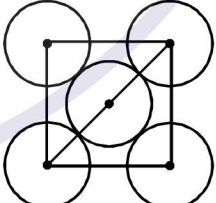


- If the anions (A) form hexagonal closest packing and cations (C) occupy only $2/3$ octahedral voids in it, then the general formula of the compound is
(1) CA (2) CA₂ (3) C₂A₃ (4) C₃A₂
- Which one of the following schemes of ordering closest packed sheets of equal sized spheres do not generate close packed lattice.
(1) ABCABC (2) ABACABAC
(3) ABBAABBA (4) ABCBCABCBC
- Packing fraction in 2-D hexagonal arrangement of identical sphere is
(1) $\frac{\pi}{3\sqrt{2}}$ (2) $\frac{\pi}{3\sqrt{3}}$ (3) $\frac{\pi}{2\sqrt{3}}$ (4) $\pi/6$
- In fcc unit cell smallest distance between octahedral void & tetrahedral void is -
(a = edge length of unit cell)
(1) $\frac{a}{\sqrt{2}}$ (2) $\frac{\sqrt{3}a}{2}$ (3) a (4) $\frac{\sqrt{3}a}{4}$
- What is not true regarding hexagonal close packing (hcp)
(1) packing fraction is 0.74
(2) coordination number is 12
(3) ABC ABC.....type packing
(4) Containing both tetrahedral and octahedral voids
- How many unit cell are there in 1 gram cubic crystal of NaCl?
(1) $\frac{4 \times N_A}{58.5}$ (2) $\frac{N_A}{58.5}$
(3) $\frac{N_A}{58.5 \times 4}$ (4) $\frac{N_A}{58.5 \times 8}$
- The mass of a unit cell of CsCl corresponds to
(1) 1 Cs⁺ and 1 Cl⁻ (2) 1 Cs⁺ and 6 Cl⁻
(3) 4 Cs⁺ and 4 Cl⁻ (4) 8 Cs⁺ and 1 Cl⁻
- Edge length of M⁺X⁻ (NaCl structure) is 7.2 Å. Assuming M⁺ - X⁻ contact along the cell edge, radius of X⁻ ion is ($r_{M^+} = 1.6 \text{ \AA}$):
(1) 2.0 Å (2) 5.6 Å (3) 2.8 Å (4) 38 Å
- $r_{Na^+} = 95 \text{ pm}$ and $r_{Cl^-} = 181 \text{ pm}$ in NaCl (rock salt) structure. What is the shortest distance between Na⁺ ions?
(1) 778.3 pm (2) 276 pm
(3) 195.7 pm (4) 390.3 pm
- The measured density of AgI is 6.94 g/cm⁻³ and the theoretical density is 5.67 g/cm⁻³. These data indicate that solid AgI has -
(1) Schottky defect
(2) Frenkel defect
(3) Interstitial impurities defect
(4) Both (1) and (2)

- Which of the following statement is **CORRECT**?
(1) A metal can show only non- stoichiometric defects
(2) Schottky defect reduces the density of a solid due to significant increase in volume.
(3) Impurity defect always change the density.
(4) Solids having F-centres may have metal excess defect due to missing anions.
- Correct statement for ccp is :
(1) Each octahedral void is surrounded by 6 spheres and each sphere is surrounded by 4 octahedral voids
(2) Each octahedral void is surrounded by 6 spheres and each sphere is surrounded by 6 octahedral voids
(3) Each octahedral void is surrounded by 6 spheres and each sphere is surrounded by 8 octahedral voids
(4) Each octahedral void is surrounded by 6 spheres and each sphere is surrounded by 12 octahedral voids
- Which of the following statements is correct in the rock-salt structure of an ionic compounds?
(1) coordination number of cation is four whereas that of anion is six.
(2) coordination number of cation is six whereas that of anion is four.
(3) coordination number of each cation and anion is four.
(4) coordination number of each cation and anion is six.
- Column-I**
[Distance in terms of edge length of cube (a)]
(P) 0.866 a
(Q) 0.707 a
(R) 0.433 a
(S) a
Column-II
(I) Shortest distance between cation & anion in CsCl structure.
(II) Shortest distance between two cation in CaF₂ structure.
(III) Shortest distance between carbon atoms in diamond.
(IV) shortest distance between next nearest cations in rock salt structure.

Code :

	P	Q	R	S
(1)	IV	III	I	II
(2)	I	II	III	IV
(3)	III	II	I	IV
(4)	I	II	IV	III

15. The no. of atoms per unit cell in B.C.C. & F.C.C. is respectively :
 (1) 8, 10 (2) 2, 4 (3) 1, 2 (4) 1, 3
16. How many unit cells are present in a cube-shaped ideal crystal of NaCl of mass 1.00g ?
 (1) 1.28×10^{21} unit cells (2) 1.71×10^{21} unit cells
 (3) 2.57×10^{21} unit cells (4) 5.14×10^{21} unit cells
17. What type of crystal defect is indicated in the diagram below ?
 Na⁺ Cl⁻ Na⁺ Cl⁻ Na⁺ Cl⁻
 Cl⁻ Cl⁻ Na⁺ Na⁺
 Na⁺ Cl⁻ Cl⁻ Na⁺ Cl⁻
 Cl⁻ Na⁺ Cl⁻ Na⁺ Na⁺
 (1) Frenkel defect
 (2) Schottky defect
 (3) Interstitial defect
 (4) Frenkel and Schottky defects
18. An ionic compound has a unit cell consisting of A ions at the corners of a cube and B ions on the centres of the faces of the cube. The empirical formula of this compound would be -
 (1) A₂B (2) AB (3) A₃B (4) AB₃
19. Lattice energy of an ionic compound depends upon-
 (1) Size of the ion only
 (2) Charge on the ion only
 (3) Charge on the ion and size of the ion
 (4) Packing of ions only
20. Total volume of atoms present in a face-centred cubic unit cell of a metal is (r is atomic radius) :
 (1) $\frac{24}{3} \pi r^3$ (2) $\frac{12}{3} \pi r^3$ (3) $\frac{16}{3} \pi r^3$ (4) $\frac{20}{3} \pi r^3$
21. 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 -
 (1) X₄Y₃ (2) X₂Y₃ (3) X₂Y (4) X₃Y₄
22. The edge length of a face centred cubic cell of an ionic substance is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is :-
 (1) 144 pm (2) 288 pm
 (3) 398 pm (4) 618 pm
23. Percentages of free space in cubic close packed structure and in body centred packed structure are respectively :-
 (1) 48% and 26% (2) 30% and 26%
 (3) 26% and 32% (4) 32% and 48%
24. The radius of a calcium ion is 94 pm and of the oxide ion is 146 pm. The possible crystal structure of calcium oxide will be :-
 (1) Octahedral (2) Tetrahedral
 (3) Pyramidal (4) Trigonal
25. The coordination number of a metal crystallising in a hcp structure is
 (1) 12 (2) 4 (3) 8 (4) 6
26. In a solid "AB" having NaCl structure "A" atoms occupy the corners of the cubic unit cell. If all the face-centred atoms along one of the axes are removed, then the resultant stoichiometry of the solid is
 (1) AB₂ (2) A₂B (3) A₄B₃ (4) A₃B₄
27. A substance A_xB_y crystallises in a FCC lattice in which atoms "A" occupy each corner of the cube and atoms "B" occupy the centres of each face of the cube. Identify the correct composition of the substance A_xB_y.
 (1) AB₃
 (2) A₄B₃
 (3) A₃B
 (4) composition cannot be specified
28. Which of the following FCC structure contains cations in alternate tetrahedral voids ?
 (1) NaCl (2) ZnS (3) Na₂O (4) CaF₂
29. The correct statement(s) regarding defects in solid is (are)
 (1) Frenkel defect is usually favoured by a very small difference in the sizes of cation and anion.
 (2) Frenkel defect is a dislocation defect
 (3) Trapping of an electron in the lattice leads to the formation of F-center.
 (4) Schottky defects have no effect on the physical properties of solids.
30. The packing efficiency of the two-dimensional square unit cell shown below is

 (1) 39.27% (2) 68.02%
 (3) 74.05% (4) 78.54%

ANSWER KEY

Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	3	3	2	4	3	3	1	1	4	3
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	4	2	4	2	2	3	2	4	3	3
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	1	1	3	1	1	4	1	2	2,3	4