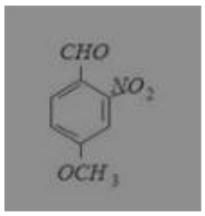
Department of Biotechnology
Class: F.Y.B.Sc
Semester: I
Subject: Basic chemistry I
Sample Questions

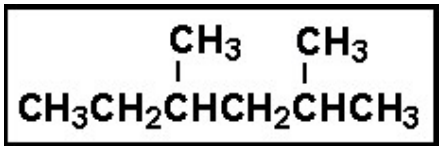
Multiple choice Questions:

1. Saturated hydrocarbons are otherwise referred as _____
   A. Alkanes
   B. Alkenes
   C. Alkynes
   D. Alkaloids
2. Identify the smallest alkane which can form a ring structure (cycloalkane)?
   A. Cyclomethane
   B. Methane
   C. Cyclopropane
   D. Propane
3. In which among the following alkane, a carbon atom is displaced so as to form a compactly structure with the resemblance of a butterfly wing?
   A. Cyclopropane
   B. Cyclobutane
   C. Cyclopentane
   D. Cyclohexane
4. The substituent in the chain is named by replacing the "ane" in the alkanes by _____
   A. ene
   B. ic
   C. one
   D. yl
5. The C=C bond in the chain of the compound considered is shown by _____
   A. Specifying the number of carbon atoms associated with the bond
   B. Specifying the number of carbon atoms at beginning of the C=C bond
   C. Specifying the number of carbon atoms at end of the C=C bond
   D. Specifying the number of carbon atoms in the entire chain
6. Dienes are the name given to compounds with _____
   A. Exactly a double bond
   B. Exactly a triple bond
   C. Exactly two double bond
   D. More than two double bond

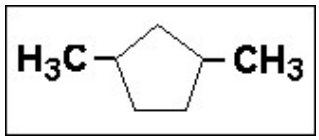
7. Triple bond with two carbon atoms on either side is called _____
   A. Methyl group
   B. Ethynyl group
   C. Propionyl group
   D. Propargyl group
8. The substituent groups that are commonly associated with benzene ring are _____
   A. Phenyl and benzyl
   B. Propyl and phenyl
   C. Methyl and benzyl
   D. Butyl and phenyl
9. Molecule with the formula C_3H_8 is a(n):
   A. hexane
   B. propane
   C. decane
   D. butane
10. Select the correct IUPAC name for:



   A. 4-methoxy-2-nitrobenzaldehyde
   B. 4-formyl-3-nitro anisole
   C. 4-methoxy-6-nitrobenzaldehyde
   D. 2-formyl-5-methoxy nitrobenzene
11. Select the correct IUPAC name for:



   A. 1,1,3-trimethylpentane
   B. 1-ethyl-1,3-dimethylbutane
   C. 2,4-dimethylhexane
   D. 3,5-dimethylhexane
12. Select the correct IUPAC name for:

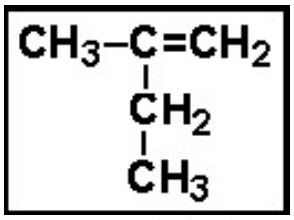


   A. 1,4-dimethylcyclopentane
   B. 1,3-dimethylcyclopentane

C. 2,5-dimethylcyclopentane
D. 2,3-dimethylcyclopentane

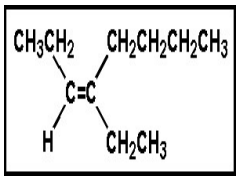
13. The general formula for noncyclic alkenes is:
A. C_nH_{2n+2}
B. C_nH_{2n}
C. C_nH_{2n-2}
D. C_nH_{n+2}

14. The correct name for the compound given below is:



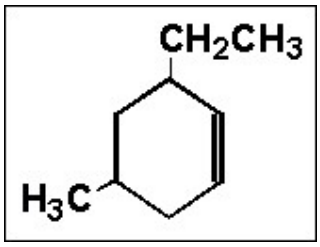
A. 2-methyl-1-butene
B. 2-ethyl-1-propene
C. 2-ethyl-1-pentane
D. 3-methyl-2-butene

15. Select the best name for:



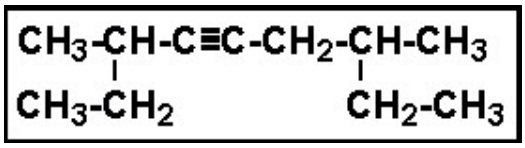
A. 4-ethyl-cis-3-octene
B. 4-ethyl-trans-3-octene
C. 4-butyl-cis-3-hexene
D. 5-ethyl-trans-5-octene

16. Name the following compound:



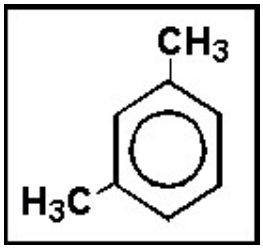
A. 6-ethyl-4-methylcyclohexene
B. 6-ethyl-3-methylcyclohexene
C. 3-ethyl-5-methylcyclohexene
D. 6-ethyl-4-methylcyclohex-1-ene

17. What is the IUPAC name of the following compound.



A. 2,6-diethyl-3-nonyne
B. 2,5-diethyl-3-nonyne
C. 3,7-dimethyl-5-nonyne
D. 3,7-dimethyl-4-nonyne

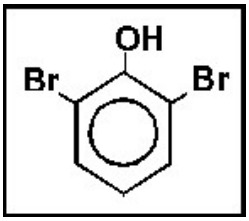
18. The following chemical structure represents a molecule of what molecular formula?



A. C_8H_{10}
B. C_6H_6
C. C_6H_8
D. C_8H_{12}

19. Which of the following formulas represents an alkene?
A. $CH_3CH_2CH_3$
B. CH_3CH_3
C. $CH_3CH_2CHCH_2$
D. CH_3CH_2Cl

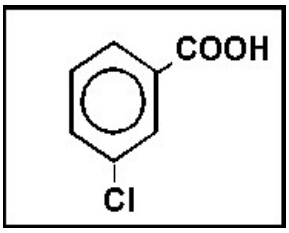
20. What is the name of the following compound?



A. 1,3-dibromophenol
B. 2,5-dibromophenol
C. 2,6-dibromophenol
D. m- dibromophenol

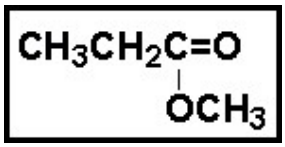
21. Select the IUPAC name for: $(CH_3)_2CHCH(OH)CH_2C(CH_3)$
A. 2,5,5-trimethyl-3-hexanol
B. 1,1,4,4-pentamethylbutanol
C. 1,1-dimethylisopentanol
D. 2,5-dimethyl-4-hexanol

22. Give the IUPAC name of this compound: $CH_3OCH_2CH_3$.
    A. dimethyl ether
    B. methoxymethane
    C. methylethyloxide
    D. propyl ether
23. An organic compound A reacts with sodium metal and forms B. On heating with conc. H_2SO_4, A gives diethyl ether. What are A and B?
    A. C_4H_9OH and C_4H_9ONa
    B. CH_3OH and CH_3ONa
    C. C_2H_5OH and C_2H_5ONa
    D. C_3H_7OH and CH_3Ona
24. The systematic name for the compound in Problem 21 is _____.
    A. pentyl amine
    B. methyl-n-propyl amine
    C. diethyl amine
    D. 2-aminopentane
25. Which of the following is neither an acid nor base?
    A. KCl
    B. CH_3OH
    C. HCl
    D. CH_3COOH
26. Select the best name for:



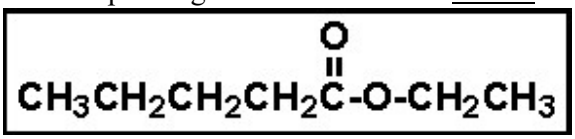
    A. m-chlorobenzoic acid
    B. o-chlorobenzaldehyde
    C. p-chlorobenzoate
    D. m-chlorosalicylic acid

27. The best classification for the following compound is: _____



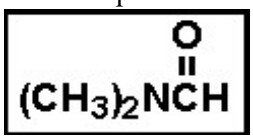
A. aldehyde
B. ester
C. ketone
D. carboxylic acid

28. The compound given below is called _____



A. butyl acetate
B. ethyl pentanoate
C. propyl pentanoate
D. ethyl butanoate

29. The compound illustrated below is called_____



A. acetamide
B. formyl acetamide
C. dimethyl acetate
D. N,N-dimethylformamide

30. The hybridization of carbon atoms in alkanes is
A. sp
B. B.sp^2
C. sp^3
D. sp^3d

31. How many actual double bonds does the benzene ring possess?
A. None, carbon-carbon bonds in benzene are delocalized around the ring
B. 1 double bond
C. 2 double bonds
D. 3 double bonds

32. What makes carbon such a unique element?
A. Elemental carbon comes in two forms, diamond and graphite.
B. Carbon forms four bonds, although the ground state configuration would predict the formation of fewer bonds.
C. Carbon forms covalent bonds rather than ionic bonds.
D. To a greater extent than any other element, carbon can bond to itself to form straight chains, branched chains and rings.

UNIT II

33. Which among the following chemical bond were described by Kossel and Lewis?
    A. Metallic bond
    B. Polar covalent bond
    C. Coordinate bond
    D. Ionic and Covalent bond
34. Which among the following is not a property of Ionic bond?
    A. Losing of electrons
    B. Gain of electrons
    C. Sharing of electrons
    D. Transfer of electrons
35. If a bond is made up of a large number of organic compounds, then the bond is termed as?
    A. Ionic bond
    B. Metallic bond
    C. Covalent bond
    D. Dipolar bond
36. Which among the following is not an example of hydrogen bond?
    A. H20
    B. Liquid HCl
    C. NH3
    D. CHCl3
37. An atom differs from its ion in which among the following?
    A. Mass number
    B. Atomic number
    C. Neutrons
    D. Number of protons

38. Which among the following chemical bond were described by Kossel and Lewis?
    A. Metallic bond
    B. Polar covalent bond
    C. Coordinate bond
    D. Covalent bond
39. Molecules are held together in a crystal by
    A. hydrogen bond
    B. electrostatic attraction
    C. Van der Waal's attraction
    D. dipole-dipole attraction
40. Sp3d2 hybridization is present in [Co(NH3)63+], find its geometry
    A. octahedral geometry
    B. square planar geometry
    C. tetragonal geometry
    D. tetrahedral geometry
41. Find the molecule with the maximum dipole moment
    A. CH4
    B. NH3
    C. CO2
    D. NF3
42. MX6 is a molecule with octahedral geometry. How many X – M – X bonds are at 180°?
    A. four
    B. two
    C. three
    D. six
43. Find the pair with sp2 hybridization of the central molecule
    A. NH3 and NO2–
    B. BF3 and NH2–
    C. BF3 and NO2–
    D. NH2– and H2O
44. Which of the molecules does not have a permanent dipole moment?
    A. SO3
    B. SO2
    C. H2S
    D. CS2
45. Which one has a pyramidal shape?
    A. SO3

B. PCl3
C. CO32-
D. NO3–

46. Which of the following property is not of ionic compound?
A. Solubility in water
B. High melting and boiling points
C. Electrical conductivity in solid state
D. Electrical conductivity in molten state

47. Which of the following compounds is not ionic in nature?
A. Lithium Chloride
B. Ammonium Chloride
C. Calcium Chloride
D. Carbon tetrachloride

48. Ionic compound are soluble in:
A. Ether
B. Alcohol
C. Kerosene
D. Water

49. The boiling point of water is exceptionally high because
A. there is a covalent bond between H and O
B. water molecule is linear
C. water molecules associate due to hydrogen bonding
D. water molecules are not linear

50. Hydrogen can behave as a metal
A. A.at very high temperature
B. B.at very low temperature
C. C.at very high pressure
D. D.at very low pressure

51. When two ice cubes are pressed over each other, they unite to form one cube. Which of the following forces is responsible to hold them together?
A. hydrogen bond formation
B. van der Waals forces
C. covalent attraction
D. ionic interaction

52. Hydrogen will not reduce
A. heated cupric oxide
B. heated ferric oxide
C. heated stannic oxide
D. heated aluminium oxide

53. The reagent commonly used to determine hardness of water titrimetric ally is
A. oxalic acid
B. sodium thiosulphate

C. sodium citrate
D. disodium salt of EDTA

54. The nature of bonding in CCl_4 and CaH_2 is
A. electrovalent in both CCl_4 and CaH_2
B. covalent in CCl_4 and electrovalent in CaH_2
C. electrovalent in CCl_4 and covalent in CaH
D. covalent in both CCl_4 and CaH_2

55. The compound with the lowest melting point is
A. AlF_3
B. $AlCl_3$
C. $AlBr_3$
D. AlI_3

56. A solid substance is soft, has a low melting point and is a poor conductor of electricity. The substance is most likely
A. an ionic solid
B. network solid
C. a metallic solid
D. a molecular solid

57. The rate of reaction of organic compounds is slow due to
A. ionic bonding
B. amphoteric nature
C. covalent bonding
D. coordinate covalent bonding

58. The self-linking ability of carbon is called
A. catenation
B. sublimation
C. hydrogenation
D. carbonation

59. Almost 95% of compounds are of carbon because they can form
A. single bonds
B. double bonds
C. triple bonds
D. multiple bonds

60. When two species A and B form an electron-pair bond and A does not provide its electrons for bonding, the bond present between A and B must be
A. ionic
B. covalent
C. dative
D. Hydrogen

61. Each of the following pairs of chemical species will combine. Which of the following combinations is best explained by the coordinate covalent bond?
A. $H_2 + I_2$

B. $Mg + O_2$
C. $Cl + Cl$
D. $H^+ + H_2O$

62. BF_3 forms an adduct with NH_3 because
A. nitrogen has a high electronegativity
B. boron has a high electronegativity
C. boron has an empty p-orbital and nitrogen has one lone pair of electrons
D. boron has an electropositive character

63. The type of bond formed during the hydration of cation is
A. ionic
B. covalent
C. electrostatic
D. dative bond

64. Which of the following compounds has electrovalent linkage?
A. CH_3Cl
B. NaCl
C. CH_4
D. Cl_2

UNIT III

65. Water is oxidised to oxygen by
A. H_2O_2
B. $KMnO_4$
C. ClO_2
D. fluorine

66. The H-O-H bond angle in a water molecule is about
A. 90^o
B. 105^o
C. 135^o
D. 180^o

67. The action of water or dilute mineral acids on metals can give
A. tritium
B. dihydrogen
C. trihydrogen
D. mono hydrogen

68. Reaction of potassium with water is
A. hydrolysis
B. absorption
C. exothermic
D. Endothermic

69. A variety of water which contains soluble salts of Ca and Mg is known as
B. soft water

C. heavy water
D. conductivity water
D. hard water

70. Oxygen does not react with
A. Na
B. P
C. Cl
D. S

71. The molarity of pure water at 277K is
A. 1M
B. 5M
C. 55.5M
D. 2.5M

72. The molality of pure water is
A. 5.55
B. 50.5
C. 18
D. 60.5

73. The number of moles of NaCl in 3 litres of 3M solution is
A. 1
B. 3
C. 9
D. 27

74. The mole fraction of the solute in one molal aqueous solution is
A. 0.009
B. 0.018
C. 0.027
D. 0.036

75. 5cm^3 of acetone is added to 100 cm^3 of water, the vapour pressure of water over the solution will be
A. equal to the vapour pressure of pure water.
B. less than the vapour pressure of pure water.
C. greater than the vapour pressure of pure water.
D. very large.

76. Equal volumes of 0.1M $AgNO_3$ and 0.2M NaCl are mixed. The concentration of NO_3^- ions in the mixture will be
A. 0.1M
B. 0.05M
C. 0.2M
D. 0.15M

77. substance that donates a pair of electrons to form a coordinate covalent bond is called
A. Lewis acid
B. Lewis base

C. Bronsted-Lowry acid
D. Bronsted-Lowry base

77. Substances that react with both acids and bases are called
A. neutral
B. conjugate bases
C. amphoteric substances
D. conjugate acids

78. The Bronsted-Lowery acid in the reaction $H_2O + NH_3\ NH^+_4 + OH^-$ is
A. H_2O
B. NH_3
C. OH^-
D. NH^+

79. Crystalline NaF is added to a dilute solution of hydrofluoric acid. What happens to the hydrogen ion concentration as a result of this addition?
A. impossible to determine
B. unchanged
C. decreases
D. increases

80. Which is the strongest acid (pK_a value is given)?
A. HCOOH [3.77]
B. C_6H_5COOH [4.22]
C. CH_3COOH [4.7]
D. CH_3CH_2COOH [4.88]

81. Range of pH scale is
A. 7 to 10
B. 0 to 10
C. 0 to 14
D. 7 to 14

82. pH of neutral salt is
A. 7
B. <7
C. >7
D. 0

83. When more and more water is diluted with acids its H^+ ion concentration will
A. increase
B. decrease
C. remains the same
D. depends on the type of acids

84. When acids react with metal oxide it produces
A. water and salt
B. salts and hydrogen gas
C. salts only

D. no reaction takes place

85. Which of the following is released when a Hydrogen atom loses an electron?
A. Nucleus
B. Proton
C. Charge
D. Ion

86. Which of the following is an example of amphoteric molecule?
A. Acetic acid
B. Malic acid
C. Sugars
D. Water

88. What is the full form of pH?
A. Positive hydrogen
B. Potential Hydrogen
C. Positron
D. Proton of hydrogen

89. A solution having a pH of 6 has a proton concentration of _____
A. 10^{-6} M
B. 10^{6} M
C. 6 M
D. 0.6 M

90. What is the concentration of pure water?
A. 55.51 M
B. 25.51 M
C. 55 M
D. 25 M

91. Which of the following combinations cannot produce a buffer solution?
A. HNO_2 and $NaNO_2$
B. HCN and NaCN
C. $HClO_4$ and $NaClO_4$
D. NH_3 and $(NH_4)_2SO_4$

92. Calculate the pH of a solution prepared by mixing 300 mL of 0.10 M HF and 200 mL of 0.10 M KOH.
A. 2.82
B. 2.96
C. 3.32
D. 3.44

93. What is the pH at the equivalence point in the titration of 100.0 mL of 0.20 M ammonia with 0.10 M hydrochloric acid?
A. 4.6
B. 5.2
C. 7.0
D. 5.5

94. Which of the following does not form an acidic salt?
A. Phosphoric acid
B. Carbonic acid
C. hydrochloric acid
D. sulphuric acid

95. Methyl orange is_____.
A. Pink in acidic medium, yellow in basic medium
B. Yellow in acidic medium, pink in basic medium
C. Colourless in acidic medium, pink in basic medium
D. Pink in acidic medium, colourless in basic medium.

96. Which one of the following will turn blue litmus red?
A. Vinegar
B. Lime water
C. Baking soda solution
D. washing soda lime

97. Buffers usually contain _____ with its conjugate _____
A. weak base, acid
B. strong base, acid
C. weak acid, base
D. strong acid, base

98. Carbonic acid and bicarbonate ions buffer which of the following?
A. Cytosol
B. Cytoplasm
C. Blood
D. Lymph

99. The electronic structure of the SO_2 molecule is best represented as a resonance hybrid of equivalent structures.
A. 2
B. 3
C. 4
D. 5

100. The valence electrons of representative elements are
A. in s orbitals only.
B. located in the outermost occupied major energy level.
C. located closest to the nucleus.
D. located in d orbitals.