AMINES

CHEMISTRY

Single Correct Answer Type

- 1. Acetonitrile on reduction gives
 - a) Propanamine
- b) Methanamine
- c) Ethanamine
- d) None of these
- 2. Hofmann's rearrangement during the conversion of an amide to amine involves...... rearrangement
 - a) Intermolecular
- b) Intramolecular.
- c) Both (a) and (b)
- d) None of these
- 3. The reduction of which of the following compound would yield secondary amine?
 - a) Alkyl nitrile

b) Carbylamine

c) Primary amine

- d) Secondary nitro compound
- 4. Which of the test is used for detection of secondary amines?
 - a) Liebermann's nitroso test

b) Lucas test

c) Tollen's test

- d) Carbylamine reaction
- 5. From the following compounds which does not react with C₆H₅SO₂CI?
 - a) C_2H_5 . NH_2

b) CH₃. NH₂

c) $(CH_3)_2NH$

- d) $(C_2H_5)_3N$
- 6. Which of the following statements is not correct?
 - a) Alkyl isocyasnides have bad odours while alkyl cyanides have pleasant odours
 - b) Alkyl cyanides are not as poisonous as KCN
 - c) Alkyl cyanides have lower boiling points than the corresponding alkyl isocyanides
 - d) Acetonitrile is soluble in water but methylcarbylamine is not
- 7. Which of the following reaction will not occur?

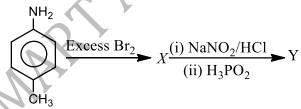
a)
$$\phi N_2^+ + CuBr \xrightarrow{HBr} \phi - Br$$

b)
$$\phi N_2 + \phi OH \longrightarrow \phi - N = N - \langle O \rangle - OH$$

c)
$$\Phi N_2^+ \xrightarrow{H_3PO_2} \Phi H$$

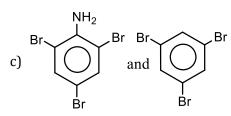
d)
$$\phi N_2^+ + I^- \rightarrow \phi - I$$

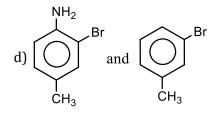
- 8. Which of the following is not characteristic of amines?
 - a) They smell like ammonia
 - b) They are inflammable in air
 - c) They show the property of hydrogen bonding
 - d) They are amphoteric in nature
- 9. In the following reaction sequence predict the compound *X* and *Y*.



The compound X and Y are

a)
$$\bigcap_{CH_3}^{NH_2}$$
 and $\bigcap_{CH_3}^{Br}$ $\bigcap_{CH_3}^{Br}$





- 10. The type of isomerism shown by C_6H_5CN and C_6H_5NC is:
 - a) Position
- b) Functional
- c) Enantiomerism
- d) Tautomerism

11. Identify *A* and *B* in the reaction given below.

Ethane nitrile $\xrightarrow[aq.H_2SO_4]{aq.H_2SO_4} A \xrightarrow[NH_3]{Decarboxylation} Sodalime \xrightarrow[CO_2]{\Delta} A \xrightarrow[CO_2]{CO_2}$

a) Acetic acid, methanol

b) Acetone, methane

c) Ethanoic acid, ethane

- d) Ethanoic acid, methane
- 12. When ethanol is mixed with ammonia and passed over catalyst, the compound formed is:
 - a) $C_2H_5NH_2$
- b) C_2H_4

- c) $C_2H_5OC_2H_5$
- d) CH₃OCH₃

- 13. Which of the following is strongest base?
 - a) $C_6H_5NH_2$
- b) $p NO_2 C_6H_4NH_2$
- c) $m NO_2 C_6H_4NH_2$
- d) C₆H₅CH₂CH₂

14. In the reaction

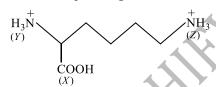
$$R - C \equiv N + 4(H) \xrightarrow{X} RCH_2NH_2$$

X can be

- a) LiAIH₄
- b) H₂SO₄
- c) Ni

- d) 2KBi
- 15. Increasing order of basicity of $CH_3CH_2CH_2NH_2$ $H_2C = CHCH_2NH_2$ and $HC \equiv CCH_2NH_2$ is
 - a) $CH_3CH_2CH_2NH_2 < HC \equiv CCH_2NH_2 < H_2C = CHCH_2NH_2$
- b) $CH_3CH_2CH_2NH_2 < H_2C = CHCH_2NH_2 < CH$ $\equiv CCH_2NH_2$
- HC \equiv CCH₂NH₂ < H₂C = CHCH₂NH₂ < CH₃CH₂CH₂NH₂
- d) $CH \equiv CCH_2NH_2 < CH_3CH_2CH_2NH_2 < H_2C$ = $CHCH_2NH_2$

16. In the compound given below,



the correct order of acidic nature of the positions (X), (Y) and (Z) is:

- a) Z > X > Y
- b) X > Y > Z
- c) X > Z > Y
- d) Y > X > Z

- 17. Which of the following is carbamide?
 - a) CH₃CONH₂
- b) NH₂CONH₂
- c) CH₂(NH₂)CONH₂
- d) CO(OH)NH₂
- 18. Aniline is not the major product in one of the following reactions. Identify that reaction.
 - a) $C_6H_5OH + NH_3 \xrightarrow[300^{\circ}C]{200^{\circ}C}$ $C_6H_5Ci + NH_3 \xrightarrow[Cu_2O]{200^{\circ}C}$ High pressure
- b) $C_6H_5NO_2 + Zn$ powder $\xrightarrow{Alcoholic KOH}$
- d) $C_6H_5NO_2 + 6(H) \xrightarrow{\text{Fe+H}_2O} HCI$
- 19. An organic compound 'A' having molecular formula C_2H_3N on reduction gave another compound B, upon treatment with nitrous acid 'B' gave ethyl alcohol. On warming with chloroform and alcoholic KOH, it formed an offensive smelling compound 'C'. The compound 'C' is
 - a) CH₃CH₂NH₂
- b) CH₃CH₂N \rightleftharpoons C
- c) $CH_3C \equiv N$
- d) CH₃CH₂. OH

20. The IUPAC name of the compound having formula,

$$O = C - CH - CH_2$$
 is:
 $C = C - CH - CH_2$ is:

- a) 3-aminohydroxy propionic acid b) 2-amino-propan-3-oic acid
- c) Amino hydroxy propanoic acid
- d) 2-amino-3-hydroxy propanoic acid
- 21. Methyl amine reacts with methyl iodide. For completion of reaction, how many moles of methyl iodide are required?
 - a) 1

b) 2

c) 3

d) 4

- 22. The IUPAC name of CH_3 –CH– CH_2 –CH– CH_3 is:
 - a) 2-cyano-3-methyl hexane
 - b) 2-dimethyl-4-cyanopentane
 - c) 2,4-dimethyl pentane nitrile
 - d) 2-cyano-3-methyl hexane
- 23. Identify X in the series,



 $\xrightarrow{\text{HNO}_3}$ Intermediate $\xrightarrow{\text{H}_2\text{O}} X$:



 NH_2



NHCOCH₃



d)



Recognize the compound C from the following a) Propanenitrile

b) Methylamine

c) Ethylamine

- d) Acetamide
- 25. Dichlorocarbene does not form as an intermediate in this reaction

a) phenol + CHCl₃ + 4KOH

b) Ethyl amine +CHCl₃ + KOH

c) Phenol+CCl₄ + 4KOH

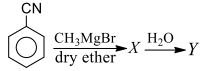
- d) $CHCl_3 + KOH$
- 26. Which of the following methods neither means for the synthesis nor for separation of amines?
 - a) Hinsberg's method
- b) Hofmann's method
- c) Wurtz reaction
- d) Curtius method

- 27. Reaction of aniline with benzaldehyde is
 - a) Substitution
- b) Addition
- c) Condensation
- d) Polymerisation
- 28. On heating benzyl amine with chloroform and ethanolic KOH, product obtained is

- a) Benzyl alcohol
- b) Benzaldehyde
- c) Benzonitrile
- d) Benzyl isocyanide
- 29. Choose the amide which on reduction with LiAIH₄ yields a secondary amine a) Ethanamide
 - b) N-methylethanamide

- d) Phenylmethanamide
- c) N, N-dimethylethanamide 30. Hofmann bromamide reaction is used to prepare
 - a) 1° amine
- b) 2° amine
- c) 3° amine
- d) All of these

31.



Identify Y

- a) Benzophenone
- b) Acetophenone
- c) Benzoic acid
- d) phenol
- 32. Which of the following compound does not undergoes Schotten-Baumann reaction?
 - a) Phenol
- b) Primary amine
- c) Secondary amine
- d) Tertiary amine
- 33. Arrange the following CH₃NH₂ (I); CH₃NH (II); C₆H₅NH₂ (III); (CH₃)₃N (IV) in increasing order of basic nature in aqueous medium:
 - a) II < I < IV < III
- b) III < IV < I < II
- c) I < II < III < IV
- d) II < III < I < IV

34. The reaction,

$$R \mathsf{COOH} \xrightarrow{\mathsf{NaN}_3/\mathsf{conc.H}_2\mathsf{SO}_4} R \mathsf{NH}_2 + \mathsf{N}_2 + \mathsf{CO}_2$$

is known as

- a) Curtius reaction
- b) Lossen reaction
- c) Schmidt reaction
- d) Hofmann reaction
- 35. Which of the following compounds on treatment first with NaNO₂/HCI and then coupled with phenol produces *p*-hydroxyazobenzene?
 - a) Nitrobenzene
- b) Azobenzene
- c) Phenol
- d) Aniline
- 36. A compound which on reaction with aqueous nitrous acid gives an oily nitrosoamine is:
 - a) Methylamine
- b) Ethylamine
- c) Diethylamine
- d) Triethylamine
- 37. Benzene diazonium chloride on reaction with phenol in weakly basic medium gives
 - a) Diphenyl ether
- b) *p*-hydroxy azobenzene c) Chlorobenzene
- d) Benzene

38.

a)
$$H_2N$$
 N CH_3 CH_3

$$O_2N$$
 O_2N
 O_2N
 O_2N
 O_2N

- 39. 1 mole of ethyl amine on reaction with HNO₂ gives at NTP
 - a) 11.2 L of N₂
- b) 5.6 L of N₂
- c) 22.4 L of N₂
- d) 1 L of N_2

- 40. Dehydration of an amide gives:
 - a) Cyanide
- b) Amine
- c) Isocyanide
- d) Fatty acid
- 41. In aqueous solutions, the basic strength of amines decreases in the order
 - a) $CH_3NH_2 > (CH_3)_2NH_2 > (CH_3)_3N$
- b) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$
- c) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$
- d) $(CH_3)_2NH_2 > CH_3NH_2 > (CH_3)_3N$
- 42. Methyl cyanide gives on hydrolysis
 - a) Methyl amine
- b) Acetic acid
- c) Formic acid
- d) Ethyl amine

- 43. Alkyl nitrite on reduction with Sn/HCl gives:
 - a) Alcohol
 - b) Hydroxylamine
- c) Both (a) and (b)
- d) hydrazine

44.	The molecular formula C ₃	H ₉ N cannot represent									
	a) 1°amine	b) 2°amine	c) 3°amine	d) Quaternary salt							
45.	2,4,6-tribromo aniline is a	a product of:	-								
	a) Electrophilic addition	-									
	b) Electrophilic substitut										
	c) Nucleophilic addition of	0 0 -									
	d) Nucleophilic substituti	-									
46.	The value of K_b is highest										
10.	~ -	b) <i>p</i> -chloroaniline	c) <i>p</i> -nitroaniline d) <i>p</i> -methylanilin								
47.	$(CH_3)_3 N \xrightarrow{(i)BrCN} [X], here$										
	a) CH ₃ NH ₂	b) (CH ₃) ₂ NH	c) $(CH_3)_3NO$	d) $(CH_3)_2NNO$							
48.	The decreasing order of b	asic characters of the thre	e amines and ammonia is	A Y							
	a) $NH_3 > CH_3NH_2 > C_2H_3$	$I_5NH_2 > C_6H_5NH_2$	b) $C_2H_5NH_2 > CH_3NH_2 >$	$NH_3 > C_6H_5NH_2$							
			d) $CH_3NH_2 > C_2H_5NH_2 >$								
49.		erate CO ₂ from NaHCO ₃ so									
	a) CH ₃ CONH ₂	b) CH ₃ NH ₂		d) CH ₃ N ⁺ H ₃ CL ⁻							
50.	Acetaldoxime reacts with	- 5 -	c) (CH ₃) ₄ N ⁺ OH ⁻	,							
	a) CH ₃ CN	b) C ₂ H ₅ CNO	c) C ₂ H ₅ CN	d) All of these							
51	· ·	r distinguishing primary, s	, 2 3	a) Thi of these							
51.	a) Alcohols	a distinguishing primary, s	b) Amines								
	c) Alkyl halides		d) Hydrogens in hydrocarbons								
52.											
54.	Nitration of aniline in strongly acidic medium, result in the formation of <i>m</i> -nitroaniline also. This is because										
	a) Amino group is <i>meta</i> orienting during electrophilic substitution reaction.										
	b) Nitro group goes always to the <i>meta</i> position irrespective of the substituents.										
	c) Nitration of aniline is a nucleophilic substitution reaction in strongly acidic medium.d) In strongly acidic conditions aniline is present as anilinium ion.										
- 2											
53.	= -		nolic KOH, product obtained								
	a) Benzyl alcohol	b) Benzaldehyde	c) Benzonitrile	d) Benzyl isocyanide							
54.	= =		itrous acid at low temperat	ure to produce an oily							
	nitroso amine. The compo	ound is									
	a) CH ₃ NH ₂		b) CH ₃ CH ₂ NH ₂								
	c) $(CH_3CH_2)_3N$		d) $CH_3CH_2 - NHCH_2CH_3$								
55.	Nitrosoamines (R_2 N – N	= 0) are soluable in water	r. On heating them with con	c H ₂ SO ₄ , they give							
	secondary amines. The reaction is called										
	a) Perkin's reaction		b) Fries reaction								
	c) Liebermann nitroso re	action	d) Etard reaction								
56.	Which one of the following	ng functional groups under	goes hydrolysis with alkali	to yield an acid group?							
	a) -CN	b) -CHO	c) -COCH ₃	d) -Br							
57.	The correct set of the pro	ducts obtained in the follo	wing reactions is								
7	Reduction	ON DCM (I)CH ₃ MgBr									
		$RCN \xrightarrow{(II)H_2O}$									
~	$(C)RNC \xrightarrow{\text{Hydrolysis}}$ ($D)RNH_2 \xrightarrow{HNO_2}$									
	A B										
	a) 2°amine Methyl ketone	1°amine Alcohol	b) 1°amine Methyl ketone	1°amine Alcohol							
	c) 2°amine Methyl ketone	2°amine Acid	d) 2°amine Methyl ketone	2°amine aldehyde							
58.	Which of the following is	<u> </u>	, <u> </u>								
	J										

- a) $C_6H_5NO_2$
- b) CH₃CH₂ONO
- c) $CH_3 CH N \bigcirc O$ $CH_3 CH_3$
- d) $C_6H_4(OH)NO_2$

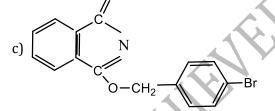
- 59. $CHCI_3 + C_6H_5NH_2 + 3NaOH \rightarrow A + 3B + 3C$ In the above reaction, the product 'A' is
 - a) Chlorobenzene
- b) Phenyl isocyanide
- c) Phenyl cyanide
- d) Phenyl chloride

- 60. Carbonyl chloride reacts with ammonia to form:
 - a) CO₂

- b) NH₂CONH₂
- c) CH₃COONH₄
- d) CH₃CONH₂

- 61. Which of the following statements are correct?
 - a) Aniline is a stronger base ethyl amine
 - b) Aniline is a stronger base than *p*-methoxyaniline
 - c) Aniline must be acetylated before nitration with an acid mixture
 - d) Aniline is soluble in an ammonium hydroxide solution
- 62. The major product of the following reaction is

a)
$$N - H_2C - BI$$



- b) C N CH₂CI
 - d) $N H_2C CH_2C$
- 63. Diazotisation can be carried out by the action of NaNO₂ and dilute HCl at ice cold temperature on:
 - a) Aromatic secondary amine
 - b) Aromatic primary amine
 - c) Aromatic nitro compound
 - d) Aromatic amine
- 64. The molecular formula of benzonitrile is
 - a) C_6H_5CN
- b) C₆H₅NC
- c) C_6H_5CNO
- d) C₆H₅NCO
- 65. Which of the following reactions is given by only primary amines?
 - a) Reaction with HONO

b) Reaction with chloroform and alcoholic KOH

c) Reaction with acetyl chloride

d) Reaction with Grignard reagent

- 66. The diamide of carbonic acid is:
 - a) Acetamide
- b) Formamide
- c) Benzamide
- d) Urea

- 67. Urea reacts with hydrazine to form:
- a) Nitrogen
- b) Phenyl hydrazine
- c) Semicarbazide
- d) Urethane

- 68. Final product of hydrolysed alkyl cyanide is
 - a) *R*COOH
- b) RCONH₂
- R C = NH
- c) | OH
- d) R—C $\stackrel{\bigoplus}{=}$ NH

69.	Secondary nitroalkanes of	an be converted into keton	es by using Y . Identify Y from	om the following
	R	R_{\downarrow}		
	\searrow CHNO ₂ + $Y \longrightarrow$	> c=0		
	R´	R'		
	a) Aqueous HCl	b) Aqueous NaOH	c) KMnO ₄	d) CO
70.		ipounds, the most basic is		
	a) Aniline	b) Acetanilide	c) <i>p</i> -nitroaniline	d) Benzyl amine
71.	-	group by replacing hydroge	en of primary amines:	
	a) Increases the base stre	-		
	b) Decreases the base str	rength		
	c) Remains the same			
	d) None of the above			
72.		kidation in the presence of l		
	a) An acid	b) An alcohol	c) An aldehyde	d) a N-oxide
73.	· ·	ompounds will undergo car	•	
	a) $(CH_3CH_2)_2NH$	b) $(CH_3)_2NH$	c) C ₆ H ₅ NH ₂	d) $(CH_3)_3N$
74.		forms non-superimposable	e mirror images but it does	not show optical activity
	because:			
	a) Of rapid flipping			
	b) Amines are basic in na			
	c) Nitrogen has a lone pa			
	d) Of absences of asymm	-		
75.	O	-		
	a) Urethane	b) Urea alcohol	c) Ureides	d) None of these
76.	Aliphatic amines are solu	ble in water because:		
	a) They are basic)	
	b) They are amino compo		<i>y</i>	
	c) They are lighter than v			
	d) Of formation of hydrog			
77.	A positive carbylamines t	test is given by		
	a) N, N-dimethylaniline		b) 2,4-dimethylaniline	
	c) N-methy-o -methylani		d) N-methylbenzylamine	
78.		nines form maximum hydr	-	
	a) CH ₃ NH ₂	b) (CH ₃) ₂ NH	c) $(CH_3)_3N$	d) None of these
79.		ne with dimethylamine in the		
	- A Y	ng the reaction is continuou	isly removed. The compour	id formed is generally
	known as	15.4		12 4 6 1 46 1
	a) An amine	b) An imine	c) An enamine	d) A Schiff's base
80.		ride on treatment with hypo	o phosphorous acid and wa	ter in presence of Cu ⁺
	catalyst produce	15	S 4 34	
4	a) Benzene	b) Toluene	c) Aniline	d) Chlorobenzene
81.		ng does not have sp^2 hybric		
	a) Acetone	b) Acetic acid	c) Acetonitrile	d) Acetamide
82.	The product of Hofmann	elimination of		
	The product of Hofmann $CH_2N(CH_3)_2\overline{O}$	н is		
	a) $\langle -CH_2N(CH_3)_2 \rangle$		b) $\langle \bigcirc \rangle$ NH ₂ + (CH ₃)	₂ N

=CH₂ + (CH₃)₂NOH

 $+ (CH_3)_4 NOH$

- 83. The best method to synthesise *m*-dibromobenzene is by using the reaction
 - a) Benzene $\xrightarrow{Br_2/FeBr_3/heat}$

b) Aniline $\xrightarrow{Br_2,H_2O}$ [] $\xrightarrow{1.HONO}$

Nitrobenzene

C)
$$\xrightarrow{\text{Fuming HNO}_3}$$
 [] $\xrightarrow{\text{Fe/HCl}}$ [] $\xrightarrow{\text{1.HONO}}$ 2.CuBr

- Bromobenzene d) $\frac{\text{HNO}_3}{\text{H}_2\text{SO}_4}$ [] $\frac{\text{Fe/HCl}}{\text{C}_2\text{H}_5\text{OH,heat}}$ [] $\frac{\text{1.HONO}}{\text{2.CuBr}}$
- 84. Aniline is reacted with Br2 water and the resulting product is treated with an aqueous solution of sodium nitrite in the presence of diluteHCl. The compound so formed is converted into tetrafluoroborate which is subsequently heated dry. The end product is
 - a) p-bromofluorobenzene

b) p-bromoaniline

c) 2, 4, 6- tribromofluoro benzene

- d) 1, 3, 5- tribromobenzene
- 85. Which of the following statements is correct?
 - a) Aniline is stronger base than ammonia
 - b) Methylamine is a stronger base than aniline and ammonia
 - c) Aniline is stronger than ammonia, but weaker base than methylamine
 - d) Methylamine is stronger than aniline, but weaker base than ammonia
- 86. RNH₂ reacts with C₆H₅SO₂Cl in aqueous KOH to give a clear solution. On acidification a precipitate is obtained which is due to the formation of

a)
$$R = N^{+} - SO_{2}C_{6}H_{5}OH^{-}$$

b)
$$R - N^{-}SO_{2}C_{6}H_{5}K^{+}$$

c) C₆H₅SO₂NH₂

- 87. When NaNO₂ and dilute HCl were added to an amine at 0°C, a colourless gas was evoloved and an ionic compound is formed. The amine is:
 - a) An primary amine
 - b) An aromatic primary amine
 - c) Any amine
 - d) None of the above
- 88. Choose the incorrect comparision(s)

a)
$$\begin{array}{c} \text{CH}_3 \\ \text{H}_3\text{C}-\text{C}-\text{NH}_2 < \text{CH}_3-\text{NHCH}_3 \\ \text{CH}_3 \\ \text{(basicity in aqueous medium)} \end{array}$$

b) $CH_3CH_2CH_2NH_2 > (CH_3)_3N$ (basicity in aqueous medium)

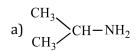
(basicity aqueous medium)

- 89. Grignard reagent and acetyl chloride does not react with:
 - a) RNH₂
- b) R_2 NH
- c) R_3N

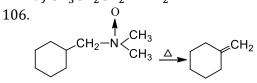
- d) None of these
- 90. Which of the following can be used to distinguish acetamide and urea?
 - a) Fehling's solution
- b) Biuret test
- c) Hofmann's reaction
- d) NaOH solution

- 91. Among the amines $(A)C_6H_5NH_2$, $(B)CH_3NH_2$, (C)
 - $(CH_3)_2NH$, $(D)(CH_3)_3N$, the order of basicity is
 - a) A < B < D < C
 - b) D < C < B < A
 - c) A < B < C < D
 - d) B < C < D < A
- 92. Choose the incorrect statement
 - a) In the case primary, secondary and tertiary amines, the basic strength depends on the extent on the extent of hydrogen bonding in the protonated amines

	of the presence of groups like - Och ₃ and - ch ₃ in	icreases the basic strength (of affilies
	c) The presence of groups like – NO_2 , –CN and halo	ogens reduces the basic stre	ength of amines
	d) The basic strength of amines depends on their c	oncentration	
93.	An organic amino compound reacts with aqueous i	nitrous acid at low tempera	ture to produce an oily
	nitrosoamine. The compound is	•	•
	a) CH ₃ NH ₂ b) CH ₃ CH ₂ NH ₂	c) CH ₃ CH ₂ NHCH ₂ CH ₃	d) $(CH_3CH_2)_3N$
94.	RMgX on reacting with cyanogen chloride gives:	-7 - 3 - 2 - 2 - 3	- 5 (- 3 - 273
<i>,</i> 11	a) R—NC b) R—Cl	c) R—CN	d) None of these
95.	Ethyl isocyanide on hydrolysis in acidic medium ge	•	a) Notice of these
<i>)</i> J.	a) Ethyl amine salt and methanoic acid	b) Propanoic acid and ar	nmonium salt
	c) Ethanoic acid and ammonium salt	d) Methyl amine salt and	
96.	Which of the following will give a primary amine o	-	i etilalioic acid
90.			d) Alleylian ayanata
07	a) Nitroparaffin b) Alkyl cyanide	c) Oxime	d) Alkyl isocyanate
97.	Urea when heated a white residue is formed. Its a	alkaline solution when trea	ted with few drops of $Cuso_4$
	solution gives:		
	a) Red colour b) Violet colour	c) Green colour	d) Yellow colour
98.	Which one of the following is most basic?		
	a) FCH ₂ NH ₂ b) FCH ₂ CH ₂ NH ₂	c) C ₆ H ₅ NH ₂	d) C ₆ H ₅ CH ₂ NH ₂
99.	The basicity of compounds I, II, III and IV		
	CH_3NH_2 , $(CH_3)_2NH$, $(CH_3)_3N$, $C_6H_5CH_2NH_2$		
	I II III IV		
	varies in the order		
	a) $I > II > III > IV$ b) $II > I > III > IV$	c) $III > I > II > IV$	d) $IV > I > II > III$
100	A gaseous carbon compound is soluable in dilute H	ICI. The solution on treating	with NaNO ₂ gives off
	nitrogen leaving behind a solution which smells of	wood spirit. The carbon con	mpound is
	a) HCHO b) CO	c) $C_2H_5NH_2$	d) CH ₃ NH ₂
101	The correct order of basic nature of the following of	compounds is:	
	NH CH ₃ CH ₂ NH ₂		
	CH_3-C		
	NH ₂		
	(1) 0		
	(CH) NH		
	$(CH_3)_2NH$ $CH_3-\ddot{C}-NH_2$		
	(3)		
	a) 2 > 1 > 3 > 4		
	b) 1 > 3 > 2 > 4		
	c) 3 > 1 > 2 > 4		
	d) 1 > 2 > 3 > 4		
102	The basic character of amines can be explained:		
	a) In terms of Lewis and Arrhenius concept		
4	b) Only in terms of Lowry Bronsted concept		
	c) It terms of Lewis and Lowry Bronsted concept		
	d) Only in Lewis concept		
103	Gas evolved during the reaction of sodium metal or	n ethyl amine is:	
	a) N ₂ b) C ₂ H ₂	c) H ₂	d) CO_2
104	When methyl cyanide is hydrolysed in presence of	alkali, the product is:	-
	a) Acetamide b) Methane	c) $CO_2 + H_2O$	d) Acetic acid
105	An organic compound (C_3H_9N) (A), when treate		•
	evolved. (A) on warming with $CHCl_3$ and c		
	isopropylmethylamine. Predict the structure of (<i>A</i>)		3.1.2
		•	



- b) CH₃CH₂— NH— CH₃ CH₃— N— CH₃
- c) | CH₃
- d) CH₃CH₂CH₂— NH₂



This reaction is called

- a) Cope reaction
- b) Ritter reaction

 $+(CH_3)_2NOH$

- c) Schmidt reaction
- d) Gabriel reaction
- 107. Which of the following regents will be useful as the basic for a simple chemical test to distinguish between?

$$H_3C - \bigcirc -NH_2$$
 and $\bigcirc -CH_2NH_2$

a) C₆H₅SO₂Cl and OH⁻ in H₂O

b) HONO, then β-naphthol

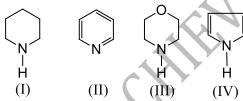
c) Dilute HCl

- d) AgNO₃ in H₂O
- 108. Alkanamide, which on Hofmann's reaction gives 1-phenylethylamine, is:
 - a) 2-phenylpropanamide
 - b) 3-phenylpropanamide
 - c) 2-phenylethanamide
 - d) N-phenylethanamide
- 109. Reduction of nitrobenzene in the presence of Zn/NH₄Cl gives
 - a) Azobenzene

b) Hydrazobenzene

c) N-phenyl hydroxylamine

- d) Aniline
- 110. Arrange the following compounds in increasing order of basic strength



- a) IV>I>III>II
- b) III>I>IV>II
- c) II>I>III>IV
- d) I>III>IV
- 111. Which of the following reactions can be used to prepare ethyl isocyanide?
 - a) $CH_3CH_2I + NaCN \xrightarrow{C_2H_5OH/H_2O}$

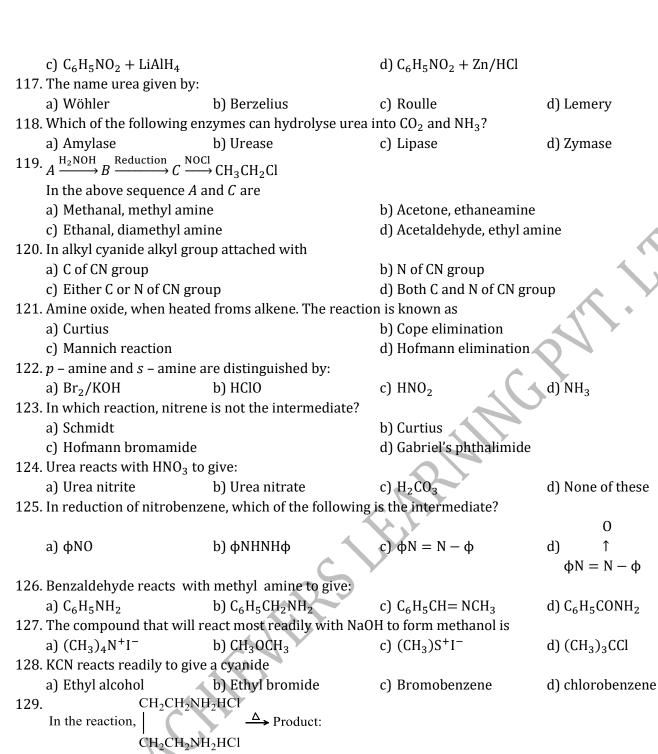
- b) $CH_3CH_2I + KCN \xrightarrow{Alcohol}$
- c) $CH_3CH_2NH_2 + CHCL_3 + KOH \xrightarrow{Alcohol}$
- d) None of the above
- 112. An amine reacts with C₆H₅SO₂Cl and the product is soluble in alkali, amine is:
 - a) :

b) 2°

c) 3°

- d) All of these
- 113. Carbylamine reaction tubes are not thrown into sink, to avoid bad odour, but are treated with conc. HCl to give:
 - a) $RCOOH + NH_3$
- b) RNH₂
- c) $RNH_2 + HCOOH$
- d) $RCOOH + N_2$
- 114. The product obtained when methylamine is treated with nitrous acid is:
 - a) CH₃OH
- b) CH₃—ONO
- c) CH₃OCH₃
- d) Both (b) and (c)
- 115. Correct order of basic nature of $CH_3NH_2(A)$, $CH_3CN(B)$ and $CH_3N = CHCH_3(C)$ is
 - a) A > B > C
- b) B > C > A
- c) A > C > B
- d) C > A > B
- 116. Which of the following reactions can produce aniline as main product?
 - a) $C_6H_5NO_2 + Zn/KOH$

b) $C_6H_5NO_2 + Zn/NH_4Cl$



The product is:

b)
$$\begin{bmatrix} NH_2 \\ NH_3 \end{bmatrix}$$

d)
$$\langle O \rangle$$
 N(CH₃)

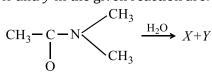
$$130. C_6 H_5 NO_2 \xrightarrow{Sn/HCl} C_6 H_5 X$$

(X') is identified as

a) NO

- b) $-NH_2$
- c) NHOH
- d) None of these
- 131. When methyl iodide is treated with ammonia, the product obtained is:
 - a) Methylamine
- b) Dimethylamine
- c) Trimethylamine
- d) All of these

132. *X* and *y* in the given reaction are:



a) $CH_3COOH + (CH_3)_2NH$

- b) $CH_3CONH_2 + CH_3OH$
- c) $CH_3CHO + (CH_3)_2NH$
- d) $CH_3COCH_3 + CH_3NH_2$
- 133. The correct sequence of reactions to convert p-nitrophenol into quinol involves
 - a) Reduction, diazotization and hydrolysis
- b) Hydrolysis, diazotization and reduction
- c) Hydrolysis, reduction and diazotization
- d) Diazotization, reduction and hydrolysis
- 134. Reaction of benzaldehyde with methylamine gives
 - a) C₆H₅COOH

b) $C_6H_5N = NCl$

c) $C_6H_5 - CH = N - CH_3$

- d) $C_6H_5NH_2$
- 135. The compound formed when malonic ester reacts with urea is:
 - a) Cinnamic acid
- b) Butyric acid
- c) Barbituric acid
- d) Crotonic acid
- 136. A colourless organic compound gave brisk effervescence with a mixture of $NaNO_2$ and dil. HCl. It could be:
 - a) Glucose
- b) Oxalic acid
- c) Urea

- d) Benzoic acid
- 137. A colourless, odourless and non-combustible gas is liberated when ethylamine reacts with:
 - a) NaOH
- b) CH₃COCl
- c) $NaNO_2 + HCl$
- d) H_2SO_4
- 138. The compound obtained by heating a mixture of 1° amine and chloroform with ethanolic potassium hydroxide is
 - a) An alkyl isocyanide

b) An alkyl isothiocyanate

c) An amide

- d) An amide and nitro compound
- 139. $CH_3CONH_2 + NaOH \rightarrow CH_3COONa + A$

Urea is obtained if product if product 'A' in the above reaction reacts with the following compound

- a) Ethyl carbonate
- b) Ethyl urethane
- c) Phosgene
- d) All of these
- 140. Which of the following amines can be directly oxidized to the corresponding nitro compound by potassium permanganate?

$$CH_2 - CH - CH_3$$

- a) CH₃NH₂
- c) (CH₃)₂NH
- d) $(CH_3)_3C NH_2$
- 141. Which one of the following compound when heated with KOH and primary amines gives carbylamine test?
 - a) CHCl₃
- b) CH₃Cl
- c) CCl₄

d) CH₃NC

- 142. The hydrochlorides of amines form double salt with:
 - a) PtCl₄

- b) AuCl₃
- c) Both (a) and (b)
- d) None of these

143. In the following reactions, reactants *A*, *B* and *C* are:

$$Cl_2H_5NH_2 + A \rightarrow C_2H_5N = CH - C_6H_5 + H_2O$$

Urea +B \rightarrow H₂N - NHCONH₂ + NH₃

 $\mathsf{CH_2H_5NH_2} + \mathsf{C} \longrightarrow \mathsf{C_2H_5Cl} + \mathsf{H_2O} + \mathsf{N_2}$

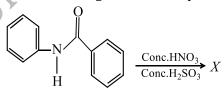
- a) CH₃CHO, NH₂ NH₂ and PCl₅
- c) C_6H_5CHO , $NH_2 NH_2$ and NOCl

- b) C₆H₅CHO, NH₂ NH₂and SOCl₂
- d) CH₃CHO, NH₂ NH₂and PCl₃

- 144. Nitroparaffins on reduction give:
 - a) Amides
- b) Alkylamines
- c) Ammonium salts
- d) Acetanilides

- 145. Aniline is prepared in presence of Fe/HCI from
- a) Benzene
- b) Nitrobenzene
- c) Dinitrobenzene
- d) None of these

146. In the following reaction, the product X is:



a)
$$NO_2$$

147. Which one of the following compound is most basic?

$$(A) \qquad (B) \qquad (C)$$

a) (A)

b) (B)

c) (C)

d) All are equally basic

148.
$$C_6H_5NH_2 \xrightarrow{H_2SO_4} H_2NC_6H_4(SO_3H)$$
(para)

The true statement about the product is

- a) It does not exist as Zwitter ion
- b) -NH₂displays a powerful basic character
- c) It does not act as inner salt
- d) -SO₃ dimminishes the basic character of -NH₂
- 149. NH₂

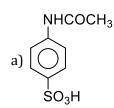
$$\begin{array}{c}
Ac_2O \\
CH_3
\end{array}
A \xrightarrow{Br_2} B \xrightarrow{H_2O} C$$

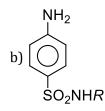
The final product 'C' in the above reaction is

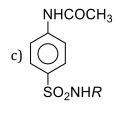
$$\begin{array}{c}
\mathsf{NH}_2\\ \mathsf{d}) & & \mathsf{Br}\\ \mathsf{CH}_3
\end{array}$$

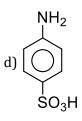
- 150. Which of the following compound reacts with chloroform and a base to form phenyl isocyanide?
 - a) Phenol
- b) Aniline
- c) Benzene
- d) Nitrobenzene

- 151. NH₂
 - - here *X* is









- 152. Amine is not formed in the reaction
 - (A) Hydrolysis of RCN
 - (B) Reduction of RCH = NOH
 - (C) Hydrolysis of RNC
 - (D) Hydrolysis of RCONH₂

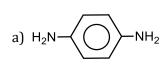
The correct answer is

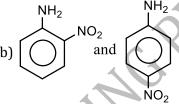
- a) A, B, D
- b) A, D

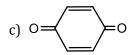
c) B, C

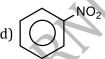
d) A, B, C

153. Aniline reacts with conc. HNO₃ to give









- 154. The pri., sec. and ter. amines can be distinguished by:
 - a) Hinsberg's reagent
- b) Grignard reagent
- c) Fehling's solution
- d) Tollen's reagent
- 155. Which one of the following is not the correct reaction of aryl diazonium salts?
 - a) $C_6H_5N_2^+CI^- + Cu_2CI_2 \rightarrow C_6H_5CI$

- b) $C_6H_5N_2^+CI^- + HBF_4 \xrightarrow{Heat} C_6H_5F$
- c) $C_6H_5N_2^+CI^- + H_3PO_2 \rightarrow C_6H_5PO_4$
- d) $C_6H_5N_2^+CI^- + SnCI_2/HCI \rightarrow C_6H_5NHNH_2$

- 156. The geometry of ethylamine is:
 - a) Pyramidal
- b) Tetrahedral
- c) Triangular
- d) Square planar

157. Consider the following reaction,

$$C_6H_5NO_2 \xrightarrow{Sn/HCI} X \xrightarrow{C_6H_5COCI} Y + HCI$$

What is Y?

- a) Acetanilide
- b) Benzanilide
- c) Azobenzene
- d) Hydrazobenzene

158.
$$\left[\begin{array}{c} \uparrow \\ \uparrow \\ \downarrow \end{array} \right] \stackrel{\text{I}}{\longrightarrow} \begin{array}{c} \text{Ag}_2\text{O} \\ \text{H}_2\text{O} \end{array} X \stackrel{\text{400 K}}{\longrightarrow}$$

The products of above sequence of reactions are

a) $CH_2 = CH_2$ and $(CH_3)_2 CHCN$

b) CH₃CH₂CN and C₂H₅NH₂

c) $CH_2 = CH_2$ and $(CH_3)_3N$

- d) $(CH_3)_2 C = CH_2$ and NH_3
- 159. Which of the following is hydrolysed to give secondary amine?
 - a) Alkyl

- b) HCON
- c) Nitroparaffins
- d) Acidamide

- 160. Carbylamine reaction is given by aliphatic
 - a) Primary amine

b) Secondary amine

c) Tertiary amine

- d) Quaternary ammonium salt
- 161. Ethyl amine reacts with nitrous acid to form
 - a) C_2H_5OH
- b) C₂H₅OH, N₂, H₂O
- c) $C_2H_5N_2^+CI^-$
- d) C₂H₅NHOH, NH₃

- 162. Aniline reacts with ... to yield ... as the final product.
 - a) Bromine, 2-bromoaniline

- b) Bromine, 2, 4, 6-tribromoaniline
- c) Chloroform/KOH, phenyl cyanide
- d) Acetyl chloride, benzanilide

- 163. The amine which will not liberate nitrogen on reaction with nitrous acid is
 - a) Trimethyl amine
- b) Ethyl amine
- c) Sec-butyl amine
- d) t-butyl amine
- 164. Which of the following reagents will convert nitromethane into methylamine?
 - a) Zn/HCl
- b) Zn/NaOH
- c) Zn/C_2H_5OH
- d) Ni/H₂

- 165. Tertiary nitroalkane cannot tautomerise because
 - a) Their tautomeric forms are highly unstable
 - c) They do not have labile H-atom

- b) They do not contain any multiple bond
- d) They are not basic in nature

166.
$$|X| = ArN_2^+ X$$
 $Ph = 5-7$
 $Ph = 8-10$
 $Ph = 8-10$

[X] and [Y] are

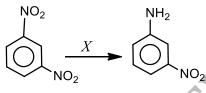
a)
$$\phi N=N$$
 $\phi N=N$ $\phi N=N$ $\phi N=N$ $\phi N=N$ $\phi N=N$

$$b) \overbrace{\bigvee_{N=N}^{NH_2 \text{ OH}}}_{N=N} \phi \xrightarrow{NH_2 \text{ OH}}_{N=N}$$

c)
$$\phi N=N$$
 NH_2 OH NH_2 OH $N=N$ ϕ

d)
$$NH_2$$
 OH $N=N$ ϕ $N=N$ NH_2 OH $N=N$

167. In the reaction



Xis

a) SiC

- b) H₂SO₄
- c) KMnO₄
- d) Fe/HCl
- 168. A compound A when reacted with PCl_5 and then with ammonia gave B. B when treated with bromine and caustic potash produced C. C on treatment with $NaNO_2$ and HCl at $0^{\circ}C$ and then boiling produced orthocresol. Compound A is:
 - a) o-toluic acid
- b) o-chlorotoluene
- c) o-bromotoluene
- d) m-toluic acid

169. The correct order of basicities of the following compound is

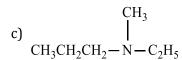
$$CH_3-C$$
 NH_2
 $CH_3CH_2NH_2$
(1)
$$(2)$$

$$(CH_3)_2NH$$
 (3)

$$CH_3$$
 CH_3 CH_3 CH_3

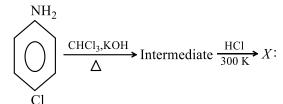
- a) 2>1>3>4
- b) 1>3>2>4
- c) 3>1>2>4
- d) 1>2>3>4

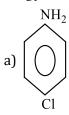
- 170. Which of the following amines is optically active?
 - a) CH₃NH₂
 - b) CH₃NHCH₃

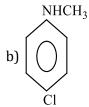


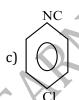
- d) Sec. butylamine
- 171. CH₃CH₂NH₂ contains a basic NH₂ group, but CH₃CONH₂ does not, because:
 - a) Acetamide is amphoteric in character
 - b) In CH₃CH₂NH₂ the electron pair on N-atom is delocalised by resonance
 - In CH₃CH₂NH₂ there is no resonance, while in acetamide the lone pair of electron on N-atom is delection and the resonance of the second second
 - delocalised and therefore less available for protonation
 - d) None of the above
- 172. Benzaldehyde condenses with N, N-diamethylaniline in presence of anhydrous ZnCl₂ to give
 - a) Azo dye
- b) Malachite green
- c) Michler's ketone
- d) Buffer yellow

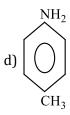
173. Identify *X* in the reaction,







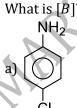


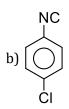


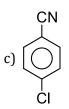
- 174. Aliphatic nitriles are prepared by the treatment of alkyl halides with
 - a) Sodium cyanide
- b) Sodium isocyanide
- c) Sodium isocyanate
- d) Cyanamide

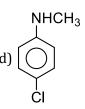
- 175. Diethylamine on oxidation with KMnO₄ gives:
 - a) Ethanal
- b) Propanone
- c) Tetraethyl hydrazine
- d) None of these
- 176. Which one of the following amines will not react with HNO₂ acid to give nitrogen?
 - a) CH₃NH₂
- b) CH₃CH₂NH₂

177.









- 178. C₅H₁₃N reacts with HNO₂ to give an optically active alcohol. The compound is
 - a) Pentan-1-amine

b) Pentan-2-amine

c) N, N-dimethylpropan-2-amine

- d) N-methylbutan-2-amine
- 179. Which of the following is not a nitro-derivative?

			/ ₀ 0	
	a) C ₆ H ₅ NO ₂	b) CH ₃ CH ₂ ONO	c) CH ₃ CH—N O CH ₃	d) C ₆ H ₅ (OH)NO ₂
180.	Hinsberg's reagent is		J	
	a) C ₆ H ₅ COCI	b) CH ₃ COCI	c) C ₆ H ₅ CH ₂ CI	d) C ₆ H ₅ SO ₂ CI
	Among the following the v	-	c) d ₆ 115011201	u) 0611500201
	a) C ₆ H ₅ CH ₂ NH ₂	b) C ₆ H ₅ CH ₂ NHCH ₃	c) O ₂ NCH ₂ NH ₂	d) CH ₃ NHCHO
	A secondary amine is:	b) 66115611214116113	c) Oznanzmiz	u) chiziviicho
	a) A compound with two	NH groups		(Y
			eoun.	
		bon atoms and a $-NH_2$ gr		
	_	NH ₂ group on the carbon at		l av avel avanue
			nave been replaced by alky	i or aryi groups
	Benzyl amine reacts with	-) D	Way I
	a) Azobenzene	b) Benzene	c) Benzyl alcohol	d) Phenol
	Urea is not used:			
	a) As fertilizer		1	
	b) In manufacture of plast			
	c) In preparation of medi			
	d) In purification of water			
	Which of the following sta			
	a) Primary amines show i	ntermolecular hydrogen b	onding	
	b) Secondary amines show	w intermolecular hydrogen	bonding	
	c) Tertiary amines show i	ntermolecular hydrogen b	onding	
	d) Amines have lower boi	ling points as compared to	those of alcohols and carbo	oxylic acids of comparable
	molar masses			
186.	The structural formula of	methyl amino methane is:		
	a) $(CH_3)_2CHNH_2$	b) (CH ₃) ₃ N	c) $(CH_3)_2NH$	d) CH ₃ NH ₂
187.	Aniline and ethylamine re	esembles in:		
	a) Solubility			
	b) Action with HNO ₂			
	c) Action of Grignard reas	gent		
	d) Coupling reaction	X Y		
	, ,	nce of reagent in the Hofma	ann's degradation reaction	?
	a) Br ₂ , KOH, H ₂ O	b) KOH, Br ₂ , H ₂ O	c) H ₂ O, KOH, Br ₂	d) KOH, H ₂ O, Br ₂
			identified by the action of:	
	a) $HNO_2 + NaOH(aq.)$	b) $CHCl_3 + NaOH(aq.)$	•	d) None of these
		ertiary amines may be sepa	, ,	a) None of these
	a) Ethanoyl chloride	b) Diethyl oxalate	c) Thionyl chloride	d) None of these
		ed in Hofmann's bromami	•	u) None of these
	a) Br ⁻	eu III Hoimaini S bi omaini	ue reaction is.	
	b) Br ₂			
	c) OBr			
	d) OBr ₂	1. 1.01.1 110		TT 1 C.11 11
	-			H solution, followed by the
				isappears with the addition
		= =	is made alkaline. The aliph	-
	a) CH ₃ CH ₂ NO ₂	b) (CH ₃) ₂ CHNO ₂	c) $(CH_3)_3CNO_2$	d) All of these
193.	Isopropylamine $\xrightarrow{\text{KMnO}_4} X$	$\xrightarrow{\text{H}_3\text{U}}$ Y. In the above seque	nce X and Y are respectivel	у

a) Acetaldimine, ethanal	b) Ethanal, ketimine	
c) Ketimine, acetone	d) Acetone, propan-2-ol	
194. Benzyl amine cannot be prepared by		
a) $C_6H_5CONH_2 \xrightarrow{\text{LiAlH}_4}$	b) $C_6H_5CH_2CONH_2 + Br_2$	+ KOH →
c) $C_6H_5CN \xrightarrow{LiAlH_4}$	d) $C_6H_5CH_2NC \xrightarrow{LiAlH_4}$	
195. When $(NH_4)_2SO_4 + KCNO$ are heated, we get:	3 06115 011211 V	
a) Nitrogen		
b) Carbon dioxide		
c) Biuret		\wedge
d) Ammonium carbonate		
196. Which of the following is most basic in aqueous med	lium?	
a) CH ₃ CH ₂ CH ₂ CH ₂ NH ₂	b) $CH_3 - CH_2 - CH_2 - NH$	I_2
ÇH₃	ÇH₃	
CH ₃ c) CH ₃ -N-CH ₃	CH ₃ d) CH ₃ -CH ₂ -NH-CH ₃	
197. Diazomethane reacts with carboxylic acids to produ	ce:	
a) Ester b) Alcohol	c) Amine	d) Imines
198. Hinsberg's method to separate amines is based on the	ne use of:	
a) Benzene sulphonyl chloride		
b) Benzene sulphonic acid		
c) Ethyl oxalate		
d) Acetyl chloride		
199. CH ₃ CONH ₂ . Br ₂ and KOH give CH ₃ NH ₂ as the produc	ct. The intermediates of the	reaction are
O	V	
(A) $CH_3 - C - NHBr$ B) $CH_3 - N = C = 0$, ,	
(C)CH $_3$ NHBr (D) CH $_3$ CONBr $_2$		
The correct answer is		
a) A, B b) A, C	c) C, D	d) B, D
200. Which will not go for diazotization?		
	H ₂ N	H ₂ N
a) $C_6H_5NH_2$ b) $C_6H_5CH_2NH_2$	c) C_6H_4	d) C_6H_4
	H ₃ C	O_2N
201. Amine may contain:		
a) $-NH_2gp$ b) $>NH_gp$.	c) \rightarrow N gp.	d) All of these
202. Nitration of aniline also gives m -nitro aniline in stro	ng acidic medium because	
In electrophilic substitution reaction amino group		nitro group always goes to
a) is <i>meta</i> directive	b) m -position	8 L
c) In strong acidic medium aniline aniline present as	s d) None of the above	
anilinium ion		
203. In the reaction $RCONH_2 + X \rightarrow RNH_2$, the regent X is	S	
a) Soda lime b) PCl ₅	c) NaOBr	d) All of these
204. The bad smelling substance formed by the action of	alcoholic caustic potash on	chloroform and aniline is

c) Phenyl cyanide

c) 3

206. $\underbrace{\frac{\text{HNO}_3}{\text{H}_2\text{SO}_4}} A \underbrace{\frac{\text{Br}_2}{\text{FeBr}_3}} B$

b) Phenyl isocyanide

205. How may primary amines are possible for the formula $C_4H_{11}N$?

The compound *B* is

a) Nitrobenzene

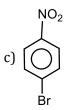
a) 1

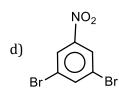
d) Phenyl isocyanate

d) 4









- 207. $R N = C + HgO \longrightarrow A + Hg_2O$; What is A?
 - a) RNH₂
- b) RCONH₂
- c) R-NCO
- d) RCOOH
- 208. Which of the following on reduction with LiAlH₄ gives a secondary amine?
 - a) CH₃NC
- b) CH₃CONH₂
- c) CH₃CN
- d) CH₃NO₂
- 209. Aniline on treatment with NaNO₂ in HCI at 0°C followed by treatment with alkaline β –naphthol gives
 - a) A violet solution

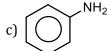
b) A red solution

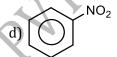
c) A green solution

- d) A blue precipitate
- 210. The compound with foul odour among the following is









- 211. Aniline first reacts with acetyl chloride producing compound 'A'. 'A' reacts with nitric acid/sulphuric acid mixture and produces compound 'B', which hydrolyses to compound 'C'. What is the identify of 'C'?
 - a) Acetanilide
- b) *p*-nitroacetanilide
- c) p-nitroaniline
- d) Aniline

212. $F \longrightarrow NO_2$ $DMF \mid (CH_3)_2 \text{ NH}$

$$A = \frac{\text{(i) NaNO}_2/\text{HCl, 0-5}^{\circ}\text{C}}{\text{(ii) H}_2\text{Pt}} B$$

In the above sequence *B* is

a)
$$H_2N CH_3$$
 CH_3

$$O_2N-O_2N-O_2N-O_2N$$

b)
$$H_2N - \left(\bigcirc \right) - NH_2$$

d)
$$O_2N-\bigcirc$$
-NH₂

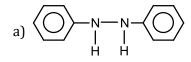
- 213. The product *A* and *B* in the reaction are:
 - $C_2H_5NH_2 + CHCl_3 + 3KOH \rightarrow A + B + 3H_2O$
 - a) $C_2H_5NC + 3KCl$
- b) $C_2H_5CN + 3KCl$
- c) $C_2H_5CONH_2 + 3KCl$
- d) $C_2H_5NC + K_2CO_3$
- 214. When aqueous solution of benzene diazonium chloride is boiled, the product formed is
 - a) C₆H₅CH₂OH
- b) $C_6H_6 + N_2$
- c) C_6H_5COOH
- d) C_6H_5OH

215. Correct order of basicity of $\phi NH_2[A]$, $OCH_2[B]$

$$NH_2[C]$$
 H_3CO $NH_2[D]$ is OCH_3

- a) A > B > C > D
- b) D > C > A > B
- c) B > D > C > A
- d) D > A > B > C

- 216. Tertiary amine is obtained in the reaction
 - a) Aniline $\xrightarrow{CH_3I} \xrightarrow{CH_3I}$
- b) Aniline $\stackrel{CH_3I}{\longrightarrow}$
- c) Nitrobenzene $\xrightarrow{Sn/HCl}$
- d) None of these
- 217. The structure of the compound formed, when nitrobenzene is reduced by lithium aluminium hydride (LiAIH $_4$)is





$$C) \left(\begin{array}{c} \\ \\ \end{array} \right) - N = N - \left(\begin{array}{c} \\ \\ \end{array} \right)$$



- 218. Why do 2° and 3° amines fail to undergo the carbylamines test?
 - a) They combine with chloroform to give a stable compound
 - b) They react with alcoholic KOH
 - c) They nitrogen atom of the amine group does not have the required number of hydrogen atoms
 - d) All the given reasons are correct
- 219. Nitrogen of nitrobenzene at 125°C with mixed acids gives
 - a) meta-dinitrobenzene

b) ortho-dinitrobenzene

c) para-dinitrobenzene

d) 1, 3, 5-trinitrobenzene

220. Complete the following reaction

 $RNH_2 + H_2SO_4 \rightarrow$

- a) $[RNH_3]^+HSO_4^-$
- b) $[RNH_3]_2^+SO_4^{2-}$
- c) RNH₂. H₂SO₄
- d) No reaction

- 221. Ethylamine reacts with nitrosyl chloride (NOCl)to form:
 - a) Ethyl chloride
- b) Ethyl alcohol
- c) Ethyl nitrite
- d) Nitroethane
- 222. Reduction of aniline with acetyl chloride in presence of NaOH produce
 - a) Aniline hydrochloride b) Acetanilide
- c) p-choloroaniline
- d) A red dye
- 223. Amino group is *ortho/para*-directing for aromatic electrophilic substitution. On nitration of aniline, a good amount of *m*-nitroaniline is obtained. This is due to
 - a) In nitration mixture, ortho, para-activity of NH2 group is completely lost
 - b) -NH₂ because NH₃⁺, which is m-directing
 - c) $-NH_2$ becomes $-NH^+SO_4^-$, which is *m*-directing
 - d) $-NH_2$ becomes $-NH^-NO_2^+$, which is *m*-directing
- 224. p-chloro aniline and anilinium hydrogen chloride can be distinguished by
 - a) Sandmeyer reaction

b) Carbylamines reaction

c) Hinsberg's reaction

- d) AgNO₃
- 225. Nitrobenzene on reduction with Al-Hg and water gives:
 - a) Azobenzene
 - b) Aniline
 - c) Azoxy benzene
 - d) phenylhydroxylamine
- 226. Which of the following is most basic in nature?
 - a) NH₃

- b) CH₃NH₂
- c) $(CH_3)_2NH$
- d) $C_6H_5N(CH_3)_2$
- 227. The reaction of CHCI₃ and alcoholic KOH with *p*-toluidine gives

a)
$$H_3C$$
 NCC

228. The IUPAC name of, $CH_3-CH_2-CH-NH_2$ is:



- a) 1-methyl-amino propane
- b) 2-aminobutane
- c) 2-methyl-2-aminopropane
- d) None of the above

229.

R-N

and-R-O-N=O are....isomer

a) Chain
b) Functional
c) Position

d) All of these 230. Which of the following is not used for nitration of organic compounds?

a) $\frac{A \text{ mixture of concentrated HNO}_3}{H_2 SO_4}$ and concentrated b) $\frac{A \text{ mixture of concentrated HNO}_4}{anhydride}$

c) Fuming nitric acid and concentrated sulphuric d) Alcoholic potassium nitrate acid

231. n-propylamine yields a volatile compound X on warming with alc. alkali and chloroform. X has an offensive odour. The structure of X is

a) CH₃CH₂CH₂CN

b) $(CH_3)_2CHCN$

c) CH₃CH₂CH₂NC

d) (CH₃)₂CHNC

232. *n*-butylamine (I), diethylamine (II) and N, N-dimethylethylamine (III) have the same molar mass. The increasing order of their boiling point is

a) III < II < I

b) I < II < III

c) II < III < I

d) II < I < III

233. Aniline reacts with acetaldehyde to form

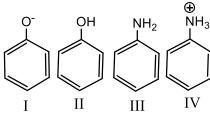
a) Schiff's base

b) Carbylamine

c) Immine

d) None of these

234. Coupling of diazonium salts of following takes place in the order



a) IV < II < III < I

b) IV > III < II < I

c) II < IV < I < III

d) I < II < III < IV

235. The general formula of quaternary ammonium compound is:

a) R—NH₂

b) R_3N

c) $[R_4N]^+X^-$

d) NH₄X

236. Which of the following statement about primary amines is false?

a) Alkylamines are stronger base than arylamines

b) Alkylamines react with nitrous acid to produce alcohols

c) Arylamines react with nitrous acid to produce phenols

d) Alkylamines are stronger bases than ammonia.

237. The end product in the below reaction is

$$C_2H_5NH_2 \xrightarrow{HNO_2} A \xrightarrow{PCl_5} B \xrightarrow{NH_3} C$$

a) Ethyl cynide

b) Ethyl amine

c) Methyl amine

d) Acetamide

238. In hypobromite reaction of amide, carbonyl carbon atom is lost as:

a) CO

b) CO₂

c) CO_3^{2-}

d) None of these

239. Identify the product Z in the following reaction scheme

$$C_6H_5NH_2 \xrightarrow{Ac_2O} X \xrightarrow{Br_2/CCl_4} Y \xrightarrow{HOH} Z$$

a) p-bromoaniline

b) *p*-bromoacetophenone

c) p-bromoacetanilide

d) o-bromoacetophenone

240. Which of the following is not correct?

a) Ethylamine and aniline both have NH₂ group

b) Ethylamine and aniline both dissolve HCl

c) Ethylamine and aniline both react with CHCl₃ and KOH to form unpleasant smell

d) Ethylamine and aniline both react with NaNO₂ + HCl to give hydroxyl compounds in cold

241. The reduction of CH₃CN to CH₃CH₂NH₂ is called:

a) Rosenmund's reduction
b) Clemmensen's reduction

c) Mendius reduction

d) Hofmann's reduction

242. Phenyl cyanide cannot be obtained by

a)
$$C_6H_5CONH_2 \xrightarrow{P_2O_5,\Delta}$$

c)
$$C_6H_5Cl \xrightarrow{alc.KOH}$$

b) $C_6H_5 - CH = NOH \xrightarrow{AC_2}$ d) $C_6H_5NH_2 \xrightarrow{1.NaNO_2/HCl}$

243. Which nitro compound will show tautomerism?

a)
$$C_6H_5NO_2$$

b) $(CH_3)_3CNO_2$

c) CH₃CH₂NO₂

d) o-nitrotoluene

244. Alkyl halide (RX) on treatment with KCN followed by reduction leads to formation of:

b) RCH₂NH₂

c)
$$RH + NH_3$$

245. Aniline gives a precipitate with bromine. The colour of precipitate is

b) Black

246. The reagent that reacts with nitromethane to form methyl hydroxylamine is

b) Zn/NH₄CI

d) Sn/HCI

247. Identify the product in the following sequence 3, 4, 5-tribromoaniline

$$\frac{\text{(i)Diazotization}}{\text{(ii)H}_3\text{PO}_2}$$
?

a) 3, 4, 5-tribromobenzene

b) 1, 2, 3-tribromobenzene

c) 2, 4, 6-tribromobenzene

d) 3, 4, 5-tribromonitrobenzene

248. Production of amines by ammonia and alkyl halides is called

a) Frankland reaction

b) Hofmann's ammonolysis

c) Hofmann's mustrard oil reaction

d) Hofmann's bromamide reaction

249. *m*-fluoronitrobenzene is best synthesized by using the reaction

b) Aniline
$$\xrightarrow{F_2}$$

c) Fluorobenzene
$$\xrightarrow{\text{HNO}_3}_{\text{H}_2\text{SO}_4,\text{heat}}$$

b) Aniline
$$\xrightarrow{F_2}_{\text{heat}}$$

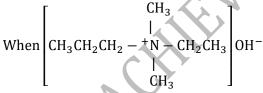
d) $m\text{-C}_6\text{H}_4(\text{NH}_2)_2 \xrightarrow[2.\text{CuNO}_2,3.\text{HBF}_4]{1.\text{HONO}}$

250. Allyl isocyanide containsandbonds

c)
$$3\sigma$$
, 4π

d) 5σ , 7π

251.



Is heated, then

a) Propene is the major product

- b) Ethane and C₃H₇N(CH₃)₂ are the only product
- c) Ethane and propene are obtained while ethane as d) Equimolar amounts of ethane and propene are the major product obtained

252. In the following reaction, $X \xrightarrow{\text{Bromination}} Y \xrightarrow{\text{NaNO}_2} Z \xrightarrow{\text{Boiling}} \text{tribromo benzene. } X \text{ is}$

- a) Benzoic acid
- b) Salicylic acid
- c) Phenol
- d) Aniline

253. Reaction of nitrous acid on 1° aliphatic amines in cold will give:

- a) A diazonium salt
- b) An alcohol
- c) A nitrile
- d) A dye

254. Benzoyl chloride does not react with:

- a) Primary or secondary amines
- b) Aliphatic compounds
- c) Aromatic compounds
- d) Carboxylic acids

255. The compound, N-ethyl-N-methylpropanamine forms non-superimposable mirror image but does not show optical activity. This is due to

a) Absence of a chiral N-atom

b) Presence of a chiral N- atom

- c) Presence of lone pair on N-atom
- d) Rapid flipping of one from into another
- 256. > C=O compounds reacts with NH $_3$ or amines followed by H $_2$ /Ni. The reaction is called
 - b) Hofmann bromamide

a) Mendius reaction c) Reductive amination

- d) Gabriel's phthalimide
- 257. Decreasing order of basic nature in aqueous solutions
 - a) $C_6H_5NH_2 > NH_3 > CH_3NH_2 > (CH_3)_2NH$
- b) $NH_3 > C_6H_5NH_2 > CH_3NH_2 > (CH_3)_2NH$
- c) $(CH_3)_2NH > CH_3NH_2 > NH_3 > C_6H_5NH_2$
- d) $CH_3NH_2 > (CH_3)_2NH > NH_3 > C_6H_5NH_2$
- 258. Comparing basic strength of NH₃, CH₃NH₂ and C₆H₅NH₂ it may be concluded that
 - a) Basic strength remains unaffected
- b) Basic strength of alkyl amines is lowest
- c) Basic strength of aryl amines is lowest
- d) Basic strength of NH₃ is highest
- 259. Decreasing order of basicity of the three isomers of methoxyaniline is

a)
$$p$$
-CH₃OC₆H₄NH₂ > o - CH₃OC₆H₄NH₂ > m - CH₃OC₆H₄NH₂

b)
$$p-CH_3OC_6H_4NH_2 > m - CH_3OC_6H_4NH_2 > o - CH_3OC_6H_4NH_2$$

c)
$$o-\text{CH}_3\text{OC}_6\text{H}_4\text{NH}_2 > m - \text{CH}_3\text{OC}_6\text{H}_4\text{NH}_2 > m - \text{CH}_3\text{OC}_6\text{H}_4\text{NH}_2$$

d)
$$o$$
-CH₃OC₆H₄NH₂ > m - CH₃OC₆H₄NH₂ > p - CH₃OC₆H₄NH₂

- 260. Which one of the following is the strongest base in aqueous solution?
- - a) Trimethylamine
- b) Aniline
- c) Dimethylamine
- d) Methylamine

- 261. Which compound is known as alkyl carbylamines?
 - a) R. CN
- b) R. NC

- c) Ar. CN
- d) Ar. NC

262. The product D in the following sequence of reactions is,

$$\mathsf{CH}_3\mathsf{COOH} \xrightarrow{\mathsf{NH}_3} A \xrightarrow{\mathsf{Heat}} B \xrightarrow{\mathsf{P}_2\mathsf{O}_5} C \xrightarrow{\mathsf{Na}+\mathsf{C}_2\mathsf{H}_5\mathsf{OH}} D:$$

- c) Acid

d) Alcohol

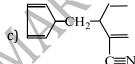
263.
$$C_6H_5NH_2 \xrightarrow{NaNO_2} X \xrightarrow{Cu_2(CN)_2} Y \xrightarrow{H_2O/H^+} Z$$

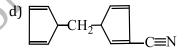
Z is identified as

- a) $C_6H_5 NH CH_3$
- b) $C_6H_5 COOH$
- c) $C_6H_5 CH_2 NH_2$ d) $C_6H_5 CH_2COOH$

264. The product [A] formed in the reaction;

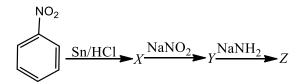
$$2C_5H_5 - CN \xrightarrow{Na} [A]$$
 is:



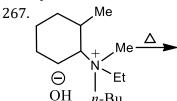


- 265. Gabriel's sunthesis is used frequently for the preparation of which of the following?
 - a) Primary amines
- b) Primary alcohols
- c) Tertiary amines
- d) Tertiary alcohols

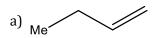
266. What is 'Z'in the following reaction?



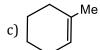
- a) Benzoic acid
- b) Cyanobenzoic acid
- c) Benzamide
- d) Aniline

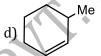


The alkene formed as a major product in the above elimination reaction is



b) $CH_2 = CH_2$





268. Nitroalkane is acidic only towards:

- a) Na₂CO₃
- b) NaOH
- c) Alcohol
- d) Liquid NH₃

269. Nitrobenzene is reduced by Zn and alcoholic potash mixture to get

a) $C_6H_5 - NH_2$

b) $C_6H_5 - NH - NH - C_6H_5$

c) $C_6H_5 - N - N - C_6H_5$

d) $C_6H_5 - NH - CO - C_6H_5$

270. CH₃NH₂ + CHCl₃ + KOH →nitrogen containing compound +KCI + H₂O. Nitrogen containing compound is

- a) $CH_3 C \equiv N$
- b) $CH_3 NH CH_3$
- d) CH₃ N == c

271.
$$Y \xrightarrow{\text{Reduction}} [R_2 C = NH] \xrightarrow{\text{H}_3 O^+} X$$

In the above sequence of reaction X, Y, Z are respectively

a) Aldehyde, ketone, NH₃

b) Ketone, 1° amine, KMnO₄

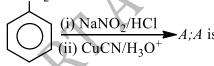
c) Ketone, 2° amine, KMnO₄

d) Ketimine, 1° amine, H₂SO₅

272. Aniline is weaker base than ethylamine because:

- a) Lone pair of electrons of N-atom is not freely available for coordination with a proton due to resonance than in ethylamine
- b) Its b. p. is higher than that of ethylamine
- c) It does not produce sufficient concentration of OH⁻ ions in solution
- d) It is insoluble in water while ethylamine is soluble in water

 NH_2 273.











274. The compound will react most readily with NaOH to form methanol is

- a) $(CH_3)_4N^+I^-$
- b) CH₃OCH₃
- c) $(CH_3)_3S^+I^-$
- d) $(CH_3)_3CI$

275. N₂ gas is liberated when [HCl + NaNO₂] reacts with the following compounds

- (A)CH₃CH₂NH₂ (B) Urea
- (C)CH₃CONH₂
- $(D)C_6H_5NH_2$

The answer is

- a) A, B, C
- b) B, C, D
- c) A, C, D
- d) A, B, D

276. Dye test can be used to distinguish

- a) Ethyl amine and acetamide
- c) Urea and acetamide

- b) Ethyl amine and aniline
- d) Methyl amine and ethyl amine

- 277. (A) $C_2H_5NH_2 \xrightarrow{(i)NOCl}_{(ii)AgNO_2} [W]$
 - $(B)(CH₃)₂CHNH₂ \xrightarrow{(i)NOCl}_{(ii)AgNO₂} [X]$
 - $(C)(CH_3)_3 CNH_2 \xrightarrow{(i)NOCl}_{(ii)AgNO_2} [Y]$
 - (D)CH₃CH(NH₂)C₂H₅ $\xrightarrow{\text{(i)NOCl}}_{\text{(ii)AgNO}_2}$ [Z]

Which product will not show tautomerism?

c) Y

d)Z

a) W b) X

- 278. Name of method use to separate primary, secondary and tertiary amines is

a) Hofmann method b) Lucas method c) Victor Meyer method 279. Alkyl cyanides undergo Stephen reduction to produce

- a) Aldehyde
- b) Secondary amine
- c) Primary amine
- d) amide
- 280. A compound of molecular formula C₃H₉N when reacts with benzene sulphonyl chloride gives a product soluble in dilute NaOH solution. The compound should be
 - a) $(CH_3)_3N$
- b) $(CH_3)_2CH NH_2$
- d) All of these

d) Kolbe method

- 281. Benzenediazonium chloride on reaction with phenol in weakly basic medium gives
 - a) Diphenyl ether

b) p-hydroxyazobenzene

c) Chlorobenzene

d) benzene

282. The conversion

$$C_6H_5NO_2 \longrightarrow C_6H_5N = N - C_6H_5$$

Can be brought about by reduction with

- a) Na₃AsO₃/NaOH
- b) Glucose/HCl
- d) LiAlH₄/ether

283. The correct order of basicities of the following compounds is:

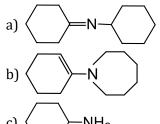
$$CH_3-C$$
 NH
 NH_2
 $CH_3CH_2NH_2,(CH_3)_2NH,$
 CH_3-C
 NH_2
 CH_3-C
 CH_3

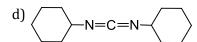
- b) 1 > 3 > 2 > 4
- c) 3 > 1 > 2 > 4
- d) 1 > 2 > 3 > 4

- 284. Aniline on oxidation with Na₂Cr₂O₇ and H₂SO₄ gives
 - a) Benzoic acid
- b) *m*-amino benzoic acid c) Schiff's base
- d) p-bezoquinone

- 285. Which among the following has the highest boiling point?
 - a) CH₃CH₂CH₂NH₂
- CH_3CH_2 -NH ĊНа
- c) CH_3 CH_3 —N— CH_2
- d) CH₃NH₂

286. Which of the following is an enamine?





- 287. When aniline is heated with glacial acetic acid in presence of anhydrous ZnCl₂, the product is:
 - a) Acetamide
- b) Acetanilide
- c) Phenyl acetamide
- d) Chlorobenzene

- 288. Acetonitriles on hydrolysis produce which of the following?
 - a) Amine
- b) Acid

- c) Amides
- d) Carbonyl compounds
- 289. The number of π -bonds in the formula given below, NC—CH=CH—CN are:
 - a) 5

b) 4

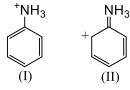
c) 3

d) 2

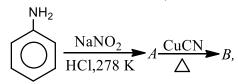
290. Hydrazobenzene $\xrightarrow{\text{NaIO}_3}$ $(X) \xrightarrow{\text{CH}_3\text{CO}_3\text{H}} (Y)$

$$\xrightarrow{\text{NaIO}_3} (X) \xrightarrow{\text{CH}_3\text{CO}_3\text{H}} (Y$$

- Both X and Y on reduction with Sn/HCl giveZ. Which of the following does not represent X, Y or Z'
- a) Azobenzene
- b) Phenol
- c) Aniline
- d) Azoxybenzene
- 291. Examine the following two structures for the anilinium ion and choose the correct statement from the ones given below



- a) II is not acceptable as canonical structure because carbonium ions are less stable than ammonium ions
- b) II is not an acceptable canonical structure because it is non-aromatic
- c) II is not an acceptable canonical structure because in it N has 10 valence electrons
- d) II is an acceptable as canonical structure
- 292. In the chemical reactions,



Compounds A and B respectively are

- a) Fluorobenzene and phenol
- c) Nitrobenzene and chlorobenzene
- b) Benzene diazonium chloride and benzonitrile
- d) Phenol and bromobenzene

293. In the chemical reaction,

$$CH_3CH_2NH_2 + CHCI_3 + 3KOH \rightarrow (A) + (B) + 3H_2O$$

The compounds (A) and (B) are respectively

- a) CH₃CH₂CONH₂ and 3KCI
- c) C₂H₅NC and 3KCI

- b) C₂H₅NC and K₂CO₃
- d) C2H5CN and 3KCI
- 294. The product obtained in the reduction

$$NO_2$$
 H_2S, NH_3
 NO_2
 CH_3
 NH_2
 NH_2
 NH_2

- d) The compound is not reduced
- 295. In the reaction between CH_3NC and HgO, the product obtained is
 - a) Methyl isothiocyanate

b) Methyl isocyanate

c) Methyl amine

d) Methyl cyanide

- 296. The compound which on reaction with cold HNO₂ gives only nitrosoamine is:
 - a) CH₃NH₂
- b) $(CH_3)_2NH$
- c) $(CH_3)_3N$
- d) $(C_2H_5)_3N$

- 297. Which of the following is involved in Sandmeyer's reaction?
 - a) Ferrous salt
 - b) Diazonium salt
 - c) Ammonium salt
 - d) Cupraammonium salt
- 298. During diazotization of benzenamine with sodium nitrite and hydrochloric acid, the excess of hydrochloric acid is used primarily to
 - a) Check the hydrolysis of ϕ OH

- b) Ensure a stoichiometric amount of nitrous acid
- c) Check the concentration of free aniline
- d) Neutralize any base formed during reaction
- 299. The correct structure of ethylenediamine-tetra acetic acid (EDTA) is:

- 300. Hofmann's hypobromite reaction affords a method of:
 - a) Preparing a tertiary amine
 - b) Preparing a mixture of amines
 - c) Stepping down a series
 - d) Stepping up a series
- 301. Identify *X* in the sequence,

$$X \xrightarrow{\text{HNO}_2} \text{C}_3\text{H}_8\text{O} \xrightarrow{\text{H}_2\text{SO}_4} \text{C}_3\text{H}_6\text{O}_2$$
:

- c) $(CH_3)_3N$
- d) None of the above
- 302. Reduction of alkyl nitriles, produces

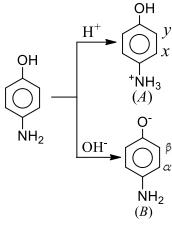
- a) Secondary amine
- b) Primary amine
- c) Tertiary amine
- d) amide

- 303. General formula of an amine is:
 - a) $C_n H_{2n+1} N$
- b) $C_n H_{2n+2} N$
- c) $C_n H_{2n+3} N$
- d) $C_n H_{2n} N$

- 304. Biuret test is not given by:
 - a) Proteins
- b) Carbohydrates
- c) Polypeptides
- d) Urea

- 305. Which of the following is not a nitro derivative?
 - a) $C_6H_5NO_2$
- b) CH₃CH₂ONO
- $_{\text{C})} \stackrel{\text{CH}_3-\text{CH}-\text{N}}{\stackrel{\text{C}}{\subset}}_{\text{CH}_3}$
- d) C₆H₄(OH)NO₂

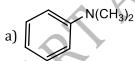
306. Consider p-aminophenol

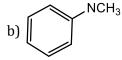


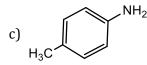
Which positions are activated for coupling reaction in acidic and basic media respectively?

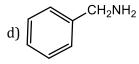
- a) x in A and β in B
- b) x in A and α in B
- c) y in A and α in B
- d) y in A and β in B

- 307. Diethyl carbonate on heating with ammonia gives:
 - a) $C_2H_5NH_2$
 - b) $(C_2H_5)_3N$
 - c) $(C_2H_5)_2NH$
 - d) Urea
- 308. A primary amine hated with CS₂ in presence of excess of HgCl₂ gives isothiocyanate. The reaction is called:
 - a) Hofmann's bromamide reaction
 - b) Hofmann's mustard oil reaction
 - c) Perkin's condensation
 - d) Hofmann's elimination
- 309. Amongst the compound given, the one that would form a brilliant coloured dye on treatment with $NaNO_2$ in dil. HCI followed by addition to an alkaline solution of β —naphthol is





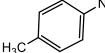


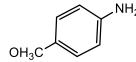


310. The correct order of increasing basic nature of the following bases is



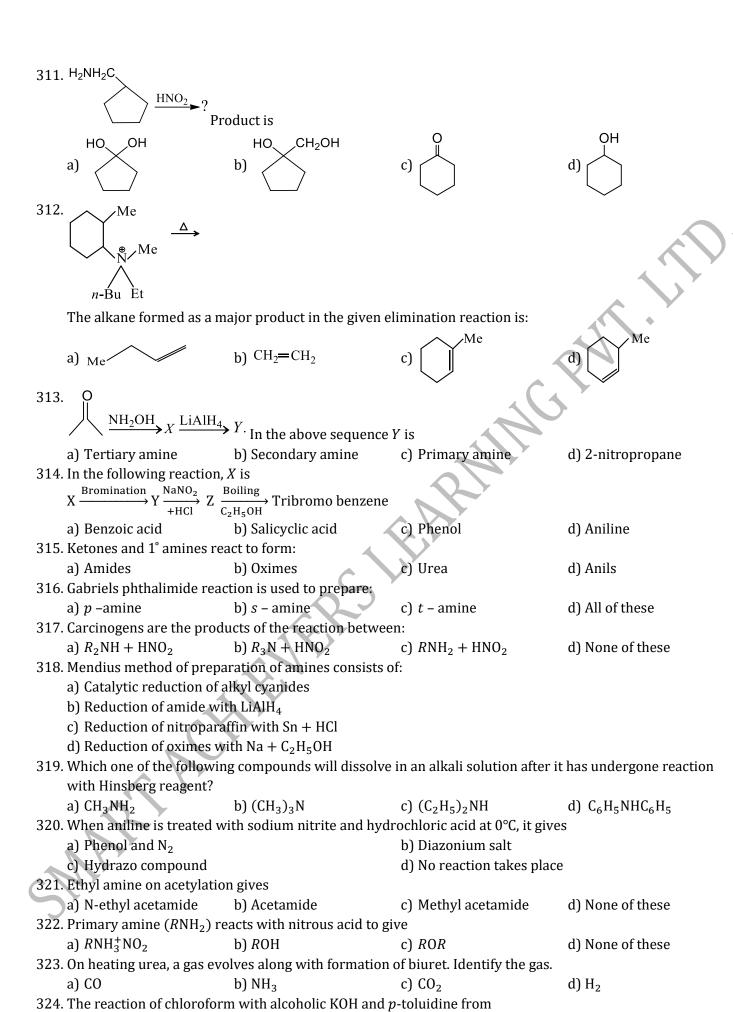


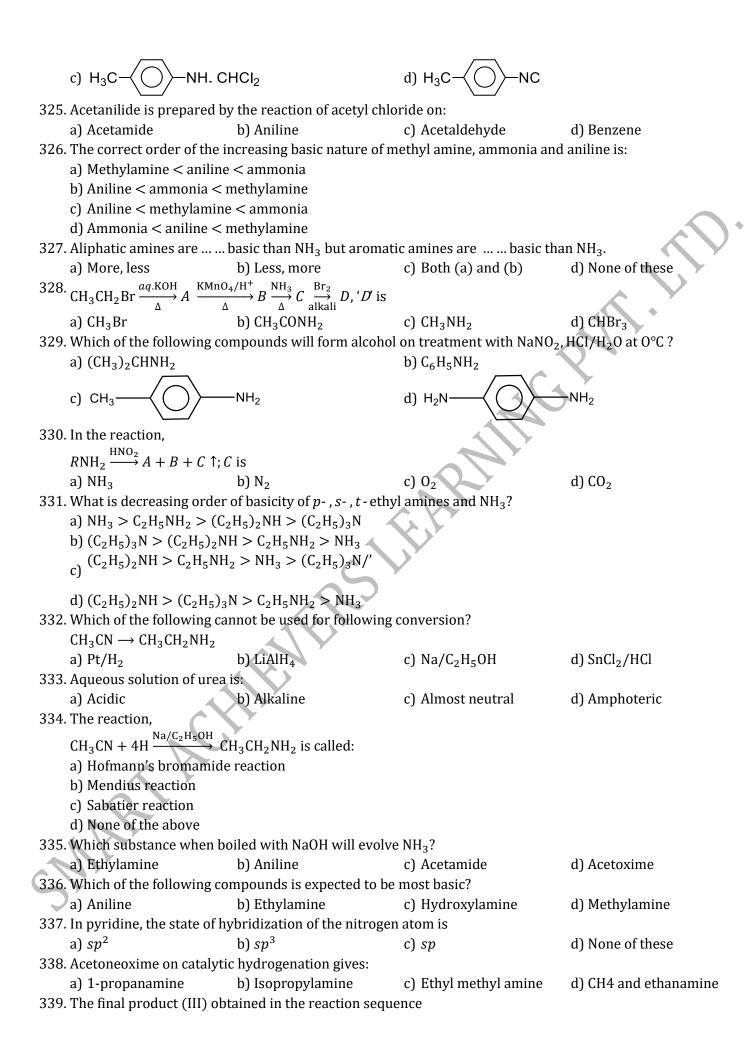


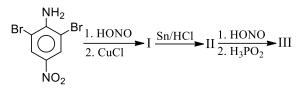




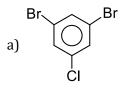
- a) II < V < I < III < IV
- b) V < II < I < III < IV
- c) II < V < I < IV < III
- d) V < II < I < IV < III



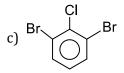




is



b) Br



d) None of these

340. The main product in the reaction,

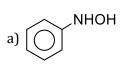
HCONHR $\xrightarrow{\text{POCl}_3}$ is:

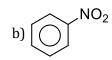
a) RCN

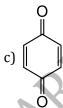
b) RNC

- c) RCNO
- d) RNCO

- 341. Ethyl isocyanide on hydrolysis in acidic medium generates
 - a) Ethylamine salt and methanoic acid
- b) Propanoic acid and ammonium salt
- c) Ethanoic acid and ammonium salt
- d) Methylamine salt and ethanoic acid
- 342. The oxidation of aniline with per acetic acid in the presence of acetic acid by refluxing gives







d) None of these

- 343. The compound having the molecular formula C_3H_9N represent :
 - a) Trimethylamine
- b) *n*-propylamine
- c) Isopropylamine
- d) All of these

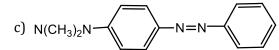
- 344. Amines have:
 - a) Garlic odour
- b) Fishy odour
- c) jasmine odour
- d) Bitter almonds odour
- 345. Which of the following compounds gives a secondary amine on reduction?
 - a) Nitromethane
- b) Nitrobenzene
- c) Methyl isocyanide
- d) Methyl cyanide

- 346. Indicate the correct statement.
 - a) C₂H₅N⁺H₃OH⁻ is acidic
 - b) C₂H₅NH₂ is less basic than NH₃
 - c) C₂H₅NH₂ is a stronger base than NH₃
 - d) C₂H₅NH₂ forms salts with bases
- 347. Choose the incorrect statement.
 - a) Primary amines show intermolecular hydrogen bonds.
 - b) Tert-butylamine is primary amine.
 - c) Tertiary amines do not show intermolecular hydrogen bonds.
 - d) Isopropylamine is a secondary amine.
- 348. Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains.
 - a) Mixture of o-and p-bromotoluenes
- b) Mixture of o-and p-dibromobenzenes
- c) Mixture of *o*-and *p*-bromoanilines
- d) Mixture of o-and m-bromotoluenes
- 349. The strongest base among the following is
 - a) $C_6H_5NH_2$
- b) $(C_6H_5)_2NH$
- c) NH_3

- d) $(C_2H_5)_2NH$
- 350. Aniline when diazotized in cold and then treated with dimethyl aniline gives a coloured product. Its structure would be

a)
$$CH_3NH$$
 $N=N$ $N+CH_3$

b)
$$CH_3$$
 $N=N$ NH_2



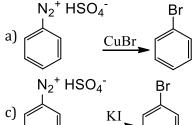
d)
$$(CH_3)_2N$$
 $N=N$ NH_2

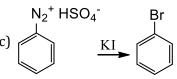
- 351. Treatment of nitrobenzene with acetyl chloride in the presence of anhydrous AlCl₃ gives
 - a) 2-nitroacetophenone

b) 3-nitroacetophenone

c) 4-nitroacetophenone

- d) None of these
- 352. Urea when heated slowly, product formed is:
 - a) N_2
 - b) CO₂
 - c) biuret
 - d) Ammonium carbamate
- 353. Which of the following reactions is an example of Sandmeyer reaction?





$$\begin{array}{c|c} & N_2^+ \operatorname{HSO_4}^- & NO_2 \\ \hline d) & & & \\ \hline & & \underline{NaNO_2/Cu} \end{array}$$

354. Given the following sequence of reactions,

$$\operatorname{CH_3CH_2I} \xrightarrow{\operatorname{NaCN}} A \xrightarrow[\operatorname{Partial}\\ \operatorname{hydrolysis}]{\operatorname{OH^-}} B \xrightarrow[\operatorname{Br_2/NaOH}\\ OH^-]{\operatorname{CH_3CH_2I}} C$$

The major product C' is

$$CH_3$$
. CH_2C — $NHBr$

$$CH_3$$
. $CH_2C - NBr_2$

a) CH₃CH₂NH₂

c)
$$CH_3$$
. $CH_2 - COONH_4$

- 355. CHCl₃ and KOH on heating with a compound from a bad smelling product, compound is
 - a) C₂H₅CN
- b) C₂H₅NC
- c) C_2H_5OH
- d) $C_2H_5NH_2$

- 356. Benzamide can be converted into benzonitrile with
 - a) H_30^+

- b) OH-/H₂O
- c) KCN

d) P_2O_5

357. Compare boiling point of isomeric alkyl amines.

a)
$$1^{\circ} > 2^{\circ} > 3^{\circ}$$

b)
$$1^{\circ} > 2^{\circ} < 3^{\circ}$$

c)
$$1^{\circ} < 2^{\circ} < 3^{\circ}$$

d)
$$1^{\circ} < 2^{\circ} > 3^{\circ}$$

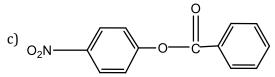
- 358. Hofmann's bromamide reaction is to convert
 - a) Acid to alcohol
- b) Alcohol to acid
- c) Amide to amine
- d) Amine to amide
- 359. During coupling reaction of benzene diazonium chloride and aniline, the pH of reaction medium should be approximately
 - a) 1-2

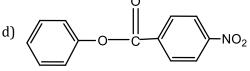
- b) 9-10
- c) 4-5

d) 7 - 8

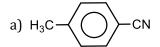
360.

The product A is





361. The reaction of chloroform with alcoholic KOH and *p*-toluidine form



b)
$$H_3C$$
 \longrightarrow N_2CI

d)
$$H_3C$$
 \longrightarrow NC

362.

$$Me \rightarrow N$$

Pyrolysis of Me´ + `CD₃ would give

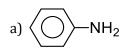
- a) Mixture of $CH_2 = CH CD_3$ and $CH_3 CH = CD_2$ b) $CH_3 CH = CD_2$
- c) $Me_2N^+ = C(CD_3)(CH_3)$

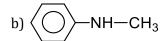
- d) $CH_2 = CH CD_3$
- 363. Which of the following compounds is soluble in benzene but almost insoluble in water?
 - a) C_2H_5OH
- b) CH₃CO₂H
- c) CH₃CHO
- d) $C_6H_5NO_2$

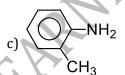
364. The action of nitrous acid on a primary amine gives:

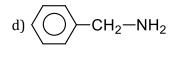
- a) Nitroalkane
- b) Alkyl nitrite
- c) Alcohol
- d) Secondary amine

365. Which of the following is the strongest base?









366. Which is not the property of ethanenitrile (CH₃CN)?

- a) Undergoes acidic hydrolysis to give carboxylic acid
- b) Undergoes alkaline hydrolysis to give salt of carboxylic acid
- c) It tautomerises to give methyl isocyanide
- d) It gives carbylamines reaction with chloroform
- 367. The basic character of methylamines in vapour phase is:
 - a) $3^{\circ}>2^{\circ}>1^{\circ}>NH_{3}$
- b) 2°>3°>1°>NH₃
- c) $1^{\circ}>2^{\circ}>3^{\circ}>NH_{3}$
- d) None of these

368. In which case formation of butane nitrile is possible?

- a) $C_3H_7Br + KCN$
- b) $C_4H_9Br + KCN$
- c) $C_3H_7OH + KCN$
- d) $C_4H_9OH + KCN$

369. Isopropyl amine with excess of acetyl chloride will give

a)
$$(CH_3CO)_2N - CH - (CH_3)_2$$

$$(CH_3)_2CH - N - COCH_3$$

b)

$$CH_3CH_2CH_2 - N - COCH_3$$

c) (CH₃)₂CHN(COCH₃)₂

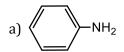
370. In the reaction of (S) 2-phenylpropamide with NaBr/H₂O to give 1-phenylethylamine

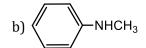
- a) There is retention of configuration
- b) There is inversion of configuration
- c) A mixture of two products is obtained
- d) There is no reaction

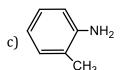
371. High basicity of Me₂NH relative to Me₃N is attributed to

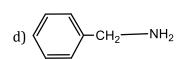
- a) Effect f solvent
- b) Inductive effect of Me
- c) Shape of Me₂NH
- d) Shape of Me₃N

372. Which of the following is the strongest base?

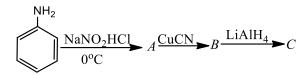








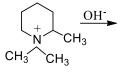
373. In the reaction sequence

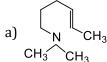


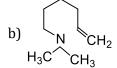
The product 'C' is

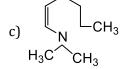
- a) Benzonitrile
- b) Benzaldehyde
- c) Benzoic acid
- d) Benzyl amine
- 374. Which one does not liberate NH₃ when undergoes hydrolysis?
 - a) Acetanilide
- b) Acetonitrile
- c) Acetamide
- d) Phenyl isocyanide

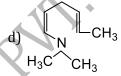
375. Identify the major product of the reaction











- 376. Primary nitroalkanes on hydrolysis give:
 - a) $RCOOH + NH_2OH$
- b) RCOOH
- c) NH₂OH
- $^{-}$ d) RCOR

377. In the reaction

$$\mathsf{CH}_{3}\mathsf{CN} + 2\mathsf{H} \xrightarrow[\mathsf{SnCI}_{2}]{\mathsf{HCI}} X \xrightarrow[\mathsf{Boiling} \mathsf{H}_{2}\mathsf{O}]{\mathsf{V}},$$

The term Y is,

- a) Acetone
- b) Ethanamine
- c) Acetaldehyde
- d) Dimethyl amine
- 378. Which one of the following compounds forms a quaternary salt on reacting with excess methyl iodide?
 - a) $C_2H_5OCH_3$
- b) (CH₃)₂CHOC₂H₅
- c) $C_6H_5NH_2$
- d) $C_6H_5NO_2$

AMINES

CHEMISTRY

: ANSWER KEY:														
1)	С	2)	b	3)	b	4)	a	177)	a	178)	d	179)	b	180) d
5)	b	6)	c	7)	b	8)	d	181)	d	182)	d	183)	С	184) d
9)	d	10)	b	11)	d	12)	a	185)	c	186)	c	187)	c	188) a
13)	b	14)	a	15)	c	16)	b	189)	a	190)	b	191)	c	192) a
17)	b	18)	b	19)	b	20)	d	193)	c	194)	d	195)	c	196) d
21)	c	22)	c	23)	b	24)	c	197)	a	198)	a	199)	a	200) b
25)	c	26)	c	27)	c	28)	d	201)	d	202)	c	203)	c	• 204) b
29)	d	30)	a	31)	b	32)	d	205)	d	206)	a	207)	C	208) a
33)	b	34)	c	35)	d	36)	c	209)	d	210)	a	211)	С	212) a
37)	b	38)	a	39)	c	40)	a	213)	a	214)	d	215)	d	216) a
41)	d	42)	b	43)	c	44)	d	217)	c	218)	b	219)	a	220) d
45)	b	46)	a	47)	b	48)	b	221)	a	222)	d	223)	a	224) d
49)	d	50)	a	51)	b	52)	b	225)	d	226)	C	227)	c	228) b
53)	d	54)	d	55)	C	56)	a	229)	b	230)	C	231)	c	232) a
57)	b	58)	b	59)	b	60)	b	233)	a	234)	a	235)	c	236) c
61)	b	62)	a	63)	b	64)	a	237)	b	238)	c	239)	a	240) d
65)	b	66)	d	67)	C	68)	a		c	242)	C	243)	C	244) b
69)	a	70)	d	71)	a	72)	C	245)	d	246)	b	247)	b	248) b
73)	C	74)	a	75)	a	•	d		a	250)	a	251)	C	252) d
77)	b	78)	a	79)	C	80)	a	253)	b	254)	d	255)	b	256) c
81)	C	82)	C	83)	C	84)	C	257)	C	258)	C	259)	C	260) c
85)	b	86)	d	87)	b	88)	_	261)	b	262)	b	263)	b	264) b
89)	С	90)	b	91)	a	92)	d	,	a	266)	d	267)	b	268) b
93)	C	94)	C	95)	a	96)	_	269)	b	270)	b	271)	b	272) a
97)	b	98)	d	4	b	100)	d	,	b	274)	a	275)	a	276) b
101)	b	102)	С	103)	C	104)	d	,	С	278)	a	279)	a	280) b
105)	a	106)	a	107)	b	108)	a	,	a	282)	a	283)	b	284) d
109)	C	110)	b	111)	c	112)	a	285)	a	286)	a	287)	b	288) b
113)	C	114)	\ \	115)	C	116)		289)	a	290)	b h	291)	C h	292) b
117)	C b	118)	b	119)	d	-		293)	C h	294)	b	295)	b	296) b
121) 125)	b a	122) 126)	c	123) 127)	d	-		297) 301)	b b	298) 302)	c b	299) 303)	c	300) c 304) b
123) 129)	d	130)	c b	131)	a d	-		305)	b	302)	b	303) 307)	c d	304) b
133)	1	134)	C	131)	c	-		309)	C	310)	a	307) 311)	d	300) b 312) d
137)	C	138)	a	139)	d	-		313)	С	314)	d	311)	d	316) a
141)		142)	c	143)	c	-		317)	a	318)	a	319)	a	320) b
145)	b	146)	b	147)	d	-		321)	a	322)	b	323)	b	324) d
149)	d	150)	b	151)	b	-		325)	b	326)	b	327)	a	328) c
153)	c	154)	a	151) 155)	c	-		329)	a	330)	b	331)	d	332) d
157)	b	151) 158)	c	159)	b	-		333)	c	334)	b	335)	С	336) b
161)	b	162)	b	163)	a	-		337)	a	338)	b	339)	b	340) b
165)	c	166)	С	167)	d	-		341)	a	342)	b	343)	d	344) b
169)	b	170)	d	171)	c	-		345)	С	346)	c	347)	d	348) a
173)	a	174)	a		c	176)		349)	d	350)	c	351)		352) c
,		- ,		~,	-	,		/			-		-	, -

```
d 369) c
353)
            354) a
                        355) b
                                    356)
                                                        370)
                                                             a
                                                                    371)
                                                                                372) d
    a
                                                                         a
357)
            358)
                        359)
                                    360)
                                         c 373) d
                                                        374) d
                                                                    375) b
                                                                                376) a
                 C
                             C
                                          c 377) c
                        363)
                                    364)
                                                        378) c
361)
     d
            362)
                              d
365)
                        367)
     d
            366)
                                    368)
                                          a
```

SMART ACHIEVERS LEARNING BYTE. LITTE

CHEMISTRY

: HINTS AND SOLUTIONS :

1 (c)

$$CH_3CN \xrightarrow{\text{Reduction}} CH_3CH_2NH_2$$

acetonitrile ethanamine

3 **(b)**

Carbylamine (or isocyanides) give secondary amine on reduction.

$$R - N \stackrel{\supseteq}{=} C \xrightarrow{\text{Ni/H}_2} R - \text{NH} - \text{CH}_3$$
 carbylamine secondary amine

4 (a)

For detection of secondary amines Liebermann's nitroso test is used.

5 **(b)**

Tertiary amines, due to lack of H-atom, attached directly with N, does not react with benzene sulphonyl chloride ($C_6H_5SO_2CI$), i.e., Hinsberg's reagent. (C_2H_5)₃N is a tertiary amine, so does not react with $C_6H_5SO_2CI$.

7 **(b)**

$$\phi N_2^+ + \phi OH \rightarrow \phi N_2 \phi OH$$
or \leftrightarrow N=N-\leftrightarrow D-OH

coupling product

10 **(b)**

—CN and —NC are different functional groups.

11 (d)

$$CH_3CN \xrightarrow[\text{aq.H}_2\text{SO}_4]{\text{H.OH}} CH_3COOH \xrightarrow[\text{Sodalime}]{\text{Decarboxylation}} CH_4$$

$$+2H_2O \xrightarrow[\text{-NH}]{\Delta}$$

$$-CO_2$$

Ethane

ethanoic acid

methane

17 **(b)**

Urea is monoamide of carbamic acid or diamide of carbonic acid,

$$O = C$$

OH

OH

Carbamic acid

OH

Carbanic acid

Amide of carbamic acid or diamide of carbonic acid acid or diamide of carbonic acid

18 **(b**)

Aniline is not obtained as a major product by the reaction.

$$C_6H_5NO_2 + Zn powder \xrightarrow{Alcoholic KOH} H_1$$

Nitrile (A)

12 **(a)**

$$C_2H_5OH + NH_3 \rightarrow C_2H_5NH_2 + H_2O$$

13 **(b**)

Aliphatic amines (in which amino group is attached with alkyl group) are more basic than aromatic amines (in which amino group is bonded directly with benzene nucleus). Hence, $C_6H_5CH_2NH_2$ (benzyl amine), being an aliphatic amine, is the most basic among the given the compounds.

14 (a)

$$R - C \equiv N + 4[H] \xrightarrow{\text{LiAIH}_4} RCH_2 NH_2$$

15 **(c)**

Electron deficient group decreases the electron density of N-atom, thus, makes its lone pair less available for donation

16 **(b)**

The order for acidic nature depends upon the ease to lose H^+ ion. —COOH is resonance stabilized and thus lose H^+ at the earliest. Also NH_3^+ near to —COOH releases H^+ more easily due to electron withdrawing nature of —COOH than NH_3^+ far away from —COOH.

Nitrobenezene

$$\langle \bigcirc \rangle$$
-N=N- $\langle \bigcirc \rangle$ azobenzene

$$\begin{array}{c} \text{CH}_3 - \text{C} \equiv \text{N} \xrightarrow{\text{Reduction}} \text{CH}_3 \text{CH}_2 \text{NH}_2 \\ \xrightarrow{\text{HONO}} \text{CH}_3 \text{CH}_2 \text{OH} \\ \text{methyl cyanide} & \text{ethanamine} \\ \text{1.} & \textit{(B)} \end{array}$$

$$\begin{array}{c} {\rm CH_3CH_2NH_2} \xrightarrow{{\rm CHCI_3,KOH}} {\rm CH_3CH_2N} \stackrel{\scriptstyle \simeq}{=} {\rm C} \\ {\rm 2.} & {\rm Ethyl} \ \ {\rm isocyanide} \end{array}$$

(C)

 $CH_3 - NH_2 + 3CH_3I \rightarrow (CH_3)_4N^+I^$ methyl amine quaternary ammonium salt

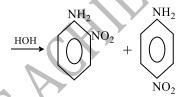
therefore, 3 moles of ${\rm CH_3I}$ (methyl iodide) are required for reaction with methyl amine.

23 **(b)**

$$\begin{array}{c|c}
 & \text{NHCOCH}_3 \\
\hline
 & \text{HNO}_3 \\
\hline
 & \text{H}_2\text{SO}_4
\end{array}$$

$$\begin{array}{c|c}
 & \text{NHCOCH}_3 \\
\hline
 & \text{NHCOCH}_3
\end{array}$$

$$\begin{array}{c|c}
 & \text{NHCOCH}_3 \\
\hline
 & \text{NO}_2
\end{array}$$



(-NHCOCH₃ is o- and p-directing)

24 (c)

$$C_2H_5NH_2 \xrightarrow{HNO_2} C_2H_5OH \xrightarrow{PCI_3} C_2H_5CI \xrightarrow{NH_3} C_2H_5NH_2$$

ethyl amine ethanol ethyl chloride ethyl amine

3.

(B)

(C)

27 **(c)**

Reaction of aniline with benzaldehyde is condensation reaction.

H |

$$C_6H_5 - C = O + H_2NC_6H_5 \xrightarrow{Condensation} C_6H_5CH$$

= $NC_6H_5 + H_2O$
Benzaldehyde aniline benzylidene
aniline

28 **(d)**

$$C_6H_5CH_2NH_2 + CHCI_3 + 3KOH$$

 $\rightarrow C_6H_5CH_2NC + 3KCI + 2H_2O$

29 **(d)**

Secondary amides such as N-methylethanamide on reduction with LiAIH₄ give secondary amines. $\text{CH}_3\text{CONHCH}_3 + [\text{H}] \xrightarrow{\text{LiAIH}_4} \text{CH}_3\text{CH}_2\text{NHCH}_3 + \text{H}_2\text{O} \\ \text{N-methylethanamide} \qquad \qquad 2^\circ \text{amine}$

30 **(a)**

Hofmann bromamide reaction is used to prepare 1° amine form primary amides. In this method, amides are treated with bromine in presence of KOH

$$R-{\rm CONH_2} + 4{\rm KOH} + {\rm Br_2} \stackrel{\Delta}{\rightarrow} R{\rm NH_2} + {\rm K_2CO_3} \\ + 2{\rm KBr} + 2{\rm H_2O}$$

32 **(d)**

Compounds having active hydrogen such as, phenols, alcohols, primary or secondary amines and amides show Schotten-Baumann reaction.
But tertiary amines do not have active hydrogen, hence, do not undergo Schotten-Baumann reaction.

$$R-OH+OH+OH-NaOH$$

$$-H_2O$$

$$-NaCl$$

33 **(b)** Due

to +ve IE

in alkylamines and resonance in $C_6H_5NH_2$.

34 **(c**

Schmidt reaction

0 ||
$$R - C - OH \xrightarrow{\text{NaN}_3}_{\text{H}_2\text{SO}_4} R - NH_2 + N_2 + CO_2$$

37 **(b)**

Benzene diazonium chloride reacts with phenol in weakly basic medium gives *p*-hydroxy azobenzene.

benzene diazonium phenol
chloride

Weakly
basic
medium

$$p$$
-hydroxy azobenzene

OH + HO

40 (a) $RCONH_2 \xrightarrow{P_2O_5} RCN + H_2O$

41 **(d)**

Basicity of amines depends upon the availability of lone pair of electrons of nitrogen for donation. Electron releasing group increases the electron density over nitrogen, thus increases the basic character. 3° methyl amine although contains three electron realeasing groups but is least basic because of steric hindrance. Hence, the order of basic character is

 $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N$

42 **(b)**

Methyl cyanide gives acetic acid on hydrolysis.

$$CH_3CN \xrightarrow{H_2O/H^+} CH_3 - C - NH_2 \xrightarrow{H_2O/H^+} CH_3COOH + NH_3$$

43 **(c)**

$$R$$
—0—N=0 $\stackrel{4[H]}{\longrightarrow}R$ —0H + NH₂OH

44 **(d)**

C₃H₉N represent following structures

 $CH_3CH_2CH_2NH_2$

Propanamine

(1°amine)

H $CH_3CH_2 - N - C$

N-methyl ethanamine

(2°amine)

$$CH_3$$

 $|$
 $CH_3 - N - CH_3$
 N,N -dimethyl methanamine
 $(3^\circ amine)$

45 **(b)**

H-atom of C_6H_6 ring is replaced by S_E reactions

46 (a)

Presence of— OCH_3 gp. on aniline makes it more basic than the presence of — NO_2 , —Cl or

 $-CH_3$ gp.

48 **(b)**

Electron withdrawing groups (*e.g.*, benzyl) because the basicity of amines. Electron donating groups (*e.g.*, alkyl) increase the acidity of amines. \therefore The correct order of basicity of amines is $C_2H_5NH_2 > CH_3NH_2 > NH_3 > C_6H_5NH_2$

49 **(d)**

CH₃NH₃Cl is acidic in nature.

50 **(a**)

$$CH_3CH = NOH \xrightarrow{P_2O_5} CH_3CN + H_2O$$

51 **(b**)

Dimethyl oxalate is used for distinguishing primary, secondary and tertiary amines (Hofmann's method).

4. The primary (1°) amine forms the corresponding substituted oxamide which is usually a crystalline solid.

$$COOC_2H_5$$
 $H-NHR$ $CONHR$
$$+ \rightarrow | +2C_2H_5OH$$

$$COOC_2H_5 H-NHR CONHR$$

5. The secondary amine forms a diethyl oxamic ester which is generally a liquid.

$$COOC_2H_5$$
 $CONR_2$

$$| +NHR_2 \rightarrow | +C_2H_5OH$$

$$COOC_2H_5 \qquad COOC_2H_5$$

- 6. The tertiary amine under these conditions does not react at all since it does not contain a replaceable hydrogen atom.
- 52 **(b)**

Nitro group goes always to meta position, in aromatic compounds, irrespective to the substituents.

53 **(d)**

It is carbylamine reaction,

$$\begin{array}{c|c} \text{CH}_2\text{NH}_2 & \text{CHCI}_3 \\ \hline \text{benzyl amine} & C_2\text{H}_5\text{OH} & \text{benzyl} \\ & \text{isocyanide} \end{array}$$

54 **(d)**

Secondary amines give oily nitrosoamine with nitrous acid

$$(CH_3CH_2)_2NH + HNO_2$$

$$\rightarrow (CH_3CH_2)_2N - NO + H_2O$$

Secondary amine nitrous acid oily nitrosoamine

55 **(c)**

Nitrosoamine on heating with conc. $\rm H_2SO_4$ gives secondary amine. This reaction is called Liebermann nitroso reaction.

$$R_2$$
N - N = 0 + H₂O $\xrightarrow{\text{Conc.H}_2\text{SO}_4} R_2$ NH + HNO₂ nitrosoamine secondary amine

56 (a)

Cyanides are hydrolysed either by alkali or acid to give carboxylic acid.

$$R - \text{CN} + 2\text{H}_2\text{O} \xrightarrow{\text{NaOH}} R - \text{COOH} + \text{NH}_3$$

57 **(b)**

(A)
$$RCN \xrightarrow{\text{Reduction}} RCH_2NH_2$$
1°amine

$$RCN + CH_3MgBr \longrightarrow R-C = N-MgBr \xrightarrow{H. OH}$$
 CH_3
 $-Mg$
 OH

$$C = O + NH_3$$
CH₃
methyl ketone

(B)

(C)
$$RNC \xrightarrow{Hydrolysis} H - COOH + RNH_2$$
1°amine

(D)
$$RNH_2 \xrightarrow{HNO_2} ROH + N_2 + H_2O$$

59 **(b)**

$$CHCI_3 + C_6H_5NH_2 + 3NaOH$$

$$\rightarrow C_6H_5NC + 3NaCI + 3H_2O$$

phenylisocyanide

62 **(a)**

It is the first step of Gabriel's phthalimide synthesis. The hydrogen bonded to nitrogen is sufficiently acidic due to two α -carbonyls.

$$N \longrightarrow H_2O + \bigcirc O$$

The conjugate base forms above act as nucleophile in the subsequent step of reaction. As

shown above, the nucleophile exist in three resonating form, one may think of oxygen being the donor atom in the nucleophilic attack. However, nitrogen act as donor as it is better donor than oxygen.

$$\begin{array}{c|c} & & & \\ & & &$$

Bromine is not substituted in the above reaction as it is in resonance with benzene ring giving partial double bo0nd character to C — Br bond, hence difficult to break.

$$H_2CCI$$
 Br
 H_2CCI
 H_2CCI

63 **(b)**

Only these aromatic primary amines undergo diazotisation in which $-\mathrm{NH}_2$ is attached to nucleus.

64 **(a)**

Molecular formula of benzonitrile is C₆H₅CN.

phenyl cyanide or benzonitrile

65 **(b)**

In carbylamines reaction, when a primary amine reacts with chloroform in presence of alc. KOH, it gives iso-cyanide which has abonxious odour. This reaction is given by primary amine

$$RNH_2 + CHCl_3 + 3KOH \xrightarrow{\Delta} RNC + 3KCl + 3H_2O$$

Primary (alc) alkyl
Amine *iso*-cyanide

67 **(c)**

 $NH_2CONH_2 + NH_2 \cdot NH_2 \rightarrow NH_2CONHNH_2 + NH_3$

68 **(a)**

$$R - C \equiv N \xrightarrow{\text{hydrolysis}} R - \text{CONH}_2 \xrightarrow{\text{hydrolysis}} R\text{COOH}$$
Alkyl cyanide alkyl amide carboxylic acid

69 **(a)**

Secondary nitroalkanes can be converted into ketones by using aqueous HCI.

$$2 \xrightarrow{R} CHNO_2 + HC1 \longrightarrow 2 \xrightarrow{R} C = O + N_2O + H_2O$$

70 **(d)**

Benzyl amine is most basic because positive inductive effect (+1) increases due to presence of methylene group.

72 **(c)**

$$C_2H_5NH_2 \xrightarrow{[0]} CH_3CH = NH \xrightarrow{HOH} CH_3CHO + NH_3$$

73 **(c)**

Carbylamine reaction is given by only primary amines (both aliphatic and aromatic). In this reation a primary amine reacts with chloroform in basic medium, to form a very bad smelling compound, called carbylamines

90

 $C_6H_5NH_2 + CHCl_3KOH \rightarrow C_6H_5NC + KCl + H_2O$

75 **(a)**

$$NH_2CONH_2 + HOC_2H_5 \xrightarrow{\Delta} H_2NCOOC_2H_5 + NH_3$$
Urethane

77 **(b**)

Only primary amines give positive carbylamine test

78 **(a)**

Primary amines have tendency of forming H-bonds

81 **(c)**

7.

$$\begin{array}{c} || \\ CH_3 - C_2 - CH_3 \end{array}$$

0

(b) (

$$CH_3 - C_2 - OH$$

$$sp^3 - sp^2$$

(c)

$$CH_3 - C - \equiv N$$
 $sp^3 \quad sp$

(d) 0

$$\begin{array}{c} || \\ \mathrm{CH_3} - \mathrm{C_2} - \mathrm{NH_2} \\ sp^3 & sp^2 \end{array}$$

Acetonitrile does not contain sp^2 hybridised

carbon.

85 **(b)**

Due to

+ ve IE in alkyamines and resonance in C₆H₅NH₂.

86 **(d)**

$$C_6H_5SO_2Cl + RNH_2 \rightarrow RNHSO_2C_6H_5 \xrightarrow{KOH} R - NKSO_2C_6H_5$$

Benzene sulphyonyl N-alkyl benzene

soluble in KOH

chloride sulphonamide

87 **(b)**

$$C_6H_5NH_2 \xrightarrow{Diazotisation} C_6H_5N_2Cl + H_2O$$

89 **(c)**

Tertiary amines do not have replaceable H-atom.

90 **(b)**

Urea gives biuret test. Biuret formed gives violet colour with CuSO₄ in alkaline medium.

91 **(a)**

The order of basicity among the following amines is

$$(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > C_6H_5NH_2$$

92 (d)

Concentration does not affect the basis strength of amines

93 **(c)**

Secondary amine on reaction with aq. HNO₂ at low temperature produces yellow oily nitrosoamines. CH₃CH₂NHCH₂CH₃ is secondary amine.

95 **(a)**

Ethyl isocyanide on hydrolysis in acidic medium gives methanoic acid and ethyl amline salt

$$C_2H_5NC + H_2O \xrightarrow{H+} HCOOH + C_2H_5NH_2$$
methanoic acid

$$C_2H_5NH_2 + H^+ \rightarrow C_2H_5NH_3^+$$

Ethylamine salt

96 **(d)**

$$R$$
—N=C=0 $\xrightarrow{\text{HOH}} R\text{NH}_2 + \text{H}_2\text{CO}_3$

97 **(b**)

Biuret formed gives violet colour with CuSO₄ in alkaline medium.

98 **(d**)

Benzyl amine $(C_6H_5CH_2NH_2)$ is more basic than aniline $(C_6H_5NH_2)$ because N-atom of aniline is delocalized over the benzene ring. However in benzyl amine the lone pair of electrons on the N-atom is not conjugated with the benzene ring and

therefore it is not delocalized. Hence, the lone pair of electrons on the N-atom in benzyl amine is more readily available for protonation than that on the N-atom of aniline. Thus, the benzyl amine is a stronger base than aniline.

99 **(b)**

Basicity of amines increases with increasing +I effect of alkyl group.3°amine has greater +I effect than 2° and 1° amines but less basic than these, due to steric hindrance of bulky groups.

Moreover, benzyl amine is a weaker base than aliphatic amines. Hence, the following compounds has the order of basicity.

$$CH_3NH_2(1^\circ)$$
, $(CH_3)_2NH(2^\circ)$, $(CH_3)_3N(3^\circ)$, C_6H_5CH
 I II IV
 $II > I > III > V$

100 (d)

It is methyl amine which, being basic dissolves in dilute HCI. It with NaNO2 evolves nitrogen gas leaving behind methyl alcohol which has smell of wood-spirit.

$$\begin{array}{c} \text{CH}_{3}\text{NH}_{2} \xrightarrow{\text{HCI}} \text{CH}_{3}\text{NH}_{2}.\text{HCI} \\ \text{CH}_{3}\text{NH}_{2} + \text{HNO}_{2} \xrightarrow{\text{NaNO}_{2}/\text{HCI}} \text{CH}_{3}\text{OH} + \text{N}_{2} \uparrow + \text{H}_{2}\text{O} \\ & \text{methyl alcohol} \end{array}$$

101 **(b)**

2° amines are more basic than 1° amines due to +ve IE of — CH_3 gp. In amide the resonance give rise to less availability to electron pair for coordination and thus less basic. The negative

charge developed on N in CH₃due to resonance makes it more basic.

102 (c)

Availability of lone pair on N-atom (Lewis 120 (a) concept),

 $RNH_2 + H_2O \rightarrow RNH_3^+ + OH^-$ Bronsted concept proton acceptor).

103 (c)

$$C_2H_5NH_2 + Na \rightarrow C_2H_5NHNa + \frac{1}{2}H_2$$

104 (d)

$$CH_3CN \xrightarrow{HOH} CH_3COOH$$

105 (a)

$$C_3H_9N(A) \xrightarrow{HNO_2} Alcohol + N_2$$
}
 $\Rightarrow A \text{ is } 1^\circ \text{ amine, } i.e.,$
 $C_3H_9N \text{ is } C_3H_7NH_2$
 $C_3H_9N \xrightarrow{KOH+CHCl_3} Carbylamine \xrightarrow{Reduction}$

$$\begin{array}{c} \text{CH}_{3} \\ \text{CH-NH-CH}_{3} \Longrightarrow \text{Alkyl part is} \\ \text{CH}_{3} \\ \text{Isopropyl methyl amine} \end{array} \begin{array}{c} \text{CH}_{3} \\ \text{CH}_{3} \\ \text{CH}_{3} \end{array}$$

$$C_3H_9N$$
 is CH_3 $CH-NH_2$

109 (c)

Reduction of nitrobenzene by Zn and NH₄CI gives N-phenyl hydroxylamine.

$$+4[H]$$
 Zn/NH_4Cl $+H_2O$

N-phenyl hydroxylamine

111 (c)

Carbylamine reaction is used to prepare isocyanides.

112 (a)

$$RNH_2 + C_6H_5SO_2Cl \rightarrow C_6H_5SO_2NHR$$
(Sulphonamide soluble in alkali)

114 (d)

All primary (aliphatic) amines give alcohol with H which forms

$$CH_3$$
— O — N = O and CH_3OCH_3 .

117 (c)

Roulle first isolated urea (in 1773) from urine and named it as urea.

119 (d)

$$\begin{array}{l} \text{CH}_3\text{CHO} \\ \xrightarrow{\text{H}_2\text{NOH}} \text{CH}_3\text{CH} = \text{NOH} \xrightarrow{\text{Reduction}} \text{CH}_3\text{CH}_2\text{NH}_2 \xrightarrow[-\text{H}_2\text{O}]{\text{NOCl}} \text{CH}_3 \\ \end{array}$$

Acetaldehyde ethyl amine ethyl chloride

$$(A) (B)$$

$$R - C \equiv N$$

∴ Alkyl group is attached to carbon.

122 (c)

p-amine forms alcohol; *s*-amine forms only nitrosoamine.

123 **(d)**

Nitrene is not the intermediate of Gabriel's phthalimide reaction

124 **(b)**

$$NH_2CONH_2 + HNO_3 \rightarrow NH_2CONH_2 \cdot HNO_3$$

126 (c)

$$C_6H_5CH = O + H_2NCH_3 \rightarrow C_6H_5CH = NCH_3$$

128 **(b)**

Ethyl bromide reacts with KCN to give ethyl cyanide.

 $C_2H_5Br + KCN(alc.) \rightarrow C_2H_5CN + KBr$ Ethyl bromide ethyl cyanide

130 **(b)**

$$\mathsf{C_6H_5NO_2} \xrightarrow{\mathsf{Sn/HCl}} \mathsf{C_6H_5NH_2}$$

Nitrobenzene Aniline Nitrobenzene in reduction with Sn and HCI produce aniline. Hence, 'X' is identified as – NH₂ group.

131 **(d)**

$$CH_3I + NH_3 \rightarrow CH_3NH_2 \xrightarrow{CH_3I} (CH_3)_2NH$$

 $\xrightarrow{CH_3I} (CH_3)_3N \xrightarrow{CH_3I} (CH_3)_4N^+I^-$

137 (c)

$$C_2H_5NH_2 \xrightarrow{HNO_2} C_2H_5OH + N_2 \uparrow + H_2O$$

138 (a)

Primary amines on heating with chloroform and ethanolic KOH, give alkyl isocyanide. This reaction is called carbylamine reaction.

$$R - NH_2 + CHCI_3 + 3KOH \xrightarrow{\Delta} R - NC + 3KCI + 3H_2O$$

1°amine alcohol alkyl isocyanide

139 **(d)**

$$CH_3CONH_2 + NaOH \rightarrow CH_3COONa + NH_3$$
(A)

 $(C_2H_5)_2CO_3 + 2NH_3 \rightarrow NH_2CONH_2 + 2C_2H_5OH$ ethyl carbonate urea

 $NH_2COOC_2H_5 + NH_3 \rightarrow NH_2CONH_2 + 2C_2H_5OH$ Ethyl urethane urea

 $COCl_2 + 2NH_3 \rightarrow NH_2CONH_2 + 2HCl$ phosgene urea

140 (c)

Tertiary amine can be directly oxidised to corresponding nitro compound by KMnO₄.

141 **(a)**

$$R - NH_2 + CHCl_3 + 3KOH \rightarrow 3KCl + 3H_2O$$

+ RNC
Offensive

142 **(c)**

$$2RNH_2 + 2HCl$$

+
$$PtCl_4 \rightarrow (RNH_3)_2 PtCl_6$$
; $RNH_3 AuCl_4$

143 (c)

$$H$$

$$|$$

$$C_2H_5NH_2 + O = C - C_6H_5 \rightarrow C_2H_5N$$

$$= HCC_6H_5 + H_2O$$

$$Benzaldehyde$$

$$(A)$$

NH₂CO
$$\stackrel{\cdot}{N}$$
H₂ + H;NH·NH₂ \longrightarrow NH₂CONHNH₂ + NH₃
urea hydrazine
(B)

C₂H₅NH₂ + NOCl \rightarrow C₂H₅Cl + H₂O + N₂

$$C_2H_5NH_2 + NOCl \rightarrow C_2H_5Cl + H_2O + N_2$$
(C)

144 **(b)**

$$R$$
— $NO_2 \xrightarrow{Sn/HCl} R$ — NH_2

145 **(b)**

Aniline is prepared by the reduction of nitrobenzene in acidic medium.

$$+6H \xrightarrow{\text{Fe/HCl}} +2H_2C$$
nitrobenzene

146 **(b)**

 $-\ddot{N}$ H and $-\ddot{C}$ - gp. are *o*-and *p*-directing (activating) and *m*-directing gps.(deactivating)

respectively. In such case *o*-(minor) and *p*-isomers (major) predominates.

147 (d)

Electron donors are bases. In the given choices structure which does not involve resonance will have electron easily available for donation, hence most basic.

- ∴ Only in choice (b) electrons are not in conjugation with double bond of adjacent atom.
- : Compound in choice (b) is most basic.

148 (d)

$$H_2SO_4$$
 NHSO₃H H_2SO_4 NHSO₃H H_2SO_4 H_2O

Sulphanilic acid exists as a dipolar ion which has acidic and basic groups in the same molecule. Such ions are called Zwitter ions or inner salts

150 **(b)**

$$C_2H_5NH_2 + CHCI_3 + 3KOH$$

 $\rightarrow C_6H_5NC + 3KCI + 3H_2O$

Aniline chloroform phenyl isocyanide Thus in this reaction phenyl isocyanide is produced. This is called carbylamine reaction.

$$RCN \xrightarrow{\text{Hydrolysis}} RCOOH + \text{NH}_3$$

$$RCH = \text{NOH} \xrightarrow{\text{Reduction}} RCH_2\text{NH}_2 + \text{H}_2\text{O}$$

$$RCN + 2H_2O \xrightarrow{\Delta} R\text{NH}_2 + \text{HCOOH}$$

$$RCONH_2 \xrightarrow{\text{Hydrolysis}} RCOOH + \text{NH}_3$$

154 (a)

Hinsberg reagent $C_6H_5CO_2Cl$ reacts with primary amines and gives alkali soluble benzene sulphonamide; with secondary amine it gives alkali insoluble benzene sulphonamide , with tertiary amines it does not react.

$$\begin{array}{ccc} \mathsf{C_6H_5SO_2Cl} + R\mathsf{NH_2} & \longrightarrow \\ R\mathsf{NHSO_2C_6H_5} & \overset{\mathsf{KOH}}{\longrightarrow} & R\mathsf{NKSO_2C_6H_5} \\ & & \mathsf{Soluble\ in\ KOH} \end{array}$$

156 (a)

Due to sp^3 -hybridisation and lone pair of electron (like NH₃)

157 **(b)**

$$\begin{array}{c} \mathsf{C_6H_5NO_2} \xrightarrow{\mathsf{Sn/HCI}} \mathsf{C_6H_5NH_2} \\ \xrightarrow{\mathsf{C_6H_5COCI}} \mathsf{C_6H_5CONHC_6H_5} \end{array}$$

Nitrobenzene aniline benzanilide

160 (a)

Carbylamine reaction is given by aliphatic and aromatic primary amine hence, it can be used for the distinguish of primary amine with secondary and tertiary amine. In this reaction, a primary amine reacts with chloroform and alcoholic KOH to give poisonous substance isocyanide.

$$RNH_2 + CHCI_3 + 3KOH(alc.) \xrightarrow{\Delta} RNC + 3KCI + 3H_2O$$

Primary amine

alkyl isocyanide

161 **(b)**

Ethyl amine reacts with nitrous acid to give ethyl alcohol and nitrogen.

$$C_2H_5NH_2 + HNO_2 \rightarrow C_2H_5OH + N_2 + H_2O$$

162 **(b)**

Aniline reacts with Br₂to give 2, 4, 6-tribromoaniline not bromoaniline as

$$H_2$$
 $+ 3Br_2$
 Br
 $+ 3HBr$

2,4,6-tribromoaniline

163 (a)

Trimethyl amine is a tertiary amine. It dissolve in cold nitrous acid to form salts which decompose on warming to nitrosoamine and alcohol. It will not liberate nitrogen.

$$(CH_3)_3N + HNO_2 \rightarrow [(CH_3)_3NH]^+NO_2^-$$

trimethyl ammonium nitrite

167 (d)

Reduction of NO₂ group to NH₂group is taking place by Fe/HCI.

$$\begin{array}{c|c}
 & \text{NO}_2 \\
\hline
 & \text{Fe/HCl} \\
\hline
 & \text{NO}_2
\end{array}$$

172 **(b)**

Benzaldehyde condenses with N, N-diamethyl aniline in presence of anhydrous ZnCl₂ to give malachite green

$$\begin{array}{c} \text{H-} & \text{CH}_3 \\ \text{CH}_3 & \text{CH}_3 \\ \text{CH}_3 & \text{ZnCl}_2 \\ \text{CH}_3 & \text{-H}_2\text{O} \end{array}$$

174 (a)

$$R - X + \text{NaCN} \rightarrow R - \text{CN} + \text{Na} X$$

Alkyl halide aliphatic cyanide

175 (c)

$$R_2 NH \xrightarrow{[0]} R_2 N-NR_2$$

176 (d)

Tertiary amines react as, $(CH_3)_3N + HNO_2 \rightarrow (CH_3)_3NHNO_2$

178 (d)

HNO₂ reacts to give an alcohol means the compound is primary amine.

 $C_5H_{13}N$ means $C_5H_{11}NH_2$ (primary amine) Optically active alcohol means C_5H_{11} segment contain a chiral carbon.

Pentan-2-amine

179 **(b)**

 $CH_3CH_2 - 0 - N = 0$ is a nitrite derivative, hence it is not a nitro derivative.

180 (d)

or C₆H₅SO₂CI is called Hinsberg

reagent.

It is used for the distinction of 1° , 2° , 3° amine.

181 (d)

Presence of electron withdrawing group like -CN, -CHO, $-\text{NO}_2$ etc decreases the electron density over N- atom of amines, and thus decreases their basic character as lone pair is less available for donation

184 **(d)**

It is not used in purification of water.

185 **(c)**

In tertiary amines, no H-atom is attached directly to the more electronegative N-atom. Hence, it has no tendency to form H-bond

186 (c)

Methylaminomethane is trivial name of N-methyl methanamine (CH₃)₂NH.

187 (c)

Both gives alkane (RH) with Grignard reagents RMgX due to the presence of acidic hydrogen (N—H)

190 **(b)**

Hofmann's method is used to separate primary, secondary and tertiary amines. The compound used is diethyl oxalate for this purpose.

191 (c)

The reaction is believed to follow the mechanism. $R op CONH_2 + OBr^- op RCONHBr + OH^ RCONHBr + OH^- op RCONBr + H_2O$ $RCONBr op R - C = O + Br^- R - C = O op R - \ddot{N} = C = O$ \ddot{N} : \ddot{N} : $\ddot{R} - N = C = O + 2OH^- op RNH_2 + CO_3^{2-}$

192 (a)

Primary nitro alkanes when treated with nitrous acid from nitrolic acid which when dissolve in alkali gives, salt of nitrolic acid which is red in colour. In excess of acid, the salt dissociated, thus colour disappears while in excess of alkali the red colour reappears

194 (d)

(a)
$$C_6H_5CONH_2 \xrightarrow[\text{ether}]{\text{LiAlH}_4} C_6H_5CH_2NH_2$$

Benzylamine

(b)
$$C_6H_5CH_2CONH_2 \xrightarrow{Br_2/KOH} C_6H_5CH_2NH_2$$

Benzylamine

$$(c)C_6H_5CN \xrightarrow{\text{LiAlH}_4} C_6H_5CH_2NH_2$$
Benzylamine

(d)
$$C_6H_5CH_2NC \xrightarrow{\text{LiAlH}_4} C_6H_5CH_2NHCH_3$$

2°amine

195 (c)

$$NH_4CNO \xrightarrow{\Delta} NH_2CONH_2 \xrightarrow{\Delta} NH_2CONHCONH_2$$
Urea Biure

196 (d)

The amines are basic in nature due to presence of lone pair of electron on nitrogen. The 2°amines are basic among 1°, 2° and 3°amines because of steric effect and hydration effect

197 (a) $CH_2N_2 + CH_3COOH \rightarrow CH_3COOCH_3 + N_2$ Ester

198 **(a)**

Follow text.

200 **(b)**

Only 1° aromatic amine (primary aromatic amine) from diazonium salts at low temperature (0° – 5°C). A reaction in which – NH₂ group is converted into diazo group ($-N^+ \equiv N$) is called diazotization. Diazotized salts are stable in cold aqueous solution.

$$C_{6}H_{5}NH_{2}+HCI \xrightarrow{0^{\circ}-5^{\circ}C} C_{6}H_{5}NH2CI^{-}$$
 $NaNO_{2}+HCI \xrightarrow{0^{\circ}-5^{\circ}C} HNO_{2}+NaCI$
 $C_{6}H_{5}NCI^{-}+HNO_{2} \xrightarrow{0^{\circ}-5^{\circ}C} C_{6}H_{5}N_{2}CI^{-}+2H_{2}O$
 $C_{6}H_{5}NH_{2}, C_{6}H_{4}, C_{6}H_{4}$

Amines, so undergo diazotization but $C_6H_5CH_2NH_2$ (aliphatic amine) will not undergo diazotisation.

202 (c)

$$NH_2$$
 HNO_3
 H_2SO_4
 NH_2
 NH_2
 NH_2
 NH_2
 NH_2
 NO_2
 m -nitroaniline

 p -nitroaniline

 (47%)
 (2%)

(51%)

Nitration of aniline also gives *m*-nitro aniline in strong acidic medium because in strong acidic condition protonation of - NH₂ group gives anilinum ion (+NH₃) which is deactivating in nature and of *m*-directive nature

$$RCONH_2 + NaOBr$$

 $\rightarrow RNH_2 + NaBr + Na_2CO_3$
 $+ 2H_2O$
 $'X'$

204 **(b)**

Action of alcoholic caustic potash on chloroform and aniline forms a bad smelling compound phenyl isocyanide.

$$\begin{array}{c} C_6H_5NH_2 + CHCI_3 + 3KOH(alc.) \\ \hspace{2cm} \rightarrow C_6H_5NC + 3KCI + 3H_2O \\ aniline \quad chloroform \qquad \quad phenyl \\ isocyanide \end{array}$$

This reaction is called carbylamine reaction and it 219 (a) is actually the test of primary amines.

206 (a)



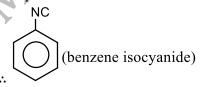
 $-NO_2$ is a *meta* directing group. As it is also a deactivating group, so no chance of introduction of second – Br atom.

207 **(c)**

$$R$$
—NC+2HgO $\rightarrow R$ NCO+Hg₂O

210 (a)

Isocyanides (carbylamines) are foul odour compounds.



As foul odour

213 (a)

This is carbylamine reaction.

214 (d)

When aqueous solution of benzene diazonium

chloride boiled, it gives phenol.

$$N_2$$
+Cl-OH

benzene

diazonium

chloride

215 (d)

Electron withdrawing groups result in decreased basicity while electron releasing groups increases the basicity. Thus, the order of basic character is D > A > B > C

217 (c)

Nitrobenzene on reduction with lithium aluminium hydride (LiAIH₄) gives azobenzene.

$$2 \underbrace{ \underbrace{ \text{LiAlH}_4}_{\text{nitrobenzene}} } \underbrace{ \underbrace{ \text{N}}_{\text{N}} \underbrace{ \text{N}}_{\text{azobenzene}}$$

218 **(b)**

Secondary and tertiary amines fail to undergo the carbylamine test because they react with alcoholic KOH.

Nitrobenzene on nitration gives m-dinitro benzene as – NO₂ group is meta-directing.

In this reaction the attacking reagent is NO_2^+ .

220 (d)

Bases react with acid to form salt.

- : Amines are basic in nature.
- ∴It forms salt on reaction with H₂SO₄

$$2RNH_2 + H_2SO_4 \rightarrow [RNH_3]_2^+SO_4^{2}$$

221 (a)

$$C_2H_5NH_2 + NOCl \rightarrow C_2H_5Cl + N_2 + H_2O$$

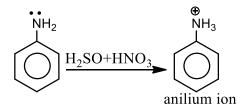
222 (d)

$$C_6H_5NH_2 + CI - COCH_3 \xrightarrow{NaOH} C_6H_5NHCOCH_3 + HCI$$

acetvl chloride aniline acetanilide

223 (a)

On direct nitration of aniline, lone pair of electrons present at nitrogen atom will accept proton from the nitrating mixture to give anilium ion which is meta directing.



224 (d)

Anilinium hydrogen chloride ($C_6H_5NH_2$. HCI) gives white precipitate. With AgNO $_3$ solution as it gives CI $^-$ ion, p-chloro aniline has CI atom attached directly to the nucleus, hence cannot be ionised.

226 **(c)**

The basic character of amines depends upon the capacity nitrogen atom to donate an electron pair. More the ability of nitrogen atom to donate electron pair, more will be the basic character. In presence of electron releasing groups (+I showing group, $-CH_3$) the basic character of amines increases due to more availability of electrons on nitrogen atom.

Tertiary amines are least basic due to steric hindrance caused by three bulky alkyl groups. ∴The order of basic character is $NH(CH_3)_2 > CH_3NH_2 > N(CH_3)_3 > NH_3$

227 **(c)**

Aliphatic and aromatic primary amines on warming with CHCI_3 and alcoholic KOH form isocyanide or carbylamine which has very unpleasant smell. This reaction is known as carbylamine reaction.

Since *p*-toluidine contains an aromatic primary amine group, it undergoes similar reaction and give 4-methyl phenyl isocyanide.

$$NH_2$$
 +CHCl₃+3(alc)KOH $Warm$ + 3KCl+3H₂O H_3 C P -toluidine H_3 C $H_$

229 **(b)**

R-N is nitroalkane having -N of f. gp

R—0— N=0 is alkylnitrite having —0—N=0 f. gp. ; f. gps are different.

231 **(c)**

Primary amines react with alc alkali and chloroform to give an offensive odour compound *i.e.*, isocyanide. This reaction is called carbylamine reaction.

$$CH_3CH_2CH_2NH_2 + CHCI_3 + 3KOH$$

 $\rightarrow CH_3CH_2CH_2NC + 3KCI + 3H_2O$
 n -propyl amine (alco.) propyl isocyanide

232 **(a)**

Intermolecular H-bonding is more in primary amines than in secondary amines as there are two H-atom available for H-bonding. Tertiary amines do not have intermolecular H-bonding due to absence of H-atom available for H-bonding. Therefore, the order of boiling points of the given amines is as fallows

$$nC_4H_9NH_2 > (C_2H_5)_2NH > C_2H_5N(CH_3)_2$$

b.p. 350.8 K b.p. 329.3 K b.p. 310.5 K

233 (a)

Aniline or any 1° amine reacts with aldehyde to form Schiff's base or anils.

$$NH_2$$
 $+ CH_3CHO$
 $-H_2O$
 $N \equiv CHCH_3$
aniline acetadehyde schiff's base or anil

234 (a)

Coupling of diazonium salts takes place in the following order as

235 (c)

Quaternary ammonium compounds, e. g., $[R_4N]^+X^-$, tetra alkyl amm. halide or $[R_4N]^+OH^-$, tetra alkyl amm. Hydroxide.

237 **(b)**

$$\begin{array}{c} C_2H_5NH_2 \\ \xrightarrow{HNO_2} C_2H_5OH \xrightarrow{PCl_5} C_2H_5Cl \xrightarrow{NH_3} C_2H_5NH_2 \\ \text{Ethyl amine} & \text{ethyl alcohol} & \text{ethyl chloride} \\ \text{ethyl amine} \end{array}$$

238 **(c)**

 $\rm K_2CO_3$ is formed in Hofmann's degradation reactio

(*A*)

240 **(d)**

Aniline undergoes diazotisation.

241 **(c)**

The conversion of —CN to —CH₂NH₂ by catalytic reduction is called Mendius reaction.

244 **(b)**

$$RBr + KCN \longrightarrow RCN \xrightarrow{Reduction} RCH_2NH_2$$

245 (d)

Aniline reacts with bromine and give white ppt. of

(B)

2, 4, 6 tribromoaniline.

$$+3 \text{ Br}_2$$
 $+3 \text{ HBr}$
white ppt.

246 **(b)**

Nitromethane forms methyl hydroxylamine on reduction in netural medium with Zn/NH₄CI.

$$CH_3NO_2 + 4[H] \xrightarrow{Zn/NH_4CI} CH_3NHOH + H_2O$$

Nitromethane

N-methyl hydroxyl

amine

251 (c)

In Hofmann elimination reaction, less substitudes alkene is the main product

$$\begin{bmatrix} \mathsf{CH_3} \\ \mathsf{CH_3CH_2CH_2}^{-1} \mathsf{N} - \mathsf{CH_2CH_3} \\ \mathsf{CH_3} \end{bmatrix} \mathsf{OH}^{-} \xrightarrow{\Delta} \\ \mathsf{CH_3CH_2CH_2} - \mathsf{N}(\mathsf{CH_3})_2 + \mathsf{CH_3CH} = \mathsf{CH_2} + \mathsf{CH_2} = \mathsf{CH_2}$$

253 **(b)**

$$R - NH_2 \xrightarrow{HNO_2} R - OH$$

254 (d)

C₆H₅COCl has no reaction with carboxylic acids.

257 **(c)**

Basic nature of an amine depends upon availability of lone pair on nitrogen atom. If lone pair is easily available the compound would be more basic.

Dut to +I effect of methyl group, methyl amine is more basic than ammonia and dimethyl amine is more basic than methyl amine. While aniline is a weaker base than ammonia due to delocalization of lone pair of nitrogen atom at different position.

258 (c)

Presence of methyl group increase the electron density on nitrogen. So, increases the basicity. Aniline is weaker base than the primary aliphatic amines and this may be explained by resonance. The lone pair of N is involved in resonance, thus not available for donation. That's why basic strength of aryl amines (aniline) is lowest.

260 **(c)**

In aqueous solution, basicity order dimethyl amine > methyl amine > trimethyl amine > aniline

2° 1° 3°

261 **(b)**

The name of isocyanides is carbylamine, and when it is attached with an alkyl group, the compound is called alkyl carbylamine, *i.e.*,RNC.

264 **(b)**

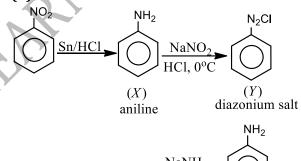
$$C \equiv N \xrightarrow{Na} C \longrightarrow NH$$

This is thorpe nitrile condensation involving only α -H-atom of nitrile due to strong attraction nature of CN gp.

265 (a)

Grabriel's synthesis: Phthalimide is reacted with KOH to form potassium phthalimide. The potassium salt is treated with an alkyl halide. The product N-alkyl phthalimide is put to hydrolyse with hydrochloric acid, then primary amine is formed.

266 (d)



NaNH₂ (Z) aniline

 $\therefore Z$ is aniline

267 **(b)**

$$\begin{array}{c}
 & \overset{\text{OH}}{\downarrow} 4 \\
 & \overset{\text{H}}{\beta} 4 \\
 & \overset{\text{H}}{\beta} 4 \\
 & \overset{\text{H}}{\beta} 4 \\
 & \overset{\text{H}}{\beta} 4 \\
 & \overset{\text{Me}}{\downarrow} \text{Me} \\
 & \overset{\text{CH}_2-\text{CH}_2-\text{CH}_3}{\text{CH}_2-\text{CH}_2-\text{CH}_3}
\end{array}$$

There are four β - hydrogens, in this quaternary ammonium salt.

On heating quaternary ammonium salt gives Hofmann elimination (abstraction of most acidic hydrogen which is β^1).

Hence, major product is $CH_2 = CH_2$. (Least substituted alkene).

268 **(b)**

$$C_2H_5NO_2 \xrightarrow{NaOH} CH_3COONa + NH_2OH$$

269 **(b)**

Nitrobenzene is reduced by Zn and alcoholic KOH into hydrazobenzene.

$$\begin{split} 2 \text{C}_6 \text{H}_5 \text{NO}_2 + 10 \text{H} & \xrightarrow{\text{Zn+alc.KOH}} \text{C}_6 \text{H}_5 - \text{NH} - \text{NH} \\ & - \text{C}_6 \text{H}_5 + \text{H}_2 \text{O} \\ & \text{hydrazobenzene} \end{split}$$

270 **(b)**

$$CH_3NH_2 + CHCI_3 + 3KOH$$

 $\rightarrow CH_3NC + 3KCI + 3H_2O$

 CH_3NC or $CH_3 - N^+ \equiv C^-$ methyl isocyanide or methyl carbylamine.

This reaction is an example of carbylamine reaction and it is used for the distinction of *p*-amines from *s*- and *t*-amines or identification of *p*-amino group.

274 (a)

$$(CH_3)_4N^+I^- + NaOH \rightarrow (CH_3)_4N^+OH^- + Nal$$

 $(CH_3)_4N^+OH^- \xrightarrow{\Delta} (CH_3)_3N + CH_3OH$
methanol

275 (a)

$$\label{eq:ch3} \begin{split} \text{CH}_3\text{CH}_2\text{NH}_2 & \xrightarrow{\text{NaNO}_2 + \text{HCl}} \text{CH}_3 \text{ CH}_2 \text{ OH} + \text{N}_2 \ + \text{H}_2\text{O} \\ & + \text{NaCl} \end{split}$$

Ethylamine

$$NH_2CONH_2 \xrightarrow{NaNO_2+HCl} 2N_2 + H_2O + CO_2 + NaCl$$

Urea

$$\begin{array}{c} \text{CH}_{3}\text{CONH}_{2} \xrightarrow{\text{NaNO}_{2} + \text{HCl}} \text{CH}_{3} \text{ COOH} + \text{N}_{2} + \text{H}_{2}\text{O} \\ + \text{NaCl} \end{array}$$

Acetamide

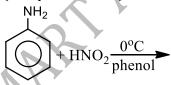
$$C_6H_5NH_2 \xrightarrow{NaNO_2+HCl} C_6H_5N_2^+Cl^-H_2O + NaCl$$

Aniline

276 **(b)**

$$C_2H_5NH_2 + HNO_2 \rightarrow C_2H_5OH + N_2 + H_2O$$

ethyl amine ethyl alcohol
(1°aliphatic amine)



aniline

1°aromatic amine

∴Dye test is used to distinguish between

1°aliphatic and

1° aromatic amine

277 (c)

Presence of α -H atom is the main condition for exhibiting tautomerism.

The reactant taken in reaction (C) does not contain any α -H atom, thus the product (Y)will

also show the absence of α -H atom, Hence, Y will show tautomerism

278 (a)

8. In Hofmann method, a mixture of primary, secondary and tertiary amines is treated with diethyloxalate, when primary amine forms solid oxamide, secondary amine forms a liquid oxamic ester whereas tertiary amine remains unaffected.

$$(COOC_2H_5)_2 + 2HNHR \rightarrow (CONHR)_2 + 2C_2H_5OH$$

Diethyl oxalate 1° amine solid

CONR₂

$$(\mathsf{COOC}_2\mathsf{H}_5)_2 + \mathsf{HN}R_2 \to |$$

$$COOC_2H_5 + C_2H_5OH$$

2°amine liquid

$$(COOC_2H_5)_2 + NR_3 \rightarrow No reaction$$
3° amino

279 (a)

An alkyl cyanide is dissolved in ether or better in ethyl formate or ethyl acetate, and reduced with $SnCI_2$ and HCI and then steam distilled. The whole process is called Stephen reaction. In this process alkyl cyanide is reduced to aldehyde.

$$CH_3 - C \equiv NH = 2[H] + HCI \xrightarrow{SnCI_2 + HCI} \xrightarrow{ether}$$

$$CH_3 \longrightarrow CH_2 = NH \cdot HCl \xrightarrow{H_2O} CH_3CHO + NH_4Cl$$

There is no analogous method for the preparation of ketones.

282 (a)

Azoxybenzene is the main product when reducing agent used is Na₃AsO₃/NaOH

283 **(b)**

Negative charge developed on N in the resonance hybrid makes it more basic as it loses electron pair readily. Also 2° amine is more basic than 1°

amine due to +ve *IE* of alkyl group. In amide the lone pair remains less available due to delocalisation in resonance.

284 (d)

Aniline on oxidation with $Na_2Cr_2O_7$ and H_2SO_4 gives *p*-benzoquinone.

$$NH_2$$

$$Na_2Cr_2O_7/H_2SO_4$$
aniline
$$p$$
-benzoquinone
(quinone)

285 (a)

As the molecular mass increase, boiling point increases. In case of isometric amines, however, as the number of H-atoms attached directly to N-atom decreases, boiling point decreases because tendency to form H-bonds decreases. Hence, the order of boiling points of given amines is $\text{CH}_3\text{NH}_2 < (\text{CH}_3)_3 \text{ N} < \text{CH}_3\text{CH}_2\text{N}(\text{NH}_3) \\ < \text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$

288 **(b)**

Acetonitriles on hydrolysis produce carboxylic acids with the evolution of ammonia.

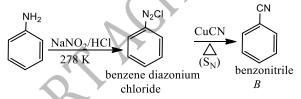
$$\begin{array}{c} O & O \\ || & || \\ CH_3 - C \equiv N \xrightarrow{H_2O} CH_3 - C - NH_2 \xrightarrow{H_2O} CH_3 - C \\ - OH + NH_3 \end{array}$$

Acetonitrile acetamide acetic acid

289 (a)

 $N \equiv C - CH = CH - C \equiv N$; It has five π -bonds.

292 **(b)**



Formation of A is by diazotization and formation of B from A is by S_N reaction.

293 (c)

CCH₃CH₂NH₂ + CHCI₃ + 3KOH

$$\rightarrow$$
 CH₃CH₂NC + 3KCI + 3H₂O
9. (B)

This reaction is known as carbylamine reaction

294 **(b)**

By using $\mathrm{H}_2\mathrm{S}$, NH_3 as reagent, selective reduction takes place

$$NO_2$$
 H_2S, NH_3
 NO_2
 NO_2
 NO_2

296 **(b)**

A characteristic reaction of secondary amines.

$$(CH_3)_2NH \xrightarrow{HNO_2} (CH_3)_2 N-N=0$$
 (nitrosoamine).

299 (c)

EDTA is ethylenediamine-tetra acetic acid

300 **(c)**

$$R$$
— $CONH_2 + Br_2 + KOH \rightarrow R$ — NH_2

301 **(b**

C₃H₈O is alcohol and C₃H₆O₂ is acid. Thus, C₃H₉N i

302 **(b)**

$$R - CN + 4[H] \xrightarrow{\text{LiAIH}_4} R - CH_2NH_2$$

Alkyl nitriles primary amine

303 **(c)**

General formula for any amine is $C_nH_{2n+3}N$; also note that for primary amine, it is C_nH_{2n+1} NH_2 ; for secondary amine, it is $C_nH_{2n+2}NH$ and for tertiary amine, it is $C_nH_{2n+3}N$.

304 **(b)**

Biuret test is given by compounds having — $CONH_2gp$.

305 **(b)**

 $CH_3CH_2 - 0 - N = 0$ is a nitrite derivative, hence, it is not a nitro derivative

309 (c)

As we know, benzenediazonium salt forms brilliant coloured dye with β -naphthol, the compound under consideration must be p-toludine (c) as it is a primary aromatic amine. Primary aromatic amine, on treatment with NaNO $_2$ in dil. HCI forms the corresponding diazonium chloride salt.

$$NH_2$$
 N_2
 N_2

310 (a)

 $-0\mathrm{CH_3}$ is strongest electron releasing group (+M effect) which opposes most the dispersion of lone pair of electron of nitrogen into the ring. Thus, $-0\mathrm{CH_3}$ being at *para* position imparts

hifhest basicity. NO_2 being at *meta* position stabilises the electron pair of nitrogen only by -I effect. While NO_2 being present at *para* position due to -M effect and -I effect stabilizes the lone pair of electron of nitrogen, most and impart least basicity.

$$\mathsf{O_2N} \overset{\mathsf{NH_2}}{\longleftarrow} \mathsf{NH_2} \overset{\mathsf{NH_2}}{\longleftarrow} \mathsf{NH_2}$$

$$\begin{array}{c|c} & & & \\ &$$

317 **(a)**

 R_2 NH + HNO₂ \rightarrow R_2 N—N=0 + H₂O Nitrosoamines are carcinogens.

318 (a)

$$R$$
— $CN \xrightarrow{Reduction} RCH_2CH_2$

319 (a)

$$CH_3NH_2 + C_6H_5SO_2CI$$

$$\rightarrow C_6H_5SO_2NHCH_3$$

$$\xrightarrow[(alkali)]{NaOH} C_6H_5SO_2N(Na)CH_3$$

1° amine hinsberg's N-methyl benzene soluble sodium salt

Reagent sulphonamide

320 **(b)**

It gives diazonium salt.

It is known as diazotization reaction.

321 **(a)**

Ethyl amine, on acetylation, gives N-ethyl acetamide.

$$C_2H_5NH_2 \xrightarrow{CH_3COCI} C_2H_5NHCOCH_3$$

N-ethyl acetamide

322 **(b)**

 $1^{\circ} aliphatic amines on reduction with HNO <math display="inline">_2$ form alcohol and evolve $N_2.$

$$RNH_2 + HONO \xrightarrow{NaNO_2 - HCI} ROH + N_2 + H_2$$
323 **(b)**

 $NH_2CONH_2 + HNHCONH_2 \rightarrow NH_2CONHCONH_2 + NH_3$

324 **(d)**

$$NH_2$$
 $+ CHCl_3 + alc 3KOH$
 $- CH_3$
 $- CH_3$

it is a example of carbylamines reaction

325 **(b)**

$$C_6H_5NH_2 + CH_3COCl \rightarrow C_6H_5NHCOCH_3$$

326 **(b)**

Due to +ve IE in alkylamines and resonance in $C_6H_5NH_2$.

327 **(a)**

Due to +ve IE in alkylamines and resonance in $C_6H_5NH_2$.

328 **(c)**

$$\begin{array}{c} \operatorname{CH_3CH_2Br} \xrightarrow{\operatorname{aq.KOH}} \operatorname{CH_3CH_2OH} \xrightarrow{\operatorname{KMnO_4/H^+}} \operatorname{CH_3COOH} \\ \xrightarrow{\operatorname{NH_3}} \operatorname{CH_3COONH_4} \xrightarrow{\Delta} \operatorname{CH_3CONH_2} \end{array}$$

10. Acetic acid

acetamide

 $\xrightarrow{\text{Br}_2/\text{alkali}} \text{CH}_3\text{NH}_2$

Methyl amine (*D*)

329 (a)

Aliphatic primary amines on treatment with ${\rm NaNo_2/HCI}$ gives alcohols with evolution of nitrogen gas.

$$(CH_3)_2CHNH_2 + HONO \xrightarrow{NaNO_2/HCI} (CH_3)_2CHOH + N_2 + H_2O$$

330 **(b)**

$$RNH_2 \xrightarrow{HNO_2} ROH + H_2O + N_2 \uparrow$$
11. (B) (C)

331 (d)

The abnormal trend of 3° amines is explained in terms of steric effect. Note basic order of amines on the basis of pK_b reported in Finar

$$(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$$

3.23 3.32 4.2

4.73

 pK_b

$$(C_2H_5)_2NH > (C_2H_5)_3N > C_2H_5NH_2 > NH_3$$

3.07 3.13 3.37

4.73

 pK_b

332 **(d)**

The mixture of SnCl₂ + HCl, reduces, –CN group partially

333 **(c)**

The aqueous solution of urea is neutral in nature but urea behaves as a weak monoacid-base and forms salts with strong acids, *e.g.*,

$$\mathrm{NH_2CONH_2} + \mathrm{HNO_3} \longrightarrow \mathrm{NH_2CONH_2} \cdot \mathrm{HNO_3}$$
 Urea nitrate

334 **(b)**

The conversion of —CN to —CH₂NH₂ by catalytic reduction is called Mendius reaction.

335 (c)

$$RCONH_2 + NaOH \rightarrow RCOONa + NH_3$$

336 **(b)**

Due to +ve IE of alkyl gp., N-atom of amines acquires partial -ve charge and thus, electron pair is easily donated.

340 **(b)**

$$HCONHR \xrightarrow{POCl_3} RNC \times H_2O$$

341 (a)

$$C_2H_5NC + H_2O \xrightarrow{H^+} HCOOH + C_2H_5NH_2$$

formic acid
 $C_2H_5NH_2 + H^+ \rightarrow C_2H_2NH_3^+$
salt

342 **(b)**

Aniline on oxidation with per acetic acid, CH₃CO₃H gives nitrobenzene

343 (d)

 C_3H_9N may have the structures as: $(CH_3)_3N$, $CH_3CH_2CH_2NH_2$, $(CH_3)_2CHNH_2$ (a) (b) (c)

344 **(b)**

Amines possess fishy smell.

345 (c)

$$CH_3NC \xrightarrow{Reduction} CH_3NHCH_3$$

346 **(c**)

 $\rm C_2H_5NH_2$ is stronger base than $\rm NH_3$. The presence of alkyl group on N-atom intensifies –ve charge on N-atom and thus, electron pair is donated more readily.

$$R \longrightarrow NH_2$$
 $H-NH_2$ (+ve *IE* of alkyl gp.)

347 (d)

Isopropyl amine is a primary amine because one hydrogen atom of ammonia is replaced by isopropyl group.

$$\begin{array}{c} \rm NH_2 \\ | \\ \rm CH_3 - CH - CH_3 \\ 1^{\circ} \, amine \end{array}$$

349 (d)

 $(C_2H_5)_2$ NH (2°amine) is strongest base. Basic nature of amines due to presence of lone pair of electron on nitrogen atom which is available for the bond formation with Lewis acid. Due to the +I effect 2° amine is better base than 1° amine and NH $_3$. In case of aromatic amines the lone pair on nitrogen atom involved in resonance, therefore, not available for bond formation, so aromatic amines are less basic.

350 **(c)**

Aniline on diazotization in cold (at 0° to 5°C) gives benzene diazonium chloride.

$$NH_2 + NaNH_2 + 2 HCI \frac{0.5^{\circ}C}{Diazotization}$$

$$N = N - CI + NaCI + 2H_2O$$
benzene diazonium chloride

This benzene diazonium chloride on coupling reaction with dimethyl aniline gives a coloured product *i.e.*, p(N, N dimethyl) amino azobenzene (azodye)

$$N = N.C1 + H - N(CH_3)_2 \xrightarrow{NaOH} N(CH_3)_2 - HCI$$

352 (c)

$$NH_2CONH_2 + HNHCONH_2 \xrightarrow{\Delta} NH_2CONHCONH_2$$

$$\begin{array}{c} \operatorname{CH_3CH_2I} \xrightarrow{\operatorname{NaCN}} \operatorname{CH_3CH_2CN} \xrightarrow{\operatorname{OH}^-} \operatorname{CH_3CH_2CONH_2} \\ \xrightarrow{\operatorname{Br_2/NaOH}} \operatorname{CH_3CH_2NH_2} \end{array}$$

355 **(b)**

This is carbylamine reaction which is used to distinguish 1° amines from other amines. The reaction is given by 1° amines only.

$$C_2H_5NH_2 + CHCI_3 + 3KOH$$

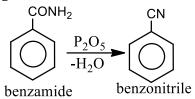
 $\rightarrow C_2H_5N \xrightarrow{=} C + 3KCI + 3H_2O$

$$RNH_2 + CHCI_3 + 3KOH$$

$$\rightarrow R - N \xrightarrow{=} C + 3KCI + 3H_2O$$
1°amine chloroform isocyanide (bad smelling)

356 (d)

With P₂O₅benzamide loses a water molecule and gives benzonitrile.



Here, P_2O_5 is a dehydrating agent.

357 (a)

The order of boiling points of the isomeric amines is as fallows:

Primary amines > secondary amines > tertiary amines

$$(1^{\circ} > 2^{\circ} > 3^{\circ})$$

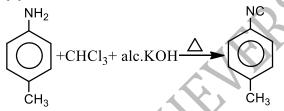
358 (c)

Hofmann's bromamide reaction is used to convert amide to amine.

$$RCONH_2 + Br + 4KOH$$

 $\rightarrow RNH_2 + K_2CO_3 + 2KBr + 2H_2O$
amide amine

361 (d)



p-toluidine (a carbylamine reaction)

363 (d)

Nitrobenzene is insoluble in water but soluble in benzene alcohol etc.

364 (c)

R—NH₂ + HNO₂ \rightarrow ROH + N₂ + H₂O; But note that CH₃NH₂ gives CH₃ONO or CH₃OCH₃ on treating with HNO₂.

365 **(d)**

Benzyl amine is the strongest base among the given compounds because lone of \ddot{N} are not taking part in conjugation whereas in other compounds lone pairs are taking part in conjugation

$$\langle \bigcirc \rangle$$
-CH₂- \mathring{N} H₂

366 (d)

Carbylamine reaction is given by aliphatic and aromatic primary amine.

CH₃CN does not give carbylamine reaction with chloroform because it is not an amine.

CH₃CN undergoes acidic hydrolysis to give carboxylic acid.

$$CH_3CN \xrightarrow{H_2O/H^+} CH_3CONH_2 \xrightarrow{H_2O/H^+} CH_3COOH + NH_3$$

acetic acid

CH₃CN undergoes alkaline hydrolysis to give salt of carboxylic acis.

$$\mathsf{CH_3CN} \xrightarrow[\mathsf{H_2O}]{\mathsf{NaOH}} \mathsf{CH_3CONH_2} \xrightarrow[\mathsf{H_2O}]{\mathsf{NaOH}} \mathsf{CH_3COONa} + \mathsf{NH_3}$$

Sodium acetate

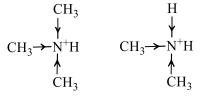
CH₃CN tautomerises to give methyl isocyanide.

$$CH_3$$
 $C = N$ CH_3

367 (a)

In vapour phase the basic character of methylamines is $3^{\circ} > 2^{\circ} > 1^{\circ} > NH_3$.

This is due to less acidic character in conjugate acid of amines because of +ve IE of methyl group which disperses +ve charge on N-atom more effectively in 3° ion.



+ve charge on N is more dispersed and thus, more stable.

In case of solution phase steric hindrance or solvation effect play role to give the basic order $2^{\circ} > 1^{\circ} > 3^{\circ} > NH_3$.

368 (a)

When propyl bromide is reacted with KCN, butanenitrile is formed.

 $CH_3CH_2CH_2Br + KCN \rightarrow CH_3CH_2CH_2C \equiv N + KBr$ propyl bromide butane nitrile

369 (c)

$$(CH_3)_2CH.NH_2 + 2CH_3COCI \xrightarrow{-HCI} (CH_3)_2CH$$

- $N(COCH_3)_2$

iso-propyl amine (pri amine)

(ter-amine)

370 (a)

Hofmann bromamide degradation takes place with complete retention of stereochemical configuration in the migrating alkyl group

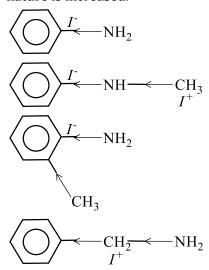
371 (a)

Electrons donors are bases. Greater the stabilisation of cation formed by loss of electron more will be basicity of amine.

2° amine is more basic than 3° amine because 2° amine is stabilized by hydrogen bonding with solvent molecule.

372 **(d)**

 ${
m CH_3}$ — (an electron releasing (+I)group) increases electron density at N-atom hence, basic nature is increased.



 C_6H_5 decreases electron density at N-atom thus basic nature is decreased. (Lone-pair on N in aniline compounds is delocalised along with π -electrons in benzene).

Thus, (d) is the strongest base.

374 (d)

Isocyanide on hydrolysis forms primary amine

not ammonia.

$$C_6H_5NC + H_2O \xrightarrow{H^+} C_6H_5NH_2 + HCOOH$$

375 **(b)**

Less substituted alkene is the main product

376 **(a)**

$$RCH_2NO_2 \xrightarrow{HOH} RCOOH + NH_2OH$$

377 **(c)**

$$\begin{split} \text{SnCI}_2 + 2\text{HCI(g)} &\to \text{SnCI}_4 + 2[\text{H}] \\ \text{CH}_3\text{CN} + 2[\text{H}] + \text{HCI} &\to \text{CH}_3\text{CH} \\ &= \text{NH. HCI} \xrightarrow[\text{boil}]{\text{H}_2\text{O}} \text{CH}_3\text{CHO} + \text{NH}_4\text{CI} \end{split}$$

$$(X)$$
 (Y)

(X) is acetaldimine hydrochloride and (Y) is acetaldehyde.

378 (c)

Amines react with alkyl halide (excess) to give quaternary ammonium salt.

$$C_6H_5NH_2 + 3CH_3I \rightarrow C_6H_5N^+(CH_3)_3I^-$$

CHEMISTRY

Assertion - Reasoning Type

This section contain(s) 0 questions numbered 1 to 0. Each question contains STATEMENT 1(Assertion) and STATEMENT 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 is correct explanation for Statement 1
- b) Statement 1 is True, Statement 2 is True; Statement 2 is not correct explanation for Statement 1
- c) Statement 1 is True, Statement 2 is False
- d) Statement 1 is False, Statement 2 is True

1

- Statement 1: Hofmann degradiation and curtius degradation methods are used to prepare 1° amones
- **Statement 2:** Both involves intermolecular alkyl shift

2

- Statement 1: Stable diazonium salt is formed when primary amines reacts with nitrous acid
- **Statement 2:** Cl⁻ is the leaving group

3

- **Statement 1:** In strongly acidic solutions, aniline becomes more reactive towards electrolphilic reagents
- **Statement 2:** The amino group being completely protonated in strongly acidic solution, the lone pair of

electrons on the nitrogen is no longer available for resonance

4

- **Statement 1:** Tertiary amine is less basic than secondary amine in aqueous solution
- **Statement 2:** Over crowding due to I⁺effect of three alkyl groups increases strain

5

Statement 1: Carbylamines reaction involves chemical reaction between 1°amine and chloroform in

basic medium

Statement 2: In carbylamines reaction, -NH₂ group changes into-NC group

CHEMISTRY

							WER	KEY:				
))	a a	2)	d	3)	d	4)	a					
,	а											
												1, "
												*
										4	1 >	*
									(
									1			
								4				
							\$	()				
							1 3	<i>></i>				
						C						
						2						
					4							
					()							
				7								
		_										
	<)										
	6											
	V	7										
	7											

CHEMISTRY

: HINTS AND SOLUTIONS :

1 (a)

Hofmann bromamide degrdadation and Curtius degradation both involve the intramolecular alkyl shift and, thus result in the formation of 1° amines

2 **(d)**

When primary amines (aliphatic) react with HNO_2 , unstable diazonium salt is obtained which readily dissociate to give a carbocation, N_2 and Cl^- (the leaving group). The carbocation upon hydrolysis gives alcohol

$$CH_3CH_2NH_2 \xrightarrow{HONO} CH_3CH_2N^+ \equiv N^- CI$$

$$\longrightarrow CH_3CH_2 \xrightarrow{\Phi} CH_3CH_2OH + H^+$$

3 **(d)**

Since aniline gets protonated in strongly acidic medium, the lone pair of electrons are not available to produce mesomeric or electrometric effect. Thus, aniline becomes less reactive

4 (a)

Alkyl group is +I showing group. In general, it increases the electron density over nitrogen, thus increase the availability of lone pair for donation. But in case of tertiary amines, in aqueous solution, the over crowing of three bulkier alkyl group result in increased strain, which decreases the availability of lone pairs for donation and thus

result in decreased basicity. Hence, in aqueous solution, 3° amines are less basic as compared to 2° amine

5 **(a)**

When primary amine is treated with chloroform and alkali, a very bad smelling compound, called isocyanide or carbylamine is obtaied. On the basis of the name of the product, the reaction is called carbylamines reaction

$$R - NH_2 + CHCl_3 + KOH$$

 $\rightarrow RNC + KCl + H_2O$

1°amine chloroform alkali isocyanide or carbylamine

CHEMISTRY

Matrix-Match Type

This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (B, C, D) in **columns I**.

1. Match the following

Column-I

- (A) $(CH_3)_3C OH + HCN \xrightarrow{H+} (CH_3)_3C NH_2$
- **(B)** $CH_3CONH_2 + Br_2 + KOH \rightarrow RNH_2$
- (C) $CH_3CN + 4H \xrightarrow{Na}_{alc.} CH_3CH_2NH_2$
- **(D)** $CH_3MgBr + ClNH_2 \rightarrow CH_3NH_2$

Column-II

- (1) Grignard
- (2) Mendius
- (3) Hofmann bromamide
- (4) Ritter

CODES:

	A	В	C	D
a)	1	2	3	4
b)	4	3	2	1
c)	2	3	4	1
4)	4	2	3	1

2. Aromatic diazonium group can be replaced by various groups/atoms. In this context, match list I with list II and select the correct answer using the codes given below the lists

Column-I

Column-II

- (A) H_3PO_2
- (B) Sandmeyer reaction
- (C) Boiling with water
- (D) Gomberg reaction

- (1) Hydrogen
- (2) Hydroxyl group
- (3) Aryl group
- (4) Chlorine

CODES:

A \mathbf{C} D В 4 3 2 1 a) b) 1 3 c) 1 2 3 4

- d)
- 3
- 4
- 1

3.

Column-I

(A)
$$RNH_2 \xrightarrow{NaNO_2 + HCl}$$

2

(B)
$$\phi NH_2 \xrightarrow{NaNO_2 + HCl}$$

(C)
$$\phi_N(CH_2)_2 \xrightarrow{NaNO_2 + HCl}$$

(D)
$$R_2 NH \xrightarrow{NaNO_2 + HCl}$$

CODES:

A

1

- В

- **a)** 2
- 3
- 1

D

2

1

4

- b)
- 3

3

3

- **c)** 2
- 4

- **d)** 1
- 2
- 4. Match the following

Column-I

- (A) Aniline
- **(B)** TNT
- (C) Sulphanilamide
- (D) Nitrobenzene

CODES:

- A
- D

D

4

1

1

- a)
- 1
- 2

3

 \mathbf{C}

3

-) 4
- 3
- 3

3

- 1 2
- 5. Match the list

Column-I

- (A) $RNH_2 \xrightarrow{KMnO_4}$
- **(B)** $R_2 \text{NH} \xrightarrow{\text{H}_2 \text{SO}_5}$
- (C) $R_3N \xrightarrow{H_2SO_5}$

Column- II

- (1) R_2 NNO
- (2) $ROH + N_2$
- (3) ϕ NNCl
- (4) ON- $\left(\begin{array}{c} \\ \\ \end{array} \right)$ -N $\left(\begin{array}{c} \\ \\ \end{array} \right)$

Column- II

- (1) Sulpha drug
- (2) Solvent in Friedel-Craft
- (3) Explosive
- (4) Used in azo dyes

Column- II

- $(1) \quad R_3 N \to 0$
- (2) R_3 CNO₂
- (3) R_3 CNO

(D)
$$R_3C - NH_2 \xrightarrow{H_2SO_5}$$

CODES:

A В \mathbf{C} D

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

6.

Column-I

(A)
$$\phi NO_2 \xrightarrow{Zn/NH_4Cl}$$

- $\begin{array}{c} \varphi NO_2 \xrightarrow[NaOH]{Zn/alc.} \\ \varphi NO_2 \xrightarrow[LAH]{} \end{array}$
- (C)
- (D) $\phi NO_2 \xrightarrow{\text{Na}_3 \text{AsO}_3/\text{NaOH}}$

CODES:

- C A В
- 1 a)
- b) 2
- c) 2
- 2 d)

(4) R_2 NOH

Column- II

- (1) $\phi N = N \phi$
- (3) фNНОН

CHEMISTRY

1)	b 2)	b	3) a		SWER I	KEY:				
=	a 6)	c	<u>.</u>							
								Q	1	
							1	3		
						1				
						8				
					\ \footnote{\chi_{\chi}}					
				C.Y						
				1						
•	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\									
CN										
51/										
SM										