CHEMISTRY

BOOKS - NARENDRA AWASTHI

SOLID STATE

Exercise

1. which of the following statement is true for ionic solids?

    A. Ionic solids are soluble in non-polar solvent

    B. Under the electric field cation and anions acquire translatory motion in opposite directions

    C. Structural units have strong electrostatic force of arrtraction

    D. Structural units have dipole-dipole interactions

Answer: C

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2. Which one is called pseudo solid?

A. CaF_2

B. Glass

C. NaCl

D. All

Answer: B

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3. Solid which do not show the same physical properties in different

directions are called:

A. pseudo solids

B. isotropic solids

C. polymorphic solids

D. anisotropic solids

Answer: D

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4. Graphite is an example of:

A. ionic solid

B. covalent solid

C. metallic solid

D. none of these

Answer: B

5. Amorphous solids are

    A. isotropic and supercooled liquids

    B. anisotropic and supercooled liquids

    C. isoenthalpic and superheated liquids

    D. isotropic and superheated solids

Answer: A

6. Which type of solid crystals will conduct heat and electricity?

    A. ionic crystals

B. Covalent crystal

C. metallic crystals

D. molecular crystals

Answer: C

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7. The bond length and bond angles in molecules in the solid state are calculated by:

A. X-ray diffraction technique

B. neutrons bombardment

C. protons bombardment

D. none of these

Answer: A

8. if $a = b \neq c$ and $\alpha = \beta = \gamma = 90°$, the crystal system is

A. cubic

B. triclinic

C. hexagonal

D. tetragonal

Answer: D

9. Triclinic crystal has the following the cell parameters:

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

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

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

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

Answer: C

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10. If all three iterfacial angeles defining the unit cell, are equal in magniture, the crystal cannot be:

A. rhombohedral

B. cubic

C. hexagonal

D. tetragonal

Answer: C

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11. In a hexagoanl crystal:

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

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

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

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

Answer: D

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12. Orthorhombic crystal has the following unit cell parameters:

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: C

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13. Which of the crystal systems has maximum number of Bravais lacttices?

A. Cubic

B. Hexagonal

C. Triclinic

D. Orthohombic

Answer: D

14. The most unsysmmetrical and symmeterical systems are, respectively:

    A. Tertragonal, Cubic

    B. triclinic , Cubic

    C. Rhombohedral, Hexagonal

    D. Orthohombic, Cubic

Answer: B

15. Tetragonal crystal system has the following unit cell dimensions :

A. cubic

B. tertragonal

C. monoclinic

D. rhombohedral

Answer: B

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16. In the primitive cubic unit cell, the atoms are present at the:

A. corners of the unit cell

B. centre of the unit cell

C. centre of each face of the unit cell

D. one set of faces of the unit cell

Answer: A

17. In the body centered unit cell, the lattice point are present at the:

    A. corners of the unit cell only

    B. corners and centre of the unit cell

    C. corners and centre of each face of the unit cell

    D. corners and at one set of faces of unit cell

Answer: B

18. In the face centered per unit cell, the lattice points are present at the:

A. corners of unit cell only

B. corners and centre of the unit cell

C. corners and centre of each face of the unit cell

D. face centres of the unit cell

Answer: C

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19. The number of atom per unit in a simple cubic, face - centered cubic and body - centered cubic are ....respectively

A. 1,4,2

B. 1,2,4

C. 8,14,9

D. 8,4,2

Answer: A

20. What would be the effective number of atoms per unit cell in end centred cubic uit cel, if this type of unit cell exist in nautre?

A. 1

B. 2

C. 3

D. 4

Answer: B

21. In the body centered cubic unit cell and simple unit cell, the radius of atoms in terms of edge length (a) of the unit cell is respectively:

A. $\dfrac{a}{2}, \dfrac{a}{2\sqrt{2}}$

B. $\dfrac{a}{\sqrt{2}}, \dfrac{a}{2}$

C. $\dfrac{a}{2\sqrt{2}}, \dfrac{a}{2}$

D. $\dfrac{3\sqrt{a}}{4}, \dfrac{a}{2}$

Answer: D

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22. How many electrons are present in Al3+ ion ?

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23. The fraction of total volume occupied by the atom present in a simple cubic is

    A. 0.48

    B. 0.52

    C. 0.55

    D. 0.68

Answer: B

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24. The fraction of volume occupied by atoms in a body centered cubic unit cell is:

    A. 0.32

    B. 0.48

C. 0.68

D. 0.74

Answer: C

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25. The fraction of volume occupied by atoms in a face centered cubic unit cell is:

A. 0.32

B. 0.48

C. 0.68

D. 0.74

Answer: D

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26. Which of the following crystal lattice has the miniumuum empty space?

    A. simple cubic

    B. Body centred cubic

    C. Face centred cubic

    D. Simple tertragonal

Answer: C

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27. Which of the following has the smallest packing efficency for atoms of a single type?

    A. Body centred cubic

B. Face centred cubic

C. Face centred cubic

D. Simple tetragonal

Answer: C

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28. Polonium crystallizes in a simple cubic strtucture. The edge of the unit cell is 0.236nm. What is the radius of the polonium atoms:

A. $0.144nm$

B. $0.156nm$

C. $0.118nm$

D. $0.102nm$

Answer: C

29. Lithium crystallizes as body centered cubic crystals. If the length of the side of unit cell is 350=pm, the atomic radius of lithium is:

A. 303.1pm

B. 606.2pm

C. 151.5pm

D. 123.7pm

Answer: C

30. Metallic gold crystallises in face centred cubic lattice with edge-length 4.07Å. Closest distance between gold atoms is:

A. 576.6pm

B. 287.8pm

C. 352.5pm

D. 704.9pm

Answer: B

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31. When atoms are placed at the corners of all 12 edges of a cube. How many atoms are present per unit cell?

A. 490pm

B. 320pm

C. 453pm

D. 481pm

Answer: C

32. What are the number of atoms per unit cell and the number of nearest neighbours in a simple cubic structure?

A. 1,6

B. 4,12

C. 2,8

D. 2,6

Answer: A

33. What are the number of atoms per unit cell and the number of nearest neighbours in a face centered cubic structure?

    A. 4,8

    B. 2,8

    C. 2,6

    D. 4,12

Answer: D

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34. A atom crystallise in fcc and B atoms occupies tetrahedral voids. what is the formula of compound?

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35. Draw lewis structure of O & O2-

36. Tungsten has an atomic radius of 0.136nm. The density of tungsten is $19.4g/cm^3$. What is the crystal structure of tungsten ? $(\text{Atomic mass} W = 184)$

A. simple cubic

B. Body centred cubic

C. Face centred cubic

D. none of these

Answer: B

37. The density of argon (face centered cubic cell) is $1.83g/cm^3$ at $20°C$. What is the length of an edge a unit cell? (Atomic mass: $Ar = 40$)

A. 0.599nm

B. 0.569nm

C. 0.525nm

D. 0.551nm

Answer: C

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38. The density of nickel (face centered cubic cell) is $8.94g/cm^3$ at $20°C$. What is the radius of the atom? (Atomic mass: $Ni = 59$)

A. 0.124nm

B. 0.136nm

C. 0.149nm

D. 0.110nm

Answer: A

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39. The density of krypton (face centered cubic cell) is $3.19g/cm^3$.

What is the radius of the atom? $(\text{Atomic mass}: Kr = 84)$

A. 0.198nm

B. 0.221nm

C. 0.206nm

D. 0.225nm

Answer: A

40. The face centered cubic cell of platinum ha an edge length of 0.392nm. Calculate the density of platinum (g/cm^3) : $(\text{Atomic mass}: Pt = 195)$

    A. 20.9

    B. 20.4

    C. 19.6

    D. 21.5

Answer: D

41. Chromium metal crystallizes with a body-centred cubic lattice. The length of the unit cell edge is found to be 287pm. Calculate the atomic radius. What woulds be the density of chromium in gcm^{-3}?

  A. 6.8

  B. 7.6

  C. 6.6

  D. 7.3

Answer: D

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42. An elements crystallizes in a face centered cubic lattice and the edge of the unit cell is 0.559nm. The density is $3.19g/cm^3$. What is the atomic mass?

A. 87.6

B. 79.9

C. 85.5

D. 83.9

Answer: D

43. The elements crystallizes in a body centered cubic lattice and the edge of the unit cell is 0.351nm. The density is $0.533g/cm^3$. What is the atomic mas?

A. 12

B. 6.94

C. 9.01

D. 10.8

Answer: B

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44. An element $X(At, wt = 80g/mol)$ having fcc structure, calculate the number of unit cells in $8 g of X$

A. $0.4 \times N_A$

B. $0.1 \times N_A$

C. $4 \times N_A$

D. none of these

Answer: D

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45. Molybdenum $\left(\text{At. mass}=96\text{g}//\text{mol}^{-1}\right)$ crystallizes as bcc crystal. If density of crystal is $10.3g/cm^3$, then radius of Mo atoms $\left(useN_A = 6 \times 10^{23}\right)$:

   A. 111PM

   B. 314PM

   C. 135.96PM

   D. none of these

Answer: C

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46. The most malleable metals (Cu,Ag,Au) have close-packing of the type:

   A. Hexagonal closse-packing

B. Cubic close-packing

C. Body-centred cubic packing

D. Malleablity is not related to type of packing

Answer: B

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

A. 12

B. 4

C. 8

D. 6

Answer: A

48. If the ratio of coordination no. of A to that iof B is x:y, then the ratio of no. of atoms of A to that no, of atoms of B in the unit cell is

A. $x : y$

B. $y : x$

C. $x^2 : y$

D. $y : x^2$

Answer: B

49. The atomic radius of strontium (Sr) is $215pm$ and it crystallizes with a cubic. Closest packing . Edge length of the cube is :

A. 4.30pm

B. 608.2pm

C. 496.53pm

D. none of these

Answer: B

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50. By X-ray diffraction it is found tht nickel $\left(\text{at mass} = 59 g\text{mol}^{-1}\right)$, crystallizes with ccp. The edge length of the unit cell is 3.5Å. If density of Ni crystal is $9.0 g/cm^3$, then value of Avogadro's number from the data is:

A. 6.05×10^{23}

B. 6.11×10^{23}

C. 6.02×10^{23}

D. 6.023×10^{23}

Answer: B

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51. Stacking of square close packed layers give rise to:

A. bcc structure

B. fcc structure

C. Simple cubic structure

D. hcp structur

Answer: C

52. 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 for A and B is:

A. $A = B$

B. $A < B$

C. $A > B$

D. A is equal to the fraction in a simple cubic lattice.

Answer: A

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53. The unit cell present in ABCABC, closet packing of atoms is:

A. Hexagonal

B. tetragonal

C. Face centred cubic

D. primitive cubic

Answer: C

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54. The number of atoms present in a hexagonal close-packed unit cell is:

A. 4

B. 6

C. 8

D. 12

Answer: B

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55. The unit cell present in ABAB, closest packing of atoms is:

A. Hexagonal

B. tertragonal

C. face centered cubic

D. primitive cubic

Answer: A

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56. The number of tetrahedral and octahedral holes in a hexagonal primitive unit cell are respectively:

A. 8,4

B. 6,12

C. 2,1

D. 12,6

Answer: D

57. Which one of the following schemes of ordering closed packed sheets of equal sized spheres does not generate close packed lattice?

A. ABCABC

B. ABACABAC

C. ABBAABBA

D. ABCBCABCBC

Answer: C

58. In the closed packing of atoms, there are:

A. one tetrahedral void and two octahedral voids per atom

B. two tetrahedral voids and one octahedral void per atom

C. two of each tertrahedral and octahedral voids per atom

D. one of each tetrahedral and octahedral voids per atom

Answer: B

59. Which of the following figures represets the cross-section of an octahedral site?

A. (a)

B. (b)
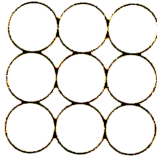
C. (c)
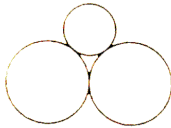
D. (d)
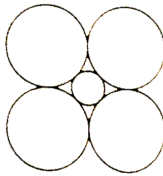
Answer: D

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60. In which of the following pairs of structures, tetrahedral as well

as octahedral holes are found?

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61. The number of octahedral void in bcc structure is:

A. 0

B. 1

C. 2

D. 4

Answer: A

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62. An ionic compound is expected to have octahedral structure if $r_c/r_a(r_c < r_a)$ lies in the range of:

A. 0.414 to 0.732

B. 0.732 to 0.82

C. 0.225 to 0.414

D. 0.155 to 0.225

Answer: A

63. A ionic compound is expected to have tetrahedral structure if r_c/r_a:

A. lies in the range of 0.141 to 0.732

B. lies in the range of 0.225 to 0.414

C. lies in the range of 0.155 to 0.225

D. is more than 0.732

Answer: B

64. An ionic compound is expected to have body centred type cubic unit cell if r_c/r_a:

    A. is greater than 0.732

    B. lies in the range of 0.141 to 0.732

    C. lies in the range of 0.255 to 0.414

    D. lies in the range of 0.155 to 0.225

Answer: A

65. In the closed packing of atoms A $(\text{radius}: r_a)$, the radius of atom B that can be fitted into tetrahedral void is:

A. $0.155r_a$

B. $0.255r_a$

C. $0.414r_a$

D. $0.732r_a$

Answer: B

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66. In closest packing of A type of atoms (radius r_A) the radius of atom B that can be fitted into octabedral voids is

A. $1.155r_a$

B. $0.255r_a$

C. $0.414r_a$

D. $0.732r_a$

Answer: C

67. How many nearest neighbours are there in an atom or ion for an octahedral hole of a closed packed structure?

A. 4

B. 6

C. 8

D. 12

Answer: D

68. How many "nearst" and "next nearst" neighbours, respectively, does potassium have in bcc lattice?

A. 8,8

B. 8,6

C. 6,8

D. 6,6

Answer: B

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69. In the closest packing of atoms

A. the size of tetrahedral void is greater than that of octahedral void

B. the size of tertrahedral void is smaller than that of octahedral

void

C. the size of tertrahedral void is equal than that of octahedral

void

D. the size of tetraderal void may be or smaller or equal to that

of octahedral void depending upon the size of atoms

Answer: B

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70. The ionic compound AB the ratio $r_{A+} : r_{B-}$ is 0.414. Indicate the

correct statement among the following:

A. Cation form close packing and anion exactly fir into the

octahedral voids

B. Anion form close packing and anion occupy precisely half of

the tetrahedral voids

C. Anion form close packing and cation occupy precisely all the

octahedral voids

D. Cation form close packing and anion fit into the octahedral

voids loosely

Answer: C

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71. Number of atoms present per unit cell in NaCl

A. 2

B. 3

C. 4

D. none of these

Answer: B

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72. Which is incorrect statement?

A. In NaCl structure, tetrahedral voids are unoccupied

B. In ZnS structure, octahedral voids are unoccupied

C. In CaF_2 structure, all tetrahedral voids are occupied

D. In Na_2O structure, all tetrahedral voids are unoccupied

Answer: D

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73. In the radius of the anion in an ionic acid solid is 200pm, what would be the radius of the cation that fits exactly into a cubic hole:

A. 146.4pm

B. 82.8pm

C. 45pm

D. none of these

Answer: A

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74. The CsCl type structure is exhibited by alkali halides only when the radius of the cation is large enough to keep touching its eight nearst neighbour aniion. Below what minimum raiton of cation of anion radii (r^+ / r^-) this contact is prevented

A. 0.225

B. 0.414

C. 0.632

D. 0.732

Answer: D

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75. MgO crystallizes in a cubic type crystal system. The ionic radii for Mg^{2+} and O^{2-} are 0.066 abd 0.140nm respectively One can conclude that the Mg^{2+} ions occypy:

A. a cubic hole in a simple structure

B. every tetrahedral hole in a close packed structure

C. an octahedral hole in a cubic packed structure

D. every other tetrahedral hole in a close paked structure

Answer: C

76. The unit cell of diamond is made up of:

    A. 8 carbon atoms, 4 atoms ccp and two atoms occuypy half of

       octahedral voids

    B. 8 carbon atom, 4 atoms constitute ccp and 4 atoms occupy all

       the octahedral voids

    C. 8 carbon atoms, 4 atoms form fcc lattice and 4 atoms occupy

       half of the tetrahedral voids altenately

    D. 12 carbon atoms. 4 atoms form fcc lattice and 8 atoms occupy

       all the tetrahedral holes

Answer: C

77. For a solid with the structure shown in Fig, the coordination number of the points of the points A and , respectively are
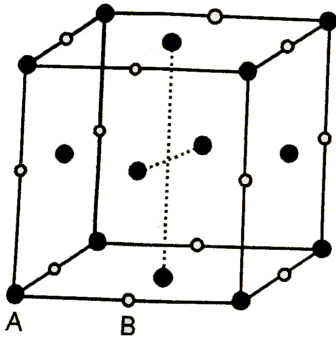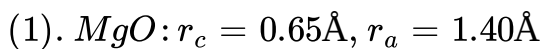

A. four and its unit cell has eight carbon atoms

B. four and its unit cell has six carbon atoms

C. six and its unit cell has four carbon atoms

D. four and its unit cell has four carbon atoms

Answer: A

78. Predict coordination umber of the cation in crystals of the following compounds :

(1). $MgO: r_c = 0.65\text{Å}, r_a = 1.40\text{Å}$
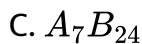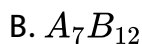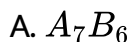
(2). $MgS: r_c = 0.65\text{Å}, r_a = 1.84\text{Å}$
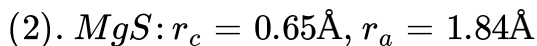
A. 6,4

B. 4,6

C. 3,4

D. 6,8

Answer: A

79. In a cubic unit cell, seven of the eight corners are occupied by atoms A and centres of faces are occupied by atoms B. The general formula of the compound is:

A. A_7B_6

B. A_7B_{12}

C. A_7B_{24}

D. $A_{24}B_7$
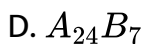
Answer: C

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80. CaS exists in a cubic close packed arrangement of S^{2-} ions in which Ca^{2+} ions occupy 1/2 of the available tetrahedral holes. How many Ca^{2+} and S^{2-} ions are contained in the unit cell?
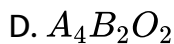
A. 1,1

B. 2,4

C. 4,4

D. 4,2

Answer: C

81. In the spinel structur, oxides ions are cubical-closet packed whereas 1/8th of tetrahedral voids are occupied by A^{2+} cation and 1/2 of octahedral voids are occupied by B^{+} cations. The general formula of the compound having spinel structure is:
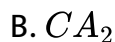
A. $A_2B_2O_4$

B. AB_2O_4

C. $A_2B_2O_2$

D. $A_4B_2O_2$

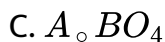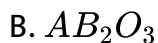**Answer: B**

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82. If the anion (A) form hexagonal closet packing and cation (C) occupy only 2/3 octahedral voids in it, then the general formula of the comound is:

A. CA

B. CA_2

C. C_2A_3

D. C_3A_2

Answer: C

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83. In a solid, oxide ions are arrnged in ccp, cations A occupy A occupy $\left(\dfrac{1}{8}\right)^t h$ of the tetrahedral voids and cation B occupy $\left(\dfrac{1}{4}\right)^{th}$ of the octahedral voids. The formula of the compound is:
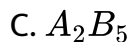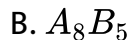
A. ABO_4

B. AB_2O_3

C. $A_\circ BO_4$

D. AB_4O_4

Answer: A

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84. In a face centered cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face

centers. One of the B atoms missing from one of the face in unit cell. The simplest formula of compounding is:

A. AB_3

B. A_8B_5

C. A_2B_5

D. $AB_{2/5}$
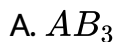
Answer: C

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85. An alloy of Cu, Ag and Au is found to have copper constituting the $c.c.p.$ lattice. If Ag atom occupy the edge centres and Au atom is present at body centre, the formula of this alloy is :

A. Cu_4Ag_2Au

B. Cu_4Ag_4Au

C. Cu_4Ag_3Au

D. $CuAgAu$
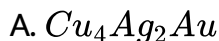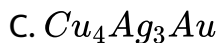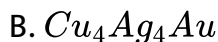
Answer: C

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86. Which of the following statements is correct ?

    A. Co-ordination number of cation is four and anion is six

    B. Co-ordination number of cation is six and anion is four

    C. Co-ordination number of each cation and anion in four

    D. Co-ordination number of each cation and anion in six

Answer: D

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87. Which of the following statement is correct for the body-centred cubic structure of an ionic compound?

    A. Co-ordination number of each cation and anion is two

    B. Co-ordination number of each cation and anion in four

    C. Co-ordination number of each cation and anion in six

    D. Co-ordination number of each cation and anion in eight

Answer: D

88. Which of following statements is correct in the zinc-blende-type structure of an ionic compound?

    A. Co-ordination number of each cation and anion is two

B. Co-ordination number of each cation and anion in four

C. Co-ordination number of each cation and anion in six

D. Co-ordination number of each cation and anion in eight

Answer: B

89. Which of the following expressions is correct in the case of a sodium chloride unit cell (edge length, a)?

A. $r_c + r_a = a$

B. $r_c + r_a = 2a$

C. $r_c + r_a = \sqrt{2}a$

D. $r_c + r_a = \dfrac{a}{2}$

Answer: B

90. In an ideal rock salt structure (edge length a) which of the following expression is correct?

A. $r_a = \sqrt{2}a$

B. $r_a = a/\sqrt{2}$

C. $r_a = a/2\sqrt{2}$

D. $r_a = a/4$

Answer: C

91. Which of the following expression is correct in case of a CsCl unit cell (edge length, a)?

A. $r_c + r_a = a$

B. $r_c + r_a = a/\sqrt{2}$

C. $r_c + r_a = \sqrt{3}a/2$

D. $r_c + r_a = a/2$

Answer: C

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92. In the face centered per unit cell, the lattice points are present at the:

A. $\dfrac{1}{2}a\sqrt{2}$

B. $\dfrac{1}{2}a$

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

D. $\dfrac{1}{\sqrt{2}}2a$

Answer: A

---

93. What are the number of atoms per unit cell and the number of nearest neighbours in a face centered cubic structure?

A. $8Cl^-ions$

B. $12Na^+ions$

C. $12Cl^-ions$

D. $24Cl^-ions$

Answer: B

94. In an ionic compound A^+X^-, the radii of A^+ and X^- ions ar

1.0pm and 2.0pm, respectively. The volume of the unit cell of the

crystal AX will be:

A. 27pm^3

B. 64pm^3

C. 125pm^3

D. 216pm^3

Answer: D

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95. The coordination number of cation and anion in fluorite CaF_2

and anti-fluroite Na_2O are respectively:

A. 8:4 and 6:3

B. 6:3 and 4:4

C. 8:4 and 4:8

D. 4:8 and 8:4

Answer: C

96. Select the incorrect statement in a CsCl crystal:

A. Cs^+ forms a simple cubic lattice, Cl^- forms a simple cubinc lattice

B. Cl^- occupies body centre of Cs^+

C. Cs^+ occupies body centre of Cl^-

D. It is impossible for Cl^- to occupy body centre of Cs^+ because the body centre void of Cs^+ is smaller than Cl^-

Answer: D

97. The radius of a divaent cation A^{2+} is 94pm and of divalent anion B^{2-} is 146pm. The compound AB has:

A. (a) Rock salt structure

B. (b) Zinc blende structure

C. (c) Antifluorite structure

D. (d) CsCl like structure

Answer: A

98. A binary solid (AB) has a rock salt structure. If the edge length is 400pm, radius of cation is 80pm the radius of anion is:

A. 100pm

B. 120pm

C. 250pm

D. 325pm

Answer: B

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99. For a solid with the structure shown in Fig, the coordination number of the points of the points A and , respectively are
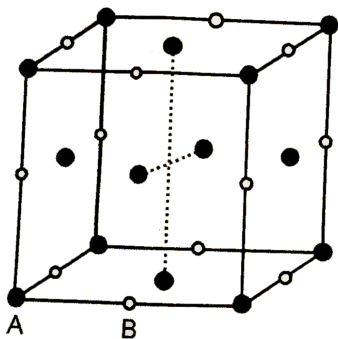
A. 6,8

B. 8,8

C. 6,6

D. 4,6

Answer: C

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100. An ionic compound AB has fluorite type structures. If the radius

$B^{(-)}$ is 200pm, then the ideal radius of A^+ would be:

A. 82.8pm

B. 146.4pm

C. 40pm

D. 45pm

Answer: D

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101. In which of the following structures, the anion has maximum coordination number?

A. NaCl

B. ZnS

C. CaF_2

D. Na_2O

Answer: D

---

102. CsCl has bcc structure with Cs^+ at the centre and Cl^- ion at each corner. If r_{Cs^+} is 1.69Å and r_{Cl^-} is 1.81Å what is the edge length of the cube?

A. 3.50Å

B. 3.80Å

C. 4.04Å

D. 4.50Å

Answer: C

103. CsBr has bcc like structures with edge length 4.3Å. The shortest inter ionic distance in between Cs^+ and Br^- is:

A. 3.7Å

B. 1.86Å

C. 7.44Å

D. 4.3Å

Answer: A

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104. If the radius of Cl^+ ion 181pm, and the radius of Na^+ ion is 101pm then the edge length of unit cell is:

A. 282pm

B. 285.71pm

C. 512pm

D. 564pm

Answer: D

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105. Ammonium chloride, crystallizes in a body centered cubic lattice with edge length of unit cell equal to 387pm. If the size of Cl^- ion is 181pm, the size of NH_4^+ ion would be:

A. 116pm

B. 154pm

C. 174pm

D. 206pm

Answer: B

106. Salt AB has a zinc blende structure. The radius of A^{2+} and B^{2-} ion are 0.7Å and 1.8Å respectively. The edge length of AB unit cell is:

A. 2.5Å

B. 5.09Å

C. 5Å

D. 5.77Å

Answer: D

107. Transition metals, when they form interstitial compounds, the non-metals (H,B,C,N) are accommodated in:

  A. voids or holes in cubic-packed structure

  B. tetrahedral voids

  C. octahedral voids

  D. all of these

Answer: D

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108. In a diamond, each carbon atom is bonded to four other carbon atoms tetrahedrally. Alternate tetrahedral voids are occupied by carbon atoms. The number of carbon atoms per unit cell is:

A. 4

B. 6

C. 8

D. 12

Answer: C

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109. Which of the folloiwng statement for cyrstals having Schottly

defect is not correct?

A. Schottky defect arises due to the absence of a cation and

anion from the position which it is expected to occupy

B. schooty defect ar emore commmon in ionic compound with

high co-ordination number

C. The dinsity of the crystals having schottky defect is larger than that of the perfect crystal

D. The crystal having schottly defect is electrically neutral as a whole.

Answer: C

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110. Which is correct statement?

A. When temperature increases then number of defects decreases.

B. Schottky defect occurs when radius of cation is smalller

C. Frenkel defect occurs when radius of cation is smaller

D. none of these

Answer: C

111. Which of the following statements for cyrstals having Frenkel defect is not correct?

A. The density of crystals having Frenkel defect is less than that of a pure percfect crystal

B. In an ionic crystal having Frenkel defect may also contian Schottky defrect

C. Usually alkali halides do not Frenkel defect

D. Frenkel defects are observed where the difference in size of cation and anion is large

Answer: B

112. When anion leaves the normal lattice site and electron occupies interstitial sites in its crystal lattice, It is called:

    A. Schottky defect

    B. Frenkel defect

    C. Metal excess defect

    D. Stoichiometric defect

Answer: C

113. Which of the following defects does KBr show?

    A. Frenkel

B. Schottky defect occurs when radius of cation is smalller

C. Metal excess

D. Metal deficiency

Answer: B

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114. Dopping of AgCl crystals with $CdCl_2$ results in:

A. Schottky defect

B. Frenkel defect

C. Substitutional cation vacancy

D. Formation of F-centres

Answer: C

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115. $NaCl$ shows Schottky defects and $AgCl$ shows Frekel defects. Their electrical conductivity is due to the

    A. motion of ions and not the motion of electrons

    B. motion of electrons and not the motion of ions

    C. lower coordination number of NaCl

    D. higher coordinaiton number of AgCl

Answer: A

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116. Which one of the following crystal does not exhibit Frenkel defect?

    A. AgBr

B. AgCl

C. CsCl

D. ZnS

Answer: C

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117. Select the incorrect statement :

A. Stiochiometery of crystal remains uneffected dure to Schottky

defect

B. Frenkel defect is usually shown by ionic compounds having

low coordinaiton number

C. F-centres generation is responsible factor for imparting the

colour to the crystal

D. Density of crystal always increases due to substitutional impurity defect.

Answer: D

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118. Write lewis structure of P3-

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119. When NaCl is dopped with 10^{-5} mole % of $SrCl_2$, what is the no. of cationic vacanies?

A. $10^{-5} \times N_A$

B. $10^{-7} \times N_A$

C. $2 \times 10^{-7} \times N_A$

D. none of these

Answer: B

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120. The composition of a sample of Wustite is $Fe_{0.93}O_{1.00}$. What percentage of the iron is present in the form of $Fe(III)$?

A. 15.05 %

B. 25 %

C. 35 %

D. 45 %

Answer: A

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121. A certain sample of cuprous sulphide is found to have composition $Cu_{1.8}S$, , because of imcroporation of Cu^{2+} ion in the lattice, What is the mole % of Cu^{2+} in total content in this crystal?

A. 99.8 %

B. 11.11 %

C. 88.88 %

D. none of these

Answer: B

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122. Ferrimagnetism is in:

A. ↑ ↑ ↑ ↑ ↑ ↑

B. ↑ ↓ ↑ ↓

C. ↑ ↑ ↑ ↓ ↓

D. none of these

Answer: C

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123. Fe_3O_4 is ferrimagnetic at room temperature but at 850K it becomes::

A. diamagnetic

B. ferromagnetic

C. non-magnetic

D. paramagnetic

Answer: D

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124. When heated above $916°C$, iron changes its bcc crystalline from to fcc without the change in the radius of atom . The ratio of density of the crystal before heating and after heating is :

A. 1.069

B. 0.918

C. 0.725

D. 1.231

Answer: B

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125. $TIAI(SO_4)_2 . xH_2O$ is bcc with 'a' =1.22 nm. If the density of the solid is $2.32g/cc$, then the value of x is (Given : $N_A = 6 \times 10^{23}$) ,

at . Mass : $TI = 204$, $AI = 27$, $S = 32$).

A. 2

B. 4

C. 47

D. 70

Answer: C

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126. In an atomic bcc lattie what fraction of edge is not covered by atoms?

A. 0.32

B. 0.16

C. 0.134

D. 0.268

Answer: C

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127. The packing fraction of a simple cubic crystal with an interstitial

atom exactly fitting at the body center is :

A. 0.48

B. 0.52

C. 0.73

D. 0.91

Answer: C

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128. A face centered cubic element (atomic mass =60) has edge length of 400pm. What is the density of unit cell

A. 6.23 g//"cc"`

B. $50.7g/cc$

C. $3.5g/cc$

D. `1.75 g//"cc"

Answer: D

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129. Sodium (Na =23) crystallize in bcc arrangement with the edge length is 400"pm"`. The density of sodium crystal is:

A. $2.07g/cc$

B. $2.46g/cc$

C. $1.19 g/cc$

D. None of these

Answer: C

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130. The density of solid Ar (Ar=40 g/mole) is 1.65 g/ml at 40 K. if the argon atom is assumed to be a sphere of radius $1.54 \times 10^{-8} cm$, then % of solid Ar is apparently empty space?

A. 35.64

B. 64.36

C. 74

D. None of these

Answer: B

131. A bcc lattice is made up of hollow spheres of B. Spheres of solids A are present in hollow spheres of B. The radius of A is half of the radius of B. The ratio of total volume of spheres of B unoccupied by A in a unit cell and volume of unit cell is $A \times \dfrac{\pi\sqrt{3}}{64}$. Find the value of A.

A. $\dfrac{7\sqrt{3}\pi}{64}$

B. $\dfrac{7\sqrt{3}}{128}$

C. $\dfrac{7.\,\pi}{24}$

D. None of these

Answer: D

132. First three nearest neighboure distance for primitive cubic lattice are respectively (edge length of unit cell = a):

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

B. $\sqrt{3a}, \sqrt{2a}, a$

C. $a\sqrt{2a}, 2a$

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

Answer: A

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133. First three nearestneighbour distances for body centered cubic lattice are respectively :

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

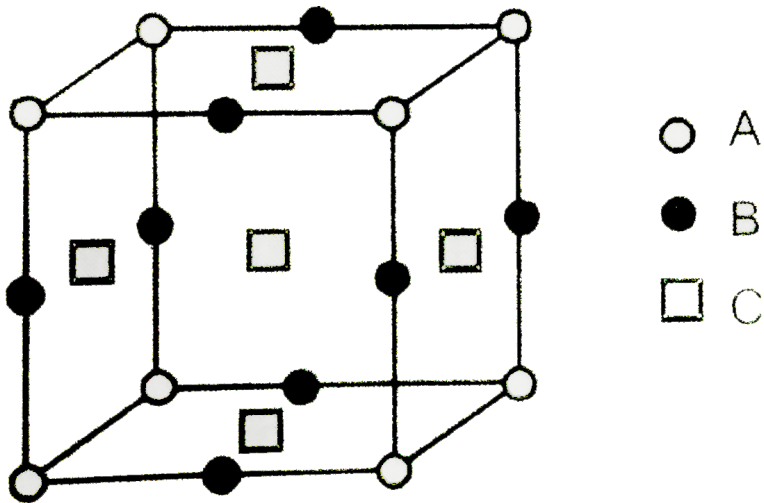B. $\dfrac{a}{\sqrt{2}}, a, \sqrt{3a}$

C. $\dfrac{\sqrt{3a}}{2}$, a, $\sqrt{2}$
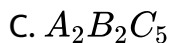
D. $\dfrac{\sqrt{3a}}{2}$, a, $\sqrt{3a}$

Answer: C

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134. Given : The unit cell structure o fcompound is show below .

○ A

● B

□ C

The formula of compound is :

A. $A_8 B_{12} C_{15}$

B. AB_2C_3

C. $A_2B_2C_5$

D. ABC_5

Answer: B

135. The density of apure substance 'A' whose atoms are in cubic close pack arragement is $1g/cc$. If the all the tetrahedral voids are occupied by 'B' atom , What is the density of resulting solid in g/cc. ["Atomic mass" $=(A) = 30g/mol$ and atomic mass $(B) = 50g/mol$]

A. 33.3

B. 4.33

C. 2.33

D. 5.33

Answer: B

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136. Find the number of proton & electron in Al3+ ion ?

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137. How many unit cells are present in 5.0 gm of crystal AB (formula mass of AB =40) having rock salt type structure ? (N_A = Avogadro 's no.)

A. N_A

B. $\dfrac{N_A}{10}$

C. $4N_A$

D. None of these

Answer: D

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138. The density of CaF_2 (fluorite structure) is $3.18g/cm^3$. The length of the side of the unit cell is :

A. 253 pm

B. 344 pm

C. 546 pm

D. 273 pm

Answer: C

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139. A crystal of lead (II) sulphide has NaCl structure . In this crystal the shortest distance between a Pb^{2+} ion and S^{2-} ion is 297 pm . What is the volume the of unit cell in lead sulphide ?

A. $209.6 \times 10^{-24} cm$

B. $207.8 \times 10^{-23} cm$

C. $22.3 \times 10^{-23} cm$

D. $209.8 \times 10^{-23} cm$

Answer: A

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140. CdO has $NaCl$ like structure with density $8.27 g/cc$. If the ionic-radius of O^{2-} is $1.24 A°$ determine the ionic radius of Cd^{2+}:

A. $1.5Å$

B. 1.1Å

C. 1.9Å

D. 1.5Å

Answer: B

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141. KCl crystallizes int the same type of lattic as done NaCl . Given that $r_{Na^+}/r_{Cl^-} = 0.50$ and $r_{Na^+}/r_{K^+} = 0.70$, Calcualte the ratio of the side of the unit cell for KCl to that for NaCl:
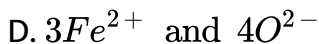
A. 1.122

B. 1.224

C. `1.143

D. 0.875

142. Ferrous oxide has a cubie structure and edge length of the uint cell is 5.0Å . Assuming the density o ferrous oxide to be $3.84g/cm^3$, the no. Of Fe^{2+} and O^{2-} ions present in each unit cell be : (use $N_A = 6 \times 10^{23}$):

A. $4Fe^{2+}$ and $4O^{2-}$

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

C. $1Fe^{2+}$ and $1O^{2-}$

D. $3Fe^{2+}$ and $4O^{2-}$
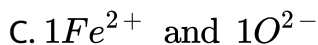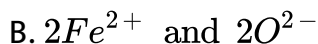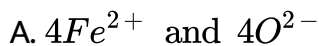
143. If an element (at. Mass =50) crystallises in fcc lattie ,with a= 0.50 nm . What is the density of unit cell if it contains 0.25% Schottky defects (use $N_A = 6 \times 10^{23}$)?

    A. $2.0g/cc$

    B. $2.66g/cc$

    C. $3.06g/cc$

    D. None of these

Answer: B

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144. An element X (At. Wt. =24) forms FCC lattice. If the edge length of lattice is 4×10^{-8} cm and the observed density is

$2.4 \times 10^3 kg/m^3$. Then the percentage occupancy of lattice point by element X is : $\left(N_A = 6x10^{23}\right)$

A. 96

B. 98

C. 99.9

D. None of these

Answer: A

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145. In fcc lattice ,A, B, C,D atoms are arranged at corner , face centre , ocatahedral void and tetrahedral void respectively , then the body diagonal contains :

A. $2A, C, 2D$

B. $2A, 2B, 2C$

C. $2A, 2B, D$

D. $2A, 2D$

Answer: A

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146. The distance between an octahedral and tetrahedral void in fcc lattice would be:

A. $\sqrt{3}a$

B. $\dfrac{\sqrt{3a}}{2}$

C. $\dfrac{\sqrt{3a}}{3}$

D. $\dfrac{\sqrt{3a}}{4}$

Answer: D

147. A_2B molecules(molar mass $= 259.8g/ml$) crystallises in a hexagonal lattice as shown in figure .The lattic constants were $a = 5Å$ and $b = 8Å$. If denstiy of crystal is $5g/cm^3$ then how many molecules are contained in given unit cell ? ($UseN_A = 6 \times 10^{23}$)
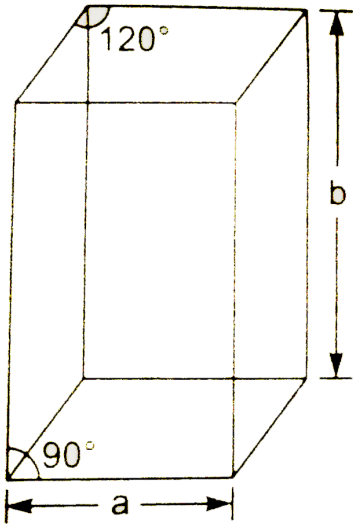
A. 6

B. 4

C. 3

D. 2

Answer: D

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148. 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?

A. A2B2

B. A3B4

C. A4B3

D. None

Answer: B

149. How many effiective Na^+ and Cl^- ions are present respectively in a uint cell of NaCl solid (Rock salt structure) if all ions along line connecting opposite face centres are absent ?

A. 3,3

B. $\dfrac{7}{2}$, 4

C. $\dfrac{7}{2}$, $\dfrac{7}{2}$

D. 4, $\dfrac{7}{2}$

Answer: A

150. A compound of X & Y crystallise in cubic structure in which Y are at corners & X are at alternate faces of the cube. Find the formula of the compound?

151. The element similar to Ca2+

    A. K

    B. Cl-

    C. Ar

    D. both B & C

Answer: B

152. A crystal is made of particles A and B. A forms fcc packing and B occupies all the octahedral voids . If all the particle along the plane as shown in figure are removed , then, the formula of the crystal would be :

A. XYZ_2

B. X_2YZ_2

C. $X_8YT_4Z_5$

D. $X_5Y_4Z_8$
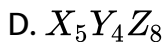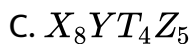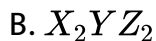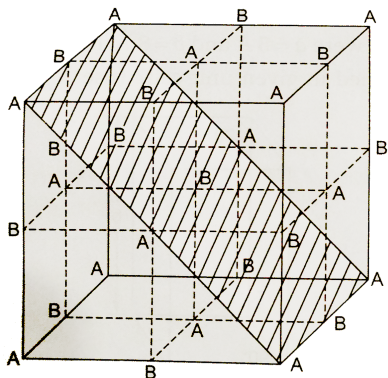
Answer: D

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153. A crystal is made of particles A and B. A forms fcc packing and B occupies all the octahedral voids . If all the particle along the plane as shown in figure are removed , then, the formula of the crystal would be :
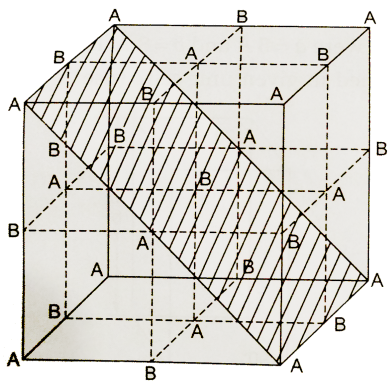
A. AB

B. A_5B_7

C. A_7B_5

D. ABC_8

Answer: A

154. In the rock salt AB, if C introduced in tetrahedral voids such that no distortion occurs, then formula of resultant compound is :

A. ABC

B. ABC_2

C. A_4B_4C

D. ABC_8

Answer: B

155. Given length of side of hexagonal uint cell is $\dfrac{100}{\sqrt{2}}$ pm . The volumes of hexagonal unit cell is (inpm^3):

A. 8×10^6

B. 1.5×10^6

C. 64×10^6

D. 36×10^6

Answer: B

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156. packing fraction of a unit cell is drfined as the fraction of the total volume of the unit cell occupied by the atom(s).

$$P.\,E = \frac{\text{Volume of the atoms(s) present in a unit cell}}{\text{Volume of unit cell}} = \frac{Z \times \frac{4}{3}\pi r^3}{a^3}$$

and $\%$ of empty space = $100 - P.\,F. \times 100$

where Z= effective number of atoms in s cube .

r= radius of a an atoms

a = edge length of the cube

% of empty space in body centered cubic cell unit is nearly :

A. 52.36

B. 68

C. 32

D. 26

Answer: C

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157. packing fraction of a unit cell is drfined as the fraction of the total volume of the unit cell occupied by the atom(s).

$$P.\,E = \frac{\text{Volume of the atoms(s) present in a unit cell}}{\text{Volume of unit cell}} = \frac{Z \times \frac{4}{3}\pi r^3}{a^3}$$

and % of empty space = $100 - P.\,F.\ \times 100$

where Z= effective number of stoms in s cube .

r= radius of a an atoms

a = edge lenght of the cube

Packing fraction in face centered cubic unit cell is :

A. 0.7406

B. 0.6802

C. 0.5236

D. None of these

Answer: A

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158. Density of a unit cell is respresented as

$$\rho = \frac{\text{Effective no. of atoms (s)} \times \text{Mass of a unit cell}}{\text{Volume of a unit cell}} = \frac{Z. M}{N_A . a^3}$$

where , mass of unit cell =mass of effectuive no . of atoms(s) or ion (s).

M= At . mass// formula

N_A= Avogadro' s no . $\Rightarrow 6.0323 \times 10^{23}$

a= edge lemght of unit cell

Silver crystallizes in a fcc lattice and has a density of $10.6g/cm^3$.

What is the length of a edge of the unit cell ?

A. $40.7nm$

B. $0.2035nm$

C. $0.101nm$

D. $4.07nm$

Answer: A

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159. Density of a unit cell is respresented as

$$\rho = \frac{\text{Effective no. of atoms (s)} \times \text{Mass of a unit cell}}{\text{Volume of a unit cell}} = \frac{Z. M}{N_A. a^3}$$

where , mass of unit cell =mass of effectuive no . of atoms(s) or ion (s).

M= At . mass// formula

N_A= Avogadro' s no . $\Rightarrow 6.0323 \times 10^{23}$

a= edge lemght of unit cell

An element crystallizes in a structure having fcc unit cell of an edge 200 pm . Calculate the density , if 100 g of this element contains 12×10^{23} atoms :

A. $41.66 g / cm^3$

B. $4.166 g / cm^3$

C. $10.25 g / cm^3$

D. $1.025 g / cm^3$

Answer: A

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160. Density of a unit cell is respresented as

$$\rho = \frac{\text{Effective no. of atoms (s)} \times \text{Mass of a unit cell}}{\text{Volume of a unit cell}} = \frac{Z. M}{N_A. a^3}$$

where , mass of unit cell =mass of effectuive no . of atoms(s) or ion (s).

M= At . mass// formula

N_A= Avogadro' s no . $\Rightarrow 6.0323 \times 10^{23}$

a= edge lemght of unit cell

The density of KBr is $2.75 g/cm^{-3}$. The length of the edge of the unit cell is 645 pm .To which type of cubic crystal , KBr belongs ?

A. Simple cubic

B. bcc

C. fcc

D. None of these

Answer: C

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161. A spinel is an important class of oxide consisting two types of metal ions with the oxide ions arranged in ccp layers . The normal spinel has one -eight of the tetrahedral holes occupied by one type of metal ions and one- half of the octahedral holes occupied by another type of metal ion. Such a spinel is formed by Mg^{2+}, Al^{3+} and O^{2-} . The neutrality of the crystal is being maintained.

The formula of the spinel is :

A. Mg_2AlO_4

B. $MgAl_2O_4$

C. $Mg_3Al_2O_6$

D. None of these

Answer: B

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162. A spinel is an important class of oxide consisting two types of metal ions withs the oxide ions arranged in ccp layers . The normal spinel has one -eight of the tetrahendral holes occupied by one type of metal ions and one- half of the octaherdral holes occupied by another type of metal ion. Such a spine is formed by Mg^{2+}, Al^{3+} and O^{2-} . The netutrality of the crystal is benig maintained.

Type of hole occupied by Al^{3+} ions is:

A. tetrahedral

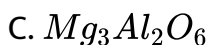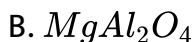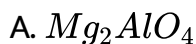B. octahedral

C. both (a) and (b)

D. None of these

Answer: B

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163. A spinel is an important class of oxide consisting two types of metal ions with the oxide ions arranged in ccp layers . The normal spinel has one -eight of the tetrahedral holes occupied by one type of metal ions and one- half of the octahedral holes occupied by another type of metal ion. Such a spinel is formed by Mg^{2+}, Al^{3+} and O^{2-} . The neutrality of the crystal is being maintained.

The formula of the spinel is :

A. tetrahedral

B. octahedral

C. both (a) amd(b)

D. None of these

Answer: A

164. A spinel is an important class of oxide consisting two types of metal ions with the oxide ions arranged in ccp layers . The normal spinel has one -eight of the tetrahedral holes occupied by one type of metal ions and one- half of the octahedral holes occupied by another type of metal ion. Such a spinel is formed by Mg^{2+}, Al^{3+} and O^{2-} . The neutrality of the crystal is being maintained.

The formula of the spinel is :

A. 1

B. 2

C. 3

D. $3/4$

Answer: A

165. Ionic lattic has two major points defects ,(1) Schottky (2) Frenkel defects . Schottkly defects occurs due to the cations - anion pair's missing from the lattice sites . Frenkel defects occurs when smaller ion leaves from its lattic site and fits into an intersitial space.which defect decrease density of the crystal ?

    A. Frenkel defect

    B. Schootky defect

    C. both (a) amd(b)

    D. None of these

Answer: B

166. Ionic lattic has two major points defects ,(1) Schottky (2) Frenkel defects . Schottkly defects occurs due to the cations - anion pair's missing from the lattice sites . Frenkel defects occurs levels its lattic site and fits into an intersitial space. The neturaity of the crystal is benig maintained and we considerd all losses from interstitical positions.

Structure shown here represents :

Cation : A^+
Anion : B^-

A. Schootky defect

B. Frenkel defect

C. Mental excess defect

D. None of these

Answer: B

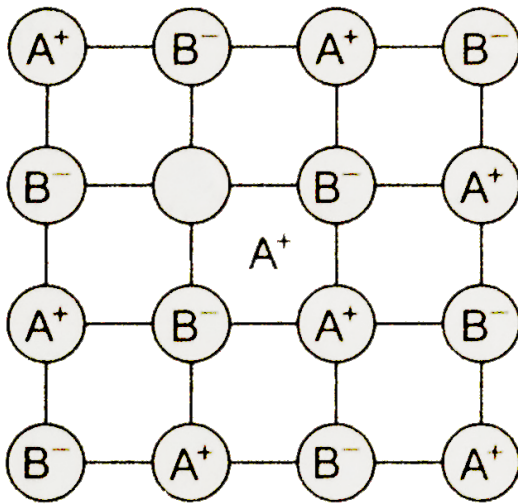▶ **Watch Video Solution**

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167. Ionic lattic has two major points defects ,(1) Schottky (2) Frenkel defects . Schottkly defects occurs due to the cations - anion pair's missing from the lattice sites . Frenkel defects occurs levels its lattic site and fits into an intersitial space. The neturaity of the crystal is benig maintained and we considerd all losses from interstitical positions.

Structure shown here represents :
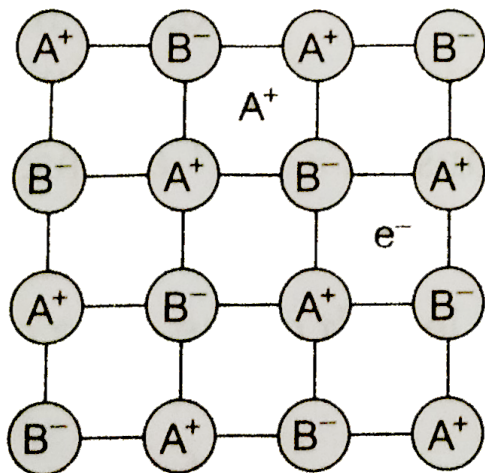
Cation : A^+

Anion : B^-

A. Schootky defect

B. Frenkel defect

C. Both defect

D. None of these

Answer: D

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168. Doping mens introduction of small amount of impurities like phosphorus , arsenic or boron into the pure crystal . In pure silicon , ther are four valenices used in bonding with other four adjacent silicon crystal is doped with a group -15 element (with five valence electron) such as P, As , or Bi , the structure of the crystal lattic remains unchanged . Out of the five valence electron of group -15 doped element four element are used in normal covalent bonding with silicon while fiffth electron is delcoasiled and thus conducts electricity

Doping a silicon crystal with a group -13 element (with three valence electrons) such as B, Al, Ga or In products a semiconductor with three electrons in in dopant . The place where fourth electron is missing is called an electron vacancy or hole . Such hole can move throught the crystal like a positive charge giving rise conduction of electricity.

No. of valene electrons in silicon are :

A. 3

B. 4

C. 5

D. 6

Answer: B

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169. Doping mens introduction of small amount of impurities like

phosphorus , arsenic or boron into the pure crystal . In pure silicon ,

ther are four valenices used in bonding with other four adjacent

silicon crystal is doped with a group -15 element (with five valence

electron) such as P, As , or Bi , the structure of the crystal lattic

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doped element four element are used in normal covalent bonding

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Doping a silicon crystal with a group -13 element (with three valence electrons) such as B, Al, Ga or In products a semiconductor with three electrons in in dopant . The place where fourth electron is missing is called an electron vacancy or hole . Such hole can move throught the crystal like a positive charge giving rise conduction of electricity.

Silicon that has been dopend with group - 15 elements is called :

A. p- type semicondouctor

B. n-type semiconductor

C. electron vancany or hole

D. None of these

Answer: B

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170. Doping mens introduction of small amount of impurities like phosphorus , arsenic or boron into the pure crystal . In pure silicon , ther are four valenices used in bonding with other four adjacent silicon crystal is doped with a group -15 element (with five valence electron) such as P, As , or Bi , the structure of the crystal lattic remains unchanged . Out of the five valence electron of group -15 doped element four element are used in normal covalent bonding with silicon while fiffth electron is delcoasiled and thus conducts electricity

Doping a silicon crystal with a group -13 element (with three valence electrons) such as B, Al, Ga or In products a semiconductor with three electrons in in dopant . The place where fourth electron is missing is called an electron vacancy or hole . Such hole can move throught the crystal like a positive charge giving rise conduction of electricity.

Silicon that has been dopend with group - 13 elements is called :

A. p- type semicondouctor

B. n-type semiconductor

C. electron vancany or hole

D. None of these

Answer: A

171. Mentallic Gold crystallise in fcc lattice and the length of cubic unit cell is 407 pm.

(Given : Atomic mass of Gold =197, $N_A = 6 \times 10^{23}$)

The density if it have 0.2 % Schottky defect is (in gm/cm^3)

A. 4.86

B. 9.72

C. 19.48

D. 19.44

Answer: D

172. Gold has a face centered cubic lattice with an edge length of the unit cube of 407pm. The diameter of th gold atom is:

A. $407\mathrm{pm}$

B. $407\sqrt{1}$

C. $\dfrac{407}{\sqrt{2}}$

D. $407\dfrac{\sqrt{3}}{2}$

Answer: A

173. In diamond structure ,carbon atoms form fcc lattic and 50% tetrahedral voids occupied by carbon atoms . Every carbon atoms is surrounded tetrahedral by four carbon atom with bond length 154 pm . Germanium , silicon and grey tin also crystallise in same way as diamond $(N_A = 6 \times 10^{23})$

The mass of diamond unit cell is:

A. $96 amu$

B. $96 gm$

C. $144 amu$

D. $144 gm$

Answer: A

174. In diamond structure ,carbon atoms form fcc lattic and 50% tetrahedral voids occupied by carbon atoms . Every carbon atoms is surrounded tetrahedral by four carbon atom with bond length 154 pm . Germanium , silicon and grey tin also crystallise in same way as diamond $\left(N_A = 6 \times 10^{23}\right)$

The mass of diamond unit cell is:

   A. 154

   B. 1422.63

   C. 711.32

   D. 355.66

Answer: D

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175. In diamond structure ,carbon atoms form fcc lattic and 50% tetrahedral voids occupied by acrbon atoms . Evergy carbon atoms is surrounded tetrachedral by four carbon atom with bond length 154 pm . Germanium , silicon and grey tin also crystallise in same way as diamond $\left(N_A = 6 \times 10^{23}\right)$

The side length of diamond unit cell is (in pm):

    A. 28.48

    B. 0.0556

    C. 0.445

    D. 3.56

Answer: D

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176. select thee correct statement (S)

A. Co-ordination no. of an atom at a lattice point in sample cubic

arrangement is 6

B. Co- ordination no. of an atom at octahedral site 8.

C. Co-ordination no. of an atom at lattice point in hcp

arrangment is 6

D. Co-ordination no.of an atmo at octahedral site is 6

Answer: A::B

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177. Packing fraction of an identical solid sphere is 74% in :

A. simple cubic structure

B. fcc structure

C. hcp structure

D. bcc structure

Answer: B::C

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178. Position of octahedral voids in fcc structure is//are

A. edge centers

B. face centers

C. body centers

D. corners

Answer: A::C

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179. If the radius of Na^+ ion is $95pm$ and that of Cl^- ion is $181pm$, then the coordination number if of Na+

A. 6

B. 8

C. 4

D. none

Answer: A::C

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180. Calculate the percentage composition of C2H5OH.

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181. An hcp and a ccp structure for a given element would be expected to have

    A. The same co-ordinational number

    B. the same density

    C. the same packing fraction

    D. all of the above

Answer: A::C

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182. Select the correct statement (s) for the rock -salt structure (NaCl) :

    A. The tetrahedral voids are smaller than the octhedral sites

B. The octahedral voids are occupied by cations and the tetraherdral sites are empty

C. The radius ratio (r_c/r_a) is 0.225

D. The radius ratio (r_c/r_a) is 0.732

Answer: A::B

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183. select the correct statement (s)

A. The ionic crstal of AgBr may have Schottky defect

B. The unit cell having crystal parameters, $a = b \neq c, \alpha = \beta = 90°, \gamma = 10°$ is hexagonl

C. In ionic compounds having Frenkel defect the ratio r^+/r^- is high

D. The co-ordination number of Na^+ ion in NaCl is 6

Answer: A::B::D

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184. Which of the following represents the closet packed arrangement of uniform solid spheres:

A. simple cubic unit cell

B. body centered cubic unit cell

C. face centered cubic unit cell

D. hcp unit cell

Answer: C::D

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185. select the correct statement (s)

   A. A cubic system possesses a total of 23 elements of symmetry

   B. A cubic contains centre of symmetry , planes of symmetry as

      well as axes of symmetry

   C. For triclinic system $a \neq b \neq c$ and $\alpha \neq \beta \neq \gamma \neq 90°$

   D. The total no. of Bravais space lattic belonging ta all the seven

      crystals are 14

Answer: A::B::C::D

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186. select the correct statement (s)

   A. Co-ordination no. of Cs^+ and Cl^- are 8, 8 in CsCl crystal

B. If radius ratio $(r_c/r_a) < 0.225$ then shap of compound must

be linear

C. If radius (r_c/r_a) lies between 0.414 to 0.732 then shope of

ionic compound may be square planner $(Ex.\ PtCl_4^{2-})$

D. If radius ratio is less than than 0.155 then shape of compound

is linear

Answer: A::C::D

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187. select the correct statement (s)

A. CsCl change to NaCl structure on heating

B. NaCl changes to CsCl structure on applying pressure

C. Co-ordination number decreses on applyping pressure

D. Co-ordination number increses on heating

Answer: A::B

188. Predict the position of the element in periodic table have the electronic configuration (n-1)d1 ns2 n=4

189. The number of atoms per unit cell in BCC is

A. 2

B. 3

C. 4

D. 8

Answer: A::B::C

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190. Amorphous soilds :

  A. do not have sharp melting points .

  B. are isotrophic

  C. have same physical propertical in all direction

  D. are supercooled liquids

Answer: A::B::C::D

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191. Element A have atomic no 11 . write the period to which it belong?

192. Element A have atomic no 11 . write the group to which it

belong?

193. Element A have atomic no 11 . write the block to which it

belong?

A.

B.

C.

D.

Answer: A::B::C::D

194. Find number of electron in Ca2+

195. Which have lower IE2 : Na or Mg?

196. Explain shape, geometry & hybridisation of AlCl3?

197. Shape of ammonia is ....

198. Shape of PCl2F3 ....

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199. Match the following columns

Column-I		Column-II	
(A) Co-ordination no. of Ca^{2+} and F^- in fluorite structure	(P)	8, 4	
(B) C.No. of Zn^{2+} and S^{2-} in zinc blende structure	(Q)	8, 8	
(C) C.No. of Cs^- and Cl^- in CsCl (bcc type) structure	(R)	4, 8	
(D) C.No. of Li^+ and O^{2-} in antifluorite structure	(S)	4, 4	

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200. Electronic configuration of mangnese ....

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201. Al3+ is paramagnetic.

202. Match the following columns

Column-I (Structure)	Column-II (Voids occupied)
(A) Rock salt	(P) 100% tetrahedral voids occupied by cation
(B) Zinc blende	(Q) 100% tetrahedral voids occupied by anion
(C) Fluorite	(R) 100% octahedral voids occupied by cation
(D) Anti fluorite (Na_2O)	(S) 50% tetrahedral voids occupied by cation

203. Magnetic nature of Mn2+ ....

204. In diamond, the coordination number of carbon is:

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: B

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205. STATEMENT -1 : In NaCl structure , Na^+ ion occupy octahedral holes and Cl^- ions occupy ccp.

STATEMENT -2 : The distance of the nearest neighours in NaCl

structure is $a/2$ where a

is the edge length of the cube .

A. If both the statement are TRUE and STATEMENT -2 is the

correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the

correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is

FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is

TRUE

Answer: B

206. STATEMENT -1 : For fluorite structure , the F^- ions occupy tetrahedral void and Ca^{2+} ions in ccp

STATEMENT-2 : The radius ratio of fluorite structure is 0.414

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: C

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207. Statement-1 C.N of Cs^+ ion in CsCl structure is 8

Statement -2 CsCl crystallizes in BCC structure

A. If both the statement are TRUE and STATEMENT -2 is the

correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the

correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is

FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is

TRUE

Answer: D

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208. How does conductivity of a semi conductor change with the rise in temperature ?

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: A

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209. STATEMENT -1 : FeO is non-stoichiometric with formula $Fe_{0.95}O$

.

STATEMENT -2 : Some Fe^{2+} ions are replaced by Fe^{3+} as $3Fe^{3+}$ = $2Fe^{3+}$ to maintain electrons neutrality .

A. If both the statement are TRUE and STATEMENT -2 is the

correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the

correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is

FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is

TRUE

Answer: A

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210. Assertion : The number of tetrahedral voids is double the number of octahedral voids

Reason : The size of the tetrhedral voids is half of that of the ochedral void

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: C

211. Statement : Due to Frenkel defect the density of the crystalline solid remains same.

Explanation : In Frenkel defect, no cations or anions leave the lattice.

A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: A

212. Assertion (A) : Antiferromagnetic substances on heating to high temperature become paramagnetic.

Reason (R) : On heating, the randomization of spins occurs.

   A. If both the statement are TRUE and STATEMENT -2 is the correct explanation of STATEMENT -1

   B. If both the statement are TRUE and STATEMENT -2 is NOT the correct explanation of STATEMENT -1

   C. If STATEMENT -1 is the correcct and TRUE and STATEMENT -2 is FALSE

   D. If STATEMENT -1 is the correcct and FALSE and STATEMENT -2 is TRUE

Answer: A

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213. SEVEN CRYSTAL SYSTEMS

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214. In seven possible crystal system how many crystal system have more than one Bravais lattices ?

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215. The effective number of atoms per unit cell in a simple cube, face centered cube and body centred cube are respectively:

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216. In soild X atoms goes to corner of the cube and two alternate face center . Calculate effective number of atom of X in unit cell ?

217. Find the distance (in pm) between the body centered atoms one corner atom in an element $(a = 2.32\text{pm})$

218. The structure of MgO is similar to NaCl. What is the co-ordination number of Mg?

219. Calculate the following:

a. Number of Zns units in a unit cell of zine blende.

b. Number of CaF_2 unit cell of CaF_2.

220. What is the co-ordination number of sodium in Na_2O ?

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

222. What is the co-ordination number of Cl^- in CsCl structure ?

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223. In cubic system how many atoms arrangement exsit in nature ?

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224. The ionic radii of A^+ and B^- are 1.7Å and 1.8Å respectively . Find the co-ordination number of A^+

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225. The electronic configuration of sodium is

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226. Calculate the value of `(Z)/(10). Where

z = co-ordination number of 2D-square close packing

+

Co-ordination number of 2D-hcp

+

Co-ordination number of 3D-square close packing

+

Co-ordination number of 3D, ABCABC........packing

+

Co-ordiantional number of 3D, ABAB.......packing .

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Level 1 Q 33 To Q 62

1. Which of the following layering pattern will have a void fraction of 0.260?

    A. ABCCBAABC

    B. ABBAABBA

    C. ABCABCABC

    D. ABCAABCA

Answer: C

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Level 3 One Or More Answers Are Correct

1. What would be the IUPAC name and symbol of the element with atomic number 125?

Level 3 Match The Column

1. Number of unpaired electron in sodcium.

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Level 3 Subjective Problems

1. The number of unpaired electron in Zn2+

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