THE SOLID STATE

CHAPTER-1

TEST-A

SOLVED

Time: 1 hr. **Max. Marks: 30**

SECTION-A

Tick the correct option:

1. Which of the following is correctly matched? **[1]**

   (i) Aluminium nitride → covalent solid

   (ii) Benzene → covalent solid

   (iii) Graphite → molcular solid

   (iv) Hydrogen chloride → Ionic solid

2. An element with molar mass 2.7×10^{-2} kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is 2.7×10^{3} kg m^{-3}, what is the nature of the cubic unit cell? ($N_A = 6.02 \times 10^{23}$ mol^{-1}). **[1]**

   (i) simple cubic unit cell (ii) body centred cubic unit cell

   (iii) face centred cubic unit cell (iv) end centred cubic unit cell

3. The incrorrect statement about zinc sulphide (zinc blende) solid is **[1]**

   (i) There are four formula units per unit cell

   (ii) The sulphide ions are in a cubic close packed arrangement, whereas zinc ions are occu pying all the tetrahedral voids.

   (iii) The coordination number of each ion is four

   (iv) Zinc sulphide show Frenkel defect.

Assertion-Reason type Questions:

(i) If assertion and reason both are correct and reason is the correct explanation of assertion.

(ii) If assertion and reason both are correct and reason is not the correct explanation of assertion.

(iii) If assertion is correct and reason is wrong.

(iv) If assertion is wrong and reason is correct.

4. Assertion: There is an enhanced electrical conductivity on heating zinc oxide.

   Reason: Zinc oxide shows metal excess defect due to the presence of extra cation in the interstitial sites. **[1]**

5. Assertion: Ferrites like $MgFe_2O_4$ and $ZnFe_2O_4$ are ferrimagnetic in nature.

   Reason: Magnetic moments of the domains in these substances are aligned in parallel and antiparallel direction in equal number. **[1]**

One word /One Sentence type Questions.

6. In a cubic solid, atoms A are at the corners and atoms B present at the centre of an alternate face. What is the formula of the solid? **[1]**

7. What is the percentage of an unoccupied space in a crystal having a packing pattern ABCABC.....? **[1]**

SECTION-B

8. The density of silver is 10.2 g/cm^3. Silver crystallises in a cubic structure in which the silver atoms are present at the corners as well as at the centre of each face. The distance between the two nearest silver atoms is 288 pm. Find the value of the Avogadro's number.

   (Atomic mass of Ag = 108) **[2]**

9. Give reason:

   (i) Iron is a ferromagnetic substance but becomes paramagnetic at high temperature.

   (ii) ZnO is white at low temperature but yellow at high temperature. **[2]**

10. Gold (atomic radius 1.44Å) crystallises in a face-centred unit cell. What is the length of a side of the cell? Also, find the volume of the unit cell. **[2]**

11. In a cubic solid, atoms M occupying two-third of the tetrahedral voids while atom N is in a cubic close packed structure. What is the formula of this solid? **[3]**
    If atom M is slipped into an octahedral void instead of tetrahedral and occupies all octahedral voids, then what will be the new formula of the solid?

12. Explain how the addition of (i) arsenic and (ii) gallium affects the conductivity of germanium. Draw proper diagram. **[3]**

13. NaCl is doped with 10^{-3} mol % $SrCl_2$. **[3]**

    (i) What is the concentration of cation vacancies?

    (ii) How does this doping affects the melting point of NaCl?

    (iii) Name the type of defect obtained.

14. Analysis shows that iron oxide has formula $Fe_{0.85}\ O_{1.00}$. What is the percentage of Fe^{2+} and Fe^{3+} in the lattice? **[3]**

15. (i) Which type of defect is shown by AgBr crystal?

    (ii) Give one use of amorphous silicon

    (iii) How the crystaline quartz can be changed into amorphous glass?

    (iv) Define ferromagnetism.

    (v) What is the co-ordination of each atom in a solid with simple cubic packing? **[1×5]**