CBSE 12th Chemistry
Chapter- 01 (The Solid State)
Unsolved Important Questions

SECTION A

(This section carry 11 questions each carry 1 mark)

Q.1. What type of magnetism is shown by a substance if magnetic moments of domains are arranged in same direction?

Q.2. What is total number of atoms per unit cell in a face-centered cubic (fcc) crystal structure?

Q.3. Silver crystallizes in a fcc lattice. The edge length of its unit cell is 4.077×10^{-8} cm and its density is 10.5 g cm^{-3}. Calculate on this basis the atomic mass of silver. (N_A 6.02×10^{23} mol^{-1})

Q.4. What is the coordination number of each type of ions in a rock-salt type crystal structure?

Q.5. What is primitive cell?

Q.6. Write a feature which will distinguish a metallic solid from an ionic solid.

Q.7. 'Crystalline solids are anisotropic in nature.' What does this statement mean?

Q.8. How many atoms constitute one-unit cell of a face-centered cubic crystal?

Q.9. What is the formula of a compound in which the element Y form ccp lattice and Atom of X occupy 1/3rd of tetrahedral voids?

Q.10. What type of magnetism is shown by a substance if magnetic moments of domains are arranged in same direction?

Q.11. How the conductivity of an intrinsic semiconductor may be increased?

SECTION B

(This section carry 11 questions each carry 2 marks)

Q.12. Calculate the number of unit cells in 8.1 g of aluminum if it crystallizes in a face-centered cubic (f.c.c.) structure. (Atomic mass of Al = 27 g mol^{-1}).

Q.13. An element with density 2.8 $g\ cm^{-3}$ forms a $f.c.c.$ unit cell with edge length $4 \times 10^{-8} cm$. Calculate the molar mass of the element.
(Given: $N_A = 6.022 \times 10^{23} mol^{-1}$)

Q.14. (i) What type of non-stoichiometric point defect is responsible for the pink color of LiCl?
(ii) What type of stoichiometric point defect is shown by NaCl?

Q.15. How will you distinguish between the following pairs of terms?
(i) Tetrahedral and octahedral voids
(ii) Crystal lattice and unit cell

Q.16. Account for the following:
(i) Schottky defects lower the density of related solids.
(ii) Conductivity of silicon increases on doping it with phosphorus.

Q.17. Aluminum crystallizes in an fcc structure. Atomic radius of the metal is 125 pm. What is the length of the side of the unit cell of metal?

Q.18. Calculate the packing efficiency of a metal crystal for a simple cubic lattice.

Q.19. Silver crystallizes with face-centered cubic unit cells. Each side of the unit cell has a length of 409 pm. What is the radius of an atom of silver? (Assume that each face atom is touching the four corner atoms.)

Q.20. An element with density 11.2 g cm^{-3} forms a f.c.c. lattice with edge length of 4×10^{-8} cm. Calculate the atomic mass of the element.
(Given: $N_A = 6.022 \times 10^{23}\ mol^{-1}$).

Q.21. Examine the given defective crystal

A^+	B^-	A^+	B^-	A^+
B^-	0	B^-	A^+	B^-
A^+	B^-	A^+	0	A^+
B^-	A^+	B^-	A^+	B^-

Answer the following question:

(i) What type of stoichiometric defect is shown by the crystal?

(ii) How is the density of the crystal affected by this defect?

(iii) What type of ionic substances show such defect?

Q.22. Name the parameters that characterize a unit cell.

SECTION- C

(This section carry 14 questions each carry 3 marks)

Q.23. An element crystallizes in a f.c.c lattice with cell edge of 250 pm. Calculate the density if 300 g of element contain 2×10^{24} atoms.

Q.24. Examine the given defective crystal:

X^+	Y^-	X^+	Y^-	X^+
Y^-	O	Y^-	X^+	Y^-
X^+	Y^-	X^+	O	X^+
Y^-	X^+	Y^-	X^+	Y^-

Answer the following questions:

(i) Is the above defect stoichiometric or non- stoichiometric?

(ii) Write the term used for this type of defect. Give an example of the compound which shows this type defect.

(iii) How does this defect affect the density of the crystal?

Q.25. Copper crystallizes with face centered cubic unit cell. If the radius of copper atom is 127.8 pm, calculate the density of copper metal.
(Atomic mass of Cu = 63.55 u and Avogadro's number $N_A = 6.02 \times 10^{23}$ mol^{-1})

Q.26. **Iron has a body centered cubic unit cell with the cell dimension of 286.65 pm. Density of iron is 7.87 g cm^{-3} Use this information to calculate Avogadro's number (Atomic mass of Fe = 56.0 u)**

Q.27. **The density of copper metal is 8.95g cm^{-3}. If the radius of copper atom be 127.8 pm, is the copper unit cell simple cubic, body-centered cubic or face-centered cubic.**

Q.28. **What is point defects. Describe two types of point defects.**

Q.29. **Iron has a body centered cubic unit cell with a edge of 286.65 pm. The density of iron is 7.87 g cm^{-3}. Use this information to calculate Avogadro's number (At. Mass of Fe = 56 g mol^{-1}).**

Q. 30. **The well known mineral fluorite is chemically calcium fluoride. It is known that in one unit cell of this mineral there are 4 Ca^{2+} ions and 8 F^{-} ions and that Ca^{2+} ions are arranged in a fcc lattice. The F^{-}ions fill all the tetrahedral holes in the face centred cubic lattice of Ca^{2+} ions. The edge of the unit cell is 5.46×10^{-8} cm in length. The density of the solid is 3.18 g cm^{-3}. Use this information to calculate Avogadro's number (Molar mass of CaF_2= 78.08 g mol^{-1})**

Q.31. **Silver crystallizes in face-center cubic unit cell. Each side of this unit cell has a length of 400 pm. Calculate the radius of the silver. (Assume the atoms just touch each other on the diagonal across the face of the unit cell. That is each face atom is touching the four corner atoms.)**

Q.32. **Tungsten crystallizes in body centered cubic unit cell. If the edge of the unit cell is 316.5 pm, what is the radius of tungsten atom?**

Q.33. **Iron has a body centered cubic unit cell with a cell dimension of 286.65 pm. The density of iron is 7.874 g cm^{-3}. Use this information to calculate Avogadro's number. (At. Mass of Fe=55.845 u)**

Q.34. **An element with molar mass 27 g mol^{-1} forms a cubic unit cell with edge length 4.05×10^{-8} cm. If its density is 2.7 $g\ cm^{-3}$, what is the nature of the cubic unit cell?**

Q.35. **An element crystallizes in a f.c.c lattice with cell edge of 250 pm. Calculate the density if 300 g of element contain 2×10^{24} atoms.**

Q.36. (a) What type of semiconductor is obtained when silicon is doped with boron?

(b) What type of magnetism is shown in the following alignment of magnetic moments?

↑ ↑ ↑ ↑ ↑ ↑

(c) What type of point defect is produced when AgCl is doped with $CdCl_2$?

SECTION- D

(This section carry 03 questions each carry 5 marks)

Q.37. (a) An element has atomic mass 93 $g\ mol^{-1}$ and density 11.5 $g\ cm^{-3}$. If the edge length of its unit cell is 300 pm, identify the type of unit cell.

(b) Write any two differences between amorphous solids and crystalline solids.

Q.38. (a) Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a f.c.c. structure. (Atomic mass of Al = 27 $g\ mol^{-1}$)

(b) Give reasons:

(i) In stoichiometric defects, NaCl exhibits Schottky defect and not Frenkel defect.

(ii) Silicon on doping with Phosphorous forms n-type semiconductor.

(iii) Ferrimagnetic substances show better magnetism than antiferromagnetic substances.