

India's Number 1 Education App

CHEMISTRY

BOOKS - MAXIMUM PUBLICATION

THE SOLID STATE



1. The 14 possible three dimenstional crystal

lattices are called

2. Which of the following type of cubic lattices has maximum number of atoms per unit cell?

A. simple cubic

B. body centred cubic

C. face centred cubic

D. all have same

Answer: C

- 3. F- centres in an ionic crystal are
- a. lattice sites containing electrones
- b. interstitial sites containing electrons
- c. lattice cites that are vacant

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4. The colour imparted by excess potassium in

KCI crystal is_____

5. Which of the following substances show antiferromagnetism?

A. ZrO_2

B. CdO

 $\mathsf{C.}\, CrO_2$

D. Mn_2O_3

Answer: D

6. The number of tetrahedral and octahedral voids in a ccp array of 100 atoms are respectively

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7. Potassium dichromate belongs to which

crystal system

8. 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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9. The empty space in body centred cubic lattice is





10. Which solid has weakest intermolecular

force



11. 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?





Write the names of A and B?



Identify and write the name of the shaded parts of A and B?

14. Teacher said that Frenkel defect will not happen in alkali metal halides. Ramu asked the

reason for this.

Can you explain?



15. "Dielectric substances are related to conductors. "Dielectric substances do not conduct electricity at normal condition"
These are two arguments of a class discussion.

Do you agree with these arguments?

16. "Dielectric substances are related to conductors. "Dielectric substances do not conduct electricity at normal condition" These are two arguments of a class discussion. If yes, justify both statements?

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Identify A and B.







Explain them.



19. Name the unit of magnetic moment



20. Match the following.

Paramagnetic - Fe_3O_4

Ferromagnetic - O_2 .

Antifemomagnetic - CrO_2

Ferrimagnetic - MnO

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21. All crystals exhibit imperfections.

- a) Which law is related to this statement?
- b) Draw the picture showing Frenkel defect.

22. All crystals exhibit imperfections.

Draw the picture showing Frenkel defect.

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23. What do you mean by Anisotropy how is it

differ from isotropy

24. 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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25. Packing efficiency differ for B.C.C, F.C.C and

Simple cube what is packing efficiency?

26. If NaCl is doped with 10^{-3} mol % of $SrCl_2$,

what is the concentration of cation vacancies?

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27. Even crystal, the substance which we consider as the most perfect solid, shows some defects or imperfections.
Which law in thermodynamics deals with this

topic?



28. Even crystal, the substance which we consider as the most perfect solid, shows some defects or imperfections.

Explain the law.



29. Excess of Li makes LiCl crystal pink and excess of K makes KCl crystals lilac. Is this



31. Calculate the number of atoms per unit cell of silver which crystallizes in fcc lattice.



33. In an answer paper a student wrote as

"carborundum crystals are very soft."

Do you agree with this?

34. In an answer paper a student wrote as

"carborundum crystals are very soft."

What is your opinion?

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35. In an answer paper a student wrote as

"carborundum crystals are very soft."

In which crystal type carborundum is included?

36. In an answer paper a student wrote as

"carborundum crystals are very soft."

Substantiate your view.

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37. During a seminar a student asked another

student, "Can NaCl give flame test?"

a) Write your answer.

38. During a seminar a student asked another

student, "Can NaCl give flame test?"

Write the colour of sodium during flame test.



39. During a seminar a student asked another student, "Can NaCl give flame test?" Write the name of the point which is responsible forthe colour of alkali metal halides having excess metal ions.



42. Solids are classified into two types.

Give 3 features of them

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43. Teacher explained that due to a stoichiometric defect, the density of a crystal changes.

Name the defect.

44. Teacher explained that due to a stoichiometric defect, the density of a crystal changes.
What change can we observe?

45. Teacher explained that due to a stoichiometric defect, the density of a crystal changes.

Give an example.

46. 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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47. An element has a body centred cubic structure with a cell edge of 288 pm. The

density of the element is 7.2 g/ cm^3 . How many

atoms are present in 208 g of the element?



49. Derive packing efficiency of

body centered cubic



51. Iron (II) oxide crystallise in cubic structure with unit cell edge of 5.0Å If the density of the oxide is 3.8 g cm-3 . Calculate the no. of Fe^2 +



52. Which are the two types of close packing in

two dimension. What are its differences?

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53. 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



54. A substance 'A' crystallizes in fcc lattice.

Calculate the number of atoms present per unit cell of 'A'.



55. A substance 'A' crystallizes in fcc lattice. In a crystalline solid AB, some vacancy is produced by missing of equal number of oppositely charged ions. What is the defect called?





56. What is meant by the term coordination

number?



57. What is the coordination number of atoms:

- i) in a cubic close-packed lattice?
- ii) in a body-centred cubic structure?



58. Identify the crystal



Write the name of the crystal.



59. Identify the crystal



How many particles are present in the unit cell

of this crystal?

60. Identify the crystal



Write the relation connecting edge length and

radius of the particle.

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

i) ↑ ↑ ↑ ↑ ↑ ↑ ii) ↑ ↓↑↓ ↑↓ iii) ↑↑ ↓ ↑↑↓

Identify the magnetic properties denoted by (i),(ii),(iii).
62. Examine the substances H_2O , NaCl, C_6H_6

and name the magnetic property common to

them.



63. How many lattice points are there in one

unit cell of the following lattices?

Face centred cubic

64. How many lattice points are there in one

unit cell of the following lattices?

Body centred cubic

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65. How many lattice points are there in one unit cell of the following lattices? **Simple cubic**

66. Classify the following into crystalline and amorphous solids.

NaCl ,Graphite , Plastic, Diamond, Rubber, KCI,

Wood, $CaC0_3$, lodine .

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67. Write any two properties of graphite.

68. Fill in the blanks.

Name	Dimension		Example
Cubic	a=b=c,α=β=	γ=(a)	(b)
Orthorhombic	(c)	(d)	Rhombic Sulphur
(e)	a=b≠c,α=β=(f)	γ=(g)	(h)



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69. NaCl shows mainly Schottky defect and

AgCI shows Frenkel defect. Do you agree with

this statement? Justify.



70. Classify the following solids into isotropic and anisotropic.

Polyvinylchloride, Rubber, Glucose, Glass

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71. The common salt, sodium chloride is an example for crystal system with edge length a

= b = c and angles α = β = γ = 90°.

Identify the crystal system.

72. The common salt, sodium chloride is an example for crystal system with edge length a = b = c and angles $\alpha = \beta = \gamma = 90^{\circ}$.

What happens when sodium chloride crystal is

heated in presence of sodium?



73. Stoichiometric defects are of two types such as vacancy defects and interstitial defects. Which defect is basically a vacancy defect in

ionic solids?



74. Stoichiometric defects are of two types such as vacancy defects and interstitial defects.

Which stoichiometric defect causes the

decrease in density of solid?

75. Stoichiometric defects are of two types such as vacancy defects and interstitial defects.

)On heating white ZnO it turns yellow. Which is

the crystal involved here? Explain.

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76. Why is Frenkel defect not found in alkali

metal halides?

77. A crystalline solid has simple cubic structure in which P atoms are present at the corners, Q atoms are present at the edge centres and R atoms are present at the centre of the unit cell.

What is the formula of the compound?



78. Classify each of the following solids as ionic, metallic, molecular, network or

amorphous.

a) I_2 b) Plastic

c) LiBr d) SiC

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79. In terms of band theory differentiate

Conductors, insulators & semi conductors

80. On the basis of nature of constituent particles,crystals are classified into four types. Which are they?



81. On the basis of nature of constituent particles ,crystals are classified into four types.

In which type does diamond belongs to? Why?



82. On the basis of nature of constituent particles,crystals are classified into four types. Can you say whether lodine can be written as an example of ionic crystal? Why?

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Distinguish between A and B?

c) Give two examples of crystals showing this

defect.





Explain the defect in figure B.



Give two examples of crystals showing this defect.



86. Teacher explained crystal defects in class

room.

What are the different types of crystal

defects?



87. Teacher explained crystal defects in class room.

Explain with the help of diagram the

important difference between Schottky and

Frenkel defects?

88. NaCl is an example for diamagnetic substance.

Write an example for paramagnetic substance.

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89. NaCl is an example for diamagnetic

substance.

What is the difference between ferromagnetic

and anti ferromagnetic substances?

90. NaCl is an example for diamagnetic substance.
In case of feri magnetic substances net magnetic moment is not zero. Justify.
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91. The diagram of a cubic crystal whose molecular mass=M, edge length=a, density=P , is given below. N is the Avogrado number.



From the above given details find the mass of

this cube and also the mass of N particles?

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92. The diagram of a cubic crystal whose molecular mass=M, edge length=a, density=P ,

is given below. N is the Avogrado number.



By equating these two equations, try to find out a suitable equation for the density of this cube.

93. Classify each of the following as being either a ptype or a n-type semiconductor.a) Ge dopped with In b) Si dopped with B .



94. A compound is formed by two elements P and Q. The element Q forms ccp and atoms of P occupy $\frac{1}{3^r}d$ of the tetrahedral voids. What is the formula of the compound?

95. 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, $CdCl_2$

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96. Schottky defects and Frenkel defects are two stoichiometric defects shown by crystals.

Name a crystal showing both Schottky defect

and Frenkel defect.



97. Schematic alignment of magnetic moments

of ferromagnetic, antiferromagnetic and

ferrimagnetic substances are given below.

Identify each ofthem.

i) $\uparrow \downarrow \uparrow \downarrow \uparrow \downarrow \uparrow \downarrow \uparrow \downarrow$ ii) $\uparrow \uparrow \downarrow \uparrow \downarrow \uparrow \uparrow \uparrow$ iii) $\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$

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

List out any four points of difference between crystalline end amorphous solids. b) Alist of solids are given below :

Quartz, glass, iodine, ice.

From this, identify crystal (s)

i) having sharp melting point.

ii) which is/are isotropic

99. A list of solids are given below :

Quartz, glass, iodine, ice.

From this, identify crystal (s)

having sharp melting point.



100. A list of solids are given below :

Quartz, glass, iodine, ice.

From this, identify crystal (s)

which is/are isotropic



101. Cristal defects give rise to certain special

properties in the solids.

What is meant by Frenkel Defect?



102. Cristal defects give rise to certain special

properties in the solids.

Why does LiCl not exhibit Frenkel Defect?





103. Cristal defects give rise to certain special

properties in the solids.

Explain the pink colour of LiCl when heated in

the vapours of Li.

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104. A cubic unit cell is characterized by a = b =

c and
$$\alpha$$
 = β = γ = 90°

a) Name three important types of cubic unit

cells and calculate the number of atoms in one

unit cell in the above three cases.



105. A cubic unit cell is characterized by a = b =

c and
$$\alpha$$
 = β = γ = 90°

A metal forms cubic crystals. The mass of one unit cell of it is $\frac{M}{N_A}$ gram, where M is the atomic mass of the metal and N_A is Avogardo Number. What is the type of cubic unit cell possessed by the metal?





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

i) Name three types of solids classified on the

basis of electrical conductivities.



107. Solids can be classified into three types on

the basis of their electrical conductivities.

How will you explain such classification based

on Band theory?



108. Schottky and Frenkel defects are stoichiometric defects.

Write any two differences between Schottky

defect and Frenkei defect.

109. Schottky and Frenkel defects are stoichiometric defects.

When pure NaCl (Sodium Chloride) crystal is

heated in an atmosphere of sodium vapours, it

tums yellow. Give reason.



110. NaCl has fcc structure. Calculate the

number of NaCl units in a unit cell of NaCl.

111. Calculate the density of NaCl, if edge length of NaCl unit cells is 564pm. [Molar, mass of NaCl =58.5g/mol].



112. Unit cells can be broadly classified into 2

categories primitive and centred unit cells.

What is a unit cell?

113. Unit cells can be broadly classified into 2

categories primitive and centred unit cells.

Name the three types of centred unit cells.



114. Unit cells can be broadly classified into 2 categories primitive and centred unit cells. The unit cell dimension of a particular crystal system is a = b = c and $\alpha = \beta = \gamma = 90^{\circ}$. Identify the crystal system.



115. Unit cells can be broadly classified into 2 categories primitive and centred unit cells. The unit cell dimension of a particular crystal system is a = b = c, $\alpha = \beta = \gamma = 90^{\circ}$. Identify the crystal system.Give one example for the above crystal system.



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

Paramagnetic property

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



Ferromagnetic property



118. A compound is formed by two elements P and Q. Atoms of Q (as anions) make hcp lattice and those of the element P (as cations) occupy all the tetrahedral voids. What is the formula of the compound?

119. Crystalline solids are 'anisotropic'. What is

'anisotropy'?



120. Copper crystals have fcc unit cells.

Compute the number of atoms per unit cell of

copper crystals
121. Copper crystals have fcc unit cells.

Calculate the mass of a unit cell of copper

crystals. (Atomic mass of copper = 63.54 μ)



122. Unit cells can be divided into two categories, primitive and centred unit cells. Differentiate between Unit Cell and Crystal Lattice.



123. Calculate the number of atoms per unit cell in the following :

Body centred cubic unit cell (bcc)

ii) Face centred cubic unit cell (fcc)

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124. Calculate the number of atoms per unit

cell in the following :

Face centred cubic unit cell (fcc)

125. Which of the following is not a characteristic of a crystalline solid? i) Definite heat of fusion ii) Isotropic nature iii) A regular ordered arrangement of constituent particles. iV) A true solid

126. Frenkel defect and Shottky defects are two stoichiometric defects found in crystalline solids.

What are stoichiometric defects?

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127. Frenkel defect and Shottky defects are two stoichiometric defects found in crystalline solids.

Write any two differences between Frenkel

defect and Schottky defect.



128. Which of the following is a molecular solid?

a) Diamond b) Graphite c) ice d) Quartz.



129. Unit cells can be classified into primitive and centered unit cells. Differentiate between primitive and centered unit cells.



130. Presence of excess Sodium makes NaCl crystal coloured. Explain on the basis of crystal defects.

uerects.



132. A unit cell is a term related to crystal structure.

Name any two types of cubic unit cells.

133. A unit cell is a term related to crystal structure.

d) Identify the substance which shows Frenkel

defect:

i) Naa ii) KCI

iii) Zns iv) AgBr

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134. Identify the non-stoichiometric defect

i) Schottky defect

ii) Frenkel defect



iv) Metal deficiency defect





137. From the following choose the incorrect

statement about crystalline solids.

- i) Melt at sharp temperature.
- ii) They have definite heat of fusion.
- iii) They are isotropic
- iv) They have long range order.





138. Cubic unit cells are divided into primitive,

bcc and fcc.

Calculate the number of atoms in a unit cell of

each of the following:

* **bcc**

* fcc

139. Cubic unit cells are divided into primitive,

bcc and fcc.

Write two examples for covalent solids.



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

i) Tetraphosphorus decoxide (P_4O_{10})

ii) Ammonium phosphate $\left(\left(NH_4
ight)_3 PO_4
ight)$

iii) SiC

- iv) I_2
- V) P_4
- vi) Plastic
- vii) Graphite
- viii) Brass
- ix) Rb
- x) LiBr
- xi) Si



141. What is meant by the term coordination

number?

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142. What is the coordination number of

atoms:

In a cubic close-packed lattice?

143. What is the coordination number of atoms:

In a body-centred cubic structure?



144. How many lattice points are there in one

unit cell of each of the following lattice?

Face-centred cubic

145. How many lattice points are there in one

unit cell of each of the following lattice?

End-centred monoclinic

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146. How many lattice points are there in one unit cell of each of the following lattice?

Body-centred

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

