

India's Number 1 Education App

CHEMISTRY

NCERT - NCERT CHEMISTRY(ENGLISH)

THE SOLID STATE



1. Why are solid rigid?

2. Why do solids have definite volume?



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



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

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5. Classify the following solids in different categories based on the nature of the inter molecular forces : sodium sulphate, copper, benzene, urea, ammonia, water, zinc sulphide, diamond, rubedium, argon, silicon carbide.

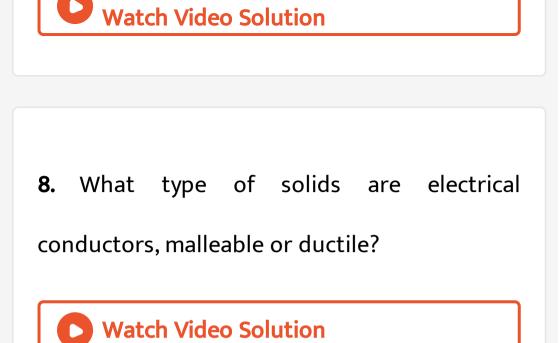


6. Solid X is a very hard solid which is electrical insulator in solid as well as in molten state and has extremely high melting point. What type of solid is it ?

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





9. Give the significance of "lattice point."

10. Name the parameters that characterized a

unit cell.

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11. Distinguish between

- a. Hexagonal and monoclinic unit cells
- b. Face-centred and end-centred unit cells

12. Explain how much portin of an atom located at (a) corner and (b) body centre of a cubic unit cell is part of its neighouring unit cell.

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13. What is the two-dimensional coordination

number of a molecule in square close-packed

layer?



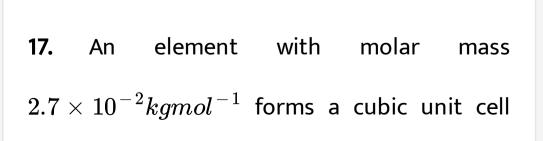
14. A compound forms hexagonal close-packed structure. What is the total number of voids in0.5 mol of it? How many of these are tetrahedral voids?

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15. A compound is formed by two elements Y and Z . The element Z forms ccp and atoms Y occupy 1/3 rd of tetrahedral voids. The formula of the compound is



16. Which of the following lattices has the highest packing efficency (a) simple cubic, (b) body-centred cubic, and (c) hexagonal close-packed lattice?



with edge length 405pm.lf its density is $2.7 imes10^3kg^{-3}$, what is the nature of the cubic unit cell?

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18. What type of defect can arise when a solid is heated?

Which physical property is affected by it and in

what way?

19. What type of stoichiometric defect is shown by:

(a) ZnS (b) AgBr

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20. Explain how vacancies are introduced in an

ionic solid when a cation of higher valencey is

added as an impurity in it.

21. Ionic solids, which have anioninc vacancies due to metal excess defect, developed colour. Explain with the help of a suitalbe example.

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



23. What type of substances would make better permanent magnets, ferromagnetic or ferrimagnetic? Justify your answer.



24. Define the term "amorphous". Give a few

example of amorphous solids.



25. What makes a glass different from a solid susch as quartz? Under what conditions could quartz be converted into glas?



26. Classify each of the following solids as ionic, metallic, molecular, network (covalent), or amorphoues.

a. Tetra phosphorus decoxide (P_4O_{10})

b. Graphite c. Brass

- d. Ammonium phosphate $(NH_4)_3PO_4$
- e. Sic f. Rb g. I_2 h. LiBr
- i. P_4 j. Si k. Plastic



27. What is meant by the term "coordination number"?

- b. What is the coordination number of atoms:
- i. in a cubic closed-packed structure?
- ii. In a body-centred cubic structure?

28. How can you determine the atoic mass of

an unknown metal if you know its density and

the dimension of its unit cell ? Explain.



29. a. "Stability of a crystal is reflected in the magnitude of its melting points" Comment. b. Melting points of some compounds are given below water = 273K, ethyl alcohol = 153.7K, diethyl ether = 156.8K, methane = 90.5K. What can you say about the intermolecular forces between the molecules of these compounds? **Vatch Video Solution**

30. How will you distinguish between the following pairs of terms?

- a. Hexagonal close-packing and cubic closepacking
- b. Crystal lattice and unit cell
- c. Tetrahedral void octahedral void





31. How many lattice points are there in one

unit cell of each of the following lattice?

- a. Face-centred cubic
- b. Face-centred tetragonal
- c. Body-centred

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32. Explain

a. The basic of sumilarities and differences

between metallic and ionic crystals.

b. Ionic solids are hard and brittle.



- 33. Calculate the efficiency of packing in case
- of a metal crystal for
- a. Simple cubic
- b. Body-centred cubic
- c. Face-centred cubic (with the assumptions

that atoms are touching each other).



34. Silver crystallizes in fcc lattic. If the edge length of the cell is $4.07 \times 10^{-8} cm$ and density is $10.5 g cm^{-3}$. Calculate the atomic mass of silver.

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35. A cubic solid is made of two element P and Q Atoms of Q are the corners of the cube P at the body-centre. What is the formula of the

compound? What are the coordination

number fo P and Q?

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36. Niobium crystallizes in body-centred cubic structure. If the density is $8.55gcm^{-3}$, calculate the atomic radius of niobium using its atomic mass 93u.

37. If the radius of the octaheral void is r and

the radius of the atoms in close-packing is R,

derive relation between r and R



38. Copper crystallizer into an fcc lattice with edge length $3.61 \times 10^{-8} cm$, Show that the calculated density in in agreement with its measured value of $8.92gcm^3$.

39. Analysis shows that nickel oxide has the formula $Ni_{0.98}O_{1.00}$. What fractions of nickel "exist" as Ni^{2+} and Ni^{3+} ions?



40. What is a semiconductor? Describe the

two main types of semiconductor and contrast

their conduction mechanism.

41. Non-stoichiometric cuprous oxide. Cu_2O can be perpared 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 semiconductors?

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42. Ferric oxide crystalliizes in a hexagonal close-packed array of oxide ions with two out of every three octahedral holes occupied by

ferric ions. Derive the formula of the ferric

oxide.



43. Classify each of the following as being

either a p-type or an n-type semiconductor

a. Ge doped with In

b. B doped with Si

44. Gold (atoic radius = 0.144 nm) crystallizes in a facelcentred unit cell. What is the length of a side of the cell?



45. In terms of band theory, what is the difference between

a. a condcutor and an insulator

b. a conductor and a semiconductor

46. Explain the following terms with suitable example:

- a. Schottky defect b. Frenkel defect
- c. Interstitials d. F-centres

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47. Aluminium crystallizes in a cubic closepacked structre. Its metallic radius is $125p \pm$ a. What is the length of the side of the unit cell? b. How many unit cell are there in $1.00 cm^3$ of

aluminium?



48. If NaCl is doped with 10^{-3} mol% of $SrCl_2$, what is the concentration of cation vacancies?



49. Example the following with suitable examples:

a. Ferromagnetism b. Paramagnetism

c. Ferrimagnetism d. Antiferromagnetism





1. A compound is formed by two elements Xand Y. Atoms of the element Y (as anion) make ccp and those of element X (as cation) occupy all the octahedral voids. What is the formula of the compound?

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2. Atoms of elements B from hcp lattice and those of element A occupy two-thirds of tetrahedral voids. What is the formula of the compound formed by elements A and B?



3. An element has a bcc structure with a cell edge of 288 pm. The density of the element is $7.2gcm^{-3}$. How many atoms are present in 208g of the element?