

CHEMISTRY 739

1. Which element is present in all organic compounds?
 - a) carbon
 - b) nitrogen
 - c) oxygen
 - d) phosphorous
2. Which property is generally characteristic of an organic compound?
 - a) low melting point
 - b) high melting point
 - c) soluble in polar solvents
 - d) insoluble in nonpolar solvents
3. Compared to the rate of inorganic reactions, the rate of organic reactions generally is
 - a) slower because organic particles are ions
 - b) slower because organic particles contain covalent bonds
 - c) faster because organic particles are ions
 - d) faster because organic particles contain covalent bonds
4. Which compounds are isomers?
 - a) 1-propanol and 2-propanol
 - b) methanoic acid and ethanoic acid
 - c) methanol and methanal
 - d) ethane and ethanol
5. Which statement explains why the element carbon forms so many compounds?
 - a) Carbon atoms combine readily with oxygen.
 - b) Carbon atoms have very high electronegativity.
 - c) Carbon readily forms ionic bonds with other carbon atoms.
 - d) Carbon readily forms covalent bonds with other carbon atoms.
6. Which polymers occur naturally?
 - a) starch and nylon
 - b) starch and cellulose
 - c) protein and nylon
 - d) protein and plastic
7. What is the name of the compound that has the molecular formula C_6H_6 ?
 - a) butane
 - b) butene
 - c) benzene
 - d) butyne

8. In a molecule of CH_4 , the hydrogen atoms are spatially oriented toward the centers of a regular

- a) pyramid
- b) tetrahedron
- c) square
- d) rectangle

9. In which pair of hydrocarbons does each compound contain only one double bond per molecule?

- a) C_2H_2 and C_2H_6
- b) C_2H_2 and C_3H_6
- c) C_4H_8 and C_2H_4
- d) C_6H_6 and C_7H_8

10. The reaction $\text{CH}_2\text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3\text{CH}_3$ is an example of

- a) substitution
- b) addition
- c) esterification
- d) fermentation

11. The products of the fermentation of sugar are ethanol and

- a) water
- b) oxygen
- c) carbon dioxide
- d) sulfur dioxide

12. Which compound is a saturated hydrocarbon?

- a) ethane
- b) ethene
- c) ethyne
- d) ethanol

13. What type of reaction is $\text{CH}_3\text{CH}_3 + \text{Cl}_2 \rightarrow \text{CH}_3\text{CH}_2\text{Cl} + \text{HCl}$?

- a) an addition reaction
- b) a substitution reaction
- c) a saponification reaction
- d) an esterification reaction

14. What is the maximum number of covalent bonds than an atom of carbon can form?

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

15. Which class of organic compounds can be represented as R – OH?

- a) acids
- b) alcohols
- c) esters
- d) ethers

16. Which molecule contains a total of three carbon atoms?

- a) 2-methylpropane
- b) 2-methylbutane
- c) propane
- d) butane

17. What substance is made up of monomers joined together in long chains?

- a) ketone
- b) protein
- c) ester
- d) acid

18. During fractional distillation, hydrocarbons are separated according to their

- a) boiling points
- b) melting points
- c) triple points
- d) saturation points

19. Which compound is an organic acid?

- a) CH_3OH
- b) CH_3OCH_3
- c) CH_3COOH
- d) $\text{CH}_3\text{COOCH}_3$

20. 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
- e)

21. Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives

- a) 2,4,6-trinitrobenzene
- b) o-nitrophenol
- c) p-nitrophenol
- d) nitrobenzene

22. Larger number of oxidation states are exhibited by the actinoids than those by the lanthanoids, the main reason being
- 4f orbitals more diffused than the 5f orbitals
 - lesser energy difference between 5f and 6d than between 4f and 5d orbitals
 - more energy difference between 5f and 6d than between 4f and 5d orbitals
 - more reactive nature of the actinoids than the lanthanoids
23. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?
- Metal sulphides are thermodynamically more stable than CS_2
 - CO_2 is thermodynamically more stable than CS_2
 - Metal sulphides are less stable than the corresponding oxides
 - CO_2 is more volatile than CS_2
24. α -D-(+)-glucose and β -D-(+)-glucose are
- conformers
 - epimers
 - anomers
 - enantiomers
25. Which one of the following is the correct statement?
- Boric acid is a protonic acid
 - Beryllium exhibits coordination number of six
 - Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase
 - $\text{B}_2\text{H}_6 \cdot 2\text{NH}_3$ is known as 'inorganic benzene'
26. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is
- R_4Si
 - RSiCl_3
 - R_2SiCl_2
 - R_3SiCl
27. In a compound atoms of element Y form ccp lattice and those of element X occupy $\frac{2}{3}$ rd of tetrahedral voids. The formula of the compound will be
- X_4Y_3
 - X_2Y_3
 - X_2Y
 - X_3Y_4
28. Amount of oxalic acid present in a solution can be determined by its titration with KMnO_4 solution in the presence of H_2SO_4 . The titration gives unsatisfactory result when carried out in the presence of HCl , because HCl
- gets oxidised by oxalic acid to chlorine
 - furnishes H^+ ions in addition to those from oxalic acid
 - reduces permanganate to Mn^{2+}
 - oxidises oxalic acid to carbon dioxide and water

29. Which one of the following pairs of species have the same bond order?
- CN^- and NO^+
 - CN^- and CN^+
 - O^- and CN^-
 - NO^+ and CN^+
30. A reaction was found to be second order with respect to the concentration of carbon monoxide. If the concentration of carbon monoxide is doubled, with everything else kept the same, the rate of reaction will
- remain unchanged
 - triple
 - increase by a factor of 4
 - double
31. HBr reacts with $\text{CH}_2 = \text{CH} - \text{OCH}_3$ under anhydrous conditions at room temperature to give
- CH_3CHO and CH_3Br
 - BrCH_2CHO and CH_3OH
 - $\text{BrCH}_2 - \text{CH}_2 - \text{OCH}_3$
 - $\text{H}_3\text{C} - \text{CHBr} - \text{OCH}_3$
32. The IUPAC name for the complex $[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]\text{Cl}_2$ is
- nitrito-N-pentaamminecobalt (III) chloride
 - nitrito-N-pentaamminecobalt (II) chloride
 - pentaammine nitrito-N-cobalt (II) chloride
 - pentaammine nitrito-N-cobalt (III) chloride
33. The term anomers of glucose refers to
- isomers of glucose that differ in configurations at carbons one and four (C-1 and C-4)
 - a mixture of (D)-glucose and (L)-glucose
 - enantiomers of glucose
 - isomers of glucose that differ in configuration at carbon one (C-1)
34. Phenyl magnesium bromide reacts with methanol to give
- a mixture of anisole and $\text{Mg}(\text{OH})\text{Br}$
 - a mixture of benzene and $\text{Mg}(\text{OMe})\text{Br}$
 - a mixture of toluene and $\text{Mg}(\text{OH})\text{Br}$
 - a mixture of phenol and $\text{Mg}(\text{Me})\text{Br}$
35. The pyrimidine bases present in DNA are
- cytosine and adenine
 - cytosine and guanine
 - cytosine and thymine
 - cytosine and uracil

36. Among the following mixtures, dipole-dipole as the major interaction, is present in
- benzene and ethanol
 - acetonitrile and acetone
 - KCl and water
 - benzene and carbon tetrachloride
37. Fluorobenzene (C_6H_5F) can be synthesized in the laboratory
- by heating phenol with HF and KF
 - from aniline by diazotisation followed by heating the diazonium salt with BF_3
 - by direct fluorination of benzene with F_2 gas
 - by reacting bromobenzene with NaF solution
38. A metal, M forms chlorides in its +2 and +4 oxidation states. Which of the following statements about these chlorides is correct?
- MCl_2 is more volatile than MCl_4
 - MCl_2 is more soluble in anhydrous ethanol than MCl_4
 - MCl_2 is more ionic than MCl_4
 - MCl_2 is more easily hydrolysed than MCl_4
39. Which of the following statements is true?
- H_3PO_3 is a stronger acid than H_2SO_3
 - In aqueous medium HF is a stronger acid than HCl
 - $HClO_4$ is a weaker acid than $HClO_3$
 - HNO_3 is a stronger acid than HNO_2
40. In which of the following molecules/ions are all the bonds not equal?
- SF_4
 - SiF_4
 - XeF_4
 - 4 BF^-
41. Which one of the following sets of ions represents a collection of isoelectronic species?
- K^+ , Cl^- , Ca^{2+} , Sc^{3+}
 - Ba^{2+} , Sr^{2+} , K^+ , S^{2-}
 - N^{3-} , O^{2-} , F^- , S^{2-}
 - Li^+ , Na^+ , Mg^{2+} , Ca^{2+}
42. What products are expected from the disproportionation reaction of hypochlorous acid?
- $HClO_3$ and ClO_2
 - $HClO_2$ and $HClO_4$
 - HCl and Cl_2O
 - HCl and $HClO_3$
43. In $Fe(CO)_5$, the Fe – C bond possesses
- π -character only
 - both σ and π characters
 - ionic character
 - σ -character only

44. Lanthanoid contraction is caused due to
- the appreciable shielding on outer electrons by 4f electrons from the nuclear charge
 - the appreciable shielding on outer electrons by 5d electrons from the nuclear charge
 - the same effective nuclear charge from Ce to Lu
 - the imperfect shielding on outer electrons by 4f electrons from the nuclear charge
45. In Langmuir's model of adsorption of a gas on a solid surface
- the rate of dissociation of adsorbed molecules from the surface does not depend on the surface covered
 - the adsorption at a single site on the surface may involve multiple molecules at the same time
 - the mass of gas striking a given area of surface is proportional to the pressure of the gas
 - the mass of gas striking a given area of surface is independent of the pressure of the gas
46. Rate of a reaction can be expressed by Arrhenius equation as:
 $k = Ae^{-E/RT}$ (where E/RT is read as power of e) In this equation, E represents
- the energy above which all the colliding molecules will react
 - the energy below which colliding molecules will not react
 - the total energy of the reacting molecules at a temperature, T
 - the fraction of molecules with energy greater than the activation energy of the reaction
47. Reaction of trans-2-phenyl-1-bromocyclopentane on reaction with alcoholic KOH produces
- 4-phenylcyclopentene
 - 2-phenylcyclopentene
 - 1-phenylcyclopentene
 - 3-phenylcyclopentene
48. Increasing order of stability among the three main conformations (i.e. Eclipse, Anti, Gauche) of 2-fluoroethanol is
- Eclipse, Gauche, Anti
 - Gauche, Eclipse, Anti
 - Eclipse, Anti, Gauche
 - Anti, Gauche, Eclipse
49. Following statements regarding the periodic trends of chemical reactivity of the alkali metals and the halogens are given. Which of these statements gives the correct picture?
- The reactivity decreases in the alkali metals but increases in the halogens with increase in atomic number down the group
 - In both the alkali metals and the halogens the chemical reactivity decreases with increase in atomic number down the group
 - Chemical reactivity increases with increase in atomic number down the group in both the alkali metals and halogens
 - In alkali metals the reactivity increases but in the halogens it decreases with increase in atomic number down the group

50. The ionic mobility of alkali metal ions in aqueous solution is maximum for
- (a) K^+
 - (b) Rb^+
 - (c) Li^+
 - (d) Na^+
51. Density of a 2.05 M solution of acetic acid in water is 1.02 g/mL. The molality of the solution is
- (a) 1.14 mol kg^{-1}
 - (b) 3.28 mol kg^{-1}
 - (c) 2.28 mol kg^{-1}
 - (d) 0.44 mol kg^{-1}
52. How many EDTA (ethylenediaminetetraacetic acid) molecules are required to make an octahedral complex with a Ca^{2+} ion?
- (a) Six
 - (b) Three
 - (c) One
 - (d) Two
53. 18 g of glucose ($C_6H_{12}O_6$) is added to 178.2 g of water. The vapour pressure of water for this aqueous solution at $100^\circ C$ is
- (a) 759.00 Torr
 - (b) 7.60 Torr
 - (c) 76.00 Torr
 - (d) 752.40 Torr
54. Which of the following oxides is amphoteric in character?
- (a) CaO
 - (b) CO_2
 - (c) SiO_2
 - (d) SnO_2
55. If α is the degree of dissociation of Na_2SO_4 , the vant Hoff's factor (i) used for calculating the molecular mass is
- (a) $1 + \alpha$
 - (b) $1 - \alpha$
 - (c) $1 + 2 \alpha$
 - (d) $1 - 2 \alpha$
56. Hydrogen bomb is based on the principle of
- (a) Nuclear fission
 - (b) Natural radioactivity
 - (c) Nuclear fusion
 - (d) Artificial radioactivity

57. An ionic compound has a unit cell consisting of A ions at the corners of a cube and B ions on the centres of the faces of the cube. The empirical formula for this compound would be
- (a) AB
 - (b) A₂B
 - (c) AB₃
 - (d) A₃B
58. Which of the following is a polyamide?
- (a) Teflon
 - (b) Nylon – 66
 - (c) Terylene
 - (d) Bakelite
59. Which one of the following types of drugs reduces fever?
- (a) Analgesic
 - (b) Antipyretic
 - (c) Antibiotic
 - (d) Tranquiliser
60. Due to the presence of an unpaired electron, free radicals are:
- (a) Chemically reactive
 - (b) Chemically inactive
 - (c) Anions
 - (d) Cations
61. Lattice energy of ionic compounds depends upon
- (a) Charge on the ion only
 - (b) Size of the ion only
 - (c) Packing of ions only
 - (d) Charge on the ion and size of the ion
62. The highest electrical conductivity of the following aqueous solutions is of
- (a) 0.1 M acetic acid
 - (b) 0.1 M chloroacetic acid
 - (c) 0.1 M fluoroacetic acid
 - (d) 0.1 M difluoroacetic acid
63. Which one of the following statements is NOT true about the effect of an increase in temperature on the distribution of molecular speeds in a gas?
- (a) The most probable speed increases
 - (b) The fraction of the molecules with the most probable speed increases
 - (c) The distribution becomes broader
 - (d) The area under the distribution curve remains the same as under the lower Temperature

64. Two solutions of a substance (non electrolyte) are mixed in the following manner. 480 ml of 1.5 M first solution + 520 mL of 1.2 M second solution. What is the molarity of the final mixture?

- (a) 1.20 M
- (b) 1.50 M
- (c) 1.344 M
- (d) 2.70 M

65. A reaction involving two different reactants can never be

- (a) Unimolecular reaction
- (b) First order reaction
- (c) second order reaction
- (d) Bimolecular reaction

66. If we consider that $1/6$ in place of $1/12$ mass of carbon atom is taken to be the relative atomic mass unit, the mass of one mole of a substance will

- (a) Decrease twice
- (b) Increase two fold
- (c) Remain unchanged
- (d) Be a function of the molecular mass of the substance

67. In a multi – electron atom, which of the following orbitals described by the three quantum numbers will have the same energy in the absence of magnetic and electric fields?

- (a) $n = 1, l = 0, m = 0$
- (b) $n = 2, l = 0, m = 0$
- (c) $n = 2, l = 1, m = 1$
- (d) $n = 3, l = 2, m = 1$
- (e) $n = 3, l = 2, m = 0$

- (a) (a) and (b)
- (b) (b) and (c)
- (c) (c) and (d)
- (d) (d) and (e)

68. During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud' These are

- (a) Sn and Ag
- (b) Pb and Zn
- (c) Ag and Au
- (d) Fe and Ni

69. The disperse phase in colloidal iron (III) hydroxide and colloidal gold is positively and negatively charged, respectively, which of the following statements is NOT correct?

- (a) magnesium chloride solution coagulates, the gold sol more readily than the iron (III) hydroxide sol.
- (b) sodium sulphate solution causes coagulation in both sols
- (c) mixing the sols has no effect
- (d) coagulation in both sols can be brought about by electrophoresis

70. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point.

- (a) LiCl
- (b) NaCl
- (c) KCl
- (d) RbCl

71. Heating mixture of Cu_2O and Cu_2S will give

- (a) $\text{Cu} + \text{SO}_2$
- (b) $\text{Cu} + \text{SO}_2$
- (c) $\text{CuO} + \text{CuS}$
- (d) Cu_2SO_2

72. The molecular shapes of SF_4 , CF_4 and XeF_4 are

- (a) the same with 2, 0 and 1 lone pairs of electrons on the central atom, respectively
- (b) the same with 1, 1 and 1 lone pair of electrons on the central atoms, respectively
- (c) different with 0, 1 and 2 lone pair of electrons on the central atoms, respectively
- (d) different with 1, 0 and 2 lone pairs of electron on the central atoms respectively

73. The number and type of bonds between two carbon atoms in calcium carbide are

- (a) One sigma, one pi
- (b) One sigma, two pi
- (c) Two sigma, one pi
- (d) Two sigma, two pi

74. The oxidation state of chromium in the final product formed by the reaction between KI and acidified potassium dichromate solution is

- (a) +4
- (b) +6
- (c) +2
- (d) +3

75. The number of hydrogen atom(s) attached to phosphorus atom in hypophosphorous acid is

- (a) zero
- (b) two
- (c) one
- (d) three

76. The lanthanide contraction is responsible for the fact that

- (a) Zr and Y have about the same radius
- (b) Zr and Nb have similar oxidation state
- (c) Zr and Hf have about the same radius
- (d) Zr and Zn have the same oxidation

77. The IUPAC name of the coordination compound $K_4[Fe(CN)_6]$ is

- (a) Potassium hexacyanoferrate (II)
- (b) Potassium hexacyanoferrate (III)
- (c) Potassium hexacyanoiron (II)
- (d) tripotassium hexacyanoiron (II)

78. 2-methylbutane on reacting with bromine in the presence of sunlight gives mainly

- (a) 1-bromo-2-methylbutane
- (b) 2-bromo-2-methylbutane
- (c) 2-bromo-3-methylbutane
- (d) 1-bromo-3-methylbutane

79. The best reagent to convert pent-3-en-2-ol into pent-3-en-2-one is

- (a) Acidic permanganate
- (b) Acidic dichromate
- (c) Chromic anhydride in glacial acetic acid
- (d) Pyridinium chloro-chromate

80. Tertiary alkyl halides are practically inert to substitution by S_N2 mechanism because of

- (a) insolubility
- (b) instability
- (c) inductive effect
- (d) steric hindrance

81. Among the following acids which has the lowest pK_a value?

- (a) CH_3COOH
- (b) $HCOOH$
- (c) $(CH_3)_2COOH$
- (d) CH_3CH_2COOH

82. Which one of the following methods is neither meant for the synthesis nor for separation of amines?

- (a) Hinsberg method
- (b) Hofmann method
- (c) Wurtz reaction
- (d) Curtius reaction

83. Which of the following is fully fluorinated polymer?

- (a) Neoprene
- (b) Teflon
- (c) Thiokol
- (d) PVC

84. Of the five isomeric hexanes, the isomer which can give two monochlorinated compounds is

- (a) n-hexane
- (b) 2, 3-dimethylbutane
- (c) 2,2-dimethylbutane
- (d) 2-methylpentane

85. Alkyl halides react with dialkyl copper reagents to give

- (a) alkenes
- (b) alkyl copper halides
- (c) alkanes
- (d) alkenyl halides

86. Acid catalyzed hydration of alkenes except ethene leads to the formation of

- (a) primary alcohol
- (b) secondary or tertiary alcohol
- (c) mixture of primary and secondary alcohols
- (d) mixture of secondary and tertiary alcohols

87. Amongst the following the most basic compound is

- (a) benzylamine
- (b) aniline
- (c) acetanilide
- (d) p-nitroaniline

88. Which types of isomerism is shown by 2,3-dichlorobutane?

- (a) Diastereo
- (b) Optical
- (c) Geometric
- (d) Structural

89. Elimination of bromine from 2-bromobutane results in the formation of-

- (a) equimolar mixture of 1 and 2-butene
- (b) predominantly 2-butene
- (c) predominantly 1-butene
- (d) predominantly 2-butyne

90. Equimolar solutions in the same solvent have

- (a) Same boiling point but different freezing point
- (b) Same freezing point but different boiling point
- (c) Same boiling and same freezing points
- (d) Different boiling and different freezing points

91. Which of the following statements in relation to the hydrogen atom is correct?

- (a) 3s orbital is lower in energy than 3p orbital
- (b) 3p orbital is lower in energy than 3d orbital
- (c) 3s and 3p orbitals are of lower energy than 3d orbital
- (d) 3s, 3p and 3d orbitals all have the same energy

92. The structure of diborane (B_2H_6) contains

- (a) four 2c-2e bonds and two 3c-2e bonds
- (b) two 2c-2e bonds and four 3c-2e bonds
- (c) two 2c-2e bonds and two 3c-3e bonds
- (d) four 2c-2e bonds and four 3c-2e bonds

93. Which of the following factors may be regarded as the main cause of lanthanide contraction?

- (a) Poor shielding of one of 4f electron by another in the subshell
- (b) Effective shielding of one of 4f electrons by another in the subshell
- (c) Poorer shielding of 5d electrons by 4f electrons
- (d) Greater shielding of 5d electrons by 4f electrons

94. Reaction of cyclohexanone with dimethylamine in the presence of catalytic amount of an acid forms a compound 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

95. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm. Pressure. Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask. When the decomposition reaction reaches equilibrium, the total pressure in the flask rises to 0.84 atm. The equilibrium constant for NH_4HS decomposition at this temperature is

- (a) 0.30
- (b) 0.18
- (c) 0.17
- (d) 0.11

96. Which of the following sets of quantum numbers is correct for an electron in 4f orbital?

- (a) $n = 4, l = 3, m = +4, s = +1/2$
- (b) $n = 3, l = 2, m = -2, s = +1/2$
- (c) $n = 4, l = 3, m = +1, s = +1/2$
- (d) $n = 4, l = 4, m = -4, s = -1/2$

97. Consider the ground state of Cr atom ($Z = 24$). The number of electrons with the azimuthal quantum numbers $l = 1$ and 2 are respectively

- (a) 12 and 4
- (b) 16 and 5
- (c) 16 and 4
- (d) 12 and 5

98. Which one the following ions has the highest value of ionic radius?

- (a) Li^+
- (b) F^-
- (c) O^{2-}
- (d) B^{3+}

99. Which of the following cannot be broken down to anything simpler?

- (a) water
- (b) table salt
- (c) silver
- (d) sugar

100. Elements combine in fixed mass ratios to form compounds. This must mean that elements

- (a) are made up of continuous matter without subunits.
- (b) are composed of discrete units called atoms.
- (c) have unambiguous atomic numbers.
- (d) are always chemically active.

101. The first part of an atom to be discovered was the

- (a) proton.
- (b) neutron.
- (c) electron.
- (d) nucleus.

102. The electron was discovered through experiments with

- (a) electricity.
- (b) light.
- (c) radio waves.
- (d) radioactivity.

103. The nucleus was discovered through experiments with

- (a) electricity.
- (b) light.
- (c) radio waves.
- (d) radioactivity.

104. The planetary model of an atom, with the nucleus playing the role of the Sun and the electrons playing the role of planets, is unacceptable because

- (a) the electrical attraction between a proton and an electron is too weak.
- (b) an electron is accelerating and would lose energy.
- (c) the nuclear attraction between a proton and an electron is too strong.
- (d) none of these because the planetary model is acceptable.

105. Most of the volume of an atom is occupied by

- (a) electrons.
- (b) protons.
- (c) neutrons.
- (d) empty space

106. The atomic number of an atom identifies the number of

- (a) protons.
- (b) neutrons.
- (c) quantum orbits.
- (d) excited states.

107. The Bohr model of the atom was able to explain the Balmer series because

- (a) larger orbits required electrons to have more negative energy in order to match the angular momentum.
- (b) differences between the energy levels of the orbits matched the difference between energy levels of the line spectra.
- (c) electrons were allowed to exist only in allowed orbits and nowhere else.
- (d) none of the above

108. The idea of matter waves, as reasoned by de Broglie, describes a wavelike behavior of any

- (a) particle, moving or not.
- (b) particle that is moving.
- (c) charged particle that is moving.
- (d) particle that is stationary.

109. According to the equation de Broglie derived to describe matter waves, doubling the velocity of an electron would result in

- (a) less momentum.
- (b) a greater mass.
- (c) a smaller wavelength.
- (d) an unchanged wavelength and mass.

110. A hydrogen atom has an electron in the sixth excited state so the principal quantum number of this electron is

- (a) 7.
- (b) 6.
- (c) 5.
- (d) 4.

111. One reason the Bohr model of the atom failed was because it did not explain why

- (a) accelerating electrons do not emit electromagnetic radiation.
- (b) moving electrons have a greater mass.
- (c) electrons in the orbits of an atom have negative energies.
- (d) electrons in greater orbits of an atom have greater velocities.

112. A hydrogen atom is in a ground state when its electron

- (a) has moved away from the atom to the ground.
- (b) has stopped moving.
- (c) is moving back and forth through the nucleus.
- (d) remains at the lowest energy level.

113. An atom of hydrogen emits a photon when its electron

- (a) jumps from a lower-energy orbit to a higher-energy orbit.
- (b) jumps from a higher-energy orbit to a lower-energy orbit.
- (c) combines with a proton.
- (d) combines with a neutron.

114. What is the energy of a photon of black light (ultraviolet) that has a frequency of 2.00×10^{16} Hz?

- (a) 1.33×10^{-17} J
- (b) 13.26×10^{18} J
- (c) 1.33×10^{51} J
- (d) 3.05×10^{-19} J

115. What is the de Broglie wavelength of an electron with a velocity of 2.00×10^7 m/s?

- (a). 1.82×10^{-23} m
- (b). 1.21×10^{-10} m
- (c). 3.64×10^{-11} m
- (d). 3.32×10^{-41} m

116. What is the frequency of a photon emitted when an electron in a hydrogen atom jumps from $n = 3$ to $n = 2$?

- (a) 3.02×10^{-19} Hz
- (b) 4.56×10^{14} Hz
- (c) 7.29×10^{14} Hz
- (d) 6.2×10^{14} Hz

117. What is the electron configuration for potassium (atomic number 19)?

- (a) $1s^2 2p^6 3s^4 3p^6 4s^2$
- (b) $1s^4 2p^6 3s^2 3p^6 4s^2$
- (c) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
- (d) $1s^2 2s^2 2p^6 3s^2 3p^8$

118. What is the energy of a photon of red light with a frequency of 4.00×10^{14} Hz?

- (a). 1.66×10^{-48} J
- (b). 2.65×10^{-19} J
- (c). 6.63×10^{-34} J
- (d). 4.00×10^{14} J

119. Which of the following compounds is the strongest Brønsted base?

- (a) CH₄
- (b) NH₃
- (c) H₂O
- (d) HF

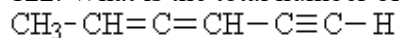
120. The pressure of a gas will ? when the volume is decreased and will ? when the absolute temperature is decreased.

- (a) increase...increase
- (b) increase...decrease
- (c) decrease...increase
- (d) decrease...decrease

121. Which of the following compounds is the strongest Brønsted **base**?

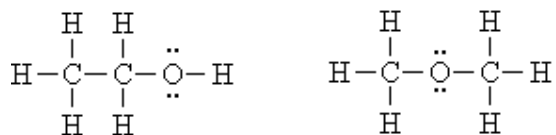
- (a) H₂PO₄⁻
- (b) HSO₄⁻
- (c) NO₃⁻
- (d) CH₃COO⁻

122. What is the total number of sigma bonds found in the following compound?



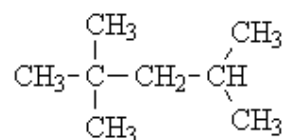
- (a) 8
- (b) 10
- (c) 11
- (d) 15

123. How are the following compounds related?



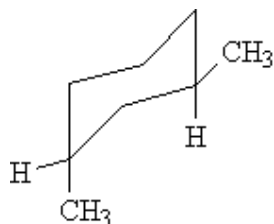
- (a) isoelectronic species
- (b) isotopes
- (c) isomers
- (d) These compounds are not related at all...they are totally different.

124. What is the IUPAC name for the following compound?



- (a) 1,3-pentamethylpropane
- (b) 1,1,3,3-tetramethylbutane
- (c) 2,4,4-trimethylpentane
- (d) 2,2,4-trimethylpentane

125. What is the IUPAC name for the following compound?

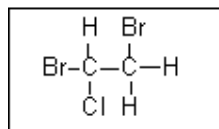


- (a) dimethylcyclohexane
- (b) 1,3-dimethylcyclohexane
- (c) *cis*-1,3-dimethylcyclohexane
- (d) *trans*-1,3-dimethylcyclohexane

126. The most stable conformational isomer of *cis*-1-bromo-2-chlorocyclohexane will have...

- (a) both halide atoms in axial positions.
- (b) both halide atoms in equatorial positions.
- (c) the bromine atom in an axial position and the chlorine atom in an equatorial position.
- (d) the bromine atom in an equatorial position and the chlorine atom in an axial position.

127. Which Newman projection shows the most stable conformation of the following compound?



- (a)

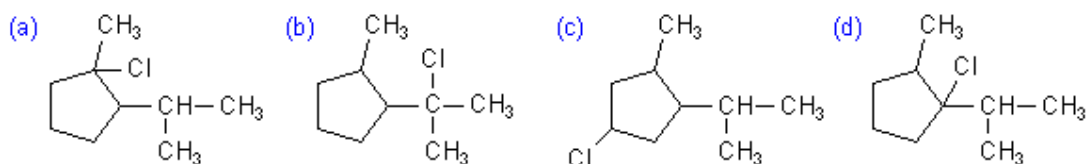
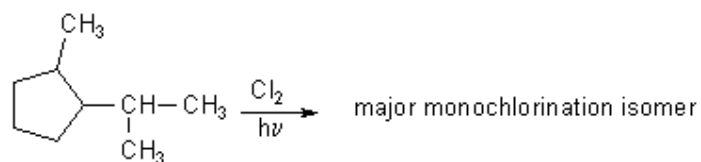
Newman projection (a): Front carbon has Br on the left and Cl on the right. Back carbon has H on the left and Br on the right.
- (b)

Newman projection (b): Front carbon has Cl on the left and Br on the right. Back carbon has H on the left and Br on the right.
- (c)

Newman projection (c): Front carbon has H on the left and Cl on the right. Back carbon has HBr on the left and HBr on the right.
- (d)

Newman projection (d): Front carbon has Cl on the left and Br on the right. Back carbon has H on the left and Br on the right.

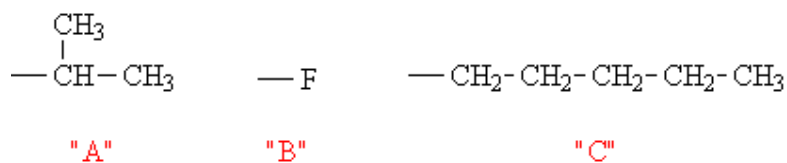
128. Which of the these compounds represents the major monochlorination isomer formed in the following reaction?



129. How many dichlorinated isomers can be formed by the halogenation of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ with Cl_2 in the presence of light?

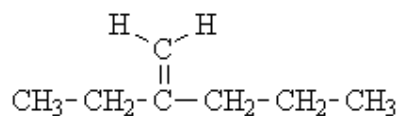
- (a) 2
- (b) 3
- (c) 5
- (d) 6

130. Arrange the following groups in decreasing order of priority for E/Z nomenclature with the highest priority group listed first.



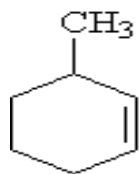
- (a) $\text{B} > \text{A} > \text{C}$
- (b) $\text{B} > \text{C} > \text{A}$
- (c) $\text{A} > \text{C} > \text{B}$
- (d) $\text{C} > \text{A} > \text{B}$

131. What is the best name for the following compound?



- (a) 3-methylenhexane
- (b) 2-propyl-1-butene
- (c) 4-ethyl-4-pentene
- (d) 2-ethyl-1-pentene

132. What is the best name for the following compound?



- (a) 2-methylcyclohexene
- (b) 3-methylhexene
- (c) 1-methylcyclohex-2-ene
- (d) 3-methylcyclohexene

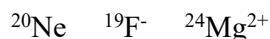
133. The common isotopes of carbon are ^{12}C and ^{13}C . The average mass of carbon is 12.01115 amu. What is the abundance of the ^{13}C isotope?

- (a) 1.115%
- (b) 98.885%
- (c) 0.480%
- (d) 99.52%

134. If the abundance of ^6Li (6.015121 amu) is 7.500% and the abundance of ^7Li (7.016003 amu) is 92.500%, what is the average atomic mass?

- (a) 6.0750 amu
- (b) 6.0902 amu
- (c) 6.9250 amu
- (d) 6.9409 amu

135. What do the following have in common?



- (a) They are isotopes of each other.
- (b) They are isomers of each other.
- (c) They are isoelectronic with each other.
- (d) They are different elements so they have nothing in common.

136. How many valence electrons does an oxygen atom have?

- (a) 2
- (b) 6
- (c) 8
- (d) 16

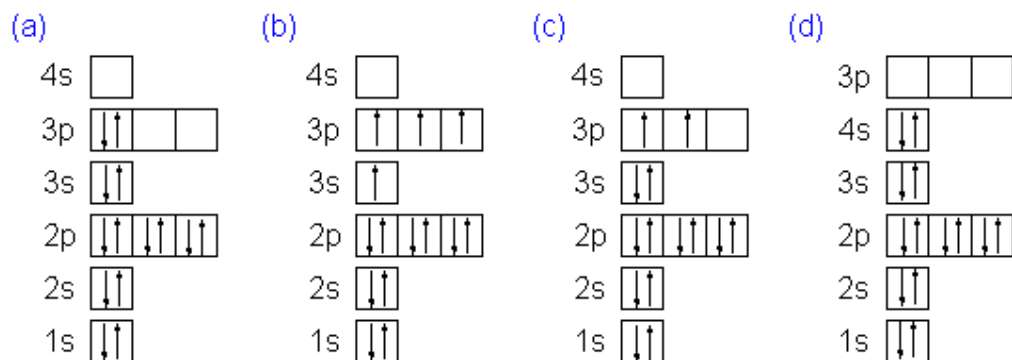
137. Fluorine atoms tend to...?...when they form chemical compounds with metals.

- (a) lose electrons
- (b) gain electrons
- (c) neither lose nor gain electrons...they usually share electrons equally with metals.
- (d) Fluorine atoms do not form compounds with other atoms...fluorine is an inert gas.

138. The identity of an element is determined by...

- (a) the number of its protons.
- (b) the number of its neutrons.
- (c) the number of its electrons.
- (d) its atomic mass.

139. Which of the following orbital box diagrams represents silicon, which has 14 electrons?



140. The half-life of francium-212 is 19 minutes. How many minutes will it take for 1 gram of this isotope to decay to 0.125 grams?

- (a) 4.75 minutes
- (b) 9.5 minutes
- (c) 38 minutes
- (d) 57 minutes

141. The atom formed by the beta decay of carbon-14 is...

- (a) oxygen-18
- (b) beryllium-10
- (c) boron-14
- (d) nitrogen-14

142. Which of the following substances would have $\Delta H_{\text{formation}} = 0$ (please explain why you chose that answer)

- (a) CH_4 (g)
- (b) CH_4 (l)
- (c) F(s)
- (d) F_2 (g)

143. What is the 1st Law of Thermodynamics?

- (a) The Energy of the Universe is a constant.
- (b) A spontaneous process is exothermic
- (c) Entropy is increasing disorder.
- (d) Heat and Work are state functions .

144. Which one of the following is a strong acid? (how did you determine your answer?)

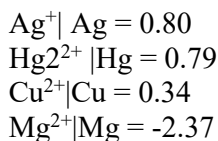
- (a) H_2CO_3
- (b) H_2SO_3
- (c) HNO_3
- (d) CH_3COOH

145. Faraday's laws of electrolysis are related to the

- a. atomic number of the cation.
- b. atomic number of the anion.
- c. equivalent weight of the electrolyte
- d. speed of the cation

146A solution containing one mole for litre each of $\text{Cu}(\text{NO}_3)_2$, AgNO_3 , $\text{Hg}_2(\text{NO}_3)_2$ and $\text{Mg}(\text{NO}_3)_2$ is electrolysed using inert electrodes.

Standard electrode potentials in volts (reduction potentials) are:



With increasing voltage, the sequence of deposition of metals on the cathode will be:

- (a) Ag,Hg,Cu, Mg
- (b) Mg,Cu,Hg,Ag
- (c) Ag,Hg, Cu
- (d) Cu,Hg, Ag

147. The electric charge or electrode deposition of one gram equivalent of a substance is:

- (a) one ampere for one second
- (b) 96,500 coulombs per second
- (c) one ampere for one hour
- (d) charge on one mole of electrons

148 The reaction $\frac{1}{2} \text{H}_2(\text{g}) + \text{AgCl}(\text{s}) = \text{H}^+(\text{aq}) + \text{Cl}^-(\text{aq}) + \text{Ag}(\text{s})$ occurs in the galvanic cell:

- a. $\text{Ag}|\text{AgCl}(\text{s})|\text{KCl}(\text{soln})|\text{AgNO}_3(\text{soln})|\text{Ag}$
- b. $\text{Pt}|\text{H}_2(\text{g})|\text{HCl}(\text{soln})|\text{AgNO}_3(\text{soln})|\text{Ag}$
- c. $\text{Pt}|\text{H}_2(\text{g})|\text{HCl}(\text{soln})|\text{AgCl}(\text{s})|\text{Ag}$
- d. $\text{Pt}|\text{H}_2(\text{g})|\text{KCl}(\text{soln})|\text{AgCl}(\text{s})|\text{Ag}$

149. A drug which prevents uric acid synthesis by inhibiting the enzyme xanthine oxidase is

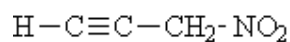
- (a) Aspirin
- (b) Allopurinol
- (c) Colchicine
- (d) Probenecid

150. Arrange the following in decreasing order of their boiling points.

- (A) n-butane (B) 2-methylbutane
- (C) n-pentane (D) 2,2-dimethylpropane

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

151. What is the total number of pi bonds found in the following compound?



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

152. Arrange the halogens F_2 , Cl_2 , Br_2 , I_2 , in order of their increasing reactivity with alkanes.

- (a) $\text{I}_2 < \text{Br}_2 < \text{Cl}_2 < \text{F}_2$
- (b) $\text{Br}_2 < \text{Cl}_2 < \text{F}_2 < \text{I}_2$
- (c) $\text{F}_2 < \text{Cl}_2 < \text{Br}_2 < \text{I}_2$
- (d) $\text{Br}_2 < \text{I}_2 < \text{Cl}_2 < \text{F}_2$

153. The increasing order of reduction of alkyl halides with zinc and dilute HCl is

- (a) $\text{R}-\text{Cl} < \text{R}-\text{I} < \text{R}-\text{Br}$
- (b) $\text{R}-\text{Cl} < \text{R}-\text{Br} < \text{R}-\text{I}$
- (c) $\text{R}-\text{I} < \text{R}-\text{Br} < \text{R}-\text{Cl}$
- (d) $\text{R}-\text{Br} < \text{R}-\text{I} < \text{R}-\text{Cl}$

154. Which of the following is the correct IUPAC name?

- (a) 3-Ethyl-4, 4-dimethylheptane
- (b) 4,4-Dimethyl-3-ethylheptane
- (c) 5-Ethyl-4, 4-dimethylheptane
- (d) 4,4-Bis(methyl)-3-ethylheptane

155. Electronegativity of carbon atoms depends upon their state of hybridisation. In which of the following compounds, the carbon marked with asterisk is most electronegative?

- (a) $\text{CH}_3 - \text{CH}_2 - \text{*CH}_2 - \text{CH}_3$
- (b) $\text{CH}_3 - \text{*CH} = \text{CH} - \text{CH}_3$
- (c) $\text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{*CH}$
- (d) $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{*CH}_2$

156. In which of the following, functional group isomerism is not possible?

- (a) Alcohols
- (b) Aldehydes
- (c) Alkyl halides
- (d) Cyanides

163. The element which exists in liquid state for a wide range of temperature and can be used for measuring high temperature is

- (a) B
- (b) Al
- (c) Ga
- (d) In

164. Which of the following is a Lewis acid ?

- (a) AlCl_3
- (b) MgCl_2
- (c) CaCl_2
- (d) BaCl_2

165. The geometry of a complex species can be understood from the knowledge of type of hybridisation of orbitals of central atom. The hybridisation of orbitals of central atom in $[\text{Be}(\text{OH})_4]^-$ – and the geometry of the complex are respectively

- (a) sp^3 , tetrahedral
- (b) sp^3 , square planar
- (c) sp^3d^2 , octahedral
- (d) dsp^2 , square planar

166. Which of the following oxides is acidic in nature?

- (a) B_2O_3
- (b) Al_2O_3
- (c) Ga_2O_3
- (d) In_2O_3

167. The exhibition of highest co-ordination number depends on the availability of vacant orbitals in the central atom. Which of the following elements is not likely to act as central atom in MF_6^{3-} ?

- (a) B
- (b) Al
- (c) Ga
- (d) In

168. Boric acid is an acid because its molecule

- (a) contains replaceable H^+ ion
- (b) gives up a proton
- (c) accepts OH from water releasing proton
- (d) combines with proton from water molecule

169. Catenation i.e., linking of similar atoms depends on size and electronic configuration of atoms. The tendency of catenation in Group 14 elements follows the order:

- (a) $\text{C} > \text{Si} > \text{Ge} > \text{Sn}$
- (b) $\text{C} \gg \text{Si} > \text{Ge} \approx \text{Sn}$
- (c) $\text{Si} > \text{C} > \text{Sn} > \text{Ge}$
- (d) $\text{Ge} > \text{Sn} > \text{Si} > \text{C}$

170. Silicon has a strong tendency to form polymers like silicones. The chain length of silicone polymer can be controlled by adding

- (a) MeSiCl_3
- (b) Me_2SiCl_2
- (c) Me_3SiCl
- (d) Me_4Si

171. Ionisation enthalpy ($\Delta_i H_1$ kJ mol^{-1}) for the elements of Group 13 follows the order.

- (a) $\text{B} > \text{Al} > \text{Ga} > \text{In} > \text{Tl}$
- (b) $\text{B} < \text{Al} < \text{Ga} < \text{In} < \text{Tl}$
- (c) $\text{B} < \text{Al} > \text{Ga} < \text{In} > \text{Tl}$
- (d) $\text{B} > \text{Al} < \text{Ga} > \text{In} < \text{Tl}$

172. In the structure of diborane

- (a) All hydrogen atoms lie in one plane and boron atoms lie in a plane perpendicular to this plane.
- (b) 2 boron atoms and 4 terminal hydrogen atoms lie in the same plane and 2 bridging hydrogen atoms lie in the perpendicular plane.
- (c) 4 bridging hydrogen atoms and boron atoms lie in one plane and two terminal hydrogen atoms lie in a plane perpendicular to this plane.
- (d) All the atoms are in the same plane.

173. A compound X, of boron reacts with NH_3 on heating to give another compound Y which is called inorganic benzene. The compound X can be prepared by treating BF_3 with Lithium aluminium hydride. The compounds X and Y are represented by the formulas.

- (a) B_2H_6 , $\text{B}_3\text{N}_3\text{H}_6$
- (b) B_2O_3 , $\text{B}_3\text{N}_3\text{H}_6$
- (c) BF_3 , $\text{B}_3\text{N}_3\text{H}_6$
- (d) $\text{B}_3\text{N}_3\text{H}_6$, B_2H_6

174. Quartz is extensively used as a piezoelectric material, it contains _____.

- a) Pb
- b) Si
- c) Ti
- d) Sn

175. The most commonly used reducing agent is

- a) AlCl_3
- b) PbCl_2
- c) SnCl_4
- d) SnCl_2

176. Dry ice is

- a) Solid NH_3
- b) Solid SO_2
- c) Solid CO_2
- d) Solid N_2

177. Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group (s) are present in the mixture?

- a) group 2
- b) groups 2, 13 and 14
- c) groups 2 and 13
- d) groups 2 and 14

178. Which of the following gases is not a green house gas?

- a) CO
- b) O₃
- c) CH₄
- d) H₂O vapour

179. Photochemical smog occurs in warm, dry and sunny climate. One of the following is not amongst the components of photochemical smog, identify it.

- a) NO₂
- b) O₃
- c) SO₂
- d) Unsaturated hydrocarbon

180. Which of the following statements is not true about classical smog?

- a) Its main components are produced by the action of sunlight on emissions of automobiles and factories.
- b) Produced in cold and humid climate.
- c) It contains compounds of reducing nature.
- d) It contains smoke, fog and sulphur dioxide.

181. Biochemical Oxygen Demand, (BOD) is a measure of organic material present in water. BOD value less than 5 ppm indicates a water sample to be _____.

- a) rich in dissolved oxygen.
- b) poor in dissolved oxygen.
- c) highly polluted.
- d) not suitable for aquatic life.

182. Which of the following statements is wrong?

- a) Ozone is not responsible for green house effect.
- b) Ozone can oxidise sulphur dioxide present in the atmosphere to sulphur trioxide.
- c) Ozone hole is thinning of ozone layer present in stratosphere.
- d) Ozone is produced in upper stratosphere by the action of UV rays on oxygen.

183. Sewage containing organic waste should not be disposed in water bodies because it causes major water pollution. Fishes in such a polluted water die because of

- a. Large number of mosquitoes.
- b. Increase in the amount of dissolved oxygen.
- c. Decrease in the amount of dissolved oxygen in water.
- d. Clogging of gills by mud.

184. Which of the following statements about photochemical smog is wrong?

- a) It has high concentration of oxidising agents.
- b) It has low concentration of oxidising agent.
- c) It can be controlled by controlling the release of NO_2 , hydrocarbons, ozone etc.
- d) Plantation of some plants like pinus helps in controlling photochemical smog.

185. The gaseous envelope around the earth is known as atmosphere. The lowest layer of this is extended upto 10 km from sea level, this layer is _____.

- a. Stratosphere
- b. Troposphere
- c. Mesosphere
- d. Hydrosphere

186. Dinitrogen and dioxygen are main constituents of air but these do not react with each other to form oxides of nitrogen because _____.

- a. the reaction is endothermic and requires very high temperature.
- b. the reaction can be initiated only in presence of a catalyst.
- c. oxides of nitrogen are unstable.
- d. N_2 and O_2 are unreactive.

187. The pollutants which come directly in the air from sources are called primary pollutants. Primary pollutants are sometimes converted into secondary pollutants. Which of the following belongs to secondary air pollutants?

- a. CO
- b. Hydrocarbon
- c. Peroxyacetyl nitrate
- d. NO

188. Which of the following statements is correct?

- a) Ozone hole is a hole formed in stratosphere from which ozone oozes out.
- b) Ozone hole is a hole formed in the troposphere from which ozone oozes out.
- c) Ozone hole is thinning of ozone layer of stratosphere at some places.
- d) Ozone hole means vanishing of ozone layer around the earth completely.

189. Which of the following practices will not come under green chemistry?

- a) If possible, making use of soap made of vegetable oils instead of using synthetic detergents.
- b) Using H_2O_2 for bleaching purpose instead of using chlorine based bleaching agents.
- c) Using bicycle for travelling small distances instead of using petrol/diesel based vehicles.
- d) Using plastic cans for neatly storing substances.

190. If travelling at same speeds, which of the following matter waves have the shortest wavelength?

- a. Electron
- b. Alpha particle (He^{2+})
- c. Neutron
- d. Proton

191. An alpha (α) particle is essentially a _____ nucleus.

- a) carbon-12
- b) helium
- c) plutonium
- d) hydrogen

192. For the most common types of radioactive decay, the order of least penetrating to human tissue, to most penetrating to human tissue is:

- a) alpha, beta, gamma
- b) gamma, beta, alpha
- c) beta, gamma, alpha
- d) gamma, alpha, beta

193. Compared to chemical reactions, nuclear reactions produce:

- a) more vegetables
- b) proportionally far less energy
- c) fewer changes in the nucleus
- d) proportionally far more energy

194. Gamma (γ) rays are:

- a) are very high energy, very long wavelength electromagnetic radiation
- b) are very high energy, very short wavelength electromagnetic radiation
- c) are very low energy, very short wavelength electromagnetic radiation
- d) are very low energy, very long wavelength electromagnetic radiation

195. A process in which a very heavy nucleus splits into more-stable nuclei of intermediate mass is called:

- a) a chain reaction
- b) radioactive decay
- c) nuclear fission
- d) radiocarbon dating

196. An electron emitted from the nucleus during some kinds of radioactive decay is known as:

- a) An alpha (α) particle
- b) A positron
- c) A gamma ray
- d) A beta (β) particle

197. For the most common types of radioactive decay, the order of mass from lightest to heaviest is:

- a) beta, alpha, gamma
- b) beta, gamma, alpha
- c) gamma, alpha, beta
- d) gamma, beta, alpha

198. Given the reaction: $\text{ZnO} + \text{X} + \text{heat} \rightarrow \text{Zn} + \text{XO}$

Which element, represented by X, is used industrially to reduce the ZnO to Zn?

- a) Cu
- b) C
- c) SN
- d) Pb

199. Which type of reaction is occurring when a metal undergoes corrosion?

- a) oxidation-reduction
- b) neutralization
- c) polymerization
- d) saponification

200. What factor distinguishes a suspension from a colloid?

- a) light reflects off the particles of a suspension
- b) the particles of a suspension will sink out if left over time to rest
- c) suspensions are clear
- d) suspensions cannot be filtered

ANSWERS

- | | | | | | | | |
|------|---|------|---|------|---|------|---|
| 1. | a | 37. | b | 73. | b | 109. | c |
| 2. | a | 38. | c | 74. | d | 110. | a |
| 3. | b | 39. | d | 75. | b | 111. | a |
| 4. | a | 40. | a | 76. | c | 112. | d |
| 5. | d | 41. | a | 77. | b | 113. | b |
| 6. | b | 42. | d | 78. | b | 114. | a |
| 7. | c | 43. | b | 79. | c | 115. | c |
| 8. | b | 44. | d | 80. | d | 116. | b |
| 9. | c | 45. | c | 81. | b | 117. | c |
| 10. | b | 46. | b | 82. | c | 118. | c |
| 11. | c | 47. | d | 83. | b | 119. | c |
| 12. | a | 48. | c | 84. | b | 120. | b |
| 13. | b | 49. | d | 85. | c | 121. | d |
| 14. | d | 50. | b | 86. | d | 122. | c |
| 15. | b | 51. | c | 87. | a | 123. | c |
| 16. | c | 52. | c | 88. | b | 124. | d |
| 17. | b | 53. | d | 89. | b | 125. | d |
| 18. | a | 54. | d | 90. | c | 126. | d |
| 19. | c | 55. | c | 91. | d | 127. | a |
| 20. | a | 56. | c | 92. | a | 128. | b |
| 21. | b | 57. | c | 93. | a | 129. | d |
| 22. | b | 58. | b | 94. | b | 130. | a |
| 23. | a | 59. | b | 95. | d | 131. | d |
| 24. | c | 60. | a | 96. | c | 132. | d |
| 25. | c | 61. | d | 97. | d | 133. | a |
| 26. | b | 62. | d | 98. | c | 134. | d |
| 27. | a | 63. | b | 99. | c | 135. | c |
| 28. | c | 64. | c | 100. | b | 136. | b |
| 29. | a | 65. | a | 101. | c | 137. | b |
| 30. | c | 66. | c | 102. | a | 138. | a |
| 31. | d | 67. | d | 103. | d | 139. | c |
| 32. | d | 68. | c | 104. | b | 140. | d |
| 33. | d | 69. | c | 105. | d | 141. | d |
| 34. | b | 70. | b | 106. | a | 142. | d |
| 35. | c | 71. | a | 107. | b | 143. | a |
| 36. | b | 72. | d | 108. | b | 144. | c |
| 145. | c | 182. | a | | | | |

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|------|---|------|---|
| 146. | c | 183. | c |
| 147. | d | 184. | b |
| 148. | c | 185. | b |
| 149. | b | 186. | a |
| 150. | d | 187. | c |
| 151. | c | 188. | c |
| 152. | a | 189. | d |
| 153. | b | 190. | b |
| 154. | b | 191. | b |
| 155. | c | 192. | a |
| 156. | c | 193. | d |
| 157. | d | 194. | b |
| 158. | d | 195. | c |
| 159. | b | 196. | d |
| 160. | a | 197. | d |
| 161. | c | 198. | b |
| 162. | a | 199. | a |
| 163. | c | 200. | b |
| 164. | a | | |
| 165. | a | | |
| 166. | a | | |
| 167. | a | | |
| 168. | b | | |
| 169. | b | | |
| 170. | c | | |
| 171. | d | | |
| 172. | b | | |
| 173. | a | | |
| 174. | b | | |
| 175. | d | | |
| 176. | c | | |
| 177. | b | | |
| 178. | a | | |
| 179. | c | | |
| 180. | a | | |
| 181. | a | | |