



CHEMISTRY

BOOKS - MTG GUIDE

SOLID STATE

Illustration

1. If three elements P, Q and R crystallise in a cubic solid lattice with P atoms at the corners, 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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2. Calculate the number of unit cells in 8.1 g of aluminium if it crystallizes in a fcc structure.

(Atomic mass of $Al = 27\text{g mol}^{-1}$)

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3. What is the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy $\frac{2}{3}$ of octahedral voids?

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4. 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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5. The radius of Nation is 95 pm and that of Cl ion is 181 pm. Predict whether the coordination number of Nation is 6 or 4.

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6. Iron crystallizes in a bcc system with a lattice parameter of 2.861 \AA .

Calculate the density of iron in the bcc system.

(Given : atomic weight of $Fe = 56$, $N_0 = 6.023 \times 10^{23} \text{ mol}^{-1}$.)

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7. An element with density 2.8 g cm^{-3} forms a fcc unit cell with edge length $4 \times 10^{-8} \text{ cm}$. Calculate the molar mass of the element.

(Given : $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$)

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8. An element X crystallises in fcc structure. 208 g of it has 4.2832×10^{24} atoms. Calculate the edge of the unit cell, if density of X is 7.2 g cm^{-3}

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9. The density of lead is 11.35 g cm^{-3} and crystallise with fcc unit cell.

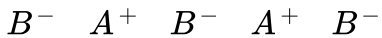
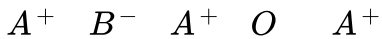
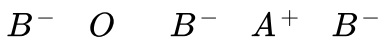
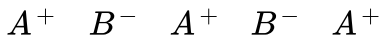
Estimate the radius of lead atom.

(At. mass of lead = 207 g mol^{-1} and $N_A 6.02 \times 10^{23} \text{ mol}^{-1}$)



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10. Examine the given defective crystal.



Answer the following questions:

(i) What type of stoichiometric defect is shown by the crystal?

(ii) How is the density of the crystal affected by this defect?

(iii) What type of ionic substances show such defect?



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1. Which of the following properties does not define a crystalline solid?

A. When cut into pieces, have irregular surface

B. Isotropic in nature

C. Anisotropic in nature

D. Both (a) and (b)

Answer: D



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2. Solid CO_2 is an example of

A. covalent solid

B. metallic solid

C. molecular solid

D. ionic solid

Answer: C



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3. Which of the following statements is true?

- A. Molecular crystals are very hard and incompressible.
- B. Ionic crystals have very low volatility.
- C. Metallic bond is directional and rigid.
- D. Boron nitride has an ionic crystal structure.

Answer: B



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4. Match column I with column II and select the correct answer.

Column I		Column II	
A	Ionic solid	I	NaCl
B	Metallic solid	II	Fe
C	Covalent solid	III	C (graphite)
D	Molecular solid	IV	CO ₂

A. A-II, B-I, C-IV, D-III

B. A-I, B-II, C-III, D-IV

C. A-III, B-II, C-I, D-IV

D. A-II, B-IV, C-I, D-III

Answer: B



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5. Graphite is a soft solid lubricant, extremely difficult to melt. The reason for this anomalous behaviour is that graphite

A. is a non-crystalline substance

B. is an allotropic form of diamond

C. has molecules of variable molecular masses like polymers

D. has carbon atoms arranged in large plates of rings of strong bound carbon atoms with weak interplate bonds.

Answer: D

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6. Which one has the highest melting point?

A. Ionic crystal

B. Molecular crystal

C. Covalent crystal

D. Metallic crystal

Answer: C

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7. Which of the following is a pseudo solid?

A. CaF_2

B. Glass

C. NaCl

D. All of these

Answer: B



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8. Which solid will have weakest intermolecular forces?

A. Ice

B. Phosphorus

C. Naphthalene

D. Sodium fluoride

Answer: A

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9. Which of the following is an example of polycrystalline solid?

A. Glass

B. Rubber

C. Alum

D. Metal

Answer: D

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10. The interparticle forces in solid hydrogen are

- A. hydrogen bonds
- B. covalent bonds
- C. coordinate bonds
- D. van der Waals' forces,

Answer: D

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11. Which among the following will show anisotropy?

- A. Glass
- B. Barium chloride
- C. Wood
- D. Paper

Answer: B

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12. Which one of the following forms a molecular solid when solidified?

- A. Silicon carbide
- B. Calcium fluoride
- C. Rock salt
- D. Methane

Answer: D

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13. The pure crystalline substance when heated gradually first forms a turbid liquid at constant temperature and still at higher temperature, turbidity completely disappears. The behaviour is a characteristic of substance forming

- A. allotropic crystals

- B. liquid crystals
- C. isomeric crystals
- D. isomorphous crystals.

Answer: B

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14. The major binding force in diamond, silicon and quartz

- A. electrostatic force
- B. electrical attraction
- C. covalent bond force
- D. van der Waals' force.

Answer: C

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15. To which of the following systems does copper belong?

- A. Cubic
- B. Tetragonal
- C. Monoclinic
- D. Triclinic

Answer: A



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16. For two ionic solids CaO and KI, identify the wrong statement among the following.

- A. CaO has high melting point.
- B. Lattice energy of CaO is much larger than that of KI.
- C. KI is soluble in benzene.

D. None of these.

Answer: C

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17. Which of the following statements about amorphous solids is incorrect?

- A. They melt over a range of temperature.
- B. They are anisotropic.
- C. There is no orderly arrangement of particles.
- D. They are rigid and incompressible.

Answer: B

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18. Which of the following is not correct for ionic crystals?

- A. They possess high melting point.
- B. They all are electrolyte.
- C. They exhibit the property of isomorphism.
- D. They exhibit directional properties of the bond.

Answer: D



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19. Quartz is a crystalline variety of

- A. silicon carbide
- B. sodium silicate
- C. silica
- D. silicon

Answer: C



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20. The number of unit cells in 58.5 g of NaCl is nearly

A. 6×10^{20}

B. 3×10^{22}

C. 1.5×10^{23}

D. 0.5×10^{24}

Answer: C



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21. A cubic close packed (ccp) structure contains 'N' atoms. The tetrahedral and octahedral voids, respectively, will be

A. N and N

B. 2N and 2N

C. 2N and N

D. N and 2N

Answer: C



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

A. $\frac{20}{3}\pi r^3$

B. $\frac{24}{3}\pi r^3$

C. $\frac{12}{3}\pi r^3$

D. $\frac{16}{3}\pi r^3$

Answer: D



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23. In fcc lattice of NaCl structure, if the diameter of Na^+ is x , and the radius of Cl^- is y , then the edge length of NaCl in the crystal is

A. $2x + 2y$

B. $x + y$

C. $x + 2y$

D. none of these.

Answer: C



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24. Percentage of free space in a body-centred cubic unit cell is

A. 0.34

B. 0.28

C. 0.3

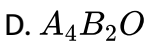
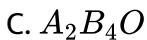
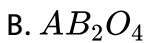
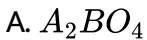
D. 0.32

Answer: D



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25. In spinel structure, O^{2-} ions are cubic closed packed, whereas $1/8^{th}$ of the tetrahedral holes are occupied by A^{2+} cations and $1/2$ of the octahedral holes are occupied by cations B^{2+} . The general formula of this compound is



Answer: B



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26. If r_+ / r_- lies between 0.414 to 0.732, the cation will occupy

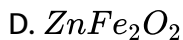
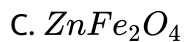
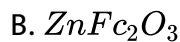
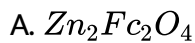
- A. trigonal void
- B. tetrahedral void
- C. octahedral void
- D. cubic void.

Answer: C



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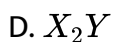
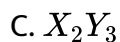
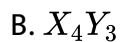
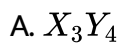
27. In a normal spinel type structure, the oxide ions are arranged in cop
whereas $1/8$ tetrahedral holes are occupied by Zn^{2+} ions and 50% of
octahedral holes are occupied by Fe^+ ions. The formula of the compound
is



Answer: C

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

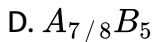
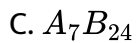
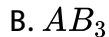
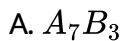


Answer: B



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29. In a face-centred cubic arrangement of A and B atoms, A atoms are at the corners of the unit cell and B atoms at the face centres. One of the A atoms is missing from one corner in the unit cell. The simplest formula of the compound is



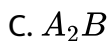
Answer: C



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30. A binary solid (A^+B^-) has a zinc blende structure with B^- ions constituting the lattice and A^+ ions occupying 25% tetrahedral holes.

The formula of the solid is



Answer: A



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31. In corundum, oxide ions have hcp arrangement. What percentage of octahedral voids are occupied by Al?

A. 0.33

B. 0.5

C. 0.66

D. 0.75

Answer: C



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32. KCl crystallises in the same type of lattice as NaCl does. If $r_{Na^+} / r_{K^+} = 0.7$ then the ratio of the sides of unit cell for KCl to that for NaCl is

A. 1.1

B. 0.8

C. 0.4

D. 1.7

Answer: A



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33. Atoms of element B form hcp lattice and those of the element A occupy $\frac{2}{3}$ rd of tetrahedral voids. The ratio of number of atoms of A and B in the compound is

- A. 2:3
- B. 4:3
- C. 3:4
- D. 3:2

Answer: B

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34. Which of the following arrangements correctly represents hexagonal and cubic close packed structure respectively?

- A. ABCABC and ABAB

B. ABAB and ACBACB

C. Both have ABABarrangement.

D. Boh have ABCABC arrangement.

Answer: B

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35. Ratio of the total volume of bcc to simple cubic structure is

A. $3\sqrt{3}:8$

B. $8:3\sqrt{3}$

C. $24\sqrt{3}:1$

D. $1:24\sqrt{3}$

Answer: B

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36. The ionic radii of Rb^+ and I^- are 1.46 and 2.16 Å respectively. The most possible type of structure exhibited by it, is

A. CsCl type

B. NaCl type

C. ZnS type

D. CaF_2 type.

Answer: B



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37. The crystal system of a compound with unit cell dimensions $a = 0.387$, $b = 0.387$ and $c = 0.504nm$ and $\alpha = \beta = 90^\circ$ and $\gamma = 120^\circ$ is

A. cubic

B. hexagonal

C. orthorhombic

D. rhombohedral.

Answer: B



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38. Percentage of free space in cubic close packed structure and in body centred packed structure are respectively

A. 48% and 26%

B. 30% and 26%

C. 20% and 32%

D. 32% and 48%

Answer: C



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39. Which of the following statements is not correct?

- A. The number of carbon atoms in a unit cell of diamond is 8.
- B. The number of Bravais lattices in which a crystal can be categorized is 14.
- C. The fraction of the total volume occupied by the atoms in a primitive cell is 0.48.
- D. Molecular solids are generally volatile.

Answer: C



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40. Which one of the following is correct about ferrites?

- A. These possess formula AB_2O_4 (where A is divalent and B is trivalent cation).

B. These possess spinel structure.

C. $MgAl_2O_4$ is a ferrite.

D. All of the above.

Answer: D

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41. CsBr has bcc structure with edge length 4.3 \AA . The shortest inter-ionic distance in between Cs and Br is

A. 3.72 \AA

B. 1.86 \AA

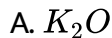
C. 7.44 \AA

D. 4.3 \AA

Answer: A

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42. Which of the following compounds have an antifluorite structure?

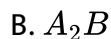


Answer: A



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43. 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, then the resultant stoichiometry of the solid is



C. A_4B_3

D. A_3B_4

Answer: D



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44. The total number of atoms required to form a unit cell of bcc lattice will be

A. 6

B. 8

C. 9

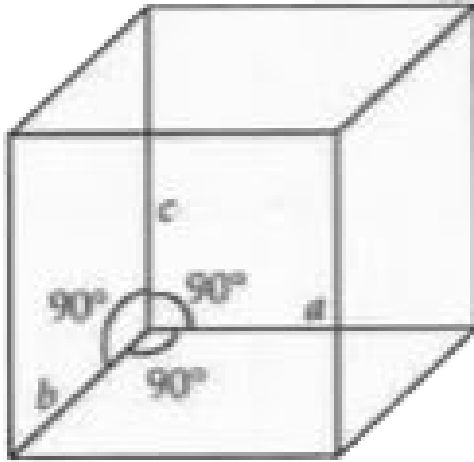
D. 12

Answer: C



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45. The unit cell with the structure given below represents crystal system.

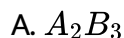


- A. cubic
- B. orthorhombic
- C. tetragonal
- D. trigonal

Answer: A

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46. A compound formed by elements A and B crystallises in cubic structure in which A atoms are at the corners of the cube while B atoms are at the centre of cube. Formula of the compound is



Answer: D

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47. Number of unit cells in 4 g of X (atomic mass = 40) which crystallises in bcc pattern is (N_A = Avogadro number)

A. $0.1N_A$

B. $2 \times 0.1N_A$

C. $\frac{0.1N_A}{2}$

D. $2 \times N_A$

Answer: C



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48. Which is not the correct statement for ionic solids in which positive and negative ions are held by strong electrostatic attractive forces?

A. The radius ratio r_+/r_- increases as coordination number increases.

B. As the difference in size of ions increases, coordination number increases.

C. When coordination number is eight, r_+/r_- ratio lies between 0.225 to 0.414.

D. In ionic solid of the type AX (ZnS, Wurtzite), the coordination number of Zn^{2+} and S^{2-} respectively are 4 and 4.

Answer: C



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49. In hexagonal close packing of spheres in three-dimensions

- A. in one unit cell there are 12 octahedral voids and all are completely inside the unit cell
- B. in one unit cell there are six octahedral voids and all are completely inside the unit cell
- C. in one unit cell there are six octahedral voids out of which three are completely inside the unit cell and other three are from contributions of octahedral voids which are partially inside the unit cell

D. in one unit cell there are 12 tetrahedral voids, all are completely inside the unit cell.

Answer: B



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50. The arrangement of the first two layers, one above the other, in hcp and ccp arrangements is

- A. exactly same in both cases
- B. partly same and partly different
- C. different from each other
- D. nothing definite.

Answer: A



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51. Antifluorite structure is derived from fluorite structure by

- A. heating fluorite crystal lattice
- B. subjecting fluorite structure to high pressure
- C. interchanging the positions of positive and negative ions in the lattice
- D. none of these.

Answer: C



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52. The arrangement ABC ABC is referred to as

- A. octahedral close packing
- B. hexagonal close packing
- C. tetrahedral close packing

D. cubic close packing

Answer: D



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53. In hcp arrangement, the coordination number is

A. 6

B. 12

C. 8

D. 10

Answer: B



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54. For an octahedral arrangement the lowest radius ratio limit is

A. 0.155

B. 0.732

C. 0.414

D. 0.225

Answer: C

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55. The radius of Na⁺ ion is 95 pm and that of Cl⁻ ion is 181 pm. Predict the coordination number of NaCl.

A. 4

B. 6

C. 8

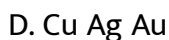
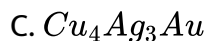
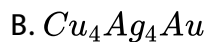
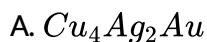
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Answer: B



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56. An alloy of copper, silver and gold is found to have copper constituting the ccp lattice. If silver atoms occupy the edge centres and gold atom is present at body centre, the alloy has a formula



Answer: C



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57. At the limiting value of radius ratio r_+ / r_- ,

A. forces of attraction are larger than the forces of repulsion

- B. forces of attraction are smaller than the forces of repulsion
- C. forces of attraction and repulsion are just equal
- D. none of these.

Answer: C

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58. A binary solid ($A^+ B^-$) has a rock salt structure. If the edge length is 400 pm and radius of cation is 75 pm, then the radius of anion is

- A. 100 pm
- B. 125 pm
- C. 250 pm
- D. 325 pm

Answer: B

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59. A solid has a bcc structure. If the distance of closest approach between the two atoms is 1.73 \AA , the edge length of the cell is

A. 200 pm

B. $\sqrt{3}/\sqrt{2}$ pm

C. 142.2 pm

D. $\sqrt{2}$ pm

Answer: A



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60. A solid XY has NaCl structure. If radius of X^+ is 100 pm, what is the radius of Y^- ion?

A. 120 pm

B. 136.6 to 241.5 pm

C. 280 pm

D. 400 pm

Answer: B



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61. The melting point of RbBr is $682^{\circ}C$ while that of NaF is $988^{\circ}C$. The principal reason for melting point of NaF at much higher temperature than that of RbBr is that

A. the two crystals are not isomorphous

B. the molar mass of NaF is smaller than that of RbBr

C. the internuclear distance $r_c + r_e$ is greater for RbBr than for NaF

D. the bond in RbBr has more covalent character than the bond in NaF.

Answer: C

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62. Edge length of a cube is 347 pm. Its body diagonal would be

A. 245.3 pm

B. 601 pm

C. 300.5 pm

D. 490.7 pm

Answer: B

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63. In the crystal $A^{2+}B^{2-}$, having anions in the face-centred cubic packing if the radius of the anion is 1.84 \AA , ideal radius of the cation present in the tetrahedral hole will be

A. 0.225 \AA

B. 0.414 \AA

C. 0.732 \AA

D. none of these.

Answer: B

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64. The interionic distance for caesium chloride crystals will be

A. a

B. $a/2$

C. $\frac{\sqrt{3}a}{2}$

D. $\frac{2a}{\sqrt{3}}$

Answer: C

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65. The ionic radius of Cl^- ion is 1.81 \AA . The interionic distances of NaCl and NaF are 2.79 \AA and 2.31 \AA respectively. The ionic radius of F^- ion will be

A. 0.98 \AA

B. 0.80 \AA

C. 1.33 \AA

D. 2.29 \AA

Answer: C

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66. In crystal structure of sodium chloride, the arrangement of Cl^- ion is

A. fcc

B. both fcc and bcc

C. bcc

D. none of these.

Answer: A



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67. Two ions A^+ and B^- have radii of 0.88 \AA and 2 \AA , respectively. What will be the type of crystal?

A. fcc

B. bcc

C. Simple cubic

D. None of these

Answer: A



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68. A solid is made of two elements X and Z. The atoms Z are in ccp arrangement while atoms X occupy all the tetrahedral sites. What is the formula of the compound?

A. XZ

B. XZ_2

C. XZ_2

D. $X_Z - 3$

Answer: C



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69. If the ratio of coordination number P to that of Q be $y : z$, then the formula of the solid is

A. P_yQ_z

B. P_zQ_y

C. $P_{1/y}Q_{1/z}$

D. none of these.

Answer: B

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70. Xenon crystallises in face-centred cubic lattice and the edge of the unit cell is 620 pm, then the radius of xenon atom is

A. 438.5 pm

B. 219.20 pm

C. 536.94 pm

D. 265.5 pm

Answer: B

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71. The arrangement of Cs ions in CsCl structure is

- A. hcp
- B. fcc
- C. bcc
- D. simple cubic.

Answer: C



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72. If a stands for the edge length of the cubic systems: simple cubic, body-centred cubic and face-centred cubic, then the ratio of radii of the spheres in these systems will be respectively

- A. $\frac{1}{2}a : \frac{\sqrt{3}}{2}a : \frac{\sqrt{2}}{2}a$
- B. $1a : \sqrt{3}a : \sqrt{2}a$
- C. $\frac{1}{2}a : \frac{\sqrt{3}}{4}a : \frac{1}{2\sqrt{2}}a$

D. $\frac{1}{2}a : \sqrt{3}a : \frac{1}{\sqrt{2}}a$

Answer: C



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73. In closest packing of A type of atoms (radius, r_A) the radius of atom B that can be fitted into octahedral void is

A. $0.155r_A$

B. $0.125r_A$

C. $0.414r_A$

D. $0.732r_A$

Answer: C



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74. Close packing is maximum in the crystal which is

- A. simple cube
- B. bcc
- C. fcc
- D. none of these.

Answer: C



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75. An ionic compound AB has ZnS type of structure, if the radius of A^+ is 22.5 pm, then the ideal radius of B^- is

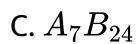
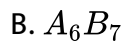
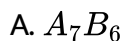
- A. 54.35 pm
- B. 100 pm
- C. 145.16 pm

D. 211.5 pm

Answer: B

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76. In fcc arrangement of A and B atoms, where A atoms are at the corners of the unit cell, B atoms at the face centres, two atoms are missing from two corners in each unit cell, then the simplest formula of the compound is



Answer: D

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77. In fluorite structure (CaF_2),

- A. Ca^{2+} ions form ccp and F^- ions are present in all the tetrahedral voids
- B. Ca^{2+} ions form ccp and F^- ions are present in all the octahedral voids
- C. Ca^{2+} ions form ccp and F^- ions are present in all the octahedral voids and half of ions are present in tetrahedral voids
- D. none of these.

Answer: A



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78. Analysis shows that nickel has the formula $Ni_{0.98}O$. The percentage of Ni present as Ni^{2+} and Ni^{3+} , respectively, will be

A. 96%, 4%

B. 97%, 3%

C. 98%, 2%

D. 99%, 1%

Answer: A

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79. If three elements X, Y and Z crystallised in cubic solid lattice with X atoms at corners, Y atoms at cube centre and Z atoms at the edges. The formula of the compound is

A. XYZ

B. XY_3Z

C. XYZ_3

D. X_3YZ

Answer: C



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80. The number of tetrahedral and octahedral voids in hexagonal primitive unit cell are

A. 8,4

B. 2,1

C. 12,6

D. 6, 12

Answer: C



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81. The intermetallic compound LiAg crystallises into cubic lattice in which both lithium and silver have coordination number of eight. The

crystal class is

- A. simple cube
- B. body-centred cube
- C. face-centred cube
- D. none of these.

Answer: B



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82. The tetrahedral voids formed by cop arrangement of Cl^- ions in rock salt structure are

- A. all occupied by Na^+ ions
- B. 50% occupied by Na^+ ions
- C. occupied by either Na^+ or Cl^- ions
- D. vacant.

Answer: D



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83. Lithium metal crystallises in a body-centred cubic crystal. If the length of the side of the unit cell of lithium is 351 pm, the atomic radius of lithium will be

A. 151.98 pm

B. 75.55 pm

C. 300.05 pm

D. 240.80 pm

Answer: A



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84. If in diamond, there is a unit cell of carbon atoms as fcc and if carbon atom is sp^3 hybridised, what fractions of voids are occupied by carbon atom?

- A. 25% tetrahedral
- B. 50% tetrahedral
- C. 25% octahedral
- D. 50% octahedral

Answer: B



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85. In a face-centred cubic unit cell, edge length is

- A. $\frac{4}{\sqrt{3}}r$
- B. $\frac{4}{\sqrt{2}}r$
- C. $2r$

D. $\frac{\sqrt{3}}{2}r$

Answer: B



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86. A metal crystallises in a simple cubic unit cell. If the edge length of the unit cell is 565.6 pm then, radius of metal atom is

A. 282.8 pm

B. 400 pm

C. 200 pm

D. 245 pm

Answer: A



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87. The distance between the body-centred atom and one corner atom in sodium is ($a = 424 \text{ pm}$)

A. 7.35 \AA

B. 1.5 \AA

C. 2.12 \AA

D. 3.67 \AA

Answer: D



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88. A metal crystallises in face-centred cubic lattice. What is the closest distance between metal atoms if edge length of cubic unit cell is 4.242 \AA ?

A. 367.3 pm

B. 150 pm

C. 300 pm

D. 183.6 pm

Answer: C



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89. A crystalline solid XY, has cop arrangement for its element Y. X occupies

A. 66% of tetrahedral voids

B. 33% of tetrahedral voids

C. 66% of tetrahedral voids

D. 33% of tetrahedral voids

Answer: D



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90. In a hexagonal close packed (hcp) structure of spheres, the fraction of the volume occupied by the sphere is A. In a cubic close packed structure, the fraction is B. The relation between A and B is

A. $A = B$

B. $A < B$

C. $A > B$

D. $A = B$ the fraction of a body-centred cubic lattice.

Answer: A



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

A. 4

B. 3

C. 6

D. 12

Answer: C

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92. What is the coordination number of sodium in Na_2O ?

A. 6

B. 4

C. 8

D. 2

Answer: B

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93. If Z is the number of atoms in the unit cell that represent the closest packing sequence - ABC ABC - the number of tetrahedral voids in the unit cell is equal to

A. Z

B. 2 Z

C. Z/2

D. Z/4

Answer: B



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94. In bec structure contribution of comer and central atom is

A. $\frac{1}{8}$, 1

B. $\frac{1}{4}$, $\frac{1}{8}$

C. $\frac{1}{8}$, $\frac{1}{2}$

D. $1, \frac{1}{2}$

Answer: A



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95. How many number of atoms are present in fcc unit cell?

A. 4

B. 3

C. 2

D. 1

Answer: A



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96. 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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97. Empty space in cop lattice is

A. 0.26

B. 0.45

C. 0.9

D. 0.3

Answer: A



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98. The crystal structure of solid Mn(II) oxide is

- A. NaCl structure
- B. Fe_2O_3 structure
- C. CaF_2 structure
- D. Na_2O structure.

Answer: A



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99. The coordination number of an atom in the simple cubic unit cell in a crystal lattice is

- A. 3
- B. 2

C. 4

D. 6

Answer: D



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100. Copper crystallises in a face-centred cubic lattice with a unit cell length of 361 pm. What is the radius of copper atom in pm?

A. 157

B. 181

C. 108

D. 128

Answer: D



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

A. CsI

B. CsF

C. LiF

D. LiI

Answer: A



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102. When Zn converts from melted state to its solid state, it has hcp structure, then find the number of nearest atoms.

A. 6

B. 8

C. 12

D. 4

Answer: C



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103. If the pressure on a NaCl structure is increased, then its coordination number will

- A. increase
- B. remain the same
- C. decrease
- D. either (a) or (b).

Answer: A



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104. If the temperature of CsCl is increased, then its coordination number will

- A. increase
- B. remain the same
- C. decrease
- D. either (a) or (b).

Answer: C



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105. A substance A_xB_y , crystallises in a face-centred cubic lattice in which A atom occupies each corner of cube and atom B occupies the centres of each face of the cube. Identify the correct composition of the substance A_xB_y ,

- A. AB_3

B. A_4B_3

C. A_3B

D. Composition cannot be specified

Answer: A



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106. Copper metal crystallises with a face-centred cubic (fcc) lattice. It has a coordination number of

A. 4

B. 1

C. 12

D. 2

Answer: C



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107. In an fcc metal, the atoms are in physical contact along

- A. face diagonal
- B. cube edge
- C. all directions
- D. body diagonal.

Answer: A



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108. In a face-centred cubic cell, an atom at the face contributes to the unit cell

- A. 2
- B. $\frac{1}{2}$
- C. 3

D. 1

Answer: B



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109. 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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110. A metal has bcc structure and the edge length of its unit cell is 3.04 Å. The volume of the unit cell in cm will be

A. $1.6 \times 10^{-21} \text{ cm}^3$

B. $2.81 \times 10^{-23} \text{ cm}^3$

C. $6.02 \times 10^{-23} \text{ cm}^3$

D. $6.6 \times 10^{-24} \text{ cm}^3$

Answer: B



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111. The number of atoms present in unit cell of a monatomic substance of simple cubic lattice is

A. 6

B. 3

C. 2

D. 1

Answer: D



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112. A metal crystallises in bcc lattice. Its unit cell edge length is about 300 pm and its molar mass is about 50gmol^{-3} What would be the density of the metal (gcm^{-3})

A. 3.1

B. 6.15

C. 9.3

D. 12.4

Answer: B



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113. In orthorhombic, the values of a , b and c are respectively 4.2 Å, 8.6 Å and 8.3 Å. Given the molecular mass of the solute is 155 g mol^{-1} and density is 3.3 g/cc, the number of formula units per unit cell is

A. 2

B. 3

C. 4

D. 6

Answer: C



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114. Gold has a close-packed structure which can be viewed as spheres occupying 0.74 of the total volume. What is the radius of gold ion if density of gold is 19.3 g/cc? (Au = 197 amu)

A. $1.439 \times 10^{-8} \text{ cm}$

B. $4.07 \times 10^{-8} \text{ cm}$

C. $1.017 \times 10^{-8} \text{ cm}$

D. $8.23 \times 10^{-8} \text{ cm}$

Answer: A



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115. 0.005 cm thick coating of silver is deposited on a plate of 0.5 m^2 area. The number of silver atoms deposited on the plate is (atomic mass of silver = 108 and density = 7.9 g cm^{-3})

A. 1.1×10^{10}

B. 1.1×10^{15}

C. 1.1×10^{24}

D. 1.1×10^{30}

Answer: C

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116. Ferrous oxide has a cubic structure. The length of edge of the unit cell is 5 \AA . The density of the oxide is 4.0 g cm^{-3} . Then the number of Fe^{2+} and O^{2-} ions present in each unit cell will be

A. four Fe^{2+} and four O^{2-}

B. two Fe^{2+} and two O^{2-}

C. four Fe^{2+} and four O^{2-}

D. two Fe^{2+} and two O^{2-}

Answer: A

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117. A metal of density $7.5 \times 10^3 \text{ kg m}^{-3}$ has an fcc crystal structure with lattice parameter $a = 400 \text{ pm}$. Calculate the number of unit cells present in 0.015 kg of the metal.

A. 6.250×10^{22}

B. 3.125×10^{23}

C. 3.125×10^{22}

D. 1.563×10^{22}

Answer: C

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118. Iron crystallises in a bcc system with a lattice parameter of 2.861 \AA .

Calculate the density of iron in the bcc system. (atomic weight of

$Fe = 56, N_A = 6.023 \times 10^{23} \text{ mol}^{-1}$)

A. 7.94 gmL^{-1}

B. 8.96 gmL^{-1}

C. 2.78 gmL^{-1}

D. 6.72 gmL^{-1}

Answer: A



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119. An element has a body-centred cubic (bcc) structure with a cell edge of 288 pm. The density of the element is $7.2\text{g}/\text{cm}^3$. How many atoms are present in 208 g of the element?

A. 6.02×10^{24} atoms

B. 12.09×10^{23} atoms

C. 24.16×10^{23} atoms

D. 29.88×10^{24} atoms

Answer: C



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120. The number of atoms in 100 g of an fcc crystal with density $d = 5\text{gcm}^{-3}$ and cell edge length 200 pm is equal to

A. 3×10^{25}

B. 5×10^{24}

C. 1×10^{25}

D. 2×10^{25}

Answer: C



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121. An element (atomic mass = 100 g/mol) having bcc structure has unit cell edge 400 pm. Then density of the element is

A. $10.376\text{g}/\text{cm}^3$

B. $5.188\text{g}/\text{cm}^3$

C. $7.289\text{g}/\text{cm}^3$

D. $2.144g/cm^3$

Answer: B



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122. Potassium has a bcc structure with nearest neighbour distance 4.52 Å. Its atomic weight is 39. Its density will be

A. $454kgm^{-3}$

B. $804kgm^{-3}$

C. $852kgm^{-3}$

D. $910kgm^{-3}$

Answer: D



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123. The edge length of the unit cell of NaCl crystal lattice is 5.623 \AA and density is 2.16 g cm^{-3} and the molar mass of NaCl is 58.5 g mol^{-1} . The number of moles per unit cell is

A. 4

B. 3

C. 1

D. 2

Answer: A



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124. If the unit cell length of sodium chloride crystal is 600 pm , then its density will be

A. 2.165 g / cm^3

B. 3.247 g / cm^3

C. $1.79\text{g}/\text{cm}^3$

D. $1.082\text{g}/\text{cm}^3$

Answer: C

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125. An element (density = 7.20 g/cc) exists in the body centred cubic structure whose cell edge is 2.88 \AA . The number of atoms in 104 g of the element is

A. 2.0×10^{23}

B. 1.209×10^{24}

C. 2.418×10^{24}

D. 6.045×10^{23}

Answer: B

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126. A unit cell of sodium chloride has four formula units. The edge length of the unit cell is 0.564 nm. What is the density of sodium chloride?

A. $1.2g/cm^3$

B. $2.16g/cm^3$

C. $3.64g/cm^3$

D. $4.56g/cm^3$

Answer: B



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127. In the laboratory, sodium chloride is made by burning sodium in the atmosphere of chlorine. The salt obtained is yellow in colour. The cause of yellow colour is

- A. presence of Na^+ ions in the crystal lattice
- B. presence of Cl^- ions in the crystal lattice
- C. presence of electrons in the crystal lattice
- D. presence of face-centred cubic crystal lattice.

Answer: C

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128. In NaCl crystal, the nature of defect is

- A. interstitial defect
- B. Schottky defect
- C. Frenkel defect
- D. none of these.

Answer: B

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129. Which of the following gives both Frenkel and Schottky defect?

A. AgCl

B. CsCl

C. KCl

D. AgBr

Answer: D



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130. Which of the following statements for crystals having Frenkel defect is not correct?

A. Frenkel defects are observed where the difference in sizes of cations and anions is large.

- B. The density of crystals having Frenkel defect is lesser than that of a pure perfect crystal.
- C. An ionic crystal having Frenkel defect may also contain Schottky defect.
- D. None of these.

Answer: B



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131. NaCl is doped with $2 \times 10^{-3} \text{ mol } \% \text{ SrCl}_2$, the concentration of cation vacancies is

- A. $3.01 \times 10^{18} \text{ mol}^{-1}$
- B. $12.04 \times 10^{18} \text{ mol}^{-1}$
- C. $6.02 \times 10^{18} \text{ mol}^{-1}$
- D. $12.04 \times 10^{18} \text{ mol}^{-1}$

Answer: B



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132. Which of the following are example(s) of thermodynamic defects?

- A. Metal excess defect
- B. Metal deficiency defect
- C. Stoichiometric defects
- D. Both (b) and (c)

Answer: C



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133. If Al^{3+} ions replace Na^+ ions at the edge centres of NaCl lattice, then the number of vacancies in 1 mole of NaCl will be

A. 3.01×10^{23}

B. 6.02×10^{23}

C. 9.03×10^{23}

D. 12.04×10^{23}

Answer: A



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134. Zinc oxide is white when cold but yellow when hot because it develops

A. Frenkel defect

B. Schottky defect

C. metal excess defect

D. metal deficiency defect.

Answer: C



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135. The yellow colour of ZnO and conducting nature produced upon heating is due to

- A. metal excess defects due to interstitial cation
- B. extra positive ions present in an interstitial site
- C. trapped electrons
- D. all of these.

Answer: D



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136. The crystal with metal deficiency defect is

- A. NaCl
- B. FeO

C. KCl

D. ZnO

Answer: B



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137. Frenkel defect is generally observed in

A. AgBr

B. AgI

C. ZnS

D. all of these.

Answer: D



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138. As a result of Frenkel defect,

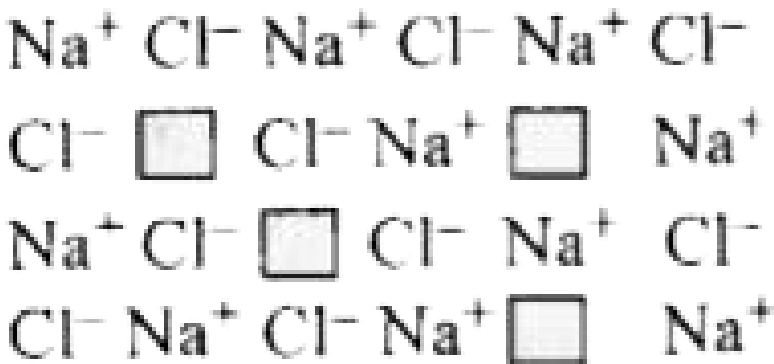
- A. there is no effect on the density
- B. there is no effect on the conductivity
- C. there is no effect on the dielectric constant
- D. there is no effect on all the above three.

Answer: A



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139. What type of crystal defect is indicated in the diagram below?



- A. Frenkel defect
- B. Schottky defect
- C. Interstitial defect
- D. Frenkel and Schottky defect

Answer: B



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140. Which of the following defect, if present, lowers the density of the crystal?

- A. Frenkel
- B. Schottky
- C. Edge dislocation
- D. Constitution of F-centres

Answer: B



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141. When NaCl crystal is doped with $MgCl_2$, the nature of defect produced is

- A. interstitial defect
- B. Schottky defect
- C. Frenkel defect
- D. impurity defect

Answer: D



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142. Ionic solids with Schottky defects contain in their structure

- A. equal number of cation and anion vacancies
- B. interstitial anions and anion vacancies

C. cation vacancies only

D. cation vacancies and interstitial cations.

Answer: A



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143. In a solid lattice the cation and anion both have left a lattice site.

The lattice defect is known as

A. interstitial defect

B. valency defect

C. Frenkel defect

D. Schottky defect.

Answer: D



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144. Which of the following defects is shown by KBr?

- A. Frenkel defect
- B. Schottky defect
- C. Metal excess defect
- D. Metal deficiency defect

Answer: B



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145. The defect that is more likely to occur in almost all types of ionic crystals is

- A. non-stoichiometric defects
- B. Schottky defect
- C. Frenkel defect
- D. all of the above.

Answer: B



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146. Schottky defect is

- A. vacancy of ions
- B. delocalization of ions
- C. interstitial vacancy of ions
- D. vacancy of only cations.

Answer: A



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147. An electron trapped in an anion site in a crystal is called

- A. F-centre

- B. Frenkel defect
- C. Schottky defect
- D. interstitial defect.

Answer: A

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148. Which of the following crystals does not exhibit Frenkel defect?

- A. AgBr
- B. AgCl
- C. KBr
- D. ZnS

Answer: C

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149. The correct statement regarding defects in solids is

- A. Frenkel defect is usually favoured by a very small difference in the sizes of cation and anion
- B. Frenkel defect is a dislocation defect
- C. trapping of protons in the lattice leads to the formation of F-centre
- D. Schottky defects increase the density of crystal solids.

Answer: B



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150. The flame colours of metal ions are due to

- A. Frenkel defect
- B. Schottky defect

C. metal deficiency defect

D. metal excess defect.

Answer: D

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151. Which substance shows antiferromagnetism?

A. TiO_2

B. CuO

C. CrO_2

D. Mn_2O_3

Answer: D

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152. Which of the following substances will conduct current in the solid state?

- A. Diamond
- B. Graphite
- C. Iodine
- D. Sodium chloride

Answer: B



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153. Germanium is an example of

- A. an intrinsic semiconductor
- B. an n-type semiconductor
- C. a p-type semiconductor

D. insulator.

Answer: A



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154. Certain crystals produce electric signals on application of pressure.

This phenomenon is called

A. pyroelectricity

B. ferroelectricity

C. piezoelectricity

D. ferrielectricity.

Answer: C



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155. Silicon doped with arsenic is an example of which type of semiconductor?

- A. p-type
- B. n-type
- C. n, p-type
- D. Intrinsic

Answer: B



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156. Which of the following is not a ferroelectric compound?

- A. Rochelle salt
- B. $K_4[Fe(CN)_6]$
- C. $BaTiO_3$

D. KH_2PO_4

Answer: B



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157. Pure silicon and germanium are

- A. conductors
- B. extrinsic semiconductors
- C. intrinsic semiconductors
- D. may be any one of the above.

Answer: C



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158. In a ferromagnetic material

- A. all the magnetic moment vectors are aligned in one direction
- B. half of the magnetic moment vectors point in one direction and rest in the opposite direction
- C. all the magnetic moment vectors are randomly oriented
- D. small magnetic moment is present

Answer: A



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159. In a ferrimagnetic material

- A. all the magnetic moment vectors point in one direction
- B. all the magnetic moment vectors are randomly oriented
- C. equal number of magnetic moment vectors are oriented in opposite directions

D. unequal number of magnetic moment vectors are in opposite directions.

Answer: D

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160. Which of the following metal oxides is antiferromagnetic in nature?

A. MnO_2

B. TiO_2

C. NO_2

D. CrO_2

Answer: A

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161. A semiconductor of Ge can be made p-type by adding

- A. trivalent impurity
- B. tetravalent impurity
- C. pentavalent impurity
- D. divalent impurity.

Answer: A



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162. To get n-type doped semiconductor, impurity is to be added to silicon should have the following number of valence electrons

- A. 2
- B. 5
- C. 3

D. 1

Answer: B



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163. With which one of the following elements silicon should be doped so as to give p-type semiconductor?

A. Selenium

B. Boron

C. Germanium

D. Arsenic

Answer: B



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164. Molecules/ions and their magnetic properties are given below.

Molecule/ion	Magnetic property
(i) C_6H_6	(1) Antiferromagnetic
(ii) CrO_2	(2) Ferrimagnetic
(iii) MnO	(3) Ferromagnetic
(iv) Fe_3O_4	(4) Paramagnetic
(v) Fe^{3+}	(5) Diamagnetic

The correctly matched pairs in the above is

A. i-5, ii-3, iii-2, iv-1, v-4

B. i-3, ii-5, iii-1, iv-4, v-2

C. i-5, ii-3, iii-1, iv-2, v-4

D. i-5, ii-3, iii-1, iv-4, v-2

Answer: C



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165. The material used in the solar cells contains

A. C

B. Si

C. S

D. Ti

Answer: B

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Check Your Neet Vital

1. A metal crystallises in face-centred cubic lattice with edge length of 450 pm, Molar mass of metal is 50gmol^{-1} . The density of the metal is

A. 3.12gcm^{-3}

B. 3.64gcm^{-3}

C. 3.95gcm^{-3}

D. 4.02gcm^{-3}

Answer: B

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2. KCl crystallises in the same type of lattice as does NaCl. Given that, $r_{\text{Na}^+} / r_{\text{Cl}^-} = 0.55$ and $r_{\text{K}^+} / r_{\text{Cl}^-} = 0.74$. Calculate the ratio of the side of the unit cell of KCl to that of NaCl.

A. 1.123

B. 0.891

C. 1.414

D. 0.414

Answer: A

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3. A face-centred cubic lattice of a single type of atoms has same defects and its one corner and one face centre is left unoccupied per unit cell.

Calculate the packing fraction of such solid.

A. 0.325

B. 0.256

C. 0.625

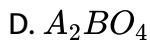
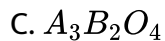
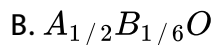
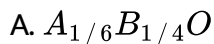
D. 0.312

Answer: C



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4. In a close packed structure of mixed oxides, it is found that lattice has O^{2-} (oxide ions), and one-half of octahedral voids are occupied by trivalent cations (A^{3+}) and one-eighth of tetrahedral voids are occupied by divalent cations (B^{2+}). What will be the formula of the mixed oxide?



Answer: D

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5. Which one of the following statements is incorrect?

A. The conductivity of metals decreases with increase in temperature.

B. The conductivity of semiconductors increases with increase in temperature.

C. There is no superconductor at room temperature.

D. Ionic solids conduct electricity due to presence of ions.

Answer: D



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6. Tungsten has a body-centred cubic lattice, and each lattice point is occupied by one atom. What will be the metallic radius of the tungsten atom, if the density of tungsten is 19.30 g cm^{-3} and atomic weight is 183.9 g?

A. 2.129 \AA

B. 6.253 \AA

C. 3.163 \AA

D. 1.369 \AA

Answer: D



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7. If an element (at. wt. = 50 u) crystallises in fcc lattice, with edge length, $a = 0.5 \text{ nm}$. What is the density of unit cell, if it contains 4% Schottky

defects?

$$(N_A = 6.023 \times 10^{23})$$

A. 2.55 g/cc

B. 2.66 g/cc

C. 2.26 g/cc

D. 1.0 g/cc

Answer: A



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8. The number of C-atoms present in the unit cell of diamond and the packing efficiency respectively are

A. 6,50.24%

B. 8,34%

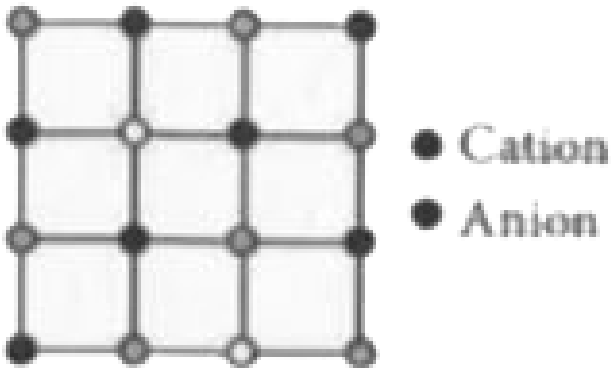
C. 8,74%

D. 6,68%

Answer: B

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9. The given structure represents



A. Schottky defect

B. Frenkel defect

C. impurity defect

D. line defect.

Answer: A



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10. In AgBr crystal, the ionic size lies in the order $Ag^+ < Br^-$. The AgBr crystal should have which of the following characteristics?

- A. Defectless (perfect) crystal
- B. Schottky defect only
- C. Frenkel defect only
- D. Both Schottky and Frenkel defects

Answer: D



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11. Conduction in a p-type semiconductor is increased by

- A. increasing the band gap
- B. decreasing the temperature
- C. adding appropriate electron deficient impurities
- D. adding appropriate electron rich impurities.

Answer: C

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12. The density of an ionic compound (molar mass = 58.5) is 2.165gcm^{-3} and the edge length of unit cell is 562 pm, then the closest distance between $A^+ + B^-$ and number of atoms per unit cell is

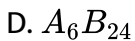
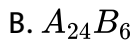
- A. 397 pm, 4
- B. 562 pm, 2
- C. 562 pm, 4
- D. 281 pm, 2

Answer: A



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13. The unit cell of a binary alloy composed of A and B metals, has a ccp structure with A atoms occupying the corners and B atoms occupying centres of each face of the cube. If during the crystallisation of this alloy, in the unit cell two A atom are missed, the overall composition per unit cell is



Answer: D



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14. The number of spheres contained in (i) one body-centred cubic unit cell and (ii) one face-centred cubic unit cell, are

- A. 2 in (i) and 4 in (ii)
- B. 3 in (i) and 2 in (ii)
- C. 4 in (i) and 2 in (ii)
- D. 2 in (i) and 3 in (ii)

Answer: A



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

- A. $\frac{\pi}{3\sqrt{2}}$
- B. $\frac{\pi}{4\sqrt{2}}$
- C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: D



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16. At ordinary pressure, NaCl crystal has coordination number 6: 6. If high pressure is applied upon it, the coordination number changes to

A. 4: 4

B. 8: 8

C. 6: 8

D. 8: 6

Answer: B



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17. Match axial parameters given in Column I with crystal systems given in Column II and select the correct option.

Column I

(Axial parameters)

(P) $a = b = c, \alpha = \beta = \gamma \neq 90^\circ$

(Q) $a \neq b \neq c, \alpha = \gamma = 90^\circ \neq \beta$

(R) $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^\circ$

(S) $a \neq b \neq c, \alpha = \beta = \gamma = 90^\circ$

Column II

(Crystal system)

1. Orthorhombic

2. Triclinic

3. Monoclinic

4. Rhombohedral

A. P-1, Q-2, R-3, S-4

B. P-4, Q-3, R-2, S-1

C. P-3, Q-4, R-2, S-1

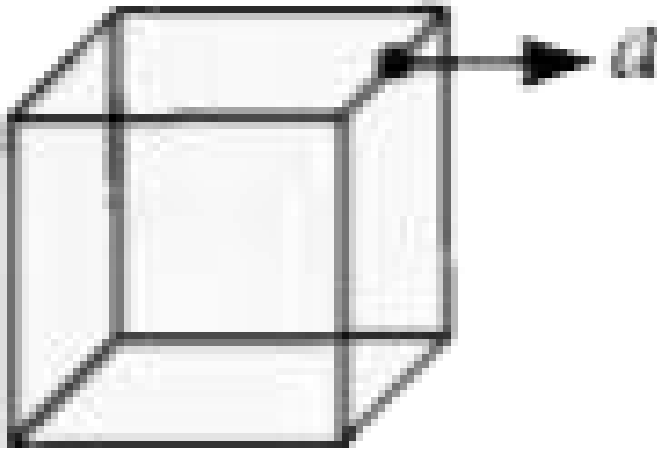
D. P-4, Q-3, R-1, S-2

Answer: B



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18. The site labelled as 'a' in fcc arrangement is



A. face with $1/4$ contribution

B. edge with $1/4$ contribution

C. corner with $1/4$ contribution

D. tetrahedral void with $1/8$ contribution.

Answer: B



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19. Consider the structure of CsCl (8: 8 coordination). How many Cs^+ ions occupy the second nearest neighbour locations of a Cs^+ ion?

- A. 8
- B. 24
- C. 6
- D. 16

Answer: C

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20. An element crystallises in a structure having a fcc unit cell of an edge 100 pm. If 24 g of the element contains 24×10^{23} atoms, the density is

- A. 2.40 g cm^{-3}
- B. 40 g cm^{-3}
- C. 4 g cm^{-3}

D. 24gcm^{-3}

Answer: B



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21. In which of the following pair, both the solids belong to same type?

A. Solid CO_2 , ZnS

B. CaF_2 , Ca

C. Graphite, ice

D. SiC , AlN

Answer: D



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22. A metallic element has a cubic lattice. Each edge of the unit cell is 2.88 Å. The density of the metals is 7.20 g cm⁻³. How many unit cells will be there in 100 g of the metal?

A. 5.82×10^{23}

B. 5.82

C. 1.89×10^{23}

D. 1.89

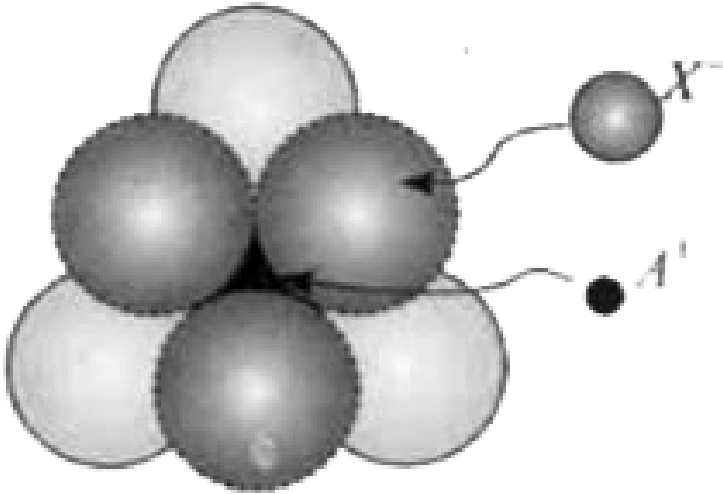
Answer: A



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23. The arrangement of X^- ions around A^+ ion in solid AX is given in the figure (not drawn to scale). If the radius of X^- is 250 pm, the radius of A^+ is

v



A. 104 pm

B. 125 pm

C. 183 pm

D. 57 pm

Answer: A



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24. Which of the following statements is not true about amorphous solids?

- A. On heating they may become crystalline at certain temperature.
- B. They may become crystalline on keeping for long time.
- C. They can be moulded by heating.
- D. They are anisotropic in nature.

Answer: D



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25. A hard, crystalline solid with a high melting point does not conduct electricity in any phase. This solid is most likely

- A. an ionic solid
- B. a metallic solid
- C. a molecular solid

D. a network covalent solid.

Answer: D



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Aipmt Neet Mcqs

1. AB crystallises in a body-centred cubic lattice with edge length 'a' equal to 387 pm. The distance between two oppositely charged ions in the lattice is

A. 335 pm

B. 250 pm

C. 200 pm

D. 300 pm

Answer: A

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2. A solid compound XY has NaCl structure. If the radius of the cation (X^+) is 100 pm, the radius of the anion (Y^-) will be

A. 275.1 pm

B. 322.5 pm

C. 241.5 pm

D. 165.7 pm

Answer: C

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3. A metal crystallises with a face-centred cubic lattice. The edge of the unit cell is 408 pm. The diameter of the metal atom is

A. 288 pm

B. 408 pm

C. 144 pm

D. 204 pm

Answer: A

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4. The number of octahedral void(s) per atom present in a cubic close-packed structure is

A. 1

B. 2

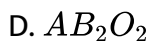
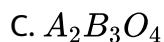
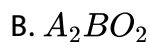
C. 3

D. 4

Answer: A

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5. Structure of a mixed oxide is cubic close packed (ccp). The cubic unit cell of mixed oxide is composed of oxide ions. One-fourth of the tetrahedral voids are occupied by divalent metal A and the octahedral voids are occupied by a monovalent metal B. The formula of the oxide is



Answer: D



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6. A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72 g cm^{-3} . The molar mass of the metal is $(N_A \text{ Avogadro's constant} = 6.02 \times 10^{23} \text{ mol}^{-1})$

A. 27g mol^{-1}

B. 20g mol^{-1}

C. 40g mol^{-1}

D. 30g mol^{-1}

Answer: A

 [View Text Solution](#)

7. The number of carbon atoms per unit cell of diamond unit cell is

A. 6

B. 1

C. 4

D. 8

Answer: D

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8. If a is the length of the side of a cube, the distance between the body-centred atom and one corner atom in the cube will be

A. $\frac{2}{\sqrt{3}}a$

B. $\frac{4}{\sqrt{3}}a$

C. $\frac{\sqrt{3}}{4}a$

D. $\frac{\sqrt{3}}{2}a$

Answer: D



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9. A given metal crystallises out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of one atom?

A. 80 pm

B. 108 pm

C. 40 pm

D. 127 pm

Answer: D



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10. The vacant space in bcc lattice unit cell is

A. 0.48

B. 0.23

C. 0.32

D. 0.26

Answer: C



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11. The correct statement regarding defects in crystalline solids is

- A. Frenkel defects decrease the density of crystalline solids
- B. Frenkel defect is a dislocation defect
- C. Frenkel defect is found in halides of alkaline metals
- D. Schottky defects have no effect on the density of crystalline solids.

Answer: B



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12. Lithium has a bcc structure. Its density is 530 kg m^{-3} and its atomic mass is 6.94 gmol^{-1} . Calculate the edge length of a unit cell of lithium metal. ($N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)

- A. 527 pm
- B. 264 pm
- C. 154 pm

D. 352 pm

Answer: D



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13. The ionic radii of A^+ and B^- ions are $0.98 \times 10^{-10} m$ and $1.81 \times 10^{-10} m$. The coordination number of each ion in AB is

A. 8

B. 2

C. 6

D. 4

Answer:



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14. In calcium fluoride, having the fluorite structure, the coordination numbers for calcium ion (Ca^{2+}) and fluoride ion (F^{-}) are

A. 4 and 2

B. 6 and 6

C. 8 and 4

D. 4 and 8

Answer: C



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15. Which is the incorrect statement?

A. Density decreases in case of crystals with Schottky defect.

B. $NaCl_{(s)}$ is insulator, silicon is semiconductor, silver is conductor, quartz is piezoelectric crystal.

C. Frenkel defect is favoured in those ionic compound in which sizes of cation and anion are almost equal.

D. $Fe_{0.98}$ has non-stoichiometric metal deficiency defect.

Answer: C::D



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16. Iron exhibits bcc structure at room temperature Above $900^{\circ}C$, it transforms to fcc structure. The ratio of density of iron at room temperature to that at $900^{\circ}C$ (assuming molar mass and atomic radii of iron remains constant with temperature) is

A. $\frac{\sqrt{3}}{\sqrt{2}}$

B. $\frac{4\sqrt{3}}{3\sqrt{2}}$

C. $\frac{3\sqrt{3}}{4\sqrt{2}}$

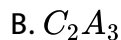
D. $\frac{1}{2}$

Answer: C



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17. A compound is formed by cation C and anion A. The anions form hexagonal close packed (hcp) lattice and the cations occupy 75% of octahedral voids. The formula of the compound is



Answer: D



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