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Crystallography

Multiple Choice questions:

1. The elements of symmetry are

- (a) plane of symmetry
- (b) axis of symmetry
- (c) centre of symmetry
- (d) all of these

Answer. (d)

2. The amorphous solid among the following is

- (a) table salt
- (b) diamond
- (c) plastic
- (d) graphite

Answer. (c)

3. A crystalline solid does not have one of the following properties. It is

- (a) anisotropy
- (b) sharp melting points
- (c) isotropy
- (d) definite and regular geometry

Answer. (c)

4. For a orthorhombic crystal system, which is incorrect?

- (a) $a \neq b \neq c$
- (b) $\alpha = \beta = \gamma = 90^\circ$
- (c) $a = b \neq c$
- (d) none of these

Answer. (a)

5. Na^+Cl^- , Cs^+Cl^- are the example of

- (a) cubic crystal system
- (b) tetragonal crystal system
- (c) orthorhombic crystal system
- (d) rhombohedral crystal system

Answer. (a)

6. The total number of atoms in a body centred cubic unit cell is

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Answer. (b)

7. If there are 4 atoms in unit cell in a cubic system, it is an example of

- (a) simple cubic unit cell
- (b) body centred cubic unit cell
- (c) face centred cubic unit cell
- (d) none of these

Answer. (c)

8. Which is incorrect for a hexagonal crystal system?

- (a) $a = b = c$
- (b) $a = b \neq c$
- (c) $\alpha = \beta = 90^\circ, \gamma = 120^\circ$
- (d) none of these

Answer. (a)

9. The co-ordination number of Na^+ in Na^+Cl^- crystal is

- (a) 2
- (b) 4
- (c) 6
- (d) 8

Answer. (c)

10. The co-ordination number of body centred cubic lattice is

- (a) 2
- (b) 4
- (c) 6
- (d) 8

Answer. (d)

11. The Bragg's equation for diffraction of X-rays is

- (a) $n \lambda = 2 d \sin \theta$
- (b) $n \lambda = 2 d \sin \theta$
- (c) $n \lambda = 2 d \sin^2 \theta$
- (d) $n \lambda = d \sin \theta$

Answer. (b)

12. In Bragg's equation $n \lambda = 2 d \sin \theta$, 'n' represents

- (a) the number of moles
- (b) the principal quantum number
- (c) the Avogadro's number
- (d) the order of reflection

Answer. (d)

13. The change in enthalpy that occurs when one mole of a solid crystalline substance is formed from the gaseous ions

- (a) lattice energy
- (b) ionic energy
- (c) Born-Haber cycle
- (d) crystalline energy

Answer. (a)

14. In cubic close packed (ccp) pattern of a metallic crystal, the co-ordination number is

- (a) 12
- (b) 8
- (c) 6
- (d) 4

Answer. (a)

15. In an ionic crystal, a cation and an anion leave the lattice to cause two vacancies. This defect is called

- (a) Schottky defect
- (b) Frenkel defect
- (c) interstitial defect
- (d) none of these

Answer. (a)

16. Which of the following defects is generally found in sodium chloride and cesium chloride?

- (a) Frenkel defect
- (b) interstitial defect
- (c) Schottky defect
- (d) none of these

Answer. (c)

17. In a solid lattice, a cation has left a lattice site and is present in interstitial position, the lattice defect is

- (a) Schottky defect
- (b) Frenkel defect
- (c) vacancy defect
- (d) interstitial defect

Answer. (b)

18. In Frenkel defect,

- (a) some of the lattice sites are vacant
- (b) an ion occupies interstitial position
- (c) some of the cations are replaced by foreign ions
- (d) none of the above

Answer. (b)

19. A device used to convert light energy into electrical energy is called

- (a) a semiconductor
- (b) a solar cell
- (c) an irreversible cell
- (d) an electrochemical cell

Answer. (b)

20. For an ionic crystal of formula AX, the radius ratio lies between 0.732 and 0.414. Its co-ordination number is

- (a) 4
- (b) 6
- (c) 8
- (d) 12

Answer. (b)

21. The radius ratio in an ionic crystal lies between 0.732–1.000, the co-ordination number is

- (a) 3
- (b) 4
- (c) 6
- (d) 8

Answer. (d)

22. The permitted co-ordination number in an ionic crystal is 6, the arrangement of anions around the cation will be

- (a) plane triangular
- (b) tetrahedral
- (c) octahedral
- (d) body centred cubic

Answer. (c)

23. The number of atoms per unit cell in a simple cubic, fcc and bcc are

- (a) 1, 2, 4
- (b) 1, 4, 2
- (c) 4, 2, 1
- (d) 2, 4, 1

Answer. (b)

24. In a crystal, the atoms are located at the positions where potential energy is

- (a) maximum
- (b) zero
- (c) minimum
- (d) infinite

Answer. (c)

25. Potassium crystallises in a bcc structure. The co-ordination number of potassium in potassium metal is

- (a) 2
- (b) 4
- (c) 6
- (d) 8

Answer. (d)

26. In an ionic crystal of general formula AX, the co-ordination number is six. The value of radius ratio is in the range

- (a) 0.155 – 0.215
- (b) 0.215 – 0.414
- (c) 0.414 – 0.732
- (d) 0.732 – 1

Answer. (c)

27. The number of atoms in a unit cell of a cube is

- (a) 0
- (b) 1
- (c) 2
- (d) 3

Answer. (c)

28. The number of atoms in a unit cell of a face centred cube is

- (a) 2
- (b) 4
- (c) 6
- (d) 8

Answer. (b)

29. NaCl is an example of

- (a) covalent solid
- (b) metallic solid
- (c) ionic solid
- (d) molecular solid

Answer. (c)

30. Which of the following defects results in the decrease of density of crystal

- (a) Schottky defect
- (b) Frenkel defect
- (c) interstitial defect
- (d) impurity defect

Answer. (a)

31. Which of the following is a non-crystalline solid?

- (a) rubber
- (b) ZnS
- (c) HgS
- (d) PbI

Answer. (a)

32. Particles of quartz are packed by

- (a) ionic bonds
- (b) van der Waal's forces
- (c) hydrogen bonds
- (d) covalent bonds

Answer. (d)

33. LiF is an example of

- (a) molecular crystal
- (b) covalent crystal
- (c) ionic crystal
- (d) metallic crystal

Answer. (c)

34. In silicon crystal each atom is covalently bonded to _____ neighbours.

- (a) 2
- (b) 4
- (c) 6
- (d) 8

Answer. (b)

35. Silicon is an example of

- (a) non-conductor
- (b) good conductor
- (c) semi conductor
- (d) metallic conductor

Answer. (c)

36. Semiconductors which exhibit conductivity due to the flow of excess negative electrons are called

- (a) *n*-type conductor
- (b) *p*-type conductor
- (c) good conductors
- (d) none of these

Answer. (a)

37. In *p*-type semiconductors, the conductivity is due to

- (a) negative holes
- (b) positive holes
- (c) mobile electrons

(d) valence electrons

Answer. (b)

38. Super conductors are substances which

(a) conduct electricity in liquid crystal state

(b) conduct electricity at low temperatures

(c) conduct electricity at high temperatures

(d) offer no resistance to the flow of current

Answer. (d)

39. The liquid crystals have

(a) properties of super cooled liquid

(b) properties of amorphous solids

(c) the fluidity of a liquid and optical properties of a solid

(d) none of these

Answer. (c)

40. Silicon and Germanium in the pure state are

(a) non-conductors

(b) good conductors

(c) metallic conductors

(d) metal complexes

Answer. (a)

41. p-Ozoxyanisole is an example of

(a) semi conductor

(b) super conductor

(c) liquid crystal

(d) none of these

Answer. (c)

42. When an arsenic atom is introduced in place of silicon in a crystal lattice, the conductivity

(a) increases

(b) decreases

(c) remains the same

(d) sometimes increases and sometimes decreases

Answer. (a)

References:

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