



Unit

1

SOLID STATE

I. Multiple Choice Questions (Type-I)

1. Which of the following conditions favours the existence of a substance in the solid state?
 - (i) High temperature
 - (ii) Low temperature
 - (iii) High thermal energy
 - (iv) Weak cohesive forces
2. Which of the following is **not** a characteristic of a crystalline solid?
 - (i) Definite and characteristic heat of fusion.
 - (ii) Isotropic nature.
 - (iii) A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal.
 - (iv) A true solid
3. Which of the following is an amorphous solid?
 - (i) Graphite (C)
 - (ii) Quartz glass (SiO_2)
 - (iii) Chrome alum
 - (iv) Silicon carbide (SiC)
4. Which of the following arrangements shows schematic alignment of magnetic moments of antiferromagnetic substances?
 - (i) 
 - (ii) 



5. Which of the following is true about the value of refractive index of quartz glass?
 - (i) Same in all directions
 - (ii) Different in different directions
 - (iii) Cannot be measured
 - (iv) Always zero
6. Which of the following statement is **not** true about amorphous solids?
 - (i) On heating they may become crystalline at certain temperature.
 - (ii) They may become crystalline on keeping for long time.
 - (iii) Amorphous solids can be moulded by heating.
 - (iv) They are anisotropic in nature.
7. The sharp melting point of crystalline solids is due to _____.
 - (i) a regular arrangement of constituent particles observed over a short distance in the crystal lattice.
 - (ii) a regular arrangement of constituent particles observed over a long distance in the crystal lattice.
 - (iii) same arrangement of constituent particles in different directions.
 - (iv) different arrangement of constituent particles in different directions.
8. Iodine molecules are held in the crystals lattice by _____.
 - (i) london forces
 - (ii) dipole-dipole interactions
 - (iii) covalent bonds
 - (iv) coulombic forces
9. Which of the following is a network solid?
 - (i) SO_2 (Solid)
 - (ii) I_2
 - (iii) Diamond
 - (iv) H_2O (Ice)
10. Which of the following solids is **not** an electrical conductor?

(A) Mg (s) (B) TiO (s) (C) I_2 (s) (D) H_2O (s)

 - (i) (A) only
 - (ii) (B) Only
 - (iii) (C) and (D)
 - (iv) (B), (C) and (D)

11. Which of the following is **not** the characteristic of ionic solids?
- (i) Very low value of electrical conductivity in the molten state.
 - (ii) Brittle nature.
 - (iii) Very strong forces of interactions.
 - (iv) Anisotropic nature.
12. Graphite is a good conductor of electricity due to the presence of _____.
- (i) lone pair of electrons
 - (ii) free valence electrons
 - (iii) cations
 - (iv) anions
13. Which of the following oxides behaves as conductor or insulator depending upon temperature?
- (i) TiO
 - (ii) SiO_2
 - (iii) TiO_3
 - (iv) MgO
14. Which of the following oxides shows electrical properties like metals?
- (i) SiO_2
 - (ii) MgO
 - (iii) $\text{SO}_2(\text{s})$
 - (iv) CrO_2
15. The lattice site in a pure crystal **cannot** be occupied by _____.
- (i) molecule
 - (ii) ion
 - (iii) electron
 - (iv) atom
16. Graphite **cannot** be classified as _____.
- (i) conducting solid
 - (ii) network solid
 - (iii) covalent solid
 - (iv) ionic solid
17. Cations are present in the interstitial sites in _____.
- (i) Frenkel defect
 - (ii) Schottky defect
 - (iii) Vacancy defect
 - (iv) Metal deficiency defect

18. Schottky defect is observed in crystals when _____.
(i) some cations move from their lattice site to interstitial sites.
(ii) equal number of cations and anions are missing from the lattice.
(iii) some lattice sites are occupied by electrons.
(iv) some impurity is present in the lattice.
19. Which of the following is true about the charge acquired by *p*-type semiconductors?
(i) positive
(ii) neutral
(iii) negative
(iv) depends on concentration of *p* impurity
20. To get a *n*-type semiconductor from silicon, it should be doped with a substance with valence _____.
(i) 2
(ii) 1
(iii) 3
(iv) 5
21. The total number of tetrahedral voids in the face centred unit cell is _____.
(i) 6
(ii) 8
(iii) 10
(iv) 12
22. Which of the following point defects are shown by AgBr(s) crystals?
(A) Schottky defect (B) Frenkel defect
(C) Metal excess defect (D) Metal deficiency defect
(i) (A) and (B)
(ii) (C) and (D)
(iii) (A) and (C)
(iv) (B) and (D)
23. In which pair most efficient packing is present?
(i) *hcp* and *bcc*
(ii) *hcp* and *ccp*
(iii) *bcc* and *ccp*
(iv) *bcc* and simple cubic cell
24. The percentage of empty space in a body centred cubic arrangement is _____.
(i) 74

- (ii) 68
 - (iii) 32
 - (iv) 26
- 25.** Which of the following statement is **not** true about the hexagonal close packing?
- (i) The coordination number is 12.
 - (ii) It has 74% packing efficiency.
 - (iii) Tetrahedral voids of the second layer are covered by the spheres of the third layer.
 - (iv) In this arrangement spheres of the fourth layer are exactly aligned with those of the first layer.
- 26.** In which of the following structures coordination number for cations and anions in the packed structure will be same?
- (i) Cl^- ion form *fcc* lattice and Na^+ ions occupy all octahedral voids of the unit cell.
 - (ii) Ca^{2+} ions form *fcc* lattice and F^- ions occupy all the eight tetrahedral voids of the unit cell.
 - (iii) O^{2-} ions form *fcc* lattice and Na^+ ions occupy all the eight tetrahedral voids of the unit cell.
 - (iv) S^{2-} ions form *fcc* lattice and Zn^{2+} ions go into alternate tetrahedral voids of the unit cell.
- 27.** What is the coordination number in a square close packed structure in two dimensions?
- (i) 2
 - (ii) 3
 - (iii) 4
 - (iv) 6
- 28.** Which kind of defects are introduced by doping?
- (i) Dislocation defect
 - (ii) Schottky defect
 - (iii) Frenkel defects
 - (iv) Electronic defects
- 29.** Silicon doped with electron-rich impurity forms _____.
- (i) *p*-type semiconductor
 - (ii) *n*-type semiconductor
 - (iii) intrinsic semiconductor
 - (iv) insulator

- 30.** Which of the following statements is **not** true?
- (i) Paramagnetic substances are weakly attracted by magnetic field.
 - (ii) Ferromagnetic substances cannot be magnetised permanently.
 - (iii) The domains in antiferromagnetic substances are oppositely oriented with respect to each other.
 - (iv) Pairing of electrons cancels their magnetic moment in the diamagnetic substances.
- 31.** Which of the following is **not** true about the ionic solids?
- (i) Bigger ions form the close packed structure.
 - (ii) Smaller ions occupy either the tetrahedral or the octahedral voids depending upon their size.
 - (iii) Occupation of all the voids is not necessary.
 - (iv) The fraction of octahedral or tetrahedral voids occupied depends upon the radii of the ions occupying the voids.
- 32.** A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because _____.
(i) all the domains get oriented in the direction of magnetic field.
(ii) all the domains get oriented in the direction opposite to the direction of magnetic field.
(iii) domains get oriented randomly.
(iv) domains are not affected by magnetic field.
- 33.** The correct order of the packing efficiency in different types of unit cells is _____.
(i) $fcc < bcc < \text{simple cubic}$
(ii) $fcc > bcc > \text{simple cubic}$
(iii) $fcc < bcc > \text{simple cubic}$
(iv) $bcc < fcc > \text{simple cubic}$
- 34.** Which of the following defects is also known as dislocation defect?
(i) Frenkel defect
(ii) Schottky defect
(iii) Non-stoichiometric defect
(iv) Simple interstitial defect
- 35.** In the cubic close packing, the unit cell has _____.
(i) 4 tetrahedral voids each of which is shared by four adjacent unit cells.
(ii) 4 tetrahedral voids within the unit cell.
(iii) 8 tetrahedral voids each of the which is shared by four adjacent unit cells.
(iv) 8 tetrahedral voids within the unit cells.