

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.

01

- Q. Which of the following is a pseudo solid?
 (A) CaF₂ (B) Glass
 (C) NaCl (D) All of these

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, Naphthalene, 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

02

- Q. Which one has the highest melting point?
 (A) Ionic crystal (B) Molecular crystal
 (C) Covalent crystal (D) Metallic crystal

UNIT CELL

■ Corner → 1/8 ■ Face center → 1/2 } contribution per unit cell
 ■ Body center → 1 ■ Edge center → 1/4

03

- 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

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%

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- Q. An element has a bcc structure with a cell edge length of 288pm. The atomic radius is:
 (A) $\frac{\sqrt{2}}{4} \times 288\text{pm}$ (B) $\frac{4}{\sqrt{3}} \times 288\text{pm}$
 (C) $\frac{4}{\sqrt{2}} \times 288\text{pm}$ (D) $\frac{\sqrt{3}}{4} \times 288\text{pm}$

SOLID STATE
 ATDB.uno



CLOSE PACKING

1- D

2- D

3- D

NUMBER OF OCTAHEDRAL VOID = N
 NUMBER OF TETRAHEDRAL VOID = 2N

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- 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) C₄A₃ (B) C₂A₃ (C) C₃A₂ (D) C₃A₄

ELECTRICAL & MAGNETIC PROPERTIES

1. Magnetic

2. Electrical

06

- 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

CRYSTAL DEFECT

1. Stoichiometric

2. Non-stoichiometric

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- 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.

CRYSTAL SYSTEM

Crystal system	Axial relationships	Interaxial angles
Cubic	a = b = c	$\alpha = \beta = \gamma = 90^\circ$
Tetragonal	a = b ≠ c	$\alpha = \beta = \gamma = 90^\circ$
Orthorhombic	a ≠ b ≠ c	$\alpha = \beta = \gamma = 90^\circ$
Hexagonal	a = b ≠ c	$\alpha = \beta = 90^\circ, \gamma = 120^\circ$
Rhombohedral or Trigonal	a = b = c	$\alpha = \beta = \gamma = 90^\circ$
Monoclinic	a ≠ b ≠ c	$\alpha = \gamma = 90^\circ \neq \beta$
Triclinic	a ≠ b ≠ c	$\alpha \neq \beta \neq \gamma \neq 90^\circ$

08

- 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