CHEMISTRY

BOOKS - OMEGA PUBLICATION

THE SOLID STATE

Questions

1. Give important characteristics of solid state.

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2. Give important differences between crystalline and amorphous solids.

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3. An enzyme contain 5.6% Fe, calculate number of Fe atoms present in 1g of enzyme.

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4. What is anisotropy ?

5. What makes a glass different from a solid such as quartz ? Under what conditions could quartz be converted into glass ?

6. Name the binding forces in molecular solids.

7. Name the binding forces in ionic solids.

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8. Name the binding forces in covalent solids.

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9. Classify crystalline solids on the basis of nature of forces among the constituent particles.

10. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Tetra phosphorous decoxide (P_4O_{10})

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11. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or

amorphous.

Graphite

12. How many molecules of O2 are present in

1L air containing 80% volume of O2 at STP?

13. Calculate the volume occupied by 28g of

nitrogen gas

14. The number of moles of nitrogen atom in 18.066 (10*23) nitrogen atom is :

A. a. 2

B. b. 4

C. c. 8

D. d. 3

Answer:

15. Classify each of the following solids as ionic, metallic, molecular, Covalent

Rb

16. Classify each of the following solids as ionic, metallic, molecular, network (Covalent).

I_2

17. Classify each of the following solids as ionic, metallic, molecular, network (Covalent)

LiBr

18. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

P_4

19. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Si

20. Classify each of the following solids as ionic, metallic, molecular, network (Covalent)

or amorphous.

Plastic

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

22. Solid which is very hard, electrical insulator in solid as well as in molten state and melts at

extremely high temperature. What type of solid is it ?

23. The number of moles of nitrogen atom in 56 g nitrogen is

    A. a. 2

    B. b. 1

    C. c. 3

    D. d. 4

Answer:

24. What weight of grams is represented by 1.5

moles of sulphur dioxide ?

A. a. 60 g

B. b. 74 g

C. c. 96 g

D. d. 91 g

Answer:

25. Collect the melting point of

Ethyl alcohol

26. The number of atoms in 20g of SO_3 is

approximately

A. a. 1(10*23)

B. b. 1.5 (10*23)

C. c. 2 (10*23)

D. d. 6 (10*23)

Answer:

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27. Collect the melting point of

methane from a databook

28. What can you say about inter molecular forces between the molecules ?

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29. Write two differences between molecular solids and covalent solids .

▶ Watch Video Solution

30. Give two differences between ionic solids and covalents solids.

> ▶ **Watch Video Solution**

31. Explain :

The basis of similarities and differences between metallic and ionic crystal.

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32. Explain :

Ionic crystals are hard and brittle.

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

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34. Define a unit cell.

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35. What is crystal lattice or space lattice ?

Give significance of lattice point.

> ▶ **Watch Video Solution**

36. Give the significance of a ' lattice point

> ▶ **Watch Video Solution**

37. What are the primitive and non-primitive unit cells ?

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38. Define the following terms :

Body centred unit cell

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39. Define the following terms :

Face centred unit cell

▶ **Watch Video Solution**

40. Define the following terms :

End centred unit cell

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41. Distinguish between :

Hexagonal and monoclinic unit cells.

42. Distinguish between :

Face-centred and end-centred unit cells.

43. Nitrogen occurs in nature in the form of two isotopes with atomic mass 14 and 15 respectively. If average atomic mass of nitrogen is 14.0067, what is the % abundance of the two isotopes ?

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44. How many lattice point are there in one unit cell of each of the following lattices ?

face-centred tetragonal

45. How many lattice points are there in one unit cell of body centred cubic

46. A unit cell consists of a cube in which there are A atoms at the corners and B atoms at the face centres and A atoms are missing from two corners of the each unit cell. What is the simplest formula of the compound ?

47. Explain how much portion of an atom located at

Corner

48. Explain how much portion of an atom located at body center of cubic unit cell is part of its neighbouring cell.

49. If three elements P, Q and R crystalline in a cubic solid lattice with P atoms of the corners, Q atoms at the cube centres and R atoms at the centre of the edges, then write the formula of the compound.

50. Define co-ordination number

51. B has two isotopes 10B (19%) and 11B(81%) . What is the atomic mass of B .

52. What is the co-ordination nnmber of atoms in a body centered cnbic structure ?

53. How will you distinguish between the following pairs of term ?

Tetrahedral void and octahedral void.

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54. What is the two dimensional co-ordination number of a molecule in

A square packed layer ?

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55. What is the change that occurs in co-ordination numlier of NaCl crystal with high pressure

56. What is the effect of high pressure on the structure of ionic solid ?

57. What is the effect of high temperature on the co-ordination number of CSCl ?

58. If the radius of the octahedral void is r and the radius of the atoms in the packing is R, derive relationship between r and R.

59. Define radius ratio what is the value of radius ratio for octahedral gemotry ?

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60. In a close packed structure there are N-spheres, how many tetrahedral voids are associated with them ?

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61. In a close packed structure there are N-spheres, how many tetrahedral voids are associated with them ?

▶ **Watch Video Solution**

62. In a close packed structure, there are P-spheres, how many voids (total) are associated with them

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63. A compound is formed by two elements in M and N. The element N forms ccp and atoms of M occupy 1/3rd of tetrahedral voids. What is the formula of the compound ?

64. Atoms of element B form hcp lattice and those of the element A occupy 2/3rd of tetrahedral voids. What is the formula of the compound formed by the elements A and B?

65. What is the coordination number of atoms.

In a cubic close packed structure ?

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66. What is the co-ordination nnmber of atoms

in a body centered cnbic structure ?

> ▶ **Watch Video Solution**

67. A cube solid is made up of two elements P and Q. Atoms Q are present at the corners of the cubic and atom P at the body centre. What is the formula of the compound ? What are the co-ordination numbers of P and Q ?

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68. How will you distinguish between the following pairs of term ?

Hexagonal close packing and cubic close packing in three dimensions.

69. How will you distinguish between the following pairs of term ?

Tetrahedral void and octahedral void.

70. Predict the structure of MgO. The radius of Mg^{2+} ion is 65 pm and radius of O^2 ion is 140 pm Also find the co-ordination number

71. What is the co-ordination number in hcp and ccp ?

72. Calculate tbe packing efficiency of a metal crystal for a simple cubic lattice.

73. Calculate the efficiency of packing in case of a metal crystal for face centred cubic lattice.

74. Write the IUPAC Name of CH3CHCLCH3CHO

75. Why hcp and ccp are preferred over bcc packing ?

76. A compound forms hexagonal close packed structure. What is· the total number of voids in 0.5 mol of it? How many .of these are tetrahedral voids ?

77. How can you determine the atomic mass of an unknown metal if you know its density and the dimensions of its unit cell ? Explain your answer.

78. An element with molar mass 2.7×10^{-2} kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is 2.7×10^{3}

kgm^{-3}, what is the nature of the cubic unit cell ?

79. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm. What is the length of the side of the unti cell ?

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

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81. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm. What is the length of the side of the unti cell ?

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82. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm. How many unit cells are there in 100 cm^3 of aluminium ?

83. Silver crystallises with face centred cubic unit cells. Each side of the unit cell has a length of 409 pm. What is the radius of an atom of silver ? (Assu!'le that each face atom is touching the four corner atoms)

84. Copper (Cu) crystal has fcc. (face centred cubic) lattice structure. Atomic mass of copper is $63.5u$. Find out density of metallic crystal. Atomic radius of copper atom is 127.8 pm.

85. Iron has a body centred 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)

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86. Niobium crystallizes in a body centred cubic structure. If density is 8.55 gcm^{-3}, calculate atomic radius of niobium, given that its atomic mass is 92.9μ.

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87. Silver metal crystallise with a face centred cubic .lattice. The length of unit cell is found to be $4.077 \times 10^{-8} cm$. Calculate the atomic radius and density of silver (Atomic mass of Ag= 108 u, $NA = 6.02 x 10^{23} mol^{-1}$.

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88. 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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89. The edge length of NaCl unit cell is 564 pm. What is the density of NaCl ? The atomic mass of Na and Cl are 23 and 35.5 respectively. NaCL has fcc structure.

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90. Lead (II) sulphide crystals has NaCl structure. What is its density ? The edge length of its unit cell is 500 pm. (Atomic mass of Pb = 207 = S = 32).

91. Potassium crystallizes in a body centred cubic lattice. Calculate the number of unit cells in 1g of potassium. Atomic mass of potassium = 39μ.

92. Sodium crystallizes in i bcc unit cell. CalCulate the approximate no. of unit cells in 9.2 grams of sodium. (Atomic mass of Na = 23 u).

93. Write the IUPAC Name of CH3CHBrCH2CH3

94. An element with density 10 g cm^{-3} forms a cubic unit cell with edge length of 3×10^{-8} cm.What is the nature of the cubic unit cell if the atomic mass of the element is 81 g mol^{-1}

95. Silver has atomic mass 108 a.m.u. and density 10.5 g cm^{-3} If the edge length of its unit cell is 409 pm, identify the type of unit

cell. Also calculate the radius of an atom of silver.

96. Tungsten has body centred cubic lattice. Each edge of the unit is 316 pm and density of the metal is 19.35g cm^{-3}. How many atoms are present in 50 g of the metal ?

97. Sodium Crystallizes in bcc unit cell Calculate the number of unit cells in 9.2 g of sodium

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

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100. Define point defects.

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101. Define the following :

Vacancy defect

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102. Define the following :

Interstitial defect

  ▶ **Watch Video Solution**

103. What do you understand by imperfections in ionic crystals ? Name the type of imperfections which occur in ionic crystals.

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104. Explain the Schottky defects in crystals.

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105. What are the consequences of Schottky defects ?

▶ **Watch Video Solution**

106. Write the IUPAC Name of CH3CHNO2COOH

▶ **Watch Video Solution**

107. What are the conditions which favour the presence of Frenkel defects in the crystal ?

108. What are Frenkel defects ? Discuss

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109. What are the consequences of Frenkel defects ?

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110. Name the compound which can show both Schottky and Frenkel defect.

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111. Write two main differences between Schottky and Frenkel defect.

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112. Non-stoichiometric cuprous oxide (Cu_2O) can be prepared in the laboratory. In this oxide, copper to oxygen ratio is sloghtly less than 2 : 1 can you account for the fact that this substance is p-type semiconductor

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

114. What type of stoichiometric defect is shown by ZnS?

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115. What type of stoichiometric defect is shown by

AgBr

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116. Carbon occurs in nature in the form of two isotopes with atomic mass 12 and 13 respectively. If average atomic mass of carbon is 12.011 u , what is the % abundance of the two isotopes ?

117. Find the equivalent weight of CaCO3

118. What are F-centres ?

119. Find the equivalent weight of : K2SO4

120. Explain the metal excess defects due to extra cation in the interstitial sites

121. What is the equivalent weight of hydride of metal if equivalent weight of its oxide is 20 ?

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122. Find the percentage of calcium in calcium carbonate .

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123. Calculate the percentage of sulphur in sulphuric acid .

124. Calculate the percentage of carbon in methanol.

125. If NaCl is doped with 10^{-3} mol% of $SrCI_2$ what is the concentration of cation vacancies?

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126. What are conductors ? Give their different

types.

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127. What are metallic conductors ?

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128. What are semi conductors ? Explain with example

129. Describe the two main types of semiconductors.

130. What is doping ?

131. What is the effect of increase in temperature on the electrical conductivity of different type of conductors?

132. The electrical conductivity of metal decreases with rise in temperature, while that of a semiconductor increases. Explain

133. What is the simplest formula of the compound which has the following percentage composition carbon 80% , hydrogen 20% , if the molecular mass is 30. calculate its molecular formula ?

134. Identify each of the following as being a p-type and n-type semi-conductor.

Ge doped with In

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

B doped with Si

136. 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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137. What is energy gap in Band theory? Compare its size in conductors, semiconductors and insulators.

Or

Define the 'Forbidden zone' of an insulator.

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138. A compound on analysis gave the following results C = 54.54% , H=9.09% and rest is oxygen and vapour density of the compound = 88. Determine the molecular formula of the compound.

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139. In terms of band theory, what is the difference: between a condutor and a semiconductor?

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140. Calculate number of moles in 48g of NH3

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141. What are dia and paramagnetic substances?

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142. What is paramagnetic substance ? Give one example.

143. What are ferromagnetic substances? Explain briefly domain theory to explain ferromagnetism?

144. What is the cause of ferromagnetic character

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145. What are anti-ferromagnetic substances? Give one example.

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146. What are ferrimagnetic substances ? Give examples

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

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148. Define the following :

Antiferromagnetic substances and antiferromagnetism

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149. Give important characteristics of solid state.

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150. Give important differences between crystalline and amorphous solids.

▶ **Watch Video Solution**

151. Define the term amorphous. Give a few examples of amorphous solids.

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152. What is anisotropy ?

153. What makes a glass different from a solid such as quartz ? Under what conditions could quartz be converted into glass ?

154. Name the binding forces in molecular solids.

155. Name the binding forces in ionic solids.

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157. Classify crystalline solids on the basis of nature of forces among the constituent particles.

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158. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Tetra phosphorous decoxide (P_4O_{10})

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159. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Graphite

160. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Brass

161. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Ammonium phosphate $(NH_4)PO_4$

162. Classify each of the following solids as ionic, metallic, molecular, network (Covalent)

or amorphous.

SiC

163. Classify each of the following solids as ionic, metallic, molecular, Covalent

Rb

164. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

I_2

165. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

LiBr

166. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

P_4

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167. Classify each of the following solids as ionic, metallic, molecular, network (Covalent)

or amorphous.

Si

> ▶ **Watch Video Solution**

168. Classify each of the following solids as ionic, metallic, molecular, network (Covalent) or amorphous.

Plastic

> ▶ **Watch Video Solution**

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

▶ **Watch Video Solution**

170. Solid which is very hard, electrical 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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171. Stability of a crystal is reflected in the magnitude of its melting point. Comment

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172. Collect the melting point of Ice

> ▶ **Watch Video Solution**

173. Collect the melting point of

Ethyl alcohol

▶ Watch Video Solution

174. Collect the melting point of

diethylether

▶ Watch Video Solution

175. Collect the melting point of methane from a databook

▶ **Watch Video Solution**

176. What can you say about inter molecular forces between the molecules ?

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177. Write two differences between molecular solids and covalent solids .

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178. Give two differences between ionic solids and covalents solids.

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179. Explain :

The basis of similarities and differences between metallic and ionic crystal.

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180. Explain :

Ionic crystals are hard and brittle.

▶ **Watch Video Solution**

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

▶ **Watch Video Solution**

182. Define a unit cell.

▶ **Watch Video Solution**

183. What is crystal lattice or space lattice ? Give significance of lattice point.

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184. Give the significance of a ' lattice point

▶ **Watch Video Solution**

185. What are the primitive and non-primitive unit cells ?

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186. Define the following terms :

Body centred unit cell

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187. Define the following terms :

Face centred unit cell

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188. Define the following terms :

End centred unit cell

▶ **Watch Video Solution**

189. Distinguish between :

Hexagonal and monoclinic unit cells.

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190. Distinguish between :

Face-centred and end-centred unit cells.

191. How many lattice point are there in one unit cell of each of the following lattices ?

face-centred tetragonal

192. How many lattice point are there in one unit cell of each of the following lattices ? face-centred tetragonal

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193. How many lattice points are there in one unit cell of body centred cubic

> ▶ **Watch Video Solution**

194. A unit cell consists of a cube in which there are A atoms at the corners and B atoms at the face centres and A atoms are missing from two corners of the each unit cell. What is the simplest formula of the compound ?

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195. Explain how much portion of an atom located at

Corner

196. Explain how much portion of an atom located at body center of cubic unit cell is part of its neighbouring cell.

197. If three elements P, Q and R crystalline in a cubic solid lattice with P atoms of the corners, Q atoms at the cube centres and R atoms at

the centre of the edges, then write the formula of the compound.

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198. Define co-ordination number

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199. What is the coordination number of atoms.

In a cubic close packed structure ?

200. What is the co-ordination nnmber of atoms

in a body centered cnbic structure ?

201. How will you distinguish between the

following pairs of term ?

Tetrahedral void and octahedral void.

202. What is the two dimensional co-ordination number of a molecule in

A square packed layer ?

203. What is the change that occurs in co-ordination numlier of NaCl crystal with high pressure

204. What is the effect of high pressure on the structure of ionic solid ?

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205. What is the effect of high temperature on the co-ordination number of CSCl ?

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206. If the radius of the octahedral void is r and the radius of the atoms in the packing is R, derive relationship between r and R.

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207. Define radius ratio what is the value of radius ratio for octahedral gemotry ?

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208. In a close packed structure there are N-spheres, how many tetrahedral voids are associated with them ?

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209. In a close packed structure, there are M-spheres, how many octahedral voids are associated with them ?

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210. In a close packed structure, there are P-spheres, how many voids (total) are associated with them

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211. A compound is formed by two elements in M and N. The element N forms ccp and atoms of M occupy 1/3rd of tetrahedral voids. What is the formula of the compound ?

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212. What is the formula of a Compound in which the element Y forms hcp lattice and atoms of X occupy 2/3 rd of tetrahedral voids?

> ▶ **Watch Video Solution**

213. What is the coordination number of atoms.

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214. What is the co-ordination nnmber of atoms

in a body centered cnbic structure ?

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215. A cube solid is made up of two elements P and Q. Atoms Q are present at the corners of the cubic and atom P at the body centre. What is the formula of the compound ? What are the co-ordination numbers of P and Q ?

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216. How will you distinguish between the following pairs of term ?

Hexagonal close packing and cubic close packing in three dimensions.

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217. How will you distinguish between the following pairs of term ?

Tetrahedral void and octahedral void.

218. Predict the structure of MgO. The radius of Mg^{2+} ion is 65 pm and radius of O^2 ion is 140 pm Also find the co-ordination number

219. What is the co-ordination number in hcp and ccp ?

220. Calculate tbe packing efficiency of a metal crystal for a simple cubic lattice.

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221. Calculate the efficiency of packing in case of a metal crystal for face centred cubic lattice.

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222. Calculate the efficiency of packing in case of a metal crystal for body centred cubic lattice.

▶ **Watch Video Solution**

223. Why hcp and ccp are preferred over bcc packing ?

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224. A compound forms hexagonal close packed 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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225. How can you determine the atomic mass of an unknown metal if you know its density and the dimensions of its unit cell ? Explain your answer.

226. An element with molar mass 2.7×10^{-2} kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is 2.7×10^3 kgm^{-3}, what is the nature of the cubic unit cell ?

227. Aluminium crystallises in a cubic close packed structure. Its metallic radius is 125 pm.

What is the length of the side of the unti cell ?

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

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What is the length of the side of the unti cell ?

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230. Aluminium crystallises in .a cubic close packed structure. Its metallic radius is 125 pm. How many unit cell are there in 1.00 cm3 of aluminium ?

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231. Discuss the term- emulsions and their types?

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232. Copper (Cu) crystal has fcc. (face centred cubic) lattice structure. Atomic mass of copper is $63.5u$. Find out density of metallic crystal. Atomic radius of copper atom is 127.8 pm.

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233. Iron has a body centred 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)

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234. Write any two applications of emulsions?

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235. Define the term- Gelation?

236. Which of the following lattices has the highest packing efficiency ?

i) Simple cubic

ii) body centred cubic

iii) hexagonal close packed lattice

237. The edge length of NaCl unit cell is 564 pm. What is the density of NaCl ? The atomic mass of Na and Cl are 23 and 35.5 respectively. NaCL has fcc structure.

238. Name two drugs which helps to prevent the production of hydrochloric acid in the stomach?

239. Potassium crystallizes in a body centred cubic lattice. Calculate the number of unit cells in 1g of potassium. Atomic mass of potassium $= 39\mu$.

240. Sodium crystallizes in i bcc unit cell. CalCulate the approximate no. of unit cells in 9.2 grams of sodium. (Atomic mass of Na = 23 u).

241. An element 'X' with an atomic mass of 60/g mol has density of $6.23 \mathrm{g} \, \mathrm{cm}^{-1}$. If the edge length of its unit cell is 400 pm, identity the type of cell. Also calculate the radius of an atom of this element.

242. An element with density 10 g cm^{-3} forms a cubic unit cell with edge length of 3×10^{-8} cm.What is the nature of the cubic unit cell if the atomic mass of the element is 81 g mol^{-1}

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243. Name two antidepressant Drugs?

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246. Analysis shows that metal oxide has formnla $M_{0.96}O_{1.00}$ What fractions of the metal exist as M^{2+} and M^{3+}

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

248. Define point defects.

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249. Define the following :

Vacancy defect

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250. Define the following :

Interstitial defect

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251. What do you understand by imperfections in ionic crystals ? Name the type of imperfections which occur in ionic crystals.

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252. Explain the Schottky defects in crystals.

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253. What are the consequences of Schottky defects ?

> ▶ **Watch Video Solution**

254. Which point defect lowers the density of crystal ?

255. What are the conditions which favour the presence of Frenkel defects in the crystal ?

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256. What are Frenkel defects ? Discuss

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257. What are the consequences of Frenkel defects ?

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258. Name the compound which can show both Schottky and Frenkel defect.

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259. Write two main differences between Schottky and Frenkel defect.

260. Non-stoichiometric cuprous oxide (Cu_2O) can be prepared in the laboratory. In this oxide, copper to oxygen ratio is sloghtly less than 2 : 1 can you account for the fact that this substance is p-type semiconductor

261. 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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262. What type of stoichiometric defect is shown by ZnS?

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263. What type of stoichiometric defect is shown by

AgBr

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264. What are metal deficiency defects ?

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265. What are the consequences of metal excess defects ?

266. What are F-centres ?

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

268. Explain the metal excess defects due to extra cation in the interstitial sites

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269. What are anion vacancies ? Discuss.

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270. 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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271. Explain the metal excess defects due to extra cation in the interstitial sites

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272. Explain the metal excess defects due to extra cation in the interstitial sites

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273. If NaCl is doped with 10^{-3} mol% of $SrCI_2$ what is the concentration of cation vacancies?

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274. What are conductors ? Give their different types.

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275. What are metallic conductors ?

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276. What are semi conductors ? Explain with example

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277. Describe the two main types of semiconductors.

278. What is doping ?

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279. What is the effect of increase in temperature on the electrical conductivity of different type of conductors?

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280. The electrical conductivity of metal decreases with rise in temperature, while that of a semiconductor increases. Explain

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281. What is the effect of temperature and pressure on viscosity of liquid and gases?

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

B doped with Si

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

B doped with Si

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284. 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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285. What is energy gap in Band theory? Compare its size in conductors, semiconductors and insulators.

Or

Define the 'Forbidden zone' of an insulator.

286. In terms of band theory, what is the difference: between a conductor and an insulator

287. In terms of band theory, what is the difference: between a condutor and a semiconductor?

288. Explain the following with suitable examples. 12-16 and 13-15 group compounds.

289. What are diamagnetic substances ? Give three examples

290. What is paramagnetic substance ? Give one example.

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291. What are ferrimagnetic substances ? Give examples

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292. What is the cause of ferromagnetic character

293. What are anti-ferromagnetic substances? Give one example.

294. What are ferrimagnetic substances ? Give examples

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

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296. Define the following :

Antiferromagnetic substances and antiferromagnetism

> ▶ **Watch Video Solution**

1. The major binding force of diamond , silicon and quartz is

    A. Electrostatic force

    B. Electrical attraction

    C. Covalent bond force

    D. Non covalent bond force.

Answer:

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2. Graphite is an example of:

A. molecular solid

B. covalent solid

C. ionic solid

D. metallic solid

Answer:

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3. The total number of lattice arrangements in different crystal system is

A. 7.0

B. 3.0

C. 8.0

D. 14

Answer:

4. Which one of the following will have a low heat of fusion ?

A. a covalent solid

B. an ionic solid

C. a metallic solid

D. a molecular solid

Answer:

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5. The crystal system of a compound with unit cell parameter,

A. $a = b = c, \alpha = \beta = \gamma = 90°$

B. $a = b \neq c, \alpha = \beta = \gamma = 90°$

C. $a \neq b \neq c, \alpha = \beta = \gamma = 90°$

D. $a = b \neq c, \alpha = \beta = 90°, \gamma = 120°$

Answer:

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6. Zn converts its melting state to its solid state, it has hcp structure, then find out the nearest number of atoms.

    A. 6

    B. 8

    C. 12

    D. 4

Answer:

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7. A metallic crystal crystallises into a lattice containing sequence oflayers AB, AB, AB. .. Any packing of spheres leaves out voids in the lattice What percentage of volume of this lattice is empty space?

A. 0.74

B. 0.26

C. 0.5

D. none of these.

Answer:

8. The cordination number of a metal crystallising in a hexagonal close-packed structure is:

A. 12

B. 4

C. 8

D. 6

Answer:

9. The packing fraction for a body centred cube is

A. 0.42

B. 0.53

C. 0.68

D. 0.82

Answer:

▶

10. In crystal structure of sodium chloride, the arrangement of Cl ions is

A. fcc

B. bcc

C. both fee and bcc

D. 1one of these

Answer:

11. The percentage of nitrogen in HNO3 is

....

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

A. 8

B. 4

C. 2

D. 1

Answer:

▶ **Watch Video Solution**

13. The number of tetrahedral sites per sphere in fcc structure is

A. 8

B. 4

C. 1

D. 2

Answer:

▶ **Watch Video Solution**

14. A crystal lattice with alternate +ve and-ve ions has radius ratio of 0.524. Its coordination number is

A. 4

B. 3

C. 6

D. 12

Answer:

▶ **Watch Video Solution**

15. Calculate the equivalent weight of oxalic acid

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16. Which of the following is Bragg's equation?

A. $n\lambda = 2\sin\theta$

B. $n\lambda = 2d\sin\theta$

C. $2n\lambda = d\sin\theta$

D. $n\dfrac{\lambda}{2} = \dfrac{d}{2}\sin\theta$

Answer:

▶ Watch Video Solution

17. 74.5g of metal chloride contains 35.5g of chlorine. the equivalent weight of metal is.....

▶ **Watch Video Solution**

18. Name the element with electronic configuration 1s2 2s2

▶ **Watch Video Solution**

19. The units of molality are ....

A.

B.

C.

D.

Answer:

▶ **Watch Video Solution**

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20. How many gram of oxygen is required to completely react with 0.200g of hydrogen to yield water .

21. Calculate the amount of water produced by the combustion of 16g of methane.

22. How many moles of methane are required to produce 22 g of CO2 for combustion?

23. Missing of one positive ion and one negative ion from the crystal lattice is called

A. Frenkel defect

B. Schottky defect

C. Point defect

D. Ionic defect

Answer:

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24. If edge of a bcc crystal of an element is a cm, number, then density of the crystal is

A. $\dfrac{4M}{a^3 N_o}$

B. $\dfrac{2M}{N_o a^3}$

C. $\dfrac{2N_o}{M a^3}$

D. $\dfrac{M a^3}{2N_O}$

Answer:

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25. Amorphous solids

   A. possess sharp melting points

   B. undergo clean cleavage when cut with knife

   C. do not undergo clean cleavage when cut with knife

   D. possess orderly arrangement over long distances.

Answer:

26. The number of atoms present in a fcc unit cell is

A. 6

B. 8

C. 4

D. 12

Answer:

27. 200 ml of N/10 H2SO4 is mixed into 300ml N/100 NaOH . calculate normality of resulting mixture.

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28. The number of atoms in bcc arrangement is

    A. 1

    B. 2

C. 4

D. 6

Answer:

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29. The fraction of volume occupied by atoms

in a primitive cubic unit cell is nearly:

A. 0.524

B. 0.74

C. 0.68

D. None of these

Answer:

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30. Volume occupied in f. c. c. is :

A. 0.74

B. 0.68

C. 0.524

D. 0.65

Answer:

31. The conductivity of metals increases with:

A. Increase in temperature

B. Decrease in temperature

C. No change observed

D. Increases then decreases

Answer:

32. What is radius ratio for the co-ordination

number 8

A. 0.732-1.0

B. 0.414--0.732

C. 0.155-0.225

D. None of these

Answer:

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33. How many moles of sodium chloride are present in 250 ml of a 0.50M NaCl solution ?

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34. Calculate number of moles of Na2SO4 produced from 1 mole of NaOH when reacted with H2SO4.

35. Calculate mass of CO2 produced by heating

40g of 20% limestone.

36. How many moles of lead nitrate is needed

to produce 224 litre of oxygen at NTP ?

37. What is the co-ordination number of atoms

:

in a cubic close packed structure

A. 6

B. 8

C. 4

D. 12

Answer:

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38. When unpaired electron is trapped in anion vacancy, then crystal with such a defect is id to have

    A. Schottky defect

    B. F-cente

    C. Frenkel defect

    D. Non-stoichiometric defect

Answer:

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39. Calculate the amount of 50% H2SO4 required to decompose 25g of marble .

40. How many grams of CaO is obtained on heating 100g of CaCO3?

41. The Common Name of 2,4,6- trinitrophenol

A. Carbolic Acid

B. Picric Acid

C. Formic Acid

D. None

Answer:

▶ **Watch Video Solution**

42. Write the IUPAC Name of

CH3CH2CH=CHCHO

43. Which of the following is strongest base ?

A. Methylamine

B. Ethylamine

C. Ammonia

D. All have same basic strength

Answer:

44. A given solution of NaOH contains 4.00 g of NaOH per litre of solution. Calculate the molarity of this solution .

45. The major binding force of diamond , silicon and quartz is

A. Electrostatic force

B. Electrical attraction

C. Covalent bond for~e

D. Non covalent bond force.

Answer:

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46. Graphite is an example of:

A. molecular solid

B. covalent solid

C. ionic solid

D. metallic solid

Answer:

▶ **Watch Video Solution**

47. The total number of lattice arrangements

in different crystal system is

A. 7.0

B. 3.0

C. 8.0

D. 14

Answer:

48. Which one of the following will have a low heat of fusion ?

A. a covalent solid

B. an ionic solid

C. a metallic solid

D. a molecular solid

Answer:

49. The crystal system of a compound with unit cell parameter,

A. $a = b = c, \alpha = \beta = \gamma = 90°$

B. $a = b \neq c, \alpha = \beta = \gamma = 90°$

C. $a \neq b \neq c, \alpha = \beta = \gamma = 90°$

D. $a = b \neq c, \alpha = \beta = 90°, \gamma = 120°$

Answer:

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50. Zn converts its melting state to its solid state, it has hcp structure, then find out the nearest number of atoms.

A. 6

B. 8

C. 12

D. 4

Answer:

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51. A metallic crystal crystallises into a lattice containing sequence oflayers AB, AB, AB. .. Any packing of spheres leaves out voids in the lattice What percentage of volume of this lattice is empty space?

A. 0.74

B. 0.26

C. 0.5

D. none of these.

Answer:

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52. The cordination number of a metal crystallising in a hexagonal close-packed structure is:

A. 12

B. 4

C. 8

D. 6

Answer:

53. The packing fraction for a body centred cube is

A. 0.42

B. 0.53

C. 0.68

D. 0.82

Answer:

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54. In crystal structure of sodium chloride, the arrangement of Cl ions is

A. fcc

B. bcc

C. both fee and bcc

D. 1one of these

Answer:

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55. The intermetallic compound LiAg crystallizes in cubic lattice in which both

lithium and silver have co-ordination number of e,ight. The crystal class is

A. simple cubic

B. body centred cubic

C. face centred cubic

D. none of these

Answer:

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

A. 8

B. 4

C. 2

D. 1

Answer:

▶ Watch Video Solution

57. The number of tetrahedral sites per sphere in fcc structure is

A. 8

B. 4

C. 1

D. 2

Answer:

▶ Watch Video Solution

58. A crystal lattice with alternate +ve and-ve ions has radius ratio of 0.524. Its coordination number is

A. 4

B. 3

C. 6

D. 12

Answer:

59. Define radius ratio what is the value of radius ratio for octahedral gemotry ?

A. 0-0.155

B. 0.155-0.225

C. 0.225-0.414

D. 0.414-0.732

Answer:

60. Which of the following is Bragg's equation?

A. $n\lambda = 2\sin\theta$

B. $n\lambda = 2d\sin\theta$

C. $2n\lambda = d\sin\theta$

D. $n\dfrac{\lambda}{2} = \dfrac{d}{2}\sin\theta$

Answer:

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61. STATEMENT -1 : Due to Frenkel defect there is no effect on density of a solid.

STATEMENT -2 : Ions shift from lattice site in Frenkel defect .

    A. decreases

    B. increases

    C. does not change

    D. changes

Answer:

62. If we mix a pentavalent impurity in a crystal lattice of germanium, what type of semi conductor formation will occur

    A. p · type

    B. n · type

    C. bothAand B

    D. none of these

Answer:

63. What are the consequences of Schottky defects ?

    A. some of lattice sites are vacant

    B. an ion occupies interstitial position between lattice points

    C. a lattice site is occupied by electron

    D. he radius ratio,$\dfrac{r^+}{r^-}$ is low

Answer:

64. Which of the following is covalent solid?

A. Fe

B. Diamond

C. NaCL

D. Cu

Answer:

65. In a solid lattice the cation has left a lattice site and is located at an interstitial position, the lattice defect is

A. Interstitial defect

B. Vacancy

C. Frenkel defect

D. defect

Answer:

66. Which of the following is a pseudo solid?

A. CaF_2

B. Glass

C. NaCl

D. LiCl

Answer:

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67. Missing of one positive ion and one negative ion from the crystal lattice is called

A. Frenkel defect

B. Schottky defect

C. Point defect

D. Ionic defect

Answer:

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68. If edge of a bcc crystal of an element is a cm, number, then density of the crystal is

A. $\dfrac{4M}{a^3 N_o}$

B. $\dfrac{2M}{N_o a^3}$

C. $\dfrac{2N_o}{Ma^3}$

D. $\dfrac{Ma^3}{2N_O}$

Answer:

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69. Amorphous solids

A. possess sharp melting points

B. undergo clean cleavage when cut with knife

C. do not undergo clean cleavage when cut with knife

D. possess orderly arrangement over long distances.

Answer:

70. The number of atoms present in a fcc unit

cell is

A. 6

B. 8

C. 4

D. 12

Answer:

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71. If the alignment of mangnetic moments in a substance is 'in-a compensatory way so as to give zero net magnetic moment, then the substance is said to be

A. Ferromagnetism

B. Anti-ferromagnetism

C. Ferrimagnetism

D. Diamagnetism

Answer:

72. The number of atoms in bcc arrangement is

A. 1

B. 2

C. 4

D. 6

Answer:

73. The fraction of volume occupied by atoms in a primitive cubic unit cell is nearly:

A. 0.524

B. 0.74

C. 0.68

D. None of these

Answer:

74. Volume occupied in f. c. c. is :

A. 0.74

B. 0.68

C. 0.524

D. 0.65

Answer:

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75. The conductivity of metals increases with:

A. Increase in temperature

B. Decrease in temperature

C. No change observed

D. Increases then decreases

Answer:

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76. What is radius ratio for the co-ordination number 8

    A. 0.732-1.0

    B. 0.414--0.732

    C. 0.155-0.225

    D. None of these

Answer:

77. Close packing is maximum in the crystal which is

A. bcc

B. fcc

C. simple cubic

D. end centered cubic.

Answer:

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78. In a solid lattice the cation has left a lattice site and is located at an interstitial position, the lattice defect is

A. n-type

B. p-type

C. Frenkel defect

D. Schottky defect.

Answer:

79. The cordination number of a metal crystallising in a hexagonal close-packed structure is:

A. 12

B. 4

C. 8

D. 10

Answer:

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80. The amorphous solid among the following is

A. Table salt

B. Diamond

C. Plastic

D. Graphite

Answer:

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81. What is the coordination number of atoms.

In a cubic close packed structure ?

A. 6

B. 8

C. 4

D. 12

Answer:

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82. When unpaired electron is trapped in anion vacancy, then crystal with such a defect is id to have

A. Schottky defect

B. F-cente

C. Frenkel defect

D. Non-stoichiometric defect

Answer:

83. Which of the following is a molecular solid?

A. Rock salt

B. Quartz

C. Ice

D. Diamond.

Answer:

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84. The empty space within hcp arrangement is

A. 0.34

B. 0.476

C. 0.32

D. 0.26

Answer:

85. The space occupied by spheres in bcc arrangement is

    A. 0.74

    B. 0.2

    C. 0.68

    D. 0.522

Answer:

86. The number of tetrahedral voids per atom in a crystal lattice is

A. 4

B. 2

C. 6

D. 8

Answer:

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87. The number of atoms in bcc arrangement is

A. 2

B. 1

C. 6

D. 4

Answer:

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88. The apperance of colour in solid alkeli metal halide is generally due to

A. Schottky defect

B. Schottky defect

C. F-centre

D. Interstitial position

Answer:

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