



# CHEMISTRY

## BOOKS - V PUBLICATION

### THE SOLID STATE

#### Question Bank

1. Why are solid rigid?



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2. Why do solids have a definite volume?



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



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4. Why is glass considered as a supercooled liquid?



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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?



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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.



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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?



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



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



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10. Give the significance of a lattice point.



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11. Name the parameters that characterise a unit cell.



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12. Distinguish between : Hexagonal and monoclinic unit cells



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**13.** 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.



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



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**15.** 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?



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**16.** 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?



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17. Which of the following lattices has the highest packing efficiency i) simple cubic ii) body centred cubic iii) hexagonal close packed lattice



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18. 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?



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



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



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



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**22.** Ionic solids which have anionic vacancies due to metal excess defect develop colour.

Explain with the help of a suitable example.



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**23.** 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?



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



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**25.** Define the term amorphous? Give a few examples of amorphous solids.



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**26.** What makes glass different from a solid such as quartz? Under what Conditions Could quartz be Converted into glass?



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**27.** Classify the following solids as ionic, metallic, molecular, network (covalent) or amorphous.

i) Tetraphosphorus decoxide ( $P_4O_{10}$ )

ii) Ammonium phosphate ( $NH_4PO_4$ )

iii) SiC

iv)  $I_2$

vi) Plastic

vi) Graphite

vii) Brass

ix) Rb

x) LiBr

xi) Si



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**28.** What is the coordination number of atoms:

i) in a cubic close-packed lattice?

ii) in a body-centred cubic structure?



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**29.** How can you determine the atomic mass of an unknown metal if you know its density and the dimension of its unit cell? Explain?



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**30.** Stability of a crystal is reflected in the magnitude of its melting points'. Comment.



Collect melting points of solid, water, ethyl alcohol, diethyl ether and methane from a data book. What can you say about the intermolecular forces between these molecules?



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31. How will you distinguish between the following pairs of terms i) Hexagonal Close packing and cubic close packing?



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**32.** How many lattice points are here in one unit cell of each of the following lattice? i) Face-centred cubic ii) Face-centred tetragonal iii) Body-centred



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**33.** Explain ii) Ionic solids are hard and brittle.



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**34.** Packing efficiency is the percentage of total space filled by the particles.

Which of the following lattices has the highest packing efficiency?

Simple cubic lattice, body centered cubic lattice, hexagonal close packed lattice



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**35.** Silver crystallises in fcc lattice. If edge length of the cell is ' $4.07 \times 10^{-8}$  cm' and

density is '10.5 gcm<sup>-3</sup>,' calculate the atomic mass of silver.



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**36.** A cubic solid is made of two elements P and Q. Atoms of Q are at the corners of the cube and P at the body-centre. What is the formula of the compound? What are the coordination numbers of P and Q?



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**37.** Niobium crystallises in body-centred cubic structure. If density is  $8.55\text{gcm}^{-3}$  calculate atomic radius of niobium using its atomic mass 93 amu



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**38.** If the radius of the octahedral void is 'r' and radius of the atoms in close-packing is 'R', derive relation between 'r' and 'R'.



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**39.** Copper crystallises into a fcc lattice with edge length ' $3.61 \times 10^{-8}$  cm'. Show that the calculated density is in agreement with its measured value of ' $8.92 \text{ g cm}^{-3}$ '



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**40.** Analysis shows that nickel oxide has the formula ' $\text{Ni}_{(0.98)} \text{O}_{(1.00)}$ '. What fraction of nickel exist as ' $\text{Ni}^{2+}$ ' and ' $\text{Ni}^{3+}$ ' ions?



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**41.** What is a semiconductor? Describe the two main types of semiconductors and contrast their conduction mechanisms



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**42.** Non-stoichiometric cuprous oxide, ' $\text{Cu}_{1-x}\text{O}$ ' can be prepared in laboratory. In this oxide, Copper to oxygen ratio is slightly less than '2:1'. Can you account for the fact that this substance is a p-type semiconductor?



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**43.** Ferric oxide crystallises in a hexagonal close packed array of oxide ions with two out of every three octahedral holes occupied by ferric ion: Derive the formula of the ferric oxide.



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**44.** Classify each of the following as being either a p-type or a n-type semiconductor.

a) Ge doped with In b) Si doped with B .



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**45.** Gold (atomic radius = 0.144 nm) crystallises in a face-centred unit cell. What is the length of a side of the cell?



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**46.** In terms of band theory differentiate Conductors, insulators & semi conductors



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**47.** Explain the following terms with suitable examples: i. Schottky defect ii. Frenkel defect iii. Interstitials and iv. F-centres.



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**48.** Aluminium crystallises in a cubic close-packed structure: Its metallic radius is '125 pm'.

i. What is the length of the side of the unit cell? ii. How many unit cells are there in  $1.00 \text{ cm}^{-3}$  of aluminium?



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**49.** If NaCl is doped with  $10^{-3}$  mol % of  $\text{SrCl}_2$ , what is the concentration of cation vacancies?



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50. Explain the following with suitable examples:

- i. Ferromagnetism
- ii. Paramagnetism
- iii. Ferrimagnetism
- iv. Antiferromagnetism

v. 12 – 16 and 13 – 15 group compounds



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51. Calculate the number of atoms in a cubic based unit cell having one atom on each Corner and two atoms on each body diagonal



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**52.** In a binary compound having cubic unit cell the anions 'B' are located at the Corners of the cube and face Corners of the cube and face centres when as cations 'A' occupy all the tetrahedral voids. What is the formula of the compound?



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

$Al, TiO_2, CO, MnO_2,$  Benzene,

$O_2, NaCl, NH_3, Fe^{3+}, Ni$



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

All of the tetrahedral voids are occupied by

$Na^+$  ions. Find molecular formula.



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**55.** In crystalline solid, atoms, ions or molecules are held in an orderly array. But some point defect is observed in a crystal, when a vacancy is created by an atom or ion dislocated from its normal position to an interstitial site. What is the defect called?



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**56.** Assign reason for the following, i.  
Phosphorus doped silicon is a semiconductor.

ii. Schottky defect lowers the density of a solid.

ii. Some of the very old glass object appear slightly milky instead of being transparent.



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**57.** Derive packing efficiency of

ccp and hcp structure



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**58.** Give the reason behind the following.

i) The glass window pannels of old buildings are thicker at the bottom than at the top.



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**59.** Why is zinc oxide white at low temperature and yellow at high temperature?



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

Name the crystalline system that resembles a match box.



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



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**62.** a. NaCl does not exhibit Frenkel. Defect. Do you agree? Justify. b: Assume that a fresh piece of KCl crystal is heated in an atmosphere of potassium " vapours. Is there any. COlour change? Substantiate your answer.



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**63.** Give reasons for the following: Copper is conducting as such while copper sulphate is

conducting only in molten state or in aqueous solution.



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**64.** Why is potassium chloride sometimes violet instead of pure white?



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**65.** 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.



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



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**67.** Classify the following solids as ionic, metallic, molecular, network (covalent) or amorphous.

i) Tetraphosphorus decoxide ( $P_4O_{10}$ )

ii) Ammonium phosphate ( $NH_4PO_4$ )

iii) SiC

iv)  $I_2$

vi) Plastic

vi) Graphite

vii) Brass

ix) Rb

x) LiBr

xi) Si



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**68.** A solid substance 'A B' has a rock salt geometry. What is the coordination number of 'A' and 'B'. How many atoms of 'A' and 'B' are present in the unit cell?



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**69.** Do all the metals possess a close packed structure? Name the different structure exhibited and give their packing fractions?



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**70.** Why are amorphous solids are considered as super cooled liquids?



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71. ZnO appears yellow on heating.



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72. The defects of crystalline solids are called thermodynamics defects. Why?



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73. Why is Frenkel defect not found in alkali metal halides?



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74.  $\text{CaCl}_2$  will introduce Schottky defect, if added to  $\text{AgCl}$  crystal. Explain?



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75. The ions of  $\text{NaF}$  and  $\text{MgO}$  have the same number of electrons and internuclear distances are also about the same ( 235 pm and 215 pm ). Then why the melting points of

NaF and MgO are different (992° C. and 2642° C resp.)



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76. MgO, has the structure of 'NaCl' and TiCl<sub>4</sub> has the structure of 'CsCl'. What are the Coordination numbers of the ions-in 'MgO' and TiCl<sub>4</sub>?



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**77.** What is the Coordination number of each type of ions in a rock salt type crystal structure?



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**78.** How many octahedral voids are there in 1 mole of a compound having cubic close packed structure?



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**79.** Find the number of atoms per unit cell in a face centred cubic structure having only single atoms at the lattice points?



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**80.** In  $\text{CaF}_2$  crystal, ' $\text{Ca}^{2+}$ ' ions are present in fcc arrangement. How many ' $\text{F}^-$ ' ions are present in the unit cell?



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**81.** What is the maximum possible coordination number of an atom in an hcp crystal structure of an element?



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**82.** What is the effect of the presence of Schottky defects on the density of a crystal?



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

Name a crystal showing both schottky defects and frenkel defects.



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**84.** Why is FeO non-stoichiometric with formula  $Fe(0.95)O$



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**85.** What is the reason for electrical conductivity in a) metals b) Ionic solids. c) semiconductors



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**86.** What are the types of lattice imperfections found in crystals?



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**87.** A metallic element crystallises into a lattice containing a sequence of layers of 'A B A B A B'. Any packing of spheres leaves out voids in the lattice. What percentage by volume of this lattice is empty space?



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**88.** Which element may be added to silicon to make electrons available for conduction of an electric current?





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**89.** How does the electrical conductivity of super conductors vary with temperature?



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**90.** What is the coordination number of Oxide ion in sodium oxide '(Na<sub>2</sub>O)'



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**91.** What is energy gap in band theory?

Compare its size in Conductors, semi

Conductors and insulators?



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**92.** AgI crystallises in cubic close packed ZnS

structure. What fraction of tetrahedral sites is

occupied by  $\text{Ag}^+$  ions?



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**93.** Why does the Conductivity of metals decrease with rise in temperature?



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**94.** What happens when ferrimagnetic  $Fe_3O_4$  is heated to  $850K$  and Why?



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**95.** Why does Frenkel defect not change the density of 'AgCl' crystals?



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**96.** Name a salt that can be added to 'AgCl' so as to produce cation vacancies?



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**97.** How will you distinguish between the following pairs of term? b) Crystal lattice and unit cell.



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**98.** Write a short notes on i) Schottky defect ii) Frenkel defect



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**99.** Explain the terms i) ferromagnetic substances ii) paramagnetic substances iii) diamagnetic substances



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**100.** What type of crystal defect is produced when 'NaCl' is doped with ' $\text{MgCl}_2$ '



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**101.** A solid has a cubic structure in which 'X' atoms are located at the corners of the cube, 'Y' atoms are at the cube centres and O atoms are at the edge centres. What is the formula of the compound?



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**102.** A compound formed by elements A and B crystallises in the cubic structure: Where' A atoms are at the corners of the cube and B



atoms are at the face centres. What is the formula of the compound?



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**103.** An element having atomic mass '52,' occurs in bcc structure with a cell edge of 288 pm. The density of the element is ' $7.2 \text{ gcm}^{-3}$ '. Evaluate Avogadro number.



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**104.** Copper crystallises into a fcc lattice with edge length  $3.61 \times 10^{-8} \text{ cm}$ . Calculate its density ( $\text{Cu}(M) = 63.5 \text{ g mol}^{-1}$ )



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**105.** If 'the length of the edge of unit cell of 'NaCl' type compound having cubic structure is 578 pm, what is the density of the compound? ( $\text{Na} = 23, \text{Cl} = 35.5, N_A = 6.023 \times 10^{23}$ )'



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**106.** An element (atomic mass=60) having face centred cubic unit cell has a density of '6.23  $\text{gcm}^{-3}$ '. What is the edge length of unit cell?



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**107.** The length of the unit cell edge of a body centred metal. crystal-is '352 pm'. Calculate the radius of an atom.of a metal?



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**108.** An element crystallises into a structure which may be described by a cubic type of unit cell having one atom on each corner of the cube and two atoms on one of its diagonals. If volume of this unit cell is  $24 \times 10^{-24} \text{ cm}^3$  and density of element is  $7.2 \text{ g / cm}^{-3}$ . Calculate the number of atoms present in 200 g of the element.



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**109.** Sodium metal crystallises in bcc lattice with the cell edge ' $a=4.29 \text{ \AA}$ '. What is the radius of sodium atom?



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**110.** Determine the density of caesium chloride which crystallises out in a bcc lattice. The length of a side of a unit cell is ' $412.1 \text{ pm}$ ', atomic masses of caesium and chlorine are 133 and 35.5 respectively.





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**111.** A metallic element crystallises into a lattice containing a sequence of layers of 'A B A B A B'. Any packing of spheres leaves out voids in the lattice. What percentage by volume of this lattice is empty space?



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**112.** A solid has a cubic structure in which 'X' atoms are located at the corners of the cube,

'Y' atoms are at the cube centres and O atoms are at the edge centres. What is the formula of the compound?



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**113.** An element having atomic mass '52,' occurs in bcc structure with a cell edge of 288 pm. The density of the element is ' $7.2 \text{ gcm}^{-3}$ '. Evaluate Avogadro number.



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**114.** How many formula units are there in a unit cell of 'NaCl ?'



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**115.** The unit cell of an element of atomic mass 108 and density ' $10.5 \text{ g cm}^{-3}$ ' is a cube with edge 'length '409 pm'. Find the structure of the crystal lattice ' $N_A = 6.022 \times 10^{23}$ '



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**116.** A compound 'A B' crystallises in bcc lattice with unit cell edge length of '380 pm'. Calculate (i) -the distance between oppositely charged ions (ii) radius of  $A^+$  if radius of  $B^-$  is in the lattice '175 pm' (c fits exactly in the cubic void)



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**117.** If the radius of  $Mg^{2+}$  ions,  $Cs^+$  ion,  $O^{2-}$  ion,  $S^{2-}$  ion and  $Cl^-$  ion are  $0.65 \text{ \AA}$ ,  $1.69 \text{ \AA}$ ,  $1.40 \text{ \AA}$ ,  $1.84 \text{ \AA}$  and  $1.81 \text{ \AA}$  respectively, then

calculate the Coordination number of cations in crystal of MgO, MgS and CsCl and Mgs



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**118.** A metal crystallises into two cubic phases, fcc and bcc whose unit cell lengths are  $3.5$  and  $3A^\circ$  respectively. Calculate the ratio of densities of fcc and bcc.



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**119.** Crystál AB (rock salt structure) has molecular weight ' $6.023 \times u$ ' where ' $x$ ' is an arbitrary number in  $u$ . If the minimum distance between cation and anion is ' $x^{1/3}$ , nm' (i) find the density in ' $\text{kgm}^{-3}$ '. if the measured density is ' $20 \text{ kgm}^{-3}$ ',(ii) Identify the type of point defect.



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**120.** AgI crystallises in cubic close packed ZnS structure. What fraction of tetrahedral sites is occupied by  $\text{Ag}^+$  ions?



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**121.** For a cubic crystal, the face diagonal is  $3.68A$ . Calculate the face length.



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**122.** An ionic compound made up of atoms 'X' and 'Y' has a face centred cubic arrangement in which atoms 'X' are at the corners and atom 'Y' are at the face centres. If one of the atoms is missing from the corner. What is the simplest formula of the compound?



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**123.** Chromium metal crystallises with a body centred cubic lattice. The length of the unit

cell edge is found to be '280 pm'. Calculate the atomic radius. What-would be the density of chromium in 'g / cm<sup>3</sup>'



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**124.** The Composition of a sample of wustite is  $Fe_{0.93}O_{1.00}$  What percentage of the iron is present in the form of Fe (III)



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**125.** In a cubic close packed structure of mixed oxides, the lattice is composed of oxide ions, one eighth of tetrahedral voids are occupied by divalent cations while one half of octahedral voids are occupied by trivalent cations. What is the formula of the oxide



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**126.** An element crystallises in fcc lattice having edge length 400pm. Calculate the

minimum diameter which can be placed interstitial sites without disturbing the structure



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**127.** Calculate the concentration of cation vacancies if NaCl doped with  $10^{-3}$  mole % of SrCl



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**128.** Diamond is hard because

- A. all the four valence electrons are bonded to carbon atoms by Covalent bonds
- B. it is a giant molecule
- C. it is made up of carbon atoms
- D. it cannot be burnt

**Answer: A**



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**129.** Which of the following is an example of paramagnetic solid?

A. NaCl

B. KF

C.

D. CuO

**Answer: D**



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130. Which is a diamagnetic compound?

TiO<sub>2</sub>, MnO<sub>2</sub>, V<sub>2</sub>O<sub>5</sub>

A. TiO<sub>2</sub>

B.

C. TiO

D.

**Answer: B**



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**131.** The material used in the solar cells contains

A. Cs

B. Si

C. Sn

D. Ti

**Answer: B**



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132. Which of the following is an ferromagnetic and metallic compound?

A.  $\text{CrO}_2$

B.  $\text{VO}_2$

C.  $\text{MnO}_2$

D.  $\text{TiO}_2$

**Answer: A**



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**133.** Pure silicon and germanium at OK are

A. conductors

B. Insulators

C. Semiconductors

D. May be any one of the above

**Answer: B**



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**134.** The liquefied metal expanding on solidification is

A. Ga

B. Al

C. Zn

D. CU

**Answer: A**



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**135.** In NaCl, the chloride ions occupy the spaces in a fashion of

A. fcc

B. bcc

C. both

D. None of these

**Answer: A**



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**136.** The crystal system of a compound with unit cell dimension  $a=0.387$ ,  $b=0.387$  and  $c=0.504\text{nm}$   $\alpha=\beta=90^\circ$  and  $\gamma=120^\circ$

A. cubic

B. hexagonal

C. orthorhombic

D. rhombohedral

**Answer: B**



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**137.** In a solid AB having the NaCl structure, A atoms occupy the corners of the cubic unit cell. If all the face centred atoms along one of the axes are removed, the resultant stoichiometry of the solid is



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**138.** How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.00g?

(Atomic mass Na-23, Cl - 35.5)



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**139.** In the crystals of which of the following ionic compounds would you expect maximum distance between the centres of the cations and anions?

A. LiF

B. CsF

C. CsI

D. Lil

**Answer: C**



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**140.** The hardest substance among the following is : Graphite, Titanium, Sic



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**141.** The fraction of the total volume occupied by the atoms present in a simple cube is



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**142.** If 'a' stands for the edge length of the cubic systems : Simple cubic, body centred cubic and face centred cubic, then the ratio of the radii of the spheres, in these system will be respectively



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**143.** Total volume of atoms present in face centred cubic unit cell of a metal is ( $r$ - atomic radius)



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**144.** A compound formed by elements 'A' and 'B' crystallises in the cubic structure: Where 'A' atoms are at the corners of the cube and 'B' atoms are at the face centres. What is the formula of the compound?



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**145.** In a tetragonal crystal



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**146.** The percentage of the available space occupied in a hexagonal close packing of spheres in three dimensions is

A. 0.26

B. 0.76

C. 0.524

D. 0.74

**Answer: D**



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**147.** The Coordination number of a metal crystallizing in a hexagonal close packed structure is



A. 12

B. 4

C. 8

D. 6

**Answer: A**



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**148.** What is the Coordination number of sodium in  $\text{Na}_2\text{O}$ .

A. 6

B. 4

C. 8

D. 2

**Answer: B**



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**149.** A solid compound contains XYZ atoms in a cubic lattice with X atoms occupying the corners, Y atoms in the body centred positions

and Z atoms at the centres of faces of the unit cell. What is the empirical formula of the compound



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**150.** If Z is the number of atoms in the unit cell that represents the closest packing sequence.....ABCABC..... the number of tetrahedral voids in the unit cell is equal to

A. Z

B.  $2Z$

C.  $Z/2$

D.  $Z/4$

**Answer: B**



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**151.** The ratio of Fe (+3) and Fe(+2) ions in Fe<sub>(0.9)</sub>S<sub>(10)</sub> is

A. 0.28

B. 0.5

C. 2

D. 4

**Answer: A**



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**152.** The number of tetrahedral voids in the unit cell of a face centred cubic lattice of similar atoms is

A. 4

B. 6

C. 8

D. 10

**Answer: C**



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**153.** If NaCl is doped with  $10^{-4}$  mol% of SrCl<sub>2</sub>, what is the concentration of cation vacancy



**154.** KCl crystallizes in the same type of lattice as does NaCl. Given that  $r_{Na^+} / r_{Cl^-} = 0.55$  and  $r_{K^+} / r_{Cl^-} = 0.74$ .

Calculate the ratio of the side of the unit cell for KCl to that of NaCl

A. 1.123

B. 0.891

C. 1.414

D. 0.414

**Answer: A**



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**155.** An ionic compound is expected to have tetrahedral structure, if  $r^+ / r^-$  lies in the range of

A. 0.155 to 0.255

B. 0.732 to 1

C. 0.414 to 0.732

D. 0.225 to 0.414



**Answer: D**



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**156.** The range of radius ratio (cation to anion) for an octahedral arrangement of ions in an ionic solid is

A. 0 to 0.155

B. 0.155 - 0.255

C. 0.225 - 0.414

D. 0.414 - 0.732

**Answer: D**



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**157.** The intermetallic compound  $\text{LiAg}$  crystallizes in cubic lattice in which both lithium and silver have coordination number of eight. The crystal class is

- A. Simple cubic
- B. Body centred cubic
- C. Face centred cubic

D. None of these

**Answer: B**



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**158.** The number of octahedral sites per sphere in fcc structure is

A. 8

B. 4

C. 2

D. 1

**Answer: D**



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**159.** Which of the following metal oxides, is antiferromagnetic in nature?

A.  $\text{MnO}_2$

B.  $\text{TiO}_2$

C.  $\text{VO}_2$

D. CrO<sub>2</sub>

**Answer: D**



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**160.** Which of the following fcc structure contains cations in alternate tetrahedral voids?

A. NaCl

B. ZnS

C.

D.

**Answer: B**



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**161.** The cubic unit cell of Al( molar mass 27g ) has an edge length of 405pm. Its density is 2.7 . The cubic unit cell is

A. face centred

B. body centred

C. primitive

D. edge centred

**Answer: A**



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**162.** CsBr crystallises in a body centred cubic lattice. The unit cell length is 436.6pm. Given that the atomic mass of Cs = 133 and that of Br

= 80 amu Avogadro number being the density of CsBr is



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**163.** In a compound atoms element Y form ccp lattice and those of element X occupy  $\frac{2}{3}$  rd of tetrahedral voids. The formula of the compound will be



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**164.** A compound is formed by elements A and B. This crystallises in the cubic structure where the A atoms are at the corners of the cube and B atoms are at the body centres. The simplest formula of the compound is



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**165.** A solid has a structure in which W atoms are located at the corners of a lattice, O atoms at the centre of the edges and Na atom at the

centre of the cube. The formula of the compound is



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**166.** When the molten Zinc is cooled to solid state, it assumes hcp structure, Then the number of nearest neighbours of zinc atom will be

A. 4

B. 6

C. 8

D. 12

**Answer: D**



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**167.** The  $\text{Ca}^{2+}$  and  $\text{F}^-$  ions are located in  $\text{CaF}_2$  crystal, respectively at face centred cubic lattice points and in

A. tetrahedral voids

B. half of tetrahedral voids

C. octahedral voids

D. half of octahedral voids

**Answer: A**



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**168.** In a face centred cubic lattice, unit cell is shared equally by how many unit cells?

A. 4

B. 2

C. 6

D. 8

**Answer: C**



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**169.** In AgBr there can occur

A. only schottky defect

B. only Frenkel defect

C. both a and b

D. None of these

**Answer: C**



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**170.** Schottky defect in crystals is observed when

A. unequal number of cations and anions  
are missing from the lattice

B. Equal number of cations and anions are missing from the lattice

C. An ion leaves its normal site and occupies an interstitial site.

D. Density of the crystal is increased

**Answer: B**



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**171.** Due to Frenkel defect, the density of the ionic solids

A. increases

B. decreases

C. does not change

D. changes

**Answer: C**



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**172.** The correct expression for Bragg equation is



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**173.** Metallic lustre is explained by

- A. diffusion of metal ions
- B. oscillation of loose electrons
- C. excitation of free protons
- D. existence of bcc lattice

**Answer: B**



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**174.** A particular solid is very hard and has very high melting point. In solid state, it is a non-conductor and its melt is a conductor of electricity. Classify the solid

A. metallic

B. molecular

C. network

D. Ionic

**Answer: D**



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**175.** With which are of the following elements silicon should be doped so as to give p-type of semiconductor

A. Germanium

B. Arsenic

C. Selenium

D. Boron

**Answer: D**



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**176.** Schottky defect occurs mainly in electrovalent compounds where

A. positive ions and negative ions are of different size

B. positive ions and negative ions are of same size

C. positive ions are small and negative ions are big

D. positive ions are big and negative ions are small

**Answer: B**



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177. A p-type material is electrically

A. positive

B. negative

C. neutral

D. depends upon the concentration of p  
impurities

**Answer: C**



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**178.** In fluorite structure Coordination number of cations is

A. 4

B. 6

C. 8

D. 3

**Answer: C**



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**179.** In antifluorine structure Coordination number of anion is

A. 4

B. 6

C. 8

D. 12

**Answer: C**



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**180.** In antifluorite structure the negative ions

A. occupy tetrahedral voids

B. occupy octahedral voids

C. are arranged in ccp

D. are arranged in bcp

**Answer: C**



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**181.** In a compound, oxide ions have a ccp arrangement. Cations A are present in  $\frac{1}{8}$ th of tetrahedral holes and cations B occupy  $\frac{1}{2}$  of octahedral holes. The simplest formula of the compound is



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**182.** The number of unit cells in 58.5g of NaCl is approximately



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**183.** How many kinds of space lattices are possible in a crystal ?

A. 23

B. 7

C. 230

D. 14

**Answer: D**



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**184.** In an antifluorite structure, cations occupy

- A. octahedral voids
- B. centre of cube
- C. Tetrahedral voids
- D. COrners of cube

**Answer: C**



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