BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

QUESTION BANK- 2017-18

L-1 Solid State

1 Mark Questions:

Q1. How many atoms per unit cells (Z) are present in bcc unit cell?
Q2. Why are crystalline solids anisotropic?
Q3. Write a distinguishing feature between a metallic solid and an ionic solid.
Q4. What is the C.N. of each type of ions in a rock salt type crystal structure?
Q5. Why is glass considered as a super cooled liquid?
Q6. A compound contains two types of atoms X and Y .It crystallizes in a cubic lattice with atom X at the corners of the unit cell and atoms Y at the body centres.What is the simplest possible formula of this compound?
Q7. A compound AB_2 possess the Ca F_2 type of crystal structure. Write the C.N. of A^{+2} and B^- ions in its crystals.
Q8. What type of substances exhibit antiferromagnetism? Q9.
What type of stoichiometric defect is shown by AgCl?
Q10. What is meant by doping in semiconductor?

2 Marks Questions:

Q1. How are the following properties of crystals affected by Schottky and Frenkel defects?
i) Density ii)
Electrical conductivity
Q2. Explain why does conductivity of germanium crystals increases on doping with gallium.
Q3. The density of KBr is 2.75 g/cm^{-3}.The length of edge of the unit cell is 654 pm.Predict the
type of cubic lattice to which unit cell of KBr belongs. (N_A =6.023x10^{23} mol^{-1}, Atomic mass: K=39, Br=80)
Q4. X- ray diffraction studies show that an element crystallizes in an FCC unit cell with cell
edge of 3.608x10^{-8} cm.In a separate experiment, the element is determined to have a density of 8.92g/cm^3, calculate the atomic mass of the element.
Q5. Lithium metal crystal has body centered cubic structure. Its density is 0.53 g/cm-3 and its molar mass is 6.94 g/mol. Calculate the volume of a unit cell of lithium metal. (NA=6.023x10^{23} mol^{-1}) Q6. Account for the following:
i) Frenkel defects are not found in alkali metal halides.
ii) Schottky defects lower the density of related solids.
Q7. Explain each of the following with suitable example:
i) F-centre ii) 12-16 group compounds
Q8. In Corundum, oxide ions are arranged in hexagonal close packing and aluminum ions occupy two-third of the octahedral voids. What is the formula of corundum?

Q9. Give Reason:
i) Why is the window glass of the old buildings look milky?
ii) Why does table salt, NaCl, sometimes appear yellow in colour?
10. Define superconductivity of a substance. How does the electrical conductivity of semiconductors vary with temperature?

3 Marks Questions:

Q1. Explain the following terms with suitable example:
i) Paramagnetism ii) Ferrimagnetism iii) Ferromagnetism
Q2. a) What is meant by the term forbidden zone in reference to band theory of solids? b) Calculate the packing efficiency of a body centered cubic (bcc) structure. Q3. The density of lead is 11.35 g/cm3 and the metal crystallizes with FCC unit cell. Estimate the radius of lead atom. (Atomic mass of lead =207g/mol and NA=$6.02X10^{23}$ /mol) Q4. An element X with atomic mass of 60g/mol has density of 6.23g/cm^{-3}.If the edge length of its cubic unit cell is 400 pm, identify the type of cubic unit cell. Calculate the radius of an atom of this element. Q5. Explain the following:
i) n-type semiconductors
ii) p-type semiconductors
iii) Metallic solid
Q6. A crystalline solid has a cubic structure in which tungsten (W) atoms are located at cube corners of the unit cell, oxygen atoms at the cube edge and sodium atoms at the centres.What is the molecular formula of the compound?

5 Marks Questions:

Q1. a) What type of semiconductor is produced when Silicon is doped with boron?
b) Copper crystallizes with FCC unit cell. If the radius of copper atom is 127.8pm, calculate the density of copper metal. (Atomic mass of Cu=63.55u and N_A =$6.02x10^{23}$ mol^{-1})
Q2. a) If three elements A,B,C crystallizes in a cubic solid lattice with A atoms at the corners, B atoms at the cube centers and C atoms at the centre of the faces of the cube, then write the formula of the compound.
b) An element with molar mass 27gmol^{-1} forms a cubic unit cell with edge length $4.05x10^{-8}$cm.If its density is 2.7gcm^{-3}, what is the nature of the cubic unit cell? Q3. a) On heating crystals of KCl in potassium vapours,the crystals start exhibiting a violet colour ,why?

b) An element has a body centered cubic structure with a cell edge of 288 pm.The density of the element is 7.2 g/cm^3.How many atoms are present in 208 g of the element?