



# CHEMISTRY

## BOOKS - A N EXCEL PUBLICATION

### THE SOLID STATE

#### Question Bank

1. Why are solid rigid?



**Watch Video Solution**

2. Why do solids have a definite volume?



[Watch Video Solution](#)

3. Classify the following as amorphous or crystalline solids: polyurethane, naphthalene, benzoic acid, teflon, potassium nitrate, cellophane, polyvinyl chloride, fibre glass, copper.



[Watch Video Solution](#)

4. Why is glass considered as a supercooled liquid?



[Watch Video Solution](#)

5. Refractive index of a solid is observed to have the same value along all directions. Comment on the nature of this solid. Would it show cleavage property?



[Watch Video Solution](#)

6. Classify the following solids based on the nature of intermolecular forces operating in them: potassium sulphate, tin, benzene, urea, ammonia, water, zinc sulphide, graphite, rubidium, argon, silicon carbide.



[Watch Video Solution](#)

7. Solid A is very hard, insulator in solid as well as in molten state and melts at extremely high temperature. What type of solid is it?



[Watch Video Solution](#)

**8.** Ionic solids conduct electricity in molten state but not in solid state. Explain.



**Watch Video Solution**

**9.** What type of solids are electrical conductors, malleable and ductile?



**Watch Video Solution**

10. Give the significance of a lattice point.



[Watch Video Solution](#)

11. Name the parameters that characterise a unit cell.



[Watch Video Solution](#)

12. Distinguish between : Hexagonal and monoclinic unit cells



[Watch Video Solution](#)

**13.** Distinguish between : face- centred and end centred unit cells



[Watch Video Solution](#)

**14.** Explain how much portion of an atom located at corner and body centre.



[Watch Video Solution](#)

**15.** Explain how much portion of an atom located at corner and body centre of a cubic unit cell is part of its neighbouring unit cell.



**Watch Video Solution**

**16.** What is the 2 D coordination number of a molecule in square close packed layer?



**Watch Video Solution**



17. A compound forms hcp structure, what is the total number of voids in 0.5 mol of it? How many of these are tetrahedral voids?



[Watch Video Solution](#)

18. A compound is formed by two element M and N . The element N forms ccp and atoms M occupy  $\frac{1}{3}$  of the tetrahedral voids. What is the formula of the compound?



[Watch Video Solution](#)

**19.** An element with molar mass  $2.7 \times 10^{-2} \text{kgmol}^{-1}$  forms a cubic unit cell with edge length 405 pm. If its density is  $2.7 \times 10^3 \text{kgm}^{-3}$ , what is the nature of the cubic unit cell?



**Watch Video Solution**

**20.** What type of defect can arise when a solid is heated? Which physical property is affected by it and in what way?



[Watch Video Solution](#)

21. What type of stoichiometric defect is shown by ZnS, AgBr



[Watch Video Solution](#)

22. Explain how vacancies are introduced in an ionic solid when a cation of higher valence is added as an impurity in it.



[Watch Video Solution](#)

**23.** Ionic solids which have anionic vacancies due to metal excess defect develop colour. Explain with the help of a suitable example.



**Watch Video Solution**

**24.** A group 14 element is to be converted into n-type semiconductor by doping it with a suitable impurity. To which group should this impurity belong?



**Watch Video Solution**

**25.** What type of substances would make better permanent magnets: ferromagnetic or ferrimagnetic ? Justify your answer.



**Watch Video Solution**

**26.** Schottky defects and frenkel defects are two stoichiometric defects shown by crystals. Classify the following crystals into those showing schottky defects and frenkel defects

*NaCl, AgCl, CsCl, CdCl<sub>2</sub>*

name a crystal showing both schottky defects and frenkel defects.



**Watch Video Solution**

**27.** Schottky defects and frenkel defects are two stoichiometric defects shown by crystals.

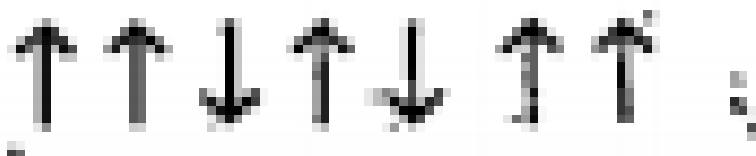
Name a crystal showing both schottky defects and frenkel defects.



**Watch Video Solution**

**28.** Schematic alignment of magnetic moments of ferromagnetic, antiferromagnetic and ferrimagnetic substances are given below.

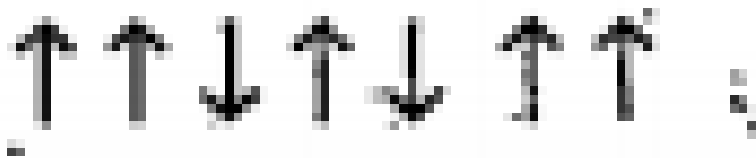
Identify each of them.



[Watch Video Solution](#)

**29.** Schematic alignment of magnetic moments of ferromagnetic, antiferromagnetic and ferrimagnetic substances are given below.

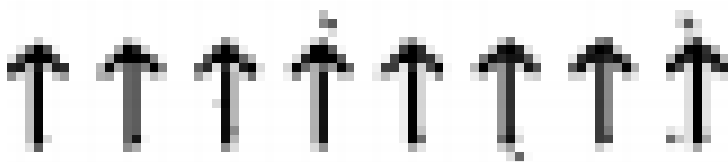
Identify each of them.



Watch Video Solution

**30.** Schematic alignment of magnetic moments of ferromagnetic, antiferromagnetic and ferrimagnetic substances are given below.

Identify each of them.







[Watch Video Solution](#)

**31.** Based on the nature of order present in the arrangement of the constituent particles, solid are classified into two crystalline and amorphous.

List out any four points of difference between crystalline and amorphous solids.



[Watch Video Solution](#)

**32.** A list of solids are given below:

Quartz, glass, iodine, ice.

From this identify crystal (s), having sharp melting point.



**Watch Video Solution**

**33.** A list of solids are given below:

Quartz, glass, iodine, ice.

From this identify crystal (s), Which is /are isotropic





[Watch Video Solution](#)

**34.** Crystal defects give rise to certain special properties in the solids. What is meant by frenkel defects?



[Watch Video Solution](#)

**35.** Crystal defects give rise to certain special properties in the solids. Why does LiCl not exhibit frenkel defect?



[Watch Video Solution](#)

**36.** Crystal defects give rise to certain special properties in the solids. Explain the pink colour of LiCl when heated in the vapours of Li.



**Watch Video Solution**

**37.** A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$ . Name the three important types of cubic unit cells.



**Watch Video Solution**

**38.** A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$  . Calculate the number of atoms in one unit cell in the above three cases.



**Watch Video Solution**

**39.** A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$  . A metal forms cubic crystals. The mass of one cell of it is  $\frac{M}{N_A}$  gram where  $M$  is the atomic mass of

the metal and  $N_A$  is avogadra number. What is the type of cubic unit cell.

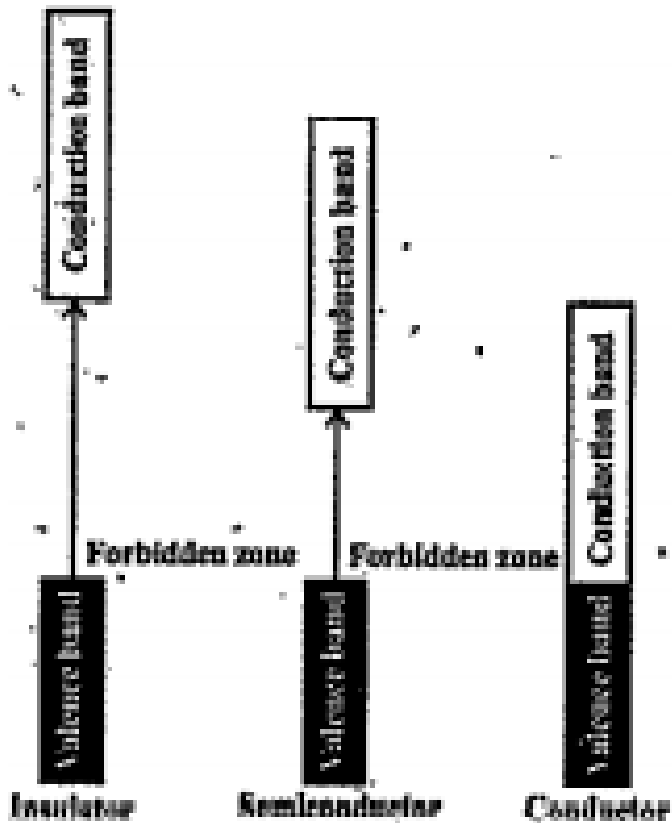


**Watch Video Solution**

**40.** Solids can be classified into three types on the basis of their electrical conductivities.

Name three types on the basis of their

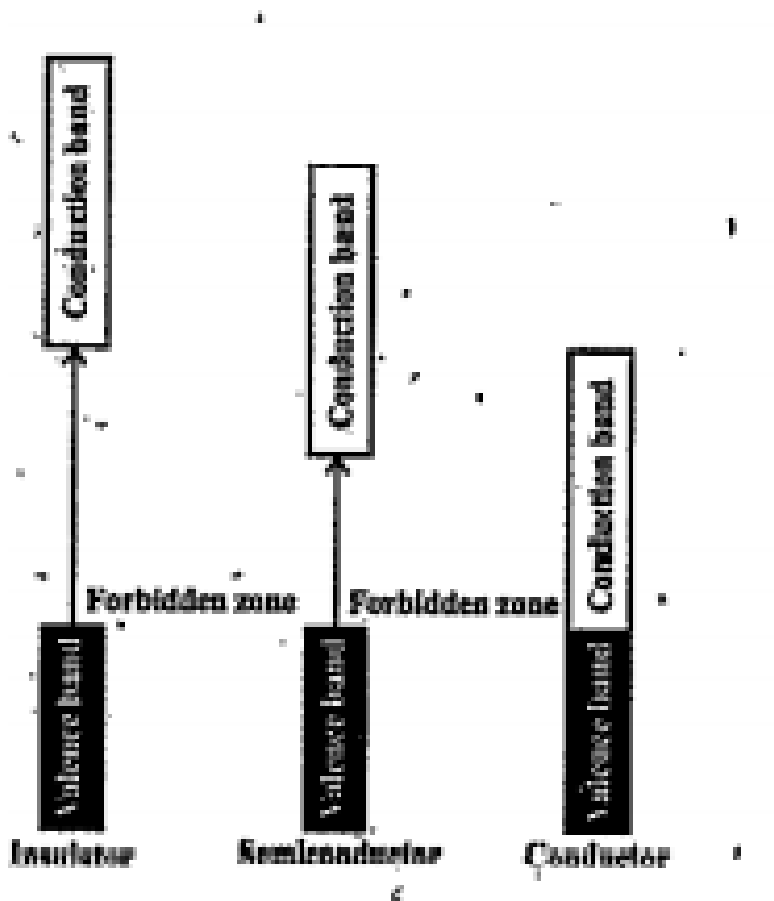
electrical conductivities.



Watch Video Solution

41. Solids can be classified into three types on the basis of their electrical conductivities.

How will you explain such classification based on band theory?







[Watch Video Solution](#)

**42.** Schottky and Frenkel defects are stoichiometric defects.

Write any two differences between Schottky defects and Frenkel defects.



[Watch Video Solution](#)

**43.** Schottky and Frenkel defects are stoichiometric defects.

When pure NaCl(sodium chloride) crystal is heated in an atmosphere of sodium vapours, it turns yellow. Give reason.



[Watch Video Solution](#)

**44.** NaCl has fcc structure. Calculate the number of NaCl unit cell of NaCl



[Watch Video Solution](#)

**45.** Calculate the density of NaCl, if the edge length of NaCl unit cell is 564 pm. (Molar mass of NaCl=58.5 g/mol)



**Watch Video Solution**

**46.** Unit cell can be broadly classified into 2 categories-primitive and centred unit cells.

What is unit cell?



**Watch Video Solution**

**47.** Unit cell can be broadly classified into 2 categories-primitive and centred unit cells.

Name the three types of centred unit cells.



**Watch Video Solution**

**48.** The unit cell dimension of a particular crystal system is  $a = b = c$ ,  $\alpha = \beta = \gamma = 90$ , identify the crystal system.



**Watch Video Solution**

**49.** Give one example for the above crystal system.



**View Text Solution**

**50.** Every substance has some magnetic properties associated with it. How will you account for the following magnetic properties?

Paramagnetic property



**Watch Video Solution**

**51.** Every substance has some magnetic properties associated with it. How will you account for the following magnetic properties?

Ferromagnetic property



**Watch Video Solution**

**52.** A compound is formed by two elements P and Q . Atoms Q (as anions) make ccp lattice and those of element P (as cation) occupy all

the tetrahedral voids. What is the formula of the compound?



[Watch Video Solution](#)

**53.** Crystalline solids are 'anisotropic'. What is anisotropy?



[Watch Video Solution](#)

**54.** Copper crystals have fcc unit cells:

Compute the number of atoms per unit cell of

copper crystal.



[Watch Video Solution](#)

**55.** Copper crystals have fcc unit cells:

Calculate the mass of a unit cell of copper crystal (atomic mass of copper=63.54u)



[Watch Video Solution](#)

**56.** Unit cell can be divided into two categories primitive and centred unit cells.



Differentiate between unit cell and crystal lattice.



[Watch Video Solution](#)

**57.** Unit cell can be divided into two categories primitive and centred unit cells.

Calculate the number of atoms per unit cell in the following: Body centred cubic unit cell (bcc)



[Watch Video Solution](#)

**58.** A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$  . Calculate the number of atoms in one unit cell in the above three cases.



**Watch Video Solution**

**59.** Which of the following is not a characteristics of a crystalline solid?

A. Definite heat of fusion

B. isotropic nature

C. A regular ordered arrangement of constituent particles

D. A true solid

**Answer: A**



**Watch Video Solution**

**60.** Frenkel defect and shottky defects are two stoichiometric defects in solids.

What are stoichiometric defects?



**Watch Video Solution**

61. Schottky and Frenkel defects are stoichiometric defects.

Write any two differences between Schottky defects and Frenkel defects.



[Watch Video Solution](#)

62. Which of the following is a molecular solid?

A. Diamond

B. Graphite

C. Ice

D. Quartz

**Answer: A**



**Watch Video Solution**

**63.** Unit cell can be classified into primitive and centred unit cells. Differentiate between primitive and centred unit cells.



**Watch Video Solution**

**64.** Presence of excess sodium makes NaCl crystal coloured. Explain on the basis of crystal defects.



**Watch Video Solution**

**65.** A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$ . Name the three important types of cubic unit cells.



**Watch Video Solution**

66. Identify the substance which shows frenkel defect.

A. nacl

B. KCL

C. ZnS

D. AgBr

**Answer: C**



**Watch Video Solution**

67. Identify the non-stoichiometric defects.

A. Schottky defects

B. Frenkel defects

C. Interstitial defects

D. Metal deficiency defect

**Answer: D**



**Watch Video Solution**



**68.** What type of substances would make better permanent magnets: ferromagnetic or ferrimagnetic ? Justify your answer.



**Watch Video Solution**

**69.** In terms of band theory write the differences between conductor and insulator.



**Watch Video Solution**

70. From the following choose the incorrect statement about crystalline solids.

A. Melt at sharp temperature

B. They have definite heat of fusion

C. They are isotropic

D. They have long range order

**Answer: A**



**Watch Video Solution**

71. A cubic unit cell is characterised by  $a = b = c$  and  $\alpha = \beta = \gamma = 90^\circ$ . Calculate the number of atoms in one unit cell in the above three cases.



[Watch Video Solution](#)

72. Cubic unit cells are divided into primitive, bcc and fcc.

Calculate the number of atoms in unit cell of each of the following : \*fcc



[Watch Video Solution](#)

**73.** Write two example of covalent solids.



**Watch Video Solution**

**74.** Thermal and elctrical conductivity of a solid is same in different directions.

Name the phenomenon involved



**Watch Video Solution**

**75.** Classify the following as amorphous or crystalline solids: polyurethane, naphthalene, benzoic acid, teflon, potassium nitrate, cellophane, polyvinyl chloride, fibre glass, copper.



**Watch Video Solution**

**76.** Diamond is a covalent solid in which carbon atoms are covalently bounded to form a three dimensional network structure.

Graphite and diamond are covalent solids. Do you agree with this statement?



[Watch Video Solution](#)

77. Give two differences in properties of covalent and ionic solids.



[Watch Video Solution](#)

78. Based on the dimensions of unit cells, crystal can be classified into seven.

Name the crystalline system that resembles a match box.



[Watch Video Solution](#)

**79.** Draw the structure of different cubic unit cells and calculate the number of particles in different cubic unit cells.



[Watch Video Solution](#)

**80.** In Beryllium crystal the layers of atoms are being arranged in a pattern of ABABAB-type

Name the close packed arrangement.



**Watch Video Solution**

**81.** Calculate the number of tetrahedral and octahedral voids present in 1 mol of a crystal.



**Watch Video Solution**



**82.** The vacant spaces in close packed structures are called voids.

illustrate a tetrahedral voids.



**Watch Video Solution**

**83.** Find the number of tetrahedral voids and octahedral voids in a crystal having  $N$  particles?



**Watch Video Solution**

**84.** A solid has a ccp arrangement of  $O^{2-}$  ions.

All of the tetrahedral voids are occupied by

$Na^+$  ions. Find molecular formula.



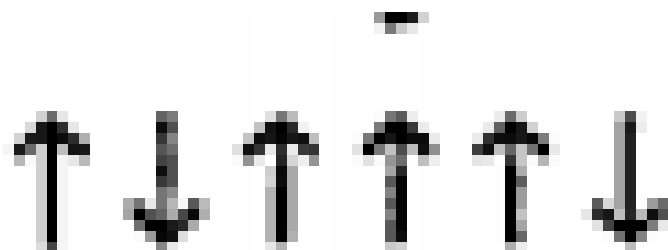
**Watch Video Solution**

**85.** Calculate the atomic mass of an element having cubic structure with one atom at each corner. The volume of the unit cell is  $2.4 \times 10^{-23} \text{ cm}^3$  and density is  $4.4 \text{ g cm}^{-3}$ .



**Watch Video Solution**

86. The following diagram shows the alignment of magnetic moments for some magnetic properties.



Which figure corresponds to anti-ferromagnetism? Justify your answer.



[Watch Video Solution](#)

**87.** Classify the following on the basis of magnetic properties and name of class.

*Al, TiO<sub>2</sub>, CO, MnO<sub>2</sub>,* Benzene,

*O<sub>2</sub>, NaCl, NH<sub>3</sub>, Fe<sup>3+</sup>, Ni*



**Watch Video Solution**

**88.** Some solids have regular order arrangement and others not. List out the difference between CCP and HCP solids.



**Watch Video Solution**

**89.** Solid A is very hard, insulator in solid as well as in molten state and melts at extremely high temperature. What type of solid is it?



**Watch Video Solution**

**90.** Account for the following : The electrical conductivity of a metal decrease with rise in temperature while that of semi-conductor increases.



**Watch Video Solution**

**91.** ZnO appears yellow on heating.



**Watch Video Solution**

**92.** Schottky defect lowers the density of ionic crystals while frenkel defects does not .



**Watch Video Solution**

**93.** Copper crystals have fcc unit cells:

Compute the number of atoms per unit cell of copper crystal.



[Watch Video Solution](#)

**94.** In a crystalline solid, some point defects is observed when a vacancy is created by an ion missing from its normal position . What is the name of the defects?



[Watch Video Solution](#)

**95.** Even crystals prepared with great care contains certain irregularities called crystal defects.

Which stoichiometric defects causes decrease in density of the crystal .



**Watch Video Solution**

**96.** Even crystals prepared with great care contains certain irregularities called crystal defects.



Why is frenal defects not found in alkali metal halides ?



[Watch Video Solution](#)

**97.** NaCl does not exhibit frenal defect. Do you agree? Justify.



[Watch Video Solution](#)

**98.** Assumes that a fresh piece of KCl crystal is heated in an atmosphere of potassium vapour.

Is there any colour change? Substantiate your answer.



[Watch Video Solution](#)

**99.** Though glass and quartz are both made up of  $SiO_4$  they differ structurally. Mention the main structural difference between them.



[Watch Video Solution](#)

**100.** Unit cell can be divided into two categories primitive and centred unit cells.

Differentiate between unit cell and crystal lattice.



**Watch Video Solution**

**101.** A metallic element crystallizes into a lattice containing a sequence of layers ABCABC.

Name the type of close packing in this element.





[Watch Video Solution](#)

**102.** A metallic element crystallizes into a lattice containing a sequence of layers ABCABC.

What is the co-ordination number of the above close packing ?



[Watch Video Solution](#)

**103.** A metallic element crystallizes into a lattice containing a sequence of layers

ABCABC.

What percentage by volume of this lattice is empty space?



[Watch Video Solution](#)