CHEMISTRY

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

SOLID STATE

Examples

1. A compound made up of elements A and B crystallises in the cubic structure . Atoms A are

present at the corners and alternate face centres whereas atoms B are present at the edge centres as well as body centre . What is the formula of the compound ?

A. A_2B

B. AB

C. AB_2

D. A_2B_2

Answer:

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2. The percentage of empty space in a body centred cubic arrangement is :

A. 74

B. 68

C. 32

D. 26

Answer:

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

A. NaCl structure

B. Linear structure

C. CsCl structure

D. ZnS structure

Answer:

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4. At room temperature, polonium crystallises in a primitive cubic unit cell . If a = 3.36, calculate the theoretical density of polonium . Its atomic weight is 209 g mol^{-1}

A. $9.15gcm^{-3}$

B. $10.33gcm^{-3}$

C. $62.22gcm^{-3}$

D. $9.47gcm^{-3}$

Answer:

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Exercise 1

1. Which of the following exists as covalent crystals in the solid state?

A. Iodine

B. Silicon

C. Sulphur

D. Phosphorus

Answer: B

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2. What type of solid is naphthalene?

A. Ionic solid

B. Convalent solid

C. Metallic solid

D. Molecular solid

Answer: D

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3. Crystalline solid

A. Changes abrupty from solid to liquid

B. Has no definite melting point

C. Undergoes deformation of its geometry easily

D. Has an irregular 3-dimensional arrangement

Answer: A

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4. Match the column I with column II

Choose the correct option

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. which one of the following is a covalent crystal?

A. Rock salt

B. Ice

C. Quartz

D. Dry ice

Answer: C

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6. Glass is a:

A. Micro-crystalline solid

B. Supercooled liquid

C. Gel

D. Polymeric mixture

Answer: B

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7. Which of the following statements about amorphous solid is incorrect ?

A. They melt over a range of temperature

B. They are anisotropic

C. There is no orderly arrangment of particles

D. They are rigid and incompressible

Answer: B

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8. 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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9. Lattice structure of group I elements is

A. fcc

B. bcc

C. hcp

D. ccp

Answer: B

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10. How many three dimensional lattices are possible ?

A. 12

B. 13

C. 14

D. 15

Answer: C

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11. When constituent particles are present only on the corner of a unit cell, it is called

A. Primitive unit cell

B. Centred unit cell

C. Body - centred unit cell

D. Face - centred unit cell

Answer: A

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12. Cinnabar is an example of A... crystal system . Here, A refers to

A. Cubic

B. Monoclinic

C. Trigonal

D. Triclinic

Answer: C

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13. Consider the following statements,

I. Possibe variations for a cubic crystal system is primitive only

II. The axial angles of a hexagonal crystal system are $\alpha = \beta = 90^\circ$ and $\gamma = 120^\circ$.

Which of the above statements(s) is / are true ?

A. Only I

B. Only II

C. Both I and II

D. None of these

Answer: B

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

A. Cubic

B. Hexagonal

C. Orthorhobic

D. Rhombohedral

Answer: B

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15. Which of the following crystal will exhibit the relation a=b=c and $\alpha = \gamma = 90^\circ$?

A. Diamond

B. Cinnabar

C. Calcite

D. Ice

Answer: A

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16. The axial angles in triclinic crystal system are

A. $\alpha = \beta = \gamma = 90^\circ$

B. $\alpha = \gamma = 90^\circ, \beta \neq 90^\circ$

C. $\alpha \neq \beta \neq \gamma \neq 90^\circ$

D. $\alpha = \beta = \gamma \neq 90^\circ$

Answer: C

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17. Match the following

A.

A	B	C	D
q,r	q,s	p,s	r

B.

A	B	C	D
q	s,p	p,r	r,s

C.

A	B	C	D
q,p	p	s,q	r,s

D.

A	B	C	D
r,s	s,q	p,s	s

Answer: A

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18. How much of any consitituent particles actually belong to a particular unit cell ?

A. $\frac{1}{4}th$

B. $\frac{1}{6}th$

C. $\frac{1}{8}th$

D. $\frac{1}{10}th$

Answer: C

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19. What is the total number of atoms per unit cell in a face centred cubic (fcc) structure ?

A. 1

B. 2

C. 0.5

D. 2.5

Answer: C

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20. Sodium metal crystallises in body centred cubic lattic with cell edge 4.29Å .What is the radius of sodium atom ?

A. 2.857 Å

B. 1.601 Å

C. 2.145 Å

D. 1.857 Å

Answer: D

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21. Na and Mg crystallize in bcc- and fcc-type crystals, respectively, then the number of atoms of Na and Mg present in the unit cell of their respective crystal is

A. 4 and 2

B. 9 and 14

C. 14 and 9

D. 2 and 4

Answer: D

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22. 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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23. The number of hexagonal faces that are present in a truncated octahedron is

A. 2

B. 4

C. 6

D. 8

Answer: D

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24. The number of atoms contained in a fcc unit cell of a monoatomic substance is

A. 1

B. 2

C. 4

D. 6

Answer: C

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25. Number of unit cells in 4g of X(atomic mass=40). Which crystallises in bcc pattern in $(N_0 = \text{Avogadro number})$

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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26. Match the following

Choose the correct option

A. $\begin{matrix} A & B & C & D \\ q & p & s & r \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ p & q & s & r \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ p & q & r & s \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ r & s & p & q \end{matrix}$

Answer: A

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27. What is the coordination number of each atom in a hexagonal close-packed solid?

A. 12

B. 10

C. 8

D. 6

Answer: A

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28. At the limiting value of radius ration $\frac{r^+}{r^-}$

A. Force 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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29. The NaCl structure can be converted into CsCl structure

A. By applying high pressure

B. By heating to 760K

C. Both by heat and pressure

D. The conversion is not possible

Answer: A

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30. If the crystallises in zinc blende structure with I^- ions at lattice points. What fraction of tetrahedral voids is occupied by Ag^+ ions ?

A. 0.25

B. 0.5

C. 1

D. 0.75

Answer: B

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31. In which pair most efficient packing is present?

A. hcp and ccp

B. bcc and ccp

C. bcc and simple cubic cell

D. bcc and hcp

Answer: A

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32. In which of the following packing 74% space is occupied by the atoms with ABCABC packing of atoms ?

A. Hexagonal closed packing

B. Simple cubic

C. Body centred cubic

D. Cubic closed packing

Answer: D

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33. When the centres of the four immediate neighbouring spheres are joined a square is formed. Thus , this packing is called

A. Square close packing

B. Hexagonal close packing

C. Rectangular close packing

D. None of these

Answer: A

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34. If the number of close packed sphere be N, then the number of octahedral and tetrahedral voids generated respectively are A and B that refers to

A. 2N, N

B. 3N, N

C. 4N, N

D. N, 2N

Answer: D

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35. While placing the second layer over that first layer , if the sphere of the second layer is above the void of the first layer, the void formed is

A. Tetrahedral

B. Octahedral

C. Both a and b

D. Hexagonal

Answer: A

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36. In an antiflourite structure, cations occupy

A. Centre of cube

B. Tetrahedral voids

C. Corners of cube

D. Octahedral voids

Answer: B

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37. The numbers of tetrahedral and octahedral holes in a ccp array of 100 atoms are respectively

A. 200 and 100

B. 100 and 200

C. 200 and 200

D. 100 and 100

Answer: A

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

A. 1

B. 3

C. 2

D. 4

Answer: A

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39. Total no. of voids in 0.5 mole of a compound forming hexagonal closed packed structure are :

A. 6.022×10^{23}

B. 3.011×10^{23}

C. 9.033×10^{23}

D. 4.516×10^{23}

Answer: C

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40. Point out the correct statement for the set of characteristics of ZnS crystal.

A. Coordination number (4:4) : ccp , Zn^{2+} ions in the alternate tetrahedral voids

B. Coordination number (6:6) , hcp, Zn^{2+} ions in all tetrahedral voids

C. Coordination number (6:4) , hcp, Zn^{2+} ions in all octahedral voids

D. Coordination number (4:4) , ccp, Zn^{2+} ions in all tetrahedral voids

Answer: D

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41. In which of the following crystals, alternate tetrahedral voids are occupied?

A. NaCl

B. ZnS

C. CaF_2

D. Na_2O

Answer: B

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42. The ionic radii of Rb^+ and I^- are 1.46 and 2.16Å. The most probable type of structure exhibited by it is:

A. CsCl type

B. ZnS type

C. NaCl type

D. CaF_2 type

Answer: C

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43. A solid is formed by two elements P and Q . The element Q forms cubic close packing and atoms of P occupy one third of tetrahedral voids. The formula of the compound is

A. PQ_3

B. P_3Q

C. P_2Q_3

D. P_3Q_2

Answer: C

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44. Match the following

A. $(A, B, C, D), (\mathrm{p,s}, \mathrm{q,p}, \mathrm{s,q}, r, p)$

B.

A	B	C	D
q,p	s,r	p,s	p,r

C.

A	B	C	D
p,q	p,q,r,s	q,r	q,s

D.

A	B	C	D
p,s	q,r	p	r

Answer: C

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45. The cubic unit cell of a metal (molar mass= 63.55 mol^{-1}) has an edge length of 362pm. Its density is $8.92 gcm^{-3}$. The type of unit cell is

A. Primitive

B. Face centred

C. Body centred

D. End centred

Answer: B

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46. Xenon crystallizes in the face-centred cubic lattice and the edge of the unit cell is 620 pm.

What is the nearest neighbour distance and what is the redius of xenon atom?

A. 438.5 pm

B. 219.25 pm

C. 420 pm

D. 261.5 pm

Answer: A

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47. How many unit cells are present in a cube-shaped crystal of NaCl of mass 1.00g?

A. 2.57×10^{21}

B. 5.14×10^{21}

C. 1.28×10^{21}

D. 1.71×10^{21}

Answer: A

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48. The pyknometric density of sodium chloride crystal is $2.165 \times 10^3 kgm^{-3}$ while its X ray density is $2.178 \times 10^3 kgm^{-3}$ the fraction of unoccupied sites in $NaCl$ crystal is

A. 5.97

B. 5.97×10^{-2}

C. 5.97×10^{-1}

D. 5.97×10^{-3}

Answer: D

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49. The molar volume of KCl and NaCl are 37.46 mL and 27.94mL respectively . The ratio of the unit cube edges of the two crystals is

A. 1.296

B. 1.102

C. 1.341

D. 0.95

Answer: B

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50. Nickle crystallise in a fcc unit cell with a cell edge length of 0.3524 nm. Calculate the radius of the nicke atom

A. 0.1624 nm

B. 0.1246 nm

C. 0.2164 nm

D. 0.1426nm

Answer: B

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51. Iron crystallises in a bcc system with a lattice parameter of 2.861 Å. Calculate the densityof iron in the bccc system (atomic weight of Fe = 56,

$N_A = 6.02 \times 10^{23} mol^{-1}$

A. $7.94 gcm^{-3}$

B. $8.96 gcm^{-3}$

C. $2.78 gcm^{-3}$

D. $6.72 gcm^{-3}$

Answer: A

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52. An element having an atomic radius of 0.14 nm crystallises in a fcc unit cell. What is the length of side of the cell ?

A. 0.56 nm

B. 0.24 nm

C. 0.96 nm

D. 0.4 nm

Answer: D

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53. a metal crystallizes with a face-centered cubic lattice.The edge of the unit cell is 408 pm. The diameter of the metal atom is :

A. 288pm

B. 408pm

C. 144pm

D. 204pm

Answer: A

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54. AB crystallises in a bcc lattice with edge length qa equal to 387 pm`.The distance between two oppositely chariged ions in the lattice is

A. 300pm

B. 335pm

C. 250pm

D. 200pm

Answer: B

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55. A metal crystallises in a bcc lattice ,its unit cell edge length in about 300 pm and its molar mass is about $50gmol^{-1}$ what would be the density of the metal (in g cm^{-3})?

A. 3.1

B. 6.2

C. 9.3

D. 12.4

Answer: B

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56. 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 inthese systems will be respectively,

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

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

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

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

Answer: A

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57. Aluminium has fcc structure. The length of the unit cell is 409 pm. If the density of the metal is $2.7g \quad cm^{-3}$, the molar mass of Al atom is

A. $28gmol^{-1}$

B. $30gmol^{-1}$

C. $26.80gmol^{-1}$

D. $25gmol^{-1}$

Answer: C

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58. Copper crystallises in fcc with a unit cell length of 361 pm. What is the radius of copper atom?

A. 128

B. 157

C. 181

D. 108

Answer: A

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59. Sodium crystallises in bcc arrangement with the interfacial separation between the atoms at the edge length of 53 pm. The density of the solid is

A. 1.23 g/cc

B. 485 g/cc

C. 4.85 g/cc

D. 123 g/cc

Answer: A

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60. Which of the following point defects are shown by AgBr (s) crystals ?

(a) Schottky defect

(b) Frenkel defect

(c) metal ecxess defect

(d) Metal deficiency defect

A. I and II

B. III and IV

C. I and III

D. II and IV

Answer: A

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61. Due to schottky defect the density of the crystal A... whereas due to frenkel defect it B..., here , A and B refers to

A. Decreases-A, remains unchanged - B

B. Decreases - A , increases - B

C. Increases - A, remains unchanged - B

D. Remains unchanged - A, decreases - B

Answer: A

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62. 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

63. When electrons are trapped into the crystalline anion vacancy the defect is known as

A. Schottky defect

B. Frenkel defect

C. Stoichiometric defect

D. F-centres

Answer: D

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64. Which is the wrong statement regarding a crystal containing Schottky defect ?

A. Electrical neutrally of the crystal is maintained

B. Entropy of the crystal increases

C. The density of the overall crystal remains the same

D. The density of the overall crystal reduces

Answer: C

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

A. Frenkel defect

B. Schottky defect

C. Interstitial defect

D. Frenkel and schottky defects

Answer: B

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66. The n-type semiconductor is obtained when Si is doped with

A. Al

B. Ge

C. B

D. As

Answer: D

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67. An element of group 13, if added in small amounts to Ge.....is formed

A. n-type semiconductor

B. p-type semiconductor

C. Insulator

D. Rectifier

Answer: B

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68. Insulators are the solid with very low conductivities ranging between A... Here , A refers to

A. $10^4 \text{to}\ \ 10^7 \Omega^{-1} m^{-1}$

B. $10^{-20}\ \ \text{to}\ \ 10^{-5} \Omega^{-1} m^{-1}$

C. $10^{-20}\ \ \text{to}\ \ 10^{-10} \Omega^{-1} m^{-1}$

D. 10^(-6) " to " 10^4 Omega^(-1) m^(-1)`

Answer: C

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69. A... is called introducing a defect in a crystal by adding impurity. Here A refers to

A. Conducting

B. Doping

C. Both a and b

D. None of these

Answer: B

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70. Which of the following is a ferroelectric compound?

A. $K_4\left[Fe(CN)_6\right]$

B. $BaTiO_3$

C. Pb_2O_3

D. `None of these

Answer: B

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71. Electrical conductivity of semiconductor A... with rise in temperature . Here , A refers to

A. Increases

B. Decreases

C. Both a and b

D. Remains unchanged

Answer: A

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72. .....A .... And B.... Are the example of intrinsic semiconductors . Here , A and B refer to

A. Po and Si

B. Si and Ge

C. Na and Si

D. Ge and Na

Answer: B

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73. The substances , which shows permanent magnetism even in the absence of magnetic field are called

A. Ferrimagnetic

B. Ferromagnetic

C. Diamagnetic

D. Paramagnetic

Answer: B

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74. If we mix a pentavalent impurity in the crystal lattice of germinium the type of semiconductor formed will be:

A. p-type

B. n-type

C. Both a and b

D. None of these

Answer: B

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75. Which of the following statements is/are correct ?

A. Silicon doped with boron is an n-type semiconductor

B. Silicon doped with arsenic is p-type semiconductor

C. Metal are good conductor of electricity

D. Electrical conductivity of semiconductor decreases with increasing temperature

Answer: C

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76. Which of the following has the highest value of energy gap ?

A. Aluminium

B. Silver

C. Germanium

D. Diamond

Answer: D

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77. Electrons in a paramagnetic compound are

A. Shared

B. Unpaired

C. Donated

D. Paired

Answer: B

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Exercise 2

1. Consider the figure ,

Which of the following system is exhibited by the figure ?

A. Monoclinic

B. Orthorhombic

C. Cubic

D. Triclinic

Answer: C

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2. Consider the following statements

I. InSb, AIP , GaAs are the compound of groups 13-15

II. ZnS, CdS , HgTe are the compounds of groups 12-16

III. ReO_3 is like metallic copper in its conductivity

IV. Metallic or insulating properties of certain oxides like VO, VO_2, VO_3 and TiO_3 are independent on temperature .

Which of the above statements is /are incorrect ?

A. I and II

B. II and III

C. Only III

D. Only IV

Answer: D

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3. Analysis show that nickel oxide consists of nickel ion with 96% ions having d^8 configuration and 4% having d^7 configuration. Which amongst the following best represents the formula of the oxide?

A. $Ni_{0.98}O_{0.98}$

B. $Ni_{1.02}O_{1.02}$

C. $Ni_{1.02}O_{1.00}$

D. $Ni_{0.98}O_{1.00}$

Answer: D

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4. A solid compound contains X,Y and Z atoms in a cubic lattice with X atoms occupying the corners,Y atoms in the body centred positions and Z atoms at the centres of faces of the unit

cell. What is the empirical formula of the compound

A. XY_2Z_3

B. XYZ_3

C. $X_2Y_2Z_3$

D. X_8YZ_6

Answer: B

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5. In the distance between Na^+ and CI^- ions in sodium chliride crystal is X pm , the length of the edge of the unit cell is

A. 4X pm

B. X/4 pm

C. X/2 pm

D. 2X pm

Answer: D

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6. The unit cell of a binary compound of A and B has ccp structure with A atoms occupying the corners and B atoms occupying the centres of each face of the unit cell. If during crystallisation of the alloy, in the unit cell two atoms of A are missing, the overall composition per unit cell is :

A. AB_6

B. AB_4

C. AB_8

D. A_6B_{24}

Answer: D

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7. The volume of atom present in a face-centred cubic unit cell of a metal (r is atomic radius) is

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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8. Ice crystallises in a hexagonal lattice . At the low temperature at which the structure was determined the lattice constants were a = 4.53 Å and b = 7.41 Å . How many H_2O molecules are contained in a unit cell ? D(ice) = 0.92g/

cm^3

A. 4

B. 3

C. 2

D. 1

Answer: A

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9. Calculate the ionic radius of Cs^+ ion assuming that the cll edge length of CsCl is 0.4123 nm and that the ionic radius of a Cl^- ion is 0.181 nm`

A. 0.176 nm

B. 0.231 nm

C. 0.357 nm

D. 0.116 nm

Answer: A

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10. Consider the following statements

I. bcc structure has maximum packing efficiency

II. Percentage of total space filled by the particles is called packing efficiency

Which of the above statements is /are true ?

A. Only I

B. Only II

C. Both I and II

D. Neither I nor II

Answer: B

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11. X-rays diffraction studies show that copper crystallizes in an fcc unit cell with cell edge of $3.608 \times 10^{-8} cm$. In a separte experiment, copper is determined to have a density of $8.92 g cm^3$. Calculate the atomic mass of copper.

A. 61.3 u

B. 62.3 u

C. 63.1 u

D. 64.1 u

Answer: C

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12. A crystal made of metal crystallises into a lattice containing a sequence of layer ABABABA.... Packing of spheres leaves out voids

in the lattice. What percentage by volume of this lattice is occupied ?

A. 0.5

B. 0.26

C. 0.74

D. None of these

Answer: C

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13. In which of the following crystals, alternate tetrahedral voids are occupied?

A. NaCl

B. ZnS

C. CaF_2

D. Na_2O

Answer: B

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14. If the crystallises in zinc blende structure with I^- ions at lattice points. What fraction of tetrahedral voids is occupied by Ag^+ ions ?

A. 0.25

B. 0.5

C. 1

D. 0.75

Answer: B

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15. The packing efficiency of the two dimensional square unit cell shown below is

A. 0.3927

B. 0.6802

C. 0.7405

D. 0.7854

Answer: D

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16. Silver (atomic weight $108gmol^{-1}$) has a density of $10.5gcm^{-3}$. The number of silver atoms on a surfaces of area $10^{-12}m^2$ can be expressed in scientific notation as $Y \times 10^{-x}$, The value of x is .....

A. 3

B. 5

C. 7

D. 9

Answer: C

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17. In orthorhombic , the value of a, b and c are respectively $4.2Å, 8.6Å \text{ and } 8.3Å$ .Given the molecular mass of the solur is $155gmmol^{-1}$ and that of density is $3.3gm/$ the number of formula unit per unit cell is

A. 2

B. 3

C. 4

D. 6

Answer: C

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18. Consider the following statements

I. NaCl and KCl show metal excess defect due to anionic vacancies

II. F- centres are the anionic site occupied by unpaired electrons

III. F-centres is derived from the germen word

farbenzenter for colour centre .

F-centres impart yellow colour to the NaCl crystals

Which of the above statements is / are correct ?

A. II, III and IV

B. I, III and IV

C. I, III and II

D. All of these

Answer: D

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19. Consider the following statements

I. Fe, Co, Ni CrO_2 are ferrimagnetic substances .

II. MnO is ferrimagnetic in nature

III. H_2O , NaCl are paramagnetic in nature

$MgFe_2O_4$ and $ZnFe_2O_4$ are antiferromagnetic in nature

Which of the above statements are true ?

A. I and II

B. III and IV

C. II and IV

D. None of these

Answer: D

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20. $CsBr$ crystallizes in a body centred cubic lattice,The unit cell length is $439.9pm$ .Given that the atomic mass of $Cs = 133\text{amu}$ and

that of $Br = 80amu$ and Avogado number being $6.02 \times 10^2 mol^{-1}$the density of $CsBr$ is

A. $42.5g/cm^3$

B. $0.425g/cm^3$

C. $8.25g/cm^3$

D. $4.2g/cm^3$

Answer: D

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21. If $NaCl$ is doped with $10^{-4} mol\,\%$ of $SrCl_2$ the concentration of cation vacancies will be $\left(N_A = 6.02 \times 10^{23} mol^{-1}\right)$

A. $6.02 \times 10^{15} mol^{-1}$

B. $6.02 \times 10^{16} mol^{-1}$

C. $6.02 \times 10^{17} mol^{-1}$

D. $6.02 \times 10^{14} mol^{-1}$

Answer: C

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22. Which of the following statements is /are correc ?

I. For a simple cubic lattice , d= a and for fcc it is $d = a/\sqrt{2}$

II. The density of the unit cell for cubic crystals for element is $\rho = \frac{ZM}{a^3 N_A \times 10^{-3}} gcm^{-3}$

III. In case of ionic compound A^+B^- having fcc structures as NaCl edge (a) = 2 x distance between A^+ and B^- ions .

A. I and II

B. II and III

C. I and III

D. All of these

Answer: D

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23. The ratio of packing fraction in fcc, bcc, and cubic structure is, respectively,

A. 0.92:0.70:1

B. 0.70:0.92:1

C. 1:0.92:0.70

D. 1:0.70:0.92

Answer: C

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24. How many Cs^+ ions occupy the second nearest neighbour location of a Cs^+ ion in the structure CsCl (8:8 coordination) ?

A. 16

B. 8

C. 6

D. 24

Answer: C

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25. If R is the radius of the octahedral voids and r is the radius of the atom in close packing, then r / R is equal to

A. 9.1

B. 2.41

C. 3.22

D. 4.76

Answer: B

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26. What is the packing efficiency of a unit cell which is represented in the figure ?

A. 0.74

B. 0.68

C. 0.52

D. 0.38

Answer: A

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27. TiO_2 is well known example of :

A. Triclinic system

B. Tetrahedral system

C. Monoclinic system

D. None of these

Answer: B

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28. The edge length of a face centred cubic cell of an ionic substance is 508 pm .If the radius of the cation is 110 pm the radius of the anion is

A. 144 pm

B. 288 pm

C. 618 pm

D. 398 pm

Answer: A

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29. A solid has a bcc structure. If the distance of closest approach between the two atoms is $1.73.^{\circ} A$. The edge length of the cell is

A. 200 pm

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

C. 142.2 gm

D. $\sqrt{2}$

Answer: A

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30. The ratio of closed packed atoms to tetrahedral holes in cubic close packing is :

A. $1:1$

B. $1:2$

C. $1:3$

D. $2:1$

Answer: B

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31. A binary silod $\left(A^{+}B^{-}\right)$ has a zine blende stracture with B inos consititating the lattice

and A^+ inos occupyiong 25% of the terahedral holes. The formula of the solid is

A. AB

B. A_2B

C. AB_2

D. AB_4

Answer: C

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32. In a face centred cubic arrangement of A and B atoms whose A atoms are at the corner of the unit cell and B atoms at the face centres. Once of the A atom is missing from one corner in unit cell. The simplest formula of compound is

A. A_7B_3

B. AB_3

C. A_7B_{24}

D. $A_{7/8}B_3$

Answer: C

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33. A given metal crystalline 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 metal atom?

A. 127 pm

B. 80 pm

C. 108 pm

D. 40 pm

Answer: A

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34. The anions A from hexagonal close packing and atoms (M) occupy only two-third of the octahedral voids. The general formula of the compound is

A. M_2A_3

B. MA

C. MA_2

D. M_3A_2

Answer: A

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35. A solid is made up of two elements A and B . Atoms B are in ccp arrangement while atoms A occupy all the tetrahedral sites. Predict the formula of the compound .

A. A_2B

B. AB_2

C. AB

D. AB_3

Answer: A

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36. Structure of a mixed oxide is cubic closed - 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 monovelent metal B .The formula of the oxide is

A. ABO_2

B. A_2BO_2

C. $A_2B_3O_4$

D. AB_2O_2

Answer: D

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37. Which of the following statement are correct for the ionic solids in which positive and negative ions are held by strong electrostatic attractive forces ?

A. The radius r^+/r^- increases as coordination number increases

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

C. When coordination number is eight , the r^+/r^- ration lies between 0.225 to 0.414 .

D. Coordinationumber of Zn^{2+} and S^{2-} respectively are 4 and 4

Answer: C

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38. Match the distribution of particles A and B in column I with formula given in column II.

A.
A	B	C	D
s	p	r	q

B.
A	B	C	D
s	p	q	r

C.
A	B	C	D
r	q	p	s

D.
A	B	C	D
s	q	r	p

Answer: A

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Mht Cet Corner

1. Which metal crystallises in a simple cubic structure ?

A. Polonium

B. Copper

C. Nickel

D. Iron

Answer: A

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2. In fcc unit cell , what is the volume occupied ?

A. $\frac{4}{3}\pi r^3$

B. $\frac{8}{3}\pi r^3$

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

D. $\frac{64r^3}{3\sqrt{3}}$

Answer: C

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3. Which metal among the following has the highest packing efficiency ?

A. Iron

B. Tungsten

C. Aluminium

D. Polonium

Answer: C

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4. Which among the following solids crystallises face centred cube ?

A. Iron

B. Rubidium

C. Uranium

D. Platinum

Answer: D

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

A. 4

B. 8

C. 6

D. 1

Answer: B

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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 $2.72gcm^{-3}$. The molar mass of the metal is $(N_A,$ Avorgadro's constant $= 6.02 \times 10^{23}mol^{-1})$

A. $40gmol^{-1}$

B. $30gmol^{-1}$

C. $27gmol^{-1}$

D. $20gmol^{-1}$

Answer: C

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7. A metallic element has a cubic lattice. Each edge of the unit cell is 2Å. The density of the metal is 2.5 g cm^{-3}.The unit cells in 200g of the metal are

A. 1×10^{24}

B. 1×10^{20}

C. 1×10^{22}

D. 1×10^{25}

Answer: D

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8. Which of the following unit cell having maximum number of atoms ?

A. bcc

B. hcp

C. fcc

D. cubic

Answer: C

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9. Silicon is a

A. Semiconductor

B. Insulator

C. Conductor

D. None of these

Answer: A

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10. In making or casting of metals, silicon is used as

A. Oxidiser

B. Semiconductor

C. Deoxidiser

D. None of these

Answer: C

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11. Hexagonal close packing is found in crystal lattice of

A. Na

B. Mg

C. Al

D. None of these

Answer: B

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12. Silicon is found in nature in the form of

A. Body centred cubic structure

B. Hexagonal close packed structure

C. Network solid

D. Coordinate bonds

Answer: C

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