CHEMISTRY

BOOKS - MTG CHEMISTRY (ENGLISH)

THE SOLID STATE

Mcqs

1. Which among the following will show anisotropy ?

A. Glass

B. NaBr

C. Plastic

D. Rubber

Answer: B

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2. Fill in the blanks by choosing the correct option .

Metals often occur in ___x___ condition. Individual crystals are randomly oriented so a metallic sample may appear to be __y___ even though a single crystal is __z__

A. x-crystalline , y-isotropic , z-anisotropic

B. x-polycrystalline , y-isotropic , z-anisotropic

C. x-anisotropic, y-isotropic , z-crystalline

D. x-crystalline , y-anisotropic , z-isotropic

Answer: B

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3. Which of the following statements is not correct about molecular crystals ?

A. They are generally soft and easily compressible

B. They are good conductors of electricity as the electrons are delocalised in the bonds

C. They have low melting and boiling points

D. They consist of polar or non-polar molecules .

Answer: B

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4. For which pair of allotropes is one a molecular solid and the other a network covalent solid?

A. Calcium fluoride

B. Silicon dioxide

C. Carbon dioxide

D. Sodium chloride

Answer: C

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5. Which of the following crystalline solids conduct electricity in molten state but not in solid state?

A. in molten state free ions are furnished which are not free to move in solid state

B. in solid state ionic solids are hard, brittle and become soft in molten state

C. all solids conduct electricity in molten state

D. in solid state ions are converted to atoms which are insulators

Answer: A

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6. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same ?

(i) Good thermal conductivity

(ii) Good electrical conductivity

(iii) Ductility

(iv) High melting point

A. Ionic solids

B. Covalent solids

C. Metallic solids

D. Molecular solids

Answer: C

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7. Solid A is a very hard electrical insulator in solid as well as in molten state and melts at extermely high temperature. What type of solid is it?

A. Ionic solids

B. Covalent solids

C. Metallic solids

D. Molecular solids

Answer: B

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8. Which of the folllowing statements is incorrect regarding diamond?

A. In diamond, each carbon atom is covalently bonded to four other carbon atoms

B. In graphite , each carbon atom is covalently bonded to three other carbon atoms in the same plane

C. The C-C bond length in graphite is intermediate between single and double bond distance

D. Diamond is a layered structure, the two layers joined by van der Wall's forces .

Answer: D

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9. Examples of few solids are given below. Find out the example which is not correctly matched.

A. Ionic solids - NaCl, ZnS

B. Covalent solids - H_2, I_2

C. Molecular solids - $H_2O_{(S)}$

D. Metallic solids - Cu,Sn

Answer: B

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10. In the crystal structure of $CsCl$:

A. Body centred cubic

B. Simple cubic

C. Face centred cubic

D. Edge centred cubic

Answer: A

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11. Which of the following does not represent a type of crystal system ?

A. Triclinic

B. Monoclinic

C. Rhombohedral

D. Isotropical

Answer: D

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12. The crystal system for which $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$ is said to be

A. Cubic

B. Tetragonal

C. Orthorhombic

D. Hexagonal

Answer: C

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13. In seven pssible crystal system hoe many crystal system have more than one Bravais lattic ?

A. Hexagonal

B. Triclinic

C. Rhombohedral

D. Monoclinic

Answer: D

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14. Monoclinic sulphur is an example of monoclinic cystal system. What are the characteristics of the crystal system ?

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

B. $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^\circ$

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

D. $a \neq b \neq c, \alpha = \gamma = 90^\circ, \beta \neq 90^\circ$

Answer: D

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15. Which of the following statements is not about the voids ?

A. Octahedral void is formed at the centre of six spheres which lies at the apices of a regular octahedron

B. There is one octahedral site for each sphere

C. There are two tetrahedral sites for each sphere

D. Octahedral voids are formed when the triangular voids in second layer exactly overlap with similar voids in the first layer .

Answer: D

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16. If $'Z'$ is the number of atoms in the unit cell that represents the closet packing sequence.....$ABCABC$..... The number of tetrahedral voids in the unit cell is equal

A. n

B. n/2

C. n/4

D. 2n

Answer: D

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17. If the radius of the octaheral void is r and the radius of the atoms in close-packing is R, derive relation between r and R

A. r=0.414R

B. R=0.414r

C. r=2R

D. $r = \sqrt{2}R$

Answer: A

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18. A metallic crystal cystallizes into a lattice containing a sequence of layers $ABABAB\ldots$. Any packing of spheres leaves out voids in the lattice. What percentage by volume of this lattice is empty spece?

A. $72\ \%$

B. $48\ \%$

C. $26\ \%$

D. $32\ \%$

Answer: C

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19. In ccp arrangement the pattern of successive layers can be designated as

A. AB AB AB

B. ABC ABC ABC

C. AB ABC AB

D. ABA ABA ABA

Answer: B

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20. which of the following statemets is not true about the hexagonal close packing ?

A. In hcp, atoms occupy 74% the available space

B. It is AB AB type packing in which third layer is aligned with the first layer

C. Be, Mg, Mo etc. are found to have hcp structure

D. The coordination number is 6

Answer: D

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

A. 12

B. 4

C. 8

D. 6

Answer: A

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22. IF the radius ratio of cation to anion is in the range of 0.225 - 0.414 , then the coordination number of cation will be _____.

A. 3, plane triangular

B. 6,octahedral

C. 4,tetrahedral

D. 8,cubic

Answer: C

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

A. 4

B. 6

C. 8

D. 12

Answer: B

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24. A solid AB has the NaCL structure, If radius of cation A^+ is 120 pm, calculate the maximum possible value of the radius of the anion B^-

A. 120 pm

B. 240 pm

C. 290 pm

D. 360 pm

Answer: C

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25. A crystal is formed by two elements X and Y in cubic structure. X atoms are at the corners of a cube while Y atoms are at the face centre . The formula of the compound will be

A. XY

B. XY_2

C. X_2Y_3

D. XY_3

Answer: D

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26. If there elements X, Y & Z crystallize in cubic solid latice with X atoms at corners, Y atoms at cube centre & Z-atoms at the edges, then the formula of the compound is

A. XYZ

B. XYZ_2

C. XYZ_3

D. X_2Y_2Z

Answer: C

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27. A compound formed by two elements M and N. Element N forms ccp and atoms of M occupy $1/3rd$ of tetrahedral voids. What is the formula of th compound?

A. Y_2Z_3

B. YZ

C. YZ_3

D. Y_2Z

Answer: A

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28. A cubic solid is made up of two elements P and Q . Atoms of P are present at the corners of the cube and atoms of Q are present at body centre. What is the formula of the compound and what are coordination numbers of P and Q ?

A. PQ_2, 6:6

B. PQ,6:6

C. P_2Q,6:6

D. PQ,8:8

Answer: D

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29. How many chloride ions are there around sodium ion in sodium chloride crystal? (a) 4 (b) 8 (c) 6 (d) 12

A. 4

B. 8

C. 6

D. 12

Answer: C

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30. In NaCl structure , all the : (a) all octahedral and tetrahedral sites are occupied. (b) only octahedral sites are occupied. (c) only tetrahedral sites occupied. (d) neither octahedral nor tetrahedral sites are occupied.

A. all octahedral and tetrahedral sites are occupied

B. only octahedral sites are occupied

C. only tetrahedral sites occupied

D. neither octahedral nor tetrahedral sites are occupied.

Answer: B

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31. 8:8 coordination of CsCl is found to change into 6:6 coordination :

A. high temperature

B. high pressure

C. high temperature and high pressure

D. low temperature and low pressure.

Answer: B

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32. In $CsCI$ lattice the coordination number of Cs ion is

A. 8,8

B. 4,4

C. 6,6

D. 8,4

Answer: A

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33. Which is /are correct statement about zinc blende structure ?

A. zinc ions occupy half of the tetrahedral sites

B. each Zn^{2+} ion is surrounded by six sulphide ions

C. each S^{2-} ion is surrounded by six Zn^{2+} ions

D. it has fcc structure

Answer: A

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34. In CaF_2 type (fluorite structure) Ca^{2+} ions form W structure and F^- ions are present in all X voids. The coordination number of

$Ca^{2=}$ is Y and F^{-} is Z. W,X,Y and Z respectively are

A. W-ccp, X-octahedral , Y-8,Z-4

B. W-bcc, X-tetrahedral , Y-4,Z-8

C. W-ccp , X-tetrahedral , Y-8,Z-4

D. W-ccp, X-octahedral, Y-4, Z-8

Answer: C

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35. Which of the following statements is not true ?

A. Silicon carbide is a covalent crystal

B. Molecular crystals are soft in nature

C. In calcium fluoride structure, coordination number of Ca^{2+} is

4.

D. Increase in radius ratio results in increase in coordination number

Answer: C

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36. A unit cell of $BaCl_2$ (fluorite structure) is made up of

A. four Ba^{2+} ions and four Cl^- ions

B. four Ba^{2+} ions and eight Cl^- ions

C. eight Ba^{2+} ions and four Cl^- ions

D. four Ba^{2+} ions and six Cl^- ions

Answer: C

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37. Which of the following structures is not correctly matched ?

A. NaCl type - Cl^- ions in ccp structure. Na^+ ions in half octahedral holes

B. ZnS type - S^{2-} ions in ccp structure . Zn^{2+} ions in alternate tetrahedral voids .

C. CaF_2 type - Ca^{2+} ions in ccp structure F^- ions in all tetrahedral voids

D. Na_2O type - O^{2-} ions in ccp structure. Na^+ ions in all tetrahedral holes .

Answer: A

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38. In face -centered cubic unit cell, edge length is

A. $\frac{4}{\sqrt{3}}$ r

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

C. 2r

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

Answer: B

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39. The edge length of a face centred unit cubic cell is 508 pm. If the radius of cation is 110 pm, the radius of anion will be

A. 110 pm

B. 220 pm

C. 285 pm

D. 144 pm

Answer: D

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40. A metal X crystallises in a face-centred cubic arrangement with the edge length 862 pm. What is the shortest separation of any two nuclei of the atom ?

A. 406 pm

B. 707 pm

C. 862 pm

D. 609.6 pm

Answer: D

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41. The edge length of sodium chloride unit cell is 564 pm. If the size of Cl^- ion is 181 pm. The size of Na^+ ion will be

A. 101 pm

B. 181 pm

C. 410 pm

D. 202 pm

Answer: A

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42. If the distance between Na^+ and Cl^- ions in NaCl crystals is 265 pm, then edge length of the unit cell will be ?

A. 265 pm

B. 795 pm

C. 132.5 pm

D. 530 pm

Answer: D

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43. In the radii of A^+ and B^- are 95 pm and 181 pm respectively, then the coordination number of A^+ will be:

A. 12

B. 8

C. 6

D. 4

Answer: C

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

A. 157 pm

B. 181 pm

C. 127 pm

D. 108 pm

Answer: C

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

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

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

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

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

Answer: B

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46. The relation between atomic radius and edge length 'a' of a body centred cubic unit cell :

A. r=a/2

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

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

D. $r = \frac{3a}{2}$

Answer: C

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47. 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. 124.27 pm

B. 287 pm

C. 574 pm

D. 143.5 pm

Answer: A

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

A. $\frac{\pi}{4}$

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

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

D. $\frac{\pi}{4\sqrt{2}}$

Answer: B

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49. Which of the following does not represent radius of the atom correctly ?

(i)Simple cubic cell : Radius $=\frac{a}{2}$

(ii)Face centred cubic cell:Radius $=\frac{a}{3\sqrt{3}}$

(iii)Body centred cubic cell:Radius $=\frac{\sqrt{3}}{4}a$

A. (i)

B. (iii)

C. (ii)

D. (i) and (ii)

Answer: C

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50. An element cyrstallises in a structure having a fcc unit cell of and edge 200 pm. Calculate its density if 200 g of this element contains 24×10^{23} atoms.

A. $41.66\ \mathrm{g\ cm^{-3}}$

B. $313.9\ \mathrm{g\ cm^{-3}}$

C. $8.117\ \mathrm{g\ cm^{-3}}$

D. $400\ \mathrm{g\ cm^{-3}}$

Answer: A

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

A. $3.89\ \mathrm{g\ cm^{-3}}$

B. $2.16\ \mathrm{g\ cm^{-3}}$

C. $3\ \mathrm{g\ cm^{-3}}$

D. $1.82\ \mathrm{g\ cm^{-3}}$

Answer: B

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52. The distance between Na^+ and Cl^- ions in NaCl with a density $3.165gcm^{-3}$ is

A. 497 pm

B. 248.5 pm

C. 234 pm

D. 538.5 pm

Answer: B

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53. The unit cell of aluminium is a cube with an edge length of 405 pm. The density of aluminium is $2.70gcm^{-3}$. What type of unti celll of alluminium is ?

A. Body centred cubic cell

B. Face-centred cubic cell

C. End-centred cubic cell

D. Simple cubic cell

Answer: B

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

A. $10\ \text{g cm}^{-3}$

B. $14.2\ \text{g cm}^{-3}$

C. $6.15\ \text{g cm}^{-3}$

D. $9.32\ \text{g cm}^{-3}$

Answer: C

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55. Density of lithium atom is 0.53 g/cm^3. The edge length of Li is `3.5 A^.The number of lithium atoms in a unit cell will be.. .

(Atomic mass of lithium is 6.94)

A. 2

B. 1

C. 4

D. 6

Answer: A

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

A. $10.37\ \mathrm{g\ cm^{-3}}$

B. $5.19\ \mathrm{g\ cm^{-3}}$

C. $7.29\ \mathrm{g\ cm^{-3}}$

D. $2.14\ \mathrm{g\ cm^{-3}}$

Answer: B

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57. An element crystallising in body centred cublic lattice has edge length of 500 pm. If the density is 4 g cm^{-3}, the atomic mass of the element $\left(\text{in g mol}^{-1}\right)$ is (consider $N_A = 6 \times 10^{23}$)

A. 100

B. 250

C. 125

D. 150

Answer: D

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58. The density of crystalline $CsCl$ is $3.988 g/cm^3$. The volume effectively occupied by a single $CsCl$ ion pairs in the crystals is : (Given $CsCl$ has mol. Mass 168.4)

A. $7.014 \times 10^{-3} cm^3$

B. $7.014 \times 10^{-23} cm^3$

C. $1.014 \times 10^{-3} cm^3$

D. $1.542 \times 10^{-5} cm^3$

Answer: B

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59. Due to Frenkel defect, the density of the ionic solids

A. The density of the crystal increases

B. The density of the crystal decreases

C. The density of the crystal remains unchanged

D. There is no relationship between density of a crystal and defect present in it.

Answer: C

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60. Why is Frenkel defect not found in pure alkali metal halides ?

A. cations and anions have almost equal size

B. there is a large difference in size of cations and anions

C. cations and anions have low coordination number

D. anions cannot be accommodated in voids.

Answer: A

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

A. AgBr

B. AgCl

C. KBr

D. ZnS

Answer: C

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62. What type of stoichiometric defecit is shoen by ZnS ?

A. Schottky defect

B. Frenkel defect

C. Both Frenkel and Schottky defects

D. Non-stoichiometric defect

Answer: B

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63. In the Schottky defect:

A. an ion moves to interstitial position between the lattice points

B. electrons are trapped in a lattice site

C. some lattice sites are vacant

D. some extra cations are present in interstitial spaces

Answer: C

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64. What type of crystal defect is indicated in the diagram given below :

Na^+	Cl^-	Na^+	Cl^-	Na^+	Cl^-
Cl^-	$\square$	Cl^-	Na^+	$\square$	Cl^-
Na^+	Cl^-	$\square$	Cl^-	Na^+	Cl^-
Cl^-	Na^+	Cl^-	Na^+	$\square$	N^+

A. Frenkel defect

B. Schottky defect

C. Interstitial defect

D. Cation excess defect

Answer: B

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65. The appearance of colour in solid alkali metal halides is generally due to

A. Schottky defect

B. Frenkel defect

C. Both Frenkel and Schottky defects

D. Cation excess defect

Answer: C

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66. When electron are trapped into the crystal in anion cancy ,the defect is known as

A. F-centre

B. Frenkel defect

C. Schottky defect

D. Interstitial defect

Answer: A

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67. The anionic sites occupied by unpaired electrons are called F-centres or colour centres . They impart __(X)__ colour to the crystals of NaCl. Excess of lithium makes LiCl crystals __(Y)__and excess of potassium makes KCl crystals _(Z)___. (X),(Y) and (Z) are

A. yellow, green and pink respectively

B. pink , yellow and violet (or lilac) respectively

C. yellow, pink and violet (or lilac) respectively

D. red, yellow and pink respectively

Answer: C

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68. ZnO shows yellow colour on heating due to

A. Zn^{2+} ions and electrons move to interstitial sites and F-centres are called

B. oxygen and electrons move out of the crystal and ions become yellow

C. Zn^{2+} again combine with oxygen to give yellow oxide

D. Zn^{2+} are replaced by oxygen

Answer: A

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69. Which of the following set of compounds will show metal deficiency defect?

A. NaCl

B. FeO

C. KCl

D. ZnO

Answer: B

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70. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be

A. $5.08\ \%$

B. $7.01\ \%$

C. $4.08\ \%$

D. $6.05\ \%$

Answer: B

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71. Mark the incorrect pair from the following.

A. Schottky defect- Equal number of cations and anions are missing

B. Frenkel defect - Dislocation of cation from its normal site to an interstitial site

C. Impurity defect- $CdCl_2$ in AgCl crystal to create cationic vacancy

D. Metal excess defect - $Fe_{0.93}O$

Answer: D

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72. Which of the following shows correct range of conductivity ?

(i)Conductors : 10^4 to $10^7 ohm^{-1} m^{-1}$

(ii)insulators : 10^{-6} to $10^4 ohm^{-1} m^{-1}$

(iii)Semiconductors : 10^{-10} to $10^{-6} ohm^{-1} m^{-1}$

A. (i) and (ii)

B. (i) only

C. (ii) and (iii)

D. (i), (ii) and (iii)

Answer: B

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73. Pure silicon and germanimum are

A. conductors

B. semiconductors

C. insulators

D. piezoelectric crystals

Answer: C

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74. The conductivity of intrinsic semiconductors can be increased by adding a suitable impurity. This process is called __(P)__. This can be

done with an impurity which is __(Q)_ rich or deficient as compared to the semiconductor. Such impurities introduce __(R)__ defects in them. Electron rich impurities result in __(S)__ type semiconductors while electron deficit impurities result in __(T)___ type semiconductors .

A. P-doping , Q-proton , R-point , S- p , T-n

B. P-doping , Q-electron , R-non-stoichiometric , S- p , T-n

C. P-energy gap , Q- charged , R-impurity , S-n , T-p

D. P-doping , Q-electron , R-electronic , S-n , T-p

Answer: D

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75. To get a n- type semiconductor from silicon , it should be doped with the sustance

A. gallium

B. arsenic

C. aluminium

D. boron

Answer: B

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

a. Ge doped with In

b. B doped with Si

A. group 14 elements

B. group 15 elements

C. group 13 elements

D. group 18 elements

Answer: C

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77. In a P -type semiconductor, germanium is doped with

A. p-type semiconductor Ge Ge Ge Ge

B. 

C. No change in conductivity Ge Ge Ge Ge

D. It becomes superconductor Ge Ge Ge Ge

Answer: A

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78. Which of the following statements are true about semiconductors?

A. Impurity of lower group creates n-type semiconductors

B. Impurity of higher group creates p-type semiconductors

C. Extrinsic semiconductors are formed by doping impurity

D. Intrinsic semiconductors become conductors when temperature is raised

Answer: D

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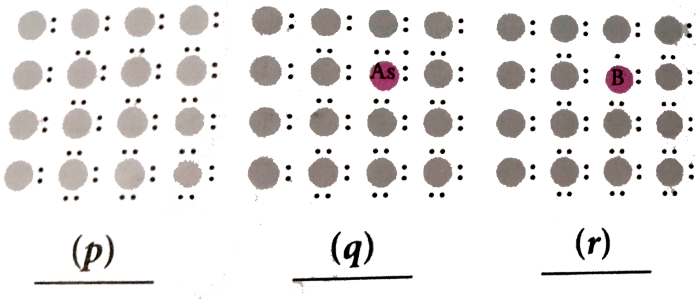
79. Observe the given figure carefully and fill in the blanks by choosing the correct option .



A.

(p)	(q)	(r)
Perfect crystal	p-type semiconductor	n-type semiconductor

B.

(p)	(q)	(r)
Doped crystal	n-type semiconductor	p-type semiconductor

C.

(p)	(q)	(r)
Perfect crystal	n-type semiconductor	p-type semiconductor

D.

(p)	(q)	(r)
n-type semiconductor	Perfect crystal	p-type semiconductor

Answer: C

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80. Paramagnetic substances are magnestised in a magnetic field in the same direction. Paramagnetism is due to the presence of

A. one or more unpaired electrons

B. all paired electrons

C. permanent spin and orbital motion

D. parallel and anti-parallel spins in equal number

Answer: A

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

A. diamagnetic

B. ferrimagnetic

C. paramagnetic

D. anti-ferromagnetic

Answer: C

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

A. MnO_2

B. TiO_2

C. NO_2

D. CrO_2

Answer: A

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83. Ferrimagnetism is in

A. oppositely oriented and cancel each other's magnetic moment

B. aligned in parallel and anti-parallel directions in unequal number

C. randomly oriented and their magnetic moments get cancelled

D. in same direction and get aligned in a magnetic field

Answer: B

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Hots

1. In a close packed structure of mixed oxides , the lattice is composed of oxide ions , one eighth of tetrahedral voids are

occupied by divalent cations while one half of octahedral voids are occupied by trivalent cations . What is the formula of the oxide ?

A. A_2BO_4

B. AB_2O_3

C. A_2BO_3

D. AB_2O_4

Answer: D

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2. The density and edge length values for a crystalline element with fcc lattice are $10gcm^{-3}$ and 400 pm respectively. The number of unit cells in 32 g of this crystal is

A. 8×10^{23}

B. 5×10^{22}

C. 8×10^{22}

D. 5×10^{23}

Answer: B

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3. For two isomorphous crystals A and B , the ratio of density of A to that of B is 1.6 while the ratio of the edge length of B to that of A is 2. If the molar mass of crystal B is 200 g mol^{-1}, then that of crystal A is

A. $240\ \text{g mol}^{-1}$

B. $120\ \text{g mol}^{-1}$

C. $80\ \text{g mol}^{-1}$

D. $40\ \text{g mol}^{-1}$

Answer: D

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4. A metal crystallizes into two cubic phases, face-centred cubic and body-centred cubic, which have unit cell lengths 3.5 and $3.0A$, respectively. Calculate the ration of densities of fcc and bcc.

A. $1.259:1$

B. $1:1.259$

C. $3:2$

D. $1.142:1$

Answer: A

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5. The density of mercury is $13.6 gm L^{-1}$. Calculate the approximate diameter of an atom of mercury assuming that each atom is occupying a cube of edge length equal to the diameter of the mercury atom.

A. 3.01 Å

B. 2.54 Å

C. 0.29 Å

D. 2.91 Å

Answer: D

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6. An element crystallizes into a structure which may be describes by a cubic type of unit cell having one atom on each corner of the cube and two atoms on one of its diagonals. If the volume of this unit cell

is $24 \times 10^{-24} cm^3$ and density of element is $7.2 g cm^{-3}$. Calculate the number of atoms present in $200 g$ of element.

A. 3.5×10^{24}

B. 5.7×10^{23}

C. 6.3×10^{20}

D. 1×10^{10}

Answer: A

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7. A sample of ferrous oxide has actual formula $Fe_{0.93}O_{1..00}$. In this sample what fraction of metal ions are Fe^{2+} ions? What type of non-stoichiometric defect is present in this sample ?

A. (i)-0.849 , (ii)-Metal deficiency

B. (i)-0.790 , (ii)-Metal deficiency

C. (i)-0.145, (ii)-Metal excess

D. (i)-0.93 , (ii)-Vacancy defect

Answer: A

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Exemplar Problems

1. which of the following favours the existenence of a substance in the solid state ?

A. high temperature

B. Low temperature

C. High thermal energy

D. Weak cohesive forces

Answer: B

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2. which of the following is not a characteristic of a crystalline solid ?

A. Definite and characteristic heat of fusion

B. Isotropic nature

C. A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal

D. A true solid

Answer: B

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3. Which of the following is an amorphous solid

A. Graphite (C)

B. Quartz glass (SiO_2)

C. Chrome alum

D. Silicon carbide (SiC)

Answer: B

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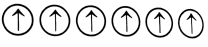
4. Which of the following arrangements shows schematic alignment of magnetic moments of antiferromagnetic substances?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: D

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5. which of the following is true about the value of refractive index of quartz glass ?

A. Same in all directions

B. Different in different directions

C. Cannot be measured

D. Always zero

Answer: A

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6. Which of the following statement is not true about amorphous solids?

A. On heating they may become crystalline at certain temperature

B. They may become crystalline on keeping for long time

C. Amorphous solids can be moulded by heating

D. They are anisotropic in nature

Answer: D

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7. The sharp melting point of crystalline solids compared to amorphous solids is due to

A. a regular arrangement of constituent particles observed over a short distance in the crystal lattice

B. a regular arrangment of constituent particles observed over a long distance in the crystal lattice

C. same arrangement of constituent particles in different directions

D. different arrangement of constituent particles in different directions

Answer: B

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8. Iodine molecules are held in the crystal lattice by:

A. London forces

B. dipole -dipole interactions

C. covalent bonds

D. coulombic forces

Answer: A

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9. which of the following is a network solid?

A. $SO_{2\,(\,Solid\,)}$

B. I_2

C. Diamond

D. $H_2O_{\,(\,Ice\,)}$

Answer: C

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10. which of the following solids is not an electrical conductor ?

(a) Mg(s) (b) TiO(s) (c) $I_2(s)$ (d) $H_2O(s)$

A. (I) only

B. (II) only

C. (III) and (IV)

D. (II),(III) and (IV)

Answer: C

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11. which of the following is not the characteristic of ionic solids?

A. Very low value of electrical conductivity in the molten state

B. Brittle nature

C. Very strong forces of interactions

D. Anisotropic nature

Answer: A

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12. Graphite is a good conductor of electricity due to the presence of :

A. lone pair of electrons

B. free valence electrons

C. cations

D. anions

Answer: B

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13. which of the following oxides behaves as conductor or insulator depending upon temperature ?

A. TiO

B. SiO_2

C. TiO_3

D. MgO

Answer: C

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14. Which of the following oxides shows electrical properties like metals ?

A. SiO_2

B. MgO

C. $SP_{2(s)}$

D. CrO_2

Answer: D

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15. The lattice site in a pure crystal cannot be occupied by :

A. molecule

B. ion

C. electron

D. atom

Answer: C

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16. Graphite cannot be classified as :

A. conducting solid

B. network solid

C. covalent solids

D. ionic solid

Answer: D

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17. Cations are present in the interstitial sites in ..... .

A. Frenkel defect

B. Schottky defect

C. Vacancy defect

D. metal deficiency defect

Answer: A

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18. Schottky defect is observed in crystals when ..... .

A. some cations move from their lattice site to interstitial sites

B. equal number of cations and anions are missing from the lattice

C. some lattice sites are occupied by electrons

D. some impurity is present in the lattice

Answer: B

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19. which of the following is true about the charge acquired by p-type semiconductors ?

A. positive

B. neutral

C. negative

D. depends on concentration of p impurity

Answer: B

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20. To get a n- type semiconductor from silicon , it should be doped with a substance with valency

A. 2

B. 1

C. 3

D. 5

Answer: D

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21. The total of tetrahedral voids in the face centred unit cell is .....

.

A. 6

B. 8

C. 10

D. 12

Answer: B

Watch Video Solution

22. 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. (II) and (IV)

C. (I) and (III)

D. (II) and (IV)

Answer: A

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23. In which pair most efficient packing is present?

A. hcp and bcc

B. hcp and ccp

C. bcc and ccp

D. bcc and simple cubic cell

Answer: B

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

A. 74

B. 68

C. 32

D. 26

Answer: C

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25. which of the following statemets is not true about the hexagonal close packing ?

A. The coordination number is 12

B. It has 74% packing efficiency .

C. Tetrahedral voids of the second layer are covered by the spheres of the third layer

D. In this arrangement spheres of the fourth layer are exactly aligned with those of the first layer .

Answer: D

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26. in which of the following structures coordination number for cations and anions in the packed structure will be same ?

A. Cl^- ions form fcc lattice and Na^+ ions occupy all octahedral voids of the unit cell.

B. Ca^{2+} ions form fcc lattice and F^- ions occupy all the eight tetrahedral voids of the unit cell

C. O^{2-} ions form fcc lattice and Na^+ ions occupy all the eight tetrahedral voids of the unit cell

D. S^{2-} ions form fcc lattice and Zn^{2+} ions go into alternate tetrahedral voids of the unit cell

Answer: A

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27. What is the coordination number in a square close packed structures in two dimensions?

A. 2

B. 3

C. 4

D. 6

Answer: C

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28. which kind of defects are introduced by doping ?

A. Dislocation defects

B. Schottky defect

C. Frenkel defects

D. Electronic defects

Answer: D

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29. silicon doped with electron rich impurity forms ..... .

A. p-type semiconductor

B. n-type semiconductor

C. intrinsic semiconductor

D. insulator

Answer: B

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30. Which of the following statements is not true ?

A. Paramagnetic substances are weakly attracted by magnetic field

B. Ferromagnetic substances cannot be magnetised permanently

C. The domains in antiferromagnetic substances are oppositely oriented with respect to each other

D. Pairing of electrons cancels their magnetic moment in the diamagnetic substances .

Answer: B

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31. which of the following is not true about the ionic solids ?

A. Bigger ions form the close packed structure

B. Smaller ions occupy either the tetrahedral or the octahedral voids depending upon their size

C. Occupation of all the voids is not necessary

D. The fraction of octahedral or tetrahedral voids occupied depends upon the radii of the ions occupying the voids .

Answer: D

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32. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because:

A. all the domains get oriented in the direction of magnetic field

B. all the domains get oriented in the direction opposite to the direction of magnetic field

C. domains get oriented randomly

D. domains are not affected by magnetic field

Answer: A

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33. the correct order of the packing effeciency in different types of unit cells is ..... .

A. fcc lt bcc lt simple cubic

B. fcc gt bcc gt simple cubic

C. fcc lt bcc gt simple cubic

D. bcc lt fcc gt simple cubic

Answer: B

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34. which of the follwing defects is also known as dislocation defect ?

A. Frenkel defect

B. Schottky defect

C. Non-stoichiometric defect

D. Simple interstitial defect

Answer: A

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35. In the cubic close close packing, the unit cell has....

A. 4 tetrahedral voids each of which is shared by four adjacent unit cells .

B. 4 tetrahedral voids within the unit cell

C. 8 tetrahedral voids each of which is shared by four adjacent unit cells

D. 8 tetrahedral voids within the unit cells .

Answer: D

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36. the edge length of the unit cells in terms of the radius of sphere constituting fcc ,bcc and simple cubic unit cells are respectively Ã¢â, Â¦Ã¢â, Â¦Ã¢â, Â¦. .

A. $2\sqrt{2}r, \frac{4r}{\sqrt{3}}, 2r$

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

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

D. $2r, \frac{4r}{\sqrt{3}}, 2\sqrt{2}r$

Answer: A

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37. which of the following represents correct order of conductivity in solids ?

A. $K_{\text{metals}} > > K_{\text{insulators}} < K_{\text{semiconductors}}$

B. $K_{\text{metals}} < < K_{\text{insulators}} < K_{\text{semiconductors}}$

C. $K_{\text{metals}}, K_{\text{semiconductors}} > K_{\text{insulators}} = \text{zero}$

D. $K_{\text{metals}} < K_{\text{semiconductors}} > K_{\text{insulators}} \neq \text{zero}$

Answer: A

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Assertion Reason

1. Assertion:At low temperature , particles of matter occupy fixed positions and exist in solid state.

Reason : Under a given set of conditions of temperature and pressure , the state of a substance depends upon the net effect of thermal energy and intermolecular forces.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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2. Assertion: Quartz glass is crystalline solid and quartz is an amorphous solid

Reason: Quartz glass has long range order

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: D

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3. Assertion: Glass panes fixed to windows or doors of old buildings are slightly thicker at the bottom than at the top .

Reason: Glass is a pseudo solid or supercooled liquid

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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4. Crystalline solids have

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

View Text Solution

5. Assertion:SiC has higher melting point than NaCl.

Reason: SiC has stronger electrostatic forces of attraction.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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6. Assertion:Face centred cubic cell has 4 atoms per unit cell.

Reason:In fcc unit cell , there are 8 atoms at the corners and 6 atoms at face centres .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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7. Assertion:A tetrahedral void is surrounded by four spheres and an octahedral void is surrounded by six spheres.

Reason:The number of tetrahedral voids is double the number of close packed spheres and number of octahedral voids is equal to number of close packed spheres.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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8. Assertion : $CsCI$ has body - centred cunic arrangement

Reason: $CsCI$ has one and $8CI^-$ ion is its unit cell

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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9. Assertion:Packing efficiency of body centred cubic structure is 68%

Reason:68% is the maximum packing efficiency any crystal can have

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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10. Assertion:Frenkel defect is also called dislocation defect

Reason:Frenkel defect is shown by ionic substances in which cation

and anion are of almost similar sizes.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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11. Assertion :-(A) semiconductors are solids with conductivites in the intermediate range from$10^{-6} - 10^{4} ohm^{-1} m^{-1}$

Reason :-(R) internmediate conductivity in semiconductor Is due to partially filled valence band .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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12. Metals are good conductor of electricity because they contain

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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13. Assertion:Diode is a combination of n-type and p-type semiconductors.

Reason: The solar cell is an efficient photo-diode used for conversion of light energy into electrical energy .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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14. Assertion:Iron, cobalt, nickel and CrO_2 are called ferromagnetic substances .

Reason:Ferromagnetic substances are weakly attracted by magnetic field

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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15. Assertion:Substances like Fe_3O_4 and $MgFe_2O_4$ lose ferrimagnetism on heating and become paramagnetic

Reason : Magnetic moments of the domains in these substances are aligned in parallel and antiparallel directions in unequal numbers.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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Amorphous And Crystalline Solids

1. Which among the following will show anisotropy ?

A. Glass

B. NaBr

C. Plastic

D. Rubber

Answer: B

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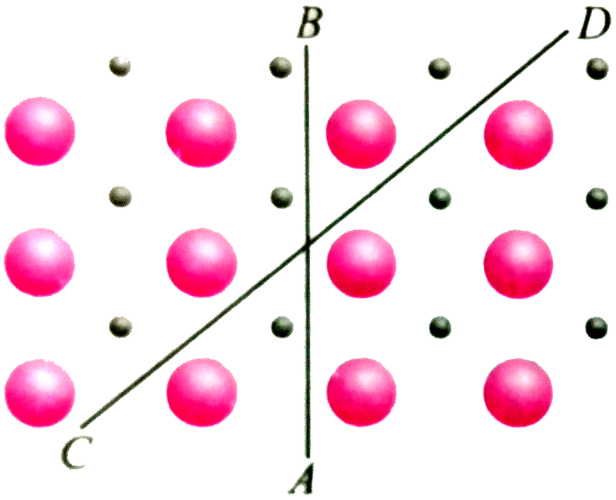
2. Study the figure of a solid given below depicting the arrangement of particles. Which is the most appropriate term used for the figure ?



A. Isotropy

B. Anisotropy

C. Irregular shape

D. Amorphous nature

Answer: B

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3. Fill in the blanks by choosing the correct option .

Metals often occur in ___x___ condition. Individual crystals are randomly oriented so a metallic sample may appear to be __y___ even though a single crystal is __z__

A. x-crystalline , y-isotropic , z-anisotropic

B. x-polycrystalline , y-isotropic , z-anisotropic

C. x-anisotropic, y-isotropic , z-crystalline

D. x-crystalline , y-anisotropic , z-isotropic

Answer: B

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Classification Of Crystalline Solids

1. Which of the following statements is not correct about molecular crystals ?

A. They are generally soft and easily compressible

B. They are good conductors of electricity as the electrons are delocalised in the bonds

C. They have low melting and boiling points

D. They consist of polar or non-polar molecules .

Answer: B

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2. For which pair of allotropes is one a molecular solid and the other a network covalent solid?

A. Calcium fluoride

B. Silicon dioxide

C. Carbon dioxide

D. Sodium chloride

Answer: C

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3. Which of the following crystalline solids conduct electricity in molten state but not in solid state?

A. in molten state free ions are furnished which are not free to move in solid state

B. in solid state ionic solids are hard, brittle and become soft in molten state

C. all solids conduct electricity in molten state

D. in solid state ions are converted to atoms which are insulators

Answer: A

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4. Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same ?

(i) Good thermal conductivity

(ii) Good electrical conductivity

(iii) Ductility

(iv) High melting point

A. Ionic solids

B. Covalent solids

C. Metallic solids

D. Molecular solids

Answer: C

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5. Solid A is a very hard electrical insulator in solid as well as in molten state and melts at extermely high temperature. What type of solid is it?

A. Ionic solids

B. Covalent solids

C. Metallic solids

D. Molecular solids

Answer: B

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6. Which of the folllowing statements is incorrect regarding diamond?

A. In diamond, each carbon atom is covalently bonded to four other carbon atoms

B. In graphite , each carbon atom is covalently bonded to three other carbon atoms in the same plane

C. The C-C bond length in graphite is intermediate between single and double bond distance

D. Diamond is a layered structure, the two layers joined by van der Wall's forces .

Answer: D

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7. Examples of few solids are given below. Find out the example which is not correctly matched.

A. Ionic solids - NaCl, ZnS

B. Covalent solids - H_2, I_2

C. Molecular solids - $H_2O_{(S)}$

D. Metallic solids - Cu,Sn

Answer: B

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Crystalline And Unit Cells

1. In the crystal structure of $CsCl$:

A. Body centred cubic

B. Simple cubic

C. Face centred cubic

D. Edge centred cubic

Answer: A

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2. Which of the following does not represent a type of crystal system ?

A. Triclinic

B. Monoclinic

C. Rhombohedral

D. Isotropical

Answer: D

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3. The crystal system for which $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90^\circ$ is said to be

A. Cubic

B. Tetragonal

C. Orthorhombic

D. Hexagonal

Answer: C

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4. In seven pssible crystal system hoe many crystal system have more than one Bravais lattic ?

A. Hexagonal

B. Triclinic

C. Rhombohedral

D. Monoclinic

Answer: D

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5. Monoclinic sulphur is an example of monoclinic cystal system. What are the characteristics of the crystal system ?

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

B. $a \neq b \neq c, \alpha \neq \beta \neq \gamma \neq 90^\circ$

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

D. $a \neq b \neq c, \alpha = \gamma = 90^\circ, \beta \neq 90^\circ$

Answer: D

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6. In the table given below, dimensions and angles of various crystals are given . Complete the table by filling the blanks.

	Type of crystal	Dimensions	Angles
1.	Cubic	$a = b = c$	$\alpha = \beta = \gamma =$ p
2.	Tetragonal	q	$\alpha = \beta = \gamma = 90°$
3.	Orthorhombic	$a \neq b \neq c$	r
4.	Hexagonal	s	$\alpha = \beta = 90°, \gamma =$ t

A. $p \quad q \quad r \quad s \quad t$
$90° \quad a = b \neq c \quad \alpha = \beta = \gamma = 90° \quad a = b \neq c \quad 120°$

B. $p \quad q \quad r \quad s \quad t$
$120° \quad a = b = c \quad \alpha = 90°, \beta = \gamma = 120° \quad a \neq b \neq c \quad 90°$

C. $p \quad q \quad r \quad s \quad t$
$90° \quad a \neq b = c \quad \alpha = \beta = \gamma = 120° \quad a \neq b \neq c \quad 90°$

D. $p \quad q \quad r \quad s \quad t$
$120° \quad a \neq b \neq c \quad \alpha \neq \beta \neq \gamma \neq 120° \quad a \neq b = c \quad 120°$

Answer: A

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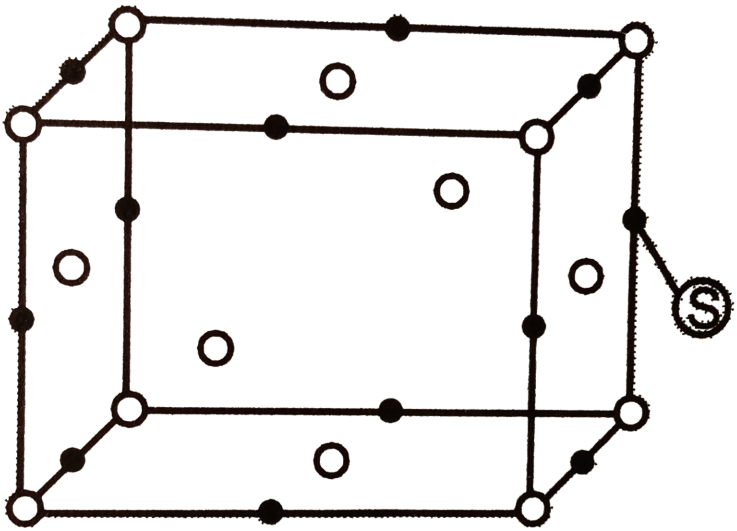
Number Of Atoms In Unit Cell And Close Packed Structures

1. For the structure given below, the site marked as S is a :



A. tetrahedral void

B. cubic void

C. octahedral void

D. none of these

Answer: C

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2. Match the column I having type of lattice point and its contribution to one unit cell in column II and mark the appropriate choice .

Column I (Lattice point)		Column II (Contribution to one unit cell)	
(A)	Corner	(i)	1
(B)	Edge	(ii)	1/8
(C)	Face centre	(iii)	1/4
(D)	Body centre	(iv)	1/2

A. A-(ii),B-(i),C-(iii),D-(iv)

B. A-(ii),B-(iii),C-(iv),D-(i)

C. A-(i),B-(ii),C-(iv),D-(iii)

D. A-(iii),B-(iv),C-(i),D-(ii)

Answer: B

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3. Which of the following statements is not about the voids ?

A. Octahedral void is formed at the centre of six spheres which lies at the apices of a regular octahedron

B. There is one octahedral site for each sphere

C. There are two tetrahedral sites for each sphere

D. Octahedral voids are formed when the triangular voids in second layer exactly overlap with similar voids in the first layer .

Answer: D

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4. If $'Z'$ is the number of atoms in the unit cell that represents the closet packing sequence.....$ABCABC$..... The number of tetrahedral voids in the unit cell is equal

A. n

B. n/2

C. n/4

D. 2n

Answer: D

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5. If the radius of the octaheral void is r and the radius of the atoms in close-packing is R, derive relation between r and R

A. r=0.414R

B. R=0.414r

C. r=2R

D. $r = \sqrt{2}R$

Answer: A

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6. A metallic crystal cystallizes into a lattice containing a sequence of layers $ABABAB\ldots$. Any packing of spheres leaves out voids in the lattice. What percentage by volume of this lattice is empty spece?

A. $72\ \%$

B. $48\ \%$

C. $26\ \%$

D. $32\ \%$

Answer: C

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7. In ccp arrangement the pattern of successive layers can be designated as

A. AB AB AB

B. ABC ABC ABC

C. AB ABC AB

D. ABA ABA ABA

Answer: B

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8. which of the following statemets is not true about the hexagonal close packing ?

A. In hcp, atoms occupy 74% the available space

B. It is AB AB type packing in which third layer is aligned with the first layer

C. Be, Mg, Mo etc. are found to have hcp structure

D. The coordination number is 6

Answer: D

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

A. 12

B. 4

C. 8

D. 6

Answer: A

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10. Match the column I with Column II and mark the appropriate choice .

Column I (Radius ratio)		Column II (Coordination number)	
(A)	0.155 - 0.225	(i)	4
(B)	0.225 - 0.414	(ii)	8
(C)	0.414 - 0.732	(iii)	3
(D)	0.732 - 1.0	(iv)	6

A. A-(i),B-(ii),C-(iv),D-(iii)

B. A-(ii),B-(iv),C-(i),D-(iii)

C. A-(iv),B-(iii), C-(i),D-(ii)

D. A-(iii) , B-(i) , C-(iv),D-(ii)

Answer: D

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11. IF the radius ratio of cation to anion is in the range of 0.225 - 0.414 , then the coordination number of cation will be _____.

A. 3, plane triangular

B. 6,octahedral

C. 4,tetrahedral

D. 8,cubic

Answer: C

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

A. 4

B. 6

C. 8

D. 12

Answer: B

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13. A solid AB has the NaCL structure, If radius of cation A^+ is 120 pm, calculate the maximum possible value of the radius of the anion B^-

A. 120 pm

B. 240 pm

C. 290 pm

D. 360 pm

Answer: C

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14. A crystal is formed by two elements X and Y in cubic structure. X atoms are at the corners of a cube while Y atoms are at the face centre . The formula of the compound will be

A. XY

B. XY_2

C. X_2Y_3

D. XY_3

Answer: D

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15. If there elements X, Y & Z crystallize in cubic solid latice with X atoms at corners, Y atoms at cube centre & Z-atoms at the edges, then the formula of the compound is

A. XYZ

B. XYZ_2

C. XYZ_3

D. X_2Y_2Z

Answer: C

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16. A compound formed by two elements M and N. Element N forms ccp and atoms of M occupy $1/3rd$ of tetrahedral voids. What is the formula of th compound?

A. Y_2Z_3

B. YZ

C. YZ_3

D. Y_2Z

Answer: A

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17. A cubic solid is made up of two elements P and Q . Atoms of P are present at the corners of the cube and atoms of Q are present at body centre. What is the formula of the compound and what are coordination numbers of P and Q ?

A. PQ_2, 6:6

B. PQ,6:6

C. P_2Q,6:6

D. PQ,8:8

Answer: D

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18. How many chloride ions are there around sodium ion in sodium chloride crystal? (a) 4 (b) 8 (c) 6 (d) 12

A. 4

B. 8

C. 6

D. 12

Answer: C

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19. In NaCl structure , all the : (a) all octahedral and tetrahedral sites are occupied. (b) only octahedral sites are occupied. (c) only tetrahedral sites occupied. (d) neither octahedral nor tetrahedral sites are occupied.

A. all octahedral and tetrahedral sites are occupied

B. only octahedral sites are occupied

C. only tetrahedral sites occupied

D. neither octahedral nor tetrahedral sites are occupied.

Answer: B

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20. 8:8 coordination of CsCl is found to change into 6:6 coordination :

A. high temperature

B. high pressure

C. high temperature and high pressure

D. low temperature and low pressure.

Answer: B

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21. In $CsCI$ lattice the coordination number of Cs ion is

A. 8,8

B. 4,4

C. 6,6

D. 8,4

Answer: A

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22. Which is /are correct statement about zinc blende structure ?

A. zinc ions occupy half of the tetrahedral sites

B. each Zn^{2+} ion is surrounded by six sulphide ions

C. each S^{2-} ion is surrounded by six Zn^{2+} ions

D. it has fcc structure

Answer: A

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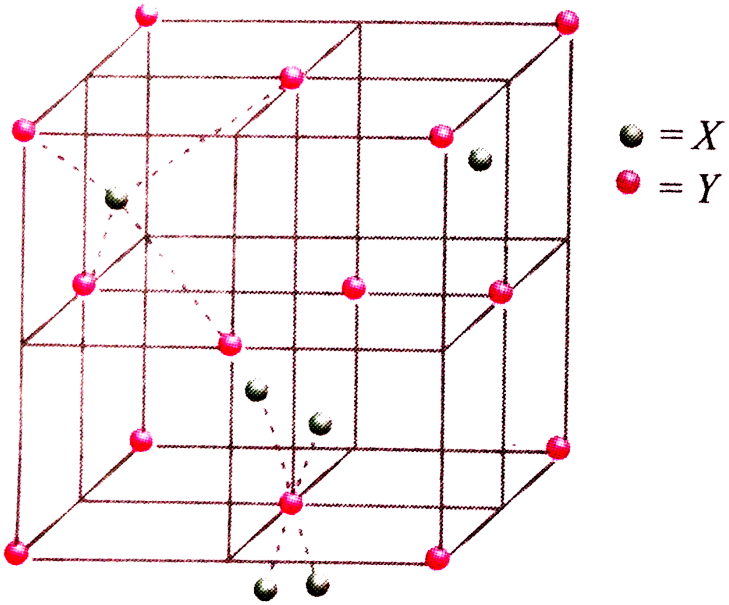
23. The unit cell shown in the figure belongs to



A. NaCl type

B. ZnS type

C. CsCl type

D. CaF_2 type

Answer: B

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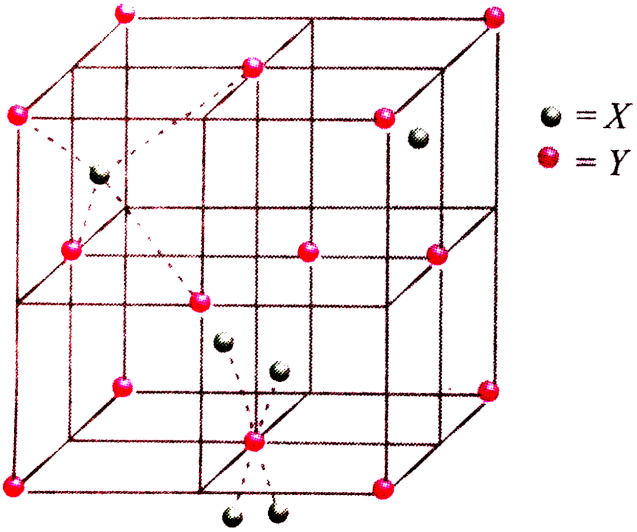
24. The coordination number of Y will be



A. 6

B. 8

C. 12

D. 4

Answer: D

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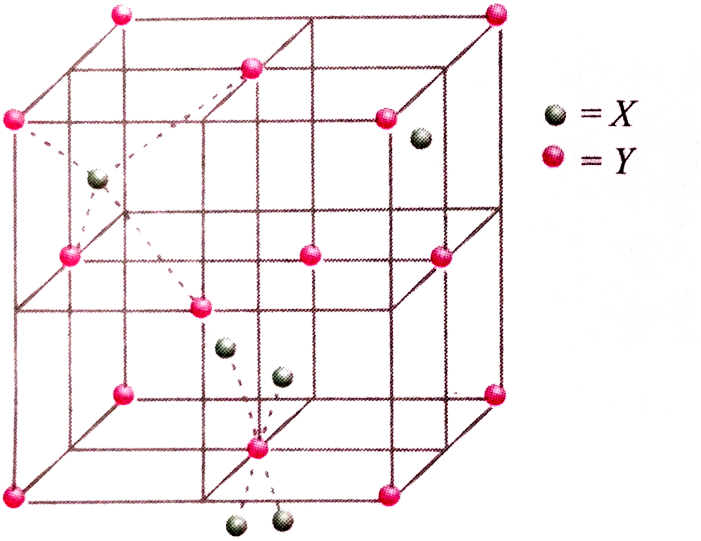
25. Which of the following about the above structure is not correct ?



A. It has ccp structure

B. Each X ion in surrounded by eight Y ions

C. The structure is similar to diamond

D. X ions are present at the corners of the cube and centre of each face.

Answer: B

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26. In CaF_2 type (fluorite structure) Ca^{2+} ions form W structure and F^- ions are present in all X voids. The coordination number of $Ca^{2=}$ is Y and F^- is Z. W,X,Y and Z respectively are

A. W-ccp, X-octahedral , Y-8,Z-4

B. W-bcc, X-tetrahedral , Y-4,Z-8

C. W-ccp , X-tetrahedral , Y-8,Z-4

D. W-ccp, X-octahedral, Y-4, Z-8

Answer: C

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27. Which of the following statements is not true ?

A. Silicon carbide is a covalent crystal

B. Molecular crystals are soft in nature

C. In calcium fluoride structure, coordination number of Ca^{2+} is 4.

D. Increase in radius ratio results in increase in coordination number

Answer: C

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28. A unit cell of $BaCl_2$ (fluorite structure) is made up of

A. four Ba^{2+} ions and four Cl^- ions

B. four Ba^{2+} ions and eight Cl^{-} ions

C. eight Ba^{2+} ions and four Cl^{-} ions

D. four Ba^{2+} ions and six Cl^{-} ions

Answer: C

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29. Which of the following structures is not correctly matched ?

A. NaCl type - Cl^{-} ions in ccp structure. Na^{+} ions in half octahedral holes

B. ZnS type - S^{2-} ions in ccp structure . Zn^{2+} ions in alternate tetrahedral voids .

C. CaF_2 type - Ca^{2+} ions in ccp structure F^{-} ions in all tetrahedral voids

D. Na_2O type - O^{2-} ions in ccp structure. Na^+ ions in all tetrahedral holes .

Answer: A

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Packing Efficiency

1. In face -centered cubic unit cell, edge length is

A. $\frac{4}{\sqrt{3}}$ r

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

C. 2r

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

Answer: B

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2. The edge length of a face centred unit cubic cell is 508 pm. If the radius of cation is 110 pm, the radius of anion will be

A. 110 pm

B. 220 pm

C. 285 pm

D. 144 pm

Answer: D

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3. A metal X crystallises in a face-centred cubic arrangement with the edge length 862 pm. What is the shortest separation of any two nuclei of the atom ?

A. 406 pm

B. 707 pm

C. 862 pm

D. 609.6 pm

Answer: D

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4. The edge length of sodium chloride unit cell is 564 pm. If the size of Cl^- ion is 181 pm. The size of Na^+ ion will be

A. 101 pm

B. 181 pm

C. 410 pm

D. 202 pm

Answer: A

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5. If the distance between Na^+ and Cl^- ions in NaCl crystals is 265 pm, then edge length of the unit cell will be ?

A. 265 pm

B. 795 pm

C. 132.5 pm

D. 530 pm

Answer: D

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6. In the radii of A^+ and B^- are 95 pm and 181 pm respectively, then the coordination number of A^+ will be:

A. 12

B. 8

C. 6

D. 4

Answer: C

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

A. 157 pm

B. 181 pm

C. 127 pm

D. 108 pm

Answer: C

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

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

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

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

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

Answer: B

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9. The relation between atomic radius and edge length 'a' of a body centred cubic unit cell :

A. r=a/2

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

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

D. $r = \frac{3a}{2}$

Answer: C

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10. 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. 124.27 pm

B. 287 pm

C. 574 pm

D. 143.5 pm

Answer: A

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

A. $\frac{\pi}{4}$

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

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

D. $\frac{\pi}{4\sqrt{2}}$

Answer: B

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12. Which of the following does not represent radius of the atom correctly ?

(i)Simple cubic cell : Radius $=\frac{a}{2}$

(ii)Face centred cubic cell:Radius $=\frac{a}{3\sqrt{3}}$

(iii)Body centred cubic cell:Radius $=\frac{\sqrt{3}}{4}a$

A. (i)

B. (iii)

C. (ii)

D. (i) and (ii)

Answer: C

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13. Match the column I with Column II and mark the appropriate choice .

Column I (Structure)		Column II (Packing efficiency)	
(A)	Simple cubic structure	(i)	68%
(B)	Face centred cubic structure	(ii)	74%
(C)	Body centred cubic structure	(iii)	52%

A. A-(iii) , B-(ii), C-(i)

B. A-(i),B-(ii) ,C-(iii)

C. A-(ii),B-(i) , C-(iii)

D. A-(iii) , B-(i) , C-(ii)

Answer: A

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Calculations Involving Unit Cell Dimensions

1. An element cyrstallises in a structure having a fcc unit cell of and edge 200 pm. Calculate its density if 200 g of this element contains 24×10^{23} atoms.

A. $41.66\ \mathrm{g\ cm^{-3}}$

B. $313.9\ \mathrm{g\ cm^{-3}}$

C. $8.117\ \mathrm{g\ cm^{-3}}$

D. $400\ \mathrm{g\ cm^{-3}}$

Answer: A

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

chloride?

A. $3.89\ \mathrm{g\ cm^{-3}}$

B. $2.16\ \mathrm{g\ cm^{-3}}$

C. $3\ \mathrm{g\ cm^{-3}}$

D. $1.82\ \mathrm{g\ cm^{-3}}$

Answer: B

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3. The distance between Na^+ and Cl^- ions in NaCl with a density $3.165 gcm^{-3}$ is

A. 497 pm

B. 248.5 pm

C. 234 pm

D. 538.5 pm

Answer: B

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4. The unit cell of aluminium is a cube with an edge length of 405 pm. The density of aluminium is $2.70 gcm^{-3}$. What type of unti celll of alluminium is ?

A. Body centred cubic cell

B. Face-centred cubic cell

C. End-centred cubic cell

D. Simple cubic cell

Answer: B

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

A. $10\ \text{g cm}^{-3}$

B. $14.2\ \text{g cm}^{-3}$

C. $6.15\ \text{g cm}^{-3}$

D. $9.32\ \text{g cm}^{-3}$

Answer: C

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6. Density of lithium atom is 0.53 g/cm^3. The edge length of Li is `3.5 A^.The number of lithium atoms in a unit cell will be.. .

(Atomic mass of lithium is 6.94)

A. 2

B. 1

C. 4

D. 6

Answer: A

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

A. $10.37\ \mathrm{g\ cm^{-3}}$

B. $5.19\ \mathrm{g\ cm^{-3}}$

C. $7.29\ \mathrm{g\ cm^{-3}}$

D. $2.14\ \mathrm{g\ cm^{-3}}$

Answer: B

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8. An element crystallising in body centred cublic lattice has edge length of 500 pm. If the density is 4 g cm^{-3}, the atomic mass of the element $\left(\text{in g mol}^{-1}\right)$ is (consider $N_A = 6 \times 10^{23}$)

A. 100

B. 250

C. 125

D. 150

Answer: D

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9. The density of crystalline $CsCl$ is $3.988 g/cm^3$. The volume effectively occupied by a single $CsCl$ ion pairs in the crystals is : (Given $CsCl$ has mol. Mass 168.4)

A. $7.014 \times 10^{-3} cm^3$

B. $7.014 \times 10^{-23} cm^3$

C. $1.014 \times 10^{-3} cm^3$

D. $1.542 \times 10^{-5} cm^3$

Answer: B

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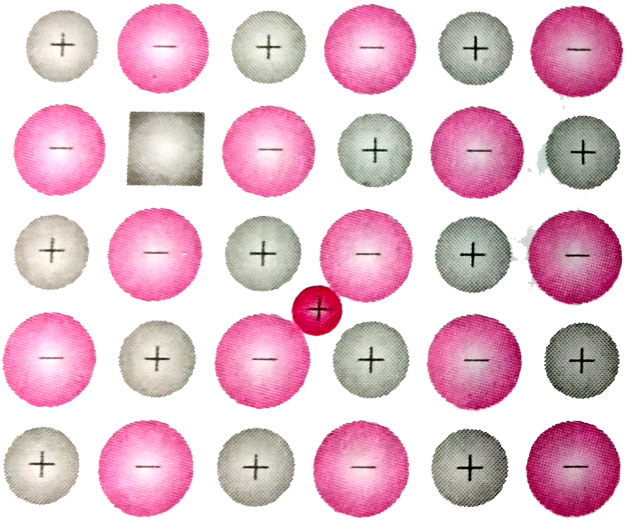
Imperfections In Solids

1. Which is the defect represented by the given figure ?



A. Schottky defect

B. Frenkel defect

C. Vacancy defect

D. Interstitial defect

Answer: B

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2. Due to Frenkel defect, the density of the ionic solids

A. The density of the crystal increases

B. The density of the crystal decreases

C. The density of the crystal remains unchanged

D. There is no relationship between density of a crystal and defect present in it.

Answer: C

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3. Why is Frenkel defect not found in pure alkali metal halides ?

A. cations and anions have almost equal size

B. there is a large difference in size of cations and anions

C. cations and anions have low coordination number

D. anions cannot be accommodated in voids.

Answer: A

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

A. AgBr

B. AgCl

C. KBr

D. ZnS

Answer: C

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5. What type of stoichiometric defecit is shoen by ZnS ?

A. Schottky defect

B. Frenkel defect

C. Both Frenkel and Schottky defects

D. Non-stoichiometric defect

Answer: B

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6. In the Schottky defect:

A. an ion moves to interstitial position between the lattice points

B. electrons are trapped in a lattice site

C. some lattice sites are vacant

D. some extra cations are present in interstitial spaces

Answer: C

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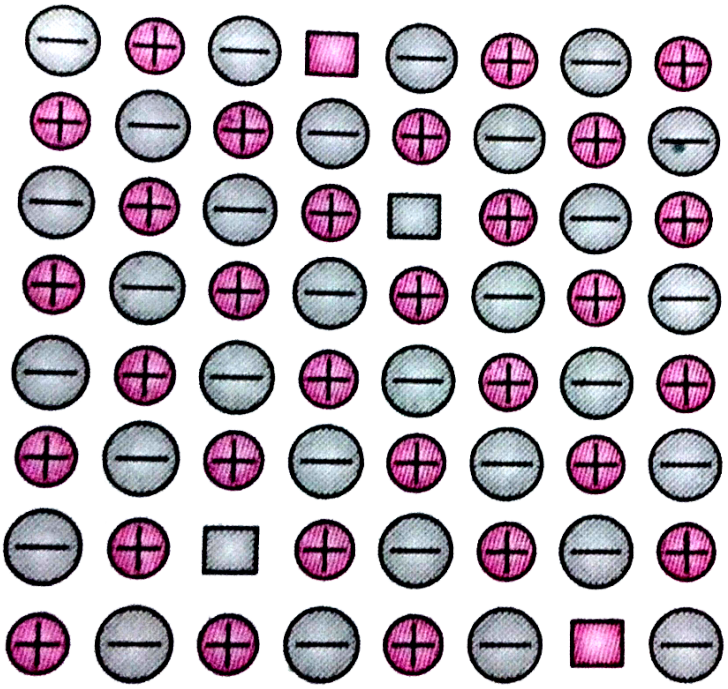
7. Which of the following defects is represented in the given figure ?



A. Impurity defect

B. Frenkel defect

C. Schottky defect

D. Metal excess defect

Answer: C

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8. What type of crystal defect is indicated in the diagram given below

:

$$\begin{array}{cccccc} Na^+ & Cl^- & Na^+ & Cl^- & Na^+ & Cl^- \\ Cl^- & \square & Cl^- & Na^+ & \square & Cl^- \\ Na^+ & Cl^- & \square & Cl^- & Na^+ & Cl^- \\ Cl^- & Na^+ & Cl^- & Na^+ & \square & N^+ \end{array}$$

A. Frenkel defect

B. Schottky defect

C. Interstitial defect

D. Cation excess defect

Answer: B

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9. The appearance of colour in solid alkali metal halides is generally due to

A. Schottky defect

B. Frenkel defect

C. Both Frenkel and Schottky defects

D. Cation excess defect

Answer: C

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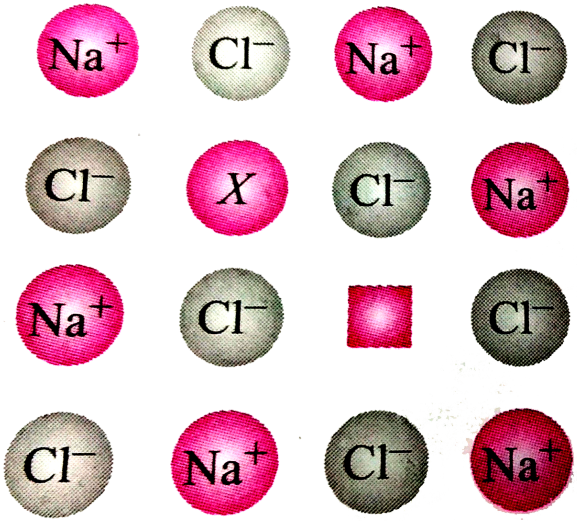
10. In the given crystal structure what should be the cation X which replaces Na^+ to create a cation vacancy ?



A. Sr^{2+}

B. K^+

C. Li^+

D. Br^-

Answer: A

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11. When electron are trapped into the crystal in anion cancy ,the defect is known as

A. F-centre

B. Frenkel defect

C. Schottky defect

D. Interstitial defect

Answer: A

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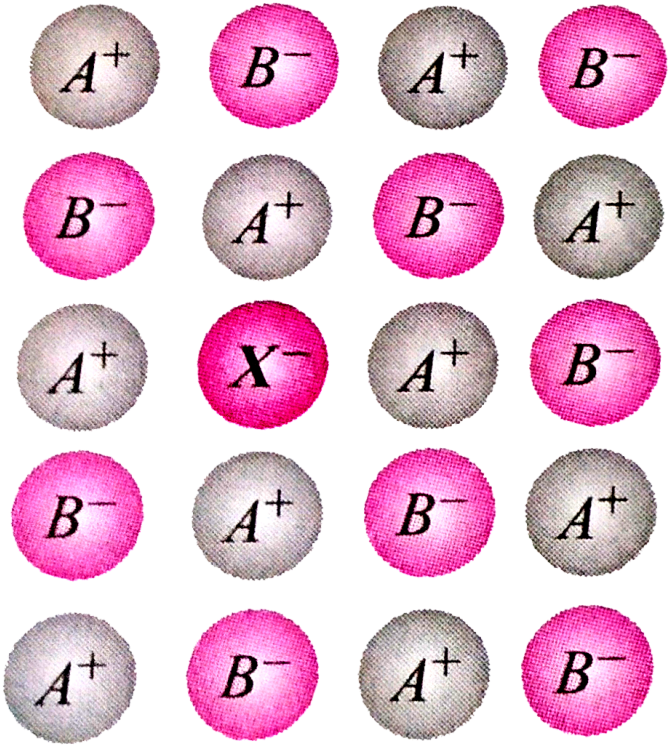
12. In the following figure , the blank X is known as ___ and why ?



A. Electron trap , because an electron is present here

B. Metal deficient centre , since negative charge is present here

C. F-centre , since it imparts colour to the crystal

D. F-centre, since it is responsible for positive charge on the crystal

Answer: C

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13. The anionic sites occupied by unpaired electrons are called F-centres or colour centres . They impart __(X)__ colour to the crystals of NaCl. Excess of lithium makes LiCl crystals __(Y)__and excess of potassium makes KCl crystals _(Z)___. (X),(Y) and (Z) are

A. yellow, green and pink respectively

B. pink , yellow and violet (or lilac) respectively

C. yellow, pink and violet (or lilac) respectively

D. red, yellow and pink respectively

Answer: C

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14. ZnO shows yellow colour on heating due to

A. Zn^{2+} ions and electrons move to interstitial sites and F-centres are called

B. oxygen and electrons move out of the crystal and ions become yellow

C. Zn^{2+} again combine with oxygen to give yellow oxide

D. Zn^{2+} are replaced by oxygen

Answer: A

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15. Which of the following set of compounds will show metal deficiency defect?

A. NaCl

B. FeO

C. KCl

D. ZnO

Answer: B

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16. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M, present as M^{2+} and M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be

A. $5.08\ \%$

B. $7.01\ \%$

C. $4.08\ \%$

D. $6.05\ \%$

Answer: B

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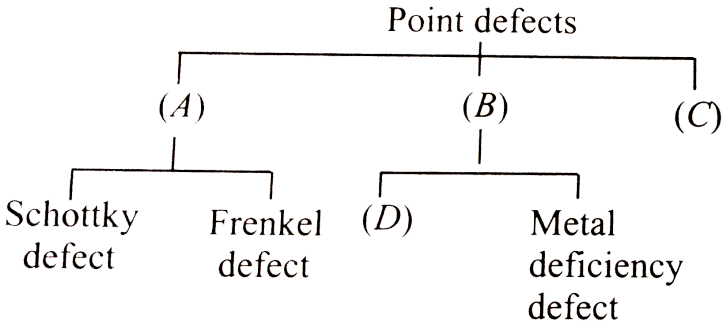
17. Identify A,B,C and D in the following flow chart :



A. A-Impurity defect , B-Stoichiometric defects , C-Non-stoichiometric defects , D-Anion excess defects

B. A-Stoichiometric defects ,B- Non-stoichiometric defects , C-Impurity defects , D-Metal excess defects

C. A- Non-stoichiometric defects , B-Stoichiometric defects , C-Impurity defects , D-Cation vacancy

D. A-Impurity defects , B-Stoichiometric defects , C-Metal excess defects , D-Non- stoichiometric defects

Answer: C

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18. Mark the incorrect pair from the following.

A. Schottky defect- Equal number of cations and anions are missing

B. Frenkel defect - Dislocation of cation from its normal site to an interstitial site

C. Impurity defect- $CdCl_2$ in AgCl crystal to create cationic vacancy

D. Metal excess defect - $Fe_{0.93}O$

Answer: D

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Electrical Properties

1. Which of the following shows correct range of conductivity ?

(i)Conductors : 10^4 to $10^7 ohm^{-1} m^{-1}$

(ii)insulators : 10^{-6} to $10^4 ohm^{-1} m^{-1}$

(iii)Semiconductors : 10^{-10} to $10^{-6} ohm^{-1} m^{-1}$

A. (i) and (ii)

B. (i) only

C. (ii) and (iii)

D. (i), (ii) and (iii)

Answer: B

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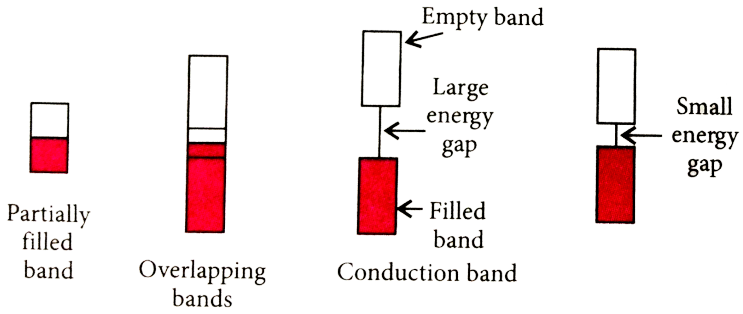
2. Three type of bands are shown in the figures given below showing the position of the valence band and conduction band. The figures A,B and C represent



A. A-Non-metal , B-Metal ,C-Semiconductor

B. A-Semiconductor , B-Insulator , C-Conductor

C. A-Metal , B-Insultor , C-Semiconductor

D. A-Insulator , B-Conductor , C-Semiconductor

Answer: C

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3. Pure silicon and germanimum are

A. conductors

B. semiconductors

C. insulators

D. piezoelectric crystals

Answer: C

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4. The conductivity of intrinsic semiconductors can be increased by adding a suitable impurity. This process is called __(P)__. This can be done with an impurity which is __(Q)_ rich or deficient as compared to the semiconductor. Such impurities introduce __(R)__ defects in

them. Electron rich impurities result in __(S)__ type semiconductors while electron deficit impurities result in __(T)___ type semiconductors .

A. P-doping , Q-proton , R-point , S- p , T-n

B. P-doping , Q-electron , R-non-stoichiometric , S- p , T-n

C. P-energy gap , Q- charged , R-impurity , S-n , T-p

D. P-doping , Q-electron , R-electronic , S-n , T-p

Answer: D

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5. To get a n- type semiconductor from silicon , it should be doped with the sustance

A. gallium

B. arsenic

C. aluminium

D. boron

Answer: B

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

a. Ge doped with In

b. B doped with Si

A. group 14 elements

B. group 15 elements

C. group 13 elements

D. group 18 elements

Answer: C

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7. In a P -type semiconductor, germanium is doped with

A. p-type semiconductor Ge Ge Ge Ge

B. (b) *n*-type semiconductor Ge Ge Ge Ge

C. No change in conductivity Ge Ge Ge Ge

D. It becomes superconductor Ge Ge Ge Ge

Answer: A

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8. Which of the following statements are true about semiconductors?

A. Impurity of lower group creates n-type semiconductors

B. Impurity of higher group creates p-type semiconductors

C. Extrinsic semiconductors are formed by doping impurity

D. Intrinsic semiconductors become conductors when temperature is raised

Answer: D

9. Match the column I with Column II and mark the appropriate choice .

Column I		Column II	
(A)	Fe in solid state	(i)	Electrolytic conductor
(B)	NaCl in molten state	(ii)	*p*-type semiconductor
(C)	CO_2 in solid state	(iii)	Electronic conductor
(D)	Si doped with aluminium	(iv)	Non-polar insulator

A. A-(iv),B-(ii),C-(i),D-(iii)

B. A-(ii),B-(iii),C-(i),D-(iv)

C. A-(iii),B-(i),C-(iv),D-(ii)

D. A-(i),B-(iv),C-(iii),D-(ii)

Answer: C

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Magnetic Properties

1. Paramagnetic substances are magnestised in a magnetic field in the same direction. Paramagnetism is due to the presence of

A. one or more unpaired electrons

B. all paired electrons

C. permanent spin and orbital motion

D. parallel and anti-parallel spins in equal number

Answer: A

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

A. diamagnetic

B. ferrimagnetic

C. paramagnetic

D. anti-ferromagnetic

Answer: C

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

A. MnO_2

B. TiO_2

C. NO_2

D. CrO_2

Answer: A

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4. Ferrimagnetism is in

A. oppositely oriented and cancel each other's magnetic moment

B. aligned in parallel and anti-parallel directions in unequal number

C. randomly oriented and their magnetic moments get cancelled

D. in same direction and get aligned in a magnetic field

Answer: B

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5. Match the column I with Column II and mark the appropriate choice .

Column I		Column II	
(A)	Ferromagnetic	(i)	↑↑↓↑↑↓↑↑
(B)	Ferrimagnetic	(ii)	↑↓↑↓↑↓↑↓
(C)	Antiferromagnetic	(iii)	↑↑↑↑↑↑↑↑
(D)	Diamagnetic	(iv)	⇅⇅⇅⇅⇅
(E)	Paramagnetic	(v)	↖ ↙ → ↑ ↘ ↗

A. A-(iii),B-(i),C-(ii),D-(iv),E-(v)

B. A-(i),B-(ii),C-(iii),D-(iv),E-(v)

C. A-(iv),B-(i),C-(iii),D-(ii),E-(v)

D. A-(v),B-(iv),C-(iii),D-(ii),E-(i)

Answer: A

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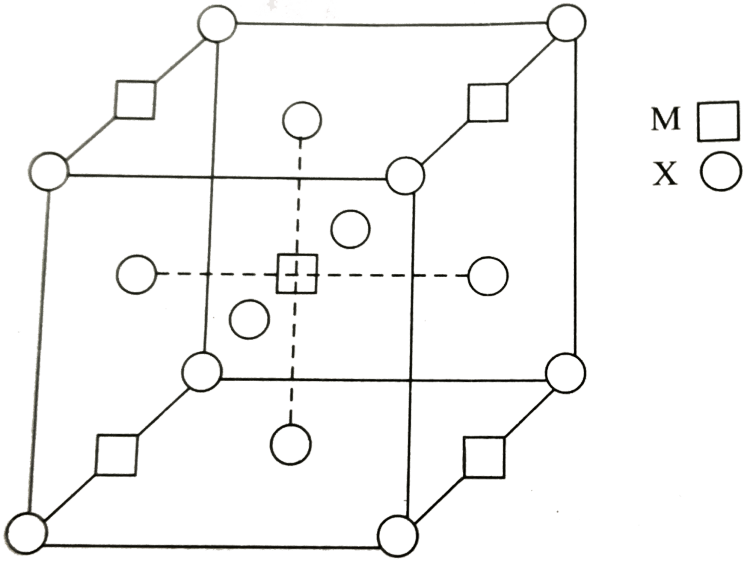
Higher Order Thinking Skills

1. A compound M_pX_q has cubic close packing (p) arrangement of X. Its unit cell structure is shown below. The empirical formula of the compound is



a. MX **b.** MX_2 **c.** M_2X

A. MX

B. MX_2

C. M_2X

D. M_5X_{14}

Answer: B

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2. In a close packed structure of mixed oxides , the lattice is composed of oxide ions , one eighth of tetrahedral voids are occupied by divalent cations while one half of octahedral voids are occupied by trivalent cations . What is the formula of the oxide ?

A. A_2BO_4

B. AB_2O_3

C. A_2BO_3

D. AB_2O_4

Answer: D

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3. The density and edge length values for a crystalline element with fcc lattice are $10gcm^{-3}$ and 400 pm respectively. The number of unit cells in 32 g of this crystal is

A. 8×10^{23}

B. 5×10^{22}

C. 8×10^{22}

D. 5×10^{23}

Answer: B

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4. For two isomorphous crystals A and B , the ratio of density of A to that of B is 1.6 while the ratio of the edge length of B to that of A is 2. If the molar mass of crystal B is 200 g mol^{-1}, then that of crystal A is

A. $240\ \text{g mol}^{-1}$

B. $120\ \text{g mol}^{-1}$

C. $80\ \text{g mol}^{-1}$

D. $40\ \text{g mol}^{-1}$

Answer: D

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5. A metal crystallizes into two cubic phases, face-centred cubic and body-centred cubic, which have unit cell lengths 3.5 and $3.0A$, respectively. Calculate the ration of densities of fcc and bcc.

A. $1.259:1$

B. $1:1.259$

C. $3:2$

D. $1.142:1$

Answer: A

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6. The density of mercury is $13.6 gmL^{-1}$. Calculate the approximate diameter of an atom of mercury assuming that each atom is occupying a cube of edge length equal to the diameter of the mercury atom.

A. 3.01 Å

B. 2.54 Å

C. 0.29 Å

D. 2.91 Å

Answer: D

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7. An element crystallizes into a structure which may be describes by a cubic type of unit cell having one atom on each corner of the cube and two atoms on one of its diagonals. If the volume of this unit cell is $24 \times 10^{-24} cm^3$ and density of element is $7.2 g cm^{-3}$. Calculate the number of atoms present in $200 g$ of element.

A. 3.5×10^{24}

B. 5.7×10^{23}

C. 6.3×10^{20}

D. 1×10^{10}

Answer: A

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8. A sample of ferrous oxide has actual formula $Fe_{0.93}O_{1..00}$. In this sample what fraction of metal ions are Fe^{2+} ions? What type of

non-stoichiometric defect is present in this sample ?

A. (i)-0.849 , (ii)-Metal deficiency

B. (i)-0.790 , (ii)-Metal deficiency

C. (i)-0.145, (ii)-Metal excess

D. (i)-0.93 , (ii)-Vacancy defect

Answer: A

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Ncert Exemplar

1. which of the following favours the existenence of a substance in the solid state ?

A. high temperature

B. Low temperature

C. High thermal energy

D. Weak cohesive forces

Answer: B

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2. which of the following is not a characteristic of a crystalline solid ?

A. Definite and characteristic heat of fusion

B. Isotropic nature

C. A regular periodically repeated pattern of arrangement of constituent particles in the entire crystal

D. A true solid

Answer: B

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3. Which of the following is an amorphous solid

A. Graphite (C)

B. Quartz glass (SiO_2)

C. Chrome alum

D. Silicon carbide (SiC)

Answer: B

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4. Which of the following arrangements shows schematic alignment of magnetic moments of antiferromagnetic substances?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: D

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5. which of the following is true about the value of refractive index of quartz glass ?

A. Same in all directions

B. Different in different directions

C. Cannot be measured

D. Always zero

Answer: A

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6. Which of the following statement is not true about amorphous solids?

A. On heating they may become crystalline at certain temperature

B. They may become crystalline on keeping for long time

C. Amorphous solids can be moulded by heating

D. They are anisotropic in nature

Answer: D

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7. The sharp melting point of crystalline solids compared to amorphous solids is due to

A. a regular arrangement of constituent particles observed over a short distance in the crystal lattice

B. a regular arrangment of constituent particles observed over a long distance in the crystal lattice

C. same arrangement of constituent particles in different directions

D. different arrangement of constituent particles in different directions

Answer: B

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8. Iodine molecules are held in the crystal lattice by:

A. London forces

B. dipole -dipole interactions

C. covalent bonds

D. coulombic forces

Answer: A

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9. which of the following is a network solid?

A. $SO_{2\,(\,Solid\,)}$

B. I_2

C. Diamond

D. $H_2O_{\,(\,Ice\,)}$

Answer: C

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10. which of the following solids is not an electrical conductor ?

(a) Mg(s) (b) TiO(s) (c) $I_2(s)$ (d) $H_2O(s)$

A. (I) only

B. (II) only

C. (III) and (IV)

D. (II),(III) and (IV)

Answer: C

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11. which of the following is not the characteristic of ionic solids?

A. Very low value of electrical conductivity in the molten state

B. Brittle nature

C. Very strong forces of interactions

D. Anisotropic nature

Answer: A

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12. Graphite is a good conductor of electricity due to the presence of :

A. lone pair of electrons

B. free valence electrons

C. cations

D. anions

Answer: B

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13. which of the following oxides behaves as conductor or insulator depending upon temperature ?

A. TiO

B. SiO_2

C. TiO_3

D. MgO

Answer: C

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14. Which of the following oxides shows electrical properties like metals ?

A. SiO_2

B. MgO

C. $SP_{2(s)}$

D. CrO_2

Answer: D

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15. The lattice site in a pure crystal cannot be occupied by :

A. molecule

B. ion

C. electron

D. atom

Answer: C

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16. Graphite cannot be classified as :

A. conducting solid

B. network solid

C. covalent solids

D. ionic solid

Answer: D

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17. Cations are present in the interstitial sites in ..... .

A. Frenkel defect

B. Schottky defect

C. Vacancy defect

D. metal deficiency defect

Answer: A

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18. Schottky defect is observed in crystals when ..... .

A. some cations move from their lattice site to interstitial sites

B. equal number of cations and anions are missing from the lattice

C. some lattice sites are occupied by electrons

D. some impurity is present in the lattice

Answer: B

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19. which of the following is true about the charge acquired by p-type semiconductors ?

A. positive

B. neutral

C. negative

D. depends on concentration of p impurity

Answer: B

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20. To get a n- type semiconductor from silicon , it should be doped with a substance with valency

A. 2

B. 1

C. 3

D. 5

Answer: D

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21. The total of tetrahedral voids in the face centred unit cell is .....

.

A. 6

B. 8

C. 10

D. 12

Answer: B

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22. 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. (II) and (IV)

C. (I) and (III)

D. (II) and (IV)

Answer: A

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23. In which pair most efficient packing is present?

A. hcp and bcc

B. hcp and ccp

C. bcc and ccp

D. bcc and simple cubic cell

Answer: B

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

A. 74

B. 68

C. 32

D. 26

Answer: C

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25. which of the following statemets is not true about the hexagonal close packing ?

A. The coordination number is 12

B. It has 74% packing efficiency .

C. Tetrahedral voids of the second layer are covered by the spheres of the third layer

D. In this arrangement spheres of the fourth layer are exactly aligned with those of the first layer .

Answer: D

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26. in which of the following structures coordination number for cations and anions in the packed structure will be same ?

A. Cl^- ions form fcc lattice and Na^+ ions occupy all octahedral voids of the unit cell.

B. Ca^{2+} ions form fcc lattice and F^- ions occupy all the eight tetrahedral voids of the unit cell

C. O^{2-} ions form fcc lattice and Na^+ ions occupy all the eight tetrahedral voids of the unit cell

D. S^{2-} ions form fcc lattice and Zn^{2+} ions go into alternate tetrahedral voids of the unit cell

Answer: A

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27. What is the coordination number in a square close packed structures in two dimensions?

A. 2

B. 3

C. 4

D. 6

Answer: C

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28. which kind of defects are introduced by doping ?

A. Dislocation defects

B. Schottky defect

C. Frenkel defects

D. Electronic defects

Answer: D

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29. silicon doped with electron rich impurity forms ..... .

A. p-type semiconductor

B. n-type semiconductor

C. intrinsic semiconductor

D. insulator

Answer: B

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30. Which of the following statements is not true ?

A. Paramagnetic substances are weakly attracted by magnetic field

B. Ferromagnetic substances cannot be magnetised permanently

C. The domains in antiferromagnetic substances are oppositely oriented with respect to each other

D. Pairing of electrons cancels their magnetic moment in the diamagnetic substances .

Answer: B

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31. which of the following is not true about the ionic solids ?

A. Bigger ions form the close packed structure

B. Smaller ions occupy either the tetrahedral or the octahedral voids depending upon their size

C. Occupation of all the voids is not necessary

D. The fraction of octahedral or tetrahedral voids occupied depends upon the radii of the ions occupying the voids .

Answer: D

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32. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because:

A. all the domains get oriented in the direction of magnetic field

B. all the domains get oriented in the direction opposite to the direction of magnetic field

C. domains get oriented randomly

D. domains are not affected by magnetic field

Answer: A

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33. the correct order of the packing effeciency in different types of unit cells is ..... .

A. fcc lt bcc lt simple cubic

B. fcc gt bcc gt simple cubic

C. fcc lt bcc gt simple cubic

D. bcc lt fcc gt simple cubic

Answer: B

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34. which of the follwing defects is also known as dislocation defect ?

A. Frenkel defect

B. Schottky defect

C. Non-stoichiometric defect

D. Simple interstitial defect

Answer: A

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35. In the cubic close close packing, the unit cell has....

A. 4 tetrahedral voids each of which is shared by four adjacent unit cells .

B. 4 tetrahedral voids within the unit cell

C. 8 tetrahedral voids each of which is shared by four adjacent unit cells

D. 8 tetrahedral voids within the unit cells .

Answer: D

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36. the edge length of the unit cells in terms of the radius of sphere constituting fcc ,bcc and simple cubic unit cells are respectively Ã¢â, Â¦Ã¢â, Â¦Ã¢â, Â¦. .

A. $2\sqrt{2}r, \frac{4r}{\sqrt{3}}, 2r$

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

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

D. $2r, \frac{4r}{\sqrt{3}}, 2\sqrt{2}r$

Answer: A

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37. which of the following represents correct order of conductivity in solids ?

A. $K_{\text{metals}} > > K_{\text{insulators}} < K_{\text{semiconductors}}$

B. $K_{\text{metals}} < < K_{\text{insulators}} < K_{\text{semiconductors}}$

C. $K_{\text{metals}}, K_{\text{semiconductors}} > K_{\text{insulators}} = \text{zero}$

D. $K_{\text{metals}} < K_{\text{semiconductors}} > K_{\text{insulators}} \neq \text{zero}$

Answer: A

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Assertion And Reason

1. Assertion:At low temperature , particles of matter occupy fixed positions and exist in solid state.

Reason : Under a given set of conditions of temperature and pressure , the state of a substance depends upon the net effect of thermal energy and intermolecular forces.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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2. Assertion: Quartz glass is crystalline solid and quartz is an amorphous solid

Reason: Quartz glass has long range order

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: D

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3. Assertion: Glass panes fixed to windows or doors of old buildings are slightly thicker at the bottom than at the top .

Reason: Glass is a pseudo solid or supercooled liquid

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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4. Crystalline solids have

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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5. Assertion:SiC has higher melting point than NaCl.

Reason: SiC has stronger electrostatic forces of attraction.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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6. Assertion:Face centred cubic cell has 4 atoms per unit cell.

Reason:In fcc unit cell , there are 8 atoms at the corners and 6 atoms at face centres .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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7. Assertion:A tetrahedral void is surrounded by four spheres and an octahedral void is surrounded by six spheres.

Reason:The number of tetrahedral voids is double the number of close packed spheres and number of octahedral voids is equal to number of close packed spheres.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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8. Assertion : $CsCI$ has body - centred cunic arrangement

Reason: $CsCI$ has one and $8CI^-$ ion is its unit cell

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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9. Assertion:Packing efficiency of body centred cubic structure is 68%

Reason:68% is the maximum packing efficiency any crystal can have

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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10. Assertion:Frenkel defect is also called dislocation defect

Reason:Frenkel defect is shown by ionic substances in which cation

and anion are of almost similar sizes.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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11. Assertion :-(A) semiconductors are solids with conductivites in the intermediate range from$10^{-6} - 10^{4} ohm^{-1} m^{-1}$

Reason :-(R) internmediate conductivity in semiconductor Is due to partially filled valence band .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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12. Metals are good conductor of electricity because they contain

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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13. Assertion:Diode is a combination of n-type and p-type semiconductors.

Reason: The solar cell is an efficient photo-diode used for conversion of light energy into electrical energy .

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: B

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14. Assertion:Iron, cobalt, nickel and CrO_2 are called ferromagnetic substances .

Reason:Ferromagnetic substances are weakly attracted by magnetic field

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: C

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15. Assertion:Substances like Fe_3O_4 and $MgFe_2O_4$ lose ferrimagnetism on heating and become paramagnetic

Reason : Magnetic moments of the domains in these substances are aligned in parallel and antiparallel directions in unequal numbers.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false

D. If both assertion and reason are false

Answer: A

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