EXERCISE-I

Introduction of Nitrogen Containing Compounds

1. A secondary amine is
(A) An organic compound with two $-NH_2$ groups
(B) A compound with two carbon atoms and an $-NH_2$ group
(C) A compound with an $-NH_2$ group on the carbon atom in number 2 position
(D) A compound in which two of the hydrogens of NH_3 have been replaced by organic groups

2. The structural formula of methyl aminomethane is
(A) $(CH_3)_2CHNH_2$ (B) $(CH_3)_3N$
(C) $(CH_3)_2NH$ (D) CH_3NH_2

3. Allyl isocyanide has
(A) 9 sigma bonds and 4 pi bonds
(B) 8 sigma bonds and 5 pi bonds
(C) 8 sigma bonds, 3 pi bonds and 4 non-bonding electrons
(D) 9 sigma bonds, 3 pi bonds and 2 non-bonding electrons

4. Triaminobenzene is a
(A) 2^o amine (B) 3^o amine
(C) 1^o amine (D) Quarternary salt

5. $CH_2 = CH - CH_2 - NH - CH_3$ is a
(A) Secondary amine (B) Primary amine
(C) Tertiary amine (D) None of these

6. Leakage of which gas was responsible for the Bhopal tragedy in 1984
(A) $CH_3 - N = C = O$ (B) $CH_3 - C - N = S$
(C) $CHCl_3$ (D) C_6H_5COCl

7. Which of the following is not a nitro-derivative
(A) $C_6H_5NO_2$ (B) CH_3CH_2ONO
(C) $CH_3CH(CH_3)-N(=O)-O$ (D) $C_6H_4(OH)NO_2$

8. Acetonitrile is:
(A) C_2H_5CN (B) CH_3CN
(C) CH_3COCN (D) $C_6H_5CH_2CN$

9. In alkyl cyanide alkyl group attached with
(A) *C* of *CN* group
(B) *N* of *CN* group
(C) Either *C* or *N* of *CN* group
(D) Both *C* and *N* of *CN* group

10. Number of isomeric primary amines obtained from $C_4H_{11}N$ are
(A) 3 (B) 4
(C) 5 (D) 6

Preparation of Nitrogen Containing Compounds

11. When methyl iodide is heated with ammonia, the product obtained is
(A) Methylamine
(B) Dimethylamine
(C) Trimethylamine
(D) A mixture of the above three amines

12. Acetanilide can be prepared from aniline and which of the following
(A) Ethanol (B) Acetaldehyde
(C) Acetone (D) Acetic anhydride

13. Reduction of nitroalkanes in neutral medium (e.g. *Zn* / NH_4Cl) forms mainly
(A) $R - NH_2$ (B) $R - NHOH$
(C) $R - N = N - Cl$ (D) All of these

14. Nitrosobenzene can be prepared by oxidizing aniline from
(A) H_2SO_4 (B) H_2SO_5
(C) H_2SO_3 (D) $K_2Cr_2O_7$

15. The Hinsberg's method is used for
(A) Preparation of primary amines
(B) Preparation of secondary amines
(C) Preparation of tertiary amines
(D) Separation of amine mixtures

16. Which one of the following compound gives a secondary amine on reduction

(A) Nitromethane (B) Nitrobenzene

(C) Methyl isocyanide (D) Methyl cyanide

17. Chloropicrin is manufactured by the reaction between Cl_2, NaOH and

(A) Nitromethane (B) Nitroethane

(C) Nitrophenol (D) Nitrostyrene

18. In the reaction

$$R-\overset{\overset{O}{\|}}{C}-OH \xleftarrow{H_3O^+} X \xrightarrow{[H]} RCH_2NH_2;\ 'X' \text{ is}$$

(A) Isonitrile (B) Nitrile

(C) Nitrite (D) Oxime

19. When ethanol is mixed with ammonia and passed over alumina the compound formed is

(A) $C_2H_5NH_2$ (B) C_2H_4

(C) $C_2H_5OC_2H_5$ (D) CH_3OCH_3

20. Which of the following reactions does not yield an amine

(A) $RX + NH_3 \longrightarrow$

(B) $RCH = NOH + [H] \xrightarrow[C_2H_5OH]{Na}$

(C) $RCN + H_2O \xrightarrow{H^+}$

(D) $RCONH_2 + 4H \xrightarrow{LiAlH_4}$

21. The reaction

$$C_6H_5NH_2 + CHCl_3 + 3KOH \rightarrow C_6H_5NC + 3KCl + 2H_2O$$

is known as

(A) Carbylamine reaction

(B) Reimer-Tiemann reaction

(C) Kolbe reaction

(D) Hofmann's degradation

22. $CH_3CONH_2 \xrightarrow{Na+ROH} Z + H_2O.$

What is *Z* ?

(A) $CH_3CH_2NH_2$ (B) CH_3CH_2NC

(C) $CH_3CH_2CH_3$ (D) NH_2CONH_2

23. Which of the following reacts with chloroform and a base to form phenyl isocyanide

(A) Aniline (B) Phenol

(C) Benzene (D) Nitrobenzene

24. Aromatic primary amine when treated with cold HNO_2 gives

(A) Benzyl alcohol (B) Nitro benzene

(C) Benzene (D) Diazonium salt

25. Which of the following compound is the strongest base

(A) Ammonia (B) Aniline

(C) Methylamine (D) *N*-methyl aniline

26. In acid medium nitrobenzene is reduced to aniline as shown in the reaction

$$C_6H_5 - NO_2 + 6[H] \rightarrow C_6H_5 - NH_2 + 2H_2O$$

The reducing agent used in this reaction is ….

(A) $LiAlH_4$ (B) Sn/HCl

(C) *Na*/alcohol (D) H_2/Ni

27. When aniline is treated with sodium nitrite and hydrochloric acid at 0^oC, it gives

(A) Phenol and N_2

(B) Diazonium salt

(C) Hydrazo compound

(D) No reaction takes place

28. $CH_3NO_2 \xrightarrow{Sn+HCl} CH_3X,$ the '*X*' contain

(A) $-NH_2$ (B) $-COOH$

(C) $-CHO$ (D) $(CH_3CO)_2O$

29. In the series of reaction

$$C_6H_5NH_2 \xrightarrow[0-5°C]{NaNO_2/HCl} X \xrightarrow[CH_2O]{HNO_2} Y + N_2 + HCl$$

X and *Y* are respectively

(A) $C_6H_5 - N = N - C_6H_5, C_6H_5N_2^{\oplus}Cl^{\ominus}$

(B) $C_6H_5N_2^{\oplus}Cl^{\ominus}, C_6H_5 - N = N - C_6H_5$

(C) $C_6H_5N_2^{\oplus}Cl^{\ominus}, C_6H_5NO_2$

(D) $C_6H_5NO_2, C_6H_6$

30. Aromatic nitriles (*ArCN*) are not prepared by reaction

(A) *ArX + KCN*

(B) $ArN_2^+ + CuCN$

(C) $ArCONH_2 + P_2O_5$

(D) $ArCONH_2 + SOCl_2$

Properties of Nitrogen Containing Compounds

31. Ethyl amine undergoes oxidation in the presence of $KMnO_4$ to form
(A) An acid (B) An alcohol
(C) An aldehyde (D) A nitrogen oxide

32. Which of the following amines would undergo diazotisation
(A) Primary aliphatic amines
(B) Primary aromatic amines
(C) Both (A) and (B)
(D) None of these

33. Reaction of primary amines with aldehyde yields
(A) Amides (B) Aldimines
(C) Nitriles (D) Nitro compounds

34. When acetamide is treated with HNO_2, the gas is evolved
(A) H_2 (B) O_2
(C) N_2 (D) CH_4

35. Nitrobenzene on nitration gives
(A) *o*-dinitrobenzene
(B) *p*-dinitrobenzene
(C) *m*-dinitrobenzene
(D) *o*- and *p*-nitrobenzene

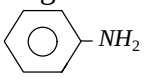
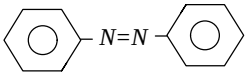
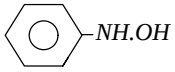
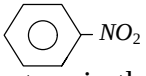
36. Reduction of alkyl nitrites yields
(A) Alcohol (B) Base
(C) Amine (D) Acid

37. When primary amines are treated with *HCl*, the product obtained is
(A) An alcohol (B) A cyanide
(C) An amide (D) Ammonium salt

38. Which one is weakest base
(A) Ammonia (B) Methylamine
(C) Dimethylamine (D) Trimethylamine

39. Chloroform when treated with aniline and alcoholic *KOH* gives
(A) Phenyl cyanide (B) Phenyl isocyanide
(C) Chlorobenzene (D) Phenol

40. Which of following do not react with HNO_2
(A) Primary nitroalkanes
(B) Secondary nitroalkanes
(C) Tertiary nitroalkanes
(D) All of these

41. By reduction of nitrosobenzene which of the following is not obtained
(A)  (B) 
(C)  (D) 

42. By the presence of a halogen atom in the ring, basic properties of aniline is
(A) Increased (B) Decreased
(C) Unchanged (D) Doubled

43. In the mustard oil reaction, an amine is treated with
(A) Na/C_2H_5OH (B) Sn/HCl
(C) CS_2 (D) $K_2Cr_2O_7/H_2SO_4$

44. Primary nitro compounds when react with HNO_2 forms crystalline solids which on treatment with *NaOH* gives
(A) Red solution
(B) Blue solution
(C) White precipitate
(D) Yellow colouration

45. Secondary nitro compounds when react with HNO_2 forms crystalline solids which one on treatment with *NaOH* gives
(A) Red solution
(B) Blue solution
(C) White precipitate
(D) Yellow colouration

46. Which of the following possess powerful mustard smell (and are called mustard oils)
(A) Alkyl isocyanates
(B) Alkyl cyanates
(C) Alkyl isothiocyanates
(D) Alkyl thiocyanates

47. On heating acetamide in presence of P_2O_5, which of the following is formed
(A) Ammonium acetate (B) Acetonitrile
(C) NH_3 (D) Methylamines

48. When chloroform reacts with ethyl amine in presence of alcoholic *KOH*, the compound formed is
(A) Ethyl cyanide (B) Ethyl isocyanide
(C) Formic acid (D) An amide

49. When methyl cyanide is hydrolysed in presence of alkali, the product is
(A) Acetamide (B) Methane
(C) $CO_2 + H_2O$ (D) Acetic acid

50. 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

51. Aniline on treatment with excess of bromine water gives
(A) Aniline bromide
(B) *o*-bromoaniline
(C) *p*-bromoaniline
(D) 2, 4, 6-tribromoaniline

52. Unpleasant smelling carbylamines are formed by heating alkali and chloroform with
(A) Any amine
(B) Any aliphatic amine
(C) Any aromatic amine
(D) Any primary amine

53. When an organic compound was treated with sodium nitrite and hydrochloric acid in the ice cold, nitrogen gas was evolved copiously. The compound is
(A) A nitro compound
(B) A primary amine
(C) An aliphatic primary amine
(D) An aromatic primary amine

54. Aniline reacts with alkyl halide to give
(A) Amino compound
(B) Tertiary compound
(C) Quaternary ammonium compound
(D) Azomethane

55. Aniline on treatment with conc. HNO_3 + conc. H_2SO_4 mixture yields
(A) *o*- and p-nitroanilines
(B) *m*-nitroanilines
(C) A black tarry matter
(D) No reaction

56. Which statement is not correct
(A) Amines form hydrogen bond
(B) Ethyl amine has higher boiling point than propane
(C) Methyl amine is more basic than ammonia
(D) Dimethyl amine is less basic than methyl amine

57. Which of the following is not used as an explosive
(A) Trinitrotoluene (B) Trinitrobenzene
(C) Picric acid (D) Nitrobenzene

58. Primary amines react with nitrous acid to yield
(A) Insoluble nitrite salts (B) Yellow oily layer
(C) Nitrogen gas (D) Azo dye

59. Which of the following has the smell of bitter almonds
(A) Nitromethane (B) Nitroethane
(C) Nitrobenzene (D) Aniline

60. The reaction of HNO_2 with '*A*' gives quaternary ammonium salt. A is
(A) Methyl amine (B) Dimethyl amine
(C) Trimethyl amine (D) Aniline

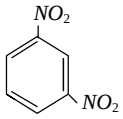
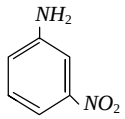
61. Which one of the following is not a base
(A) N_2H_4 (B) NH_2OH
(C) $(CH_3)_3N$ (D) HN_3

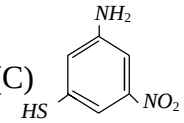
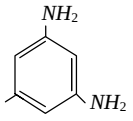
62. *p*-Nitrobromobenzene can be converted to *p*-nitroaniline by using $NaNH_2$. The reaction proceeds through the intermediate named
(A) Carbocation (B) Carbanion
(C) Benzyne (D) Dianion

63. If methyl is alkyl group, then which order of basicity is correct
(A) $R_2NH > RNH_2 > R_3N > NH_3$
(B) $R_2NH > R_3N > RNH_2 > NH_3$
(C) $RNH_2 > NH_3 > R_2NH > R_3N$
(D) $NH_3 > RNH_2 > R_2NH > R_3N$

64. Which of the following has the minimum heat of dissociation
(A) $(CH_3)_3N \rightarrow BF_3$
(B) $(CH_3)_3N \rightarrow B(CH_3)F_2$
(C) $(CH_3)_3N \rightarrow B(CH_3)_2F$
(D) $(CH_3)_3N \rightarrow B(CH_3)_3$

65. The major product (70% to 80%) of the reaction between *m*-dinitrobenzene with NH_4HS is

(A)  (B) 

(C)  (D) 

66. Which one is less alkaline

(A) $NO_2-C_6H_4-NH_2$ (B) $CH_3O-C_6H_4-NH_2$

(C) $C_6H_5-C_6H_4-NH_2$ (D) All of these

67. In the diazotisation of aniline with sodium nitrite and hydrochloric acid, an excess of hydrochloric acid is used primarily to

(A) Suppress the concentration of free aniline available for coupling

(B) Suppress hydrolysis of phenol

(C) Insure a stoichiometric amount of nitrous acid

(D) Neutralize the base liberated

68. A primary amine can be converted to an alcohol by the action of

(A) Alkali (B) Nitrous acid

(C) Reducing agent (D) Oxidising agent

69. Arrange the following in increasing order of basicity

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

(A) $(CH_3)_3N < (CH_3)_2NH < CH_3NH_2 < C_6H_5NH_2$

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

(C) $C_6H_5NH_2 < (CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$

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

70. In the reaction

$$CH_3CN + CH_3MgI \rightarrow A \xrightarrow{H_2O/H^+} B$$

The compound *B* is

(A) Acetic acid (B) Acetone

(C) Acetaldehyde (D) Ethyl alcohol

71. Which of the following chemicals are used to manufacture methyl isocyanate that caused "Bhopal Tragedy"

(i) Methylamine (ii) Phosgene

(iii) Phosphine (iv) Dimethylamine

(A) (i) and (iii) (B) (iii) and (iv)

(C) (i) and (ii) (D) (ii) and (iv)

72. An isocyanide on hydrolysis gives

(A) An amide

(B) A carboxylic acid and ammonia

(C) A N-substituted amide

(D) A 1^o-amine and formic acid

73. Methyl isocyanide on hydrolysis gives

(A) CH_3NH_2 (B) *HCOOH*

(C) CH_3COOH (D) Both (A) and (B)

74. Pure aniline is a

(A) Colourless solid

(B) Brown coloured solid

(C) Colourless liquid

(D) Brown coloured liquid

75. Reduction of methyl isocyanide gives

(A) Ethylamine (B) Methylamine

(C) Dimethylamine (D) Trimethylamine

76. Reaction of aniline with benzaldehyde is

(A) Polymerisation (B) Condensation

(C) Addition (D) Substitution

77. In the reaction $C_6H_5CHO + C_6H_5NH_2 \rightarrow C_6H_5N = HCC_6H_5 + H_2O$, the compound $C_6H_5N = CHC_6H_5$ is known as

(A) Aldol (B) Schiff's reagent

(C) Schiff's base (D) Benedict reagent

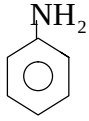
78. The unshared pair of electrons on a cyanide ion can acts as

(A) Isocyanide centre

(B) Amido centre

(C) Cationic centre

(D) Nucleophilic centre

79. Electrophilic substitution of  with bromine gives

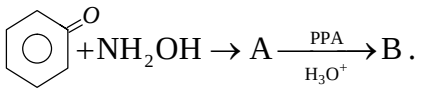
(A) 1, 4, 6-tribromo aniline

(B) 2, 4, 6-tribromo aniline

(C) 4-bromo aniline

(D) 3-bromo aniline

80. Mustard gas is obtained by
(A) The action of dilute acids on mustard seeds
(B) Treating ethylene with mustard oil
(C) Treating sulphur chloride with ethylene
(D) None of these

81. 
The product '*B*' is

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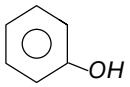
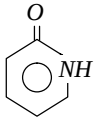
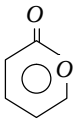
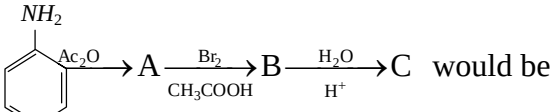
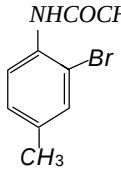
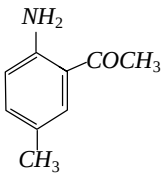
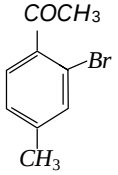
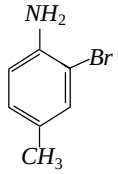
(B) 
(C) 
(D) 

82. Identify the product *Z* in the following reaction
$C_6H_5NH_2 \xrightarrow{(AC)_2O} X \xrightarrow{Br_2/CCl_4} Y \xrightarrow{HOH} Z$
(A) *p*-Bromoaniline
(B) *p* -Bromoacetophenone
(C) *o*-Bromoacetophenone
(D) *o*-Bromoacetonilide

83. Benzaldehyde condenses with *N*, *N*-dimethylaniline in presence of anhydrous $ZnCl_2$ to give
(A) Michler's ketone (B) Azo dye
(C) Malachite green (D) Buffer yellow

84. The correct order of reactivity towards the electrophilic substitution of the compounds aniline (I) benzene (II) and nitrobenzene (III) is
(A) I > II > III (B) III > II > I
(C) II > III > I (D) I < II > III

85. The final product *C*, obtained in this reaction

would be

(A) 
(B) 
(C) 
(D) 

86. The correct order of increasing basic nature for the bases NH_3, CH_3NH_2 and $(CH_3)_2NH$ is
(A) $CH_3NH_2 < NH_3 < (CH_3)_2NH$
(B) $(CH_3)_2NH < NH_3 < CH_3NH_2$
(C) $NH_3 < CH_3NH_2 < (CH_3)_2NH$
(D) $CH_3NH_2 < (CH_3)_2NH < NH_3$

87. Nitrobenzene gives *N*-phenylhydroxylamine by
(A) Sn/HCl (B) $H_2/Pd-C$
(C) Zn/NaOH (D) Zn/NH_4Cl

88. Among the following the weakest base is
(A) $C_6H_5CH_2NH_2$ (B) $C_6H_5CH_2NHCH_3$
(C) $O_2NCH_2NH_2$ (D) CH_3NHCHO

89. The correct order of basicity of amines in water is :
(A) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2$
(B) $CH_3NH_2 > (CH_3)_2NH > (CH_3)_3N$
(C) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$
(D) $(CH_3)_3N > CH_3NH_2 > (CH_3)_2NH$

90. Complete the following reaction :
$R\ NH_2 + H_2SO_4 \rightarrow$
(A) $[R\ NH_3]^+HSO_4^-$ (B) $[R\ NH_3]_2^+SO_4^{2-}$
(C) $R\ NH_2.H_2SO_4$ (D) No reaction

91. Electrolytic reduction of nitrobenzene in weakly acidic medium gives
(A) Aniline
(B) Nitrosobenzene
(C) *N*-Phenylhydroxylamine
(D) *p*-Hydroxylaniline

92. Among the following compounds $C_3H_7NH_2$, $NH_3, CH_3NH_2, C_2H_5NH_2$ and $C_6H_5NH_2$, the least basic compound is
(A) $C_3H_7NH_2$ (B) NH_3
(C) CH_3NH_2 (D) $C_6H_5NH_2$

93. The reduction of which of the following compound would yield secondary amine ?
(A) Alkyl nitrite
(B) Carbylamine
(C) Primary amine
(D) Secondary nitro compound

94. Azo dye is prepared by the coupling of phenol and :
(A) Diazonium chloride
(B) *o*-nitro aniline
(C) Benzoic acid
(D) Chlorobenzene

95. $C_6H_5NH_2 \xrightarrow{NaNO_2HCl} X \xrightarrow{Cu_2(CN)_2} Y \xrightarrow{H_2O/H^+} Z$
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) $C_6H_5 - CH_2 - COOH$

96. When acetamide reacts with Br_2 and caustic soda, then we get :
(A) Acetic acid (B) Bromoacetic acid
(C) Methyl amine (D) Ethyl amine

97. In the reaction
$CH_3CN + 2H \xrightarrow[Ether]{HCl} X \xrightarrow[H_2O]{Boiling} Y;$
the term *Y* is:
(A) Acetone (B) Ethyl amine
(C) Acetaldehyde (D) Dimethyl amine

98. Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compounds if water during the reaction is continuously removed. The compound formed is generally known as
(A) A Schiff's base (B) An enamine
(C) An imine (D) An amine

99. $R - NH - COH \xrightarrow[pyridine]{POCl_3}$ product
In the given reaction what will be the product
(A) $R - N = C = O$ (B) $R - \overset{+}{N} \equiv C^-$
(C) $R - C \equiv N$ (D) None of these.

100. Which of the following is secondary pollulant.
(A) CO_2 (B) N_2O
(C) *PAN* (D) SO_2

Tests for Nitrogen Containing Compounds

101. When acetamide reacts with Br_2 and caustic soda, then we get
(A) Acetic acid (B) Bromoacetic acid
(C) Methyl amine (D) Ethane

102. In organic compounds, nitrogen is tested in Lassaigne's test as
(A) $NaNH_2$ (B) *NaCN*
(C) $NaNO_2$ (D) $NaNO_3$

103. Liebermann's nitroso reaction is used for testing
(A) Primary amines (B) Secondary amines
(C) Tertiary amines (D) All the above

104. A nauseating smell in the carbylamine test for primary amines is due to the formation of
(A) Isocyanide (B) Chloroform
(C) Cyanide (D) DDT

105. A positive carbylamine test is given by
(A) *N*, *N*-dimethylaniline
(B) 2, 4-dimethylaniline
(C) *N*-methyl-*o*-methylaniline
(D) *p*-methylbenzylamine

106. The colour of *p*-amino azobenzene is
(A) Orange (B) Congo red
(C) Bismark brown (D) Indigo

107. When primary amine is heated with CS_2 in presence of excess mercuric chloride, it gives isothiocyanate. This reaction is called
(A) Hofmann bromide reaction
(B) Hofmann mustard oil reaction
(C) Carbylamine reaction
(D) Perkin reaction

108. Diazo-coupling is useful to prepare some
(A) Dyes (B) Proteins
(C) Pesticides (D) Vitamins

109. Carbylamine test is used in the detection of
(A) Aliphatic 2^o amine
(B) Aromatic 1^o amine
(C) Aliphatic 1^o amine
(D) Both aliphatic and aromatic 1^o amines

110. Which of the following substance does not give iodoform test
(A) C_6H_5CN (B) RNH_2
(C) CH_3OH (D) All