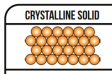
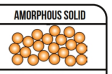
SOLID STATE

01 CRYSTALLINE & AMORPHOUS SOLID

CRYSTALLINE SOLID	AMORPHOUS SOLID
	
Constituent particles are arranged in a regular, repeating & alternating manner	Constituent particles are arranged in an irregular, random manner
True solid	Pseudo solid or super cooled liquid
Long range order	Short range order
Gives regular cleavage on cutting	Gives an irregular cleavage on cutting
Anisotropic	Isotropic
Sharp melting point	Range of melting point
NaCl, Diamond, Ice etc.	Plastic, Rubber, Glass etc.

Q. Which of the following is a pseudo solid?

(A) CaF_2 (B) Glass

(C) NaCl (D) All of these

02 CLASSIFICATION OF CRYSTALLINE SOLID

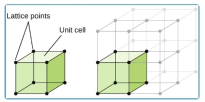
Name	Constituent Particles	Attractive Force	Properties	Examples
Ionic Solid	Ions	Ionic bond	Brittle, High melting point, poor conductors of heat & electricity	NaCl, KCl, LiCl, etc.
Covalent Solid	Atoms	Covalent bond	Hard, High melting point, poor conductors of heat & electricity	Diamond, Graphite, Quartz, Silica, etc.
Molecular Solid	Molecules	Inter molecular force of attraction	Soft, low melting point, poor conductors of heat & electricity	Wax, ice, Naphthaline, Dry ice, camphor, etc
Metallic Solid	Cations & Mobile electrons	Metallic bond	Soft - hard, low m.p- high m.p, good conductors of heat & electricity	All metals

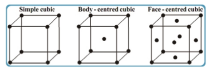
Q. Which one has the highest melting point?

(A) Ionic crystal (B) Molecular crystal

(C) Covalent crystal (D) Metallic crystal

03 UNIT CELL





- Corner → $\frac{1}{8}$
- Face center → $\frac{1}{2}$
- Body center → 1
- Edge center → $\frac{1}{4}$

} contribution per unit cell

Q. How many formula units are there in the unit cell of sodium chloride having FCC structure

(A) 2 (B) 4 (C) 6 (D) 8

04 DENSITY OF UNIT CELL

$$\rho = \frac{z \times M}{a^3 \times N_A}$$

- RADIUS & EDGE LENGTH
- Simple Cube → $r = \frac{a}{2}$
- BCC → $r = \frac{\sqrt{3}a}{4}$
- FCC → $r = \frac{a}{2\sqrt{2}}$

PACKING EFFICIENCY

Unit cell	Packing efficiency
Simple cubic	52.3%
bcc	68%
fcc	74%

Q. An element has a bcc structure with a cell edge length of 288pm. The atomic radius is:

(A) $\frac{\sqrt{2}}{4} \times 288pm$ (B) $\frac{4}{\sqrt{3}} \times 288pm$

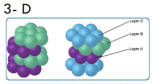
(C) $\frac{4}{\sqrt{2}} \times 288pm$ (D) $\frac{\sqrt{3}}{4} \times 288pm$

05 CLOSE PACKING

1- D

2- D

3- D



NUMBER OF OCTAHEDRAL VOID = N

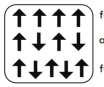
NUMBER OF TETRAHEDRAL VOID = 2N

Q. A compound is formed by cation C and anion A. The anions form hcp lattice & the cations occupy 75% of octahedral voids. The formula of the compound is

(A) C_4A_3 (B) C_2A_3 (C) C_3A_2 (D) C_3A_4

06 ELECTRICAL & MAGNETIC PROPERTIES

1. Magnetic

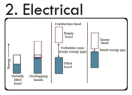


ferro magnetic

anti ferro magnetic

ferri magnetic

2. Electrical



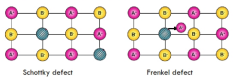
Q. Silicon doped with arsenic is an example of which type of semiconductor?

(A) p-type (B) n-type

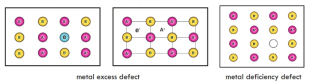
(C) n, p-type (D) Intrinsic

07 CRYSTAL DEFECT

1. Stoichiometric



2. Non-stoichiometric



Q. Which is the incorrect statement?

(A) Density decreases in case of crystals with Schottky defect.

(B) NaCl is insulator, silicon is semiconductor, silver is conductor, quartz is piezoelectric crystal.

(C) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal.

(D) $FeO_{0.98}$ has non-stoichiometric metal deficiency defect.

08 CRYSTAL SYSTEM

Crystal system	Axial relationships	Interaxial angles
Cubic	a = b = c	α=β=γ=90°
Tetragonal	a = b ≠ c	α=β=γ=90°
Orthorhombic	a ≠ b ≠ c	α=β=γ=90°
Hexagonal	a = b ≠ c	α=β=90°, γ=120°
Rhombohedral or Trigonal	a = b = c	α=β=γ≠90°
Monoclinic	a ≠ b ≠ c	α=γ=90° ≠ β
Triclinic	a ≠ b ≠ c	α≠ β≠ γ≠90°

Q. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is

(A) 7 (B) 5 (C) 2 (D) 3