GUJCET CRASH COURSE(ANSWER)

SEM- 3 - Ch- 1,2 SOLID STATE & SOLUTION

(1)

.....is not a property of solid?

(a) Rigid and incompressible

(b) Definite shape

(c) Fluidity

(d) Definite volume

Ans: (c)

(2) Which is an amorphous substance?

(a) NaCl (b) KC1 (c) Rubber (d) H_2O

Ans: (c)

(3) When constituent particles are arranged on< the four points of four corners of the unit' cell then it is called...

(a) Primitive unit cell (b) FCC (c) BCC (d) All of these

Ans: (a)

(4) In cubic solid, all axial angles are.....

(a) $\alpha = 90^o, \beta = 90^o, \gamma = 120^o$

(b) $\alpha = \beta = \gamma = 90^o$

(c) $\alpha = \beta = \gamma \neq 90^o$

(d) $\alpha \neq \beta \neq \gamma \neq 90^o$

Ans: (b)

(5) Which is the example of hcp?

(a) Graphite (b) ZnO (c) CdS (d) All of these

Ans: (d)

(6) The packing efficiency of BCC is.....

(a) 40% (b) 68% (c) 72% (d) 74%

Ans: (b)

Packing efficiency $= \dfrac{2 \times \left(\frac{4}{3}\right)\pi r^3}{\left[\left(\frac{4}{\sqrt{3}}\right)r\right]^3} \times 100$

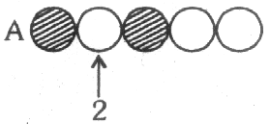
$= \dfrac{\frac{8}{3}\pi r^3 \times 100}{\frac{64}{\left(3\sqrt{3}\right)r^3}} = 68\%$

(7) The co-ordination number in one dimensional close packing is.....

(a) 2 (b) 3

(c) 4 (d) 5

Ans: (a)



(8) The ABABAB stacking pattern in two dimension is known as.....

(a) square close packing

(b) hexagonal close packing

(c) cubic close packing

(d) None of these

Ans: (b)

(9) The ABABAB stacking pattern in two dimension, the co-ordination number is.....

(a) 2 (b) 4

(c) 6 (d) 8

Ans: (c)

(10) In ccp arrangement the number of tetrahedral voids per unit cell is....

(a) 2 (b) 4

(c) 6 (d) 8

Ans: **(d)**

(11) In ccp, the number of octahedral voids on the body centre is....

(a) 1 (b) 2

(c) 3 (d) 4

Ans: **(a)**

(12) In ccp, ... octahedral voids arranged on each edge and ..... unit cells.

(a) 12, 2 (b) 12, 4

(c) 6, 4 (d) 6, 2

Ans: **(b)**

(13) In 1 mole constituent particles, there are .....defects of constituent particles in arrangement.

(a) 10^6 (b) 10^{12} (c) 10^{18}

(d) 10^{21}

Ans: **(a)**

(14) In which defect, the density of the crystal increases?

(a) Vacancy defect (b) Interstitial defect

(c) Both (a) and (b) (d) None of these

Ans: **(b)**

(15) In interstitial defect, the number of atoms for unit volume.....

(a) increases

(b) decreases

(c) remains constant

(d) increases or decreases

Ans: **(a)**

(16) .....shows both Schottky and Frenkel defect?

(a) NaCl (b) KC1 (c) AgBr (d) KI

Ans: **(c)**

(17) What type of solid is sodium chloride?

(a) Ionic (b) Molecular

(c) Covalent (d) Metallic

Ans: **(a)**

(18) The melting points of ionic solids are

(a) Very high (b) Normal

(c) Very low (d) Abnormal

Ans: **(a)**

(19) What type of solid is quartz?

(a) Ionic (b) Molecular

(c) Covalent (d) Metallic

Ans: **(c)**

(20) What type of crystal structure is of silver metal?

(a) fcc (b) Simple cube (c) bcc

(d) Metallic

Ans: **(a)**

(21) What is the percentage packing efficiency of simple cube?

(a) 53.26 (b) 68.0 (c) 74.0

(d) 52.36

Ans: **(d)**

(22) How many times is the number of octahedral voids as compared to tetrahedral voids?

(a) 4 (b) 8

(c) 2 (d) 0.5

Ans: **(c)**

(23) What is the number of atoms in the unit cell of body centred cube?

(a) 2 (b) 1

(c) 4 (d) 6

Ans: **(a)**

(24) What is the number of atoms in face centred cube?

(a) 2 (b) 1

(c) 4 (d) 6

Ans: **(c)**

(25) In which of the following compounds Schottky defect is present?

(a) NaCl (b) ZnS (c) SiO_2

(d) $SrCl_2$

Ans: **(a)**

(26) In which of the following compounds Frenkel defect is present?

(a) NaCl (b) ZnS (c) SiO_2

(d) $SrCl_2$

Ans: **(b)**

(27) Which of the following compounds show metal deficiency defect?

(a) $Fe_{0.95}O$ (b) $Fe_2O_{3.6}$

(c) Fe_3O_4 (d) $FeS_{1.6}$

Ans: **(a)**

(28) Which of the following elements is a semiconductor?

(a) Na (b) Al

(c) Fe (d) Ge

Ans: (d)

(29) Which type of semiconductor is obtained by doping Si with B?

(a) n-type (b) p-type

(c) pnp–type (d) npn–type

Ans: (b)

(30) With which element, the conductivity of ReO_3 is matching?

(a) Copper (b) Zinc

(c) Iron (d) Aluminium

Ans: (a)

(31) Which of the following will be paramagnetic?

(a) O_2^{2-} (b) Cr^{3+} (c) Na^+ (d) Cu^+

Ans: (b)

(32) Which theory is useful in explaining electrical conductivity in conductors and semiconductors?

(a) Pauli's principle

(b) Avogadro's theory

(c) Band theory (d) Hybridisation theory

Ans: (c)

(33) In one crystal structure sodium (Na) atom are at each corner, oxygen (O) atom at every edge and Tungsten (W) atom is at the centre of the cube, then the molecular formula of the solid is....

(a) NaW_2O_3 (b) Na_2W_3O

(c) $NaWO_3$ (d) NaW_3O_5

Ans: (c)

(34) Lithium forms body centred cubic structure the length of the side of its unit cell is 351 pm. Atomic radius of the lithium will be....

(a) 300 pm (b) 240 pm

(c) 152 pm (d) 75 pm

Ans: (c)

$$4R = \sqrt{3}a$$

$$\therefore R = \frac{\sqrt{3}}{4} \times 351 = 152 \text{ pm}$$

(35) In a face centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centred points, the formula of the compound is...

(a) AB_2 (b) A_2B_3

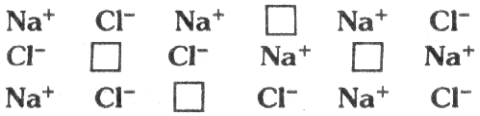
(c) A_2B_5 (d) A_2B

Ans: (c)

$$A \rightarrow 8 \times \frac{1}{8} = 1,\ B \rightarrow 5 \times \frac{1}{2} = \frac{5}{2}$$

$\therefore$ Formula of the compound is $= A_1B_{\frac{5}{2}} = A_2B_5$

(36) Which crystal defect is found in the following figure?



(a) Frenkel (b) Schottky

(c) Both (a) and (b) (d) No defect

Ans: (b)

(37) Volume of atoms present in a unit cell having fcc structure (r = radius of atom)

(a) $\frac{12}{3}\pi r^3$ (b) $\frac{16}{3}\pi r^3$

(c) $\frac{20}{3}\pi r^3$ (d) $\frac{24}{3}\pi r^3$

Ans: (b)

(38) In one solid, A atoms are at face-centres while B atoms are at the edges of sides then the formula of the solid is...

(a) AB_2 (b) A_2B

(c) A_4B_3 (d) A_3B_2

Ans: (d)

Atoms A at the face-centers

$$\therefore \quad 6 \times \frac{1}{2} = 3$$

Atoms B at the edges of sides

$$\therefore \quad 8 \times \frac{1}{4} = 2$$

(39) Number of unit cells in 1 gm NaCl is (Na = 23, Cl = 35.5)

(a) 1.28×10^{21} (b) 5.14×10^{21}

(c) 2.57×10^{21} (d) 5.14×10^{22}

Ans: (c)

Mole of NaCl $= \dfrac{1}{58.5}$

Molecules of NaCl $= \dfrac{1}{58.5}\times6.022\times10^{23}$

$= 1.029\times10^{22}$

Number of unit cells $= \dfrac{1.029\times10^{22}}{4}$

$= 2.57\times10^{21}$

(40) In ionic solid having fcc arrangement of value of $\dfrac{r^+}{r^-}$ is.....

(a) less than 0.22 (b) 0.22 to 0.41 (c) 0.73 to 1 (d) 0.41 to 0.73

Ans: (d)

(41) One cubic structure contains X, Y and Z atoms. X-atoms are at the corner of the cube, Y atoms are at the centre and Z atoms are at the face-centre then the formula of the solid is..

(a) XY_2Z_3 (b) XYZ_3

(c) $X_2Y_2Z_3$ (d) X_8YZ_6

Ans: (b)

$$X \to 8\times\frac{1}{8} = 1 \quad Y \to 1$$

$$Z \to 6\times\frac{1}{2} = 3$$

1 – b

2. (a) The number of moles of solute dissolved in 1000 *gm* of the solvent is called molal solution.

3-a

4- a and c

5. (b) According to Raoult's Law

$$\frac{P^0 - P_s}{P^0} = x_B \quad \text{(Mole fraction of solute)}$$

$$x_B = \frac{0.8 - 0.6}{0.8} = 0.25 .$$

6 (b) The relative lowering of the vapour pressure of dilute solution is equal to the mole fraction of the solute molecule present in the solution

7 (d) According to Raoult's law, the relative lowering in vapour pressure of a dilute solution is equal to mole fraction of the solute present in the solution.

8-a

9 (c) $\dfrac{P^0 - P_s}{P^0} = \dfrac{n}{N} \Rightarrow \dfrac{P^0 - P_s}{P^0} = \dfrac{1}{9.9} \Rightarrow 9.9P^0 - 9.9P_s = P^0$

$$8.9P^0 = 9.9P_s \Rightarrow P_s = \frac{8.9}{9.9}P^0 \approx 0.90P^0$$

10. (b) According to the Raoult's law for the non-volatile solute the relative lowering of vapour pressure of a solution containing a non-volatile is equal to the mole fraction of the solute.

11- d

12-b

13 (c) $\dfrac{P^0 - P_s}{P^0} = \dfrac{\frac{w}{m}}{\frac{w}{m} + \frac{W}{M}} \quad \Theta \dfrac{W}{M} > \dfrac{w}{m} \quad \Rightarrow \dfrac{640 - 600}{640}$

$$= \frac{w}{m}\times\frac{M}{W} \Rightarrow \frac{40}{640} = \frac{2.175\times78}{m\times39.08} \; ; m = \frac{2.175\times78}{39.08}\times\frac{640}{40}$$

$$m = 69.45 .$$

14. (c) $\frac{P^0 - P_s}{P^0} = \frac{n}{N} \Rightarrow \frac{P^0 - P_s}{P^0} = \frac{1}{9.9} \Rightarrow 9.9P^0 - 9.9P_s = P^0$

$8.9P^0 = 9.9P_s \Rightarrow P_s = \frac{8.9}{9.9} P^0 \approx 0.90P^0$

15. (b) $\therefore P^0 - P_s = P^0 \times \text{mole fraction solute}$

$10 = P^0 \times 0.2$; $20 = P^0 \times n \Rightarrow n = 0.4 \therefore N = 0.6$.

16 (b) In the osmosis solvent molecule move from lower concentration to higher concentration.

17 (a) Osmosis occur from dilute solution to concentrate solution. Therefore solution *A* is less concentrated than *B*.

18. (b) $\pi = CRT$; $C = \frac{\pi}{RT} = \frac{7.8}{\cdot 082 \times 310} = 0 \cdot 31 mol/litre$

19. (d) $P = CRT$ or $\frac{P}{C} = RT$

20. (b) Isotonic solution = $\frac{w_1}{m_1 V_1} = \frac{w_2}{m_2 V_2}$

$= \frac{w_1}{342 \times 1} = \frac{6}{60 \times 1} = \frac{342 \times 6}{60} = 34.2$.

21. (b) $\Delta T_b = K_b \times m$ or $K_b = \Delta T_b / m$

22. (a) The boiling occurs at lowers temperature if atmospheric pressure is lower than 76*cm Hg*.

23. (d) $\Delta T_b = \frac{K_b \times w \times 1000}{m \times W}$

$m = \frac{K_b \times w \times 1000}{\Delta T_b \times W} = \frac{2.53 \times 10 \times 1000}{1 \times 100} = 253g$.

24. (c) $\Delta T_f = K_f \times \text{molality} = 1.86 \times 0.05 = 0.093 \,^\circ C$

Thus freezing point = 0 – 0.093 = $-0.093^\circ C$.

25. (c) $Ca(NO_3)_2 \rightarrow Ca^{2+} + 2NO_3^-$ it gives three ions hence the Van't Hoff factor = 3.