EXERCISE-I (Conceptual Questions)

Build Up Your Understanding

	INTRODUCTION									
1.	$a \neq b \neq c, \alpha = \gamma = 90^{\circ}$ (1) Tetragonal system (3) Monoclinic system	$^{\circ}\beta \neq 90^{\circ}$ represents m	(2) Orthorhombic system(4) Triclinic system							
2.	The most symmetrica (1) Cubic	al crystal system is : (2) Hexagonal	(3) Triclinic	(4) Orthorhombic						
3.	Bravais lattices are of (1) 10 types	f (2) 8 types	(3) 7 types	(4) 14 types						
4.	The crystal system of nm and $\alpha = \beta = 90^{\circ}$ a	f a compound with unit and $\gamma = 120^\circ$ is :	it cell dimensions $a = 0$	0.387, b = 0.387 and c = 0.504						
	(1) Cubic	(2) Hexagonal	(3) Orthorhombic	(4) Rhombohedric						
		ANALYSIS OF	CUBIC CRYSTAL							
5.	In a simple cubic cell (1) 2unit cells	l, each point on a corne (2) 1 unit cell	er is shared by (3) 8 unit cells	(4) 4 unit cells						
6.	In a face centred cubic (1) 1 part	ic cell, an atom at the 1 (2) 1/2 part	face contributes to the unit cell (3) 1/4 part (4) 1/8 part							
7.	In a body centred cub (1) 1 unit cell	bic cell, an atom at the (2) 2 unit cell	body centre is shared (3) 3 unit cells	by (4) 4 unit cells						
8.	Which of the followi (1) Simple cubic (3) Face centred cubi	ng type of cubic lattice c	 has maximum number of atoms per unit cell ? (2) Body centred cubic (4) All have same 							
9.	The number of atoms present in a unit cell of a monatomic element of a simple cubic lattice body-centred cubic and face centred cubic respectively are (1) 8, 9 and 14 (3) 4, 5 and 16 (4) 2, 3 and 5									
10.	Which one of the following is a primitive unit cell? (1) Simple cubic (2) BCC (3) FCC (4) BCC and FCC both									
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							
12.	A compound is form the corners of the cub compound is	ed by elements A and bic and atoms B are a	B. This crystallises in the centre of the bod	the cubic structure if when at y. The simplest formula of the						
	(1) AB	(2) AB_2	$(3) A_2 B$	$(4) AB_4$						
Power by Website	y: VISIONet Info Solution Pvt.] : www.edubull.com	Ltd Mob no. : +91-9	350679141							

- 13. A compound formed by elements A and B has cubic structure in which A atoms are at the corners of the cube and B atoms are at the face centres. The formula of the compound will be $(1) A_4 B_3$ (2) A_2B $(3) AB_3$ (4) A_2B_3
- 14. Sodium metal crystallises in BCC lattice with the cell edge length (a) = 42.29 A. What is the radius of sodium atom? (1) 1.86 Å (2) 1.90 Å (3) 18.3 Å (4) 1.12 Å
- An element has BCC structure having unit cells 12.08×10^{23} . The number of atoms in these cells 15. (2) 24.16×10²³ (1) 12.08×10^{23} (3) 48.38×10^{23} $(4) 12.08 \times 10^{22}$
- A metal has BCC structure and the edge length of its unit cell is 3.04Å. The volume of the unit 16. cell in cm³ will be

(1) $1.6 \times 10^{-21} \text{ cm}^3$ (3) $6.02 \times 10^{-23} \text{ cm}^3$ (2) 2.81×10^{-23} cm³ $(4) 6.6 \times 10^{-24} \text{ cm}^3$

CRYSTAL DENSITY

- An element having BCC geometry has atomic mass 50. Calculate the density of the unit cell, if 17. its edge length is 290 pm. (2) 3.40 g cm^{-3} (1) 6.81 g cm⁻³
 - (3) 13.62 g cm⁻³
- 18. A metal (atomic mass = 50) has a body centred cubic crystal structure. The density of metal is 5.96 g cm^{-3} . Find the volume of the unit cell. (1) $13.9 \times 10 - 24$ cm³

(3) $6.95 \times 10^{-24} \text{ cm}^3$

(2) 27.8×10^{-24} cm³ (4) 55.6×10^{-24} cm³

(4) 1.23 g cm⁻³

An element crystallises in BCC structure. The edge length of its unit cell is 288 pm. If the 19. 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

An element; density 6.8 g cm⁻³ occurs in BCC structure with cell edge 290 pm. Calculate the 20. number of atoms present in 200 g of the element. (2) 1.2×10^{42} (1) 2.4×10^{42} (3) 1.2×10^{24} (4) 2.4×10^{24}

- An element A crystallises in fcc structure. 200 g of this element has 4.12×10^{24} atoms. The 21. 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
- Density of U atom is 0.53 g cm⁻³. The edge length of Li is 3.5Å. Find out the number, of Li 22. 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

CLOSE PACK	CLOSE PACKING OF IDENTICAL SOLID SPHERES							
Power by: VISIONet Info Solution Pvt. Ltd								
Website : www.edubull.com	Mob no. : +91-9350679141							

Edubull

23.	The coordination num	mber of hexagonal close (2) 10	sest packed (HCP) stru	icture is-
	(1) 12	(2) 10	(3) 8	(4) 6
24.	The ABAB close pao (1) hexagonal close p (2) ccp and hcp (3) body centred cub (4) hcp and bee	cking and ABC ABC c packing (hcp) and cubi ic (bcc) packing and h	lose packing are respe c close packing (ccp) exagonal close packing	ctively called as g (hcp)
25.	The space occupied i (1) 74%	in BCC arrangement is (2) 70%	(3) 68%	(4) 60.4%
26.	The vacant space in 1 (1) 32%	BCC unit cell is (2) 10%	(3) 23%	(4) 46%
27.	The space occupied arrangement is	l by spheres of equal	size in three dimen	sions in both HCP and CCP
	(1) 74%	(2) 70%	(<mark>3) 60.4%</mark>	(4) 52.4%
28.	The empty space in t	the HCP and CCP is ab	oout	
	(1) 26%	(2) 30%	(3) 3 <mark>5%</mark>	(4) 40%
29.	Which one of the fol	lowing is not a close p	acking ?	
	(1) hcp	(2) ccp	(3) bcc	(4) fcc
30.	Close packing is max (1) Simple cubic (3) Body centred	ximum in the crystal la	ttice of (2) Face centred (4) Simple cubic and	l body centred
31.	Which of the following	ing has HCP structure?		
	(1) Al	(2) Mg	(3) Cu	(4) Ni
32.	All noble gases cryst (1) Helium	tallise in the CCP struc (2) Neon	ture except. (3) Argon	(4) Krypton
33.	If the coordination m (1) FCC	umber · of an element i (2) HCP	n its crystal lattice is 8 (3) BCC	a, then packing is:(4) None of the above
		HOLES/VOID	S IN CRYSTALS	
34.	A tetrahedral void in	a crystal implies that		
	(1) shape of the volu (2) molecules formin	is the void are tetrahed	lral in shape	
	(3) the void is 'surrou	unded tetrahedrally by	four spheres	
	(4) the void is surrou	inded by six spheres		
35.	In a closest packed l be	attice, the number of o	octahedral sites as con	npared to tetrahedral ones will
	(1) Equal	(2) Half	(3) Doll	(4) One fourth
Power by Website	y: VISIONet Info Solution Pvt. : www.edubull.com	Ltd Mob no. : +91-9	350679141	

Edubull

36.	The coordination' nur (1) 4	nber of a cation occup (2) 6	ying an octahedral hole (3) 8	e is (4) 12					
37.	The size of an octahout void is	edral void formed in a	a closest packed lattic	e as compared to, tetrahedral					
	(1) Equal	(2) Smaller	(3) Larger	(4) Not definite					
38.	The coordination num (1) 4	nber of a cation occupy (2) 6	ying a tetrahedral hole (3) 8	is (4) 12					
39.	Number of tetrahedra (1) 1	l voids, per atom in a ((2) 2	Crystal lattice is :- (3) 4	(4) 8					
40.	A compound contains	s P and Q elements. A	toms Q are in CCP are	rangement while P occupy all					
	(1) PQ	(2) PQ_2	$(3) P_2 Q$	(4) P_3Q					
41.	If 'Z' is the number ABCABC, the num (1) Z	of atoms in the unit ober of tetrahedral void (2) 2Z	cell that represents t ds in the unit cell is equ (3) Z/2	he closest packing sequence ual to (4) Z/4					
		IONIC C	CRYSTAL						
42.	The limiting radius ra (1) 0 to 0.155 (3) 0.225 to 0.414	tio for tetrahedral shap	(2) 0.155 to 0.225 (4) 0.414 to 0.732						
43.	For an octahedral arra (1) 0.155	angement the lowest ra (2) 0.732	dius ratio limit is (3) 0.414	(4) 0.225					
44.	If the radius ratio is in (1) 2	n the range of 0.414 – (2) 4	0.732 then the co-ordir (3) 6	nation number will be : (4) 8					
45.	In NaCl crystal $r^+/r^- r$ (1) 0.4	atio is: (2) 0.98	(3) 1.0	(4) 0.52					
46.	 Which one of the following statements is incorrect about rock salt type ? (1) It has fcc arrangement of Na⁺ (2) Na⁺ and CI-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 								
47.	In sodium chloride, (this structure? (1) Cubic (3) Octahedral	Cl [−] ions form ccp arra	ngement. Which site (2) Tetragonal (4) Trigonal bipyram	does Na ⁺ ions will occupy in idal					

Power by: VISIONet Info Solution Pvt. Ltd	
Website : www.edubull.com	

Edubull

48.	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	ne cube								
40	The number of NeCl	units propont in a unit.	call of NoCl act							
47.	(1) 1 (1)	(2) 2	$(3) \Lambda$	(4) 8						
	(1) 1	(2) 2	(3) +	(+) 0						
50.	The tetrahedral voids	s formed by ccp arrange	ement of Cl ⁻ ions in ro	ck salt structure are						
	(1) Occupied by Na ⁺ ions									
	(2) Occupied by Cl^{-1}	ions								
	(3) Occupied by eithe	er Na ⁺ or Cl ⁻ ions								
	(4) Vacant.									
51.	The structure of Mg(D is similar to NaCl. The (2)	ne co-ordination number	er of Mg is						
	(1) 2	(2) 6	(3) 4	(4) 8						
52	The co-ordination nu	wher of C_{a}^{+} and C_{a}^{+} is	ng in CaCl structure is							
32.	(1) $A \cdot A$	$(2) 6 \cdot 6$	$(3) 8 \cdot 8$	$(4) 4 \cdot 8$						
	(1) 1.1	(2) 0 : 0	(5) 0. 0							
53.	A unit cell of CsCl c	onsists of								
	(1) one CsCl unit		(2) two CsCl units							
	(3) four CsCl units		(4) eight CsCl units							
54.	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						
55	TICI has structure sir	nilar to CsCl. The co-o	rdination number of T	1 ⁺ is-						
55.	(1) 4	(2) 6	(3) 10	(4) 8						
		(1) 0	(5) 10							
56.	The co-ordination nu	umber of Zn^{2+} and S^{2-} is	ons in the zinc blende	(ZnS) type structure is						
	(1) 4 : 4	(2) 6 : 6	(3) 8 : 8	(4) 4 : 8						
57.	The co-ordination nu	imber of calcium fluori	de (CaF ₂) type structur							
	(1) 1 : 2	(2) 4 : 4	(3) 4 : 8	(4) 8 : 4						
58	The number of form	ila units in an unit cell	of fluorite is							
50.	(1) 2	(2) 4	(3) 6	(4) 8						
	(1) 2	(2)	(3) 0							
59.	4:4 Co-ordination is	s found in								
	(1) ZnS	(2) CuCl	(3) AgI	(4) All						
60.	Antifluorite structure	e is derived from fluorit	te structure by							
	(1) Heating fluorite c	rystal lattice.								
	(2) Subjecting fluorite structure to high pressure.									

Power by: VISIONet Info Solution Pvt. Ltd	
Website : www.edubull.com	Mob no. : +91-9350679141

(3) Interchanging the positions of positive and negative ions in the lattice.(4) All of the above

61. A binary solid (A^+B^-) has a zinc blend structure with B^- ions constituting the lattice and A^+ ions occupying 25% tetrahedral holes. The formula of solid is. (1) AB (2) A₂B (3) AB₂ (4) AB₄

62. 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

63. The ionic radii of Rb^+ and Γ are 1.46 and 2.16Å respectively. The most probable type of structure exhibited by it is (1) CsCl type (2) NaCl type (3) ZnS type (4) CaF₂ type

64. A binary solid (A^+B^-) has a rock salt structure if the edge length is 400 pm and radius of cation (A^+) is 75 pm, the radius of anion (B^-) is (1)100 pm (2) 125 pm (3) 250 pm (4) 325 pm

- **65.** A solid XY has a bcc structure. If the distance of closest approach between the two ions is 173 pm, the edge length of the cell is
 - (1) 200 pm (2) $\frac{\sqrt{3}}{\sqrt{2}}$ pm (3) 142.2 pm (4) $\sqrt{2}$ pm
- 66. If the distance between Na⁺ and Cl⁻ ions in NaCl crystal is 'a' pm, what is the length of the cell edge? (1) 2a pm (2) a/2 pm (3) 4a pm (4) a/4 pm
- 67. Potassium fluoride has NaCl⁻ type structure. What is the distance between K^+ and F^- ions if it's cell edge length is 'a' cm? (1) 2a cm (2) a/2 cm (3) 4a cm (4) a/4 cm
- **68.** KF has NaCl structure. What is the distance between K⁺ and F⁻ in KF if density is 2.48 g cm⁻³? (1) 268.8 pm (2) 537.5 pm (3) 155.3×10^{-24} cm (4) 5.375 cm

69. In a NaCl type crystal distance between Na⁺ and Cl⁻ ion is 2.814Å 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}

- 70. 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
- **71.** 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

IMPERFECTIONS IN SOLIDS

Power by: VISIONet Info Solution Pvt. Ltd Website : www.edubull.com

72.	At zero kelvin,	most of the ionic crystals	s posses						
	(1) Frenkel def	ect	(2) Schottky def	fect					
	(3) Metal exce	ss defect	(4) No defect	(4) No defect					
73.	As a result of S	Schottky defect							
	(1) there is no	effect on the density	(2) density of th	e crystal increases					
	(3) density of t	he crystal decreases	(4) any of the ab	(4) any of the above three can happen					
74.	Schottky as we	ll as frenkel defects are o	bserved in the crystal	lof					
	(1) NaCl	(2) AgBr	(3) AgCl	$(4) MgCl_2$					
	(-)	(-)8	(-)8	(1) -1-82					
75.	Which one of t	he following is correct?							
	(1) Schottky de	efect lowers the density							
	(2) Frenkel def	ect increases the dielectri	c constant of the crys	stals					
	(3) Stoichiome	tric defects make the crys	stals good electrical c	onductors					
	(4) All the thre	e							
76	Frenkel defect	is generally observed in							
/01	(1) AgBr	(2) AgI	(3) Zn	(4) All of these					
	(-)8	(-)8-							
77.	Frenkel defect	is found in crystals in wh	nich the ra <mark>dius ratio i</mark>	s :					
	(1) low	(2) 1.3	(3) 1.5	(4) slightly less than unity					
78.	F-centres in an	ionic crystal are							
	(1) lattice sites	containing electrons	(2) interstitial si	(2) interstitial sites containing electrons					
	(3) lattice sites	that are vacant	(4) interstitial si	(4) interstitial sites containing cations					
79.	The correct sta	tement regarding F-centre	e is						
	(1) Electrons a	re held in the lattice site of	of crystals						
	(2) F-centre im	parts colour to the crystal							
	(3) Conductivi	ty of the Crystal increases	due to F-centre						
	(4) All the thre	e above							
		ANS	WER KEY						

	EXERCISE-I (Conceptual Questions)												
1.	(3)	2.	(3)	3.	(4)	4.	(2)	5.	(3)	6.	(2)	7.	(1)
8.	(3)	9.	(2)	10.	(1)	11.	(1)	12.	(1)	13.	(3)	14.	(3)
15.	(2)	16.	(2)	17.	(1)	18.	(2)	19.	(1)	20.	(4)	21.	(2)
22.	(1)	23.	(1)	24.	(1)	25.	(3)	26.	(1)	27.	(1)	28.	(1)
29.	(3)	30.	(2)	31.	(2)	32.	(1)	33.	(3)	34.	(3)	35.	(2)
36.	(2)	37.	(3)	38.	(1)	39.	(2)	40.	(3)	41.	(2)	42.	(3)
43.	(3)	44.	(3)	45.	(4)	46.	(4)	47.	(3)	48.	(3)	49.	(3)
50.	(4)	51.	(2)	52.	(3)	53.	(1)	54.	(1)	55.	(4)	56.	(1)
57.	(4)	58.	(2)	59.	(4)	60.	(3)	61.	(3)	62.	(2)	63.	(2)
64.	(2)	65.	(1)	66.	(1)	67.	(2)	68.	(1)	69.	(1)	70.	(1)
71.	(2)	72.	(4)	73.	(3)	74.	(2)	75.	(4)	76.	(4)	77.	(1)
78.	(1)	79.	(4)										

 Power by: VISIONet Info Solution Pvt. Ltd

 Website : www.edubull.com
 Mob no. : +91-9350679141