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PRE-MEDICAL

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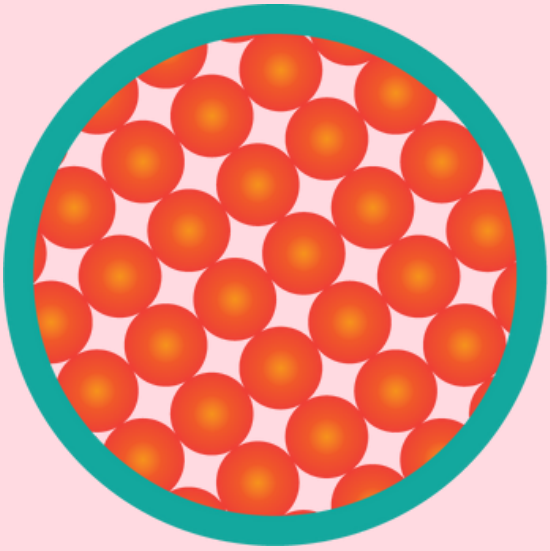


EXERCISE

Solid State

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) — Build Up Your Understanding

INTRODUCTION

1. $a \neq b \neq c$, $\alpha = \gamma = 90°$ $\beta \neq 90°$ represents :
(1) tetragonal system
(2) orthorhombic system
(3) monoclinic system
(4) triclinic system

SS0001

2. The most unsymmetrical crystal system is :
(1) Cubic (2) Hexagonal
(3) Triclinic (4) Orthorhombic

SS0002

3. Bravais lattices are of :
(1) 10 types (2) 8 types
(3) 7 types (4) 14 types

SS0003

4. The crystal system of a compound with unit cell dimensions a = 0.387, b = 0.387 and c=0.504 nm and $\alpha=\beta$ =90° and γ=120° is :
(1) Cubic
(2) Hexagonal
(3) Orthorhombic
(4) Rhombohedral

SS0004

ANALYSIS OF CUBIC CRYSTAL

5. In a simple cubic cell, each atom on a corner is shared by :
(1) 2 unit cells (2) 1 unit cell
(3) 8 unit cells (4) 4 unit cells

SS0005

6. In a face centred cubic cell, an atom at the face contributes to the unit cell :
(1) 1 part (2) 1/2 part
(3) 1/4 part (4) 1/8 part

SS0006

7. In a body centred cubic cell, an atom at the body centre is shared by :
(1) 1 unit cell (2) 2 unit cell
(3) 3 unit cells (4) 4 unit cells

SS0007

8. Which of the following type of cubic lattice has maximum number of atoms per unit cell ?
(1) Simple cubic
(2) Body centred cubic
(3) Face centred cubic
(4) All have same

SS0008

9. The number of atoms present in a unit cell of a monoatomic element of a simple cubic lattice, body-centred cubic and face centred cubic respectively are
(1) 8, 9 and 14 (2) 1, 2 and 4
(3) 4, 5 and 6 (4) 2, 3 and 5

SS0009

10. Which one of the following is a primitive unit cell?
(1) Simple cubic (2) BCC
(3) FCC (4) BCC and FCC both

SS0010

11. In a body centred cubic unit cell, a metal atom at the centre of the cell is surrounded by how many other metal atoms :
(1) 8 (2) 6 (3) 12 (4) 4

SS0011

12. A compound is formed by elements A and B. This crystallises in cubic structure when atoms A are at the corners of the cube and atoms B are at the body centre. The simplest formula of the compound is :
(1) AB (2) AB_2 (3) A_2B (4) AB_4

SS0012

13. The fraction of total volume occupied by the atoms present in a simple cubic lattice is –
(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3\sqrt{2}}$ (3) $\frac{\pi}{4\sqrt{2}}$ (4) $\frac{\pi}{4}$

SS0083

14. Sodium metal crystallises in BCC lattice with the cell edge length (a) = 42.29 Å. What is the radius of sodium atom ?
(1) 1.86 Å (2) 1.90 Å
(3) 18.3 Å (4) 1.12 Å

SS0014

15. An element has BCC structure having 12.08×10^{23} unit cells. The number of atoms in these cells is :
(1) 12.08×10^{23} (2) 24.16×10^{23}
(3) 48.38×10^{23} (4) 12.08×10^{22}

SS0015

16. A metal has BCC structure and the edge length of its unit cell is 3.04 Å. The volume of the unit cell in cm^3 will be :
(1) 1.6×10^{-21} cm^3 (2) 2.81×10^{-23} cm^3
(3) 6.02×10^{-23} cm^3 (4) 6.6×10^{-24} cm^3

SS0016

CRYSTAL DENSITY

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

(1) $\frac{1}{2}a:\sqrt{3}a:\frac{1}{\sqrt{2}}a$

(2) $\frac{1}{2}a:\frac{\sqrt{3}}{2}a:\frac{\sqrt{2}}{2}a$

(3) $1a:\sqrt{3}a:\sqrt{2}a$

(4) $\frac{1}{2}a:\frac{\sqrt{3}}{4}a:\frac{1}{2\sqrt{2}}a$

SS0085

18. An element crystallises in BCC structure. The edge length of its unit cell is 288 pm. If the density of the crystal is 7.2 g cm^{-3}. What is the atomic mass of the element?

(1) 51.8 (2) 103.6

(3) 25.9 (4) 207.2

SS0019

19. An element A crystallises in fcc structure. 200 g of this element has 4.12×10^{24} atoms. The density of A is 7.2 g cm^{-3}. Calculate the edge length of the unit cell.

(1) 26.97×10^{-24} cm

(2) 299.9 pm

(3) 5×10^{-12} cm

(4) 2.99 cm

SS0021

20. Density of Li atom is 0.53 g cm^{-3} . The edge length of Li is 3.5 Å. Find out the number of Li atoms in an unit cell. (N_A = 6.023×10^{23}), (M= 6.94 g mol^{-1})

(1) 2 (2) 8 (3) 4 (4) 6

SS0022

CLOSE PACKING OF IDENTICAL SOLID SPHERES

21. The coordination number of hexagonal closest packed (HCP) structure is

(1) 12 (2) 10 (3) 8 (4) 6

SS0023

22. The ABAB close packing and ABC ABC close packing are respectively called :-

(1) hexagonal close packing(hcp) and cubic close packing (ccp)

(2) ccp and hcp

(3) body centred cubic (bcc) packing and hexagonal close packing (hcp)

(4) hcp and bcc

SS0024

23. The space occupied in BCC arrangement is

(1) 74% (2) 70% (3) 68% (4) 60.4%

SS0025

24. The vacant space in BCC unit cell is

(1) 32% (2) 10% (3) 23% (4) 46%

SS0026

25. The space occupied by spheres of equal size in three dimensions in both HCP and CCP arrangement is

(1) 74% (2) 70%

(3) 60.4% (4) 52.4%

SS0027

26. The empty space in the HCP and CCP is about

(1) 26% (2) 30% (3) 35% (4) 40%

SS0028

27. Which one of the following is not a close packing ?

(1) hcp (2) ccp

(3) bcc (4) fcc

SS0029

28. Close packing is maximum in the crystal lattice of

(1) Simple cubic

(2) Face centred

(3) Body centred

(4) Simple cubic and body centred

SS0030

29. Which of the following has HCP structure ?

(1) Al (2) Mg (3) Cu (4) Ni

SS0031

30. All noble gases crystallise in the CCP structure except

(1) Helium (2) Neon

(3) Argon (4) Krypton

SS0032

31. If the coordination number of an element in its crystal lattice is 8, then packing is :
(1) FCC (2) HCP
(3) BCC (4) None of the above
SS0033

HOLES / VOIDS IN CRYSTALS

32. A tetrahedral void in a crystal implies that
(1) shape of the void is tetrahedral
(2) molecules forming the void are tetrahedral in shape
(3) the void is surrounded tetrahedrally by four spheres
(4) the void is surrounded by six spheres
SS0034

33. In a closest packed lattice, the number of octahedral sites as compared to tetrahedral ones will be
(1) Equal (2) Half
(3) Double (4) One fourth
SS0035

34. The coordination number of a cation occupying an octahedral void is
(1) 4 (2) 6 (3) 8 (4) 12
SS0036

35. The size of an octahedral void formed in a closest packed lattice as compared to tetrahedral void is
(1) Equal (2) Smaller
(3) Larger (4) Not definite
SS0037

36. The coordination number of a cation occupying a tetrahedral void is
(1) 4 (2) 6 (3) 8 (4) 12
SS0038

37. Number of tetrahedral voids per atom in a crystal lattice is :
(1) 1 (2) 2 (3) 4 (4) 8
SS0039

38. A compound contains P and Q elements. Atoms Q are in CCP arrangement while P occupy all tetrahedral sites. Formula of compound is :
(1) PQ (2) PQ_2 (3) P_2Q (4) P_3Q
SS0040

39. If 'Z' is the number of atoms in the unit cell that represents the closest packing sequence ABCABC---, the number of tetrahedral voids in the unit cell is equal to
(1) Z (2) 2Z (3) Z/2 (4) Z/4
SS0041

40. If a unit cell of fcc lattice is divided into eight identical small cubes, then
(1) Each small cube contains one octahedral void.
(2) Every alternate small cube contains one octahedral void.
(3) Each small cube contains one tetrahedral void.
(4) Every alternate small cube contains one tetrahedral void.
SS0134

IONIC CRYSTAL

41. The limiting radius ratio for tetrahedral shape is
(1) 0 to 0.155 (2) 0.155 to 0.225
(3) 0.225 to 0.414 (4) 0.414 to 0.732
SS0042

42. For an octahedral arrangement, the lowest radius ratio limit is
(1) 0.155 (2) 0.732 (3) 0.414 (4) 0.225
SS0043

43. If the radius ratio is in the range of 0.414 - 0.732 then the co-ordination number will be :
(1) 2 (2) 4 (3) 6 (4) 8
SS0044

44. r^+/r^- ratio in NaCl crystal is :
(1) 0.4 (2) 0.98 (3) 1.0 (4) 0.52
SS0045

45. Which one of the following statements is incorrect about rock salt structure :
(1) Na^+ occupy octahedral voids
(2) Na^+ and Cl^- ions have a co-ordination number of 6 : 6
(3) A unit cell of NaCl consists of four NaCl units
(4) All halides of alkali metals have rock-salt type structure
SS0046

46. In sodium chloride, Cl^- ions form ccp arrangement. Which sites are occupied by Na^+ in this structure ?
(1) Cubical void (2) Tetrahedral void
(3) Octahedral void (4) Triangular void
SS0047

47. The positions of Cl^- ions in NaCl structure are
(1) Corners of the cube
(2) Centres of faces of the cube
(3) Corners as well as centres of the faces of the cube
(4) Edge centres of the cube

SS0048

48. The number of NaCl units present in a unit cell of NaCl are
(1) 1 (2) 2 (3) 4 (4) 8

SS0049

49. The tetrahedral voids formed by ccp arrangement of Cl^- ions in rock salt structure are
(1) Occupied by Na^+ ions
(2) Occupied by Cl^- ions
(3) Occupied by either Na^+ or Cl^- ions
(4) Vacant

SS0050

50. The structure of MgO is similar to NaCl. The co-ordination number of Mg is
(1) 2 (2) 6 (3) 4 (4) 8

SS0051

51. The co-ordination number of Cs^+ and Cl^- ions in CsCl structure is
(1) 4 : 4 (2) 6 : 6 (3) 8 : 8 (4) 4 : 8

SS0052

52. A unit cell of CsCl consists of
(1) one CsCl unit (2) two CsCl units
(3) four CsCl units (4) eight CsCl units

SS0053

53. The NaCl structure can be converted into CsCl structure
(1) by application of high pressure
(2) by heating to 760 K
(3) both by heat and pressure
(4) the conversion is not possible

SS0054

54. TlCl has structure similar to CsCl. The co-ordination number of Tl^+ is
(1) 4 (2) 6 (3) 10 (4) 8

SS0055

55. The co-ordination number of Zn^{2+} and S^{2-} ions in the zinc blende (ZnS) type structure is
(1) 4 : 4 (2) 6 : 6 (3) 8 : 8 (4) 4 : 8

SS0056

56. The co-ordination number of calcium fluoride (CaF_2) type structure is
(1) 1 : 2 (2) 4 : 4 (3) 4 : 8 (4) 8 : 4

SS0057

57. The number of formula units in an unit cell of fluorite structure is
(1) 2 (2) 4 (3) 6 (4) 8

SS0058

58. 4 : 4 Co-ordination is found in
(1) ZnS (2) CuCl (3) AgI (4) All

SS0059

59. Antifluorite structure can be derived from fluorite structure by
(1) Heating fluorite crystal lattice.
(2) Subjecting fluorite structure to high pressure.
(3) Interchanging the positions of positive and negative ions in the lattice.
(4) All of the above

SS0060

60. The radius of Na^+ is 95 pm and that of Cl^- ion is 181 pm. Hence the co-ordination number of Na^+ will be
(1) 4 (2) 6
(3) 8 (4) 12

SS0062

61. The ionic radii of Rb^+ and I^- are 1.46 and 2.16 Å respectively. The most probable type of structure exhibited by it is
(1) CsCl type (2) NaCl type
(3) ZnS type (4) CaF_2 type

SS0063

62. A solid XY has a bcc structure. If the distance of closest approach between the two ions is 173 pm, the edge length of unit cell is
(1) 200 pm (2) $\frac{\sqrt{3}}{\sqrt{2}}$ pm
(3) 142.2 pm (4) $\sqrt{2}$ pm

SS0065

63. If the distance between Na^+ and Cl^- ions in NaCl crystal is 'x' pm, what is the length of the cell edge?
(1) 2x pm (2) x/2 pm
(3) 4x pm (4) x/4 pm

SS0066

64. In a NaCl type crystal, distance between Na^+ and Cl^- ion is 2.814 Å and the density of solid is 2.167 g cm^{-3} then find out the value of Avogadro constant.
(1) 6.05×10^{23} (2) 3.02×10^{23}
(3) 12.10×10^{23} (4) 9.6×10^{24}

SS0069

65. The density of crystalline sodium chloride is 5.85 g cm^{-3}. What is the edge length of the unit cell.
(1) 4.06×10^{-8} cm (2) 1.32×10^{-14} cm
(3) 7.8×10^{-23} cm (4) 9.6×10^{-24} cm

SS0070

66. A unit cell of sodium chloride has four formula units. The edge length of unit cell is 0.6 nm. What is the density of sodium chloride ?
(1) 7.60 g cm^{-3} (2) 1.80 g cm^{-3}
(3) 9.60 g cm^{-3} (4) 6.38 g cm^{-3}

SS0071

IMPERFECTIONS IN SOLIDS

67. At zero kelvin, most of the ionic crystals possess
(1) Frenkel defect (2) Schottky defect
(3) Metal excess defect (4) No defect

SS0072

68. As a result of Schottky defect
(1) there is no effect on the density
(2) density of the crystal increases
(3) density of the crystal decreases
(4) any of the above three can happen

SS0073

69. Schottky as well as frenkel defects are observed in the crystal of
(1) NaCl (2) AgBr (3) AgCl (4) $MgCl_2$

SS0074

70. Frenkel defect is generally observed in
(1) AgBr (2) AgI
(3) ZnS (4) All of these

SS0076

71. Frenkel defect is found in crystals in which the radius ratio is :
(1) low
(2) 1.3
(3) 1.5
(4) slightly less than unity

SS0077

EXERCISE-I (Conceptual Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**3**	**4**	**2**	**3**	**2**	**1**	**3**	**2**	**1**	**1**	**1**	**1**	**3**	**2**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**2**	**4**	**1**	**2**	**1**	**1**	**1**	**3**	**1**	**1**	**1**	**3**	**2**	**2**	**1**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**3**	**3**	**2**	**2**	**3**	**1**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**4**	**4**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**3**	**3**	**3**	**4**	**2**	**3**	**1**	**1**	**4**	**1**	**4**	**2**	**4**	**3**	**2**
Que.	61	62	63	64	65	66	67	68	69	70	71				
Ans.	**2**	**1**	**1**	**1**	**1**	**2**	**4**	**3**	**2**	**4**	**1**				

EXERCISE-II (Previous Year Questions) AIPMT/NEET

AIPMT 2009

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

(1) 300.5 pm (2) 240.8 pm
(3) 151.8 pm (4) 75.5 pm

SS0087

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

(1) 108 (2) 128
(3) 157 (4) 181

SS0088

AIPMT 2010

3. AB crystallizes in a body centred cubic lattice with edge length 'a' equal to 387 pm. The distance between two oppositively charged ions in the lattice is :-

(1) 300 pm (2) 335 pm
(3) 250 pm (4) 200 pm

SS0089

AIPMT Mains. 2011

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

(1) 165.7 pm (2) 275.1 pm
(3) 322.5 pm (4) 241.5 pm

SS0091

AIPMT Pre. 2012

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

(1) 2 (2) 4 (3) 1 (4) 3

SS0093

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

(1) 144 pm (2) 204 pm
(3) 288 pm (4) 408 pm

SS0094

AIPMT Mains 2012

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

(1) $A_2B_3O_4$ (2) AB_2O_2
(3) ABO_2 (4) A_2BO_2

SS0095

NEET-UG 2013

8. The number of carbon atoms present per unit cell of diamond is :-

(1) 1 (2) 4
(3) 8 (4) 6

SS0097

9. A metal has a FCC lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72g cm^{-3}. The molar mass of the metal is :-

(1) 20g mol^{-1} (2) 40g mol^{-1}
(3) 30g mol^{-1} (4) 27g mol^{-1}

SS0098

AIPMT 2014

10. If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be :

(1) $\frac{2}{\sqrt{3}}a$ (2) $\frac{4}{\sqrt{3}}a$ (3) $\frac{\sqrt{3}}{4}a$ (4) $\frac{\sqrt{3}}{2}a$

SS0100

AIPMT 2015

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

(1) 127 pm (2) 80 pm
(3) 108 pm (4) 40 pm

SS0102

Re-AIPMT 2015

12. The vacant space in BCC lattice unit cell is :

(1) 23% (2) 32%
(3) 26% (4) 48%

SS0103

13. The correct statement regarding defects in crystalline solids is :-

(1) Frenkel defect is a dislocation defect

(2) Frenkel defect is found in halides of alkaline metals

(3) Schottky defects have no effect on the density of crystalline solids

(4) Frenkel defects decrease the density of crystalline solids

SS0104

NEET-I 2016

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

(1) 154 pm (2) 352 pm

(3) 527 pm (4) 264 pm

SS0107

15. The ionic radii of A^+ and B^- ions are 0.98×10^{-10}m and 1.81×10^{-10} m. The coordination number of each ion in AB is :-

(1) 6 (2) 4 (3) 8 (4) 2

SS0108

NEET-II 2016

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

(1) 8 and 4 (2) 4 and 8

(3) 4 and 2 (4) 6 and 6

SS0109

NEET(UG) 2017

17. Which is the **incorrect** statement ?

(1) Density decreases in case of crystals with Schottky's defect

(2) NaCl(s) is insulator, silicon is semiconductor, silver is conductor, quartz is piezo electric crystal

(3) Frenkel defect is favoured in those ionic compounds in which sizes of cation and anions are almost equal

(4) $FeO_{0.98}$ has non stoichiometric metal deficiency defect

SS0112

NEET-II 2018

18. Iron exhibits bcc structure at room temperature. Above 900°C, it transforms to fcc structure. The ratio of density of iron at room temperature to that at 900°C (assuming molar mass and atomic radii of iron remains constant with temperature) is

(1) $\frac{\sqrt{3}}{\sqrt{2}}$ (2) $\frac{4\sqrt{3}}{3\sqrt{2}}$

(3) $\frac{3\sqrt{3}}{4\sqrt{2}}$ (4) $\frac{1}{2}$

SS0113

NEET-(UG) 2019

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

(1) C_2A_3 (2) C_3A_2

(3) C_3A_4 (4) C_4A_3

SS0135

NEET-(UG) 2019 (Odisha)

20. Formula of nickel oxide with metal deficiency defect in its crystal is $Ni_{0.98}O$. The crystal contains Ni^{2+} and Ni^{3+} ions. The fraction of nickel existing as Ni^{2+} ions in the crystal is

(1) 0.96 (2) 0.04

(3) 0.50 (4) 0.31

SS0136

NEET (UG) 2020

21. An element has a body centered cubic (bcc) structure with a cell edge of 288 pm. The atomic radius is:

(1) $\frac{4}{\sqrt{2}} \times 288\,pm$ (2) $\frac{\sqrt{3}}{4} \times 288\,pm$

(3) $\frac{\sqrt{2}}{4} \times 288\,pm$ (4) $\frac{4}{\sqrt{3}} \times 288\,pm$

SS0141

NEET (UG) 2020 (COVID-19)

22. Which one of the following compounds shows both, Frenkel as well as Schottky defects ?

(1) AgBr (2) AgI

(3) NaCl (4) ZnS

SS0142

NEET (UG) 2021

23. Right option for the number of tetrahedral and octahedral voids in hexagonal primitive unit cell are:

(1) 8, 4 (2) 6, 12

(3) 2, 1 (4) 12,6

SS0143

24. The correct option for the number of body centred unit cells in all 14 types of Bravais lattice unit cells is :

(1) 7 (2) 5

(3) 2 (4) 3

SS0144

NEET (UG) 2021 (Paper-2)

25. Which of the following statements are True (T) and which are False (F)?

S_1 : Cubic system have four possible type of unit cells.

S_2 : H_2O is diamagnetic substance and it is weakly attracted in magnetic field.

S_3 : Graphite is a covalent solid with van der Waal's forces as well.

(1) F F T (2) F T F

(3) T F F (4) F F F

SS0145

26. The range of radius ratio (cationic to anionic) for an octahedral arrangement of ions in an ionic solid is

(1) 0 – 0.155

(2) 0.155 – 0.225

(3) 0.225 – 0.414

(4) 0.414 – 0.732

SS0146

NEET (UG) 2022

27. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) :

In a particular point defect, an ionic solid is electrically neutral, even if few of its cations are missing from its unit cells.

Reason (R) :

In an ionic solid, Frenkel defect arises due to dislocation of cation from its lattice site to interstitial site, maintaining overall electrical neutrality.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

(2) (A) is correct but (R) is not correct

(3) (A) is not correct but (R) is correct.

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

SS0147

28. Copper crystallises in fcc unit cell with cell edge length of 3.608×10^{-8} cm. The density of copper is 8.92 g cm^{-3}. Calculate the atomic mass of copper.

(1) 31.55 u (2) 60 u

(3) 65 u (4) 63.1 u

SS0148

NEET (UG) 2022 (OVERSEAS)

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

(1) domains are not affected by magnetic field.

(2) domains get randomly oriented.

(3) all the domains get oriented in the direction of magnetic field.

(4) all the domains get oriented in the direction opposite to the direction of magnetic field.

SS0149

30. Which statement among the following is not correct?

(1) Ferrimagnetism arises due to the alignment of magnetic moments of the domains in the substance in parallel and anti-parallel directions in unequal numbers.

(2) Replacing some silicon atoms by boron atoms in crystal of silicon produces p-type semiconductor.

(3) Replacing some germanium atoms by phosphorus atoms in crystal of germanium produces n-type semiconductor.

(4) When conduction band and valence band overlap, a semiconductor is obtained.

SS0150

Re-NEET (UG) 2022

31. Match **List-I** with **List-II** :

List-I (Defects)	**List-II (shown by)**
(a) Frenkel defect	(i) non-ionic solids and density of the solid decreases
(b) Schottky defect	(ii) non-ionic solids and density of the solid increases
(c) Vacancy defect	(iii) ionic solids and density of the solid decreases.
(d) Interstitial defect	(iv) ionic solids and density of the solid remains constant.

Choose the **correct answer** from the options given below :

(1) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

(2) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

(4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

SS0151

32. What fraction of Fe exists as Fe(III) in $Fe_{0.96}O$?

(Consider $Fe_{0.96}O$ to be made up of Fe(II) and Fe(III) only)

(1) $\frac{1}{12}$ (2) 0.08

(3) $\frac{1}{16}$ (4) $\frac{1}{20}$

SS0152

EXERCISE-II (Previous Year Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**3**	**2**	**2**	**4**	**3**	**3**	**2**	**3**	**4**	**4**	**1**	**2**	**1**	**2**	**1**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**3**	**3**	**3**	**1**	**2**	**1**	**4**	**4**	**1**	**4**	**1**	**4**	**3**	**4**
Que.	31	32													
Ans.	**4**	**1**													

EXERCISE-III (Analytical Questions) Master Your Understanding

1. What is the % of volume occupied by atoms in FCC

(1) 58% (2) 68%

(3) 74% (4) 88%

SS0120

2. Coordination number in HCP is :-

(1) 6 (2) 8

(3) 12 (4) 18

SS0121

3. The lattice structure of group I elements is

(1) FCC (2) BCC

(3) HCP (4) CCP

SS0122

4. Elements Na and Mg crystallise in bcc and fcc respectively, then number of atoms of Na and Mg per unit cell are respectively :-

(1) 2, 4 (2) 9, 14

(3) 14, 9 (4) 4, 2

SS0123

5. In a face centred cubic lattice, atoms of A occupy the corner positions only and atoms of B occupy the face centre positions. If one atom of B is missing from one of the face centred points, the formula of the compound is :-

(1) A_2B_3 (2) A_2B_5

(3) A_2B (4) AB_2

SS0124

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

(1) Cu_4Ag_2Au (2) Cu_4Ag_4Au

(3) Cu_4Ag_3Au (4) CuAgAu

SS0125

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

(1) 7.01% (2) 4.08%

(3) 6.05% (4) 5.08%

SS0126

8. CsBr crystallises in a b.c.c. like ionic lattice. The unit cell edge length is 436.6 pm. Given that the atomic mass of Cs=133 and that of Br=80 amu and Avogadro number being 6.023×10^{23} mol^{-1} the density of CsBr is :

(1) 42.5 g cm^{-3} (2) 0.425 g cm^{-3}

(3) 8.25 g cm^{-3} (4) 4.25 g cm^{-3}

SS0080

9. NaCl is doped with 10^{-4} mol% $SrCl_2$. The number of cation vacancies in one mole NaCl is–

(1) 6.02×10^{15} (2) 6.02×10^{16}

(3) 6.02×10^{17} (4) 6.02×10^{14}

SS0082

10. Which of the following statement is not correct ?

(1) Molecular solids are generally volatile

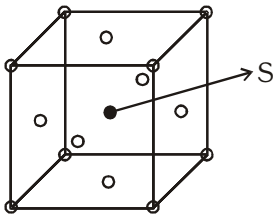
(2) The numbers of carbon atoms in an unit cell of diamond is 8

(3) The number of Bravais lattices in which a crystal can be categorized is 14

(4) The fraction of the total volume occupied by the atoms in a primitive cell is 0.48

SS0086

11. The site S in the adjoining fcc structure represents



(1) Octahedral void

(2) Tetrahedral void

(3) Triangular void

(4) Square void

SS0137

12. Which of the following statement is/are correct about the hexagonal close packing.

(a) Coordination number is 12

(b) It has 74% packing effeciency.

(c) Tetrahedral voids of the second layer are covered by the spheres of the third layer

(d) It has 32% void space

correct answer is :-

(1) a and b (2) a, b and c

(3) b, c and d (4) a,b,c and d

SS0138

13. Which of the following features are shown by quartz glass

(a) This is a crystalline solid

(b) This has definite Heat of fusion

(c) This is also called super cooled liquid

(d) Refractive index is same in all the directions.

Correct ans. is :-

(1) a and b (2) a, b and c

(3) c and d (4) a, b, c and d

SS0139

14. In which of the following arrangement regular octahedral voids are formed?

(a) BCC (b) FCC (c) HCP (d) SC

Correct ans. is

(1) b and d (2) a and c

(3) a, b and c (4) b and c

SS0140

EXERCISE-III (Analytical Questions) ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ans.	3	3	2	1	2	3	2	4	3	4	1	2	3	4