INDIAN SCHOOL MUSCAT

CHEMISTRY DEPARTMENT

QUESTION BANK

Solid State

1. What is the number of atoms in a unit cell of simple cubic, BCC and FCC crystals?
2. State a feature to distinguish
    (i) Metallic solid from ionic solid
    (ii) Covalent solid from molecular solid
3. What type of alignment in crystals makes them ferromagnetic, antiferromagnetic and ferrimagnetic?
4. How would you account for the following?
    (i) Frenkel defects are not found in ionic solids of nearly equal sizes of cations and anions.
    (ii) Schottky defects lower the density of a crystalline solid.
    (iii) Impurity doped silicon is a semiconductor.
5. Explain the following with suitable example.
    (i) Frenkel defect
    (ii) F-centres
    (iii) Paramagnetism
6. Iron has a body centred cubic unit cell with cell edge of 286.65pm. The density of iron is $7.87 gcm^{-3}$. Use this information to calculate Avogadro's number. (Atomic mass of Fe = 56 g mol^{-1})
7. Define:
    (i) Unit cell
    (ii) Lattice point
    (iii) Co-ordination number
    (iv) Rank;
    (v) Radius ratio;
    (vi) Void;

(vii) Doping

8. Explain the three types of 3-D close packing
9. Calculate the efficiency in packing in a) simple cube b) fcc c) bcc
10. Differentiate between
    - (i) crystalline and amorphous solids
    - (ii) tetrahedral and octahedral voids
    - (iii) Schottky, Frenkel& Interstitial defects
    - (iv) n and p type semiconductors
    - (v) diamagnetic and paramagnetic
    - (vi) ferro, ferri and antiferro magnetic properties
    - (vii) piezo and pyro electricity
    - (viii) ferro and antiferro electricity
11. What is metal deficiency due to cationvacancies.
12. What is a a) diode b) transistor c) photo diode
13. An element exists in bcc lattice with edge length 288pm. If its density is 7.3g/cc, how many atoms are present in 208g of the same?
14. Gold crystallizes in fcc lattice. What is the density of gold if the radius of gold atom is 236pm. RAM = 197.
15. Silver crystallizes in fcc lattice. If the edge length of unit cell is 4.077 x 10-8 cm and the density is 10.05g/cc, calculate the atomic mass of Ag.
16. Niobium crystallizes in bcc structure. If the density is 8.55g/cc, calculate the atomic radius of Nb. [93]
17. Gold crystallizes in fcc arrangement. Calculate the radius of gold atom is its edge length is 40.2nm.
18. If NaCl is doped with 10-3 mole % of $SrCl_2$, what is the concentration of cation vacancies?