DAILY PRACTICE PROBLEM OF PHYSICAL CHEMISTRY FOR NEET

BY

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DPP-1

1. Which of the following crystal is represented by $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma \neq 90°$?

(1) Orthorhombic (2) Monoclinic (3) Triclinic (4) Tetragonal

Ans. **(3)**

2. Copper belongs to a crystal system represented by the crystal dimensions as

(1) $\alpha = \beta = \gamma = 90°, a = b = c$

(2) $\alpha \neq \beta \neq \gamma, a = b = c$

(3) $\alpha = \beta = 90°, \gamma \neq 90°, a = b = c$

(4) $\alpha = \beta = \gamma = 90°, a \neq b \neq c$

Ans. **(1)**

3. What is the relation between diamond and graphite ?

(1) Polymorphous (2) Isomer (3) Isotope (4) Isomorphous

Ans. **(1)**

4. Maximum possible numbers of two dimensional and three dimensional lattices are respectively

(1) 5 and 14 (2) 7 and 14 (3) 14 and 4 (4) 5 and 13

Ans. **(1)**

5. Which type of solids will have the highest melting point ?

(1) Ionic crystal (2) Network covalent solid

(3) Molecular solids (4) Metallic crystal

Ans. **(2)**

6. The total number of elements of symmetry in a cubic crystal is

(1) 9 (2) 23 (3) 10 (4) 14

Ans. **(2)**

7. A crystal may have one or more planes of symmetry as well as one or more than one axis of symmetry but it has

(1) Two centres of symmetry

(2) Only one centre of symmetry

(3) No centre of symmetry

(4) Three centres of symmetry

Ans. **(2)**

DPP-2

1. A compound formed by element A and B crystallizes in the cubic structure, where A atoms are at the corners of a cube and B atoms are at the centre of the body. The formula of the compounds is

(1) AB (2) AB_2 (3) A_2B_3 (4) AB_3

Ans. **(1)**

2. A solid with formula ABC_3 would probably have

(1) A at body centre, B at face centres and C at corners of the cube

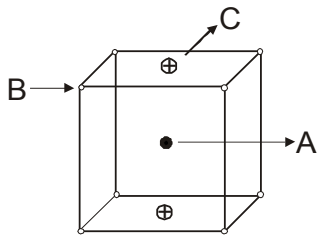
(2) A at corners of cube, B at body centre, C at face centre

(3) A at corners of hexagon, B at centres of the hexagon and C inside the hexagonal unit cell

(4) A at corner, B at face centre, C at body centre

Ans. **(2)**

3. A solid ABC has A, B and C arranged as below. The formula of solid is



(1) ABC (2) AB_2C_2 (3) A_2BC (4) AB_8C_2

Ans. **(1)**

4. An alloy of copper, silver and gold is found to have copper constituting the ccp lattice. If silver atoms occupy the edge centres and gold is present at body centre, the alloy has a formula

(1) Cu_4Ag_2Au (2) Cu_4Ag_4Au (3) Cu_4Ag_3Au (4) CuAgAu

Ans. **(3)**

5. In a face centered cubic arrangement of A and B atoms, atoms of A are at the corner of the unit cell and atoms of B are at the face centres. One of the A atom is missing from one corner in unit cell. The simplest formula of compound is

(1) A_7B_3 (2) AB_3 (3) A_7B_{24} (4) $A_{7/8}B_3$

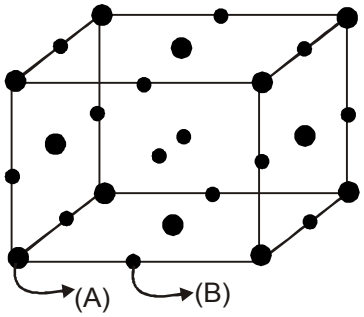
Ans. **(3)**

6. A solid has a structure in which A atoms are located at the cube corners of the unit cell, B atoms are located at the cube edges of unit cell and the C atoms at the body centre. Formula of the compound

(1) CAB_3 (2) C_2AB_3 (3) CA_3B (4) C_2A_3B

Ans. **(1)**

7. For a solid with the following structure, the coordination number of the point B is



(1) 3 (2) 4 (3) 5 (4) 6

Ans. **(4)**

DPP-3

1. If 'a' is the length of unit cell, then which one is correct relationship ?

(1) For simple cubic lattice

$$\text{Radius of metal atom} = \frac{a}{2}$$

(2) For bcc lattice,

$$\text{Radius of metal atom} = \frac{\sqrt{3}a}{4}$$

(3) For fcc lattice,

$$\text{Radius of metal atom} = \frac{a}{2\sqrt{2}}$$

(4) All of these

Ans. **(4)**

2. For face centered cubic structure edge length 'a' can be related with radius 'r' as

(1) $a = r \times \sqrt{2}$ (2) $a = r$ (3) $a = 2\sqrt{2}r$ (4) $a = \frac{4}{\sqrt{3}}r$

Ans. **(3)**

3. A crystalline solid AB adopts sodium chloride type structure with edge length of the unit cell as 745 pm and formula mass of 74.5 a.m.u. The density of the crystalline compound is

(1) 2.16 g cm^{-3} (2) 0.99 g cm^{-3} (3) 1.88 g cm^{-3} (4) 1.197 g cm^{-3}

Ans. **(4)**

4. Polonium adopts cubic structure with edge length of cube being 0.336 nm. The distance between the polonium atoms which lie at the corners along the body diagonal is

(1) 0.336 nm (2) 0.291 nm (3) 0.582 nm (4) 0.481 nm

Ans. **(3)**

5. What is the volume of a face centered cubic unit cell, when its density is 2.0 g cm^{-3} and the molar mass of the substance is 60.23 g mol^{-1} ?

(1) 4×10^{-22} cm^3 (2) 2×10^{-22} cm^3 (3) 44×10^{-22} cm^3 (4) 22×10^{-22} cm^3

Ans. **(2)**

6. An element crystallises in a 'bcc' lattice. Nearest neighbours and next nearest neighbours of the elements are respectively

(1) 8, 8 (2) 8, 6 (3) 6, 8 (4) 6, 6

Ans. **(2)**

DPP-4

1. In any ionic crystal AS has formed cubical close packing and B atoms are present at every tetrahedral voids. If any sample of crystal contain 'N' number of B atoms then number of A atoms in that sample is

(1) N (2) $\frac{N}{2}$ (3) 2N (4) $\sqrt{2}N$

Ans. **(2)**

2. A binary solid A^+B^- has a structure with B^- ions constituting the lattice and A^+ ions occupying 25% tetrahedral holes. Formula of the solid is

(1) A_2B (2) AB (3) AB_2 (4) AB_4

Ans. **(3)**

3. In a crystalline solid anions B are arranged in cubic close packing. Cation A are equally distributed between octahedral and tetrahedral voids. If all the octahedral voids are occupied, the formula for the solid is

(1) AB (2) AB_2 (3) A_2B (4) A_2B_3

Ans. **(3)**

4. In a cubic close packed structure of mixed oxides, the lattice is made up of oxide ions, one eighth of tetrahedral voids are occupied by divalent (X^{2+}) ions, while one-half of the octahedral voids are occupied by trivalent ions (Y^{3+}), then the formula of the oxide is

(1) XY_2O_4 (2) X_2YO_4 (3) $X_4Y_5O_{10}$ (4) $X_5Y_4O_{10}$

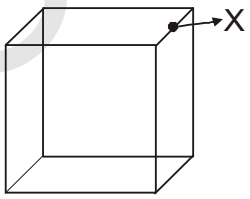
Ans. **(1)**

5. Titanium crystallizes in a face centered cubic lattice. It reacts with carbon or hydrogen interstitially by allowing atoms of these elements to occupy holes in the host lattice. Hydrogen occupies tetrahedral holes but carbon occupies octahedral holes the formula of titanium carbide and hydride are

(1) TiC_2, TiH_4 (2) TiC, TiH_2 (3) Ti_3C, TiH_2 (4) TiC_2, TiH

Ans. **(2)**

6. The site labeled as 'X' in fcc arrangement is



(1) Face with $\frac{1}{4}$ contribution (2) Edge with $\frac{1}{4}$ contribution

(3) Corner with $\frac{1}{4}$ contribution (4) Tetrahedral void with $\frac{1}{8}$ contribution

Ans. **(2)**

7. A unit cell is obtained by closed packing layers of atoms in ABAB ..... pattern. The total number of tetrahedral and octahedral voids in the unit cell are respectively

(1) 6, 12 (2) 8, 4 (3) 4, 8 (4) 12, 6

Ans. **(4)**

8. In certain solid, the oxide ions are arranged in ccp. Cations A occupy $\frac{1}{6}$ of the tetrahedral voids and cations B occupy one third of the octahedral voids. The probable formula of the compound is

(1) ABO_3 (2) AB_2O_3 (3) A_2BO_3 (4) $A_2B_2O_3$

Ans. **(1)**

9. If radius of an octahedral void is r and atomic radius of atoms assuming cubical close packing is R. Then the relation between r and R is

(1) $r = 2R$ (2) $r = 1.414\,R$ (3) $r = 0.414\,R$ (4) $r = \frac{R}{\sqrt{2}}$

Ans. **(3)**

10. Ice crystallises in a hexagonal lattice having the volume of unit cell as 132×10^{-24} cm^3. If density is 0.92 g cm^{-3} at a given temperature, then number of H_2O molecules per unit cell is

(1) 1 (2) 2 (3) 3 (4) 4

Ans. **(4)**

11. For tetrahedral co-ordination, the radius ratio (r_+/r_-) should be

(1) 0.414 – 0.732 (2) 0.732 – 1.0 (3) 0.156 – 0.225 (4) 0.225 – 0.414

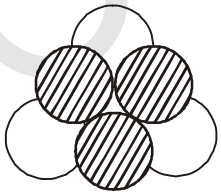
Ans. **(4)**

12. The number of octahedral sites in a cubical close pack array of N spheres is

(1) N/2 (2) 2 N (3) 4 N (4) N

Ans. **(4)**

13. The empty space between the shaded balls and hollow balls as shown in the diagram is called



(1) Hexagonal void (2) Octahedral void (3) Tetrahedral void (4) Double triangular void

Ans. **(2)**

14. A crystalline solid AB has NaCl type structure with radius of B^- ion is 250 pm. Which of the following cation can be made to slip into tetrahedral site of crystals of A^+B^- ?

(1) P^+ (radius = 180 pm) (2) Q^+ (radius = 56 pm)

(3) R^+ (radius = 200 pm) (4) S^+ (radius = 150 pm)

Ans. **(2)**

DPP-5

1. A crystalline solid AB adopts sodium chloride type structure with edge length of the unit cell as 745 pm and formula mass of 74.5 a.m.u. The density of the crystalline compound is

(1) 2.16 g cm^{-3} (2) 0.99 g cm^{-3} (3) 1.88 g cm^{-3} (4) 1.197 g cm^{-3}

Ans. **(4)**

2. CsCl crystallises in a cubic cell that has a Cl^- at each corner and Cs^+ at the centre of the unit cell. If radius of Cs^+ is 1.69 Å and $r_{cl^-} = 1.81$ Å, what is the edge length of unit cell ?

(1) 3.50 Å (2) 4.04 Å (3) 2.02 Å (4) 1.01 Å

Ans. **(2)**

3. The radius of the Na^+ is 95 pm and that of Cl^- ion is 181 pm. The co-ordination number of Na^+ will be

(1) 4 (2) 6 (3) 8 (4) Unpredictable

Ans. **(2)**

4. A mineral having formula AB_2 crystallises in the cubic close packed lattice, with the A atoms occupying the lattice points. Hence coordination number of A and B atoms are

(1) 4, 8 (2) 4, 4 (3) 8, 8 (4) 8, 4

Ans. **(4)**

5. KF has NaCl type of structure. The edge length of its unit cell has been found to be 537.6 pm. The distance between K^+ F^- in KF is

(1) 26.88 (2) 268.8 (3) 2688 pm (4) Unpredictable

Ans. **(2)**

6. Which of the following features is false regarding the structure of CsCl ?

(1) It has bcc arrangements
(2) For each ion coordination number is 8
(3) For each ion coordination number is 6
(4) The radius ratio (r_+/r_-) is 0.93

Ans. **(3)**

7. The mass of unit cell of Na_2O is

(1) Twice the formula mass of Na_2O
(2) Four times the formula mass of Na_2O
(3) Six times the formula mass of Na_2O
(4) Thrice the formula mass of Na_2O

Ans. **(2)**

8. In normal spinel structure there is a closed packed array of O^{2-} ions. The trivalent cations are present in

(1) 75% of octahedral voids
(2) 50% of octahedral voids
(3) 12.5% of tetrahedral voids
(4) 25% of octahedral voids

Ans. **(2)**

9. The C–C and Si–C interatomic distances are 154 pm and 188 pm. The atomic radius of Si is

(1) 77 pm (2) 94 pm (3) 114 pm (4) 111 pm

Ans. **(4)**

10. What is the coordination number of Rb^+ in RbBr unit cell if ionic radii of Rb^+ and Br^- ions being 148 and 195 respectively ?

(1) 6 (2) 4 (3) 8 (4) 12

Ans. **(3)**

11. Number of formula units in unit cell of MgO (rock salt), ZnS (zinc blende) and Pt (fcc) respectively

(1) 4, 3, 2 (2) 4, 3, 4 (3) 4, 4, 4 (4) 4, 3, 1

Ans. **(3)**

12. Which of the following statement is correct ?

(1) On increasing temperature the coordination number of solid remains unchanged

(2) On increasing pressure the coordination number of solid increases

(3) On increasing temperature the coordination number of solid increases

(4) On increasing pressure the coordination number of solid decreases

Ans. **(2)**

13. Pyroelectric crystals produce feeble electric current

(1) On deformation (2) On dissolving in a solvent

(3) On heating (4) On sublimation

Ans. **(3)**

14. Zinc oxide on heating changes to yellow. This is because

(1) Zinc oxide is a stoichiometric compound

(2) Zinc oxide is a covalent compound

(3) Zinc oxide shows metal excessive defect

(4) It shows metal deficiency defect

Ans. **(3)**

15. F-centres in an ionic crystals are

(1) Lattice sites containing electrons

(2) Interstitial sites containing electrons

(3) Lattice sites that are vacant

(4) Interstitial sites containing cations

Ans. **(1)**

16. When an element of group 14 is doped with an element of group 15

(1) p-type of semi-conductors are formed

(2) n-type of semi-conductors are formed

(3) Zeolites are formed

(4) Electrolytes are formed

Ans. **(2)**

17. Antiferromagnetic property is given as

(1) ↑ ↑ ↑ ↑ (2) ↑ ↑ ↓ ↑ (3) ↑ ↓ ↑ ↓ (4) ↓ ↓↓ ↓

Ans. **(3)**

18. Substances which are magnetic but having less magnetic moment than theoretically calculated value are called

(1) Ferromagnetic (2) Ferrimagnetic (3) Antiferromagnetic (4) Diamagnetic

Ans. **(2)**

19. In antiferromagnetism

(1) Alignments of magnetic moments is additive

(2) Alignments of magnetic moments in one direction is compensated by alignments in the opposite directions

(3) Alignments of magnetic moments does not take place

(4) Alignments of magnetic moments varies with the nature of the material

Ans. **(2)**

20. Which is true about Piezoelectric crystals ?

(1) They produce an electric current on heating

(2) They produce an electric current when a mechanical stress is applied

(3) They are insulators

(4) They are magnetic in nature

Ans. **(2)**

21. When a crystal having rock salt type geometry is heated in the presence of it's metal vapour then defect in it will be

(1) Stoichiometric defect (2) Metal excess defect (3) Anion excess defect (4) Frenkel defect

Ans. **(2)**

22. The mass percentage of Fe^{3+} ion present in $Fe_{0.93}\ O_{1.00}$ is

(1) 15% (2) 5.5% (3) 10.0% (4) 11.5%

Ans. **(4)**

23. If 1 mole of NaCl is doped with 10^{-3} mole of $SrCl_2$. What is the number of cationic vacancies per mole of NaCl?

(1) 10^{-3} mole^{-1} (2) 6.02×10^{18} mole^{-1} (3) 10^{50} mole^{-1} (4) 6.02×10^{20} mole^{-1}

Ans. **(4)**