QUESTION BANK (MLL)

CHAPTER 1:SOLID STATE

1 MARK QUESTIONS

1. What type of solids are electrical conductors, malleable and ductile?
2. Give the significance of lattice point.
3. Name the parameters that characterize the unit cell
4. What is the two dimensional coordination number of a molecule in square close packed structure.
5. Which of the following lattice has the highest packing efficiency , (I)simple cubic (II) BCC (III) HCP
6. What type of stoichiometric defect is shown by (i) ZnS (ii) AgBr
7. What type of substances make better permanent magnets? Justify your answer.
8. Why glass is considered as super cooled liquid?
9. Why KCl appear s pink when heated in K vapors ?
10. Give the relationship between density and edge length in an unit cell.
11. what is F-centre?
12. Give the coordination number of fcc structure.
13. Give an example of a solid that shows both schottky and frenkel defect
14. What defect is observed when $CdCl_2$ is doped with AgCl?
15. Give an example of a network solid.
16. Give an example each of 13-15 & 12-16 compounds.
17. How is quartz different from quartz glass?
18. What is a semiconductor?
19. FeO is mostly found with a composition of $Fe_{0.95}O_{1.00}$. Why?
20. What is a n-type semiconductor?

2 MARKS QUESTIONS

1. The edge length of a unit cell having molecular weight 75g/mol is 5 A^0 which crystallizes in bcc lattice . If the density is 2g/cc then find the radius of the metal atom.
2. Potssium crystallizes in bcc lattice. Calculate the approximate number of unit cell in 1gm of potassium. (atomic mass of K = 39)
3. A compound is formed by two elements M &N .The element N forms ccp & atoms of M occupy 1/3rd of tetrahedral voids. What is the formula of the compound?
4. A unit cell consists of a cube in which there are atoms A at the corners and atoms B at the face centres.Two A atoms are missing from the two corners of a unit cell.Whati is the formula of the compound.
5. Analysis shows that nickel oxide has formula $Ni_{0.98}O_{1.00}$ .What fraction of nickel exist as Ni^{2+} and Ni^{3+}.
6. If NaCl is doped with 10^{-3} mol % of $SrCl_2$. What is the concentration of cation vacancy?
7. **Under what conditions will sodium chloride conduct electricity**
8. **Name the binding force in each of the following. (a) Molecular (b) Ionic (c) Covalent (d) Metallic.**
9. **Differentiate between anisotropy & isotropy by giving examples.**

10. **Derive the relationship between edge length and radius of atom in fcc unit cell.**

3MARKSQUESTION

1. Calcium metal crystalises in a fcc lattice with edge length of 0.556nm calculate the density of the metal if it contains , (i) 0.5% frenkel defect (ii) 0.2% schottky defect.
2. How is ferromagnetism different from paramagnetism & antiferromagnetism & explain what type substances show antiferromagnetism
3. What is electrical conductivity due to in (i) metals (ii) ionic solids (iii) semiconductors
4. What is the difference between schottky defect & frenkel defect .
5. Derive an expression for the calculation of density of the cubic crystal of an element whose edge is "a "pm & atomic mass is M
6. How would account for the following

a. Frenkel defcts are not found in alkali metal halides.
b. schottky defects lower the density of related solids.
c. impurity dopped silicon is a semiconductor .

7. . Define the following terms in relation to crystaline solids

a. Unit cell
b. co ordination number
c. P- type semiconductor

8. What type of defect can arise when solid is heated ? which physical property is affected by it & in what way?
9. An element has bcc structure with cell edge of 288pm .The density of the element is 7.2 gm /$cm^{3.}$ How many atoms are present in 208 gm of the element.?
10. (I) Solid A is very hard , electrical insulator in solid as well as molten state & melt at extremily high temprature what type of solid is it ?(II) A compound forms hcp structure. what is the total no of voids in 0.5 mol of it ? how many of these are tetrahedral voids ? ,

ANSWERS1 MARK QUESTIONS

1. metallic 2. It signifies position of constituent particles of the unit cell 3.edge lengths a,b,c and angles (alpha,beta,&gamma) 4.4 5.hcp 6.(i)frenkel (ii). Both schottky and frenkel 7.ferromagnetic, domains aligned in the same direction 8.pseudo solid or shows fluidity

9. F- centres 10.density=Z .M/a^3.N_A 11. vacant anionic sites occupied by electrons

12.12 13.AgBr 14.impurity defect 15.SiC 16.AlP,ZnS

17.long range order of constituents in quartz, short range order of constituents in quartz glass

18.energy gap between valence band and conduction band is small or conductivity range is between 10^{-6}ohm^{-1} m^{-1} to 10^4 ohm^{-1} m^{-1}

19. Metal deficiency defect

20. When a group -14 element is doped with gr-15 element an electron 0f gr-15 element remains as free electron. That increases conductivity

2 MARKS QUESTIONS

1.r = 216.5pm 2. $7.72*10^{21}$ 3.M_2N_3 4.AB_4 5.Ni^{2+} =96% Ni^{3+} = 4%

6. 10^{-3} /100 mol= 10^{-5}x 6.022x10^{23}=6.022x 10^{18} 7.molten state or in aq. Solution 8. (a) vanderwaals forces(b)electrostatic(c) covalent bond(d) metallic bond

9.Substances show different properties in diffrent direction & the reverse 10. a= 2.2 $^{1/2}$ r

3 MARKS QUESTIONS

1 (i) d =1.5458g cm^{-3} (ii)1.5427g cm^{-3}
2 Attracted strongly by magnetic field ,paramagnetic substances are weakly attracted ,antiferromagnetic substances not attracted
3
a. due to flow of electrons
b. flow of ions in solution or melt and defects in solid
c. due to presence of impurities and defects
4 Schottjy defect- vacancy defect,density lowers frenkel defect- interstitial defect density is not affected.

5	
6	(i) similar size of cations and anions(ii) equal no of cations and anions are missing results into decrease in mass (iii)due to presence of free electrons or creation of positive hole.
7	(i)it is the smallest portion of the crystal lattice which when repeated in all directions gives the entire lattice.(ii) Number of nearest neighbour iii) gr-14 doped with gr-13 creates positive hole.
8	Vacancy defect, density decreases because some atoms ,ions leave the crystal completely.
9	M = 51.8gmol^{-1} no of atoms = 24.16 x 10^{23}
10	i) covalant network solid , sillicon carbide ii) no of o.v =0.5 mol no of t.v =1.0 mol total voids =1.5 mol