

Section-I : Nitro Compounds

13.0 DEFINITION

These are nitro derivatives of alkane or arene obtained by replacement of one or more hydrogen atoms from alkanes or arene by same number of nitro ($-\text{NO}_2$) group.

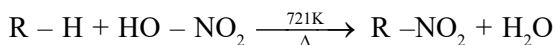
Represented by $\text{R}-\text{NO}_2$, $\text{R}_2\text{CH}-\text{NO}_2$, $\text{R}_3\text{C}-\text{NO}_2$.

It may be noted that $-\text{NO}_2$ group is ambident group, because it can attack on carbon through nitrogen as well as oxygen. When it can attack through nitrogen produces $\text{R}-\text{NO}_2$ (nitro alkane) while it can attack through oxygen produces $\text{R}-\text{O}-\text{N}=\text{O}$ (alkyl nitrite). The chemical properties of nitro alkane and alkyl nitrite are different. Nitro alkanes are more stable than alkyl nitrite.

13.1 PREPARATION METHODS

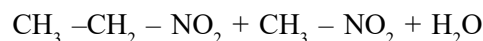
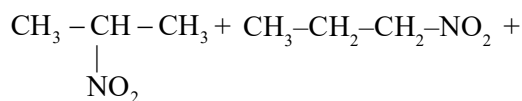
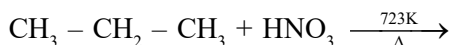
1) **From nitration of alkanes :** Industrially nitroalkane can be prepared by two ways.

a) **From vapour phase nitration of alkane :** Alkane are heated with conc. nitric acid at 423 K to 698 K to give nitroalkane. Nitration of alkane is substitution reaction in these reactions hydrogen atom from alkanes are replaced by NO_2 group. When alkanes are passed over vapours of nitric acid at 723 K gives nitro alkane. Methane does not undergoes nitration

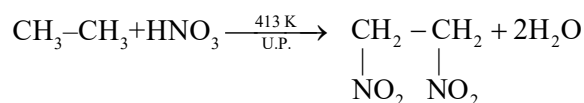


The alkanes have more than two carbons, there is always a possibility that the C-C bond may break at high temperature and mixture of nitroalkanes is formed.

Vapours of nitric acid is passed over propane at 723 K gives 2-nitro propane (33%), 1-nitro propane (32 %), nitro ethane (29%) nitro methane (6%).

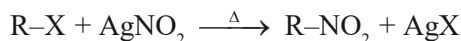


b) **Liquid phase nitration:** When alkane are heated with conc. HNO_3 under pressure at 413 K gives polynitro compounds.

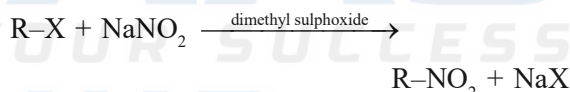


1, 2-dinitro ethane

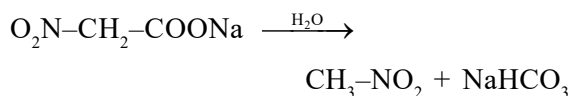
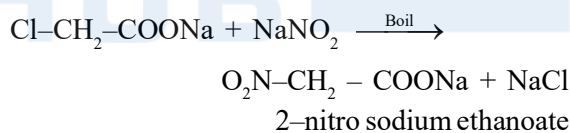
2) **From alkyl halides and AgNO_2 :** When alkyl halides are heated with silver nitrite gives nitro alkane.



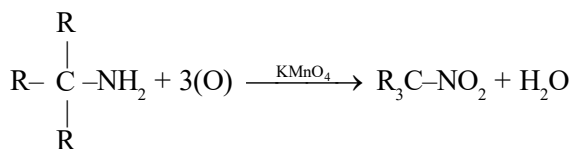
3) **From alkyl halides and NaNO_2 or KNO_2 :** When alkyl halides are heated with sodium nitrite or potassium nitrite in the presence of dimethyl sulphoxide solvent or N, N-dimethyl formamide gives nitro alkane.



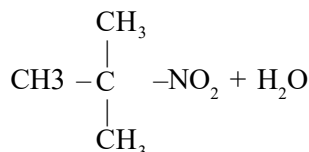
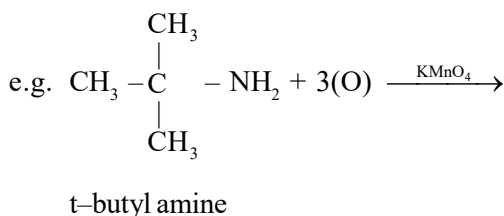
4) **From salt of ∞ -halocarboxylic acid:**



5) **From tertiary alkyl amines:** Tertiary alkyl amines are oxidised by KMnO_4 give tertiary nitro alkane

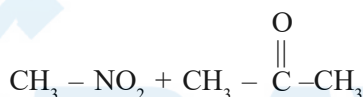
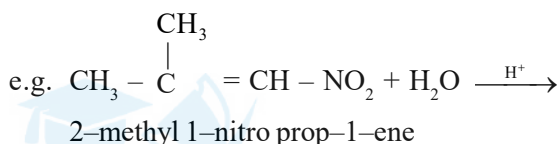


Tertiary alkyl amines Tertiary nitro alkane

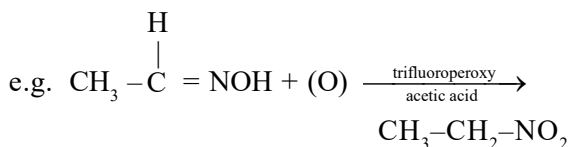
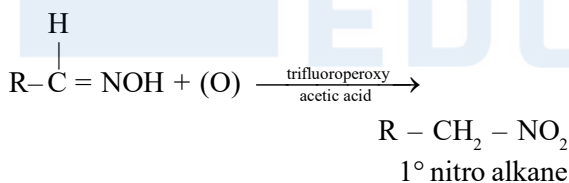


2-methyl 2-nitro propane

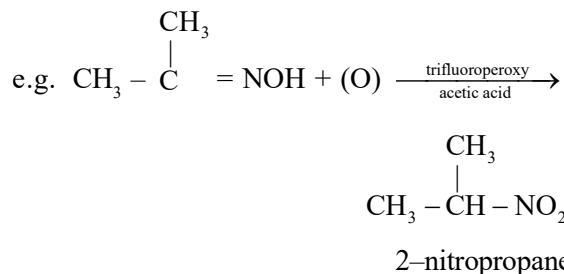
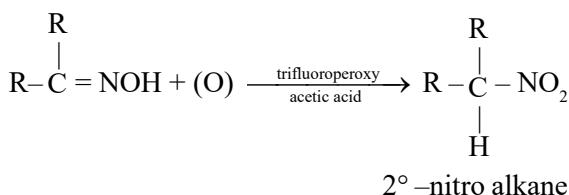
- 6) **From acid hydrolysis of α -nitroalkene:** When α -nitroalkene on acid hydrolysis gives nitroalkane, aldehyde or ketone.



- 7) **From oxidation of oxime:** Aldoxime or ketoxime are oxidised by trifluoroperoxy acetic acid gives primary and secondary nitroalkane respectively.
- a) **Oxidation of aldoxime:** Aldoximes are oxidised by trifluoroperoxy acetic acid gives primary nitroalkane.



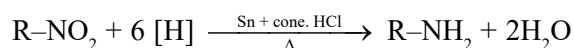
- b) **Oxidation of ketoxime :** Ketoximes are oxidised by trifluoroperoxy acetic acid gives secondary nitroalkane.



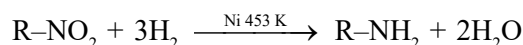
13.2 CHEMICAL PROPERTIES

1) Reduction:

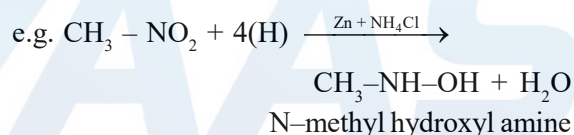
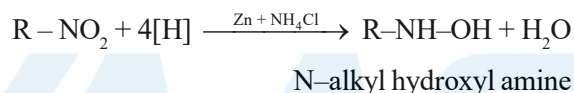
- a) **Reduction by using Sn + conc.HCl or Fe + conc. HCl or Zn + conc. HCl or LiAlH₄ or catalytic hydrogenation:**



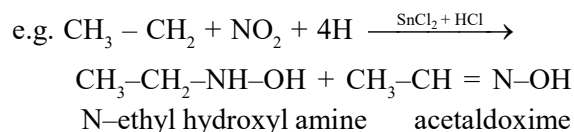
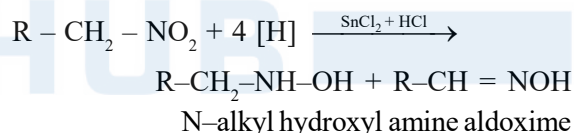
- b) **Catalytic hydrogenation by using Ni or Pt or Pd at 453K:**



- c) **Reduction by using Zn + NH₄Cl :** Nitroalkanes are reduced by Zn + NH₄Cl gives N-alkyl hydroxylamine.

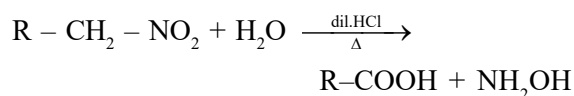


- c) **Reduction by using SnCl₂ + HCl (stannous chloride and HCl):**



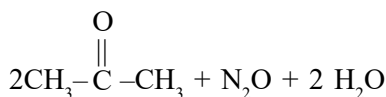
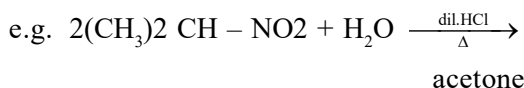
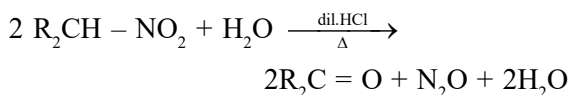
- 2) **Acid hydrolysis or Distinction test between 1°, 2°, 3° nitro alkane or reaction with dil. HCl or dil. H₂SO₄**

- a) **Primary nitro alkane:** Primary nitroalkane on acid hydrolysis gives carboxylic acid and hydroxyl amine.





- b) **Secondary nitroalkane:** These on acid hydrolysis gives ketones.

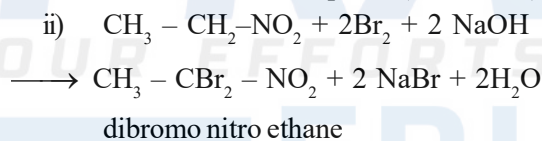
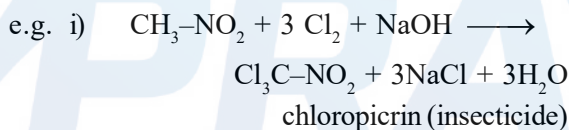


- c) **Tertiary nitroalkane:** They do not undergo acid hydrolysis

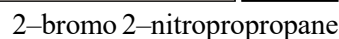
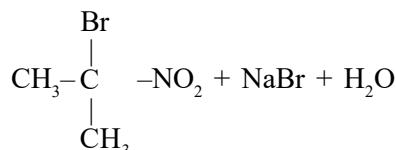
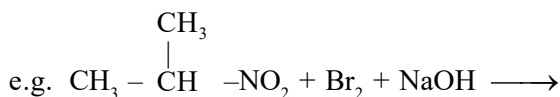
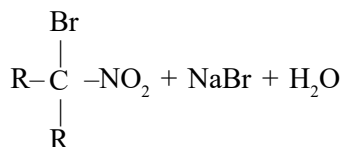
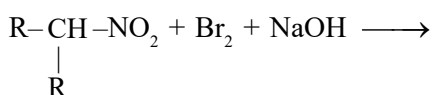


- 3) **Halogenation:** Primary and secondary nitroalkane are readily halogenated in alkaline medium. The α -H atom is replaced by chlorine or bromine atom.

- a) **Primary nitro alkane:** When 1° -nitroalkane reacts with chlorine in alkaline medium. The α -H atom of 1° -nitro alkane is / are replaced by chlorine to give di or trihalo derivatives.



- b) **Secondary nitroalkane:** They give only monohaloderivatives



- c) **Tertiary nitro alkane:**

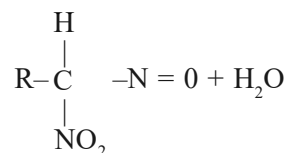
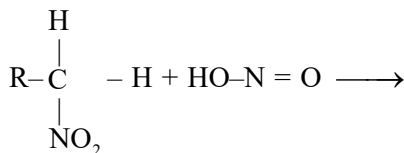
They do not react with halogens



- 4) **Reaction with nitrous acid (Victor Meyers's test):**

Primary, secondary and tertiary nitro alkane reacts differently with nitrous acid.

- a) **Primary nitroalkane:** They react with nitrous acid gives nitrolic acid, which is then treated with NaOH gives red colour sodium salt.



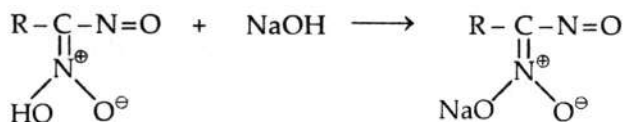
nitrolic acid (nitro form)

Nitrolic acid tautomerise to form blue coloured aci form of nitrolic acid.



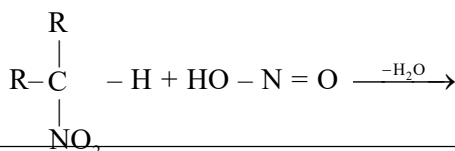
nitroform of nitrolic acid Aci form (Blue colour)

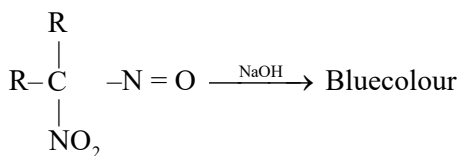
Aci form of nitrolic acid react with NaOH gives red colour sodium salt of nitrolic acid.



Red colour sodium salt of nitrolic acid

- b) **Secondary nitroalkane:** They react with nitrous acid gives blue coloured nitrosonitroalkane or pseudonitrol, which no more contain α -H atom hence do not dissolve in NaOH and blue colour is retained.

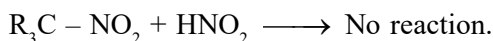




Blue colour

(Pseudonitrol or nitroso nitro alkane)

- c) **Tertiary nitroalkane:** They do not react with nitrous acid because of absence of α -H atom.

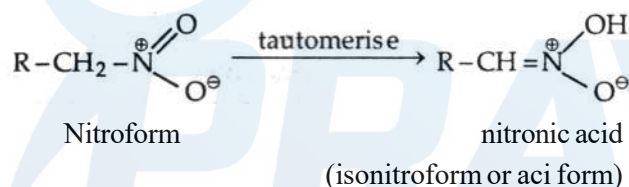


5) **Acidic nature of α -H atom (Action of alkali).**

The α -H atom in aliphatic primary and secondary nitro alkane is acidic due to electron withdrawing nature of nitro group.

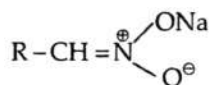
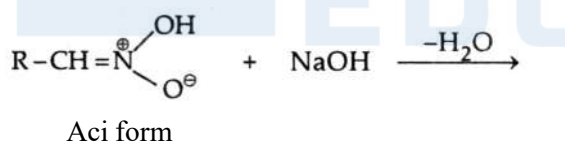
In strong alkaline medium they behave as acid and form salt.

The acidic nature is explain on the basis of tautomerism. primary and secondary nitro alkane tautomerise to form nitronic acid. Tertiary nitro alkane do not have α -H atom and therefore they do not exhibit tautomerism.



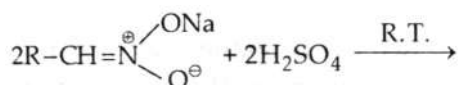
The equilibrium is entirely shifted towards nitroform due to resonance stabilization of nitro group.

- iv) The aci form or isonitro form is weak acid dissolve in aqueous NaOH to form salt.

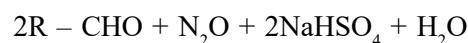


Sodium salt of nitronic acid

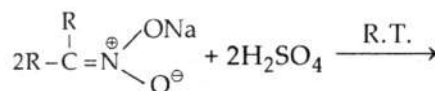
- v) **Application:** When sodium salt of primary and secondary aci form of nitronic acid is treated with 50% H_2SO_4 at room temperature gives aldehydes and ketones respectively. This reaction is known as **Nef – Carbonyl** synthesis.



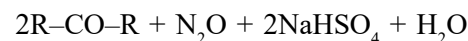
1° sodium salt of aci form of nitronic acid



Aldehyde

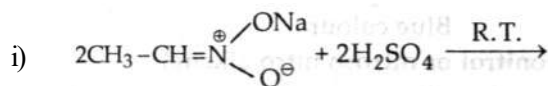


2° sodium salt of aci form of nitronic acid

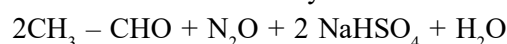


Ketone

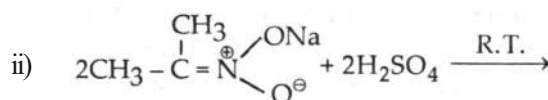
e.g.



sodium salt of aci form of methyl nitronic acid



acetaldehyde



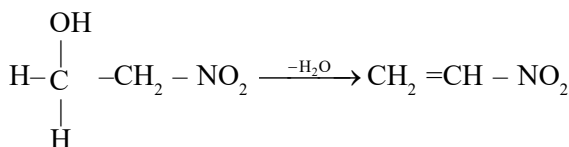
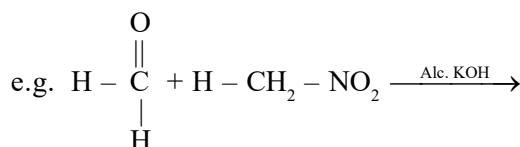
sodium salt of aci form of dimethyl nitronic acid



acetone

6) **Condensation with aldehydes and ketones:**

- 1) It is characteristic reaction of nitroalkane containing α -H atom.
- 2) Primary and secondary nitroalkane containing α -H atom condense with aldehyde or ketone in the presence of ethanolic KOH gives hydroxy nitro derivatives.
- 3) The reaction is quite similar to aldol condensation reaction and proceeds the formation of carbanion.



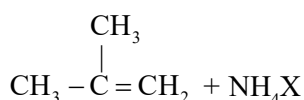
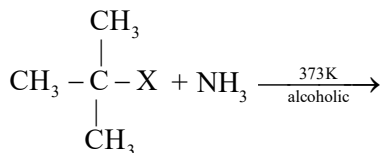
2-nitro ethanol

1-nitro ethene

- v) The purity of amines obtained in this method is very low.
- vi) Hofmann's fails ammonolysis of 3° alkyl halide because 3° alkyl halides undergo dehydrohalogenation.

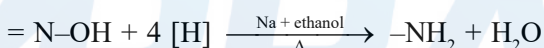
Thus the reactivity of R-X is $R-I > R-Br > R-Cl$.

Tertiary butyl amine can not be prepared by this method.



2. From reduction of oximes :

When aldo or keto oximes are reduced by Na + ethanol or LiAlH_4 or $\text{Zn} + \text{CH}_3\text{COOH}$ or Na. Hg + H_2O gives primary amine. In which oxime group ($=\text{NOH}$) is converted into $-\text{NH}_2$ group.

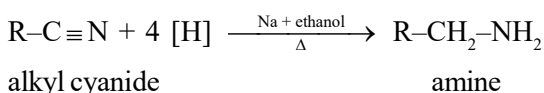


3. By reduction of cyanides or nitriles (Mendius reduction) : Cyanides are reduced by

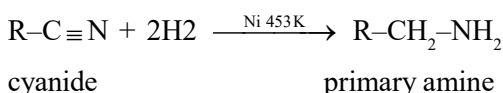
- Ni or Pt or Pd at 453K
- Na + ethanol or LiAlH_4 gives primary amines. In which $-\text{C} \equiv \text{N}$ group is converted into $-\text{CH}_2-\text{NH}_2$ group

a) Reduction by using Na + ethanol :

e.g. When nitrile is reduced by Na + ethanol, gives amine.



b) Catalytic hydrogenation by using Ni or Pt or Pd at 453K



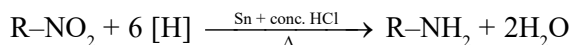
Note:

- Sn + conc. HCl, Na.Hg + H_2O , Fe + conc. HCl, Zn + conc. HCl, does not reduce $>\text{C}=\text{C}<$ or $\text{C}=\text{C}-$ bond.

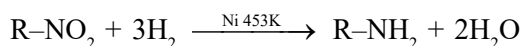
- $\text{H}_2 + \text{Ni}$ reduces $>\text{C}=\text{C}<$, $-\text{C}=\text{C}-$, $-\text{NO}_2$, $=\text{NOH}$, $-\text{C}=\text{N}$

4. Reduction of nitroparaffins:

When nitroparaffins are reduced by Sn or Fe or Zn + conc. HCl or Zn + conc. H_2SO_4 or LiAlH_4 or H_2 and Ni at 453K, gives primary amines. In which $-\text{NO}_2$ group is converted into $-\text{NH}_2$ group.

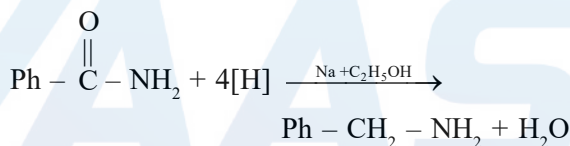
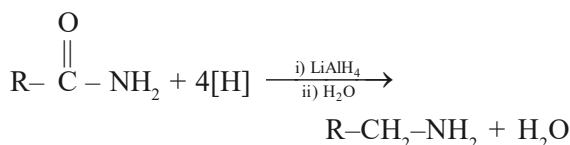


Catalytic hydrogenation by using Ni or Pt or Pd at 453K:



Note: Reduction with Fe + conc. HCl is preferred because FeCl_2 formed gets hydrolysed to release HCl during reaction. Thus only small amount of HCl is required to initiate the reaction.

5) Reduction of amide : Amides are reduced by LiAlH_4 or Na + $\text{C}_2\text{H}_5\text{OH}$ to get primary amine.

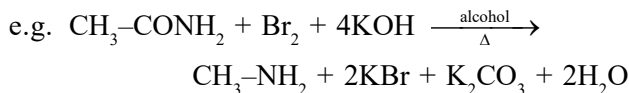
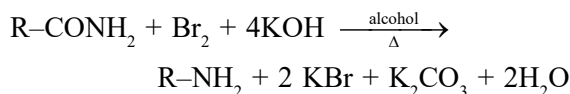


6. Hofmann's bromide degradation reaction:

By this method the amide ($-\text{CONH}_2$) group is converted into primary amine ($-\text{NH}_2$).

When amides are heated with bromine and aqueous or alcoholic KOH or NaOH or KOBr or NaOBr give pure primary amine.

In the degradation method migration of alkyl or aryl group takes place from carbonyl carbon of the amide to nitrogen atom. The amine so formed containing one carbon atom less than amide.



7) Gabriel phthalimide synthesis:

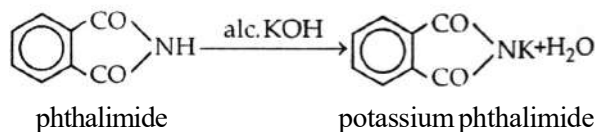
This method involves the following three steps.

- Phthalimide is reacted with ethanolic KOH to give potassium phthalimide.
- Potassium phthalimide is reacted with R-X to

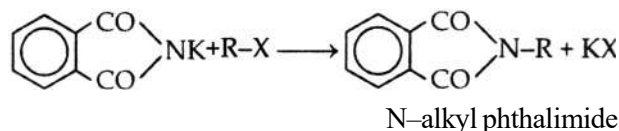
give N-alkyl phthalimide.

- iii) The N-alkyl phthalimide is hydrolysed by dil. HCl to give pure primary amine.

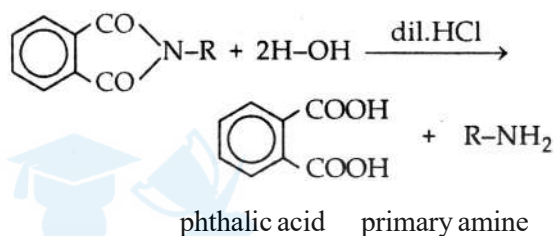
Step – (i)



Step – (ii)



Step – (iii)



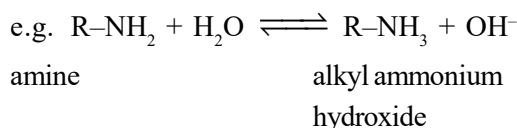
Advantages: Only pure 1° aliphatic amine can be prepared from alkyl halides by Gabriel synthesis, because alkyl halides undergo nucleophilic substitution reaction. The reactivity of R-X is 1° > 2° > 3°.

Limitation: Aromatic primary amine i.e. (aniline) cannot be prepared by this method because Ar-X does not undergo nucleophilic substitution reaction (i.e. the breaking of C-X bond in haloarene is quite difficult). Potassium phthalimide at ordinary condition does not give N-phenyl phthalimide with halo arene.

13.4 BASIC NATURE OF AMINES

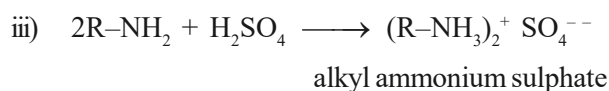
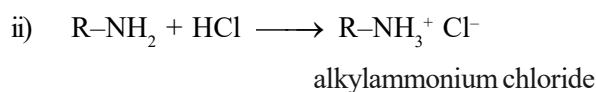
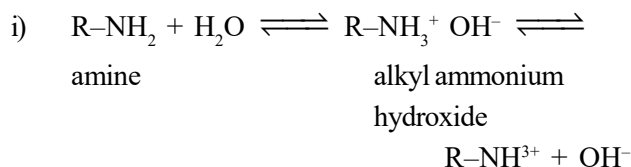
Basic nature of amines can be explained on the basis of Arrhenius theory, Lewis theory, Lowry – Bronsted theory.

Arrhenius theory : Primary, secondary and tertiary amines dissolved in water forming alkyl ammonium hydroxide, which dissociate to produce hydroxide ion. Therefore, aqueous solution of amines contains free OH⁻ ion. The OH⁻ ion is stronger base, and it has greater attraction for proton than amines. Therefore, equilibrium is shifted towards left side. Thus, aqueous solution of amines contains more undissociated alkyl ammonium hydroxide molecule. Hence, amines are weak basic in nature.

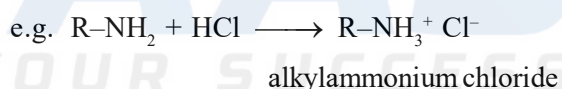


Lewis theory : Amines containing lone pair of electron on nitrogen atom. These lone pair can donate or share easily to electron deficient species to form coordinate bond. Thus, amines are Lewis base.

e.g.



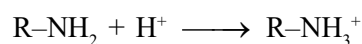
Lowry – Bronsted theory : According to Lowry Bronsted theory, the substance which accept proton are base. Amines accept proton from water and acids, hence amines are basic nature.



13.4.1 Comparison of basic character of aliphatic amines and ammonia:

The basic nature of amines can be better understood by Kb or pKb value. Larger the value of Kb or smaller the value of pKb stronger is the base.

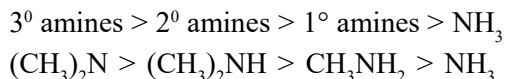
The lone pair of electron on nitrogen is available for coordination with a proton, determining the relative strength of amines. The relative basicity of amines depends upon availability of lone pair of electrons for protonation. Easier the protonation stronger will be the base. This can be explain on the basis of +I effect and -I effect.



- i) **+ I effect:** Electron donating +I effect of alkyl group increase the basicity of amines. The alkyl group increase the electron density on nitrogen

atom, thereby increasing the availability of the lone pair of electrons on nitrogen atom to proton.

For example, the methyl group are electron donating and they will increase the electron density on nitrogen from 1° to 3° amines and therefore its basic nature will increase. Thus, the basicity of amines in aqueous medium follows the order,

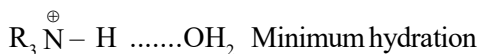
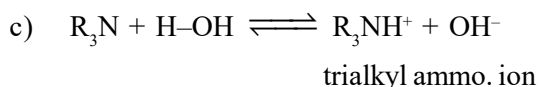
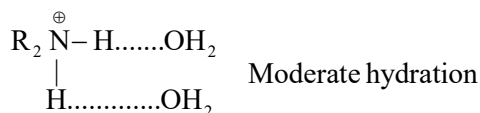
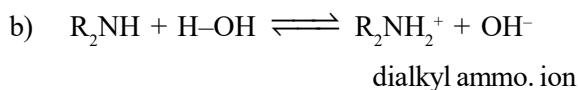
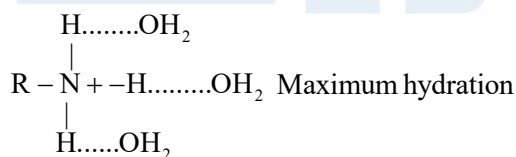
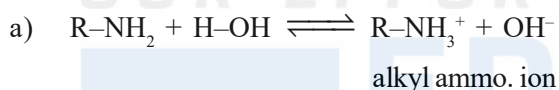


However, in aqueous medium it has been observed that trimethyl amines is less basic than dimethyl amine and methyl amines.

This may be explained on the basis of steric effect. (It is a repulsion between two or more groups or atoms in a molecule.) and solvation effect.

Steric effect: In trimethyl amine, the three methyl group cover nitrogen from all sides and thus makes the protonation difficult resulting the reduced in its basicity.

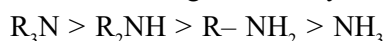
Solvation effect: When amines are dissolved in water they undergo hydration through hydrogen bonding. The protonated amines form hydrogen bonding with water and release energy known as hydration energy. Now greater the extent of hydrogen bonding in protonated amines more will be its stabilisation and greater will be the tendency to change into cation and more will be the basic nature of amines.



Thus primary amines are more hydrated than secondary and tertiary amines. Hence basicity of amines on hydration is $1^\circ > 2^\circ > 3^\circ$ amines.

The combined effect i.e. inductive and solvation the dimethyl amine is stronger base than methyl amine.

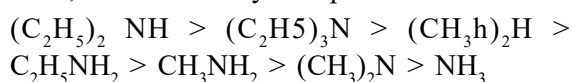
It may be noted that in gas state, where solvent effect is missing the basicity of amine is



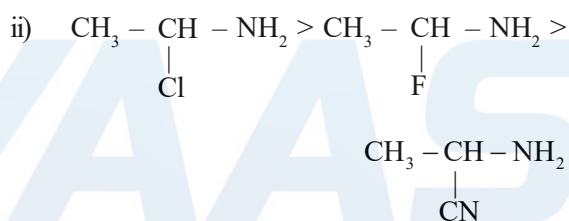
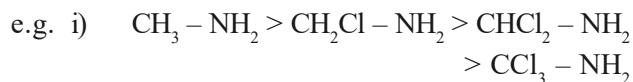
The relative basic character of amines in water is

Alkyl groups	Relative basicity
CH_3	$\text{R}_2\text{NH} > \text{R-NH}_2 > \text{R}_3\text{N} > \text{NH}_3$
C_2H_5	$\text{R}_2\text{NH} > \text{R}_3\text{N} > \text{R-NH}_2 > \text{NH}_3$

Thus, relative basicity of aliphatic amine is

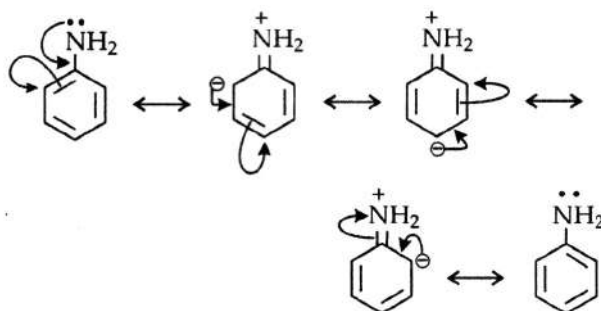


ii) **-I effect:** Electron withdrawing inductive effect (-I) decreases the strength of amines.

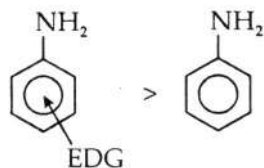


11.4.2 Comparison of basic character of aryl amines, alkyl amine and ammonia:

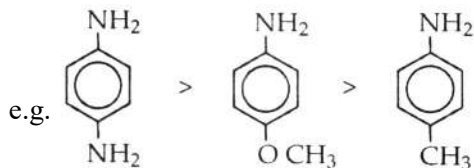
Aryl amines are less basic than alkyl amines, alkyl amines and ammonia because of lone pair of electron on nitrogen in conjugation with benzene ring and thus making less available for protonation.



a) Electron donating group i.e. NH_2 , OCH_3 , CH_3 stabilize the cation and increase the basic strength of amines.

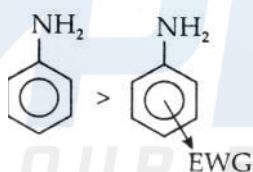
**Note:**

1. More the electron donating power of the group, more the basicity of substituted aniline
2. More the number of electron donating groups, more the basicity of substituted aniline.
3. Electron donating power of group or atom is $\text{NH}_2 > \text{OCH}_3 > \text{CH}_3$



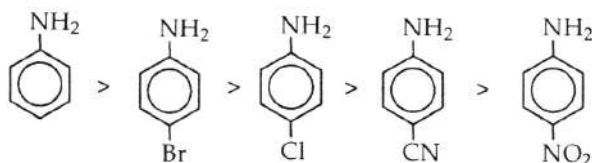
Note that $-\text{NH}_2$ group has more electron donating power than $-\text{OCH}_3$ and $-\text{CH}_3$ hence p-amino aniline is more basic.

- b) Electron withdrawing groups (W) like $-\text{NO}_2$, C_6H_5- , SO_3 , $-\text{SO}_3\text{H}$, $-\text{COOH}$, $-\text{CN}$, X etc. destabilize the cation and decrease the basic strength.

**Note:**

1. More the electron withdrawing power of the group, less the basicity of substituted aniline
2. More the number of electron withdrawing groups, less the basicity of substituted aniline.
3. Following electron withdrawing group decrease the basicity of aromatic amines in the order of $\text{SO}_3\text{H} > \text{SO}_3 > \text{COOH} > \text{OH} > \text{NO}_2 > \text{CN} > \text{F} > \text{Cl} > \text{Br} > \text{I} > \text{C}_6\text{H}_5$

It may be noted that, when SO_3H , COOH , OH groups are attached to benzene nucleus. These compounds are benzene sulphonic acid, benzoic acid and phenol. These are acidic in nature. Hence, these are least basic.

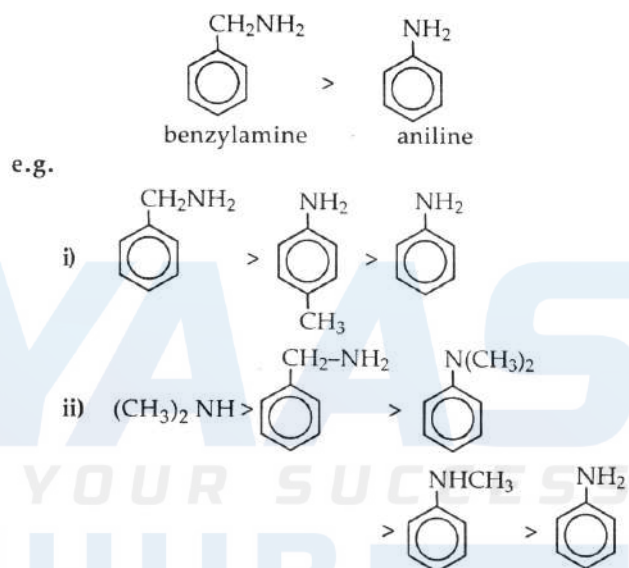


Note that $-\text{NO}_2$ has more electron withdrawing power or ring deactivating power than Cl , Br , CN hence p-nitro aniline is less basic.

11.4.3 Comparison of basic character of aralkyl amine and aryl amine

In aryl amine NH_2 group is directly attached to benzene nucleus, the lone pair of electron on nitrogen is conjugate with benzene ring. Hence lone pair of electron not readily available for protonation.

In aralkyl amine the NH_2 group is attached to side chain, the lone pair of electron on nitrogen atom is not conjugate with benzene ring. Hence lone pair of electrons are readily available for protonation. Thus all aralkyl amine are more basic than aryl amines.



Effect of substituents on nitrogen atom :

When hydrogen atoms in NH_2 group of aniline are replaced by electron donating groups then basicity of amine increases.



When hydrogen atom in NH_2 group of aniline are replaced by electron withdrawing group then basicity of amine decreases.



Thus comparative basic nature of all amines is,
Aliphatic amines > Aralkyl amines > Aryl

amines Some K_b and pK_b value of amines in aqueous medium.

Amines	K_b value	pK_b value
Primary alkanamines :		
Methanamine	4.5×10^{-4}	3.38
Ethanamine	5.1×10^{-4}	3.29
Propan-2-amine	4.0×10^{-4}	3.40
Phenylmethanamine	2.0×10^{-5}	4.70
Secondary alkanamines :		
N-Methylmethanamine	5.4×10^{-4}	3.27
N-Ethylethanamine	10×10^{-4}	3.00
Tertiary alkanamines :		
N, N-Dimethylmethanamine	0.6×10^{-4}	4.22
N, N-Diethylethanamine	5.6×10^{-4}	3.25
Ammonia		
Arylamines:		
Benzenamine	1.8×10^{-5}	4.75
N-Methylaniline	4.2×10^{-10}	9.38
N-Ethylaniline	7.1×10^{-10}	9.30
N, N-Dimethylaniline	11.7×10^{-10}	8.92

13.5 CHEMICAL PROPERTIES

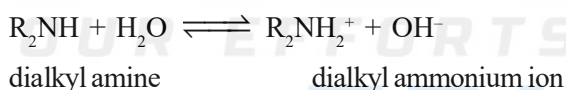
I) Reactions show the basic nature of amines.

1. Reaction with water :

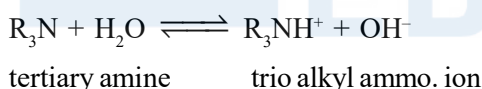
a) Primary amine :



b) Secondary amine :



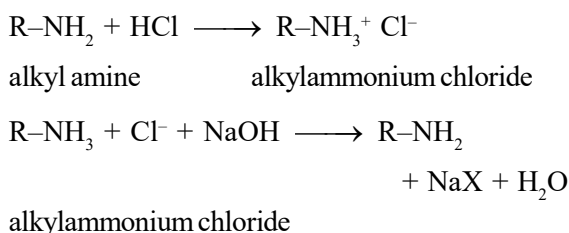
c) Tertiary amine :



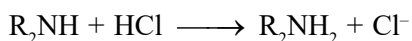
2. Reaction with dilute or cone. HCl (mineral acid) :

When amines are reacted with cone. HCl, gives alkyl ammonium chloride.

a) Primary amine :



b) Secondary amine :



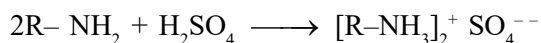
dialkyl amine dialkyl ammonium chloride

3. Reaction with dil. H_2SO_4 (mineral acid):

When amines are reacted with dil H_2SO_4 gives corresponding ammonium sulphate.

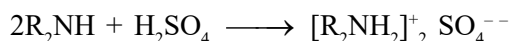
a) Primary amines :

When primary amines are reacted with dil H_2SO_4 gives alkyl ammonium sulphate.



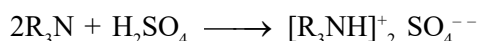
b) Secondary amines :

When secondary amines are reacted with dil H_2SO_4 gives dialkyl ammonium sulphate.



c) Tertiary amines :

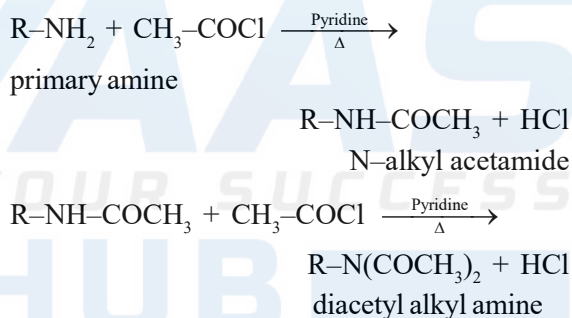
When tertiary amines are reacted with dil H_2SO_4 gives trialkyl ammonium sulphate.



II) Distinction test between 1°, 2° and 3° amines:

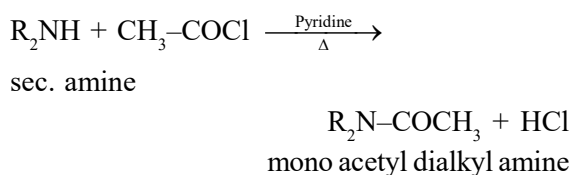
A) Acylation of aliphatic and aromatic amines : Reaction with acetyl chloride (CH_3-COCl):

a) Primary amines :



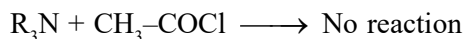
b) Secondary amines :

Secondary amine contains one replaceable hydrogen atom. Hence, they forms monoacetyl derivative or N, N-disubstituted amide.



c) Tertiary amines :

Tertiary amine (Aliphatic and aromatic) does not react with acetyl chloride due to absence of replaceable hydrogen atoms.

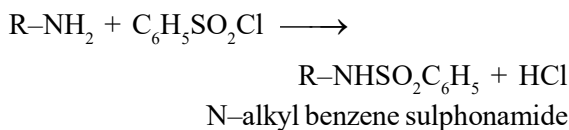


Note:

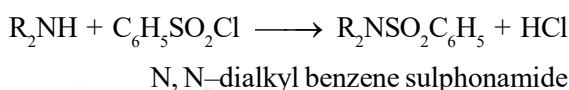
These are nucleophilic substitution reactions. 1° and 2° amines can not be distinguished by

C) Hinsberg's test :

- Primary amines :** These are reacted with benzene sulphonyl chloride (Hinsberg's reagent) gives N-alkyl benzene sulphonamide which contain acidic hydrogen atom attached to nitrogen atom, which is soluble in KOH to give clear solution, which on acidification give insoluble compound.



- Secondary amines :** These are reacted with benzene sulphonyl chloride gives ppt of N, N-dialkyl benzene sulphonamide which is insoluble in KOH or acid.

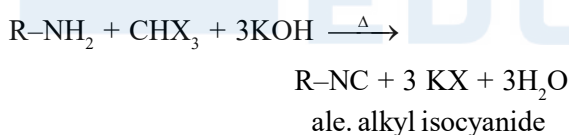
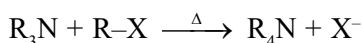
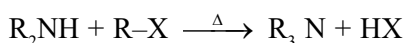
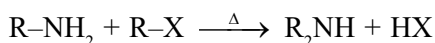


- Tertiary amines :** These are not react with benzene sulphonyl chloride.

**D) Hofmann's carbyl amine reaction:**

When haloform (CHX_3) is heated with primary amine and alcoholic KOH gives carbyl amine (alkyl isocyanide or alkyl isonitrile). Which has very bad nectar odour or disagreeable or obnoxious smell and toxic in nature. This is known as carbyl amine reaction.

Use : This reaction is useful for detection of primary amine and haloform.

**III) Alkylation amines :**

These are nucleophilic substitution reactions, the primary or secondary amine acts as nucleophile and perform nucleophilic substitution at on alkyl halide. The process of converting an amine ($1^\circ, 2^\circ, 3^\circ$) into quaternary ammonium salt on treatment of excess of alkyl halide is called exhaustive alkylation. Alkylation proceeds via S_N^1

reaction mechanism. So it is not good for 3°R-X , because they undergoes elimination reaction. At each stage of reaction an HX is formed. This can protonate the amine formed by making co-ordinate bond, therefore stop the reaction before completion.

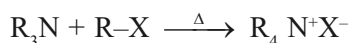
Therefore for the neutralization of acid and for liberating nucleophile, a base such as NaHCO_3 is added.

IV) Quaternary ammonium salt :

These are analogous to ammonium salt.

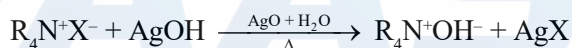
Definition : These are tetra alkyl derivatives of ammonium salt, obtained by replacing four hydrogen atoms from ammonium salt by four same or different alkyl groups. They are represented as, $\text{R}_4\text{N}^+\text{X}^-$.

Preparation : Quaternary ammonium salt is prepared from trialkyl amine and alkyl halide.



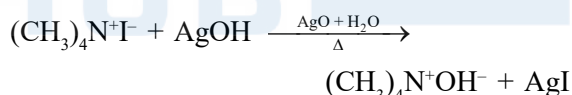
quaternary ammonium salt

- Action of moist Ag_2O on quaternary ammonium salt:** When quaternary ammonium salt is heated with moist silver oxide gives quaternary ammonium hydroxide and ppt of silver halide.

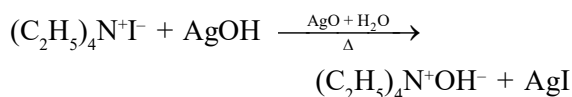


e.g.

- When tetra methyl ammonium iodide is heated with moist silver oxide gives tetramethyl ammonium hydroxide.

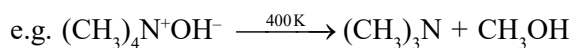


- When tetraethyl ammonium iodide is heated with moist silver oxide gives tetraethyl ammonium hydroxide.



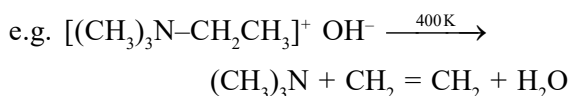
- Action of heat on quaternary ammonium hydroxide:**

The quaternary ammonium hydroxides are heated at 400 K gives 3° amine, alcohol or alkene.



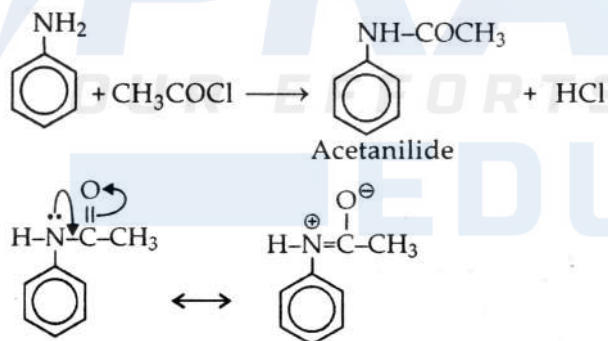
Hofmann's elimination: If one of the alkyl group is other than methyl then quaternary

ammonium hydroxide on heating gives 3^o amine, alkene and water. In these reactions methyl group retained on nitrogen atom. The pyrolysis quaternary ammonium hydroxide to give alkene is called Hofmann's elimination reaction. This can be used for the elucidation of structure of amines. The alkene formed against Saytzeff rule or less substituted alkene is major product.



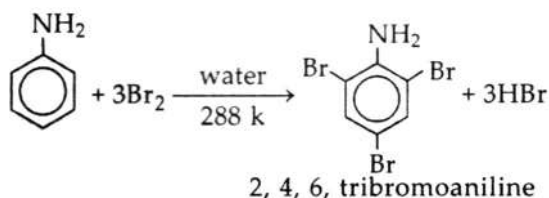
13.6 ELECTROPHILIC SUBSTITUTION OF ARYL AMINE

The NH_2 group is powerful benzene ring activating group. Due to strong activating effect of $-\text{NH}_2$ group the reaction can not stop at monosubstitution stage. To stop reaction at monosubstitution stage the activating effect of $-\text{NH}_2$ has to be reduced. This can be done by acetylation. Acetyl group is electron withdrawing group and therefore lone pair of electron on nitrogen is withdrawn towards the carbonyl group as shown as follows. This method is known as protection of amino group by acetylation and can be used to control the electrophilic substitution reaction

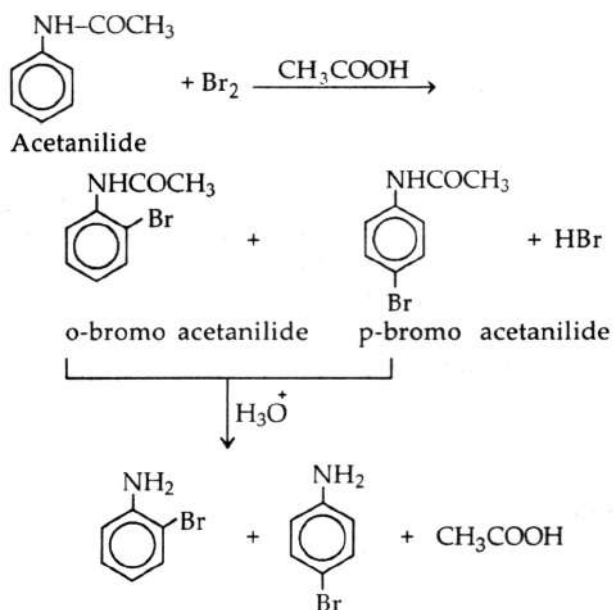


Therefore, the lone pair of electron on nitrogen is less available and the activating power of $-\text{NH}_2$ group is reduced. This also prevent di and tri substituted products. The acetyl group removed by acid hydrolysis to get back the amine.

1. Halogenation (Bromination) :



By protecting NH_2 group by acetylation

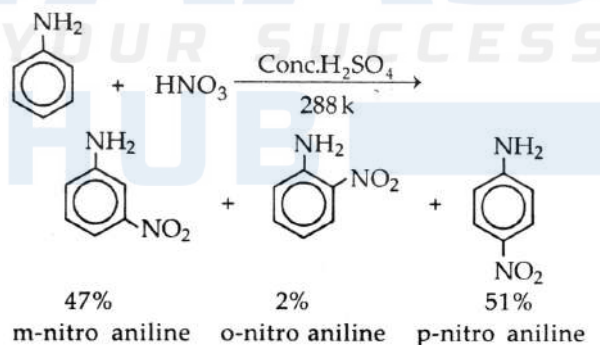


o-bromo aniline (minor) p-bromo aniline (major)

2. Nitration

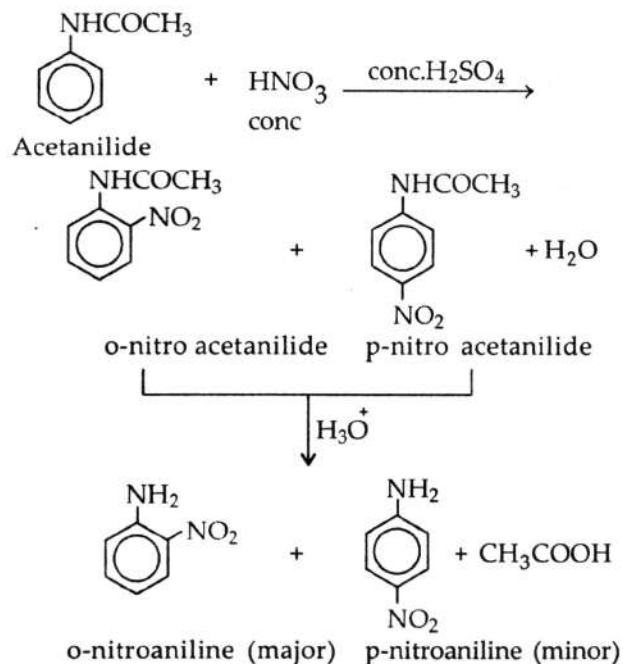
Aromatic amines cannot be nitrated directly because they undergoes oxidation with HNO_3 (oxidising agent) to give partial oxidative product of ring (black mass).

However, under controlled condition nitration of aniline gives unexpectedly 47% m-nitro aniline in addition to o- and p-nitro aniline.



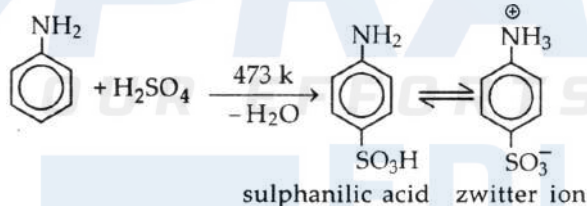
The reason for that the formation of 47% m-nitroaniline is that the strongly acidic condition. Under acidic condition aniline gets protonated to give anilinium ion ($\text{C}_6\text{H}_5\text{NH}_3^+$). The NH_3^+ group is deactivating and meta directing.

To solve this problem the nitration is carried out by protecting NH_2 group by acetylation. The acetylation deactivates the ring and therefore controls the reaction.



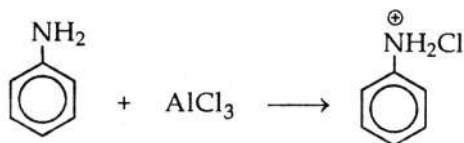
3. Sulphonation :

When aniline is heated with cone. H_2SO_4 at 473 K gives p-amino benzenesulphonic acid (sulphanilic acid) as a major product. Sulphanilic acid exists as a salt called dipolar or Zwitter ion. It is produced by the reaction between an acidic group and basic group in same molecule.



4. Friedel Craft reaction:

Aniline does not give Friedel Craft reaction due to salt formation with AlCl_3 (Lewis acid). Due to this nitrogen of aniline carries positive charge and hence acts as strong deactivating group for further reaction.



Note : $\text{NH}_2^+ \text{Cl}^-$ is ring deactivating group.

Section-III: Benzene Diazonium Salt

13.0 INTRODUCTION

The compounds in which $\text{N}_2^+ \text{X}^-$ group is directly attached to benzene nucleus are known

as benzene diazonium salt.

The diazonium salt has general formula $\text{ArN}_2^+ \text{X}^-$, where X^- may be F, Cl, Br, I.

The N_2^+ group ($-\text{N}^+ \equiv \text{N}$) is known as diazonium group.

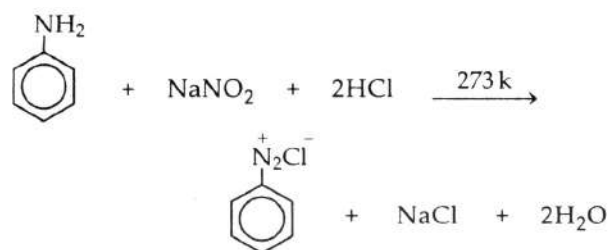
e.g. $\text{C}_6\text{H}_5\text{N}_2^+ \text{Cl}^-$ benzenediazonium chloride.

Aliphatic diazonium salt $\text{R}-\text{CH}_2\text{N}_2^+ \text{X}^-$ are highly unstable because of absence of resonance. $\text{R}-\text{CH}_2\text{N}_2^+ \text{X}^-$ decompose to give alcohol with liberation of N_2 gas.

Aromatic diazonium salt are stable by resonance.

13.1 PREPARATION METHOD

From diazotisation :

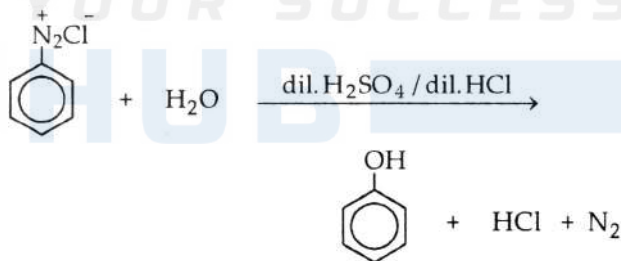


13.2 CHEMICAL PROPERTIES

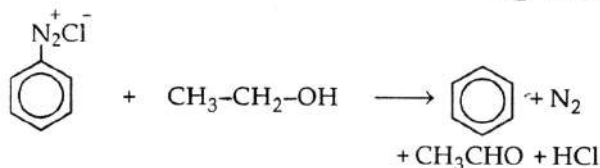
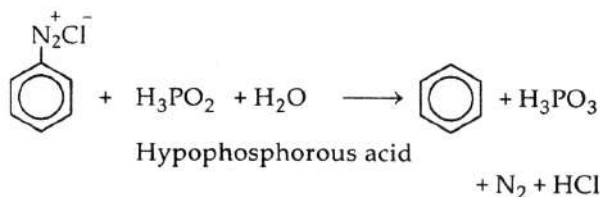
A] Substitution reactions : They undergo nucleophilic substitution reaction in which $\text{N}_2^+ \text{X}^-$ is replaced by another nucleophile i.e. OH^- , H^- , F^- , Cl^- , Br^- , I^- , CN^- , NO_2^- etc.

1. Replacement by $-\text{OH}$ group (Acid hydrolysis) :

These on acid hydrolysis give phenol.

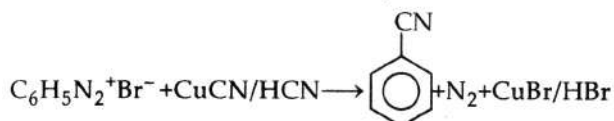
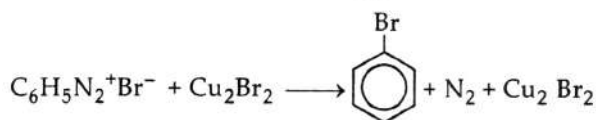
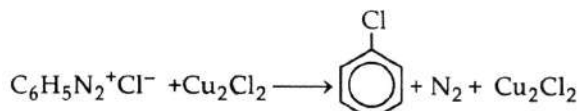


2. Reduction (Replacement of by $-\text{H}$ atom)

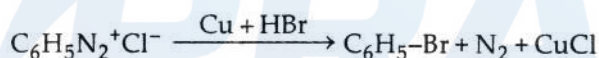
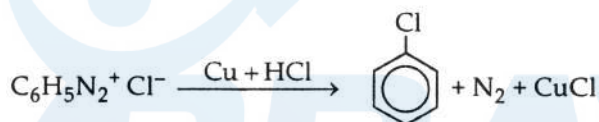


3. Replacement of N_2X by Cl or Br atom:

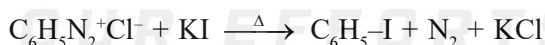
- a) **Sandmeyer's reaction (Replacement by Cl or Br atom) or CN group:** Freshly prepared solution of diazonium salt is mixed with cuprous chloride or cuprous bromide to give chlorobenzene or bromobenzene respectively.



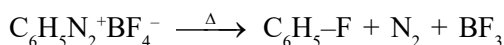
- b) **Gattermann reaction :** When benzene diazonium salt is reacted with Cu + HCl or Cu + HBr gives chlorobenzene or bromobenzene respectively. The yield of Gattermann reaction is less than Sandmeyer's reaction.



4. Replacement by iodine:

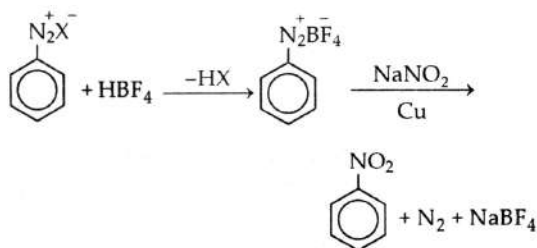


5. **Replacement by fluorine (Balz-Schiemann's reaction) :** When benzene diazonium chloride is treated with fluoroboric acid (HBF_4) give benzene diazonium fluoroborate, which on heating gives fluoro benzene.



6. Replacement by nitro group :

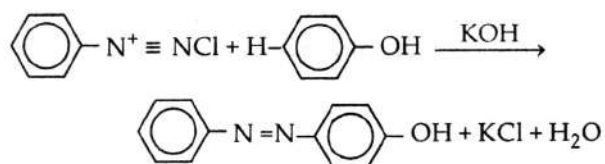
When benzene diazonium fluoroborate is heated with aqueous NaNO_2 solution in the presence of copper powder to give nitrobenzene.



- B] **Azo coupling reaction :** It reacts with certain aromatic compound gives azo compounds having general formula $\text{C}_6\text{H}_5 - \text{N} = \text{N} - \text{C}_6\text{H}_5$. This reaction is called azo coupling reaction.

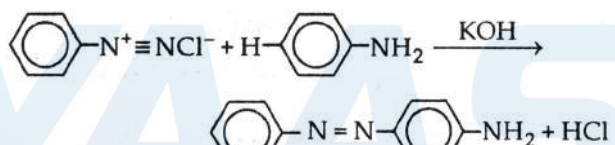
The diazonium ion acts as an electrophile because of positive charge on nitrogen atom. It reacts with nucleophilic aromatic compounds activated by electron donating groups like $-\text{OH}$, NR_2 , NHR and $-\text{NH}_2$. These are strong nucleophiles and react with aromatic diazonium salt.

- a) When benzene diazonium chloride reacts with phenol in the presence of alkaline medium to form p-hydroxy azobenzene (orange dye).

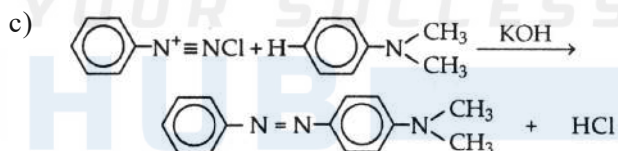


p-hydroxy azobenzene (orange dye)

- b) When benzene diazonium chloride is reacted with aniline in the presence of alkali to give p-aminoazobenzene (yellow dye).



p-amino azobenzene (yellow dye)



p-N, N-dimethyl amino azobenzene (yellow dye)

Note:

- All azo compounds are coloured and used as dyes.
- These are electrophilic substitution reactions.
- Coupling occurs at only para position with respect to electron donating group hydroxyl, amino, NH-R , NR_2 group etc.

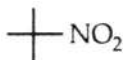


MULTIPLE CHOICE QUESTIONS

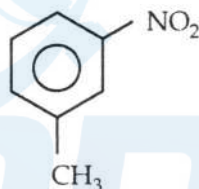
SECTION – I : NITRO ALKANES

INTRODUCTION, CLASSIFICATION, NOMENCLATURE

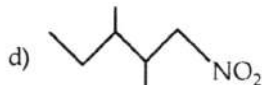
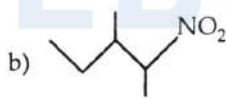
- Nitrocompounds are
 - derivatives of alkane
 - derivatives of benzene
 - nitroderivative of ammonia
 - both a and b
- IUPAC name of the following compound is



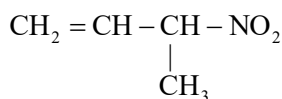
- 2-nitropropane
 - 2-methyl 2-nitropropane
 - 2-nitrobutane
 - 2-methyl 1-nitropropane
- IUPAC name of the following compound is



- p-nitro toluene
 - o-nitro toluene
 - m-nitro toluene
 - methyl nitrobenzene
- Which of the following is 2,3-dimethyl 1-nitropentane



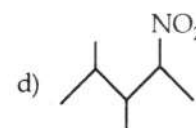
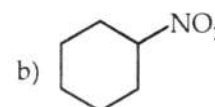
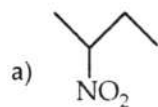
- Which of the following is ambidentate group?
 - NH₂
 - OH
 - NO₂
 - OR
- IUPAC name of the following compound is



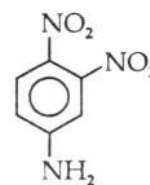
- 3-methyl 3-nitro prop-1-ene
- 1-methyl 1-nitro prop-2-ene

- 3-nitro but-1-ene
- 2-nitro but-3-ene

- Which of the following is 3^o nitroalkane



- CH₃-NO₂ and CH₃-O-N=O are
 - position isomers
 - metamers
 - linkage isomers
 - geometrical isomers
- IUPAC name of following compound is

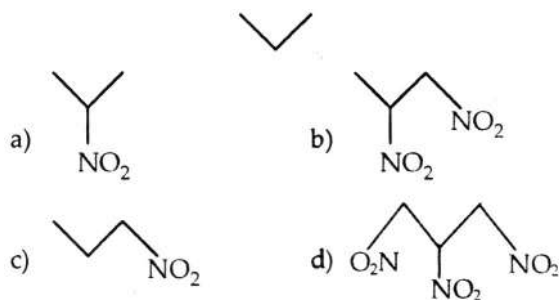


- 3,4-dinitro aniline
- 4-amino 1,2-dinitro benzene
- 4,5-dinitro aniline
- 4,5-dinitro benzyl amine

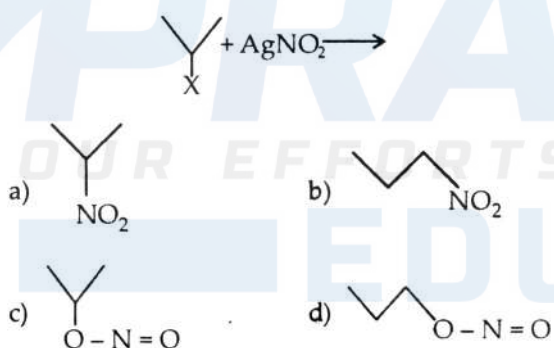
PREPARATION METHODS

- Which of the following method is not meant for the synthesis of nitroalkane?
 - nitration of alkane
 - oxidation of oxime
 - oxidation of 3^o alkyl amine
 - reduction of oxime
- Which of the following does not undergoes nitration?
 -
 - CH₃NH₂
 -
 -
- Which of the following is nitrating agent?
 - HNO₂
 - AgNO₃
 - HNO₃
 - KNO₃
- Vapour phase nitration of propane produces how many products
 - 1
 - 2
 - 3
 - 4

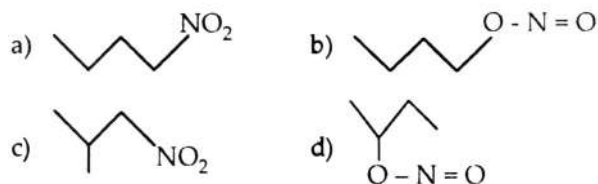
14. Vapour phase nitration of alkane gives
 a) nitroalkane b) dinitroalkane
 c) trinitroalkane d) tetranitroalkane
15. Liquid phase nitration of alkane gives
 a) mononitroalkane b) polynitroalkane
 c) alkane nitrite d) dialkyl nitrite
16. Liquid phase nitration of following compound produces.



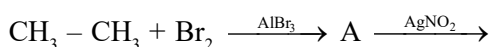
17. Which of the following gives acetone 1-nitropropane on acid hydrolysis?
 a) 2-methyl 1-nitroprop-1-ene
 b) 1-nitroprop-1-ene
 c) 3-methyl 2-nitro but-2-ene
 d) 2-methyl 3-nitro pent-2-ene
18. Product of the following reaction is



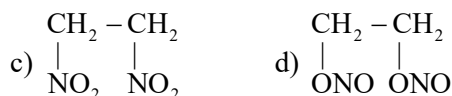
19. Alkyl halide and silver nitrite produces.
 a) silver oxide b) nitro paraffins
 c) dinitroparaffins d) alkyl nitrite
20. Which of the following is obtained when 1-halobutane is heated with AgNO₂



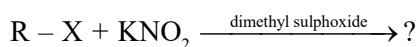
21. Product 'B' of the following reactions is



- a) $\text{CH}_3 - \text{CH}_2 - \text{ONO}$ b) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2$

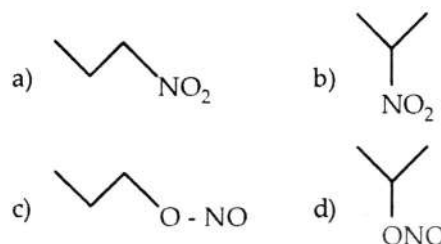


22. Product of the following reaction is

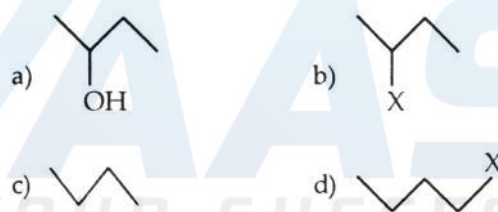


- a) $\text{R} - \text{NO}_2$ b) $\text{R} - \text{ONO}$
 c) $\text{R} - \text{OH}$ d) $\text{R} - \text{NH}_2$

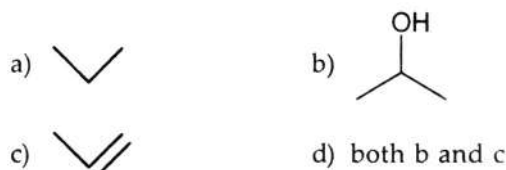
23. Product of the following reaction.



24. Compound 'A' on halogenation gives B. Which is reacted with NaNO₂ in dimethyl sulphoxide gives 2-nitrobutane. The compound 'A' is



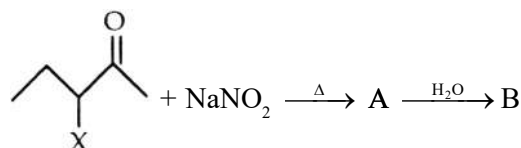
25. Compound 'A' is reacted with HX produces 'B' which is heated with silver nitrate gives 2-nitropropane. The compound 'A' is



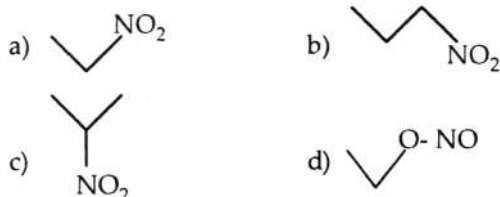
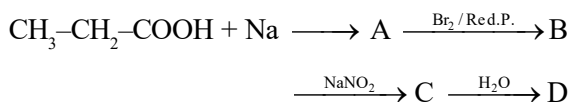
26. Sodium salt of α-halo carboxylic acid is heated with sodium nitrite and followed by hydrolysis gives

- a) amides b) nitroparaffins
 c) amines d) alcohols

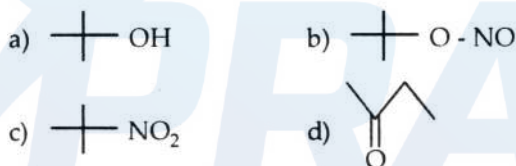
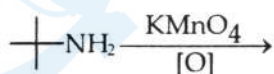
27. Product of the following reaction is



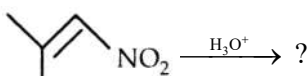
- a) 2-nitropropane b) 1-nitropropane
c) propanamine d) propanal
28. Find out product D in the following sequence of reaction



29. Tertiary alkyl amines on oxidation by KMnO_4 gives
- a) 1° - nitroalkane b) 2° - nitroalkane
c) 3° - nitroalkane d) 3° - alcohols
30. State the product available by the following reaction



31. Nitroparaffins are obtained by oxidation of
- a) 3° amines
b) α -halocarboxylic acid
c) acid amide
d) 3° alkyl amines
32. α -nitroalkene is converted into nitroalkane by
- a) oxidation
b) treating it with KNO_2 and followed by hydrolysis
c) acid hydrolysis
d) alkaline hydrolysis
33. Acid hydrolysis of following compound gives



- a) $\text{CH}_3\text{--CH}=\text{CH}_2$ and $\text{CH}_3\text{--NO}_2$
b) $\text{CH}_2=\text{CH}_2$ and $\text{C}_2\text{H}_5\text{--NO}_2$
c) $\text{CH}_3\text{--CO--CH}_3$ and $\text{CH}_3\text{--NO}_2$
d) $\text{CH}_3\text{--CHOH--CH}_3$ and $\text{CH}_3\text{--NO}_2$
34. In which of the following reaction product

obtained has less number of carbon atom than reactants?

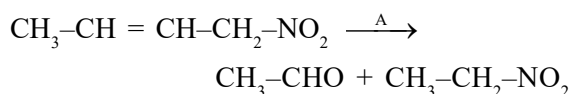
- acid hydrolysis of α -nitroalkene
- oxidation of aldehydes
- oxidation of ketones
- oxidation of 3° alkyl amine

- a) 2, 3 b) 1, 4
c) 2, 4 d) 1, 3

35. Reaction involved during conversion of 3° alkyl amine to 3° nitro alkane

- a) hydrolysis b) reduction
c) oxidation d) pyrolysis

36. Find out A in the following reaction



- a) KMnO_4 b) H_3O^+
c) LiAlH_4 d) PCC

37. Oxidation of oxime produces

- a) 1° amines b) nitro alkanes
c) aldehydes d) ketones

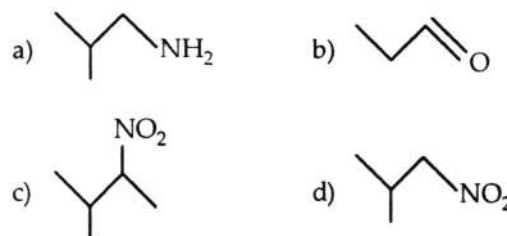
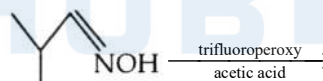
38. Aldoxime on oxidation by trifluoroperoxy acetic acid gives

- a) 1° - amines b) 2° - amines
c) 1° - nitroparaffins d) 2° - nitroparaffins

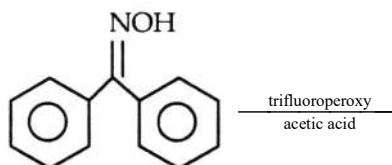
39. Ketoxime on oxidation by trifluoroperoxy acetic acid gives

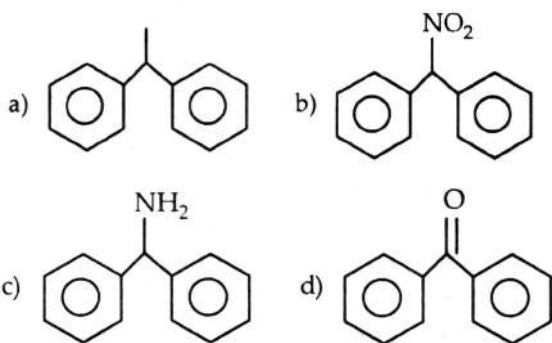
- a) 1° - nitroparaffins b) 2° - nitroparaffins
c) 3° - nitroparaffins d) 1° - amines

40. Product of the following reaction is

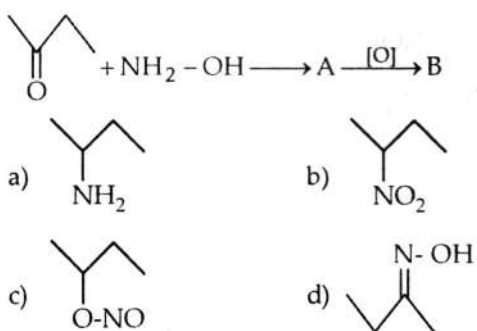


41. Product of the following reaction will be trifluoroperoxy ?

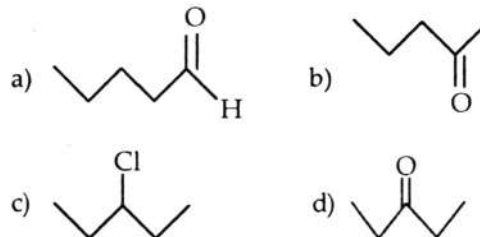




42. Propionaldoxime is reacted with trifluoroperoxy acetic acid gives
 a) propan-1-amine b) propan-2-amine
 c) 1-nitropropane d) 2-nitropropane
43. Acetoxime on reaction with trifluoroperoxy acetic acid gives
 a) 1-nitropropane b) 2-nitropropane
 c) propionic acid d) isobutyric acid
44. The reagent used to convert alkyl halide to nitroalkane are
 1. AgNO_2
 2. KMnO_4 in dimethylsulphoxide
 3. acidic KMnO_4
 4. HNO_3
 a) 1, 4 b) 2, 3
 c) 1, 3 d) 1
45. Ketoximes are oxidised into 2°-nitroalkane by using
 a) KMnO_4
 b) $\text{K}_2\text{Cr}_2\text{O}_7 + \text{dil. H}_2\text{SO}_4$
 c) trifluoroperoxy acetic acid
 d) pyridinium chlorochromate
46. During conversion of oxime to nitroparaffins, which reaction is involved?
 a) reduction b) oxidation
 c) acid hydrolysis d) alkaline hydrolysis
47. Find out final product of the following reaction



48. The unknown organic compound reacts with hydroxyl amine and followed by oxidation using trifluoroperoxy acetic acid gives 3-nitro pentane. The unknown organic compound is

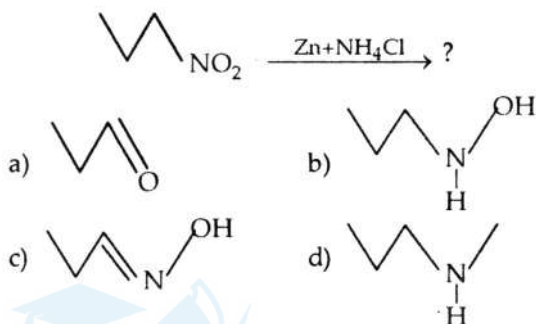


49. Product A in the following reaction is
 $\text{H}_2\text{C} = \text{NOH} \xrightarrow{\text{trifluoroperoxy acetic acid}} \text{A}$
 a) formic acid b) nitromethane
 c) methyl nitrite d) methanal
50. 1-nitro prop-1-ene on acid hydrolysis gives
 a) nitroethane and formaldehyde
 b) nitroethane and formic acid
 c) nitromethane and acetic acid
 d) nitromethane and acetaldehyde

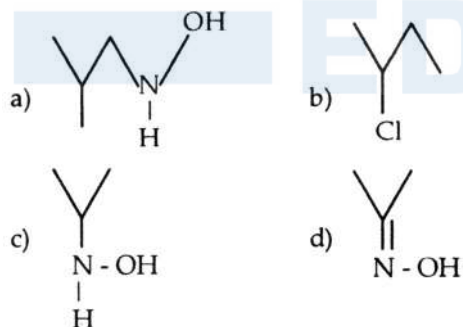
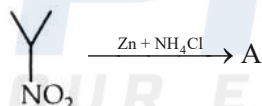
CHEMICAL PROPERTIES

51. 1°, 2° and 3° nitroalkanes can be distinguished by
 1. acid hydrolysis
 2. halogenation
 3. reaction with nitrous acid
 a) 1, 3 b) 1, 2
 c) only 3 d) 1, 2, 3
52. Reduction of nitroalkane produces
 1] 1°-amines
 2] N-alkyl hydroxyl amine
 3] oxime
 a) 1, 3 b) 1, 2
 c) only 1 d) 1, 2, 3
53. Nitroalkanes are reduced by $\text{Zn} + \text{NH}_4\text{Cl}$ gives
 a) 1° - amines
 b) N-alkyl hydroxyl amine
 c) oxime
 d) amide
54. During conversion of nitroalkane to N-alkyl hydroxyl amine, which of the following reducing agent is used?
 a) $\text{Sn} + \text{conc. HCl}$ b) H_2/Ni
 c) $\text{Zn} + \text{NH}_4\text{Cl}$ d) $\text{SnCl}_2 + \text{HCl}$
55. Nitroalkane is reduced by stannous chloride and HCl gives

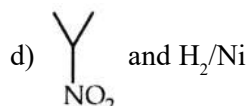
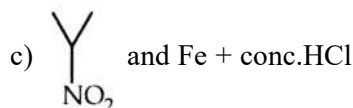
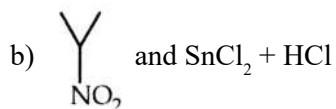
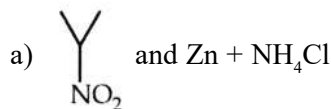
- a) 2° – amine
 b) only oxime
 c) only N-alkyl hydroxyl amine
 d) mixture of oxime and N-alkyl hydroxyl amine
56. $\text{SnCl}_2 + \text{HCl}$ convert
 a) $-\text{CHO}$ to $-\text{CH}_2-\text{OH}$
 b) $>\text{C}=\text{O}$ to $>\text{CH}-\text{OH}$
 c) $-\text{NO}_2$ to $-\text{NH}_2$
 d) $-\text{NO}_2$ to $=\text{NOH}$
57. Product of the following reaction is



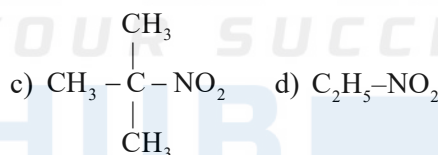
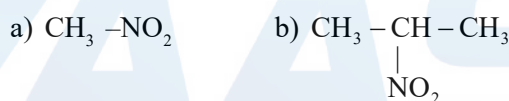
58. Reduction of the following compound would yield mixture of N-ethyl hydroxyl amine and acetaldoxime
 a) $\text{C}_2\text{H}_5-\text{NO}_2$ b) $\text{C}_2\text{H}_5-\text{CONH}_2$
 c) CH_3-NO_2 d) $\text{CH}_3-\text{CONH}_2$
59. Find out 'A' in the following reaction:



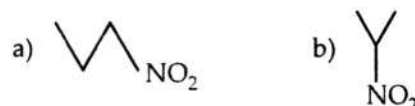
60. The compound obtained by catalytic hydrogenation of nitrobenzene is
 a) aniline b) benzaldoxime
 c) benzyl nitrite d) phenyl nitrite
61. N-isopropyl hydroxyl amine is obtained by reduction of


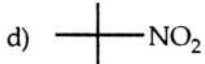
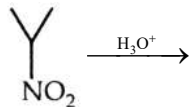
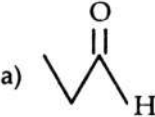
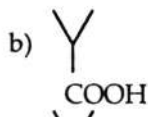
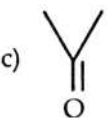
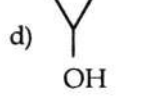
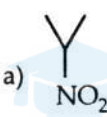
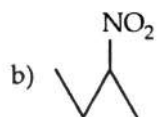

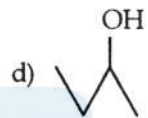
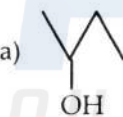

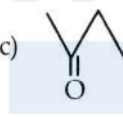
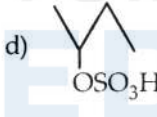
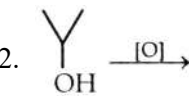
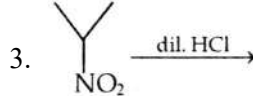


62. Acid hydrolysis of 3°-nitroalkane gives
 a) ketones b) carboxylic acids
 c) aldehydes d) no product
63. 2°-nitroparaffins on acid hydrolysis will give
 a) aldehydes b) carboxylic acids
 c) ketones d) amide
64. Which of the following doesn't undergoes acid hydrolysis?



65. The acid hydrolysis which of the following will gives acetic acid
 1] CH_3-CN
 2] $\text{CH}_3-\text{CH}_2-\text{NO}_2$
 3] $\text{CH}_3-\text{CH}(\text{NO}_2)-\text{CH}_3$
 4] $(\text{CH}_3)_3\text{C}-\text{NO}_2$
- a) only 1, 3 b) 1 and 2
 c) only 2, 4 d) 1, 2, 4
66. Propionic acid is obtained by acid hydrolysis of



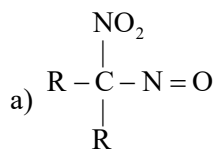
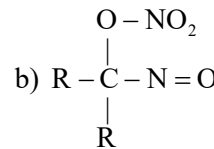
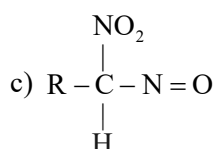
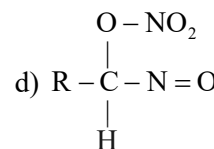
- c)  d) 
67. The product formed in following reaction is
- 
- a)  b) 
 c)  d) 
68. Which of the following compound will not give ketone on acid hydrolysis
- a)  b) 
 c)  d) 
69. 2-Nitrobutane is heated with dil. H_2SO_4 gives
- a)  b) 
 c)  d) 
70. Which of the following reaction will give acetone?
1. $\text{CH}_3 - \text{CN} + \text{CH}_3\text{MgX} \xrightarrow[\text{H}_3\text{O}^+]{\text{dry ether}}$
2.  3. 
- a) 1, 2 b) 1, 3
 c) 2, 3 d) 1, 2, 3
71. Chlorination of nitro methane gives
- a) methyl chloride
 b) chloropicrin
 c) dichloronitromethane
 d) CCl_4
72. In halogenation of nitroalkane
- a) all halogen are replaced by halogens

- b) all α -H are replaced by halogens
 c) all β -H are replaced by halogens
 d) only one α -H is replaced by halogen

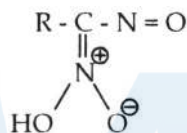
73. Halogenation of nitroparaffins is the characteristic reaction of

- a) α -H atoms b) β -H atoms
 c) γ -H atoms d) δ -H atoms

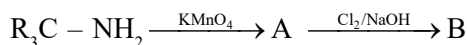
74. Which of the following is nitrolic acid

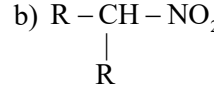
- a)  b) 
 c)  d) 

75. The following structure shown below is





- a) nitroform of nitrolic acid
 b) aci form of nitrolic acid
 c) pseudo nitrol
 d) nitroethanol
76. Product of following reaction will be
- $$\text{CH}_3 - \text{CH}_2 - \text{NO}_2 + \text{Cl}_2 \xrightarrow{\text{NaOH}} ?$$
- a) $\text{CH}_3 - \text{CHCl} - \text{NO}_2$ b) $\text{ClCH}_2 - \text{CH}_2 - \text{NO}_2$
 c) $\text{CH}_3 - \text{CCl}_2 - \text{NO}_2$ d) $\text{Cl}_3\text{C} - \text{CH}_2 - \text{NO}_2$
77. Product in the following sequence of reaction

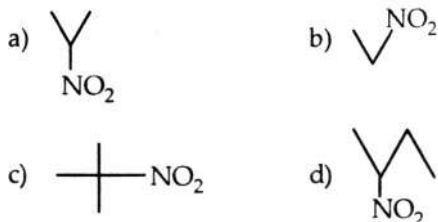


- a) $\text{CCl}_3 - \text{NO}_2$ b) 
 c) $\text{R}_2\text{CCl} - \text{NO}_2$ d) no product
78. In the reaction
- $$\text{CH}_3 - \text{CH}_2 - \text{Br} + \text{NaNO}_2 \xrightarrow[\text{sulphoxide}]{\text{dimethyl}} \text{A}$$
- $$\xrightarrow{\text{Cl}_2/\text{NaOH}} \text{B}$$

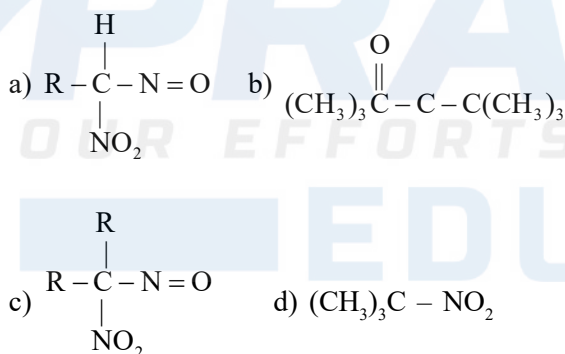
The product B is

- a) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2$ b) $\text{CH}_3 - \text{CCl}_2 - \text{NO}_2$

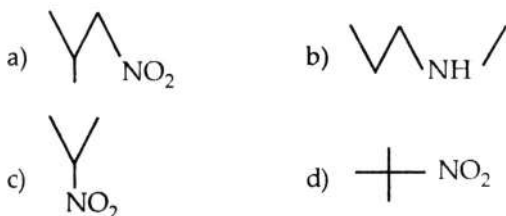
- c)  d) 
79. Which of the following compound does not react with alkaline bromine



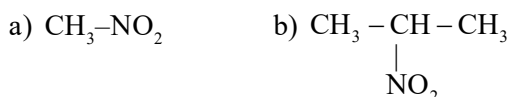
80. 1° - nitroalkane react with HNO_2 gives
- dinitroalkane
 - nitrolic acid
 - N-alkyl hydroxyl amine
 - nitrosoamine
81. Nitrosonitroalkane is obtained by 2° -nitroalkane with
- HNO_3
 - HNO_2
 - AgNO_2
 - KNO_2
82. Which of the following will undergoes tauomerisation?



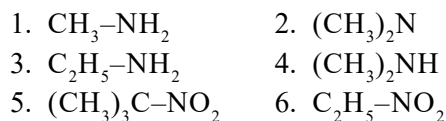
83. Nitrolic acid is formed from nitrous acid and what?



84. Blue coloured pseudonitrol is formed from nitrous acid and what

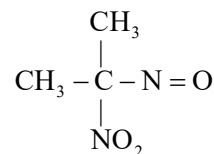


85. Which of the following does not react with nitrous acid?



- a) 2, 3 b) 4, 5
c) 5, 6 d) 2, 5

86. The following compound is

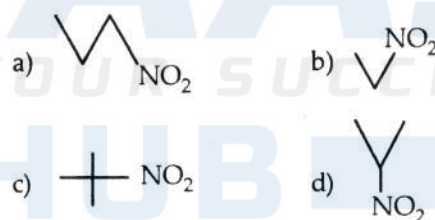


- pseudonitrol
- nitrolic acid
- nitronic acid
- nitroso isopropyl nitrite

87. Compound formed when nitroethane reacts with nitrous acid

- ethanamine
- nitroso nitroethane
- dimethyl nitroso amine
- ethanol

88. Pseudonitrol is formed from nitrous acid and what?



89. Red colour sodium salt is obtained by nitrolic acid react with



90. Aci form of nitrolic acid is

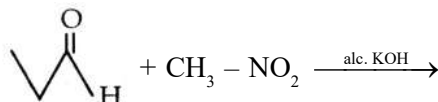
- red colour
- blue colour
- yellow colour
- white colour

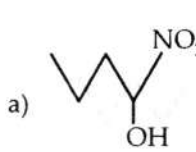
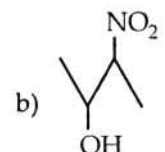


91. Nitroalkane condensed with aldehyde and ketone to form nitroalcohol. The main condition of nitroalkane is

- absence of α -H atoms
- absence of β -H atoms
- presence of α -H atoms
- it must be tertiary

92. 3-nitro 2-methyl butan-2-ol is the condensation products of
 a) ethanal and nitromethane
 b) acetone and nitro methane
 c) acetone and nitroethane
 d) methanal and 1-nitropropane

93. Product of the following reaction will be

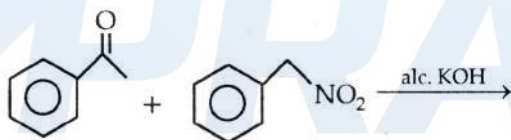


- a)  b) 
 c)  d) 

94. When carbonyl compounds react with nitroalkane. The reaction proceeding through

- a) carbocation b) carbon free radical
 c) carbene d) carbanion

95. Product of following reaction will be

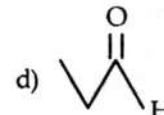
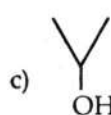
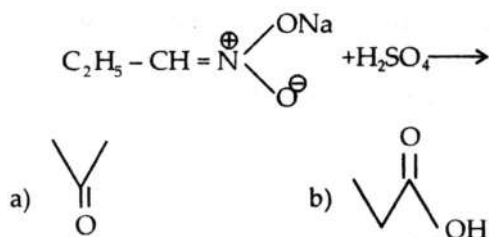


- a) 1, 2-diphenyl ethanol
 b) 1, 1-diphenyl ethanol
 c) 2, 3-diphenyl 3-nitropropan-2-ol
 d) 1, 1-diphenyl 2-nitroethanol
96. α -H atom of nitroalkane is
 a) acidic b) basic
 c) neutral d) can't be predicted

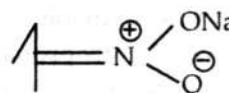
97. Nef-carbonyl synthesis is used to produce



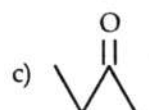

- a) carboxylic acids or esters
 b) aldehydes or ketones
 c) alcohols or ethers
 d) oxime or amide

98. The product of the following reaction will be



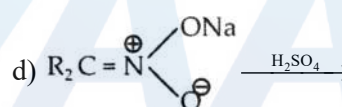
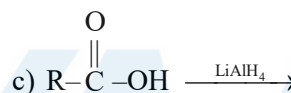
99. The compound obtained by reacting following compound with H_2SO_4 .



- a)  b) 
 c)  d) 

100. Which of the following is Nef-carbonyl synthesis

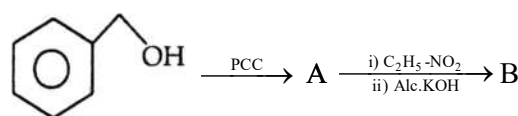
- a) $\text{H}-\text{CHO} + \text{CH}_3\text{NO}_2 \xrightarrow{\text{alc. KOH}}$
 b) $\text{R}-\text{COCl} \xrightarrow[\text{quinoline}]{\text{Pd}-\text{BaSO}_4}$

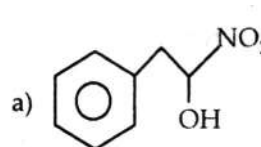
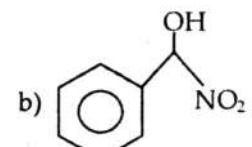
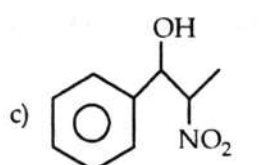
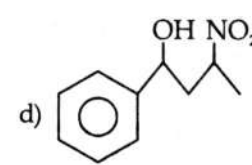


101. Which of the following does not condense with aldehydes or ketones

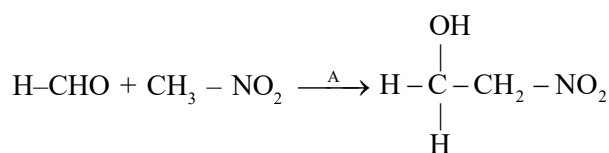
- a) CH_3NO_2 b) $\text{C}_2\text{H}_5\text{NO}_2$
 c) $(\text{CH}_3)_2\text{CHNO}_2$ d) $(\text{CH}_3)_2\text{CNO}_2$

102. Product of the following reaction is



- a)  b) 
 c)  d) 

103. Reagent 'A' in the following reaction is



- a) 20% KOH b) 50% KOH
c) ale. KOH d) $\text{SnCl}_2 + \text{HCl}$
104. Which of the following compound does not react with NaNO_2 and HCl
a) $\text{C}_6\text{H}_5\text{-NH}_2$ b) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2$
c) $\text{C}_2\text{H}_5 - \text{NH}_2$ d) $(\text{CH}_3)_2\text{C-NO}_2$
105. Hydrolysis of $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NO}_2$ with 85% H_2SO_4 gives
a) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$
b) $\text{CH}_3 - \text{CH}_2 - \text{COOH}$
c) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$
d) $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{NOH}$
106. Depending upon the reducing agent, the reduction of nitro paraffins may gives
1. 1°-amine
2. 2°-amine
3. 3°-amine
4. N-alkyl hydroxyl amine
a) only 1 b) 1, 2, 3
c) only 2 d) 1, 4
107. Primary nitrocompounds react with nitrous acid to form nitrolic acid which dissolve in NaOH to give
a) yellow solution b) red solution
c) blue solution d) colourless solution
108. The different behavior 1°, 2°, 3° nitroalkanes on the basis of
a) Victor Mayer's test b) Lucas test
c) Hinsberg test d) Tollen's test
109. Which of the following is not nitro compounds
a) $\text{C}_6\text{H}_5\text{-NO}_2$ b) $(\text{CH}_3)_2\text{CH-NO}_2$
c) $\text{CH}_3\text{-O-N}=\text{O}$ d) $(\text{CH}_3)_2\text{C-NO}_2$
110. In Nef-carbonyl synthesis of 1°-nitro alkane on treatment with NaOH followed by acidification with 50% H_2SO_4 gives
a) aldehydes b) esters
c) ketones d) carboxylic acids
111. Which of the following isomerism is exhibited in nitro ethane ?
a) geometrical b) optical
c) tautomerism d) chainisomerism

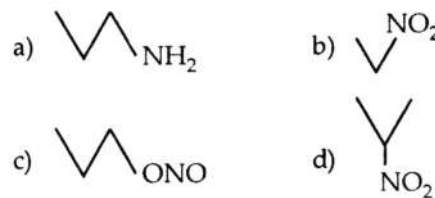
112. Nitroalkanes are acidic only towards

- a) Na_2CO_3 b) $\text{C}_2\text{H}_5\text{-OH}$
c) NaOH d) NH_3

113. Reduction of nitroalkane in neutral medium ($\text{Zn} + \text{NH}_4\text{Cl}$) forms mainly

- a) $\text{R} - \text{NH}_2$ b) $\text{R} - \text{NH} - \text{OH}$
c) $\text{R} - \text{N} = \text{N} - \text{Cl}$ d) $\text{CH}_3 - \text{CH} = \text{N} - \text{OH}$

114. A nitrogenous compound is treated with nitrous acid and the product so formed is further treated with NaOH solution which produces blue colouration. The nitrogenous compound is

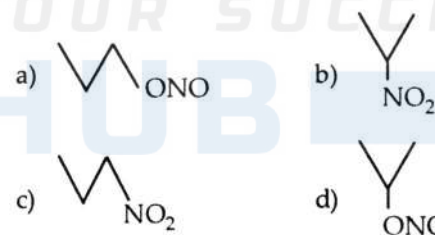


115. In Nef-carbonyl synthesis of 2-nitropropane on treatment with strong alkali and followed by acidification with 50% H_2SO_4 gives a product, which will give

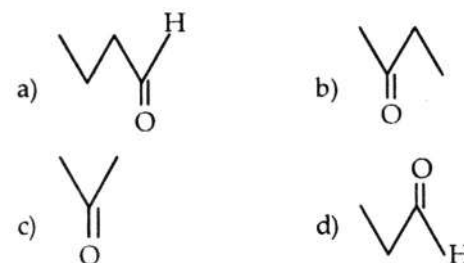
- a) Tollen's test b) Haloform test
c) Hinsberg test d) Carbyl amine reaction

116. $\text{C}_3\text{H}_7\text{NO}_2 + \text{NaOH} \rightarrow \text{A} \xrightarrow{50\% \text{H}_2\text{SO}_4} \text{B}$

Hence compound 'B' will give positive Tollen's test. The structure of $\text{C}_3\text{H}_7\text{NO}_2$ will be



117. Sodium salt of aci form of ethyl methyl nitronic acid is treated with 50% H_2SO_4 gives



118. A nitroalkane reacts with HNO_2 to yield a product which is insoluble in NaOH and give blue colour

on treatment with alkali. The nitroalkane could be

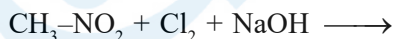
- a) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2$ b) $(\text{CH}_3)_3\text{C} - \text{NO}_2$
 c) $\text{CH}_3 - \underset{\text{NO}_2}{\text{CH}} - \text{C}_2\text{H}_5$ d) $(\text{CH}_3)_2\text{CH} - \text{CH}_2 - \text{NO}_2$

119. An aliphatic nitro compound turn red with the addition of conc. NaOH, followed by addition of excess HNO_2 . The colour disappear with the addition of excess acid but reappear if the solution is made alkaline. The aliphatic nitro compound is

- a) $\text{CH}_3 - \text{CH}_2 - \text{NO}_2$ b) $\text{CH}_3 - \underset{\text{NO}_2}{\text{CH}} - \text{CH}_3$

- c) $\text{CH}_3 - \underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}} - \text{NO}_2$ d) $\text{CH}_3 - \underset{\text{NO}_2}{\text{CH}} - \text{C}_2\text{H}_5$

120. The product obtained in the following reaction



- a) $\text{Cl} - \text{CH}_2 - \text{NO}_2$ b) $\text{Cl}_2\text{CH} - \text{NO}_2$

- c) $\text{Cl}_3\text{C} - \text{NO}_2$ d) all of these

121. What is the product when nitrobenzene is treated with zinc dust and ammonium chloride

- a) benzene
 b) aniline
 c) phenyl hydroxyl amine
 d) azobenzene

122. The conversion of nitroalkane to primary amine is carried out by

- a) reduction b) oxidation
 c) hydrolysis d) dehydration

123. Compound which does not tautomerise and does not show acidic property is

- a) $\text{CH}_3 - \text{NO}_2$ b) $\text{C}_2\text{H}_5 - \text{NO}_2$
 c) $(\text{CH}_3)_2\text{CH} - \text{NO}_2$ d) $(\text{CH}_3)_3\text{C} - \text{NO}_2$

124. $\text{R} - \text{CH}_2 - \text{NO}_2 \xrightarrow{\text{Dil. H}_2\text{SO}_4} \text{A} + \text{B}$

A, B are respectively

- a) $\text{R} - \text{COOH}$, NH_2OH
 b) $\text{R} - \text{COOH}$, NH_4OH
 c) RCONHOH , NH_3
 d) RCONH_2 , ROOH

○○○

ANSWERS - MCQ'S

SECTION - I : NITRO ALKANES

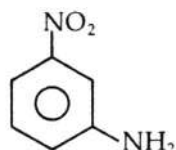
1. d)	2. b)	3. c)	4. d)	5. c)	6. c)	7. c)	8. c)	9. a)	10. d)
11. b)	12. c)	13. d)	14. a)	15. b)	16. d)	17. d)	18. a)	19. b)	20. a)
21. b)	22. a)	23. b)	24. c)	25. d)	26. b)	27. b)	28. a)	29. c)	30. c)
31. d)	32. c)	33. c)	34. d)	35. c)	36. b)	37. b)	38. c)	39. b)	40. d)
41. b)	42. c)	43. b)	44. d)	45. c)	46. b)	47. b)	48. d)	49. b)	50. d)
51. d)	52. d)	53. b)	54. c)	55. d)	56. d)	57. b)	58. a)	59. c)	60. a)
61. a)	62. d)	63. c)	64. c)	65. b)	66. a)	67. c)	68. d)	69. c)	70. d)
71. b)	72. b)	73. a)	74. c)	75. b)	76. c)	77. d)	78. b)	79. c)	80. b)
81. b)	82. a)	83. a)	84. b)	85. d)	86. a)	87. b)	88. d)	89. b)	90. b)
91. c)	92. c)	93. c)	94. d)	95. c)	96. a)	97. b)	98. d)	99. c)	100. d)
101. d)	102. c)	103. c)	104. d)	105. b)	106. d)	107. b)	108. a)	109. c)	110. a)
111. c)	112. c)	113. b)	114. d)	115. b)	116. c)	117. b)	118. c)	119. a)	120. d)
121. c)	122. a)	123. d)	124. a)						

MULTIPLE CHOICE QUESTIONS

SECTION – II : AMINES

INTRODUCTION, CLASSIFICATION, NOMENCLATURE, ISOMERISM

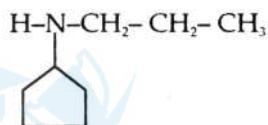
- Amines are
 - mono alkyl derivative of ammonia
 - dialkyl derivative of ammonia
 - trialkyl derivative of ammonia
 - all of these
- A secondary amine is
 - a compound with two carbon atoms and an -NH_2 group
 - a compound containing two -NH_2 groups
 - a compound in which hydrogens of NH_3 have been replaced by two alkyl groups
 - a compound with an -NH_2 group on carbon atom in number two position
- Which of the following is secondary amine?
 - Sec. butyl amine
 - Iso propyl amine
 - Diethyl amine
 - All of these
- Which of the following is not tertiary amine?
 - $(\text{CH}_3)_3\text{N}$
 - $(\text{C}_2\text{H}_5)_3\text{N}$
 - $(\text{C}_2\text{H}_5)_2\text{NCH}_3$
 - $(\text{CH}_3)_3\text{CNH}_2$
- $(\text{CH}_3)_2\text{CHNH}_2$ is
 - 1° amines
 - 2° amines
 - 3° amines
 - all of these
- Nitrogen atom in amines is
 - sp^2 -hybridised
 - sp -hybridised
 - sp^3 -hybridised
 - sp^2 -d-hybridised
- 3° amines contain
 - nitrile group
 - imino group
 - nitro group
 - amino group
- Tertiary amine contains
 - -NH_2 group
 - $>\text{NH}$ group
 - N group
 - none of these
- IUPAC name of the following compound is



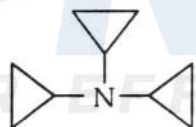
- m-nitroarene amine
- 3-nitroaniline
- 3-amino nitrobenzene
- m-amino nitrobenzene

- Imino group is present in
 - 1° amine
 - 2° amine
 - 3° amine
 - quaternary ammonium salt
- Secondary amines are represented by
 - -NH_2
 - $>\text{NH}$
 - N
 - -NO_2
- All amines have general formula
 - $\text{C}_n\text{H}_{2n}\text{NH}_2$
 - $\text{C}_n\text{H}_{2n}\text{N}$
 - $\text{C}_n\text{H}_{2n+3}\text{N}$
 - $\text{C}_n\text{H}_{2n+2}\text{N}$
- The IUPAC name for, $(\text{CH}_3)_2\text{NC}(\text{CH}_3)_3$
 - N, N-dimethyl 2-methyl 1-propanamine
 - N, N-dimethyl 2-methyl 2-propanamine
 - dimethyl t-butyl amine
 - N, N-dimethyl 2-butanamine
- The structural formula of N-methyl methanamine is
 - $(\text{CH}_3)_2\text{CHNH}_2$
 - $(\text{CH}_3)_2\text{NH}$
 - $(\text{CH}_3)_3\text{N}$
 - CH_3NH_2
- IUPAC name of $\text{CH}_3\text{N}(\text{C}_2\text{H}_5)_2$ is
 - diethyl methyl amine
 - diethyl methanamine
 - N-methyl diethanamine
 - ethyl methyl amine
- IUPAC name of 1° amine is
 - alkyl amine
 - dialkanamine
 - alkanamine
 - trialkanamine
- IUPAC name ethyl methyl amine is
 - ethyl methanamine
 - methyl ethanamine
 - diethanamine
 - dimethanamine
- What is IUPAC name of compound when imino group is attached to ethyl and n-propyl group?
 - N-Ethyl isopropyl amine
 - N-Ethyl 2-propanamine
 - N-Ethyl 1-propanamine
 - N-Ethyl 1-butanamine
- IUPAC name of following compound is $(\text{CH}_3)_2\text{N} - \text{C}_2\text{H}_5$
 - ethyl methyl methanamine
 - N, N-dimethyl ethanamine
 - ethyl dimethanamine
 - methyl ethanamine
- IUPAC name of isobutyl amine is

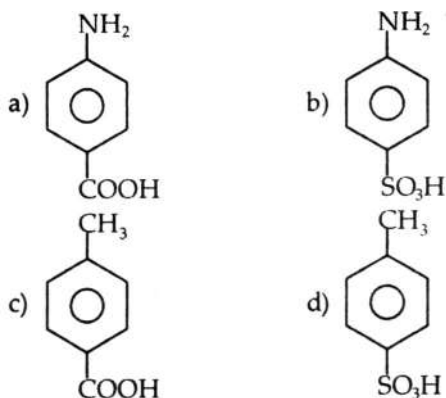
- a) 2-methyl, 2-propanamine
 b) 2-methyl, 2-butanamine
 c) 2-methyl, 1-propanamine
 d) 2-propanamine
21. IUPAC name of t-butyl amine is
 a) 2-methyl 2-propanamine
 b) trimethanamine
 c) N, N-dimethyl methanamine
 d) N-methyl diethanamine
22. How many metamers are possible for formula $C_5H_{13}N$?
 a) 5
 b) 6
 c) 7
 d) 8
23. IUPAC name of the following compound is



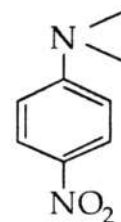
- a) N-cyclopentyl propan-1-amine
 b) N-propyl cyclopentanamine
 c) 1-amino cyclopentane
 d) Cyclopentyl amine
24. Following compound can be named as



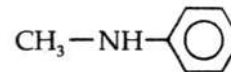
- a) N,N-dicyclopropyl cyclopropanamine
 b) tricyclopropyl amine
 c) N,N-dicyclopropyl amino cyclopropane
 d) all of these
25. Which of the following is sulphanilic acid



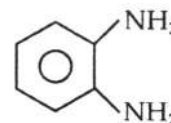
26. IUPAC name of the following compound is



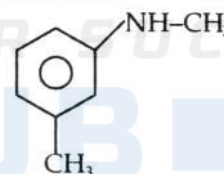
- a) 4-nitro N,N-dimethyl aniline
 b) 4-nitro N,N-dimethyl benzenamine
 c) dimethyl nitrobenzene
 d) both a and b
27. Class of the following compound is



- a) 1° - amine
 b) 2° - amine
 c) 3° - amine
 d) amide
28. IUPAC name of the following compound is



- a) 1, 2-diaminobenzene
 b) o-Phenylene diamine
 c) diphenyl amine
 d) both a and b
29. Following compound can be named as

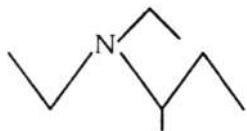


- a) N-methyl 3-methyl aniline
 b) N-methyl 3-methyl benzenamine
 c) dimethyl phenyl amine
 d) both a and b
30. IUPAC name of the following compound is

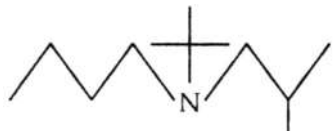


- a) 2-chloro pentanamine
 b) 4-chloro pentan-1-amine
 c) 4-chloro pent-2-en-1-amine
 d) 2-chloro pent-3-en-5-amine
31. Hybridised state of N-atom in trimethyl amine is
 a) sp^3
 b) sp^2

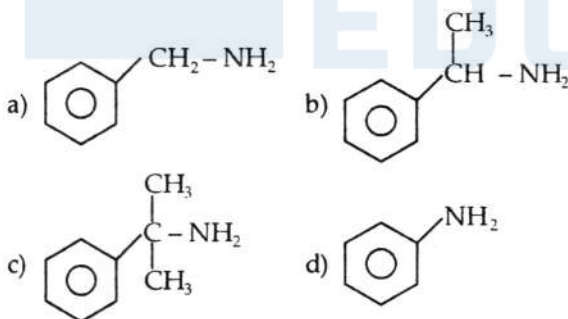
- c) sp d) sp^3 -d
32. IUPAC name of the following compound is



- a) N-N-dimethyl pentan-2-amine
b) N,N-diethyl butan-2-amine
c) N,N-diethyl 1-methyl butan-1-amine
d) N,N-diethyl butan-1-amine
33. IUPAC name of the following compound is



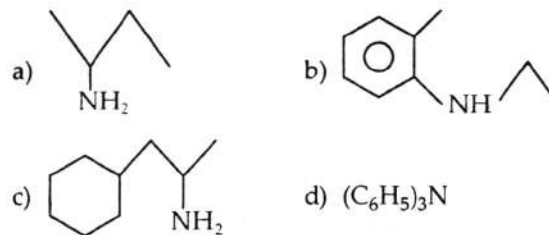
- a) N-(1,1-dimethyl ethyl) N-(2-methyl propyl) butan-1-amine
b) N(butyl) N-(1,1-dimethyl ethyl)2-methyl propan-1-amine
c) N-butyl,N-(2-methyl propyl) 2-methyl propan-1-amine
d) N-butyl N-2-methyl propyl 2-methyl butan-1-amine
34. Which of the following is incorrect IUPAC name?
a) N-(propyl) propan-2-amine
b) N-(2-propyl) propan-1-amine
c) dimethyl ethanamine
d) N-ethyl cyclohexanamine
35. Which of the following is benzyl amine?



36. Tertiary alkyl amine is
a) 1° -amine b) 2° -amine
c) 3° -amine d) quaternary salt
37. How many metamers are possible for molecular formula $C_4H_{11}N$.
a) 0 b) 2
c) 3 d) 4
38. Molecular formula C_3H_9N can show

- 1) chain isomerism
2) position isomerism
3) functional isomerism
4) metamerism
a) 1, 3 b) 3, 4
c) 1, 2 d) 2, 3

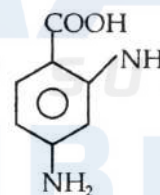
39. In which of the following imino group is present IUPAC name of the following compound is




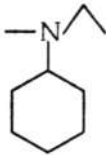
40. IUPAC name of the following compound is



- a) 1-amino butan-3-one
b) 4-amino butan-2-one
c) 3-oxo- butan-1-amine
d) 2-oxo butan-4-amine
41. IUPAC name of the following compound is



- a) 4-carboxyl phenylene diamine
b) 1-carboxyl phenylene diamine
c) 2,4-diamino benzoic acid
d) 4-carboxyl 3-amino aniline
42. $(CH_3)_3C-NH_2$ and $(CH_3)_3N$ are
1) pair of optical isomers
2) identical
3) chain isomers
4) function isomers
5) not identical
a) 1, 4 b) only 4
c) only 5 d) all of these
43. Which of the following statement is not true about $(CH_3)_3N$?
a) It's IUPAC name is trimethanamine

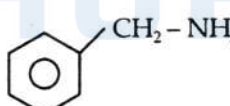
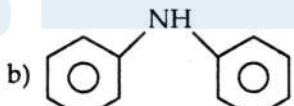
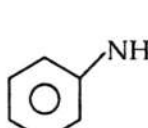
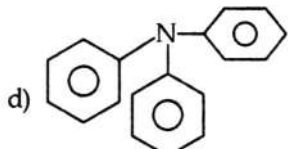
- b) N-atom is sp^3 -hybridised state
 c) it has pyramidal structure
 d) It contain imino group
44. IUPAC name of the following compound is
- 
- a) N-ethyl heptan-2-amine
 b) N-methyl 1-rnethyl heptan-1-amine
 c) heptyl ethyl amine
 d) heptyl methyl amine
45. Following compound can be named as
- 
- a) N-ethyl 1-methyl cyclohexyl amine
 b) N-ethyl N-methyl cyclohexyl amine
 c) N-ethyl N-methyl cyclohexanamine
 d) N-cyclohexyl N-methyl ethanamine
46. Total number of isomeric $1^\circ, 2^\circ, 3^\circ$ amines can be calculated by formula
- a) $I = 2^n$ b) $I = 2^{n-2}$
 c) $I = 2^{n-3}$ d) $I = 2^{n-1}$
47. Ethyl amine and dimethyl amines are
- a) metamers b) position isomers
 c) chain isomers d) functional isomers
48. Which isomerism is not present in amines ?
- a) Functional b) Position
 c) Chain d) Cis and trans
49. How many 2° amines are possible for molecular formula $C_4H_{11}N$?
- a) 2 b) 3
 c) 4 d) 5
50. How many 3° amines are possible for molecular formula $C_4H_{11}N$?
- a) 1 b) 2
 c) 3 d) 4
51. Molecular formula $C_4H_{11}N$ shows
- a) chain isomerism b) position isomerism
 c) functional isomerism d) all of these
52. $C_4H_{11}N$ represents
- a) 1° amines b) 2° amines
 c) 3° amines d) all of these
53. In general formula of amines. If $n = 3$ the amine

may be

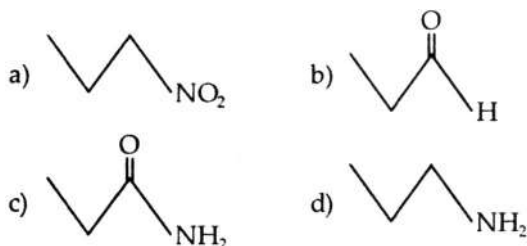
- a) 1° and 2° b) 1° and 3°
 c) 2° and 3° d) $1^\circ, 2^\circ$ and 3°
54. Isomerism shown by amines is / are
- a) chain b) position
 c) functional d) all of these
55. Which of the following is not isomer of C_3H_9N ?
- a) $(CH_3)_2N$ b) $(CH_3)_2CHNH_2$
 c) $C_2H_5NHCH_3$ d) $(CH_3)_2CNH_2$
56. How many primary amines are possible for the formula $C_4H_{11}N$?
- a) 1 b) 2
 c) 3 d) 4
57. C_3H_9N represents
- a) 1° amine b) 2° amine
 c) 3° amine d) all of these
58. Molecular formula C_2H_7N represents
- a) 2° and 3° amines b) 1° and 2° amines
 c) only 1° amines d) only 2° amines
59. Molecular formula C_2H_7N shows which type of isomerism?
- a) Position b) Functional
 c) Chain d) Optical
60. n-butyl amine and isobutyl amine are
- a) chain isomers b) position isomers
 c) optical isomers d) functional isomers

PREPARATION METHODS

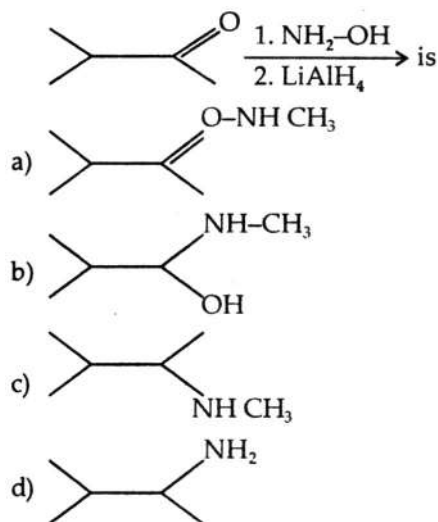
61. The reduction of alkyl cyanide with sodium and alcohol is called
- a) Mendius reduction
 b) Clemmensen's reduction
 c) Catalytic reduction
 d) none of these
62. Aldoxime on reduction with $Na + C_2H_5OH$ form
- a) 1° amines b) 2° amines
 c) 3° amines d) alcohols
63. Acetoxime on reduction and followed by acetylation gives
- a) ethyl amine
 b) isopropyl amine
 c) monoacetyl isopropyl amine
 d) diacetyl isopropyl amine
64. The reduction of which of the following gives 1-propanamine ?
- a) C_3H_7CN b) $C_2H_5CH = NOH$
 c) CH_3NO_2 d) CH_3COCH_3

65. The reduction of acetaldoxime gives
 a) $\text{CH}_3\text{-CH}_2\text{-NH}_2$ b) $\text{CH}_3\text{-NH}_2$
 c) $(\text{CH}_3)_3\text{C-NH}_2$ d) $\text{CH}_3\text{-NH-CH}_3$
66. Which of the following reagent is used to convert $-\text{CN}$ group to $-\text{CH}_2\text{NH}_2$ group?
 a) CrO_3 b) $\text{Na} + \text{C}_2\text{H}_5\text{OH}$
 c) H_3PO_4 d) Al_2O_3
67. Which of the following compound give methanamine on reduction?
 a) HCN b) HCHO
 c) CH_3CN d) HCOOH
68. On reduction with $\text{Sn} + \text{conc. HCl}$ of $\text{C}_2\text{H}_5\text{NO}_2$ yields
 a) esters b) secondary alcohol
 c) primary amine d) secondary amine
69. The reaction of CH_3CN to $\text{CH}_3\text{CH}_2\text{NH}_2$ is called
 a) Mendius reduction
 b) Rosenmund reduction
 c) Hoffman reduction
 d) Clemmenson reduction
70. $-\text{NO}_2$ group is converted into $-\text{NH}_2$ group by the reaction
 a) dehydration b) alkaline hydrolysis
 c) reduction d) decarboxylation
71. Which of the following reactions does not yield an amine?
 a) $\text{RX} + \text{NH}_3 \longrightarrow$
 b) $\text{RCH} = \text{N-OH} + \text{H}_2 \xrightarrow{\text{Ni}}$
 c) $\text{RCN} + \text{H}_2\text{O} \xrightarrow{\text{H}^+}$
 d) $\text{R-NO}_2 + 4\text{H} \xrightarrow{\text{Sn} + \text{conc. HCl}}$
72. Ethylamine can be obtained by the action of
 a) $\text{NH}_3 + \text{C}_2\text{H}_5\text{I}$ b) $\text{C}_2\text{H}_5\text{CN} + 4\text{H}$
 c) both 'a' and 'b' d) $\text{HCHO} + \text{NH}_3$
73. Which of the following compounds gives a primary amine on reduction?
 a) Nitroalkane b) Oximes
 c) Alkyl cyanides d) All of these
74. Excess of bromo ethane reacts with alcoholic ammonia to give,
 a) ethyl amine b) diethyl amine
 c) triethyl amine d) all of these
75. Ketoxime on reduction gives
 a) 1° amines b) 2° amines
 c) 3° amines d) all of these
76. Acetonitrile is treated with sodium and ethanol gives
 a) methyl amine b) acetic acid
 c) ethyl amine d) methanal
77. Acetoxime on reduction gives,
 a) dimethyl amine b) isopropyl amine
 c) ethyl methyl amine d) ethyl amine
78. $\text{R-NO}_2 \xrightarrow{\text{Sn} + \text{conc. HCl}} \text{X}$. In this reaction X is
 a) R-Cl b) R-NH_2
 c) R-SnCl_2 d) $\text{R-NH}_3^+ \text{Cl}^-$
79. CH_3NH_2 is obtained from NH_3 by
 a) Hoffmans reaction b) Cannizzaros reaction
 c) Wurtz reaction d) none of these
80. Which of the following does not give primary amine on reduction?
 a) RNO_2 b) RCHO
 c) $\text{R}_2\text{C} = \text{NOH}$ d) RCN
81. 2-nitro 2-methyl propane on reduction gives
 a) $(\text{CH}_3)_3\text{N}$ b) $(\text{CH}_3)_3\text{NH}$
 c) $(\text{CH}_3)_3\text{CNH}_2$ d) $(\text{CH}_3)_3\text{CHCH}_2\text{NH}_2$
82. n-propyl cyanide on reduction gives
 a) n-butyl amine b) n-propyl amine
 c) isobutyl amine d) t-butyl amine
83. Which of the following is Mendius reduction?
 a) $\text{RNO}_2 + 6\text{H} \rightarrow$
 b) $\text{RCN} + 4\text{H} \rightarrow$
 c) $\text{RCH} = \text{NOH} + 4\text{H} \rightarrow$
 d) $\text{RNC} + 2\text{H}_2 \rightarrow$
84. Benzyl halide on ammonolysis produces
 a)  b) 
 c)  d) 
85. The production (C) in following sequence of reaction

$$\text{CH}_3\text{CH}_2\text{COOH} \xrightarrow{\text{NH}_3} \text{A} \xrightarrow{\text{heat}} \text{B} \xrightarrow{\text{Na} + \text{C}_2\text{H}_5\text{-OH}} \text{C}$$

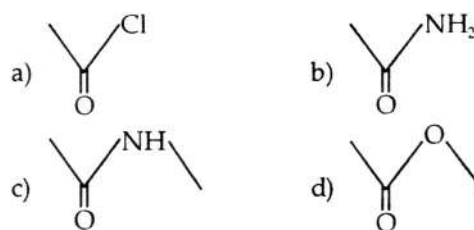


86. Methyl amine is formed by reduction of
a) nitroethane b) methyl cyanide
c) formamide d) Acetaldoxime
87. Ethyl amine is obtained by the action of sodium hypobromite on the following amide
a) formamide b) propanamide
c) acetamide d) butanamide
88. For alkylation of ammonia which of the following is not used
a) $\text{CH}_3\text{-X}$ b) $\text{CH}_3\text{-CH}_2\text{-X}$
c) $(\text{CH}_3)_2\text{CH-X}$ d) $(\text{CH}_3)_2\text{C-X}$
89. Hofmann's hypobromite reaction is affords a method of
a) preparation of 1° alcohol
b) preparation of mixture of amines
c) stepping down the series
d) stepping up a series
90. A primary amine is formed from amide, bromine and alkali. The 1°-amine has
a) one carbon less than amide
b) one carbon more than amide
c) one hydrogen less than amide
d) one hydrogen more than amide
91. The major product in the following reaction

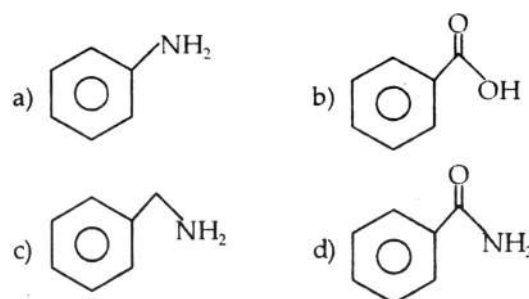
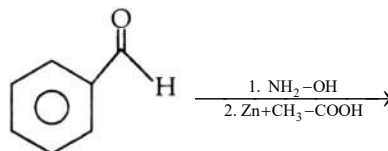


92. Which of the following will undergoes Hofmann's

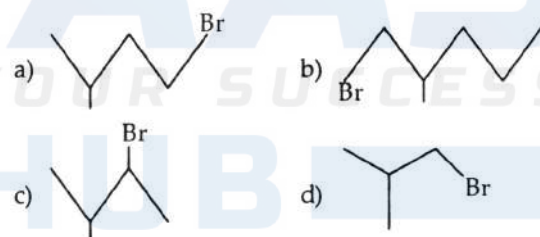
reaction to give a 1°-amine?



93. State the product available by the following reaction



94. Potassium phthalimide react with 'A' which on hydrolysis gives 2-methyl propan-1-amine. What is 'A'?

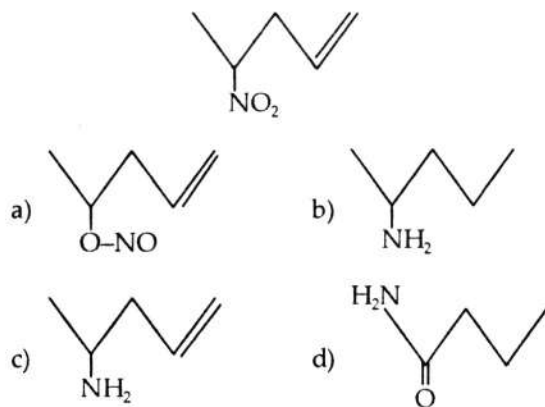


95. Reduction of nitroparaffin gives
a) 1°-amine b) 2°-amine
c) 3°-amine d) amide
96. Tertiary amine can be obtained by
a) Gabriel phthalimide synthesis
b) hydrolysis of cyanide
c) Thermal decomposition of quaternary ammonium salt
d) Reduction of nitroalkane by $\text{Zn} + \text{NH}_4\text{Cl}$
97. Which of the following may be prepared by Gabriel Phthalimide synthesis
a) Aliphatic 1°-amine b) Aromatic 1°-amine
c) Aliphatic 2°-amine d) Aromatic 2°-amine

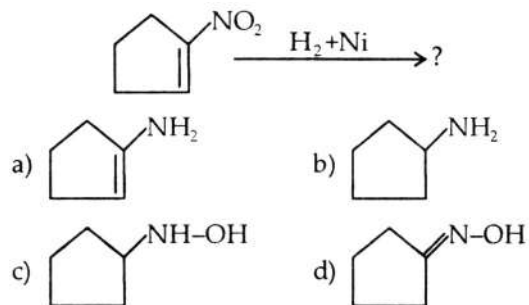
98. $\text{A} \xrightarrow{\text{Reduction}} 1^\circ\text{-amine}$.

The compound A may be

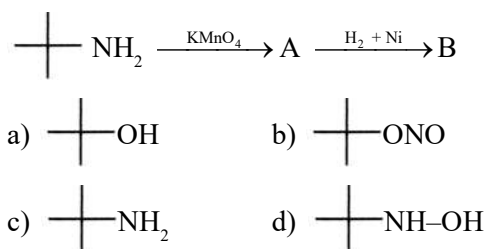
- 1) R-NC 2) R-CN
 3) R-CONH₂ 4) R-NO₂
 a) 1, 2 b) 3, 4
 c) 2 d) 2, 3, 4
99. Aniline is obtained by
 a) Reduction of benzaldoxime
 b) treating benzamide with NaOBr
 c) treating acetophenone with hydroxyl amine
 d) treating phthalimide with R-X
100. From Gabriel phthalimide synthesis aromatic primary amine cannot be prepared
 a) Ar-X do not undergoes nucleophilic substitution reaction
 b) Ar-X is stable due to resonating structures
 c) Ar-X is highly reactive due to C-X bond is very weak
 d) Ar-X is not stable
101. Potassium phthalimide is reacted with ethyl halide and followed by acid hydrolysis gives
 a) ethanol b) nitroethane
 c) ethanamine d) diethyl amine
102. In Hofmann's hypobromide reaction
 a) The alkyl group in amide migrate to nitrogen atom
 b) The alkyl group in amide migrate to oxygen atom
 c) There is a no migration of alkyl group of amide
 d) Hydrogen atom is migrated to carbonyl oxygen atom of amide
103. Following compound on reduction by using Fe+cone. HCl. gives



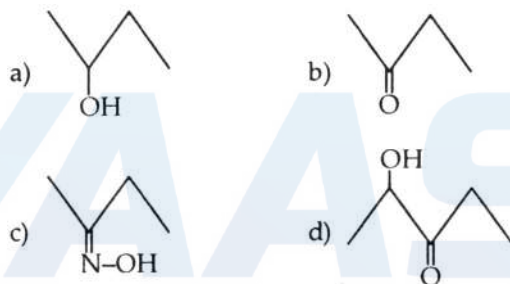
104. Product of the following reaction is



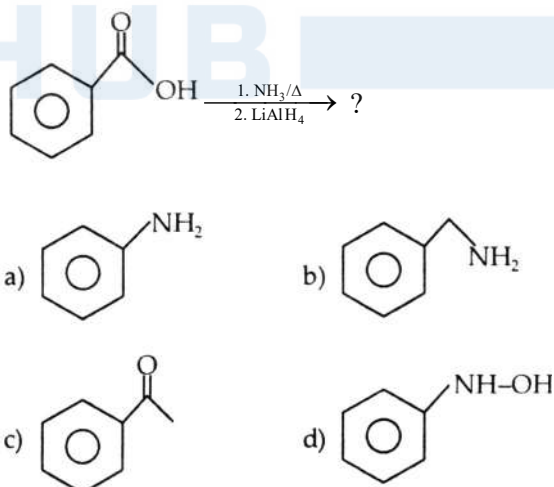
105. Find out (B) in the following reaction



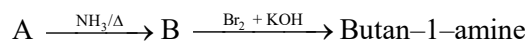
106. Compound 'A' is oxidised by trifluoroperoxy acetic acid gives 'B' followed by reduction with Fe+cone. HCl gives butan-2-amine. The compound 'A' is

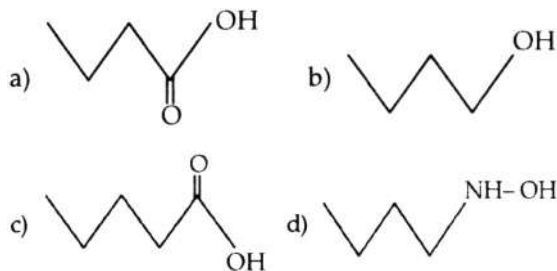


107. Product of the following reaction is



108. Compound A in the following reaction is

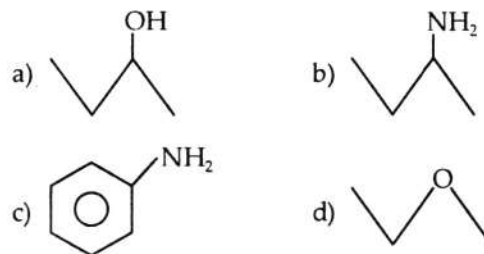


**BASIC NATURE AND PROPERTIES**

109. Amine are basic in nature according to
 a) Arrhenius theory
 b) Lewis theory
 c) Lowry-Bronsted theory
 d) all of these
110. In chemical reaction of amines, which act as
 a) electrophiles
 b) nucleophiles
 c) neutral
 d) acid
111. Aniline is less soluble in water than ethyl amine due to
 a) Resonance stabilization of benzene ring
 b) resonance stabilization of anilium ion
 c) more hydrophobic nature of C_6H_5 group than C_2H_5 group
 d) more hydrophilic nature of C_6H_5 group than C_2H_5 group
112. Amines have higher B.P. than corresponding alkane or ethers due to
 a) intermolecular hydrogen bonding
 b) intramolecular hydrogen bonding
 c) high polar nature of C-N bond
 d) Lone pair of electron on nitrogen atom
113. In isomeric amine correct order of B.P. is
 a) $1^\circ > 2^\circ > 3^\circ$
 b) $3^\circ > 2^\circ > 1^\circ$
 c) $2^\circ > 1^\circ > 3^\circ$
 d) $1^\circ > 3^\circ > 2^\circ$
114. Which of the following has lowest B.P.
 a) $CH_3-CH_2-CH_2-NH_2$
 b) $CH_3-\underset{\substack{| \\ NH_2}}{CH}-CH_3$
 c) $C_2H_5-NH-CH_3$
 d) $(CH_3)_3N$
115. All amines are soluble in
 a) water
 b) HCl
 c) CS_2
 d) CCl_4
116. Amines have lower B.P. than
 a) ethers
 b) alkanes

c) alcohols
 d) alkyl halide

117. Which of the following is more soluble in water



118. Basicity of amines in gaseous state is

- 1) $(CH_3)_3N$
 2) CH_3-NH_2
 3) $(CH_3)_2NH$
 4) NH_3
 a) $1 > 2 > 3 > 4$
 b) $1 > 3 > 2 > 4$
 c) $3 > 1 > 2 > 4$
 d) $2 > 3 > 1 > 4$

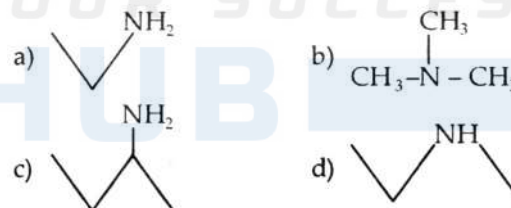
119. Basicity of following amines in aqueous medium is

- 1) CH_3-NH_2
 2) $(CH_3)_2NH$
 3) $(CH_3)_3N$
 4) NH_3
 a) $1 > 2 > 3 > 4$
 b) $3 > 2 > 1 > 4$
 c) $2 > 1 > 3 > 4$
 d) $2 > 3 > 1 > 4$

120. In gaseous state the basicity of amine is

- a) $1^\circ > 2^\circ > 3^\circ > NH_3$
 b) $3^\circ > 2^\circ > 1^\circ > NH_3$
 c) $NH_3 > 3^\circ > 1^\circ > 2^\circ$
 d) $2^\circ > 1^\circ > NH_3 > 3^\circ$

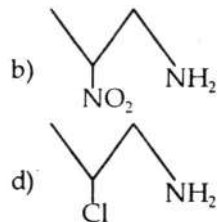
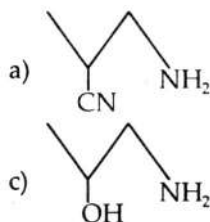
121. Which of the following is more basic in gaseous state?



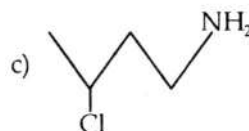
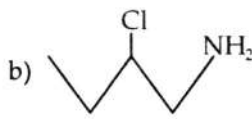
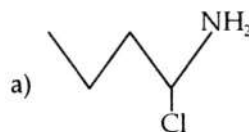
122. Which of the following is correct statement about basicity of amines?

- 1) smaller the value of pK_b weaker the base
 2) Electron donating groups increase the basicity of amines
 3) Electron withdrawing groups decrease the basicity of amines
 4) Aromatic amines are more basic than aliphatic amines
 a) 1, 4
 b) 2, 3
 c) 2, 4
 d) 1, 3

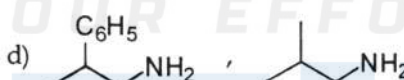
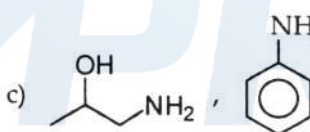
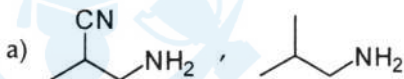
123. Which of the following is less basic in aqueous medium is



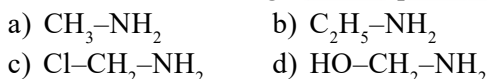
124. Which of the following is more basic in aqueous medium is



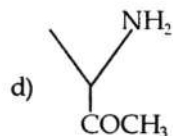
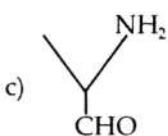
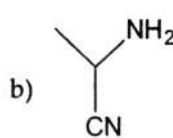
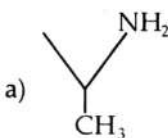
125. In which of the following 1st is more basic than 2nd



126. Which of the following has more pK_b value?



127. Which of the following has more k_b value?



128. Aryl amines are less basic than alkyl amine and ammonia which is due to

a) In aryl amine lone pair of electron on nitrogen is conjugation with benzene ring and thus making

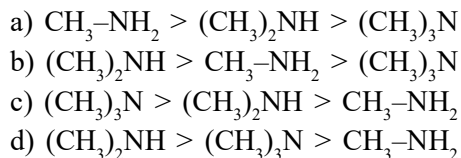
less available for protonation

b) less stability of anilium ion than alkyl ammonium ion

c) Aniline forms hydrogen bond with water

d) In aniline intermolecular hydrogen bonding is present

129. Correct order of B.P. of amine is



130. Mark the correct statement

a) methyl amine is slightly acidic
b) methyl amine is less basic than ammonia
c) methyl amine is more basic than ammonia
d) methyl amine form salt with alkalies

131. The conjugate base of $(\text{CH}_3)_2\text{NH}_2^+$ is



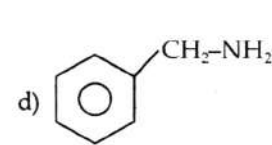
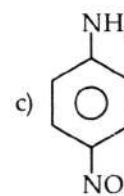
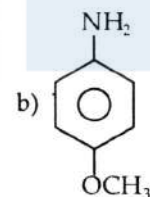
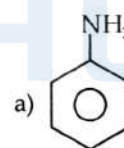
132. Which of the following is conjugate base of $(\text{CH}_3)_3\text{NH}^+$?



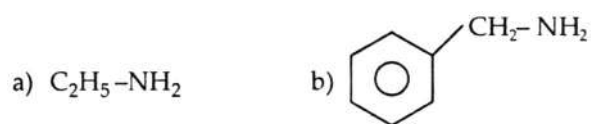
133. Which of the following shares lone pair of electron less easily?

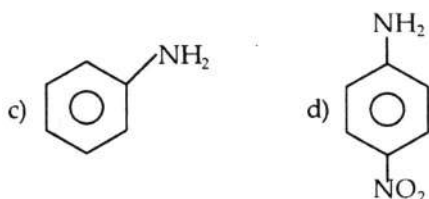


134. Which of the following is more basic in aqueous medium?



135. Among the following most basic compound in aqueous medium is

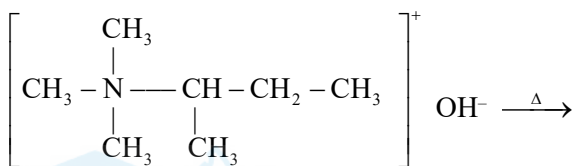




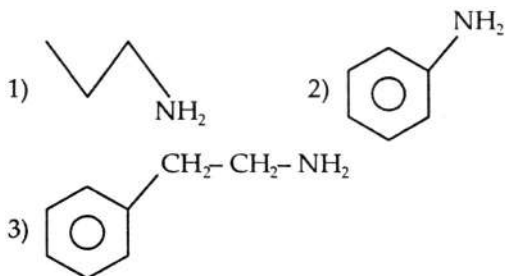
136. The correct order of basicity of following compound in aqueous medium is

- 1) $(C_2H_5)_2NH$ 2) $C_2H_5-NH_2$
 3) $(CH_3)_2NH$ 4) CH_3NH_2
 a) $1 > 2 > 3 > 4$ b) $3 > 1 > 2 > 4$
 c) $2 > 1 > 3 > 4$ d) $1 > 3 > 2 > 4$

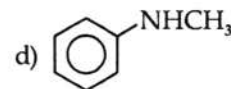
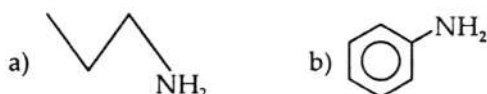
137. Product of the following reaction is

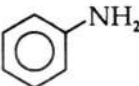


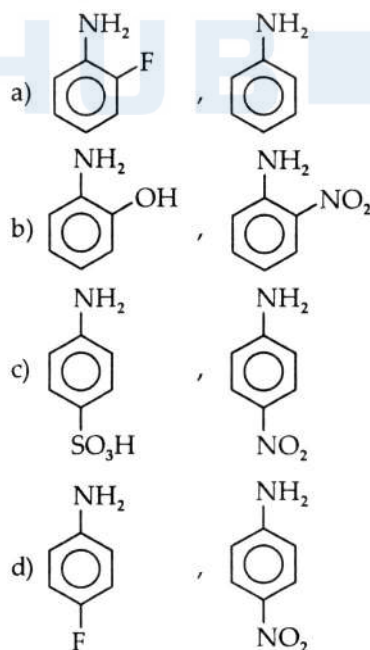
- a) $(CH_3)_2NH + CH_3-OH + CH_3-CH=CH-CH_3$
 b) $(CH_3)_3N + CH_3-CH=CH-CH_3$
 c) $(CH_3)_3N + CH_2=CH-CH_2-CH_3 + H_2O$
 d) $(CH_3)_2NH + CH_3-OH + CH_2=CH-CH_2-CH_3$
 138. Which of the following has highest pK_b value in aqueous medium?
 a) $CCl_3-CH_2-NH_2$ b) $CCl_3-CH_2-CH_2-NH_2$
 c) $CF_3-CH_2-NH_2$ d) $CF_3-CH_2-CH_2-NH_2$
 139. Which of the following is insoluble in dil HCl?
 a) Aniline b) ethyl amine
 c) triphenyl amine d) dimethyl amine
 140. Arrange the following amines in the decreasing order of their basicity in aqueous medium



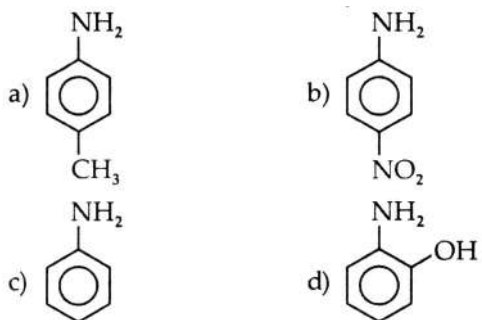
- a) $1 > 3 > 2$ b) $3 > 2 > 1$
 c) $1 > 2 > 3$ d) $2 > 1 > 3$
 141. Which of the following is least basic in aqueous medium?



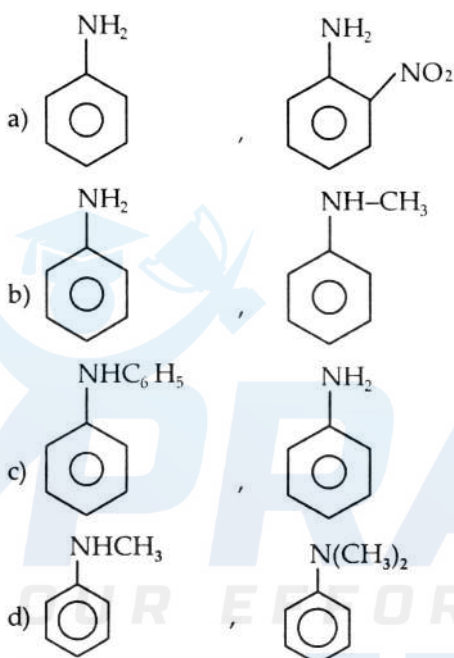
142. The less basic amine in aqueous medium is
 a) $(C_2H_5)_2NH$ b) $(C_2H_5)_3N$
 c) $(CH_3)_2NH$ d) $(CH_3)_3N$
 143. Which of the following factor influence the basicity aliphatic amines in aqueous medium?
 1) Inductive effect of alkyl groups
 2) Solvation effect
 3) Steric effect
 a) 1, 3 b) 1, 2
 c) 2, 3 d) 1, 2, 3
 144. Which of the following is more basic in aqueous medium?
 a) CH_3-NH_2 b) $CH_3-CHNH_2-CH_3$
 c) $(CH_3)_2NH$ d) 
 145. Identify the incorrect statement about the basic nature of amines
 a) Alkyl amines are less basic than ammonia
 b) Aniline is more basic than ammonia
 c) p-nitroaniline is more basic than para amino benzoic acid
 d) p-amino phenol is less basic than para methyl aniline
 146. In which of the following first is more basic than



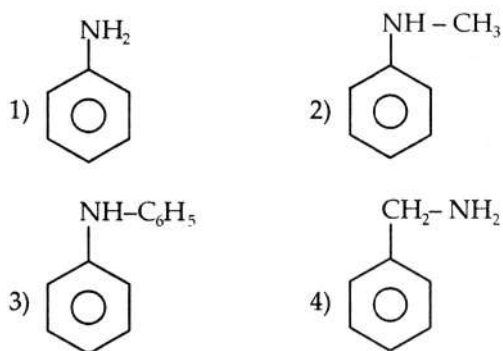
147. Which of the following has highest Kb value



148. Which of the following first is more basic than second?

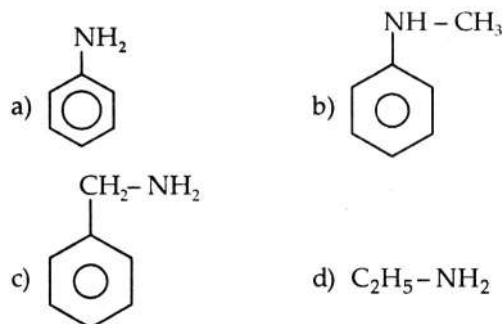


149. Correct order of basicity of following compound second is

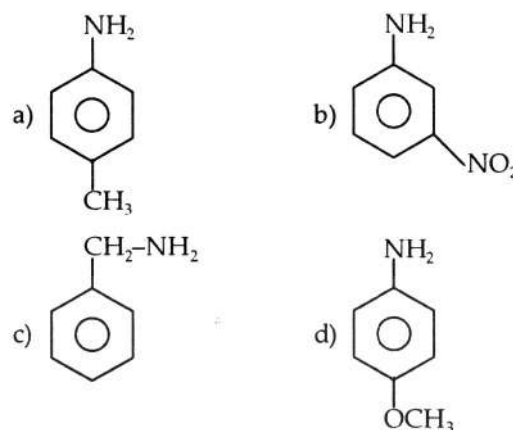


- a) $1 > 3 > 2 > 4$
 b) $4 > 2 > 1 > 3$
 c) $4 > 3 > 2 > 1$
 d) $4 > 1 > 2 > 3$

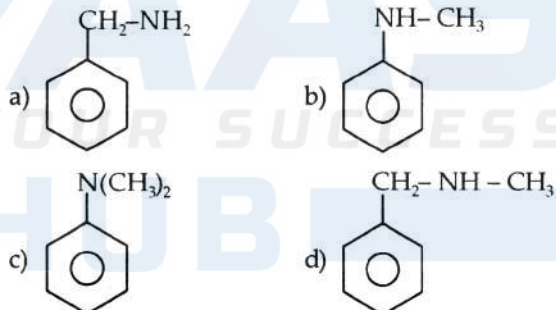
150. Which of the following has highest pKb value



151. Which of the following amine is easily protonated?



152. Which of the following amine has less tendency to accept proton form acid



153. Which of the following has maximum steric effect?

- a) $(CH_3)_2N$ b) $(CH_3)_2NH$
 c) CH_3NH_2 d) $C_2H_5NH_2$

154. Consider the following amines

- 1) n-butyl amine
 2) ethyl dimethyl amine
 3) diethyl amine

the correct sequence of boiling point is

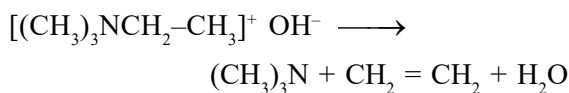
- a) $1 > 3 > 2$ b) $1 > 2 > 3$
 c) $2 > 3 > 1$ d) $2 > 1 > 3$

155. Which of the following reacts with nitrous acid to form an alcohol?

- a) $\text{CH}_3\text{CH}_2\text{NH}_2$ b) $(\text{CH}_3)_2\text{NH}$
 c) $(\text{CH}_3)_3\text{N}$ d) $(\text{C}_2\text{H}_5)_3\text{N}$
156. Which of the following will not answer Carbyl amine reaction?
 a) Ethyl amine b) Methyl amine
 c) Aniline d) Dimethyl amine
157. The correct order of basic strength of amines in aqueous medium is
 1) $\text{C}_2\text{H}_5\text{NH}_2$ 2) $(\text{CH}_3)_2\text{NH}$
 3) $(\text{C}_2\text{H}_5)_2\text{NH}$ 4) $(\text{C}_2\text{H}_5)_3\text{N}$
 a) $3 > 2 > 1 > 4$ b) $2 > 3 > 4 > 1$
 c) $3 > 4 > 2 > 1$ d) $1 > 3 > 2 > 4$
158. A substance (A) is soluble in dil. HCl and produces obnoxious smell with alcoholic potash and haloform. Which type of compound behave like this.
 a) Alcohol b) 1° amine
 c) 2° amine d) 3° amine
159. Which of the following reaction is given by only primary amine ?
 a) With HONO
 b) With CHX_3 and alcoholic potash
 c) With acetyl chloride
 d) With CH_3I
160. Which of the following compound give nitrosoamine with HNO_2 ?
 a) 1° amines b) 2° amines
 c) 3° amines d) All of these
161. The compound, which does not react with CH_3COCl is
 a) RNH_2 b) R_2NH
 c) R_3N d) all of these
162. Steric effect of methyl group reduces basic character of
 a) 3° amines b) 1° amines
 c) 2° amines d) none of these
163. A carbon compound which is soluble in conc. HCl solution, on treatment with sodium nitrite give a nitrogen gas
 a) $\text{C}_2\text{H}_5\text{NH}_2$ b) CH_3NH_2
 c) $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ d) all of these
164. $\text{R}_2\text{NH} + \text{HNO}_2 \xrightarrow{\text{cold}} \text{R}_2\text{N} - \text{N} = \text{O} + \text{H}_2\text{O}$
 This reaction is,
 a) electrophilic addition
 b) electrophilic substitution
 c) nucleophilic addition
 d) nucleophilic substitution
165. Which of the following species is formed when ethanamine is reacted with conc. HCl ?
 a) $\text{C}_2\text{H}_5\text{NH}_2^+\text{Cl}^-$ b) $\text{C}_2\text{H}_5\text{NH}_3^+\text{Cl}^-$
 c) $(\text{C}_2\text{H}_5)_2\text{NH}_2^+\text{Cl}^-$ d) $\text{C}_2\text{H}_5\text{NH}^+\text{Cl}^-$
166. Amines behave as
 a) Lewis acids
 b) Lewis bases
 c) aprotic acids
 d) amphoteric compounds
167. Which of the following alkyl halide is used as a methylating agent?
 a) CH_3I b) $\text{C}_2\text{H}_5\text{Br}$
 c) $\text{C}_2\text{H}_5\text{Cl}$ d) $\text{C}_6\text{H}_5\text{Cl}$
168. Action of nitrous acid with ethyl amine produces
 a) ethane b) ammonia
 c) ethyl alcohol d) nitroethane
169. The correct order of basicity of the following compound in aqueous medium is
 1) NH_3 2) $\text{CH}_2\text{CH}_2\text{NH}_2$
 3) $(\text{CH}_3)_2\text{NH}$ 4) $(\text{C}_2\text{H}_5)_2\text{N}$
 a) $2 > 3 > 1 > 4$ b) $4 > 3 > 2 > 1$
 c) $4 > 3 > 1 > 2$ d) $3 > 2 > 1 > 4$
170. Secondary amine forms insoluble nitrosoamine with
 a) HNO_3 b) HNO_2
 c) CH_3COCl d) HCl
171. Primary, secondary and tertiary amines are distinguished by the action of
 a) HNO_3 b) HNO_2
 c) dil. HCl d) dil. H_2SO_4
172. Consider the nitrogen atom in amines, which one of the following statement is correct?
 a) It is sp^3 -hybridised b) It is sp^2 -hybridised
 c) It is sp^3 -hybridised d) It is sp^2 -d hybridised
173. In tertiary amines the valency of nitrogen atom is
 a) 3 b) 4
 c) 5 d) 2
174. The reagent which does not react with $(\text{C}_2\text{H}_5)_3\text{N}$ is / are
 a) CH_3COCl b) $(\text{CH}_3\text{CO})_2\text{O}$
 c) NaOH d) all of these
175. An aliphatic primary amine reacts with HNO_2 in cold to form
 a) a nitrile b) an alcohol
 c) a diazonium salt d) a secondary amine
176. Carbylamine reaction is given only by

- a) primary amines b) secondary amines
c) tertiary amines d) quaternary amines
177. Which of the following is more basic ?
a) Methenamine b) Ethanamine
c) Propan-2-amine d) Phenyl methanamine
178. Hinsberg reagent is
a) $\text{Cu}^{++} + \text{OH}^-$ b) $\text{C}_6\text{H}_5\text{SO}_2 \text{Cl}$
c) $\text{C}_6\text{H}_5 \text{NHNH}_2$ d) SOCl_2
179. Which one of the following pair can consume same amount of acetyl chloride?
a) Acetyl ethyl amine and ethyl amine
b) Acetyl ethyl amine and diethyl amine
c) Ethyl amine and diethyl amine
d) Methyl amine and trimethyl amine
180. The basic character of amines is due to
a) presence of nitrogen atom
b) lone pair of electrons on nitrogen atom
c) tetrahedral structure
d) high electronegativity of nitrogen
181. All amines are basic in nature because,
a) they possess lone pair of electron on nitrogen
b) they give OH^- ion in aqueous medium
c) they form salt with acid
d) all of these
182. Isocyanide test is used for the detection of
a) primary alcohols b) secondary alcohols
c) primary amines d) secondary amines
183. $\text{C}_2\text{H}_5\text{NH}_2$ and $\text{CH}_3\text{NHC}_2\text{H}_5$ can be distinguished by
a) Hoffmann's reaction
b) Williamson's reaction
c) Wurtz's reaction
d) Carbyl amine reaction
184. Ethyl amine reacts with excess of methyl iodide to give
a) ethyl methyl amine
b) ethyl dimethyl amine
c) ethyl trimethyl ammonium iodide
d) all of these
185. How many molecules of CH_3I will react with CH_3NH_2 to form tetra methyl ammonium iodide?
a) 2 b) 3
c) 4 d) 5
186. Following 1° amine has chiral centre
 $\text{CH}_3\text{CHNH}_2\text{C}_2\text{H}_5$
- This on reaction with $\text{NaNO}_2 + \text{HCl}$ forms
a) 1° alcohol with retention of configuration
b) 2° alcohol with inverted configuration
c) racemic mixture of 2° alcohol
d) racemic mixture of 1° alcohol
187. Acetylation of amine is done in the presence of
a) CH_3COCl b) CH_3CONH_2
c) $\text{CH}_3\text{COOCH}_3$ d) all of these
188. Which of the following is more basic ?
a) CH_3NH_2 b) $(\text{CH}_3)_2\text{NH}$
c) $(\text{CH}_3)_3\text{N}$ d) NH_3
189. Which of the following is acetylating agent?
a) CH_3COCH_3 b) CH_3CONH_2
c) $(\text{CH}_3\text{CO})_2\text{O}$ d) CH_3COONa
190. Which of the following has lowest K_b value?
a) Benzenamine
b) N-methyl aniline
c) N, N-dimethyl aniline
d) N, N-dimethyl methanamine
191. Which of the following amine does not give alcohol with HNO_2 ?
a) $\text{C}_2\text{H}_5\text{NH}_2$ b) $\text{CH}_3\text{CHNH}_2\text{CH}_3$
c) CH_3NHCH_3 d) $(\text{CH}_3)_3\text{CNH}_2$
192. The best methylating agent is
a) CH_3Cl b) CH_3Br
c) CH_3F d) CH_3I
193. Triethyl amine reacts with HCl and NaNO_2 give,
a) triethyl nitroso amine
b) ethyl alcohol and diethyl nitroso amine
c) three molecules of ethyl alcohol
d) no product
194. About amines some statements are given below,
1. they possess two lone pair of electrons on nitrogen atom
2. these are monoacidic base
3. their basicity is one
4. they can accept proton
Among the above, true statement(s) is/are
a) only 2 and 3 b) only 3 and 4
c) only 2, 3 and 4 d) all of these
195. Primary amine forms
a) diacetyl derivative
b) triacetyl derivative
c) monoacetyl derivative
d) all of these
196. The unpleasant smelling isocyanide are also called

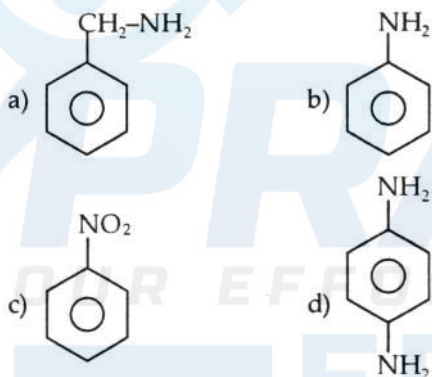
- a) nitriles b) cyanide
c) carbyl amine d) ethers
197. The conversion of 1° amine to 3° amine. The process involved may be called,
a) reduction b) alkylation
c) oxidation d) hydrogenation
198. Which of the following can not be acetylated ?
a) CH_3NH_2 b) $(\text{CH}_3)_2\text{NH}$
c) $(\text{CH}_3)_3\text{N}$ d) $(\text{CH}_3)_2\text{CNH}_2$
199. Trimethyl amine on acetylation gives
a) trimethyl acetyl amine
b) triacetyl methyl amine
c) diacetyl dimethyl amine
d) none of these
200. Amines are polar compounds because of the
a) hydrogen bonding
b) difference in electronegativity between C, H and N
c) $-\text{NH}_2$ group
d) alkyl group
201. Which of the following amine will not give effervescence with HNO_2 ?
a) CH_3NH_2 b) $\text{C}_2\text{H}_5\text{NH}_2$
c) $(\text{CH}_3)_2\text{CHNH}_2$ d) $(\text{CH}_3)_2\text{NH}$
202. Tertiary amines does not react with CH_3COCl , because of
a) least basic
b) no hydrogen atom on nitrogen
c) three alkyl groups
d) all of these
203. Which is soluble in NaNO_2 and dil HCl forming salt ?
a) $(\text{CH}_3)_3\text{CNH}_2$ b) $(\text{CH}_3)_2\text{CHNH}_2$
c) $(\text{CH}_3)_2\text{NH}$ d) $(\text{CH}_3)_3\text{N}$
204. Which type of bond is formed when amines donate lone pair to proton?
a) Covalent bond b) Ionic bond
c) Co-ordinate bond d) Electrovalent bond
205. Primary amines on treatment with HNO_2 give
a) primary alcohol b) secondary alcohol
c) tertiary alcohol d) all of these
206. The general formula of quaternary ammonium compound is
a) $\text{R}-\text{NH}_2$ b) R_3N
c) $\text{R}_4\text{N}^+ \text{X}^-$ d) NH_4X
207. N, N dimethyl acetamide is
a) $(\text{CH}_3)_2\text{NCOCH}_3$ b) $\text{CH}_3\text{N}(\text{COCH}_3)_2$
c) CH_3CONH_2 d) $\text{C}_2\text{H}_5\text{N}(\text{COCH}_3)_2$
208. Which of the following has fishy smell ?
a) CH_3NH_2 b) $\text{C}_2\text{H}_5\text{NH}_2$
c) $(\text{CH}_3)_2\text{NH}$ d) $\text{CH}_3(\text{CH}_2)_4\text{NH}_2$
209. $(\text{CH}_3)_2\text{CHNH}_2$ is reacted with excess acetic anhydride, the compound formed is
a) $(\text{CH}_3)_2\text{CHNCOCH}_3$
b) $(\text{CH}_3)_2\text{CHN}(\text{COCH}_3)_2$
c) $(\text{CH}_3)_2\text{CHOH}$
d) $(\text{CH}_3)_2\text{CHN}(\text{COOCH}_3)_2$
210. Acetylation of amine is
a) nucleophilic addition
b) nucleophilic substitution
c) electrophilic addition
d) electrophilic substitution
211. The bond(s) present in quaternary ammonium salt is/are
a) covalent
b) ionic
c) covalent, co-ordinate and ionic
d) covalent and co-ordinate
212. Amines form salt with H_2SO_4 , the molar ratio of
a) 2 : 2 b) 2 : 1
c) 1 : 2 d) 2 : 3
213. The maximum number of moles of an acetylating agent, consumed by a mole of each of 1°, 2° and 3° amines are respectively
a) 2, 3 and 4 b) 1, 2 and 3
c) 2, 1 and 0 d) 0, 2 and 1
214. The number of moles of nitrogen obtained by the complete reaction of one mole of $\text{C}_2\text{H}_5\text{NH}_2$ with nitrous acid is
a) 2 b) 3
c) 4 d) 1
215. Three moles of CH_3I are made to react with one mole of ammonia. The product formed is
a) 1° amine
b) 2° amine
c) 3° amine
d) quaternary ammonium salt
216. Which of the following reaction shows the basic nature of amines ?
a) $\text{RNH}_2 + \text{HCl}$ b) $\text{RNH}_2 + \text{CH}_3\text{COCl}$
c) $\text{RNH}_2 + \text{HNO}_2$ d) $\text{RNH}_2 + (\text{CH}_3\text{CO})_2\text{O}$
217. Select the correct statement about the following reaction.



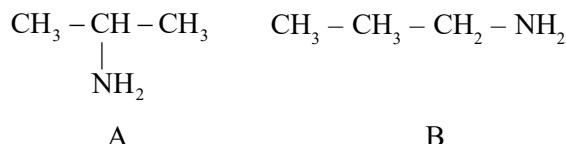
- a) This is called Hofmann elimination reaction
 b) OH^- ion function as base
 c) Less substituted alkene is major product
 d) All of these are correct
218. Which of the following alkyl halides is used as a methylating agent?
 a) $\text{C}_2\text{H}_5\text{Cl}$ b) CH_3COCl
 c) $(\text{CH}_3\text{CO})_2\text{O}$ d) CH_3I
219. Consider the following reaction



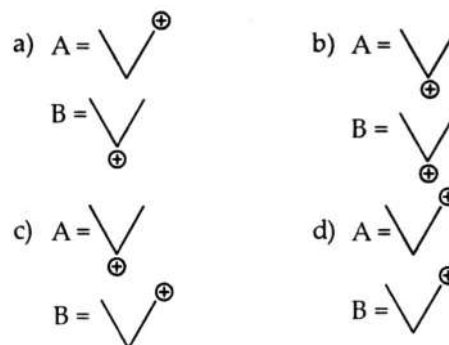
- a) Reaction I is called Hofmann's hypobromide reaction.
 b) Reaction II is called carbyl amine reaction.
 c) Reaction I and II are Hofmann reaction.
 d) Both 'a' and 'b' are correct statements.
220. Anilinium hydrochloride is obtained from HCl and what



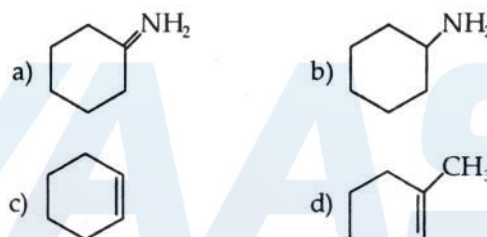
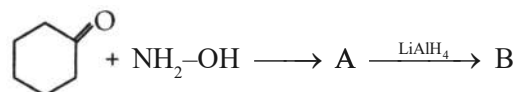
221. Optical active amine of molecular formula $\text{C}_4\text{H}_{11}\text{N}$ on reaction with nitrous acid gives
 a) butan-1-ol
 b) 2-methyl propan-1-ol
 c) 2-methyl propan-2-ol
 d) butan-2-ol
222. What will be the major product when propan-2-amine is treated with nitrous acid?
 a) propan-1-ol b) propan-2-ol
 c) propene d) cyclopropane
223. The residue insoluble in KOH obtained in the Hinsberg's test corresponds to
 a) 1°-amine b) 2°-amine
 c) 3°-amine d) cannot be predicated
224. Two compound A and B treated with nitrous acid



The corresponding stable carbocation intermediates are respectively

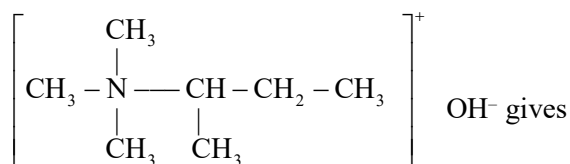


225. Product (B) of the following reaction is

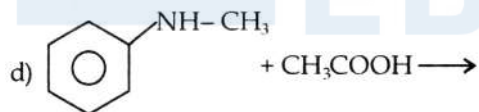
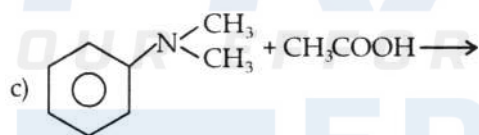
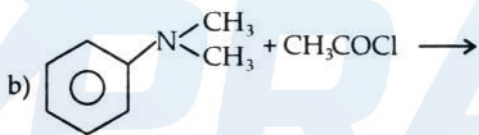
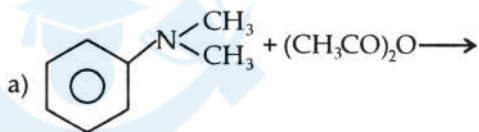


226. $\text{C}_6\text{H}_5\text{NH}_2 + \text{CHCl}_3 + \text{KOH}$ nitrogen containing compound + $3\text{KCl} + \text{H}_2\text{O}$. The nitrogen containing compound is
 a) $\text{C}_6\text{H}_5\text{NH}_3\text{Cl}$ b) $\text{C}_6\text{H}_5\text{CN}$
 c) $\text{C}_6\text{H}_5\text{NC}$ d) $\text{C}_6\text{H}_5\text{NO}_2$
227. In order to distinguish between $\text{C}_2\text{H}_5\text{NH}_2$ and $\text{C}_6\text{H}_5\text{NH}_2$, which of the following reagent is useful
 a) Hinsberg's reagent b) HNO_2
 c) $\text{CHCl}_3 + \text{KOH}$ d) NaOH
228. Which of the following is more basic amine?
 a) $(\text{CH}_3)_2\text{NH}$ b) $(\text{C}_2\text{H}_5)_3\text{N}$
 c) $(\text{CH}_3)_3\text{N}$ d) $\text{C}_2\text{H}_5\text{NH}_2$
229. Methyl alcohol is prepared from heating of
 a) $(\text{CH}_3)_4\text{NOH}$ b) $(\text{CH}_3)_3\text{N}-\text{C}_2\text{H}_5\text{OH}$
 c) $\text{CH}_3-\text{CH}_2-\text{NH}_2$ d) $\text{CH}_3-\text{NH}-\text{CH}_3$
230. Which of the following reacts with Hinsberg reagent to form a product soluble in KOH
 a) 1°-amine b) 2°-amine
 c) 3°-amine d) quaternary amine

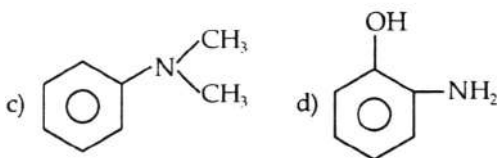
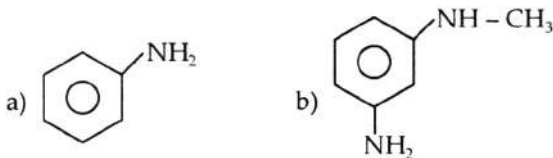
231. Thermal decomposition of



- a) $\text{CH}_3 - \text{CH} = \text{CH}_2$ b) $\text{CH}_2 = \text{CH}_2$
 c) $\text{CH}_3 - \text{CH}_3$ d) $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$
232. $1^\circ, 2^\circ, 3^\circ$ -amines can be distinguished by using
 a) $\text{NaNO}_2 + \text{HCl}$ b) CH_3COCl
 c) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ d) all of these
233. All three amines $1^\circ, 2^\circ, 3^\circ$ are react with
 1) H_2O 2) R-X
 3) HCl 4) $(\text{CH}_3\text{CO})_2\text{O}$
 a) 1, 2 b) only 4
 c) 1, 2, 4 d) 1, 2, 3
234. N,N -dimethyl anilinium acetate obtained from



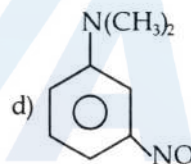
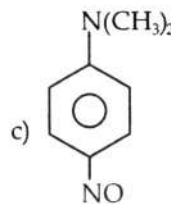
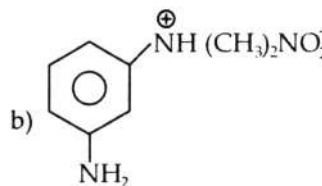
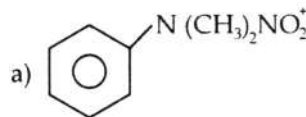
235. N -phenyl ethanamide is obtained from CH_3COCl and what



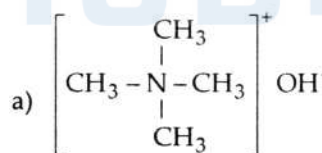
236. Aniline reacts with $\text{NaNO}_2 + \text{dil.HCl}$ gives

- a) phenol
 b) chlorobenzene
 c) dichlorobenzene
 d) benzene diazonium chloride

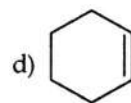
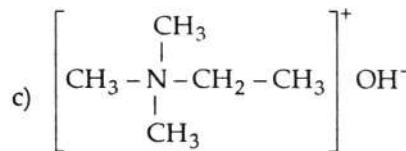
237. N,N -dimethyl phenyl amine reacts with nitrous acid gives



238. Which of the following compound produces alkene on heating



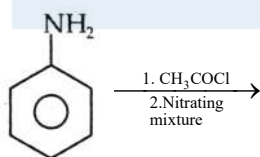
b) $(\text{CH}_3)_3\text{C-X}$



239. $-\text{NH}_2$ group in aniline is

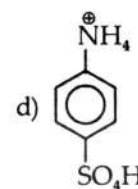
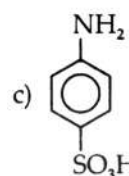
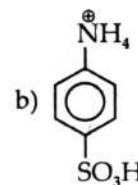
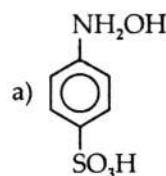
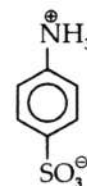
- a) only o-directing b) only p-directing

- c) only m-directing d) o and p directing
240. Strong activating effect of $-\text{NH}_2$ group is reduced by using
- a) CH_3COCl b) CH_3Cl
c) CH_3ONa d) CH_3-CHO
241. During electrophilic substitution reaction protection of $-\text{NH}_2$ group can be done by
- a) reduction b) oxidation
c) alkylation d) acylation
242. Aniline is reacted with Br_2/water gives (without protecting $-\text{NH}_2$ group)
- a) o-bromo aniline
b) p-bromo aniline
c) mixture of o- and p-bromo aniline
d) 2,4,6-tribromoaniline
243. When bromination of aniline is carried out by protecting $-\text{NH}_2$. The product is
- a) o-bromoaniline
b) 2, 4, 6-tribromo aniline
c) p-bromo aniline
d) mixture of o- and p-bromo aniline
244. Aniline on nitration gives
- a) o-nitroaniline
b) p-nitroaniline
c) m-nitroaniline
d) mixture of o,p,m nitroaniline
245. Aniline on nitration unexpectedly gives
- a) o-nitroaniline b) p-nitroaniline
c) m-nitroaniline d) o-dinitro benzene
246. Product of the following reaction will be

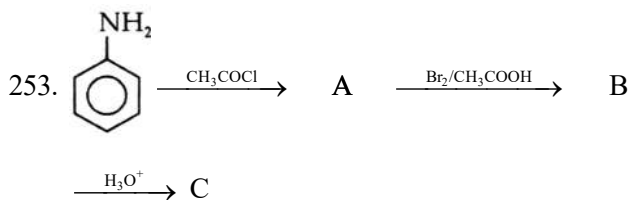


- a) o-nitroaniline as major product
b) p-nitroaniline as major product
c) m-nitroaniline as major product
d) o-amino acetophenone is major product
247. Which of the following exist as a zwitter ion?
- a) sulphanilic acid b) sulphonic acid
c) phthalic acid d) Terephthalic acid
248. Aniline is heated with cone. H_2SO_4 gives
- a) o-amino benzene sulphonic acid
b) p-amino benzene sulphonic acid
c) m-amino benzene sulphonic acid

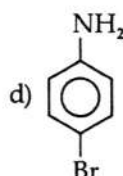
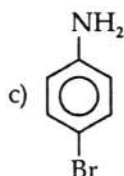
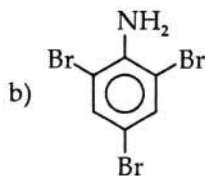
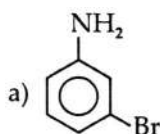
- d) isophthalic acid
249. Following is zwitter ion of



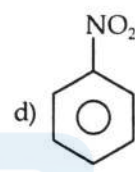
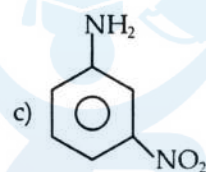
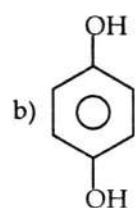
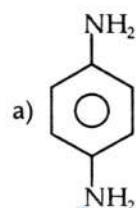
250. Aniline donot reacts with
- a) $\text{Br}_2 + \text{water}$
b) conc. NH_3
c) conc. H_2SO_4
d) CH_3-Cl in the presence of AlCl_3
251. Which of the following reaction is not occur in aniline
- a) bromination b) sulphonation
c) nitration d) Friedel-Craft reaction
252. What is the main reason for aniline which does not gives Feridel Craft reaction
- a) Aniline is stabilized by resonance
b) NH_2 group of aniline react with AlCl_3 to give ring deactivating $\text{N}^+\text{H}_2\text{Cl}$
c) lone pair of electron on nitrogen never conjugate with benzene ring
d) it is a Lewis base



What is 'C' as a major product?



254. Aniline react with cone HNO_3 gives



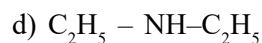
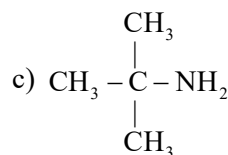
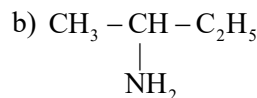
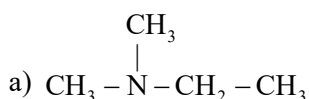
255. Bromination of aniline gives 2,4,6-tribromoaniline, whereas nitration of aniline gives m-nitroaniline. In case of nitration m-derivatives is formed because

- In presence of strong acid NH_2 group protonated to form NH_3^+ which is m-directing
- m-nitroaniline is more stable than o- and p-nitroaniline
- nitro group cannot enter at o and p position because of steric factor
- The mechanism of bromination and nitration is different

256. Aniline is reacted with acetic anhydride gives

- phenol
- acetamide
- acetanilide
- benzene

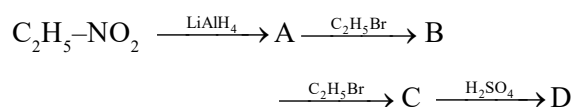
257. An organic formula $\text{C}_4\text{H}_{11}\text{N}$ does not react with $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$ but react with one mole of methyl iodide to form salt. The structure of 'X' is



258. Which medium change the directive influence of NH_2 in nitration reaction of aniline?

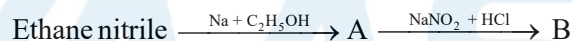
- Strongly basic
- Strongly acidic
- Neutral
- Weakly acidic

259. What is 'D' in the following reaction?



- $[(\text{C}_2\text{H}_5)_3\text{NH}]_2^+\text{SO}_4^{2-}$
- $[(\text{C}_2\text{H}_5)_3\text{NH}]_3^+\text{SO}_4^{2-}$
- $(\text{C}_2\text{H}_5)_3\text{NH}^+ \text{SO}_4^{2-}$
- $(\text{C}_2\text{H}_5)_3\text{N}^+ \text{OH}^-$

260. Product 'B' in the following reaction



- $\text{C}_2\text{H}_5\text{Cl}$
- $\text{C}_2\text{H}_5\text{NH}_2$
- $\text{C}_2\text{H}_5\text{OH}$
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

261. Which of the following amine is most basic in nature?

- 2,4-dichloro aniline
- 2,4-dimethyl aniline
- 2,4-dinitro aniline
- 2,4-dibromo aniline

262. Which of the following amine can not be prepared by Gabriel phthalimide synthesis?

- Secondary propyl amine
- Tertiary butyl amine
- 2-phenyl ethyl amine
- N-methyl benzyl amine

263. Chloropicrin is used as

- antiseptic
- antibiotic
- insecticide
- anaesthetic

○○○

ANSWERS - MCQ'S**SECTION - II : AMINES**

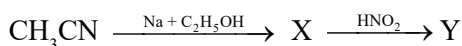
1. d)	2. c)	3. c)	4. d)	5. a)	6. c)	7. a)	8. c)	9. b)	10. b)
11. b)	12. c)	13. b)	14. b)	15. c)	16. c)	17. b)	18. c)	19. b)	20. c)
21. a)	22. b)	23. b)	24. d)	25. b)	26. d)	27. b)	28. a)	29. d)	30. c)
31. a)	32. b)	33. a)	34. a)	35. a)	36. a)	37. c)	38. d)	39. b)	40. b)
41. c)	42. c)	43. d)	44. a)	45. c)	46. d)	47. d)	48. d)	49. b)	50. a)
51. d)	52. d)	53. d)	54. d)	55. d)	56. d)	57. d)	58. b)	59. b)	60. a)
61. a)	62. a)	63. d)	64. b)	65. a)	66. b)	67. a)	68. c)	69. a)	70. c)
71. c)	72. a)	73. d)	74. d)	75. a)	76. c)	77. b)	78. b)	79. a)	80. b)
81. c)	82. a)	83. b)	84. a)	85. d)	86. c)	87. b)	88. d)	89. c)	90. a)
91. d)	92. b)	93. c)	94. d)	95. a)	96. c)	97. a)	98. c)	99. b)	100. a)
101. c)	102. a)	103. c)	104. b)	105. c)	106. c)	107. b)	108. c)	109. d)	110. b)
111. c)	112. a)	113. a)	114. d)	115. b)	116. c)	117. a)	118. b)	119. c)	120. b)
121. b)	122. b)	123. b)	124. d)	125. c)	126. c)	127. a)	128. a)	129. b)	130. c)
131. a)	132. b)	133. c)	134. d)	135. a)	136. d)	137. c)	138. c)	139. c)	140. a)
141. b)	142. d)	143. d)	144. c)	145. b)	146. d)	147. a)	148. a)	149. b)	150. a)
151. c)	152. b)	153. a)	154. a)	155. a)	156. d)	157. c)	158. b)	159. b)	160. b)
161. c)	162. a)	163. d)	164. b)	165. b)	166. b)	167. a)	168. c)	169. b)	170. b)
171. b)	172. a)	173. a)	174. d)	175. b)	176. a)	177. b)	178. b)	179. b)	180. b)
181. d)	182. c)	183. d)	184. d)	185. b)	186. c)	187. a)	188. b)	189. c)	190. a)
191. c)	192. d)	193. d)	194. c)	195. a)	196. c)	197. b)	198. c)	199. d)	200. b)
201. d)	202. b)	203. d)	204. c)	205. d)	206. c)	207. a)	208. d)	209. b)	210. b)
211. c)	212. b)	213. c)	214. d)	215. c)	216. a)	217. d)	218. d)	219. d)	220. b)
221. d)	222. b)	223. b)	224. c)	225. b)	226. c)	227. b)	228. b)	229. a)	230. a)
231. b)	232. d)	233. d)	234. c)	235. a)	236. d)	237. c)	238. c)	239. d)	240. a)
241. d)	242. d)	243. d)	244. d)	245. c)	246. b)	247. a)	248. b)	249. c)	250. d)
251. d)	252. b)	253. c)	254. c)	255. a)	256. c)	257. a)	258. b)	259. a)	260. c)
261. b)	262. d)	263. c)							



BRAIN TEASERS

SECTION – II : AMINES

1. Identify the end product (Y) in the following reaction series



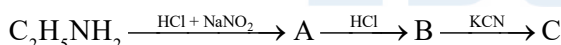
- a) CH_3OH b) CH_3OCH_3
 c) $\text{C}_2\text{H}_5\text{OH}$ d) $\text{CH}_3\text{ON} = \text{O}$
2. An optical inactive amine (A) $\text{C}_4\text{H}_{11}\text{N}$ on treatment with HNO_2 give an alcohol (B). The alcohol (B) on heating with conc. H_2SO_4 at 453K 1-butene. Identify (A).

- a) $\text{CH}_3\text{CH}_2\text{CH}(\text{NH}_2)\text{CH}_3$
 b) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
 c) $\text{CH}_3\text{NHCH}_2\text{CH}_2\text{CH}_3$
 d) $\text{C}_2\text{H}_5\text{NHC}_2\text{H}_5$
3. The compound (A) $\text{C}_4\text{H}_{11}\text{N}$ which is optically active, dissolved in conc. HCl and released nitrogen with HNO_2 . What is the compound (A) ?

- a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
 b) $\text{CH}_3\text{CHNH}_2\text{CH}_2\text{CH}_3$
 c) $\text{C}_2\text{H}_5\text{NHC}_2\text{H}_5$
 d) $\text{CH}_3\text{NHCH}(\text{CH}_3)_2$
4. In the following reaction $\text{RX} + \text{KCN} \xrightarrow{\Delta}$ which of the following isomeric compound is formed

- a) RCN b) RNC
 c) RNH_2 d) ROR

5. In the reaction



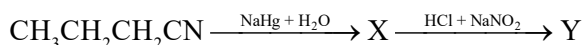
The final product C is

- a) propane nitrile b) ethane nitrile
 c) propyl amine d) formo nitrile
6. The total number of electrons around the nitrogen atom in amines are,
- a) 8 b) 7
 c) 4 d) 3

7. The end product of the reaction,

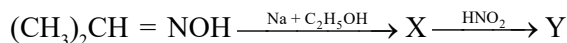


- a) ethyl amide b) ethyl amine
 c) methyl amine d) acetamide
8. Identify the product Y in the series



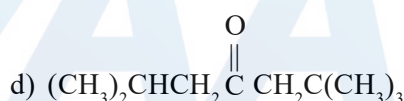
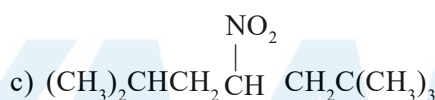
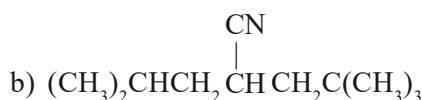
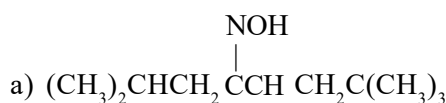
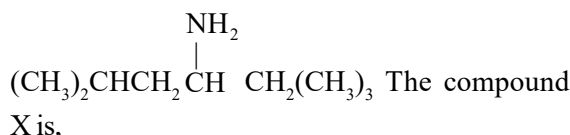
- a) 1-propanol b) 2-propanol
 c) 1-butanol d) 2-butanol

9. Identify the product Y in the series



- a) 2-propanol b) 2-propanamine
 c) 2-butanol d) 1-propanol

10. Compound X is treated with NH_2OH and followed by reduction gives



11. The type(s) of bond in RNC is / are

- a) covalent
 b) ionic
 c) ionic and co-ordinate
 d) covalent and co-ordinate

12. The unknown compound is taken in vessel soluble in dilute HCl and small amount of NaNO_2 is added, nitrogen gas is evolved. The unknown compound is

- a) 1° amines b) alcohols
 c) 2° amines d) carboxylic acids

13. Which of the following is not capable of forming hydrogen bond ?

- a) CH_3NH_2 b) $(\text{CH}_3)_3\text{CNH}_2$
 c) CH_3NHCH_3 d) $(\text{CH}_3)_3\text{N}$

14. The amine which form co-ordinate bond with Lewis acid is / are

- a) RNH_2 b) R_2NH
 c) R_3N d) all of these

15. Quaternary ammonium halide is heated with moist silver oxide gives
 a) quaternary ammonium hydroxide
 b) ammonium hydroxide
 c) alcohol
 d) alkene
16. Quaternary ammonium hydroxide containing all groups are methyl, on heated gives
 a) trimethyl amine b) methanol
 c) both 'a' and 'b' d) ethanol
 ○○○

ANSWERS - BRAIN TEASERS

SECTION - II : AMINES

1. c)	2. b)	3. b)	4. b)	5. a)	6. a)	7. b)	8. c)	9. a)	10. d)
11. d)	12. a)	13. d)	14. d)	15. a)	16. c)				

QUESTIONS ASKED IN MHT-CET

SECTION - II : AMINES

- When formaldoxime is treated with Na in C_2H_5OH it will give?
 a) Formaldehyde b) Methyl amine
 c) Methanol d) Formic acid
- The odour of amine is
 a) odourless b) pungent
 c) fishy d) garlic like
- IUPAC name of ethyl methyl amine is
 a) ethyl methanamine b) methyl ethanamine
 c) propanamine d) 2-amino propane
- When ethyl amine is treated with acetyl chloride, forms?
 a) C_2H_5NH b) C_2H_5CHO
 c) CH_3NHCH_3 d) $C_2H_5NHCOCH_3$
- Which of the following cannot be acetylated ?
 a) CH_3NH_2 b) $(CH_3)_2NH$
 c) $(CH_3)_3N$ d) $C_2H_5NH_2$
- Iso-propyl amine on acetylation gives
 a) $(CH_3)_2CH-NCOCH_3$
 b) $(CH_3)_2CH-NHCOCH_3$
 c) $(CH_3)_2CHN(COCH_3)_2$
 d) $(CH_3)_2CHN(OCH_3)_2$
- In acetylation of amines one or more hydrogen atoms are removed from
 a) carbon atom only
 b) nitrogen atom only
 c) both carbon and nitrogen atoms
 d) from acetyl chloride only
- Final product of methylation of ethyl amine is
 a) tri ethyl methyl amine
 b) ethyl tri methyl amine
 c) tri ethyl methyl ammonium halide
 d) ethyl tri methyl ammonium halide
- n-propyl amine reacts with HNO_2 gives
 a) iso-propyl alcohol
 b) n-propyl alcohol
 c) n-propyl nitrosoamine
 d) none of these
- IUPAC name of isopropyl amine is
 a) 2-amino propane
 b) 2-propanamine
 c) 2,2-methyl ethanamine
 d) dimethanamine
- Which of the following compound reacts with nitrous acid to form alcohol?
 a) R_2NH b) RNH_2
 c) $R-CONH_2$ d) R_3N
- Acetaldoxime on reduction with Na/C_2H_5OH gives
 a) 2-propanol b) ethylamine
 c) acetaldehyde d) ethanol
- Acetonitrile on reduction gives
 a) propanamine b) methanamine
 c) ethanamine d) acetic acid
- The functional group present in secondary amine is
 a) amino group b) imino group
 c) nitrile group d) oxime group
- Final product of methylation of ethyl amine and ethyl methyl amine is
 a) ethyl trimethyl amine
 b) triethyl methyl amine
 c) triethyl methyl ammonium halide

- d) ethyl trimethyl ammonium halide
16. What is the product of reaction between diethyl amine and nitrous acid?
- Diethyl amine nitrite
 - Diethyl nitroso amine
 - Diethyl alcohol
 - Diethyl nitrate
17. IUPAC name of $C_2H_5CH(CH_3)NH_2$
- ethyl methyl amine
 - methyl ethyl amine
 - 2-butanamine
 - 1-butanamine
18. Which of following is most basic amine?
- $C_2H_5NH_2$
 - $(C_2H_5)_2N$
 - $(C_2H_5)_2NH$
 - NH_3
19. Which of following forms $C_2H_5NH_2I$ on reduction?
- C_2H_5CN
 - CH_3CHO
 - CH_3CN
 - CH_3NC
-

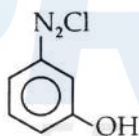
ANSWERS - QUESTIONS ASKED IN MHT-CET

1. b)	2. c)	3. b)	4. d)	5. c)	6. c)	7. b)	8. d)	9. b)	10. b)
11. b)	12. b)	13. c)	14. b)	15. d)	16. b)	17. c)	18. c)	19. c)	

MULTIPLE CHOICE QUESTIONS

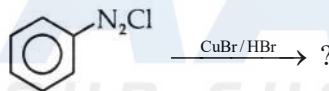
SECTION – III : DIAZOIUM SALT

1. Aliphatic diazonium chloride on decomposition gives
- 1°-amines
 - alcohols
 - aldehydes
 - alkanes
2. IUPAC name of the following compound is



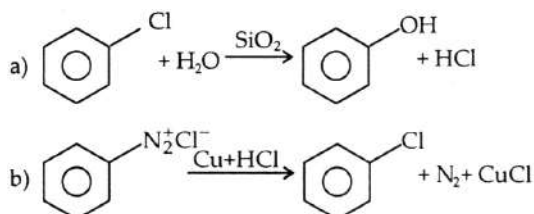
- 3-oxo benzene diazonium chloride
 - 3-hydroxy benzene diazonium chloride
 - 3-nitro chlorophenol
 - 4-hydroxy benzene diazonium chloride
3. Diazotization of aniline gives
- nitrobenzene
 - dinitrobenzene
 - benzaldehyde
 - benzene diazonium chloride
4. Which of the following is incorrect about benzene diazonium chloride?
- These are colour less crystalline solid
 - These are readily soluble in water
 - It's aqueous solution conduct electricity
 - It does not decompose in dry state
5. $-N \equiv N-$ group in benzene diazonium chloride is
- o-directing
 - p-directing
 - m-directing
 - none of these

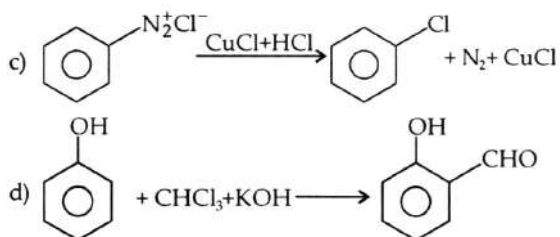
6. Benzene diazonium chloride on acid hydrolysis gives
- benzene
 - phenol
 - benzoic acid
 - benzaldehyde
7. Replacement of $-N_2^+Cl^-$ from benzene diazonium chloride by hydrogen atom can be done by using
- H_3PO_2
 - C_2H_5-OH
 - CH_3-CHO
 - both a and b
8. Product of the following reaction is



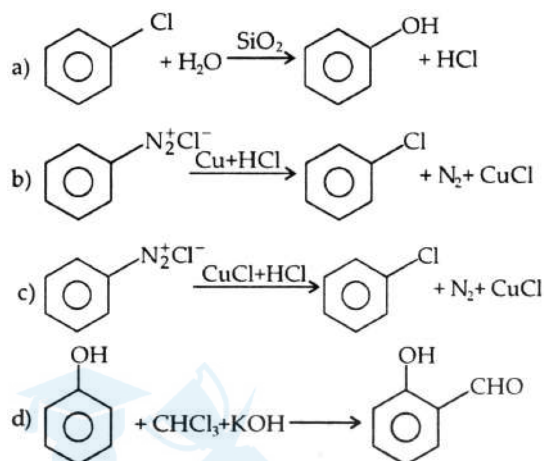
-
-
-
-

9. Replacement by $-N_2^+Cl^-$ from benzene diazonium chloride by iodine can be done by using
- HI
 - NaOI
 - PI_3
 - KI
10. Which of the following is Sandmeyer's reaction





11. Which of the following is Gattermann reaction?



12. Sandmeyer's reaction of benzene diazonium chloride is used in the preparation of

- a) chlorobenzene b) benzene
c) phenol d) iodobenzene

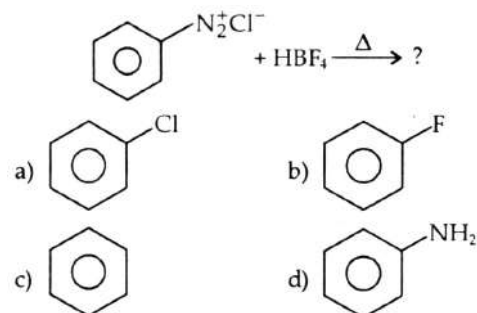
13. In Balz-Schiemann's reaction reagent used is

- a) H₃BO₃ b) BF₄
c) HBF₄ d) HF

14. Balz-Schiemann's reaction is used to convert

- a) Aromatic aldehyde to aldol
b) benzene to chlorobenzene
c) chlorobenzene to phenol
d) benzene diazonium chloride to fluorobenzene

15. Product of the following reaction is



16. Sandmeyer's reaction convert benzene diazonium chloride to

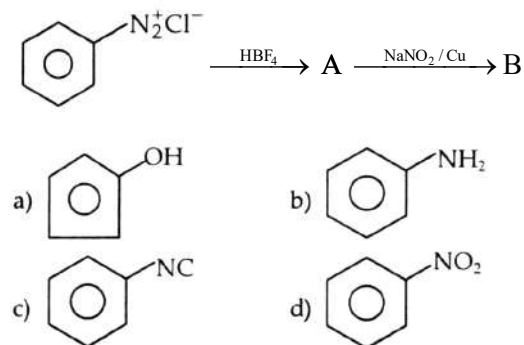
- 1) chlorobenzene 2) bromobenzene
3) toluene 4) nitrobenzene

- a) 1, 4 b) 2, 3
c) 2, 3, 4 d) 1, 2, 3

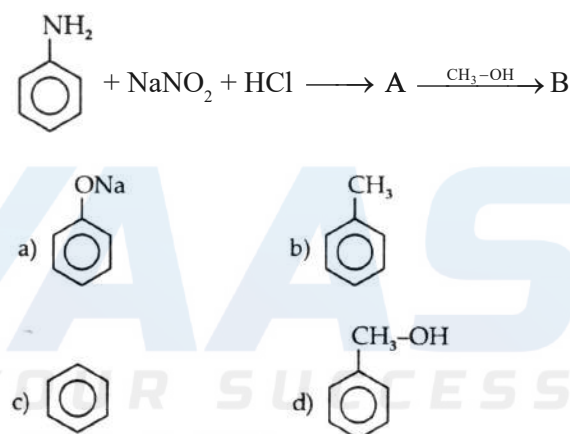
17. Benzene diazonium chloride convert phenyl cyanide by using

- a) H-CN b) AgCN
c) CuCN d) CH₃-CN

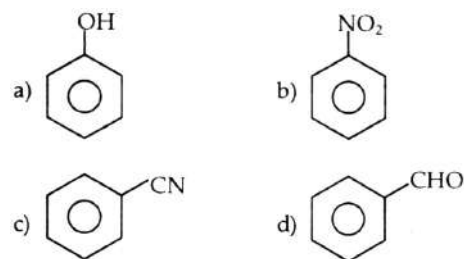
18. Product of the following reaction is



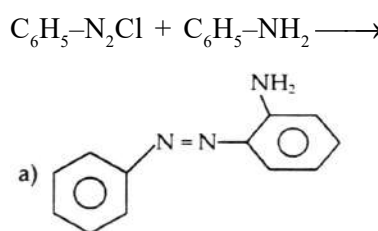
19. Product 'B' in the following reaction is

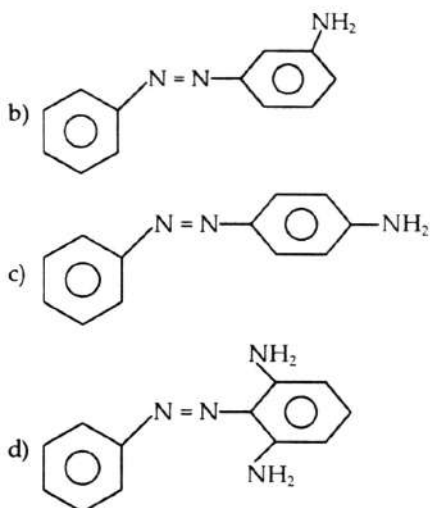


20. Which of the following undergoes coupling reaction with benzene diazonium chloride?

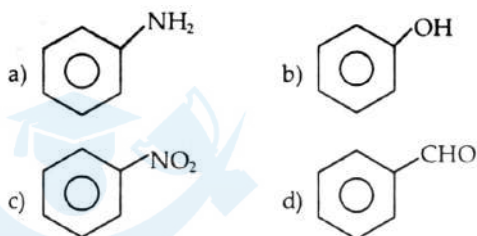


21. Product of the following reaction is

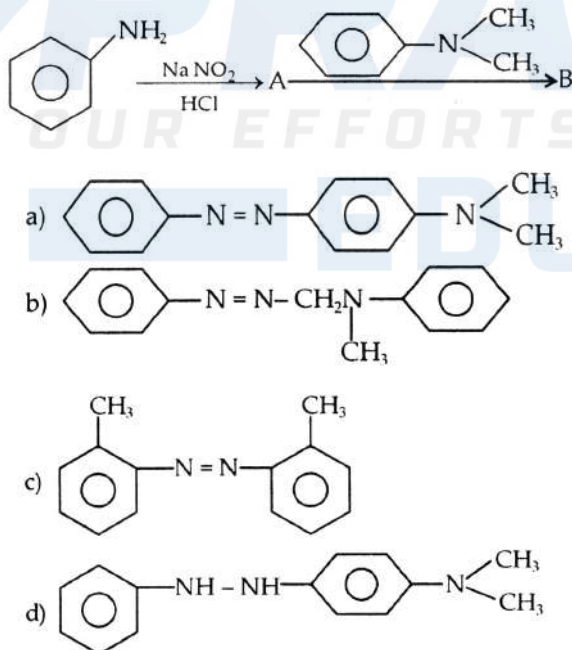




22. Orange colour compound is obtained when benzene diazonium chloride and what



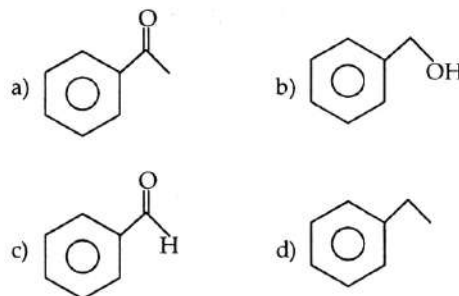
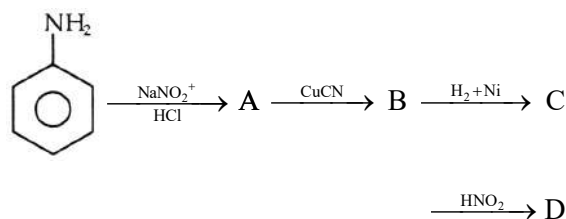
23. In the reaction of aniline a coloured product was obtained



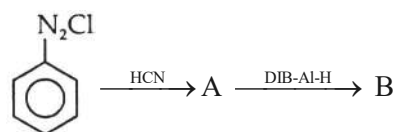
24. Gattermann reaction is modified form of

- diazotizations reaction
- Hofmann's bromide reaction
- Sand meyers reaction
- Ullman reaction

25. Product D in the following sequence of reaction

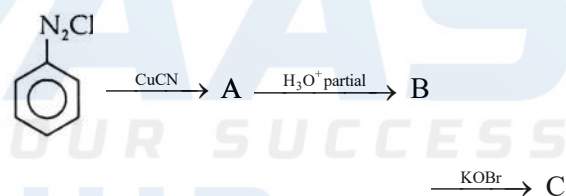


26. Product 'B' in the following reaction



- benzoic acid
- benzaldehyde
- benzonitrile
- aniline

27. Product 'C' in the following reaction



- benzoic acid
- benzaldehyde
- benzonitrile
- aniline

28. $-N_2^+X^-$ is replaced by CN using

- HCN
- CuCN
- CH_3CN
- both 'a' and 'b'

29. $C_6H_5-N_2^+X^-$ is converted into benzene by using

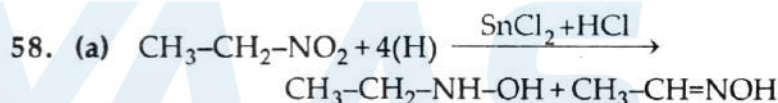
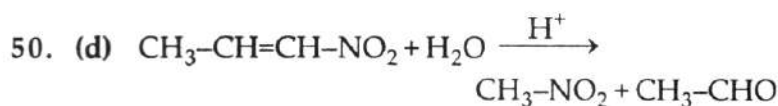
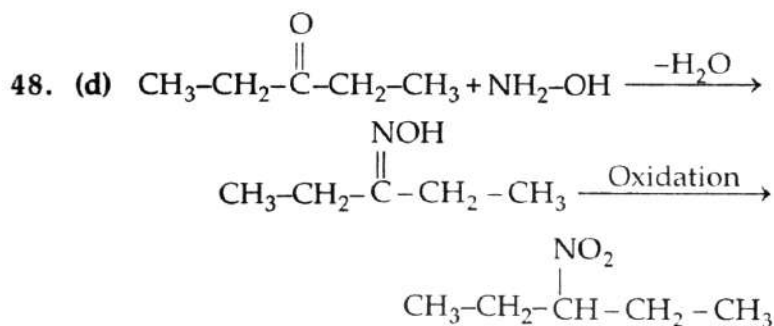
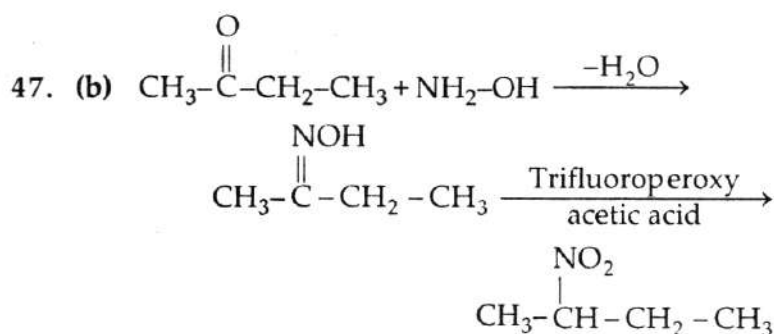
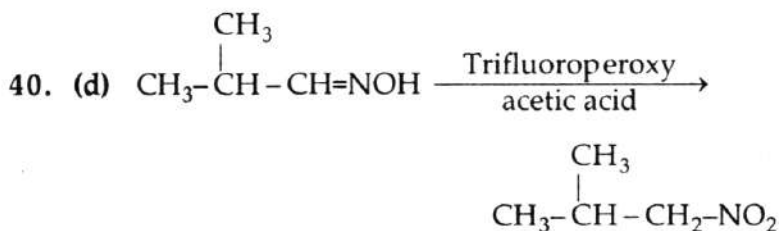
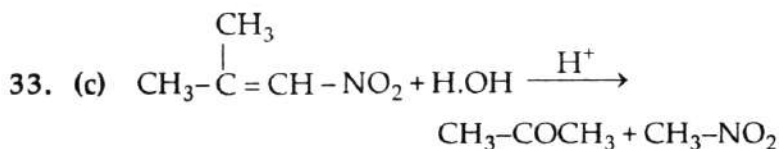
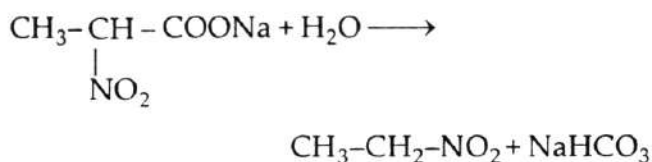
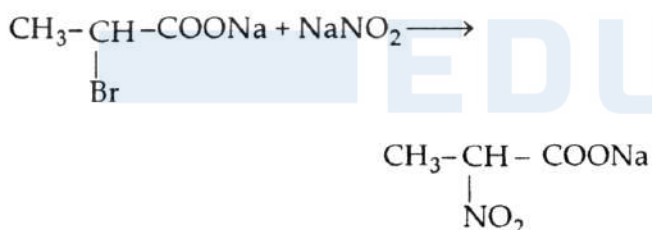
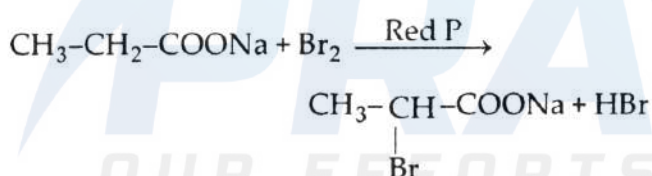
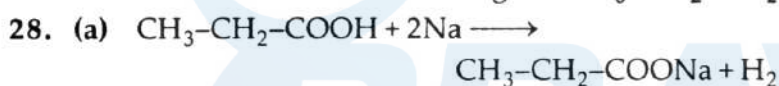
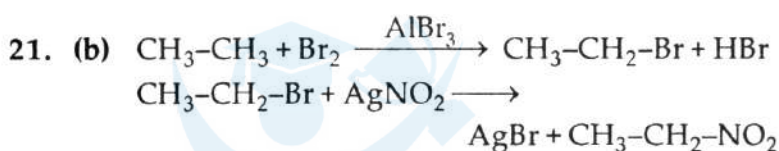
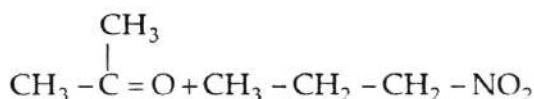
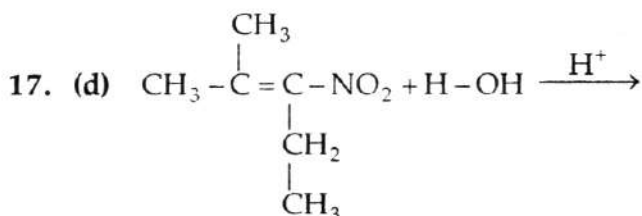
- H_3PO_2
- H_3PO_3
- H_3PO_4
- HPO_3

30. Azo coupling reaction is not possible with

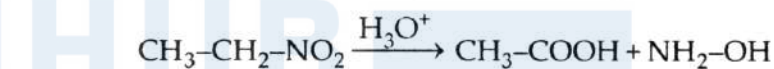
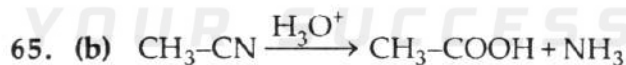
- C_6H_5OH
- $C_6H_5NH_2$
- $C_6H_5NHCH_3$
- $C_6H_5NO_2$

○○○

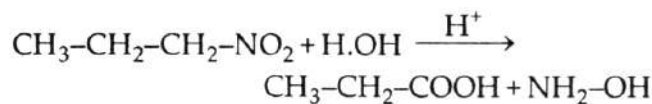
5. (c) NO_2 is ambidentate nucleophile because it has two attacking centre. It can attack on substrate through nitrogen or oxygen.
10. (d) Reduction of oxime produces 1° amines.
11. (b) $\text{CH}_3\text{-NH}_2$ does not undergoes nitration.



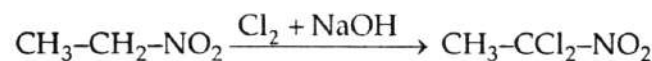
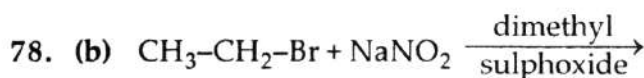
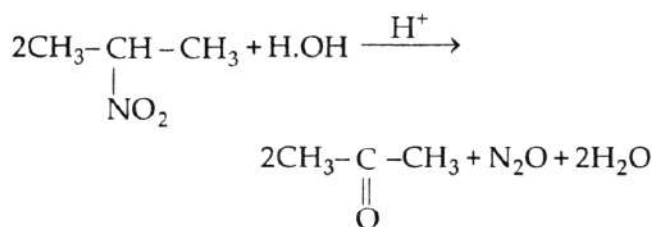
64. (c) 3° nitroalkane does not undergo acid hydrolysis because of absence of α -H atom.



Primary nitroalkane on acid hydrolysis gives acid.



67. (c) Secondary nitroalkane on acid hydrolysis gives ketone.



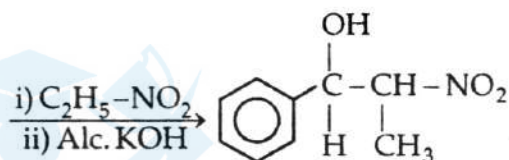
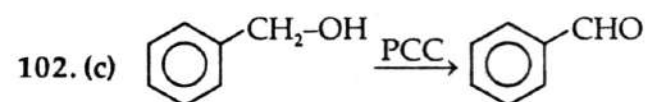
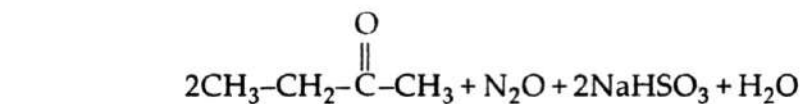
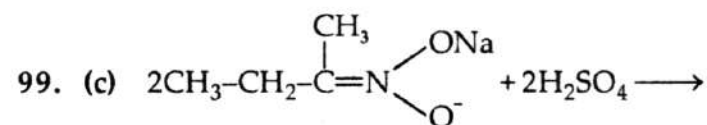
In above reaction α -H atom of nitroalkane are replaced by Cl.

82. (a) Compound containing α -H atoms undergo tautomerisation.

83. (a) Primary nitroalkane produces nitrolic acid with HNO_2 .

84. (b) Secondary nitroalkane gives blue coloured pseudonitrol with HNO_2 .

85. (d) Tertiary nitroalkane and tertiary amine does not react with nitrous acid.

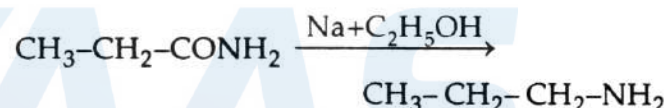
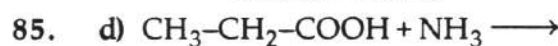
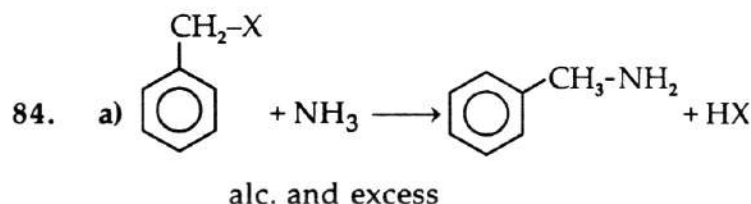
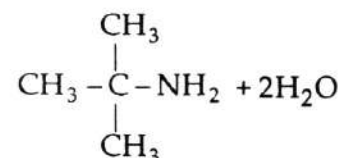
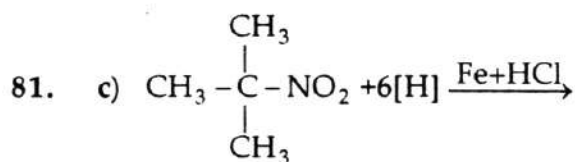


114. (d) Secondary nitroalkane gives blue coloured pseudonitrol, which do not undergo tautomerisation. Hence blue colour is retained when treated with NaOH .

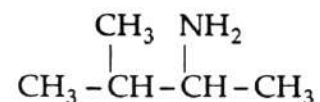
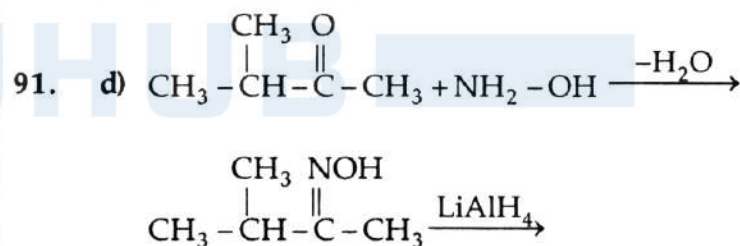
116. (c) Compound B gives positive Tollen's test, means aldehyde.

Aldehydes are prepared by Nef-carbonyl synthesis from 1° -nitroalkane.

37. c) Three metamers are possible for formula $C_4H_{11}N$.
1. $CH_3-NH-CH_2-CH_2-CH_3$
 2. $CH_3-NH-CH(CH_3)_2$
 3. $C_2H_5-NH-C_2H_5$
38. d) Molecular formula C_3H_9N can show position and functional isomerism,
- $$CH_3-CH_2-CH_2-NH_2 \text{ and } CH_3-\underset{\substack{| \\ NH_2}}{CH}-CH_3$$
- are position isomers.
 $1^0, 2^0, 3^0$ -amines are functional isomers.
39. b) NH group is imino group.
41. c) $-COOH$ group is principal functional group. Hence name of the compound is according to $-COOH$ group.
42. c) These are not identical because they have different molecular formula.
48. d) Cis trans isomerism is possible in that compounds containing $C=C$, $C=N$, $N=N$. Amines are single bonded compounds.
61. b) It is a Mendius reduction which convert $-CN$ group to $-CH_2-NH_2$ group.
62. a) Aldoxime or ketoxime on reduction gives only 1^0 -amines.
63. d) $CH_3-\overset{\substack{| \\ CH_3}}{C}=NOH \xrightarrow{Na+C_2H_5OH}$
- $$CH_3-\underset{\substack{| \\ CH_3}}{CH}-NH_2 \xrightarrow{2CH_3COCl}$$
- $$CH_3-\underset{\substack{| \\ CH_3}}{CH}-N(COCH_3)_2$$
- diacetyl isopropyl amine
64. b) $CH_3-CH_2-CH=NOH + 4(H) \xrightarrow{Na+C_2H_5-OH}$
- $$CH_3-CH_2-CH_2-NH_2 + H_2O$$
67. a) $H-C\equiv N + 4(H) \xrightarrow{Na+C_2H_5-OH} CH_3-NH_2$.
71. b) Alkyl cyanide on acid hydrolysis gives carboxylic acids.
80. b) Aldehyde on reduction gives 1^0 alcohols.

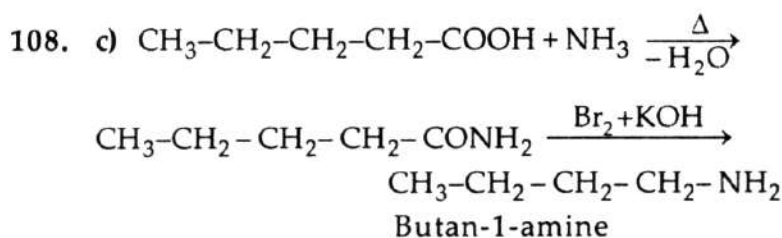
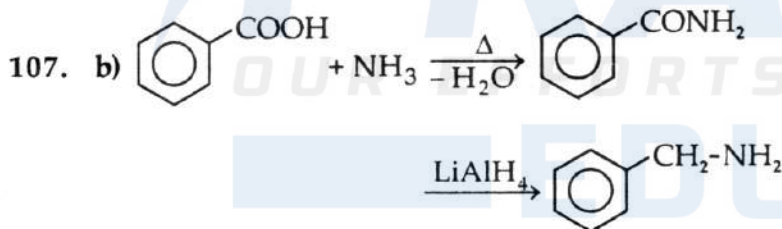
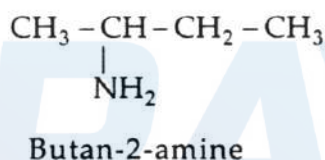
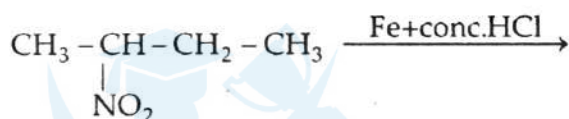
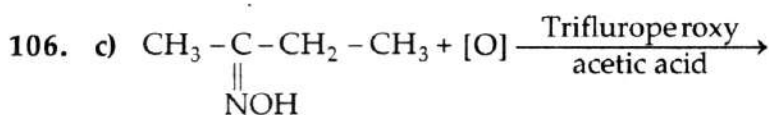
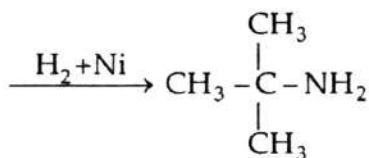
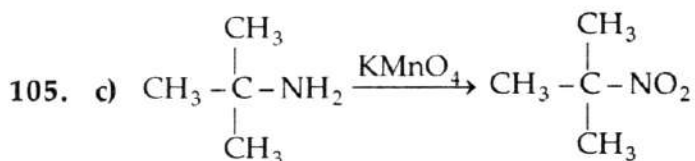


88. d) 3^0 alkyl halide is not used in alkylation of ammonia because it undergo elimination reaction with alc. NH_3 .



92. b) Amide gives 1^0 amines by Hoffmann's degradation method.
94. d) 1-bromo, 2 methyl propane gives 2-methyl propan-1-amine by Gabriel phthalimide synthesis.
97. a) Only 1^0 aliphatic amines can be prepared by Gabriel Phthalimide synthesis.
98. c) Alkyl cyanide, and nitroalkane gives 1^0 amine on reduction. Amide also give 1^0 amine but not reduction method.

group.



111. c) C_6H_5 - group is more water hating than C_2H_5 group.

112. a) Primary and secondary amines have intermolecular hydrogen bonding because of presence of hydrogen atoms attached to nitrogen atom.

113. a) In isomeric compounds normal compounds have higher B.P. than branched compounds. But in amines active hydrogen atoms are different.

3° amines = $\geq \text{N}$ group = 0 active H-atoms

Hence B.P. order is $1^\circ > 2^\circ > 3^\circ$

115. b) Amine are basic in nature. Hence these are soluble in acid forming salt.

116. c) In alcohols oxygen is more electronegative than nitrogen in amines. Hence alcohol forms strong intermolecular hydrogen bonding than amines, leads to higher B.P. than amines.

117. a) Alcohols are more soluble in water than amines because they form strong hydrogen bond with water.

123. b) Electron withdrawing groups decrease the basicity of amines. Strong electron withdrawing groups decrease more basicity of amines.

NO_2 is strong withdrawing group than CN , Cl , and OH .

124. d) When electron withdrawing group goes away from $-\text{NH}_2$ group, the basicity of amine increases.

125. c) Aliphatic amines are more basic than aromatic amines.

126. c) More the P_{kb} value less the basicity. The $-\text{Cl}$ atom is electron withdrawing which decreases the basicity of amines.

127. a) Electron donating group increases the basicity of amines. Methyl group is electron donating.

131. a) $(\text{CH}_3)_2\text{NH} + \text{H}^+ \longrightarrow (\text{CH}_3)_2\text{NH}_2^+$
conjugate base conjugate acid

133. c) Weak base can share lone pair of electron less easily. Aniline is weak base than other.

134. d) Aralkyl amines are more basic than any aromatic amines. Benzyle amine is aralkyl amine.

135. a) Aliphatic amines are more basic than aralkyl amines and aromatic amines.

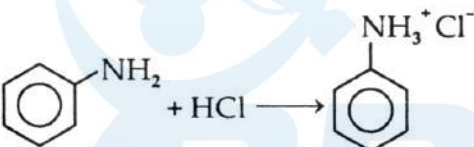
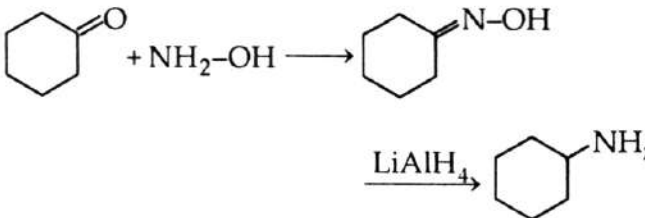
146. d) Electron withdrawing groups decreases the basicity of amine.

More the electron withdrawing power of the group less the basicity.

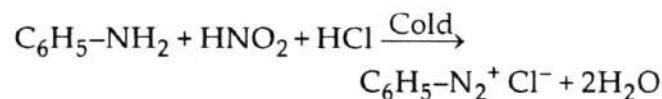
$-\text{NO}_2$ group has more electron withdrawing power than F . Hence p-fluoroaniline is more basic than p-nitro aniline.

156. d) Carbyl amine reaction is characteristics reaction of primary amine. Dimethyl amine is secondary amine, does not give Carbylamine reaction.

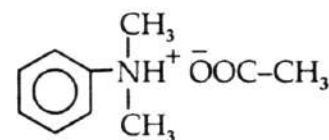
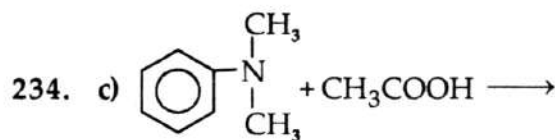
gives nitrosoamine.

161. c) Because of absence of hydrogen atom attached to nitrogen atom.
163. d) All primary amine gives N_2 gas with $NaNO_2 + HCl$.
164. b) In this reaction H^+ is replaced by NO^+ . Hence it is electrophilic substitution reaction.
169. b) Triethyl amine has more K_b value hence it is more basic than dimethyl amine.
180. b) Basicity of amines depends upon the sharing of lone pair of electrons.
191. b) Secondary amine does not give alcohol with nitrous acid.
192. d) CH_3-I is best methylating agent because of C-I bond length is more than that of C-Cl, C-Br, C-F bond length.
203. d) Tertiary amine soluble in $NaNO_2 + HCl$ forming water soluble salt.
 $(CH_3)_3 N + HNO_2 \longrightarrow (CH_3)_3 NH^+ Cl^-$
220. b) 
 Anilinium hydrochloride
221. d) Secondary butyl amine is optically active, reacts with nitrous acid to give butan-2-ol.
 $CH_3 - \underset{\substack{| \\ NH_2}}{CH} - CH_2 - CH_3 + HNO_2 \xrightarrow{Cold}$
 $CH_3 - \underset{\substack{| \\ OH}}{CH} - CH_2 - CH_3 + N_2 + H_2O$
224. c) Isopropyl amine produces isopropyl carbocation while n-propyl amine produces n-propyl carbocation.
225. b) 
226. c) It is a carbylamine reaction gives isocyanide (C_6H_5NC).

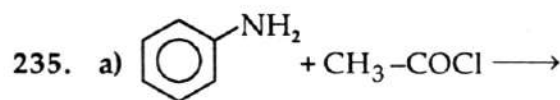
227. b) $C_2H_5-NH_2 + HNO_2 \xrightarrow{Cold} C_2H_5-OH + N_2 + H_2O$



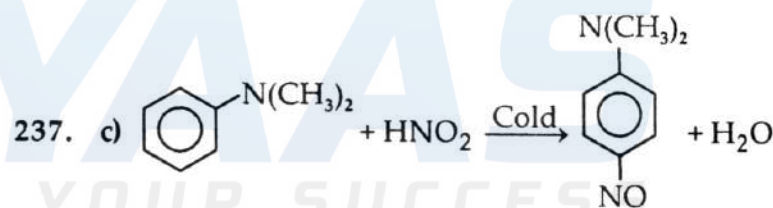
229. a) $(CH_3)_3 NOH \xrightarrow{\Delta} CH_3-OH + (CH_3)_3 N$



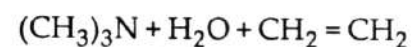
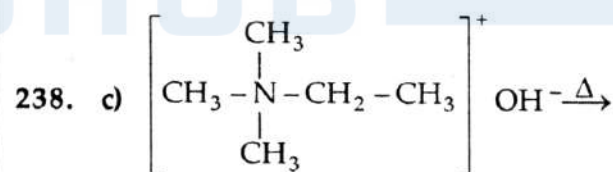
N, N -dimethyl anilinium acetate



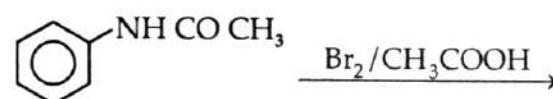
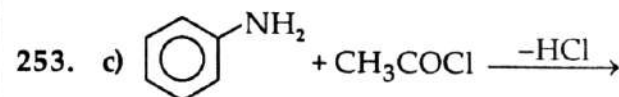
N-Phenyl ethanamide or Acetanilide

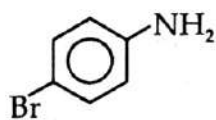


p-nitroso N, N-dimethyl phenyl amine

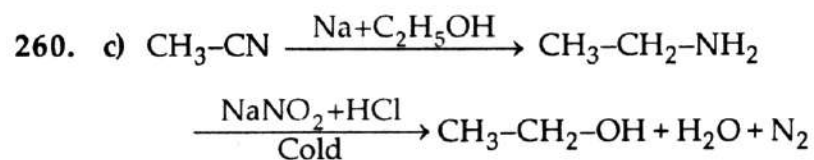
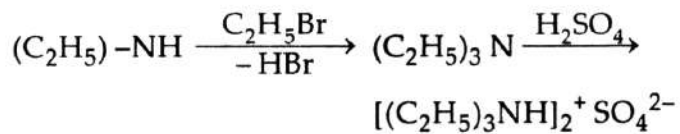
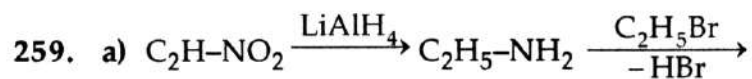


250. d) Aniline does not undergo Friedel Craft reaction because $AlCl_3$ bonded with $-NH_2$ to form $-NH_2^+ Cl^-$





258. b) Strong acidic medium change the directive influence of $-\text{NH}_2$ group and gives unexpectedly m-nitro aniline.



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