

- All the lanthanides generally exhibit a valency of
 - 3
 - 5
 - 7
 - 9

- Which one of the following transitions is mainly responsible for deep purple colour of $KMnO_4$?
 - $\sigma-\sigma^*$ transition
 - Ligand-to-metal charge-transfer (LMCT)
 - $d-d$ transition
 - $\pi-\pi^*$ transition

- Which one of the following is the most probable electronic configuration of an outermost shell of an element with the ionization energy values of $E_1 = 300 \text{ kJ}$, $E_2 = 620 \text{ kJ}$, $E_3 = 4300 \text{ kJ}$ and $E_4 = 6000 \text{ kJ}$?
 - ns^1
 - ns^2
 - $ns^2 np^1$
 - $ns^2 np^2$

- Type of hybridization in bonding of PCl_5 molecule is
 - sp^2
 - sp^3
 - $sp^3 d^2$
 - $sp^3 d$

5. Green colour produced during fireworks is due to the presence of which ions?

- (a) Cu^+
- (b) Ca^{2+}
- (c) Ba^{2+}
- (d) K^+

6. A metal M readily forms its Sulphate, MSO_4 which is water soluble. It forms its oxide MO , which becomes inert on heating. It forms an insoluble hydroxide $M(OH)_2$ which is soluble in $NaOH$ solution. Then M is

- (a) Mg
- (b) Sr
- (c) Ca
- (d) Ba

7. Which one of the following is used in thermite welding process?

- (a) Mg Powder
- (b) Fe Powder
- (c) Al Powder
- (d) Cu Powder

8. Borazine is known as

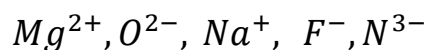
- (a) Organic Benzene
- (b) Organic Xylene
- (c) Inorganic Benzene
- (d) Inorganic Xylene

9. Which one of the following carbonates decomposes at lowest temperature?
- (a) $BaCO_3$
 - (b) $CaCO_3$
 - (c) $SrCO_3$
 - (d) $MgCO_3$
10. How many lone pairs and bonding pairs are present in H_2O ?
- (a) 2 lone pairs and 2 bonding pairs
 - (b) 3 lone pairs and 2 bonding pairs
 - (c) 2 lone pairs and 3 bonding pairs
 - (d) 3 lone pairs and 3 bonding pairs
11. Which one of the following order of the dipole moments of the molecules is correct?
- (a) $BF_3 > NH_3 > NF_3$
 - (b) $NF_3 > BF_3 > NH_3$
 - (c) $NH_3 > NF_3 > BF_3$
 - (d) $BF_3 > NF_3 > NH_3$
12. Which one of the following is the correct sequence followed by molar ionic conductance of the ions?
- (a) $Li^+ < K^+ < Na^+ < Rb^+$
 - (b) $Rb^+ < Na^+ < K^+ < Li^+$
 - (c) $Li^+ < Na^+ < K^+ < Rb^+$
 - (d) $Rb^+ < K^+ < Na^+ < Li^+$

13. Lithium is the strongest reducing agent among the alkali metals. It is due to the factor that it has high

- (a) Ionization energy
- (b) Electron affinity
- (c) Heat of hydration
- (d) Lattice energy

14. What is the correct order of ionic size for the following ions?



- (a) $Mg^{2+} > F^- > Na^+ > O^{2-} > N^{3-}$
- (b) $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+}$
- (c) $Mg^{2+} > Na^+ > F^- > O^{2-} > N^{3-}$
- (d) $N^{3-} > Na^+ > F^- > O^{2-} > Mg^{2+}$

15. Which one of the following is most stable?

- (a) $[CoCl_6]^{3-}$
- (b) $[CoF_6]^{3-}$
- (c) $[CoI_6]^{3-}$
- (d) $[CoBr_6]^{3-}$

16. Who provided first the scientific concept of Acid and Base?

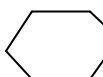
- (a) Sir Humphry Davy
- (b) Svante Arrhenius
- (c) Antoine Lavoisier
- (d) Friedrich Wilhelm

17. Which one of the following is representing a conjugate pair of an acid and a base?

- (a) H_3O^+ and H_2O
- (b) CH_3COOH and CH_3COONa
- (c) NH_4OH and NH_4Cl
- (d) SO_2 and HSO_4^-

18. H_2SO_4 behaves as a base in

- (a) HF
- (b) C_2H_5OH
- (c) CH_3COOH
- (d) H_2O

19. In piperidine NH, the hybrid state assumed by Nitrogen (N) is

- (a) sp^2
- (b) sp^3
- (c) sp^1
- (d) dsp^2

20. In which of the following compounds does hydrogen bonding occur?

- (a) SiH_4
- (b) LiH
- (c) HI
- (d) NH_3

21. Iron displaces copper from $CuSO_4$ solution, because copper is
- (a) Below Fe in electrochemical series
 - (b) Above Fe in electrochemical series
 - (c) Oxidized
 - (d) Carburized
22. The oxidation number of nitrogen in NO_3^- is
- (a) 7
 - (b) 5
 - (c) 4
 - (d) 3
23. What is the bond order in superoxide ion (O_2^-)?
- (a) 1.5
 - (b) 2
 - (c) 2.5
 - (d) 1
24. The compound that contains both ionic and covalent bonds is
- (a) KCN
 - (b) H_2O
 - (c) H_2SO_4
 - (d) KCl

25. Which one of the following contains a coordinate covalent bond?

- (a) $N_2H_5^+$
- (b) H_2O
- (c) HCl
- (d) $BaCl_2$

26. The unit of cell constant is

- (a) cm^2
- (b) cm
- (c) cm^{-1}
- (d) cm^{-2}

27. What is the coordination number of Ca^{2+} ion in the fluorite structure?

- (a) 8
- (b) 6
- (c) 4
- (d) 2

28. A unit cell has $a = 5 \times 10^{-10} m$, $b = 8 \times 10^{-10} m$ and $c = 3 \times 10^{-10} m$ and the angles $\alpha = 95^\circ$, $\beta = 65^\circ$ and $\gamma = 54^\circ$. The space lattice for this unit cell is

- (a) Rhombohedral
- (b) Monoclinic
- (c) Orthorhombic
- (d) Triclinic

29. Consider the following forces in molecular crystals:

1. Electrostatic force
2. Van der Waals force
3. Repulsive force

The molecules are maintained in their position in lattice by which of these forces?

- (a) 1 and 2 only
- (b) 2 only
- (c) 3 only
- (d) 1, 2 and 3

30. Consider the following defects of a crystal:

1. Frenkel defect
2. Interstitial defect
3. Schottky defect

Which of the above defects cause(s) decrease in the density of a crystal?

- (a) 1 only
- (b) 1 and 2 only
- (c) 3 only
- (d) 1, 2 and 3

31. An addition of hydrogen chloride with propylene gives

- (a) 1-chloropropane
- (b) Propane
- (c) 2-chloropropane
- (d) 1, 2-dichloropropane

32. Ozonolysis of which of the following compounds gives two molecules of acetaldehyde?

- (a) $CH_3CH_2CH = CH_2$
- (b) $CH_3 - CH = CH - CH_3$
- (c) $(CH_3)_2C = C (CH_3)_2$
- (d) $CH_3CH = CH_2$

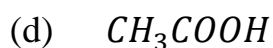
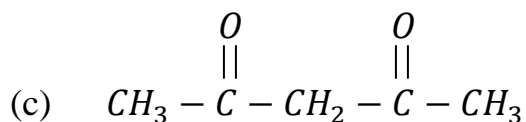
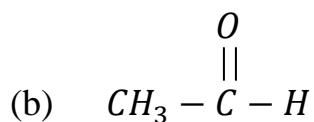
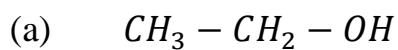
33. Compound *A* reacts with sodium metal to give compound *B*. Compound *A* also reacts with PCl_5 to give compound *C*. Compounds *B* and *C* also react with each other to give dimethyl ether. Then compounds *A*, *B* and *C* respectively, are

- (a) CH_3OH, CH_3ONa and CH_3OCl
- (b) CH_3Cl, CH_4 and CH_3ONa
- (c) CH_3OH, CH_3ONa and CH_3Cl
- (d) CH_3Cl, CH_4 and CH_3OH

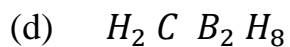
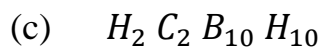
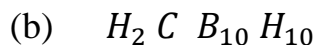
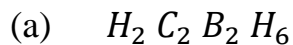
34. Which material is used in high-tech racing automobiles?

- (a) Carbotanium carbon-titanium
- (b) Silicon carbide with carbon fibre
- (c) Pure carbon-carbon
- (d) Graphite

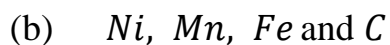
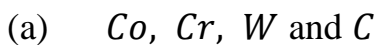
35. Alkaline hydrolysis of a gem-dihalide $CH_3CH \begin{matrix} / Cl \\ \backslash Cl \end{matrix}$ yields



36. A carborane is a cluster composed of boron and carbon atoms with a chemical composition



37. Stellite is an alloy of



38. Spiegeleisen is an alloy of *Fe*, *C* and
- (a) *Co*
 - (b) *Mn*
 - (c) *Ni*
 - (d) *Cr*
39. A chemical composition of mellitic anhydride is
- (a) C_2O_9
 - (b) $C_{12}O_4$
 - (c) C_2O_4
 - (d) $C_{12}O_9$
40. Aspirin is
- (a) Polystyrene
 - (b) Methyl salicylate
 - (c) Acetyl salicylic acid
 - (d) Nicotonic acid
41. The best method used to refine gold metal is
- (a) Distillation
 - (b) Electrolysis
 - (c) Bessemerization
 - (d) Liquidation

42. Formaldehyde is manufactured by catalytic oxidation

1. followed by dehydrogenation of methane
2. of ethylene
3. of carbon monoxide

Which of the above are correct?

- (a) 1 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

43. Which of the following is/are an antibiotic drug(s)?

1. Chloroform
2. Insulin
3. Penicillin

Which of the above are correct?

- (a) 1 only
- (b) 2 only
- (c) 3 only
- (d) 1, 2 and 3

44. Quartz is a form of

- (a) $CaCO_3$
- (b) Al_2O_3
- (c) SiO_2
- (d) MgO

45. Which one of the following is paramagnetic?
- (a) $[Fe(CN)_6]^{4-}$
 - (b) $[CoF_6]^{3-}$
 - (c) $[Ni(CO)_4]$
 - (d) $[Ni(Cl)_4]^{2-}$
46. Electrometallurgy is employed for the reduction of
- (a) *Pt*
 - (b) *Fe*
 - (c) *Na*
 - (d) *Ag*
47. Mixture of which of the following is used as solvent in duo-sol extraction for lube oil upgradation?
- (a) Phenol and cresylic acid
 - (b) Propane and pyrrolidine
 - (c) Dichloroethyl ether and glycol
 - (d) Propane and phenol-cresol

48. The cell constant of conductivity cell

1. Changes with temperature of electrolyte
2. Remains constant for a cell

Which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

49. In cooling tower, water becomes cold by

1. Evaporative cooling
2. Losing latent heat
3. Losing sensible heat

Which of the above are correct?

- (a) 1 only
- (b) 2 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

50. Molecular sieves are adsorbents composed of

- (a) Zeolites
- (b) Copper silicate
- (c) Zinc silicate
- (d) Chromium silicate

51. The concept of *LMTD* need not be used when

(a) $\frac{\Delta T_1}{\Delta T_2} > 2$

(b) $\frac{\Delta T_1}{\Delta T_2} > 10$

(c) $\frac{\Delta T_1}{\Delta T_2} < 2$

(d) $\frac{\Delta T_1}{\Delta T_2} < 10$

52. What is the minimum baffle spacing for a diameter D of the baffle that is generally used in a shell and tube heat exchanger?

(a) $0.2 D$

(b) $0.25 D$

(c) $0.4 D$

(d) $0.5 D$

53. All moisture in a non hygroscopic solid is

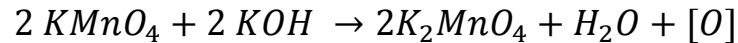
(a) Equilibrium moisture

(b) Free moisture

(c) Bound moisture

(d) Unbound moisture

54. What is the equivalent weight of $KMnO_4$ in the following reaction?



- (a) 49
- (b) 52.7
- (c) 158
- (d) 263

55. Sub-cooled boiling takes place when temperature of liquid is

- (a) Below saturation temperature
- (b) Equal to saturation temperature
- (c) More than saturation temperature
- (d) Boiling temperature

56. In which type of baffle shell side fluid flows through the clearance between the tube outside diameter and baffle hole diameter?

- (a) Segmental baffle
- (b) Rod baffle
- (c) Orifice baffle
- (d) Disk and doughnut baffles

57. Economy of an evaporator is defined as quantity

- (a) Evaporated per unit time
- (b) Evaporated per unit area
- (c) Vaporized per unit quantity of steam consumed
- (d) Vaporized per unit quantity of air consumed

58. Psychrometric ratio is

- (a) $\frac{\text{Heat transfer coefficient}}{\text{Mass transfer coefficient} \times \text{Humid Heat}}$
- (b) $\frac{\text{Heat transfer coefficient} \times \text{Humid Heat}}{\text{Mass transfer coefficient}}$
- (c) $\frac{\text{Mass transfer coefficient}}{\text{Heat transfer coefficient} \times \text{Humid Heat}}$
- (d) $\frac{\text{Mass transfer coefficient} \times \text{Humid Heat}}{\text{Heat transfer coefficient}}$

59. What is wet bulb depression?

- (a) Wet bulb temperature
- (b) Ratio of dry bulb temperature to wet bulb temperature
- (c) Difference between dry bulb temperature and wet bulb temperature
- (d) Difference between wet bulb temperature and atmospheric temperature

60. Fruit juices are concentrated in

- (a) Falling film evaporators
- (b) Long tube vertical evaporators
- (c) Direct heated evaporators
- (d) Agitated film evaporators

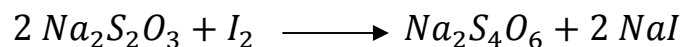
61. What is the minimum cetane number of diesel used in naval applications?

- (a) 75
- (b) 65
- (c) 45
- (d) 35

62. Which of the following reaction is neither oxidation nor reduction?

- (a) $CrO_4^{2-} \longrightarrow Cr_2O_7^{2-}$
- (b) $Cr \longrightarrow CrCl_3$
- (c) $Na \longrightarrow Na^+$
- (d) $2 S_2O_3^{2-} \longrightarrow S_4O_6^{2-}$

63. What is the equivalent weight of $Na_2S_2O_3$ in the reaction, where molecular weight is M ?



- (a) $0.25 M$
- (b) $0.5 M$
- (c) $0.75 M$
- (d) M

64. In UV spectroscopy, if the absorption band shifts from longer wavelengths to shorter wavelengths, it is called

- (a) Hypsochromic shift
- (b) Hypochromic shift
- (c) Hyperchromic shift
- (d) Bathochromic shift

65. When water is converted into steam, the enthalpy

- (a) increases
- (b) decreases
- (c) remains the same
- (d) is minimum

66. The changes in Gibbs free energy is expressed by $\Delta G = \Delta H - T\Delta S$.

The derivative of $\left[\frac{\partial(\frac{\Delta G}{T})}{\partial(\frac{1}{T})} \right]_p$ is

- (a) $-\frac{\Delta H}{T^2}$
- (b) $\frac{\Delta H}{T^2}$
- (c) $-\Delta H$
- (d) ΔH

67. The ratio of the two specific heat capacities for any ideal gas which possesses only translational energy is

- (a) 0.6
- (b) 1.667
- (c) 2.0
- (d) 0.5

68. Variation of heat of reaction with temperature T at constant P is given by

- (a) Antoine's law
- (b) Kirchhoff's law
- (c) Kelvin's law
- (d) Henry's law

69. According to one of the Maxwell relations $\left(\frac{\partial S}{\partial V}\right)_T = \left(\frac{\partial P}{\partial T}\right)_V$, for a mole of an ideal gas, $\left(\frac{\partial S}{\partial V}\right)_T$ is equal to

- (a) $\frac{P}{T}$
- (b) $\frac{T}{P}$
- (c) $\frac{T}{V}$
- (d) $\frac{V}{T}$

70. Water, on heating from 1°C to 4°C
- (a) Contracts
 - (b) Expands
 - (c) Has same volume
 - (d) May contract or expand
71. Refrigerator works on the principle of
- (a) None of these
 - (b) Second law of thermodynamics
 - (c) Third law of thermodynamics
 - (d) Zeroth law of thermodynamics
72. Under which condition, an isothermal curve will coincide with an adiabatic curve through a point on a P - V diagram of an ideal gas?
- (a) $C_p = C_v$
 - (b) $C_p < C_v$
 - (c) $C_p > C_v$
 - (d) $C_p \neq C_v$

73. The Maxwell's relation for the equation

$$dG = -SdT + Vdp \quad \text{is}$$

(a) $\left(\frac{\partial V}{\partial T}\right)_P = -\left(\frac{\partial S}{\partial P}\right)_T$

(b) $\left(\frac{\partial V}{\partial T}\right)_T = \left(\frac{\partial S}{\partial P}\right)_P$

(c) $\left(\frac{\partial V}{\partial P}\right)_T = -\left(\frac{\partial S}{\partial T}\right)_P$

(d) $\left(\frac{\partial V}{\partial P}\right)_T = \left(\frac{\partial S}{\partial T}\right)_T$

74. The equation for work (W) done for a process is given as

$$W = -nRT \ln\left(\frac{V_2}{V_1}\right)$$

The process is

- (a) Isothermal reversible expansion
- (b) Adiabatic reversible expansion
- (c) Isothermal irreversible expansion
- (d) Adiabatic irreversible expansion

75. For the reaction, $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, ΔH is equal to

- (a) $\Delta E + 2RT$
- (b) $\Delta E - 2RT$
- (c) ΔE
- (d) $\Delta E + RT$

76. The coefficient of performance (COP) of Carnot refrigerator working between two temperatures (T_a and T_b) is defined as

(a) $\frac{(T_a - T_b)}{T_a}$

(b) $\frac{(T_a - T_b)}{T_b}$

(c) $\frac{T_a}{(T_a - T_b)}$

(d) $\frac{T_b}{(T_a - T_b)}$

77. The concentration of a reactant Z decreases from $0.1 M$ to $0.005 M$ in 40 minutes. If the reaction follows first order kinetics, the rate of reaction when the concentration of Z is equal to $0.01 M$ will be

(a) $1.5 \times 10^{-4} M/\text{minute}$

(b) $3.47 \times 10^{-4} M/\text{minute}$

(c) $5.47 \times 10^{-4} M/\text{minute}$

(d) $7.5 \times 10^{-4} M/\text{minute}$

78. The electronic configuration of Ce ($Z = 58$) is

(a) $[Xe] 4f^2 5d^0 6s^2$

(b) $[Xe] 4f^1 5d^1 6s^2$

(c) $[Xe] 4f^2 5d^2 6s^0$

(d) $[Xe] 4f^0 5d^2 6s^2$

79. Electronic configuration of chromium atom ($Z = 24$) is

- (a) $[Ar] 3d^4 4s^2$
- (b) $[Ar] 3d^3 4s^2 4p^1$
- (c) $[Ar] 3d^5 4s^1$
- (d) $[Ar] 3d^6 4s^0$

80. For half-life time $\left(t_{1/2}\right) = \frac{0.693}{k}$, the order of the reaction is

- (a) 3
- (b) 2
- (c) 1
- (d) 0

81. For a chemical reaction, $A + B \xrightarrow{K} C$, the fractional conversion of reactant A is proportional to time. The order of the reaction (with respect to A) is

- (a) 2
- (b) 1
- (c) 0
- (d) 0.5

82. The most probable velocity of the gas molecules is given by

(a) $\sqrt{\frac{RT}{M}}$

(b) $\sqrt{\frac{2RT}{M}}$

(c) $\sqrt{\frac{3RT}{M}}$

(d) $\sqrt{\frac{5RT}{M}}$

83. For an ideal steady-state mixed reactor, the performance equation for constant-density systems is

(a) $\tau = \frac{C_{A0} - C_A}{(-r_A) V}$

(b) $\tau = \frac{C_{A0} - C_A}{(-r_A) C_{A0}}$

(c) $\tau = \frac{C_{A0} - C_A}{(-r_A)}$

(d) $\tau = \frac{(-r_A)}{C_{A0} - C_A}$

84. Knudsen diffusivity is directly proportional to

(a) T

(b) $\frac{1}{T}$

(c) \sqrt{T}

(d) $\frac{1}{\sqrt{T}}$

85. Shatter index of a coke is a measure of its

1. Bulk density
2. Reactivity
3. Strength

Which of the above is /are correct?

- (a) 1 only
- (b) 1 and 2 only
- (c) 3 only
- (d) 1, 2 and 3

86. Which one of the following is used as catalyst in shift converter?

- (a) Alumina
- (b) Silane
- (c) Molybdenum
- (d) Nickel

87. To burn 1 *kg* Carbon completely, dry air requirement is around

- (a) 15.4 *kg*
- (b) 11.5 *kg*
- (c) 9.6 *kg*
- (d) 2.7 *kg*

88. The pH of a 0.0001 molar HCl solution is:
- (a) 1
 - (b) 3
 - (c) 4
 - (d) 10
89. Fuel ratio of coal is defined as ratio of its fixed carbon to that of
- (a) Volatile matter
 - (b) Ash
 - (c) Moisture
 - (d) None of these
90. Which of the following fuels contains maximum carbon percentage?
- (a) Lignite
 - (b) Wood
 - (c) Anthracite
 - (d) Bituminous coal
91. Phenolphthalein will turn pink with which of the following 0.1 M solution?
- (a) $NaCl(aq)$
 - (b) $C_2H_5OH(aq)$
 - (c) $LiOH(aq)$
 - (d) $H_2SO_4(aq)$

92. Which of the following are characteristics of progressive transformation of wood to coal during coalification?

1. Oxygen content decreases
2. Fixed carbon content increases
3. Moisture content decreases
4. Volatile matter increases

- (a) 1, 2, 3 and 4
(b) 1, 2 and 4 only
(c) 3 and 4 only
(d) 1, 2 and 3 only

93. A real gas can be converted into liquid at

- (a) $T \leq T_c$ and $P \leq P_c$
(b) $T \geq T_c$ and $P \leq P_c$
(c) $T = T_c$ and $P = P_c$
(d) $T \leq T_c$ and $P \geq P_c$

94. At normal temperatures, when a gas passes through a throttle, its temperature decreases, except in the case of

- (a) CO_2
(b) CO
(c) H_2
(d) N_2

95. A gas is taken in a sealed container at 300 K . It is heated at constant volume to a temperature of 600 K . The mean kinetic energy of its molecules is

- (a) Halved
- (b) Doubled
- (c) Tripled
- (d) Quadrupled

96. What is the root mean square velocity of H_2 at N.T.P. for density of 0.0893 gram per litre of hydrogen?

- (a) $18.4 \times 10^6\text{ cm/s}$
- (b) $9.2 \times 10^6\text{ cm/s}$
- (c) $18.4 \times 10^4\text{ cm/s}$
- (d) $9.2 \times 10^4\text{ cm/s}$

97. What is the speed of the atom, when gas temperature is 264 K and molar mass of He is 0.004 kg mol^{-1} ?

- (a) $1.048 \times 10^3\text{ m/s}$
- (b) $1.097 \times 10^6\text{ m/s}$
- (c) $104.8 \times 10^2\text{ m/s}$
- (d) $109.7 \times 10^3\text{ m/s}$

98. Convection is a process of
- (a) Heat transfer that will occur between a solid surface and fluid medium when they are at different temperatures
 - (b) Heat transfer from a region of high temperature to a region of low temperature
 - (c) Heat transfer from a region of low temperature to a region of high temperature
 - (d) Heat transfer from one body to another without any transmitting medium
99. Which one of the following elements is used industrially for X , to reduce ZnO to Zn for the reaction $ZnO + X + heat \rightarrow Zn + XO$?
- (a) Pb
 - (b) C
 - (c) Cu
 - (d) Sn
100. The body centered cubic packing arrangement is found in the crystal of
- (a) Zinc
 - (b) Iron
 - (c) NaCl
 - (d) Copper

101. What is the oxidation number of carbon in NaHCO_3

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

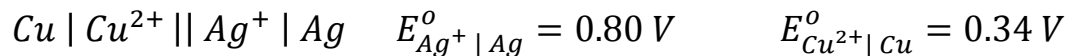
102. Which one of the following is the Bragg's equation to determine the diffraction pattern in crystal?

- (a) $n = 2 d \sin \theta$
- (b) $n \lambda = 2 d \sin \theta$
- (c) $n \lambda = 2 d \sin 2\theta$
- (d) $n = 2 d \sin 2\theta$

103. Combination of Bravais lattices and symmetry elements gives rise to

- (a) 235 Space groups
- (b) 232 Space groups
- (c) 230 Space groups
- (d) 229 Space groups

104. What is the EMF of the following cell?



- (a) 0.12 V
- (b) 0.46 V
- (c) 1.14 V
- (d) 1.26 V

105. The standard electrode potentials for $Cu^{2+} | Cu^+$ and $Cu^{2+} | Cu$ are 0.153 V and 0.337 V respectively. What is the standard electrode potential for $Cu^+ | Cu$ half cell?

- (a) 0.521 V
- (b) -0.490 V
- (c) 0.184 V
- (d) 0.827 V

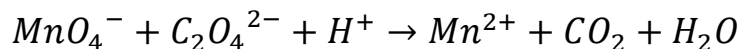
106. Specific conductance of 0.1 M NaCl solution is 10.6 mS/cm. Its molar conductance is

- (a) $1.06 \times 10^5 S cm^2/mol$
- (b) $1.06 \times 10^4 S cm^2/mol$
- (c) $1.06 \times 10^3 S cm^2/mol$
- (d) $1.06 \times 10^2 S cm^2/mol$

107. What will be the amount of aluminium metal deposited on cathode, when 0.1 Faraday of electricity is passed through aluminium chloride ($Al = 27$)?

- (a) 0.09 g
- (b) 0.81 g
- (c) 0.9 g
- (d) 8.1 g

108. What are the coefficients of reactants (i.e. MnO_4^- , $C_2O_4^{2-}$ and H^+ respectively) of the following balanced redox reaction?



- (a) 2, 5 and 16
- (b) 5, 2 and 16
- (c) 2, 16 and 5
- (d) 5, 16 and 2

109. What is the maximum work done for the following cell?

$Zn(s) | Zn^{2+} || Cu^{2+} | Cu(s)$, the E_{cell}^o is 1.1 V ($nF = 193000$ coulomb)

- (a) $-212.3 \times 10^2 J$
- (b) $-212.3 \times 10^3 J$
- (c) $-212.3 \times 10^4 J$
- (d) $-212.3 \times 10^5 J$

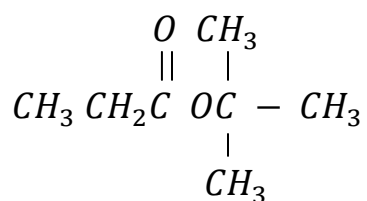
110. For a two electron transfer reaction, $K_{eq} = 10$. What is its E_{cell}° at $27^{\circ} C$?

- (a) 0.0591 V
- (b) -0.0591 V
- (c) 0.02956 V
- (d) 0.11824 V

111. What is the EMF of Zn electrode immersed in 0.1 M ZnSO₄ solution at $25^{\circ} C$? (E_{red}° for Zn electrode is -0.76 V)

- (a) -0.62395 V
- (b) -0.68425 V
- (c) -0.72546 V
- (d) -0.78955 V

112. What is the integral ratio of different protons for the 1H -NMR spectrum of the following compound (going from left to right across the spectrum)?



- (a) 2:9:3
- (b) 2:2:1
- (c) 1:3:1
- (d) 1:2:3

113. The high resolution proton-*NMR* spectrum of NH_4^+ consists of
- (a) A singlet
 - (b) A multiplet
 - (c) A triplet
 - (d) A doublet
114. Microwave region involves which energy level?
- (a) Nuclear spin state
 - (b) Vibrational
 - (c) Rotational
 - (d) Valence electron
115. The resonance due to CH_3 group in the 1H -*NMR* spectrum of toluene is expected at
- (a) δ 3.5
 - (b) δ 3.0
 - (c) δ 2.0
 - (d) δ 2.5
116. *UV*-visible spectroscopy is the most suitable method for determination of a solute when it is present in
- (a) None of these
 - (b) Nanogram quantities
 - (c) Microgram quantities
 - (d) Picogram quantities

117. Dolomite is an ore of

- (a) *Cu* and *Mg*
- (b) *Ca* and *Mg*
- (c) *Cu* and *Ca*
- (d) *Ca* and *Zn*

118. The black coloured hardest mineral with metallic luster is

- (a) Chalcopyrite
- (b) Chromite
- (c) Bournite
- (d) Magnetite

119. For petroleum products $^{\circ}API$ is

(where specific gravity S is at $60^{\circ}F/60^{\circ}F$)

- (a) $\frac{131.5}{S} - 130$
- (b) $\frac{141.5}{S} - 131.5$
- (c) $\frac{131.5}{S} - 141.5$
- (d) $\frac{141.5}{S} - 130$

120. Which one of the following minerals is known as 'Fool's gold'?

