CHEMISTRY

BOOKS - KALYANI CHEMISTRY (ENGLISH)

THE SOLID STATE

Multiple Choice Questions

1. In a crystal, the atoms are located at the position of:

A. Maximum potential energy

B. Minimum potential energy

C. Zero Potential energy

D. Infinite potential energy

Answer: B

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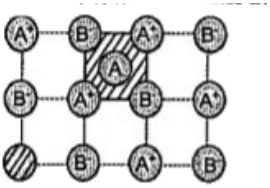
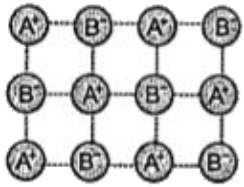
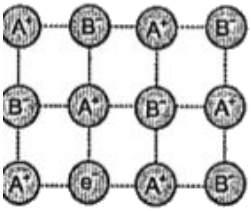
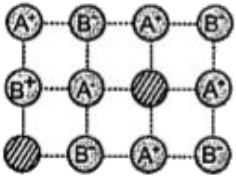
2. The crystal showing Frenkel defect is:

A. 

B. 

C. 

D. 

Answer: A

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3. In a face centered cubic lattice, atom (A) occupies the corner positions and atom (B) occupies the face centre positions. If one atom of (B) is missing from one of the face centered points, the formula of the compound is :

A. A_2B_5

B. A_2B_3

C. AB_2

D. A_2B

Answer: A

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4. Copper has the face centred cubic structure. The coordination number of each ion is:

A. 4

B. 12

C. 14

D. 8

Answer: B

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5. Schottky defect in crystal is observed when :

A. An ion leaves its normal site and occupies the interstitial site.

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

C. Unequal number of cations and anions are missing from the lattice.

D. Density of the crystal is increased.

Answer: B

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6. Crystalline solids are anisotropic in nature. What is the meaning of anisotropic in the given statement?

A. A regular pattern of arrangement of particles which repeats itself periodically over the entire crystal.

B. Different values of some of physical properties are shown when measured along different directions in the same crystals.

C. An irregular arrangement of particles over the entire crystal.

D. Same values of some of physical properties are shown when measured along different directions in the same crystals.

Answer: B

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7. Piezoelectric crystals are used in

A. Radio

B. T.V.

C. Record player

D. Refrigerator

Answer: C

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8. Cubic close packing arrangement is also known as :

A. Hexagonal close packing

B. Face centered cubic

C. Body centered cubic

D. None of these

Answer: B

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

A. NaCl

B. KF

C. TiO_2

D. CuO

Answer: D

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10. Crystals show colour due to the presence of:

A. F-centres

B. Y-centres

C. Defects

D. None of these

Answer: A

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11. Which one of the following is non-crystalline or amorphous?

A. Diamond

B. Graphite

C. Glass

D. Common Salt

Answer: C

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12. In NaCl structure, Na^+ ions occupies:

A. All octahedral and tetrahedral sites are occupied

B. Only octahedral sites are occupied

C. Only tetrahedral sites are occupied

D. Neither octahedral nor tetrahedral sites are occupied

Answer: B

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13. Edge length of unit cell of chromium metal is 287 pm with bcc arrangement. The atomic radius is of the

order:

A. 287 pm

B. 574 pm

C. 124.27 pm

D. 143.5 pm

Answer: C

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14. The density of a metal which crystallises in bcc lattice with unit cell edge length 300 pm and molar mass $50 g \mathrm{mol}^{-1}$ will be:

A. $10gcm^{-3}$

B. $14.2gcm^{-3}$

C. $6.15gcm^{-3}$

D. $9.32gcm^{-3}$

Answer: C

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15. What is the effect of Frenkel defect on the density of 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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16. To get n-type of semiconductor, germanium should be doped with:

A. Gallium

B. Arsenic

C. Aluminium

D. Boron

Answer: B

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17. p-type semi-conductors are formed when Si or Ge are doped with:

A. Group 14 elements

B. Group 15 elements

C. Group 13 elements

D. Group 18 elements

Answer: C

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18. 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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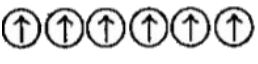
19. Which of the following arrangements shows schematic alignment of magnetic moments of anti-ferromagnetic substances?

A. 

B. 

C. 

D. 

Answer: D

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20. The relationship between atomic radius (r) and the edge length 'a' of a body centred cubic unit cell is:

A. $r = \frac{a}{2}$

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

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

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

Answer: C

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21. Na and Mg crystallise in bcc and foc structures respectively. The value of Z (number of atoms) for their crystals is:

A. 8 and 14

B. 2 and 4

C. 14 and 8

D. 6 and 4

Answer: B

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22. Which type of defect has the presence of cations in the interstitial sites?

A. Schottky defect

B. Vacancy defect

C. Frenkel defect

D. Metal deficiency defect

Answer: C

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23. The vacant space in body centred cubic lattice unit cell is:

A. 0.32

B. 0.26

C. 0.48

D. 0.68

Answer: A

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Multiple Choice Questions Formula Based Questions

1. A compound formed by elements A and B has a cubic structure in which A atoms are at the corners of cube and B atoms are at the face centres. The formula of the compound will be:

A. A_2B_4

B. AB_3

C. AB_5

D. A_2B_6

Answer: B

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2. A solid is made up of two elements X and Y. Atoms of Y are in cop arrangement while atoms of X occupy all the tetrahedral sites. The formula of the compound will be:

A. X_2Y_4

B. XY_3

C. X_3Y

D. X_2Y

Answer: D

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3. An ionic compound is made up of A cations and B anions. If A cations are present at the alternate corners and B anion is present at the diagonal, the formula of the ionic compound will be:

A. A_2B_4

B. AB_3

C. AB_2

D. A_2B

Answer: C

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4. An alloy of gold (Au) and cadmium (Cd) crystallises with a cubic structure in which gold atoms occupy the corners and cadmium atoms fit into the face centres. What is the formula of this alloy?

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5. A solid with cubic crystal is made of two elements P and Q. Atoms of Q are at the corners of the cube and P at the body-centre. The formula of the compound will be:

A. PQ_4

B. PQ

C. PQ_2

D. PQ_3

Answer: B

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Multiple Choice Questions Fill In The Blanks

1. Glass is an example of.....solid. The coordination number of atoms in a body-centred cubic structure is .....

A. Amorphous, 8

B. Crystalline, 4

C. Stoichiometric, 8

D. Amorphous, 4

Answer: A

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2. Of the three cubic lattices the one that has the largest amount of empty space is the .....Crystals of ..... and ..... have face centered cubic lattices

A. Body centered cubic, CsCl, NaCl,

B. Closed cubic, KCI, NaCl

C. Simple cubic, CSCI, NaCl

D. Face centered cubic, KBr, NaCl

Answer: C

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3. In rock-salt structure ..... percent of the octahedral voids are occupied by cations. In bcc arrangement of atoms ..... percent of the available space is occupied by atoms.

A. 68, 72

B. 100,68

C. 100,78

D. 100,89

Answer: B

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4. An atom at the corner of a unit cell makes..... contribution to a particular unit cell. If the radius ratio r^+/r^- is 0-325, the cation would most probably be present in a/an ..... void.

A. 1/4, Octahedral

B. 2/8, Square Planar

C. 1/6, Tetrahedral

D. 1/8, Tetrahedral

Answer: D

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5. When the anionic sites of a crystal are occupied by unpaired electrons, the ionic sites are called..... In diamond inter-particle forces are .....

A. F-centres, covalent bonds

B. F-centres, ionic bonds

C. Cationic, ionic bonds

D. Anionic, covalent bonds

Answer: A

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6. ..... is obtained when silicon is doped with boron..... is produced when AgCl is doped with $CdCl_2$.

A. n-type semiconductor, frenkel defect

B. p-type semiconductor, schottky defect

C. p-type semiconductor, impurity defect

D. n-type semiconductor, schottky defect

Answer: C

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7. ..... observed in ionic crystals which large difference in the size of ions. The substances that are strongly attracted by a magnetic field are called .....

A. Frenkel defect, ferromagnetic substances

B. Impurity defect, anti-ferromagnetic substances

C. Frenkel defect, paramagnetic substances

D. Schottky defect, paramagnetic substances

Answer: A

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8. The ability of certain materials to generate an electrical potential when they are heated or cooled is called as ..... The materials or substances which resist or don't allow the current to flow through them are called as.....

A. Piezolectricity, conductors

B. Pyroelectricity, conductors

C. Piezolectricity, semi-conductors

D. Pyroelectricity, insulators

Answer: D

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9. A form of magnetism in which the magnetic moments of neighbouring atoms are arranged anti-parallel is called as ..... In anti-fluoride structure, cations are present in..... voids

A. Dimagnetism, octahedral

B. Anti-ferromagnetism, tetrahedral

C. Paramagnetism, octahedral

D. Paramagnetism, tetrahedral

Answer: B

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10. In cop arrangement of atoms ..... percent of the available space remains vacant. In hcp arrangement of spheres, the coordination number is .....

A. 26,8

B. 26, 12

C. 26,10

D. 36,8

Answer: C

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Multiple Choice Questions Match The Following

1. Match the items of column A to those given in column B.

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(##OSW_GRU_MCQ_ISC_XII_SM1_CHE_C01_E01_039_Q01.png" width="80%">

A. 1-(q), 2-(p), 3-(t), 4-(r), 5-(s), 6-(v), 7-(u)

B. 1-(p), 2-(q), 3-(s), 4-(r), 5-(t), 6-(u), 7-(v)

C. 1-(v), 2-(s), 3-(u), 4-(p), 5-(r), 6-(q), 7-(t)

D. 1-(r), 2-(u), 3-(t), 4-(q), 5-(v), 6-(s), 7-(p)

Answer: A

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Multiple Choice Questions Numerical Based Questions

1. A compound AB has a simple cubic structure and has molecular mass 99. Its density is $3.4 g cm^{-3}$ What will be the edge of the unit cell ?

A. $3.6 \times 10^{-8} cm$

B. $4.2 \times 10^{-6} cm$

C. $3.8 \times 10^{-8} cm$

D. $4.6 \times 10^{-6} cm$

Answer: A

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2. An element has atomic weight 93 g mol^{-1} and density 11.5 g cm^{-3} . It the edge length of its unit cell is 300 pm, identify the type of unit cell.

A. 4

B. 1

C. 2

D. 5

Answer: C

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3. An element with density 2.8 g cm^{-3} forms a fee unit cell with edge length 4×10^{-8} cm. Calculate the molar mass of the element.

A. $42 g mol^{-1}$

B. $27 g mol^{-1}$

C. $36 g mol^{-1}$

D. $28 g mol^{-1}$

Answer: C

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4. An element occurs in bcc structure. It has a cell edge length of 250 pm. Calculate the molar mass if its density is 8.0 g cm^{-3} . Also calculate the radius of an atom of this element.

A. 109.25pm

B. 108. 27 pm

C. 208.24pm

D. 108.25 pm

Answer: D

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5. A bcc element (atomic mass 65) has a cell edge of 420 pm. Calculate its density in g/cm^3

A. $2.25 gcm^{-3}$

B. $2.97 gcm^{-3}$

C. $2.84 gcm^{-3}$

D. $2.91 gcm^{-3}$

Answer: D

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6. Aluminium crystallises in a cubic close-packed structure. Radius of the atom in the metal is 125 pm.

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

A. 354 pm, 2.254 x 10^{22} unit cells

B. 254 pm, 3.254 x 10^{22} unit cells

C. 454 pm, 4.254 x 10^{22} unit cells

D. 654 pm, 5.254 x 10^{22} unit cells

Answer: A

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7. Aluminium crystallises in a cubic close-packed structure. Radius of the atom in the metal is 125 pm. How many unit cells are there in 1 cm of aluminium?

A. 354 pm, 2.254 x 10^{22} unit cells

B. 254 pm, 3.254 x 10^{22} unit cells

C. 454 pm, 4.254 x 10^{22} unit cells

D. 654 pm, 5.254 x 10^{22} unit cells

Answer: B

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8. An element A crystallizes in foc structure, 208 g of it has 4.2832×10^{24} atoms. Calculate the edge length of the unit cell if density of A is $7.2 gcm^{-3}$

A. $2 \times 10^{-8} cm$

B. $4.3 \times 10^{-8} cm$

C. $5.2 \times 10^{-8} cm$

D. $3 \times 10^{-8} cm$

Answer: D

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9. Calculate the efficiency of packing in case of metal crystal for simple cubic (with the assumption that atoms are touching each other.

A. 0.524

B. 0.624

C. 0.544

D. 0.724

Answer: A

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10. An element crystallizes in a structure having fee unit cell of an edge 200 pm. Calculate the density if 200 g of this element contains 24×10^{23} atoms.

A. $42.66 g / cm^3$

B. $41.66 g / cm^3$

C. $43.66 g / cm^3$

D. $44.66 g / cm^3$

Answer: B

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11. Calculate the packing efficiency of bcc structure.

A. 0.88

B. 0.78

C. 0.68

D. 0.58

Answer: C

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12. Gold has cubic crystal whose unit cell has an edge length of 407.9 pm. Density of gold is 19.3 g cm^{-3} . Atomic weight of gold is 197 g mol^{-1}.

The number of atoms (Z) in a unit cell of gold is :

A. 1

B. 2

C. 3

D. 4

Answer: D

View Text Solution

13. Gold has cubic crystal whose unit cell has an edge length of 407.9 pm. Density of gold is 19.3 g cm^{-3} . Atomic weight of gold is 197 g mol^{-1}.

The type of crystal structure of gold is :

A. Simple cubic unit cell

B. Body centred cubic unit cell

C. Face centred cubic unit cell

D. Side centred cubic unit cell

Answer: C

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14. A metal has face centred cubic lattice. The edge length of the unit cell is 404 pm. The density of the metal is $2.72 g / cm^3$

The molar mass of the metal is :

A. $20 g mol^{-1}$

B. $27 g mol^{-1}$

C. $30 g mol^{-1}$

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

Answer: B

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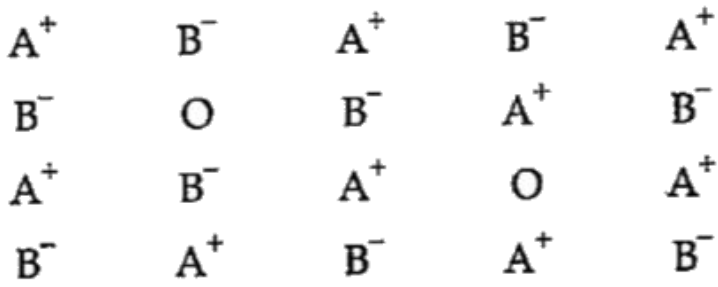
Multiple Choice Questions Structure Based Questions

1. Examine the given defected crystal



Answer the following questions:

What type of stoichiometric defect is shown in the crystal ?

A. Schottky defect, decreases, NaCl and KCl etc

B. Frenkel defect, increases, As and Si etc

C. Schottky defect, increases, As and Bi etc

D. Frenkel defect, decreases, NaCl, KCl etc

Answer: A

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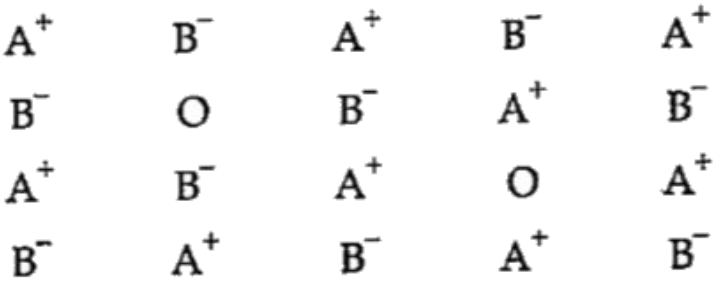
2. Examine the given defected crystal



Answer the following questions:

How is the density of crystal affected by this defect?

A. Schottky defect, decreases, NaCl and KCl etc

B. Frenkel defect, increases, As and Si etc

C. Schottky defect, increases, As and Bi etc

D. Frenkel defect, decreases, NaCl, KCl etc

Answer: A

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3. Examine the given defected crystal

A^+	B^-	A^+	B^-	A^+
B^-	O	B^-	A^+	B^-
A^+	B^-	A^+	O	A^+
B^-	A^+	B^-	A^+	B^-

Answer the following questions:

What type of ionic substance show such defect?

A. Schottky defect, decreases, NaCl and KCl etc

B. Frenkel defect, increases, As and Si etc

C. Schottky defect, increases, As and Bi etc

D. Frenkel defect, decreases, NaCl, KCl etc

Answer: A

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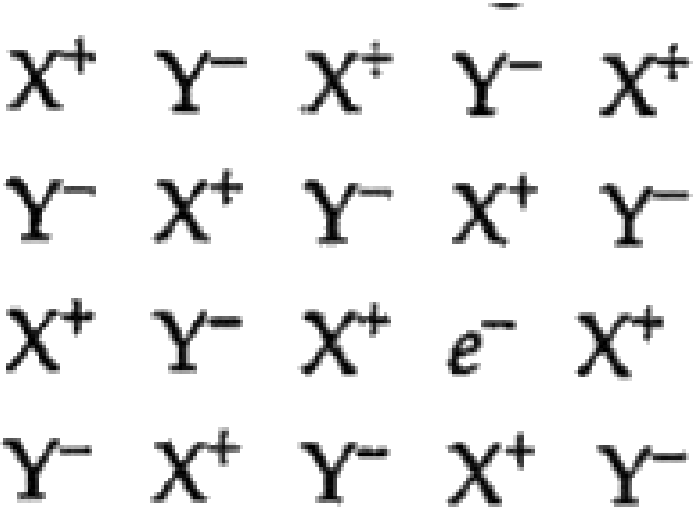
4. Examine the given defective crystal :



Answer the following questions:

Is the above defect stoichiometric or non stoichiometric?

A. Stoichiometric, F-centre, KBr

B. Non-stoichiometric, holes, NaCl

C. Non-stoichiometric, F-centre, LiCl

D. Stoichiometric, holes, KCI

Answer: C

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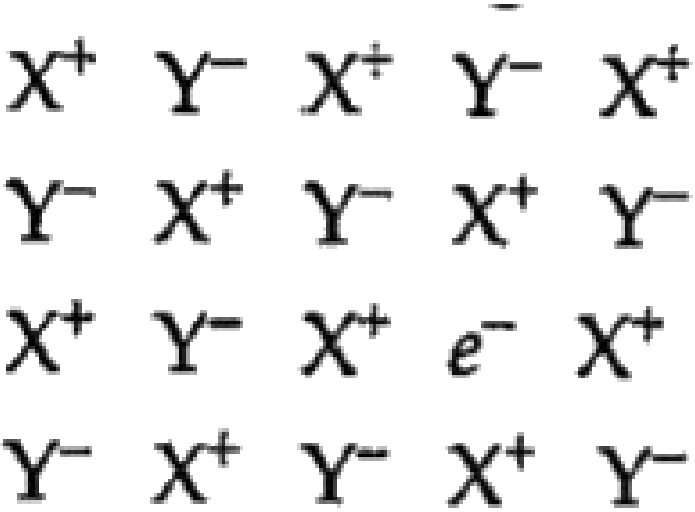
5. Examine the given defective crystal :



Answer the following questions:

Write the term used for the electron occupied site.s

A. Stoichiometric, F-centre, KBr

B. Non-stoichiometric, holes, NaCl

C. Non-stoichiometric, F-centre, LiCl

D. Stoichiometric, holes, KCI

Answer: C

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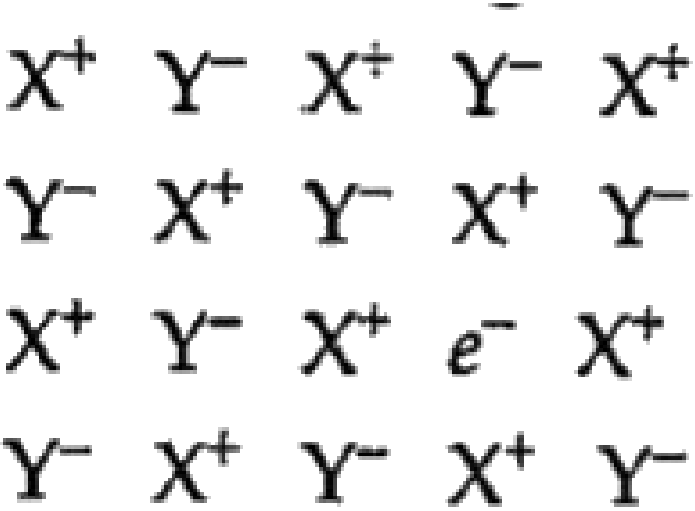
6. Examine the given defective crystal :



Answer the following questions:

Give an example of the compound which shows this type of defect.

A. Stoichiometric, F-centre, KBr

B. Non-stoichiometric, holes, NaCl

C. Non-stoichiometric, F-centre, LiCl

D. Stoichiometric, holes, KCI

Answer: C

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Multiple Choice Questions Assertion Reason Based Questions

1. 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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2. Assertion: Graphite is a good conductor of electricity however diamond belongs to the category of insulators.

Reason: Graphite is soft in nature on the other hand diamond is very hard and brittle.

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

View Text Solution

3. Assertion: In crystalline solids, the value of resistance is different in different directions.

Reason: Crystalline solids are isotropic in nature.

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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4. Assertion: Glass panes fixed to windows or panes of old buildings are found to be slightly thicker at the bottom.

Reason: Amorphous solids have a tendency to flow.

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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5. Assertion: Face-centred cubic cell has four atoms per unit cell.

Reason: In fcc unit, there are eight atoms at the corner and six atoms at face centers.

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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6. Assertion: CsCl has body centred cubic arrangement.

Reason: CsCl has one $\mathrm{C}\, s^{+}$ ion and eight Cl^{-} ions in 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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7. Assertion: In crystal lattice, the size of the tetrahedral hole is large than an octahedral hole.

Reason: The cations occupy more space than anions in crystal packing.

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

View Text Solution

8. Assertion: On heating ferromagnetic or ferrimagnetic substances, they become paramagnetic.

Reason: The electrons change their spin on heating.

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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9. Assertion: The total number of atoms present in a simple cubic unit cell is one.

Reason: Simple cubic unit cell has atoms at its corners, each of which is shared between eight adjacent unit cells.

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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10. Assertion: The packing efficiency is maximum for the fcc structure.

Reason: The coordination number is 12 in fcc structures.

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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