with hydrazine (NH_2NH_2) and sodium ethoxide, hydrocarbons are formed. Hydrazine acts as a reducing agent and sodium ethoxide as a catalyst.



Aldehyde (or) ketones is first converted to its hydrazone which on heating with strong base gives hydrocarbons.

HALOFORM REACTION:

Acetaldehyde and methyl ketones, containing $-\text{C}(\text{O})\text{CH}_3$ group, when treated with halogen and alkali give the corresponding haloform. This is known as Haloform reaction.

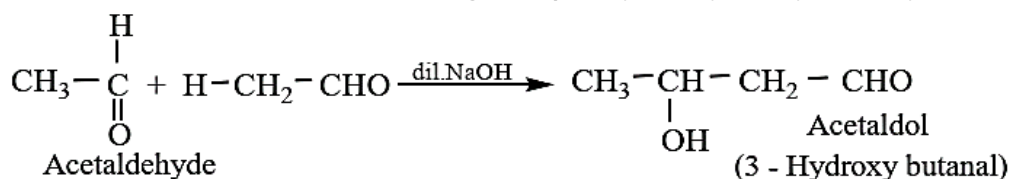


ALDOL CONDENSATION:

The carbon attached to carbonyl carbon is called α - carbon and the hydrogen atom attached to α - carbon is called α - hydrogen.

In presence of dilute base NaOH, or KOH, two molecules of an aldehyde or ketone having α - hydrogen add together to give β - hydroxyl aldehyde (aldol) or β - hydroxyl ketone (ketol). The reaction is called **aldol condensation reaction**. The aldol or ketol readily loses water to give α,β - unsaturated compounds which are aldol condensation products.

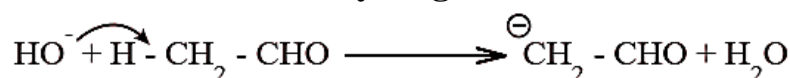
Acetaldehyde when warmed with dil NaOH gives β - hydroxyl butyraldehyde (acetaldol)



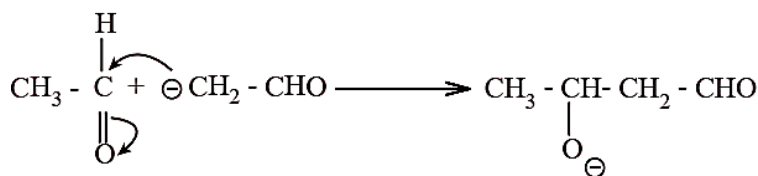
Mechanism

The mechanism of aldol condensation of acetaldehyde takes place in three steps.

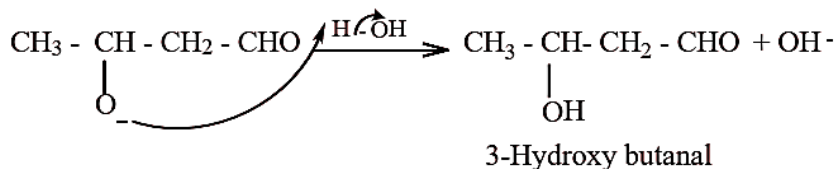
Step 1 : The carbanion is formed as the α - hydrogen atom is removed as a proton by the base.



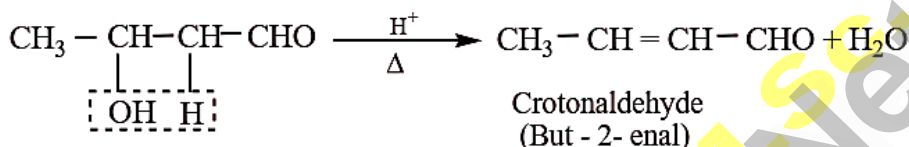
Step 2 : The carbanion attacks the carbonyl carbon of another unionized aldehyde to form an alkoxide ion.



Step 3 : The alkoxide ion formed is protonated by water to form aldol.

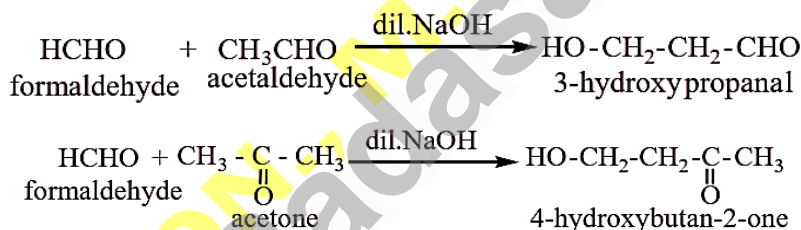


The aldol rapidly undergoes dehydration on heating with acid to form α - β unsaturated aldehyde.



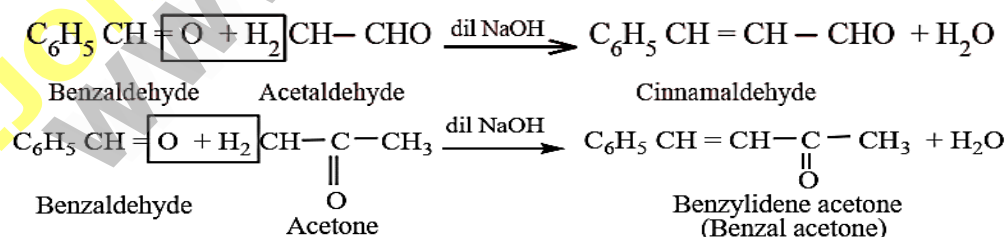
CROSSED ALDOL CONDENSATION:

Aldol condensation can also take place between two different aldehydes or ketones or between one aldehyde and one ketone such an aldol condensation is called **crossed or mixed aldol condensation**. This reaction is not very useful as the product is usually a mixture of all possible condensation products and cannot be separated easily.



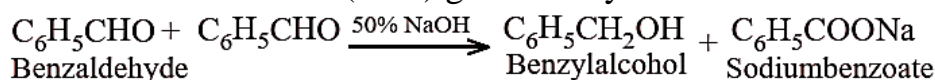
CLAISEN – SCHMIDT CONDENSATION:

Benzaldehyde condenses with aliphatic aldehyde or methyl ketone in the presence of dil. alkali at room temperature to form unsaturated aldehyde or ketone. This type of reaction is called Claisen – Schmidt condensation.



CANNIZARO REACTION:

In the presence of concentrated aqueous or alcoholic alkali, aldehydes which do not have α - hydrogen atom undergo self oxidation and reduction (disproportionation) to give a mixture of alcohol and a salt of carboxylic acid. This reaction is called **Cannizaro reaction**. Benzaldehyde on treatment with concentrated NaOH (50%) gives benzyl alcohol and sodium benzoate.

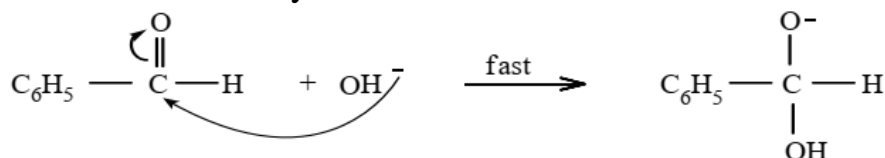


This reaction is an example disproportionation reaction

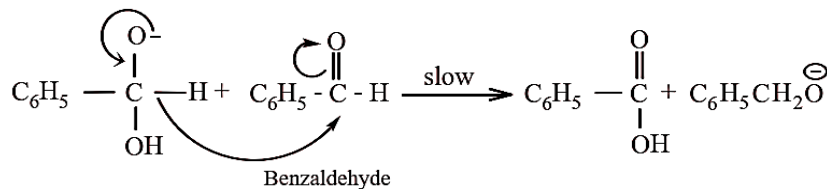
Mechanism of Cannizzaro reaction

Cannizzaro reaction involves three steps.

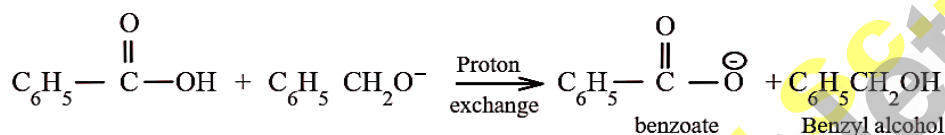
Step 1 : Attack of OH^- on the carbonyl carbon.



Step 2 : Hydride ion transfer



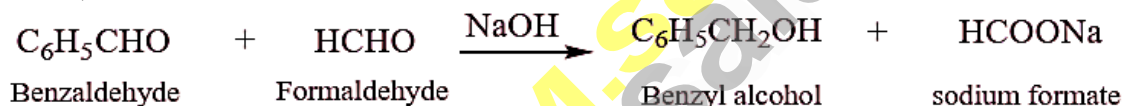
Step 3 : Acid – base reaction.



Cannizzaro reaction is a characteristic of aldehyde having no α – hydrogen.

CROSSED CANNIZARO REACTION:

When Cannizzaro reaction takes place between two different aldehydes (neither containing an α hydrogen atom), the reaction is called as crossed cannizaro reaction.

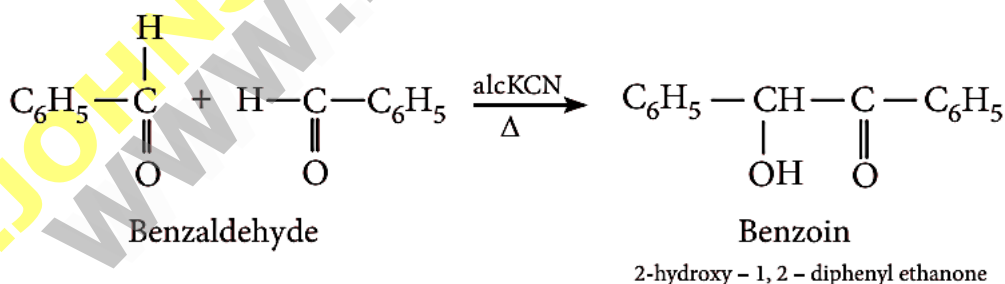


In crossed cannizaro reaction more reactive aldehyde is oxidized and less reactive aldehyde is reduced.

BENZOIN CONDENSATION:

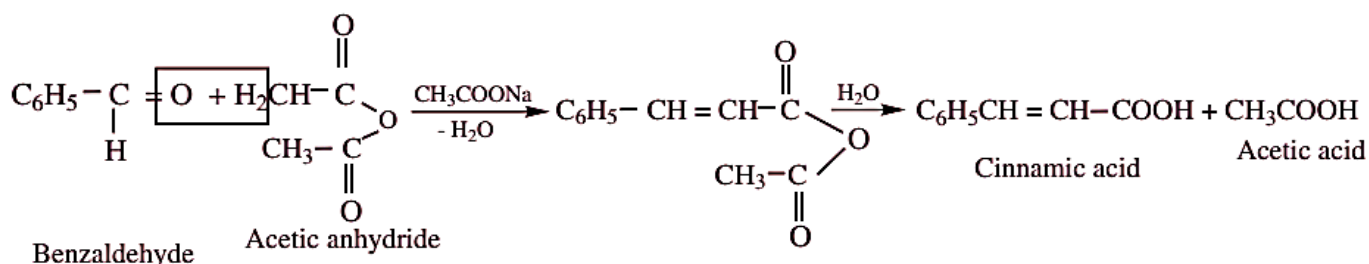
The Benzoin condensation involves the treatment of an aromatic aldehyde with aqueous alcoholic KCN. The products are a hydroxy ketone.

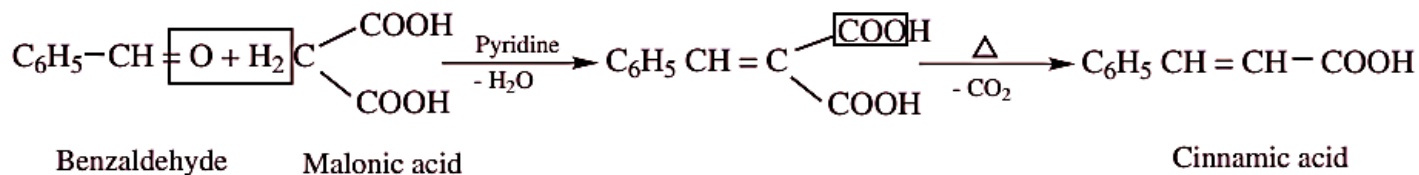
Benzaldehyde reacts with alcoholic KCN to form benzoin



PERKINS' REACTION:

When an aromatic aldehyde is heated with an aliphatic acid anhydride in the presence of the sodium salt of the acid corresponding to the anhydride, condensation takes place and an α , β unsaturated acid is obtained. This reaction is known as **Perkin's reaction**.

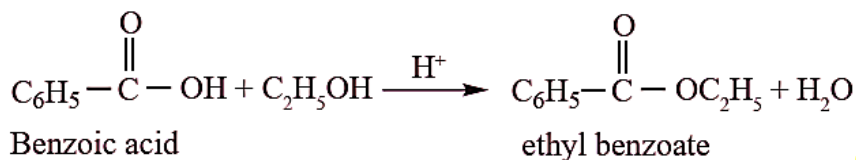


KNOEVENAGAL REACTION:

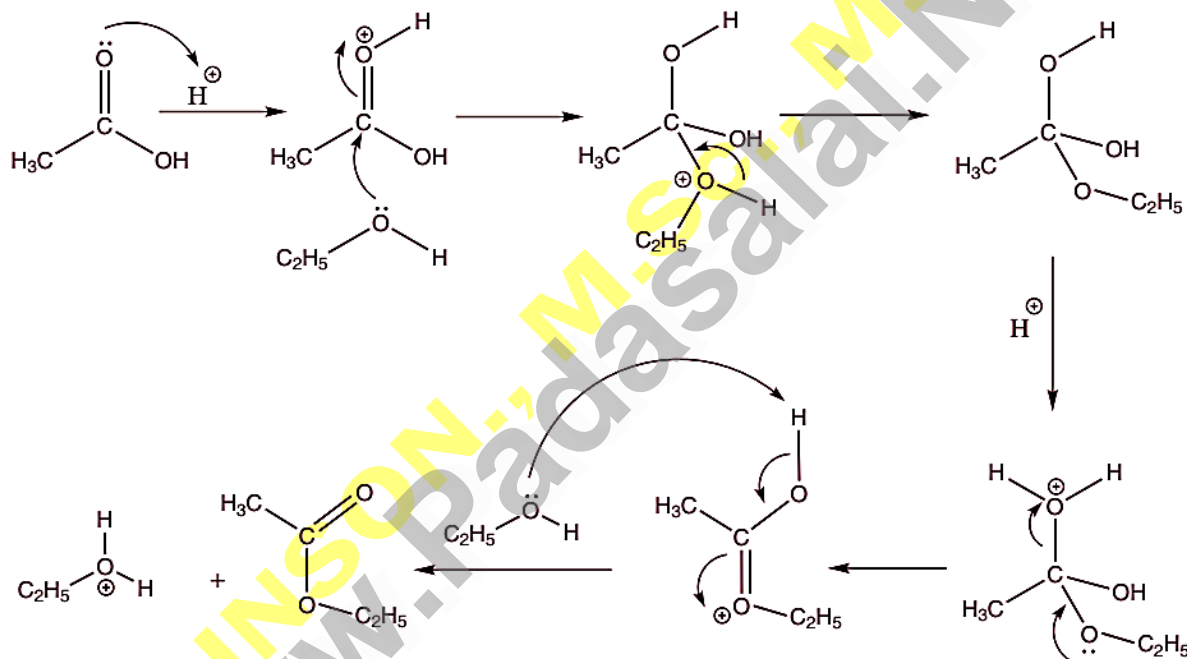
Benzaldehyde condenses with malonic acid in presence of pyridine forming cinnamic acid, Pyridine act as the basic catalyst.

ESTERIFICATION:

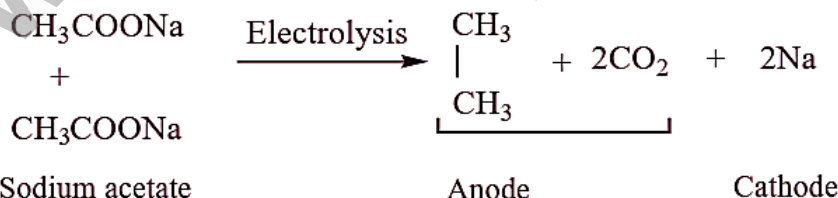
When carboxylic acids are heated with alcohols in the presence of conc. H_2SO_4 or dry HCl gas, esters are formed. The reaction is reversible and is called esterification.

**Mechanism of esterification:**

The Mechanism of esterification involves the following steps.

**KOLBE'S ELECTROLYTIC DECARBOXYLATION:**

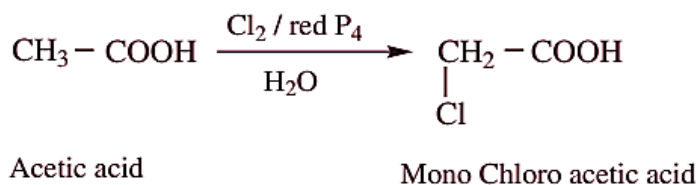
The aqueous solutions of sodium or potassium salts of carboxylic acid on electrolysis gives alkanes at anode. This reaction is called kolbes electrolysis.



Sodium formate solution on electrolysis gives hydrogen

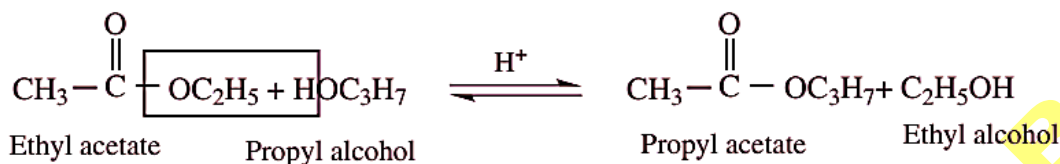
HELL – VOLHARD – ZELINSKY REACTION (HVZ Reaction):

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 form α halo carboxylic acids. This reaction is known as **Hell – Volhard – Zelinsky reaction** (HVZ reaction) The α - Halogenated acids are convenient starting materials for preparing α - substituted acids.



TRANSESTERIFICATION:

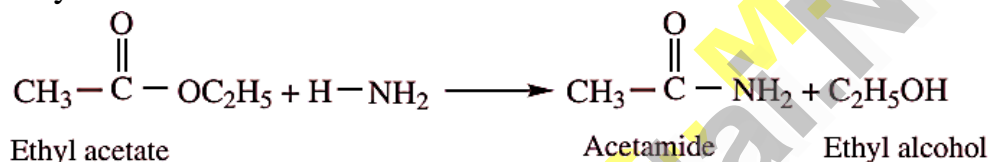
Esters of an alcohol can react with another alcohol in the presence of a mineral acid to give the ester of second alcohol. The interchange of alcohol portions of the esters is termed **transesterification**.



The reaction is generally used for the preparation of the esters of a higher alcohol from that of a lower alcohol.

AMMONOLYSIS:

Esters react slowly with ammonia to form amides and alcohol.



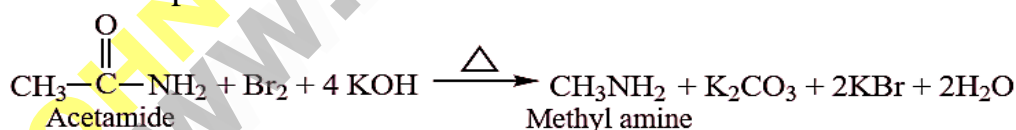
CLAISEN CONDENSATION:

Esters containing at least one α -hydrogen atom undergo self condensation in the presence of a strong base such as sodium ethoxide to form **β -keto ester**.



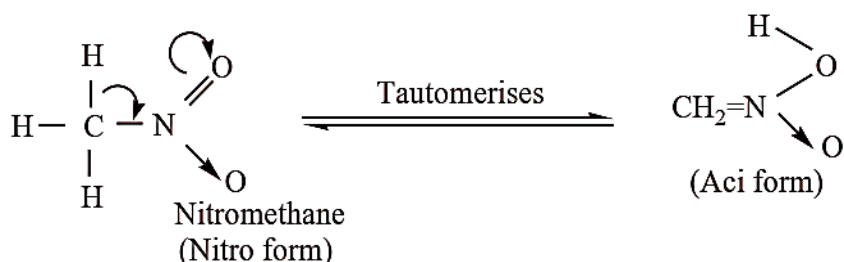
HOFFMANN'S DEGRADATION:

Amides react with bromine in the presence of caustic alkali to form a primary amine carrying one carbon less than the parent amide.

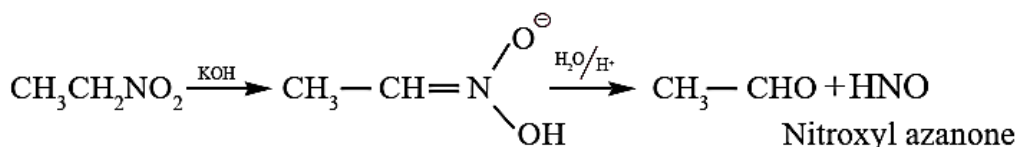


TAUTOMERISM:

Primary and secondary nitroalkanes, having α -H, also show an equilibrium mixture of two tautomers namely nitro – and aci – form



NEF CARBONYL SYNTHESIS:

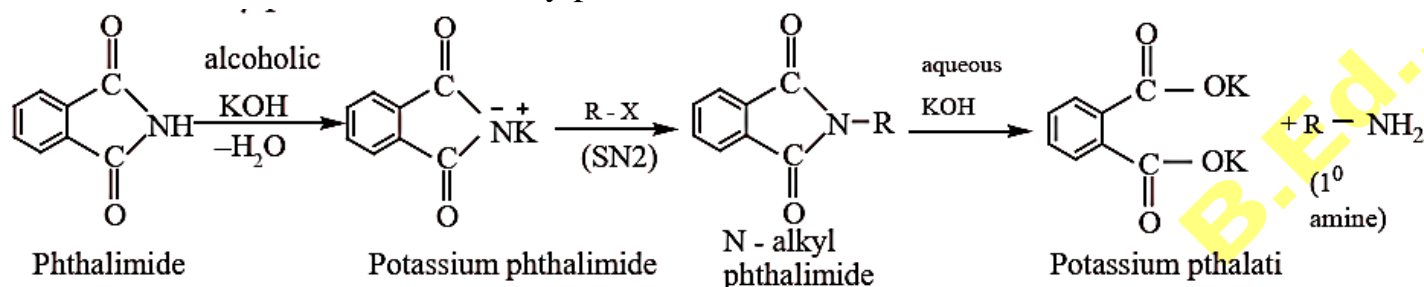


GABRIEL PHTHALIMIDE SYNTHESIS:

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

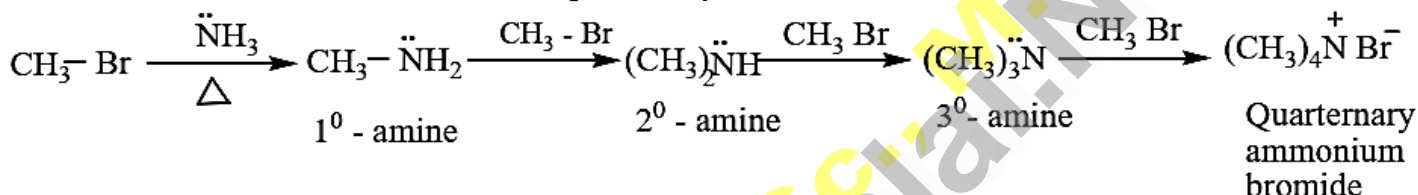
Phthalimide on treatment with ethanolic KOH forms potassium salt of phthalimide which on heating with alkyl halide followed by alkaline hydrolysis gives primary amine.

Aniline cannot be prepared by this method because the arylhalides do not undergo nucleophilic substitution with the anion formed by phthalimide.



HOFFMANN'S AMMONOLYSIS:

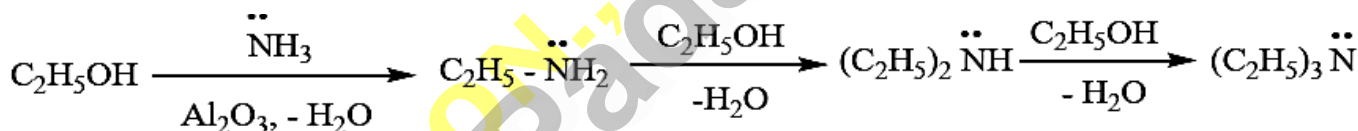
When Alkyl halides (or) benzylhalides are heated with alcoholic ammonia in a sealed tube, mixtures of 1^o, 2^o and 3^o amines and quaternary ammonium salts are obtained.



SABATIER – MAILHE METHOD:

When vapour of an alcohol and ammonia are passed over alumina, W₂O₅ (or) silica at 4000C, all types of amines are formed.

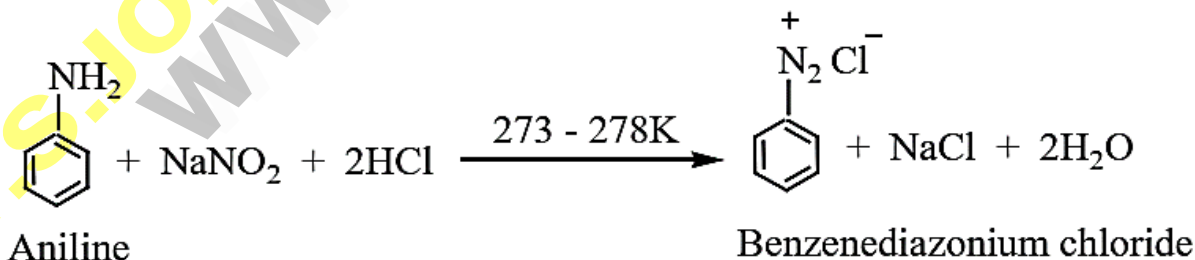
This method is called **Sabatier – Mailhe method**.



DIAZOTIZATION:

Aniline reacts with nitrous acid at low temperature (273 – 278 K) to give benzene diazonium chloride which is stable for a short time and slowly decomposes even at low temperatures.

This reaction is known as diazotization.

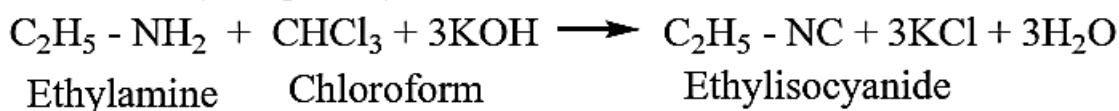


CARBYLAMINE REACTION:

Aliphatic (or) aromatic primary amines react with chloroform and alcoholic KOH to give isocyanides (carbylamines), which has an unpleasant smell.

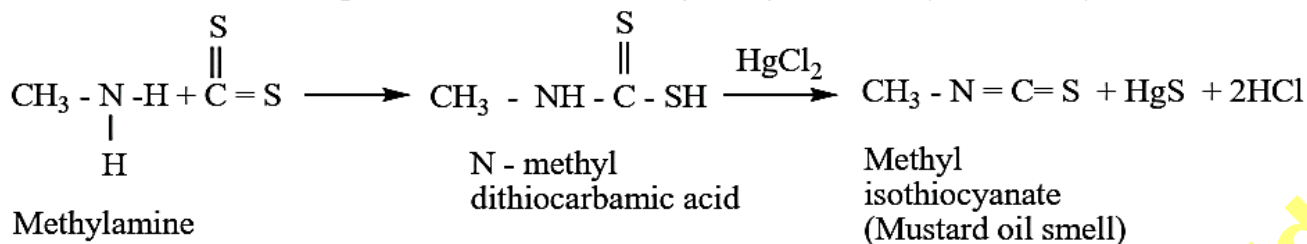
This reaction is known as carbylamine test.

This test used to identify the primary amines.

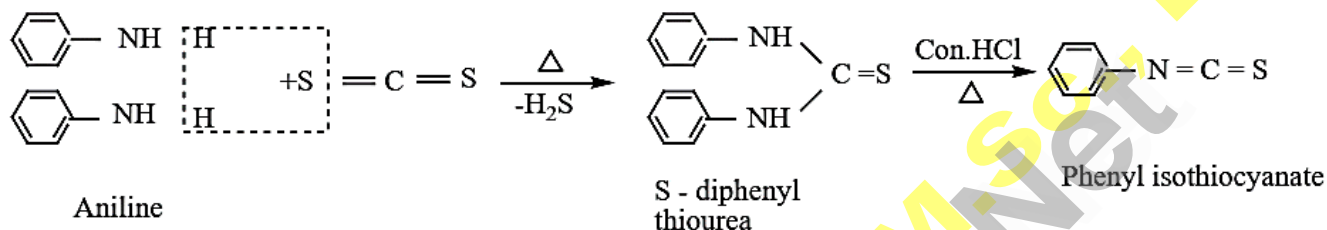


MUSTARD OIL REACTION:

When primary amines are treated with carbon disulphide (CS₂), N - alkylthio carbamic acid is formed which on subsequent treatment with HgCl₂, give an alkyl isothiocyanate.



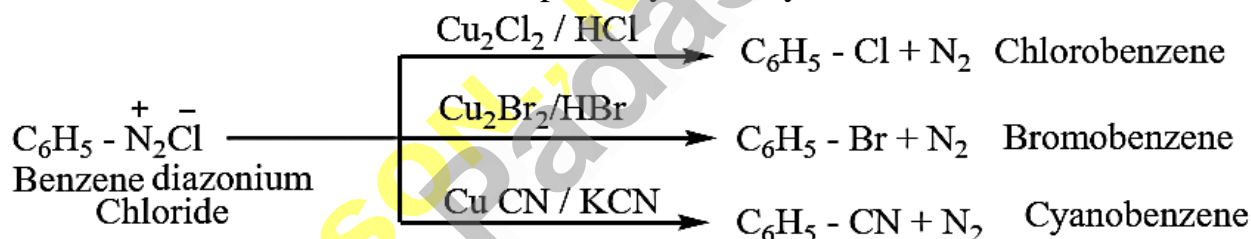
When aniline is treated with carbon disulphide, or heated together, S- diphenylthio urea is formed, which on boiling with strong HCl, phenyl isothiocyanate (phenyl mustard oil), is formed.



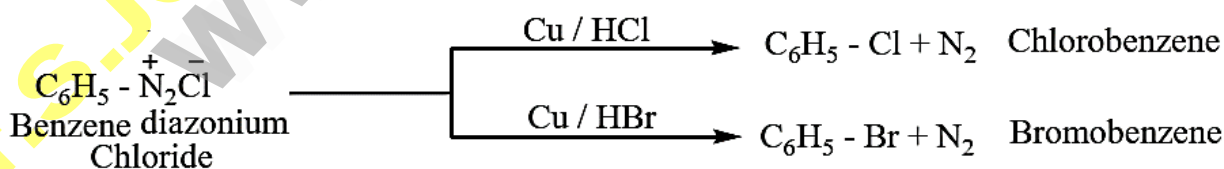
These reactions are known as **Hofmann – Mustard oil reaction**. This test is used to identify the primary amines.

SANDMEYER REACTION:

On mixing freshly prepared solution of benzene diazonium chloride with cuprous halides (chlorides and bromides), aryl halides are obtained. This reaction is called **Sandmeyer reaction**. When diazonium salts are treated with cuprous cyanide, cyanobenzene is obtained.

**GATTERMANN REACTION:**

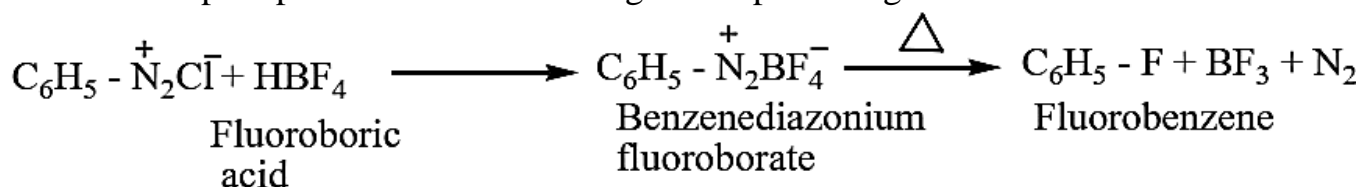
Conversion of benzene diazonium chloride into chloro / bromo arenes can also be effected using hydrochloric / hydrobromic acid and copper powder. This reaction is called Gattermann reaction.



The yield in Sandmeyer reaction is found to be better than the Gattermann reaction.

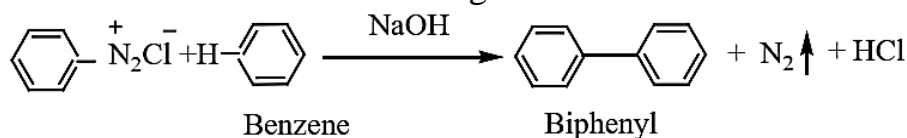
BALTZ – SCHIEMANN REACTION:

When benzene diazonium chloride is treated with fluoroboric acid, benzene diazonium tetra fluoroborate is precipitated which on heating decomposes to give fluorobenzene.

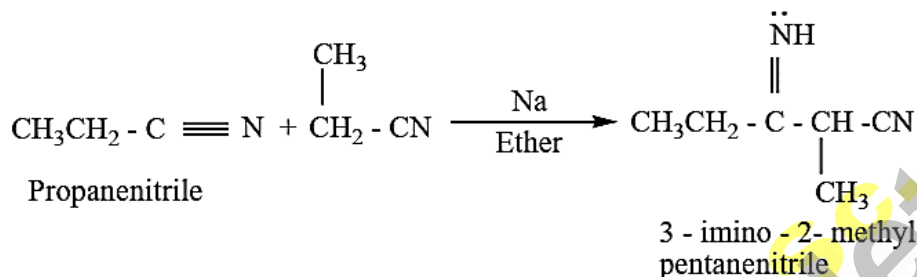


GOMBERG REACTION:

Benzene diazonium chloride reacts with benzene in the presence of sodium hydroxide to give biphenyl. This reaction is known as the Gomberg reaction.

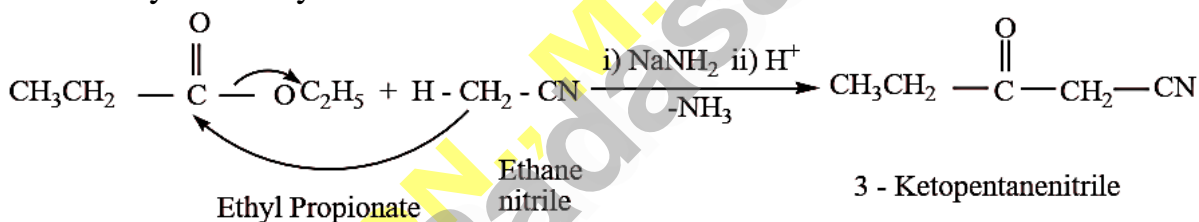
**THORPE NITRILE CONDENSATION:**

Self condensation of two molecules of alkyl nitrile (containing α -H atom) in the presence of sodium to form iminonitrile.

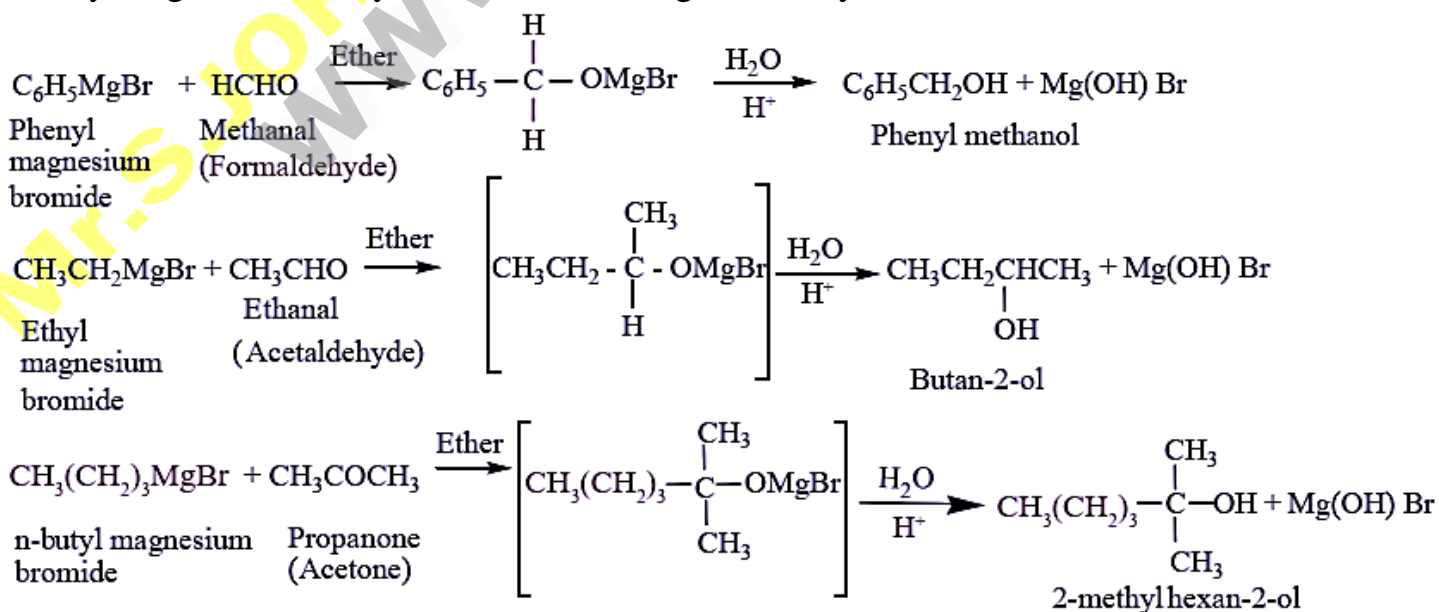
**LEVINE AND HAUSER ACETYLATION:**

The nitriles containing α -hydrogen also undergo condensation with esters in the presence of sodamide in ether to form ketonitriles. This reaction is known as "Levine and Hauser" acetylation.

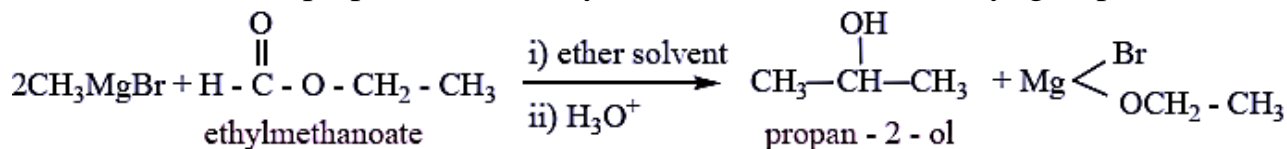
This reaction involves replacement of ethoxy (OC_2H_5) group by methylnitrile ($-\text{CH}_2\text{CN}$) group and is called as cyanomethylation reaction.

**GRIGNARD REAGENT REACTION:**

Nucleophilic addition of Grignard reagent to aldehydes/ketones in presence of dry ether followed by the acid hydrolysis gives alcohols. Formaldehyde gives primary alcohol and other aldehydes give secondary alcohols. Ketones give tertiary alcohols.



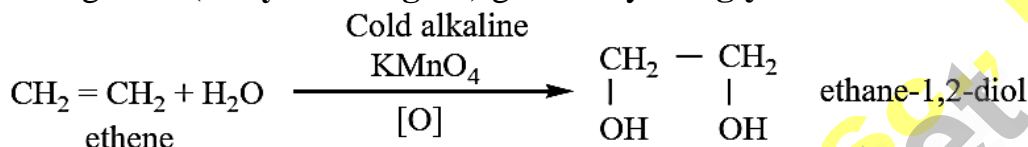
Formate ester is used to prepare a secondary alcohol with identical alkyl groups



PRODUCT NAME REACTIONS

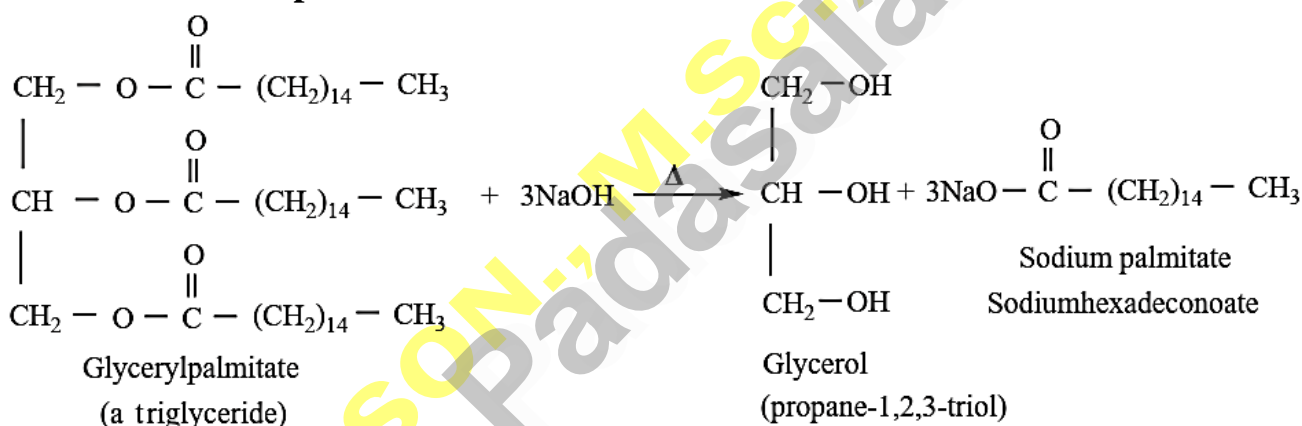
PREPARATION OF GLYCOL:

We have already learnt that the hydroxylation of ethylene using cold alkaline solution of potassium permanganate (**Baeyer's reagent**) gives ethylene **glycol**.



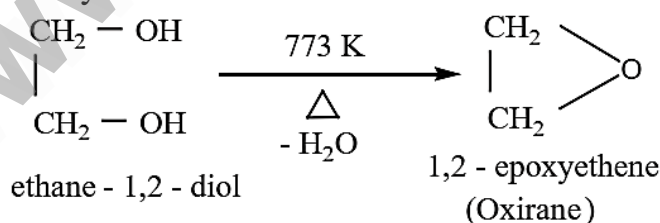
PREPARATION OF GLYCEROL:

Glycerol occurs in many natural fats and it is also found in long chain fatty acids in the form of glyceryl esters (Triglycerides). The alkaline hydrolysis of these fats gives **glycerol** and the reaction is known as **saponification**.



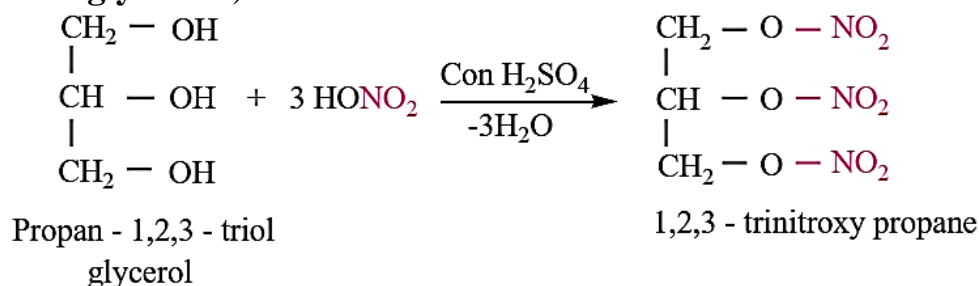
PREPARATION OF EPOXIDE:

Ethyleneglycol undergoes dehydration reaction under heated to 773K, it forms **epoxides**.



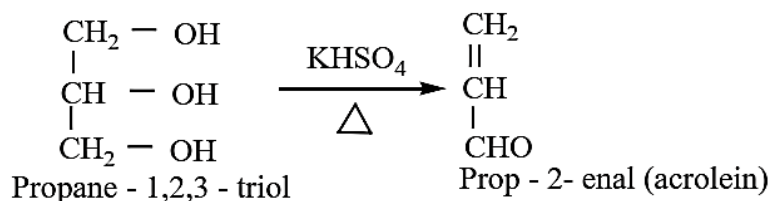
NITRATION OF GLYCEROL:

Glycerol reacts with concentrated nitric acid in the presence of concentrated sulphuric acid to form **TNG (trinitrolycerine)**.

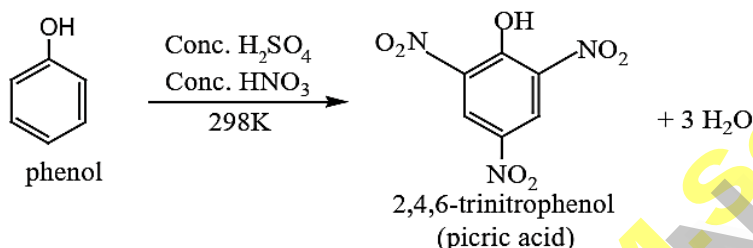


PREPARATION OF ACROLEIN:

When glycerol is heated with dehydrating agents such as $\text{Con H}_2\text{SO}_4$, KHSO_4 etc., it undergoes dehydration to form Acrolein.

**NITRATION OF PHENOL:**

Phenol can be nitrated using $\text{Conc. HNO}_3 + \text{con. H}_2\text{SO}_4$ gives **picric acid** even at room temperature.

**PREPARATION OF SALICYCLIC ACID:**

Kolbe's (or) Kolbe's Schmit reaction

PREPARATION OF SALICYLALDEHYDE

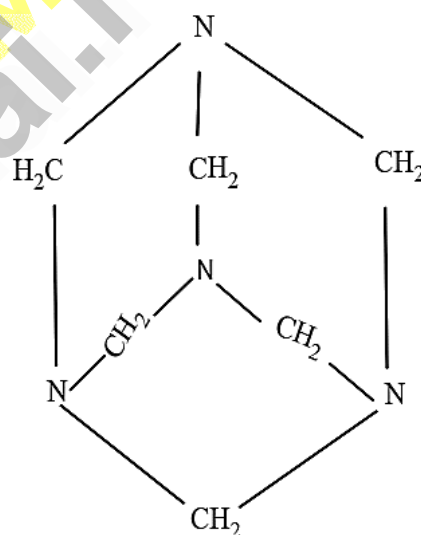
Riemer – Tiemann Reaction

PREPARATION OF PHENOLPHTHALEIN:

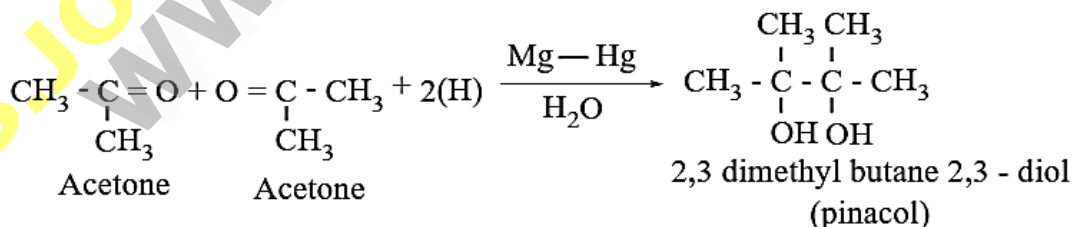
Phthalein reaction

PREPARATION OF UROTROPINE:

Formaldehyde reacts with ammonia to form hexa methylene tetramine, which is also known as **Urotropine**.

**PREPARATION OF PINACOLS:**

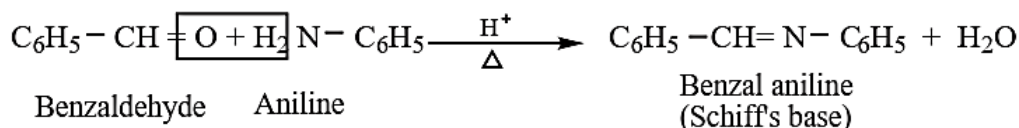
Ketones, on reduction with magnesium amalgam and water, are reduced to symmetrical diols known as **pinacol**.

**PREPARATION OF CINNAMIC ACID:**

Perkins' reaction (or) Knoevenagel reaction

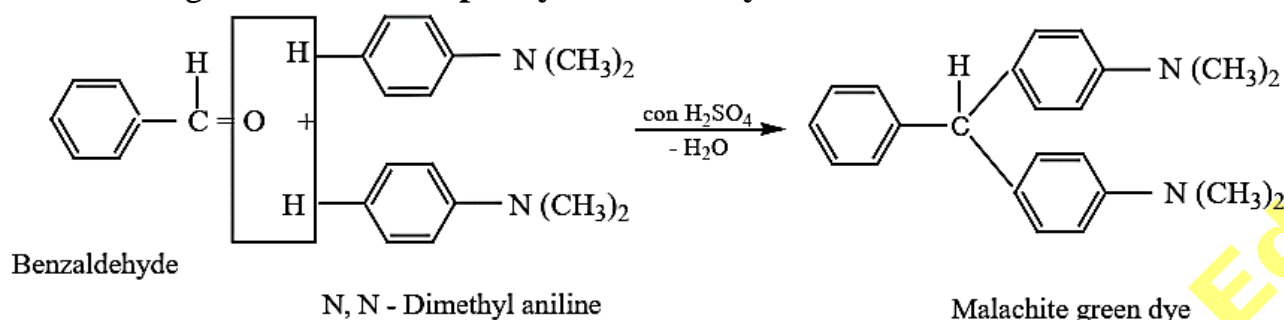
PREPARATION OF SCHIFF'S BASE:

Aromatic aldehydes react with primary amines (aliphatic or aromatic) in the presence of an acid to form **schiff's base**.



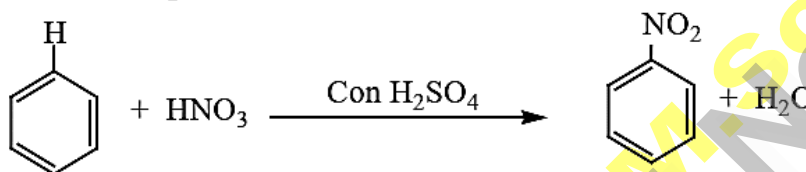
PREPARATION OF MALACHITE GREEN DYE:

Benzaldehyde condenses with tertiary aromatic amines like N, N – dimethyl aniline in the presence of strong acids to form **triphenyl methane dye**.



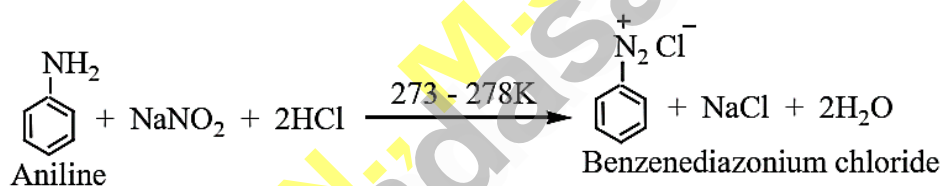
PREPARATION - OIL OF MIRBANE:

When benzene is heated at 330K with a nitrating mixture (Con.HNO₃ + Con.H₂SO₄), electrophilic substitution takes place to form nitro benzene. (**Oil of mirbane**).



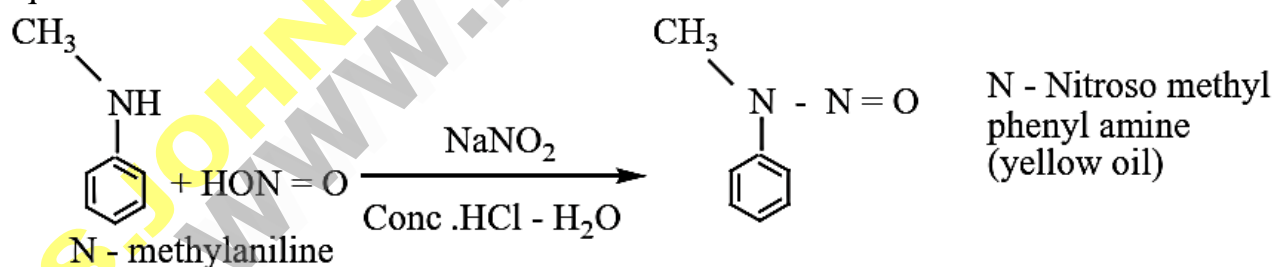
PREPARATION OF BENZENEDIAZONIUM CHLORIDE:

Aniline reacts with nitrous acid at low temperature (273–278 K) to give benzene diazonium chloride which is stable for a short time and slowly decomposes even at low temperatures. This reaction is known as **diazotization**.



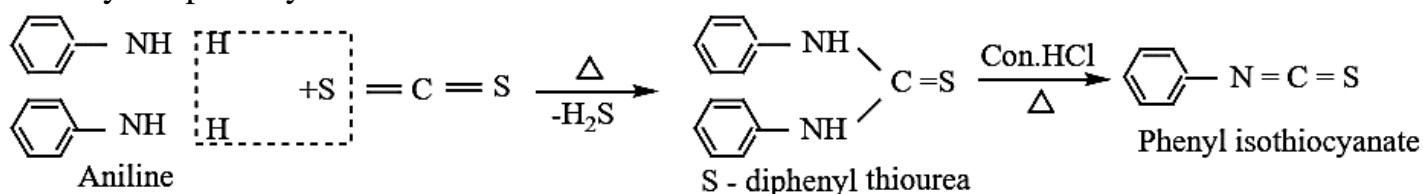
LIBERMANN'S NITROSO TEST:

Alkyl and aryl secondary amines react with nitrous acid to give N – nitroso amine as yellow oily liquid which is insoluble in water. This reaction is known as **Libermann's nitroso test**.



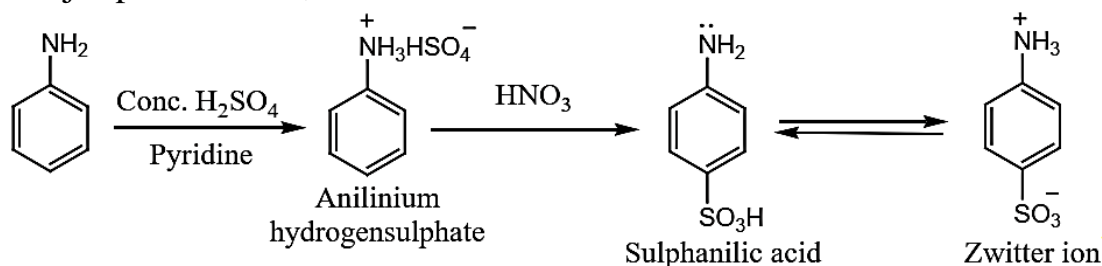
HOFMANN – MUSTARD OIL REACTION:

When aniline is treated with carbon disulphide, or heated together, S- diphenylthio urea is formed, which on boiling with strong HCl, phenyl isothiocyanate (**phenyl mustard oil**), is formed. These reactions are known as **Hofmann – Mustard oil reaction**. This test is used to identify the primary amines.



PREPARATION OF ZWITTER ION:

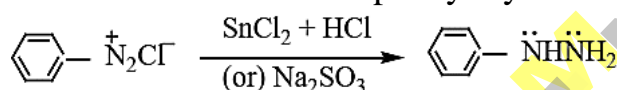
Aniline reacts with Conc. H_2SO_4 to form anilinium hydrogen sulphate which on heating with H_2SO_4 at 453 – 473K gives p- aminobenzene sulphonic acid, commonly known as sulphanilic acid, as the major product. But, its delocalise itself to form unstable **Zwitter ion**.

**PREPARATION OF BIPHENYL:**

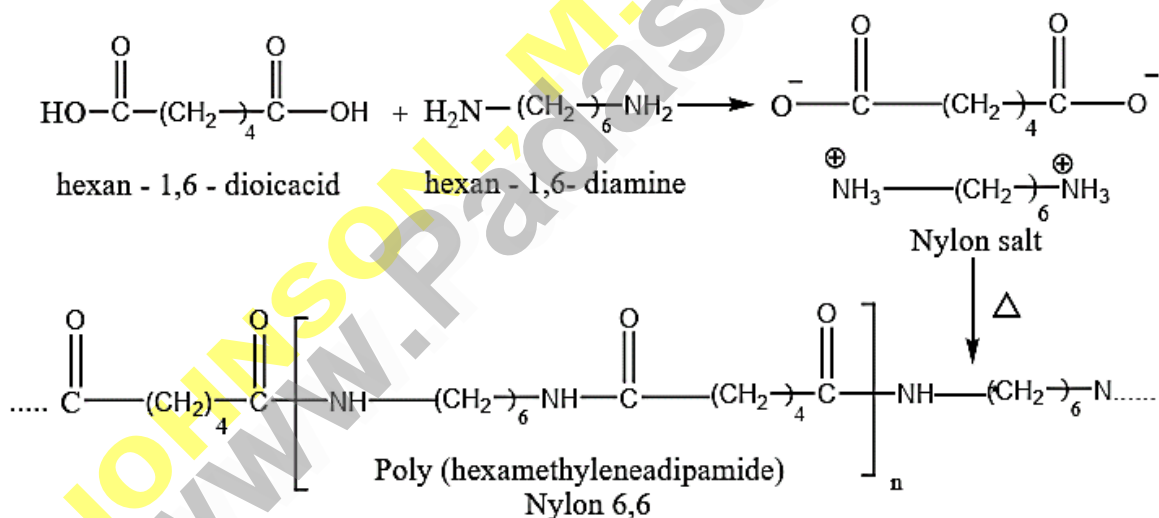
Gomberg reaction

PREPARATION OF PHENYL HYDRAZINE:

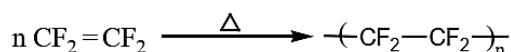
Certain reducing agents like $\text{SnCl}_2 / \text{HCl}$; Zn dust / CH_3COOH , sodium hydrosulphite, sodium sulphite etc. reduce benzene diazonium chloride to phenyl hydrazine.

**PREPARATION OF NYLON – 6,6:**

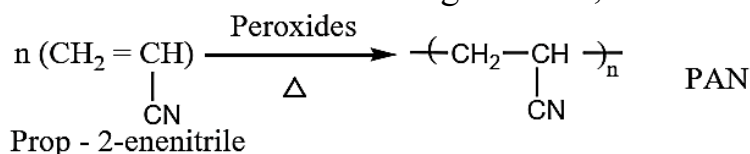
Nylon – 6,6 can be prepared by mixing equimolar adipic acid and hexamethylene – diamine to form a nylon salt which on heating eliminate a water molecule to form amide bonds. It is used in textiles, manufacture of cards etc...

**PREPARATION OF TEFLON (PTFE):**

The monomer is tetrafluoroethylene. When the monomer is heated with oxygen (or) ammonium persulphate under high pressure, Teflon is obtained. It is used for coating articles and preparing non – stick utensils.

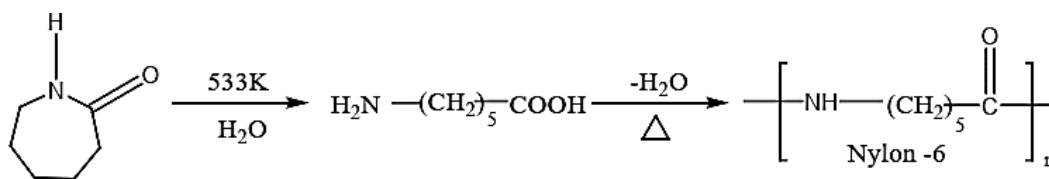
**PREPARATION OF ORLON (POLYACRYLONITRILE – PAN):**

It is prepared by the addition polymerisation of vinylcyanide (acrylonitrile) using a peroxide initiator. It is used as a substitute of wool for making blankets, sweaters etc...



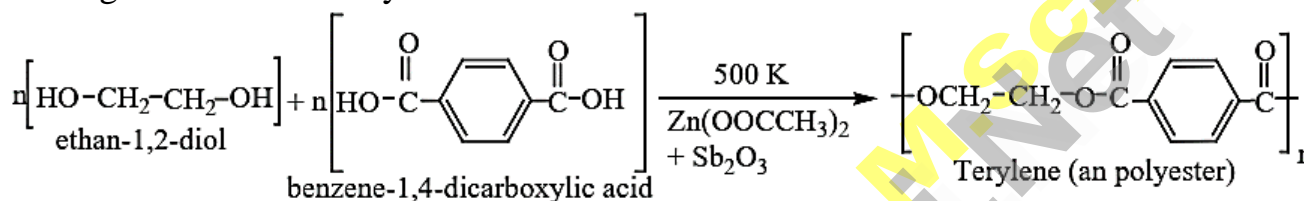
PREPARATION OF NYLON – 6:

Capro lactam (monomer) on heating at 533K in an inert atmosphere with traces of water gives ϵ -v amino caproic acid which polymerises to give nylon – 6. It is used in the manufacture of tyre cards fabrics etc....



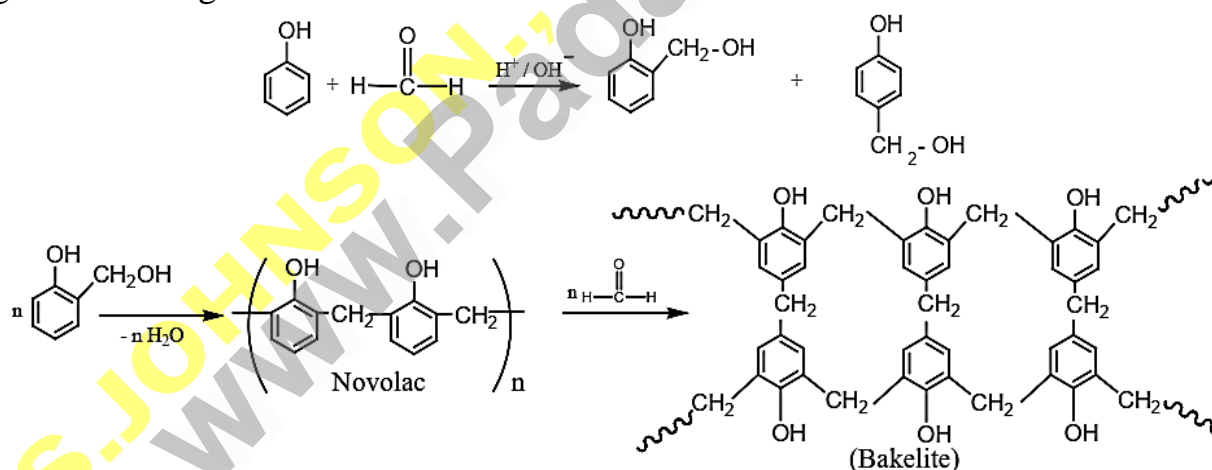
PREPARATION OF TERYLENE (DACRON):

The monomers are ethylene glycol and terephthalic acid (or) dimethylterephthalate. When these monomers are mixed and heated at 500K in the presence of zinc acetate and antimony trioxide catalyst, terylene is formed. It is used in blending with cotton or wool fibres and as glass reinforcing materials in safety helmets.



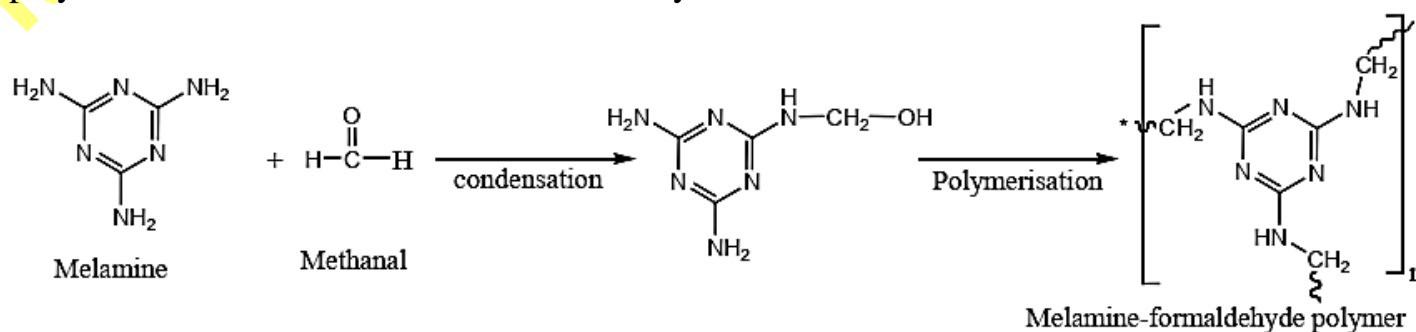
PREPARATION OF BAKELITE:

The monomers are phenol and formaldehyde. The polymer is obtained by the condensation polymerization of these monomers in presence of either an acid or a base catalyst. Phenol reacts with methanal to form ortho or para hydroxyl methylphenols which on further reaction with phenol gives linear polymer called novolac. Novolac on further heating with formaldehyde undergo cross linkages to form bakelite.



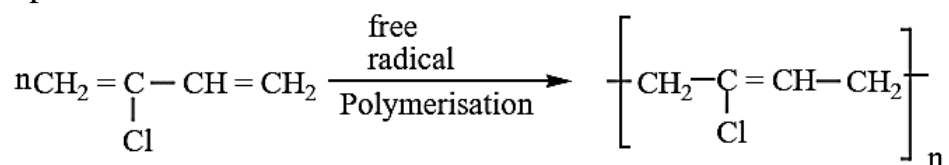
MELAMINE (FORMALDEHYDE MELAMINE):

The monomers are melamine and formaldehyde. These monomers undergo condensation polymerisation to form melamine formaldehyde resin.

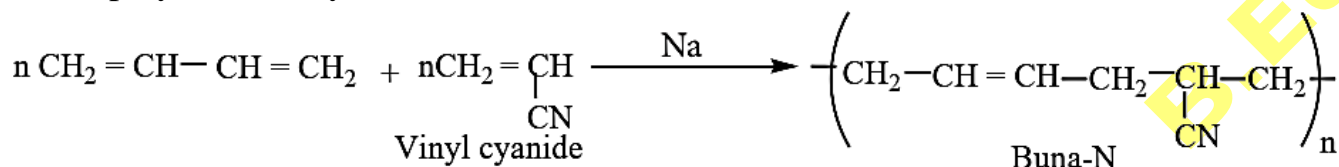


PREPARATION OF NEOPRENE:

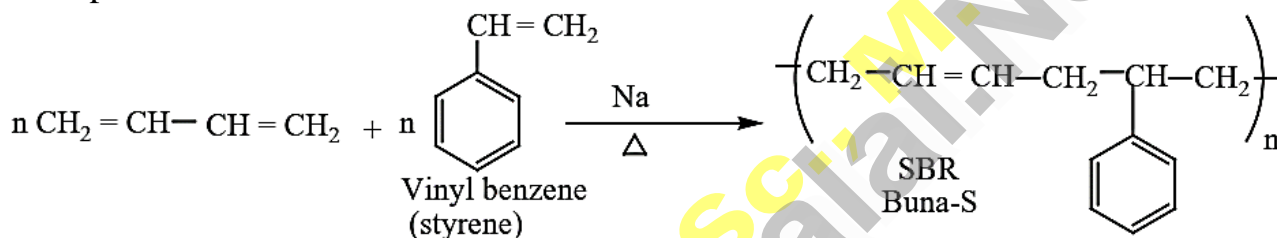
The free radical polymerisation of the monomer, 2-chloro buta-1,3-diene(chloroprene) gives neoprene. It is superior to rubber and resistant to chemical action.

**PREPARATION OF BUNA-N:**

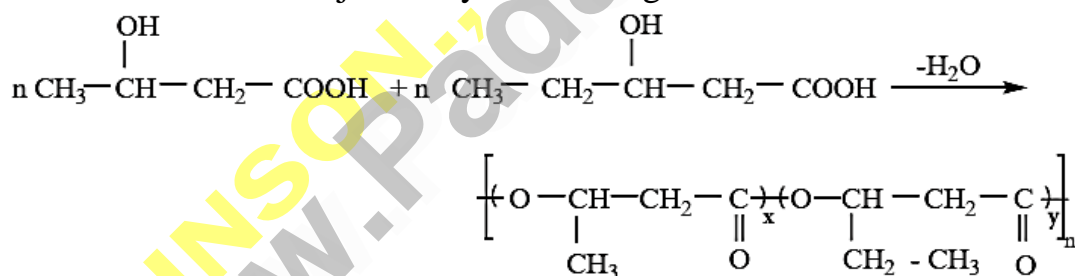
It is a co-polymer of acrylonitrile and buta-1,3-diene.

**PREPARATION OF BUNA-S:**

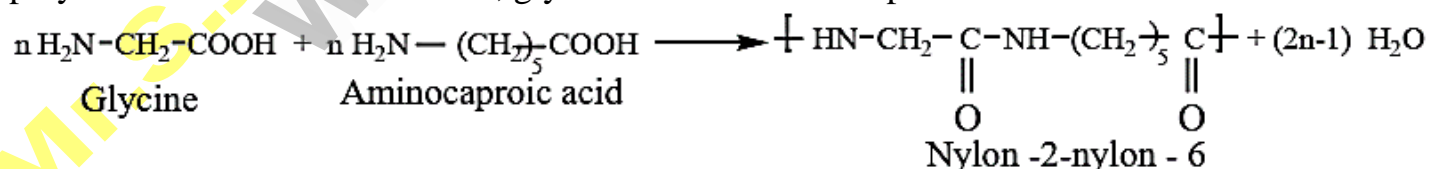
It is a co-polymer. It is obtained by the polymerisation of buta-1,3-diene and styrene in the ratio 3:1 in the presence of sodium.

**PREPARATION OF PHBV:**

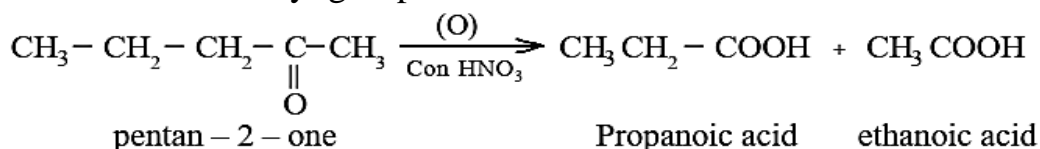
It is the co - polymer of the monomers 3 - hydroxybutanoic acid and 3-hydroxypentanoic acid. In PHBV, the monomer units are joined by ester linkages.

**PREPARATION OF NYLON- 2-NYLON -6:**

It is a co - polymer which contains polyamide linkages. It is obtained by the condensation polymerisation of the monomers, glycine and É - amino caproic acid.

**POPOFF'S RULE:**

The oxidation of unsymmetrical ketones is governed by **Popoff's rule**. It states that during the oxidation of an unsymmetrical ketone, a (C-CO) bond is cleaved in such a way that the keto group stays with the smaller alkyl group.



IUPAC NOMENCLATURE RULES FOR ORGANIC COMPOUNDS

COMPLETE IUPAC NAME FORMAT

Prefix(es) + infix + Root word + 1° suffix + 2° suffix

Prefix:

Root word:

Base Name

No. of carbon	Root word
1	Meth
2	Eth
3	Prop
4	But
5	Pent
6	Hex
7	Hept
8	Oct
9	Non
10	Dec

No. of carbon	Root word
11	Undec
12	Dodec
13	Tridec
14	Tetradec
15	Pentadec
16	Hexadec
17	Heptadec
18	Octadec
19	Nonadec
20	Icos

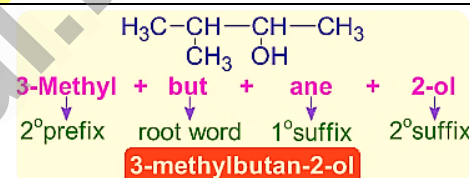
Side chain or Substituent	Prefix
-CH ₃	methyl-
-CH ₂ CH ₃ (or) -C ₂ H ₅	ethyl-
-CH ₂ CH ₂ CH ₃	propyl-
$\begin{array}{c} \\ \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \end{array}$	isopropyl-
-CH ₂ CH ₂ CH ₂ CH ₃	Butyl
$\begin{array}{c} \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}-\text{CH}_3 \end{array}$	sec-butyl (or) (1-methyl)propyl
$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{CH}-\text{CH}_2- \end{array}$	isobutyl (or) (2-methyl)propyl
$\begin{array}{c} \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}-\text{CH}_3 \\ \end{array}$	tert-butyl (or) (1,1-dimethyl)ethyl
-X	halo-
-OR	alkoxy-
-NO ₂	-nitro

1° suffix:

Type of carbon chain	Primary suffix
Saturated (all C-C bonds)	-ane
Unsaturated: one C=C	-ene
Unsaturated: two C=C	-diene
Unsaturated: one C≡C	-yne
Unsaturated: two C≡C	-diyne
Unsaturated: one C=C & one C≡C	-eneyne

2° suffix & prefix:

Name of Functional group	Representation	Suffix When carbon of the functional group is part of the parent chain	Suffix When carbon of the functional group is NOT part of the parent chain	Prefix
carboxylic acid	-COOH	-oic acid	-carboxylic acid	carboxy-
Acid anhydride	$\text{—O—C(=O)—O—C(=O)—O—}$	-oic anhydride	-carboxylic anhydride	-
Ester	-COOR	alkyl -oate	alkyl -carboxylate	alkoxycarbonyl-
Acid halide	-COX	-oyl halide	-carbonyl halide	halocarbonyl-
Acid amide	-CONH ₂	-amide	-carboxamide	carbamoyl-
Nitrile	-CN	-nitrile	-carbonitrile	cyano-
Aldehyde	-CHO	-al	-carbaldehyde	oxo-
Ketone	-CO-	-one	-	oxo-
Alcohol	-OH	-ol	-	hydroxy
Thiol	-SH	-thiol	-	mercapto
Amine	-NH ₂	-amine	-	amino-
Imine	=NH	-imine	-	imino-
Alkene	C=C	-ene	-	-
Alkyne	C≡C	-yne	-	-



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*** WISH YOU ALL THE BEST ***