SOLID STATE

Q.1. A crystalline solid:

a) changes abruptly from solid to liquid when heated.
b) has no definite melting point.
c) undergoes deformation of its geometry easily
d) has irregular 3-dimensional arrangements.

Q.2. Na and Mg crystallize in crystals of bcc and fcc form respectively and then the amount of Na and Mg atoms present in their respective crystal unit cells is:

a) 4 and 2
b) 9 and 14
c) 14 and 9
d) 2 and 4

Q.3. The fraction of the total volume occupied by the atoms present in a simple cube is

a) π/4
b) π/6
c) π/3√2
d) π/4√2

Q.4. For the orthorhombic system, axial ratios are a ≠ b ≠ c and the axial angles are:

a) α = β = γ ≠ 90°
b) α ≠ β ≠ γ ≠ 90°
c) α = β = γ = 90°
d) α ≠ β ≠ γ = 90°

Q.5. Edge length of unit cell of chromium metal is 287 pm with bcc arrangement. The atomic radius is of the order [Cr=52]

a) 287 pm
b) 574 pm
c) 124.27 pm
d) 143.5 pm

Q.6. The density of a metal which crystallises in bcc lattice with unit cell edge length 300 pm and molar mass 50 g mol^{-1} will be

a) 10 g cm^{-3}
b) 14.2 g cm^{-3}
c) 6.15 g cm^{-3}
d) 9.3 2 g cm^{-3}

Q.7. How many lithium atoms are present in a unit cell with edge length 3.5 Å and density 0.53 g cm^{-3}? (Atomic mass of Li = 6.94):

a) 2
b) 1
c) 4
d) 6

Q.8. Which of the following statements about amorphous solids is incorrect?

a) They melt over a range of temperature
b) They are anisotropic
c) There is no orderly arrangement of particles
d) They are rigid and incompressible

Q.9. Most crystals show good cleavage because their atoms, ions or molecules are

a) weakly bonded together
b) strongly bonded together
c) spherically symmetrical
d) arranged in planes

Q.10. Which of the following statement is not true about the hexagonal close packing?

a) The coordination number is 12
b) Tetrahedral voids of the second layer are covered by the spheres of the third layer.
c) In this arrangement spheres of the fourth layer are exactly aligned with those of the first layer.
d) It has 74% packing efficiency.

Q.11. Which of the following claims about crystal lattice diffraction patterns is correct?

a) Diffraction patterns possess a centre of symmetry
b) Diffraction patterns don't have centre of symmetry
c) Diffraction patterns are linear space
d) Diffraction patterns contains α-rays

Q.12. An example of body centered cube is

a) Sodium
b) Magnesium
c) Zinc
d) Copper

Q.13. Fe_3O_4 is ferrimagnetic at room temperature but at 850 K it becomes

a) Diamagnetic
b) Ferromagnetic
c) Non-magnetic
d) Paramagnetic

Q.14. Which of the following is not an example of 13-15 compounds

a) InSb
b) GaAs
c) CdSe
d) Alp

Q.15. For tetrahedral coordination, the radius ration (r+/r-) should be

a) 0.155-0.225
b) 0.225-0.414
c) 0.414-0.732
d) 0.732-1

Q.16. A compound formed by elements A and B crystallises in the cubic structure where A atoms are at comers of a cube and B atoms are at face centres. The formula of the compound is

a) AB_3
b) A_2B
c) AB_2
d) A_2B_3

Q.17. How many space lattices are possible in a crystal?

a) 23
b) 7
c) 230
d) 14

Q.18. Metallic lustre is explained by

a) diffusion of metal ions
b) oscillation of loose electrons
c) excitation of free protons
d) existence of bcc lattice.

Q.19. In a face-centered cubic lattice, unit cell is shared equally by how many unit cells?

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

Q.20. Which of the following fee structure contains cations in alternate tetrahedral voids?

a) NaCl
b) ZnS
c) Na_2O
d) CaF_2

Q.21. The pyknometric density of sodium chloride crystal is 2.165×10^3 kg m^{-3}, while its X-ray density is 2.178×10^3 kg m^{-3}. The fraction of the unoccupied sites in sodium chloride crystal is

a) 5.96
b) 15.96×10^{-2}
c) 5.96×10^{-1}
d) 5.96×10^{-3}

Q.22. Which has no rotation of symmetry?

a) Hexagonal
b) Orthorhombic
c) Cubic
d) Triclinic

Q.23. The interionic distance for cesium chloride crystal will be

a) a
b) a/2
c) $\sqrt{3}$ a/2
d) 2a/$\sqrt{3}$

Q.24. For a covalent solid, the units which occupy lattice points are:

a) atoms
b) ions
c) molecules
d) electrons

Q.25. Due to Frenkel defect, the density of ionic solids

a) decreases
b) increases
c) neither (a) nor (b)
d) does not change