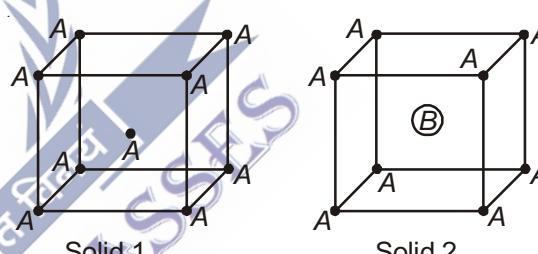


The Solid State

1. Copper crystallises in fcc with a unit cell length of 361 pm. What is the radius of copper atom?
[AIEEE-2009]
- (1) 127 pm (2) 157 pm
(3) 181 pm (4) 108 pm
2. The edge length of a face centered cubic cell of an ionic substance is 508 pm. If the radius of the cation is 110 pm, the radius of the anion is
[AIEEE-2010]
- (1) 144 pm (2) 288 pm
(3) 398 pm (4) 618 pm
3. Percentages of free space in cubic close packed structure and in body centered packed structure are respectively
[AIEEE-2010]
- (1) 48% and 26%
(2) 30% and 26%
(3) 26% and 32%
(4) 32% and 48%
4. Copper crystallises in fcc lattice with a unit cell edge of 361 pm. The radius of copper atom is
[AIEEE-2011]
- (1) 157 pm (2) 181 pm
(3) 108 pm (4) 128 pm
5. Lithium forms body centered cubic structure. The length of the side of its unit cell is 351 pm. Atomic radius of the lithium will be
[AIEEE-2012]
- (1) 300 pm (2) 240 pm
(3) 150 pm (4) 75 pm
6. Which of the following exists as covalent crystals in the solid state?
[JEE (Main)-2013]
- (1) Iodine
(2) Silicon
(3) Sulphur
(4) Phosphorus
7. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, is present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be
[JEE (Main)-2013]
- (1) 7.01% (2) 4.08%
(3) 6.05% (4) 5.08%
8. CsCl crystallises in body centred cubic lattice. If 'a' is its edge length then which of the following expressions is correct?
[JEE (Main)-2014]
- (1) $r_{Cs^+} + r_{Cl^-} = 3a$
(2) $r_{Cs^+} + r_{Cl^-} = \frac{3a}{2}$
(3) $r_{Cs^+} + r_{Cl^-} = \frac{\sqrt{3}}{2}a$
(4) $r_{Cs^+} + r_{Cl^-} = \sqrt{3}a$
9. Sodium metal crystallizes in a body centred cubic lattice with a unit cell edge of 4.29 Å. The radius of sodium atom is approximately
[JEE (Main)-2015]
- (1) 1.86 Å (2) 3.22 Å
(3) 5.72 Å (4) 0.93 Å
10. A metal crystallises in a face centred cubic structure. If the edge length of its unit cell is 'a', the closest approach between two atoms in metallic crystal will be
[JEE (Main)-2017]
- (1) $\sqrt{2}a$ (2) $\frac{a}{\sqrt{2}}$
(3) $2a$ (4) $2\sqrt{2}a$
11. Which type of 'defect' has the presence of cations in the interstitial sites?
[JEE (Main)-2018]
- (1) Schottky defect
(2) Vacancy defect
(3) Frenkel defect
(4) Metal deficiency defect

12. The one that is extensively used as a piezoelectric material is [JEE (Main)-2019]
 (1) Tridymite
 (2) Mica
 (3) Quartz
 (4) Amorphous silica
13. At 100°C, copper (Cu) has FCC unit cell structure with cell edge length of $x \text{ \AA}$. What is the approximate density of Cu (in g cm^{-3}) at this temperature? [Atomic Mass of Cu = 63.55 u]
 [JEE (Main)-2019]
- (1) $\frac{422}{x^3}$ (2) $\frac{205}{x^3}$
 (3) $\frac{105}{x^3}$ (4) $\frac{211}{x^3}$
14. Which primitive unit cell has unequal edge lengths ($a \neq b \neq c$) and all axial angles different from 90°?
 [JEE (Main)-2019]
- (1) Hexagonal
 (2) Monoclinic
 (3) Triclinic
 (4) Tetragonal
15. A compound of formula A_2B_3 has the hcp lattice. Which atom forms the hcp lattice and what fraction of tetrahedral voids is occupied by the other atoms?
 [JEE (Main)-2019]
- (1) hcp lattice - B, $\frac{1}{3}$ Tetrahedral voids - A
 (2) hcp lattice - A, $\frac{2}{3}$ Tetrahedral voids - B
 (3) hcp lattice - B, $\frac{2}{3}$ Tetrahedral voids - A
 (4) hcp lattice - A, $\frac{1}{3}$ Tetrahedral voids - B
16. A solid having density of $9 \times 10^3 \text{ kg m}^{-3}$ forms face centred cubic crystals of edge length $200\sqrt{2} \text{ pm}$. What is the molar mass of the solid?
 [Avogadro constant $\approx 6 \times 10^{23} \text{ mol}^{-1}$, $\pi \approx 3$]
 [JEE (Main)-2019]
- (1) $0.0305 \text{ kg mol}^{-1}$ (2) $0.4320 \text{ kg mol}^{-1}$
 (3) $0.0432 \text{ kg mol}^{-1}$ (4) $0.0216 \text{ kg mol}^{-1}$
17. The radius of the largest sphere which fits properly at the centre of the edge of a body centred cubic unit cell is (Edge length is represented by 'a')
 [JEE (Main)-2019]
- (1) 0.027 a (2) 0.047 a
 (3) 0.067 a (4) 0.134 a
18. Element 'B' forms ccp structure and 'A' occupies half of the octahedral voids, while oxygen atoms occupy all the tetrahedral voids. The structure of bimetallic oxide is [JEE (Main)-2019]
 (1) A_2B_2O (2) AB_2O_4
 (3) A_4B_2O (4) A_2BO_4
19. Consider the bcc unit cells of the solids 1 and 2 with the position of atoms as shown below. The radius of atom B is twice that of atom A. The unit cell edge length is 50% more in solid 2 than in 1. What is the approximate packing efficiency in solid 2?
- 
- [JEE (Main)-2019]
- (1) 45% (2) 65%
 (3) 75% (4) 90%
20. The amorphous form of silica is [JEE (Main)-2019]
 (1) Quartz (2) Tridymite
 (3) Kieselguhr (4) Cristobalite
21. An element has a face-centred cubic (fcc) structure with a cell edge of a . The distance between the centres of two nearest tetrahedral voids in the lattice is : [JEE (Main)-2019]
 (1) $\frac{3}{2}a$ (2) $\frac{a}{2}$
 (3) a (4) $\sqrt{2}a$
22. The ratio of number of atoms present in a simple cubic, body centered cubic and face centered cubic structure are, respectively [JEE (Main)-2019]
 (1) 4 : 2 : 3 (2) 4 : 2 : 1
 (3) 8 : 1 : 6 (4) 1 : 2 : 4

