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PHYSICAL CHEMISTRY-XII

Questions:

1. Compounds with identical crystal structure and analogous chemical formula are called
(a) Isomorphous (b) Allotropes
(c) Isomers (d) Isotones

2. Which of the following pairs is isomorphous?
(a) $FeSO_4.7H_2O$ and $CuSO_4.5H_2O$
(b) $FeSO_4.7H_2O$ and $MnSO_4.4H_2O$
(c) $FeSO_4.7H_2O$ and $ZnSO_4.7H_2O$
(d) $CuSO_4.5H_2O$ and $MnSO_4.4H_2O$

3. Of the following crystal lattices the one that has the largest packing fraction is
(a) Body centred cubic (b) Simple cubic
(c) Simple tetragonal (d) Covalent

4. Glass is
(a) supper cooled liquid (b) Metallic crystal
(c) Molecular crystal (d) Covalent crystal

5. Select the correct statement?
(a) A cubic packed structure has eight tetrahedral and six actahedral interstices
(b) Graphite has three dimensional crystal lattice
(c) Diamond has two dimensional crystal lattice
(d) Coordination number of body centred cubic lattice is eight.

6. For the various types of interaction the correct order of increasing a straight is
(a) Covalent<hydrogen bonding < van der Waals < dipole-dipole
(b) van der Waals < hydrogen bonding < dipole-dipole covalent
(c) van der Waals < dipole-dipole < hydrogen bonding < covalent
(d) dipole-dipole < van der Waals < hydrogen bonding < covalent

7. Layers of carbon atom in graphite are held together by
(a) coordinates covalent (b) covalent bonds
(c) van der Waal's forces (d) double bonds

8. Most crystal show good cleavage because there atom, ions and molecules are
(a) weakly bounded together
(b) shortly bounded together
(c) spherically symmetrical
(d) arranged in planes.

9. For orthorhombic system axial ratios are $a \neq b \neq c$ and the axial angle are
(a) $\alpha = \beta = \gamma \neq 90^o$ (b) $\alpha = \beta = \gamma = 90^o$
(c) $\alpha = \beta = \gamma = 90^o,\ \beta = 90^o$ (d) $\alpha \neq \beta \neq \gamma = 90^o$

10. The three states of matter are solid, liquid and gas. Which of the following statement is true about them
(a) Gases and liquid have viscosity as a common property
(b) The molecules in all the three states posses random translation motion
(c) Gases cannot be converted in to solids without passing through the liquid phase
(d) Solids and liquids have pressure as a common property.

11. A closed flask contains water in all its three states solid liquids and vapors at 0 °C. In the this situation the average kinetic energy of water molecules will be
(a) the greatest in all the three state
(b) the greatest in vapour state
(c) the greatest in the liquid state
(d) the greatest in the solid state

12. Which of the following has hcp crystal structure?
(a) NaCl (b) CaCl
(c) Zn (d) RbCl

13. On doping Ge metal with a little of In, one gets
(a) p-type semi conductor (b) n-type semi conductor
(c) insulator (d) rectifier

14. In graphite electron are
(a) localized on each carbon atom
(b) spread out between the sheets
(c) localized on ever third carbon atom
(d) present in antibonding orbital.

15. If one end of a piece of metal is heated the other end becomes hot after some time, this is due to
(a) Energised electron moving to the other part of the metal
(b) resistance of the metal
(c) mobility of atoms in the metal
(d) minor perturbation in the energy of atoms.

16. Which of the following is not a crystal line solid
(a) KCl (b) CsCl
(c) Glass (d) Rhombic S

17. The critical temperature of water is higher then that of O_2 because the H_2O molecule has
(a) fewer electron than O_2
(b) Two covalent bonds
(c) v-shape (d) dipole moment

18. In the crystal of which of the following ionic compound would you expect maximum distance between the centre of the cations and anions?
(a) LiF (b) CsF (c) Csl (d) Lil

19. How many kind of space lattices are possible in a crystal
(a) 23 (b) 7 (c) 230 (d) 14

20. Which of the following is Bragg's equation
(a) $n\lambda = 2\theta.\sin\theta$ (b) $n\lambda = 2d.\sin\theta$
(c) $2n\lambda = d.\sin\theta$ (d) $n.\theta/2 = d/2.\sin\theta$

21. A compound contains P and Q elements. Atom Q are in ccp arrangement while P occupy all tetra-hydral sites. Formula of compounds is.
(a) PQ (b) PQ_2 (c) P_2Q (d) P_3Q

22. Which of the following is correct for a solution showing positive deviations from Raoult's law
(a) $\Delta V = +ve, \Delta H = +ve$ (b) $\Delta V = -ve, \Delta H = -ve$
(c) $\Delta V = +ve, \Delta H = -ve$ (d) $\Delta V = -ve, \Delta H = +ve$

23. Pure water boils at 373 K and acid boils at 359 K. The azeotropic mixture of H_2O and HNO_3 boils at 393.5 K. By distilling the azeotropic mixture
(a) Pure nitric acid will distil over first
(b) Pure water will distill
(c) One of them will distil over with a small amount of the other
(d) Both of them will distil over in the same composition as that of the mixture being distilled.

24. The azeotropic mixture of water and HCl boils at 108.5°C. When this mixture is distilled, it is possible to obtain
(a) pure hydrogen chloride
(b) pure water
(c) pure water as well as pure HCl
(d) neither HCl nor H_2O in their pure states.

25. Which is not a colligative property?
(a) Freezing point
(b) Lowering of vapour pressure
(c) Osmotic pressure
(d) Elevation of boiling point.

26. Molecular weight of non-volatile solute can be determined by
(a) Victor-Meyer's method
(b) Graham's law of diffusion
(c) Gay Lussac's law
(d) Raoult's law

27. Which one of the following statements is false about osmotic pressure?
(a) It is the pressure of the hydrostatic column set up to osmosis.
(b) It is the pressure applied on the solution to prevent the entry of the solvent into it through semi-permeable membrane.
(c) During osmosis, the flow of solvent is only form dilute solution to concentrated solution.
(d) Osmotic pressure is directly proportional to the temperature of the solution.

28. Two solutions A and B are separated by a semi permeable membrane. As a result of osmosis, the level of solution A is found to rise. It implies that
(a) Solution A is more concentrated than solution B
(b) Solution B is more concentrated than solution A
(c) The solute molecules of A are smaller than those of B
(d) The solute molecules of B are smaller than those of A

29. A solution which has higher osmotic pressure as compared to other solution is know as
(a) Hypotonic (b) Hypertonic
(c) Isotonic (d) Normal

30. Which statement is incorrect about osmotic pressure (P), volume (V) and temperature (T) ?
(a) $P \propto \frac{1}{V}$ if T is constant

(b) $P \propto T$ If V is constant

(c) $P \propto V$ If T is constant

(d) PV is constant if V is constant.

31. What would happen if a thin slice of sugar beet is placed in a concentrated solution of NaCl?
(a) Sugar beet will lose water from its cells
(b) Sugar beet will absorb water form solution
(c) Sugar beet will neither absorb nor lose water
(d) Sugar beet will dissolve in solution

32. A plant cell shrinks when it kept in
(a) Hypotonic solution
(b) A hypertonic solution
(c) A solution isotonic with cell sap
(d) Water

33. n moles of a solute are dissolved in w g of water if K, is the molal depression constant of water, the freezing point of the solution will be

(a) $\frac{1000k_f n}{w}$ (b) $-\frac{1000k_f n}{w}$

(c) $\frac{1000k_f w}{n}$ (d) $-\frac{1000k_f w}{n}$

34. On freezing an aqueous solution of sugar, the solid that starts separating out is
(a) sugar (b) ice
(c) solution with the same composition
(d) solution with a different composition.

35. Molal elevation constant and molal depression constant for water respectively $\left(\text{in } {}^{o}C/m\right)$ are
(a) 0.52, 1.86 (b) 1.86, 0.52
(c) 1.52, 0.86 (d) 0.86, 1.52

36. Which of the following solutions will have the highest boiling point?
(a) $0.1M\,FeCl_3$
(b) $0.1M\,BaCl_2$
(c) $0.1M\,NaCl_2$
(d) 0.1M urea $\left(NH_2CONH_2\right)$.

37. Solutions A, B, C and D are respectively 0.1 M glucose, 0.05 M NaCl, 0.05 M $BaCl_2$ and 0.1 m $AlCl_3$. Which one of the following Paris is isotonic?
(a) A and B (b) B and C
(c) A and D (d) A and C

38. The van't Hoff's factor (i) for a 0.2 molal aqueous solution of urea is
(a) 0.2 (b) 0.1 (c) 1.2 (d) 1.0

39. The substance A when dissolved in solvent B shows the molecular mass corresponding to A_3. The van't Hoff factor will be
(a) 1 (b) 2 (c) 3 (d) $\frac{1}{3}$

40. Which one of the following statement is incorrect?
(a) A solution freezes at a lower temperature than the pure solvent.
(b) A solution boils at a higher temperature than the pure solvent.
(c) 0.1 NaCl solution and 0.1 M sugar solution have the same boiling point.
(d) Osmosis cannot take place without a semi permeable membrane.

41. Azeotropes are
(a) liquid mixtures which distil unchanged in composition
(b) liquids which can mix with each other in all proportions
(c) solids which form solid solutions of definite composition
(d) gases which can be separated.

42. Which of the following would exert maximum osmotic pressure?
(a) Decinormal aluminum sulphate
(b) Decinormal barium chloride
(c) Decinormal sodium chloride
(d) A solution obtained by mixing equal volumes of (b) and (c) and filtering.

43. At the same temperature which of the following solutions will be isotonic?
(a) 3.42 gm of sucrose per litre of water and 0.18 gm glucose per litre of water
(b) 3.42 gm of sucrose per litre of water and 0.18 gm glucose in 0.1 litre of water
(c) 3.42 gm of sucrose per litre of water and 0.585 gm of sodium chloride per litre of water
(d) 3.42 gm of sucrose per litre of water and 1.17 gm sodium chloride per litre of water

44. The freezing point of 1 molal NaCl solution assuming NaCl to be 100% dissociated in water is
(a) -1.86°C (b) -3.72°C
(c) + 1.86°C (d) + 3.72°C

45. Maximum feezing point falls in
(a) camphor (b) Naphthalene
(c) Benzene (d) Water

46. The osmotic pressure of a solution increases if
(a) temperature is decreased
(b) solution constant is increased
(c) number of solute particles is increases
(d) volume is increased.

47. In cold countries, ethylene glycol is added to water in the radiations of cars during winters. This results in
(a) lowering of F.P
(b) reducing the viscosity
(c) reducing the specific heat
(d) making water a better conductor of electricity.

48. Addition of common salt to a sample of water will
(a) increase its freezing point and increase the boiling point
(b) decreases its freezing point and increase the boiling point
(c) increase both the boiling and the freezing point
(d) decrease both the boiling and the freezing point

49. In a pair of immiscible liquids, a common solute dissolves in both and the equilibrium is reached, then the concentration of the solute in upped layer is
(a) In fixed ratio with that in the lower layer
(b) Same as the lower layer
(c) Lower than the lower layer
(d) Higher than the lower layer.

50. Which one of the following salt will have the same value of van't Hoff factor (i) as that of $K_4\left[Fe(CN)_6\right]$.
(a) $Al_2(SO_4)_3$ (b) NaCl
(c) $Al(NO_3)_3$ (d) $Na_2.SO_4$

51. the solution of sugar in water contains
(a) Free atoms (b) Free ions
(c) Free molecules (d) Free atoms & molecules

52. According too Raoult's law, The relative lowering of vapour pressure of solutions is equal to the
(a) Mole fraction of solute (b) Moles of solute
(c) Mole fraction of solvent (d) Moles of solvent

53. Which one of the following is an expression of Raoult's law if P_A is the partial pressure of the solvent in a solution, P^oA is the partial pressure of the pure solvent and if X_A and X_B are The mole fraction of the solute and the solvent respectively?
(a) $P_A = P^oAX_A$ (b) $P_A = P^oAX_A(1/X_B)$
(c) $P_A = P^oAX_B$ (d) $P_A = P(X_A/X_B)$

54. The molarity of a solution prepared by adding 7.1 g of Na_2SO_4 (formula weight 142 amu) to enough water to make 100 ml volume is
(a) 2.0 M (b) 1.0 M
(c) 0.5 M (d) 0.05m

55. Molanity of 4% NaOH solution is
(a) 0.1 M (b) 0.5 M (c) 0.01 M (d) 1.0 M

56. An aqueous solution of glucose is 10% in strength. The volume in which 1 gm mole of it is dissolved will be
(a) 18 litres (b) 9 litres
(c) 0.9 litres (d) 1.8 litres

57. the electrode potential of an electrode is
(a) the potential applied to the electrode
(b) the ionization potential of the material of the electrode
(c) the tendency of the electrode to lose or gain electrons when it is in correct with its ions0
(d) the potential energy of the electrons in an electrode/

58. Which one of the following statements is incorrect?
(a) The tendency of an electrode to lose electrons with respect to normal Hydrogen Electrode is called its oxidation potential
(b) The standard whereas standard reduction potentials are taken an negative.

(c) Oxidation potential and reduction potential of an electrode are equal in magnitude
(d) The absolute value of the electrode potential cannot be determined.

59. Arrange mg, K, Ba, Ca in the order of their decreasing electrode potentials
(a) K, Ba, Ca, Mg (b) Ba, Ca, K, Mg
(c) Ca, Mg, K, Ba (d) Mg, Ca, Ba, K

60. On passing C ampere of electricity through an electrolyte solution for t seconds, m gram metal deposits on cathode. The eq. wt. of metal is
(a) $E = \frac{Ct}{m \times 96500}$ (b) $E = \frac{C \times m}{t \times 96500}$
(c) $E = \frac{m \times 96500}{C \times t}$ (d) $E = \frac{C \times t \times 96500}{m}$

61. When quantity of electricity passed is one Faraday then the mass deposited at the electrode is equal to
(a) One gm. atomic weight
(b) One gm. equivalent weight
(c) Electrochemical equivalent
(d) None of the above

62. If same quantity of current is passed through the two electrolytic solutions connected in series, then the amount of product liberated at the electrode are in ratio of their
(a) densities (b) electrochemical equivalents
(c) atomic masses (d) atomic numbers

63. In the electrolysis of a fused salt, the weight of the ion deposited on the electrode will not depend on
(a) temperature of the bath
(b) current intensity
(c) electrochemical equivalent of the lons
(d) time for electrolysis.

64. Charge on one monovalent ion is
(a) 96500 Faraday (b) 1 Faraday
(c) 1.60×10^{-19} Coulomb (d) 1 coulomb

65. Total charge on one mole of a monovalent ion is equal to
(a) 6.28×10^{18} coulomb (b) 1.6×10^{-19} coulomb
(c) 9.65×10^{4} coulomb (d) None of the above

66. Which one of the following reactions takes place at the anode when an aqueous solution of $CuSO_4$ is electrolysed using copper electrodes?
(a) $Cu \rightarrow Cu^{2+} \rightarrow 2e^-$
(b) $SO_4^{2-} \rightarrow SO_2 + O_2 + 2e^-$
(c) $2SO_4^{2-} + 2H_2O \rightarrow 2H_2SO_4 + O_2 + 4e^-$
(d) $2H_2O \rightarrow O_2 + 4H^+ + 4e^-$

67. Which one of the following reactions occurs at the anode on electrolysis of aqueous solution of $CuCl_2$?
(a) $Cu \rightarrow Cu^{2+} \rightarrow 2e^-$
(b) $2Cl^- \rightarrow Cl_2 + 2e^-$
(c) $2H_2O \rightarrow O_2 + +O_2 + 4H^+ + 4e^-$
(d) $4Cl^- + 2H_2O \rightarrow 4HCl + O_2 + 4e^-$

68. When a solution of an electrolyte is heated, the conductance of the solution
(a) increases because number of molecules of the electrolyte increases
(b) decreases because of the increased heat
(c) decreases because the dissociation of the electrolyte is suppressed
(d) increases because the electrolyte is dissociated more.

69. If half cell reaction $A + e^- \rightarrow A^-$ has a large negative reduction potential, it follows that
(a) A is readily reduced (b) A is readily oxidized
(c) A^- is readily reduced (d) A^- is readily oxidized

70. Which of the following is an insulator?
(a) Graphite (b) Aluminum
(c) Diamond (d) Sillicon

71. When $CuSO_4$ is electrolysed by platinum electrodes,
(a) copper is liberated at cathode, sulphur at anode
(b) copper is liberated at cathode, oxygen at anode
(c) sulphur is liberated at cathode, oxygen at anode
(d) oxygen is liberated at cathode, copper at anode

72. E^o of Fe/Fe^{2+} is + 0.44 V; E^o of Cu/Cu^{2+} is – 0.32 V. Then in the cell
(a) Cu oxidises Fe^{2+} ion (b) Cu^{2+} oxidises iron
(c) Cu reduces Fe^{2+} ion (d) Cu^{2+} ion reduces Fe.

73. Four alkali metals A, B, C and D are having respectively standard electrode potentials as 3.05 – 1.66 – 0.40 and 0.80 V,. which one will be the most reducing?
(a) A (b) B (c) C (d) D

74. During the charging of lead storage battery, the reaction occurring at the cathode is
(a) $Pb \rightarrow Pb^{++} + 2e^-$
(b) $Pb^{2++} + 2e^- \rightarrow Pb$
(c) $Pb^{++} + SO_4^{--} \rightarrow PbSO_4$
(d) $PbSO_4 + 2H_2O \rightarrow PbO_2 + 4H^+ + SO_4^{--} + 2e^-$.

75. A conductivity cell is platinised.
(a) to prolong its lift
(b) to avoid polarization effect
(c) to avoid capacitance of the cell
(d) to avoid temperature effects

76. The standard reduction potentials at 25°C of Li^+/Li, Ba^{2+}/Ba, Na^+/Na and Mg^{2+}/Mg are -3.03, 2.73, -2.71, and -2.37 volt respectively. Which one of the following is the strongest oxidizing agent?
(a) Na^+ (b) Li^+ (c) Ba^{2+} (d) Mg^{2+}

77. Solubility of a sparingly soluble slat S, specific conductance, Ka nd the equivalent conductance, K and the equivalent conductance Λ_o are related as
(a) $S = \frac{1000\Lambda_0}{K}$ (b) $S = K\Lambda_0$
(c) $S = \frac{K}{1000\Lambda_0}$ (d) $S = \frac{1000\,K}{\Lambda_0}$

78. which one of the following statements is correct? With dilution, the equivalent conductance of
(a) both strong and weak electrolytes
(b) Strong electrolyte increases while that of weak electrolyte decreases
(c) strong electrolyte increases while that of weak electrolyte increases
(d) both strong and weak electrolyte increases.

79. The standard reduction values of the three metallic cations X, Y and Z are 0.52, - 3.03 and -1.18 V respectively. The order of reducing of the corresponding metals is
(a) Y> Z > X (b) X > Y > Z
(c) Z > Y > X (d) Z > X > Y

80. Electrode potential data are given below:
$Fe^{+3}(aq) + e^- \rightarrow Fe^{+2}(aq); E^o = +0.77V$
$Al^{3+}(aq) + 3e^- \rightarrow Al(S); E^o = -1.66V$
$Br_2(aq) + 2e^- \rightarrow 2BR^-(aq); E^o = +1.08V$

Based on the data, the reducing power of Fe^{2+}, Al and Br^- will increase in the order
(a) $Br^- < Fe^{2+} < Al$ (b) $Fe^{2+} < Al < Br^-$
(c) $Al < Br^- < Fe^{2+}$ (d) $Al < Fe^{2+} < Br^-$

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