Question bank

CHAPTER-1 SOLID STATE

(A) OBJECTIVE (MULTIPLE CHOICE QUESTIONS) TYPE QUESTIONS

Choose the correct option in the following questions-

1. Which one is not a property of a crystalline solid?
   (a) Isotropic
   (b) Sharp melting point
   (c) A definite and regular geometry
   (d) High intermolecular forces
2. Tetragonal crystal system has following unit cell dimensions-
   (a) a =b=c and $\alpha=\beta=\Upsilon=90^0$
   (b) a=b≠c and $\alpha=\beta=\Upsilon=90^0$
   (c) a≠b≠c and $\alpha=\beta=\Upsilon=90^0$
   (d) a=b≠c and$\alpha=90^0$, $\beta=90^0$, $\Upsilon=120^0$
3. the coordination no. of a each sphere in hcp arrangement is
   (a) 8
   (b) 12
   (c) 6
   (d) 4
4. The number of atoms contained in one face centered cubic unit cell of a monoatomic substance is-
   (a) 1
   (b) 2
   (c) 4
   (d) 3
5. How many chloride ions are there around sodium ion in sodium chloride system?
   (a) 3
   (b) 8
   (c) 4
   (d) 6
6. For an ionic crystal of general formula AX and coordination number 6 , the value of radius ratio will be-
   (a) Greater than 0.73
   (b) In between 0.73 and 0.41
   (c) In between 0.41 and 0.22
   (d) Less than 0.22
7. Potassium crystallizes in bcc lattice, the coordination no. of potassium in potassium metal is-
   (a) 12

(b) 4
(c) 6
(d) 8

8. Coordination number of Cu is-
   (a) 4
   (b) 6
   (c) 8
   (d) 12
9. An ionic compound is made up of P cations and Q anions. If p are present at alternate corners and Q is present at the body of the diagonal , then the formula of the ionic compound will be-
   (a) PQ
   (b) PQ_2
   (c) P_2Q
   (d) P_4Q
10. In a crystal , the atoms are located at the position of
   (a) Maximum P.E
   (b) Minimum P.E
   (c) Zero P.E
   (d) Infinite P.E
11. An element A (atomic mass 60) has simple cubic lattice of edge length 100 pm . the density of crystal (N_0= 10^{23}) is-
   (a) 600 g cm^{-3}
   (b) 1 x10^4g cm^{-3}
   (c) 6 x 10^{-2} g cm^{-3}
   (d) 1 x 10^2 g cm^{-3}
12. The inter metallic compound LiAg crystallizes in cubic lattice in which both lithium and silver have coordination number of eight . the crystal class is-
   (a) Simple cubic
   (b) Body centerd cubic
   (c) Face centerd cubic
   (d) None of these
13. A solid has a structure in which W atoms are located at the corners of a cubeic lattice , O atoms at the centre of edges and sodium atoms at the centre of cube . The formula of compound-
   (a) $NaWO_2$
   (b) $NaWO_3$
   (c) Na_2WO_3
   (d) $NaWO_4$
14. For tetrahedral coordination , the radius ratio (r_+/r_-)should be
   (a) 0.155 – 0.225
   (b) 0.225 – 0.414
   (c) 0.414 – 0.732
   (d) 0.732 – 1

15. If edge of the bcc crystal of an element is a cm , M is the atomic mass and N_0 the Avogadro number , the density of the crystal is-
    (a) $4M/N_0a^3$
    (b) $2N_0/Ma^3$
    (c) $2M / N_0a^3$
    (d) $Ma^3/2N_0$
16. In a compound AB_2O_4, oxide ions are arranged in ccp and cations A are present in octahedral voids. Cations B are equally distributed between tetradral and octahedral voids . the fraction of the octahedral void is occupied is-
    (a) 1/2
    (b) 1/4
    (c) 1/8
    (d) 1/6
17. Potassium has a bcc structure with nearest neighbor distance of 4.52 A^0 , it's atomic weight is 39. Its density will be-
    (a) 454 kg m^{-3}
    (b) 804 kg m^{-3}
    (c) 852 kg m^{-3}
    (d) 908 kg m^{-3}
18. A compound formed by atoms X and Y crystallizes in the cubic crystal structure . The X are present at corners of the cube while atoms Y are present at the face centres . The formula of the compound is
    (a) XY
    (b) X_2Y
    (c) X_3Y
    (d) XY_3
19. In a face centered cubic system , the distance d between the nearest neighbours is given by-
    (a) d = a
    (b) d=√2a
    (c) d= √3a/2
    (d) d= a/√2
20. An element crystallizes in body centered cubic structure . If the edge length of the cubic unit cell is 400 pm, the interatomic distance in the crystal is-
    (a) 346.5 pm
    (b) 282.8 pm
    (c) 400 pm
    (d) 200 pm
21. A face centerd cubic element (atomic mass = 60) has a cell edge is 400 pm . What is its density?
    (a) 0.623 g cm^{-3}
    (b) 6.23 g cm^{-3}
    (c) 62.3 g cm^{-3}
    (d) 0.623 kg m^{-3}

22. An element occurs in bcc structure . its density is 8.0 g cm^{-3}. If the cell edge is 250 pm , the atomic mass of the element is-
    (a) 26.4 g mol^{-1}
    (b) 37.6 g mol^{-1}
    (c) 54.5 g mol^{-1}
    (d) 86.1 g mol^{-1}
23. Which one of the statement is not true-
    (a) The radius of the tetrahedral void is 0.225 times the radius of the particle
    (b) The radius of an octahedral void is 0.732 times the radius of the particle
    (c) The space occupied in bcc arrangement is 68%
    (d) The number of tetrahedral voids in a close packed structure is double that of the number of constituent particles.
24. Gold crystallizes in a ccp lattice . How many nearest neighbours does a gold atom posses ?
    (a) 6
    (b) 8
    (c) 10
    (d) 12
25. Which of the following statement is not true for rock salt (NaCl) structure?
    (a) The structure is of fcc type
    (b) Cl^- ions are present at corners and face centres of a cube
    (c) Na^+ ions are present in alternate tetrahedral voids
    (d) The structure has 6:6 coordination
26. The point defect which lowers the density of a crystalis-
    (a) Schottky defect
    (b) Frenkel defect
    (c) Both (a) and (b)
    (d) None of these
27. The presence of F – centre in a crystal makes it
    (a) Conducting
    (b) Colourless
    (c) Non-conducting
    (d) Coloured
28. In a solid lattice , the cation has left a lattice site and is located in an interstitial position . The lattice defect is –
    (a) Frenkel defect
    (b) Schottky defect
    (c) Non stoichiometric defect
    (d) Valency defect
29. An ionic compound has a unit cell consisting of A ions at the corners of a cube and B ions on the centre of the faces of the cube. The formula for this compound will be-
    (a) A_3B
    (b) AB_3

(c) A_2B
(d) AB

30. In a compound , atoms of element Y form ccp lattice and those of element X occupy 2/3rd of tetrahedral voids . The formula of the compound will be-
    (a) X_4Y_3
    (b) X_2Y_3
    (c) X_2Y
    (d) X_3Y_4

TRUE and FALSE Type Questions-

1. Amorphous solids are isotropic in nature.
2. A primitive unit cell contains constituent particles only at corners.
3. Cubic system posses only primitive unit cell.
4. A particle present at the body centre is not shared by any other unit cell.
5. The unit of the face centered cubic system contains 2 atoms.
6. The percentage of the occupied space in a face centerd unit cell is 74%.
7. In hcp the arrangement is of the type ABCABC……
8. The coordination no. in hcp is the same as that in ccp.
9. A tetrahedral void is formed by four spheres.
10. The no. of tetrahedral void in a close packed structure is the same as the number of constituent particles.
11. Radius of an octahedral void is 0.414 times the radius of the constituent particles .
12. Schottky defect is a non stoichiometric defect
13. Schottky defect decreases the density of a crystal.
14. Glass is a pseudo solid.
15. Glass is also known as super cooled liquid.

Assertion – Reason type Question-

The questions given below consist of an Assertion and a reason. You have to choose the correct answer (a,) (b), (c) or (d) according to the following clue-

(a) If both Assertion and Reason are CORRECT and Reason is the CORRECT explanation of the Assertion.

(b) If both Assertion and Reason are CORRECT and Reason is not the CORRECT explanation of the Assertion.

(c) If Assertion is CORRECT but Reason is INCORRECT

(d) If Assertion is INCORRECT but Reason is CORRECT

1. ASSERTION- The presence of f-centre in a crystal lowers the density.
   REASON- Frenkel defect involves the creation of a hole in the lattice of the crystal due to migration of a cation from its lattice site to an interstial site.
2. ASSERTION- Silicon forms covalent crystals.
   REASON- Its lattice consists of silicon atoms bonded together by covalent bonds in a three dimensional network.
3. ASSERTION- The unit cell of a face centered cubic system contains contains 4 atoms.
   REASON- The unit cell of a face centered cubic system consist of atoms at face centres in addition to atoms at the corners.
4. In rock salt structure , Cl^- ions from a closepacked lattice and Na^+ ions occupy the octahedral voids.
   REASON- Sodium chloride possess a face centered cubic arrangement.
5. ASSERTION- KCl crystals appear violet in colour.
   REASON- The violet colour is due to electrons trapped in anion vacancies.