

Class: 12
Subject: Chemistry
Topic: Solid State
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

Q1. Metallic gold crystallizes in body centred cubic lattice. The coordination number of gold is

- A. zero
- B. 6
- C. 8
- D. 4

Sol: c

In CCP the nearest number of atoms is 6

Q2. Which of the following crystal systems belongs to BCC - arrangement?

- A. sodium chloride
- B. sodium metal
- C. sulphur
- D. copper

Sol: b

NaCl and Cu have FCC arrangement, Zn has hexagonal arrangement. Alkali metals have BCC arrangement. So Na has BCC arrangement

Q3. Na_2SO_4 and Na_2SeO_4 are

- A. alloys
- B. isomers
- C. isomorphous systems
- D. polymorphous systems

Sol: c

Since Na_2SO_4 and Na_2SeO_4 are different substances possessing similar formula, they are called isomorphous systems

Q4. The number of nearest neighbour for a given lattice point in a face centred cubic lattice is

- A. 8
- B. 12
- C. 4
- D. 6

Sol: b

- Q5. The important characteristic property of a crystal is
- A. geometric distribution of atoms, molecules and ions
 - B. it conducts current in the molten state
 - C. resistance offered to change of shape
 - D. definite volume

Sol: a

Option 1 is correct. - Ionic crystals conduct current in molten state. Sulphur rhombic is a crystalline substance. It does not conduct current in the molten state. All solids and liquids have definite volumes. Hence other options are not valid for crystalline substances

- Q6. Which of the following is isomorphous with magnesium sulphate ($MgSO_4 \cdot 7H_2O$)?
- A. Zinc sulphate heptahydrate
 - B. Barium chloride
 - C. Blue vitriol
 - D. Potassium perchlorate

Sol: a

Isomorphous compounds have similar formula. Zinc sulphate heptahydrate crystals have the molecular formula $ZnSO_4 \cdot 7H_2O$. Hence it is isomorphous. Note: Blue vitriol is $CuSO_4 \cdot 5H_2O$. Green vitriol is $FeSO_4 \cdot 7H_2O$

- Q7. An example of a covalent crystalline solid is
- A. Si
 - B. NaF
 - C. Ar
 - D. Al

Sol: a

In silicon covalent bonds hold the atoms together. NaF crystal is ionic. In solid Ar only Van der Waals forces operate. In Al, metallic bonds hold the atoms together

- Q8. The unit cell present in ABAB... close packing of atoms is
- A. hexagonal
 - B. tetragonal
 - C. face-centred cube
 - D. primitive cube

Sol: a

During close packing arrangement of atoms in a lattice, in the first layer the atoms are placed touching each other. Let this arrangement be called A. The atoms of the second layer are placed, in the depressions of the first layer. Let the arrangement of this layer be B. If the atoms of the third layer fall exactly over the first layer, then the pattern is called ABAB... close packing. This results in hexagonal close packing.

Note: If the atoms of the third layer occupy the depressions of the second layer such that they do not lie directly above the spheres of layers A and B, then ABC ABC... pattern results. This leads to cubic close packing structure.

Q9. Body centred cubic lattice has a coordination number of

- A. 6
- B. 8
- C. 10
- D. 12

Sol: b

Q10. The coordination number of a cation occupying an octahedral hole is

- A. 4
- B. 6
- C. 8
- D. 12

Sol: b

The interstitial space between 6 atoms touching each other and found in 3 different planes is called an octahedral hole. The cation filling this gap has a coordination number of 6 since it touches 6 atoms

Q11. Which one of the following will have low heat of fusion?

- A. A covalent solid
- B. An ionic solid
- C. A metallic solid
- D. A molecular solid

Sol: d

In the case of molecular solid only Van der Waals forces keep the molecules together in the crystal lattice. Hence the lattice is easily broken. So small amount of heat is enough to melt the solid molecular crystal

Q12. In a face centred cubic lattice atoms A form the corner points and atoms B form the face centred points. If one atom B is missing from the face centred point the formula of the ionic compound is

- A. does not change
- B. AB_2
- C. A_2B_5
- D. A_2B

Sol: c

2_5 Formula becomes A_2B

Ratio of A: B = 1: 2.5 or 2 : 5

= 2.5 2 1 Share of 5 face centered particle of B per unit cube = 5 8 = 1 8 1 Share of a corner particles of A per unit cube = \''

Q13. In hexagonal close packing, the coordination number is

- A. 8
- B. 12
- C. 6
- D. 14

Sol: b

In hexagonal close packing each atom is in contact with 12 more atoms. Thus the coordination number becomes 12

Q14. Existence of a substance in two or more crystalline forms is called

- A. isomorphism
- B. polymorphism
- C. isomerism
- D. none of these

Sol: b

If one particular substance exists in two or more, crystalline forms then the phenomenon is called polymorphism., For example rhombic and monoclinic sulphur are two polymorphic forms of Sulphur.

Q15. The contribution to the unit cell by an atom found at the edge of the unit cell is

- A. 21
- B. 41
- C. 81
- D. 1

Sol: b

is Edge is the midpoint of a line joining the 2 adjacent corners of a cube. 4 1 An atom at the edge of a unit cell will be shared by 4 unit cells. Hence contribution

Q16. The ability of a substance to assume two or more crystalline structures is called

- A. isotropy
- B. isomorphism
- C. polymorphism
- D. isomerism

Sol: c

Isomorphism is the ability of 2 or more substances to attain same crystalline structure. Eg. Al_2O_3 and Cr_2O_3 alms. Polymorphism is the ability of a substance to exist in more than two crystalline forms. If only two forms are possible then the phenomenon is called dimorphism. Eg: Rhombic and Monoclinic sulphur

Q17. Ionic crystal shows

- A. isotropic property
- B. random distribution of particles
- C. conductance in the solid state
- D. anisotropic property

Sol: d

Crystals do not have the same properties in all the directions of measurement. Hence they are anisotropic. Note: Isotropic property is possessed by non-crystalline substances

Q18. Potassium crystallises with a body centred cubic lattice. Hence, the coordination number of potassium in potassium metal is

- A. Zero
- B. 8
- C. 6
- D. 4

Sol: b

Q19. Solid iodine is

- A. metallic crystal
- B. ionic crystal
- C. covalent crystal
- D. molecular crystal

Sol: d

In solid iodine lattice points are occupied by molecules of iodine. Hence Van der Waals forces operate

Q20. The unit cell present in the crystal lattice of diamond is

- A. cube
- B. tetragonal
- C. hexagonal
- D. trigonal

Sol: a

Diamond has a face centred cubic lattice