

# WORKSHEETS

## Chapter 1:

### Solid State

CONCEPT: Close packing of SOLIDS

I) Match the following

	COLUMN-A		COLUMN-B
a)	Sqaure close packing in two dimension	1	Triangular voids
b)	Hexagonal close packing in two dimensions	2	Pattern of spheres is repeated in every fourth layer.
c)	Hexagonal close packing in threedimensionsl	3	Pattern of spheres is repeated in alternate layers layer.
d)	cubic close packing in three dimensions	4.	Co-ordination number-4

### II) Multiple choice questions.

- Percentage of empty space in a body centre cubic arrangement is
  - 74
  - 32
  - 26
  - 68
- The total no of tetrahedral voids in fcc is
  - 6
  - 8
  - 10
  - 12
- Which of the following statement is/ are not true in the hexagonal close packing.
  - Packing efficiency 74%
  - C.N=12
  - Tetrahedral voids of the second layer are covered by the spheres of the third layers.
  - Spheres of the fourth layer are exactly aligned with those of the first layer
- In which pair most efficient packing is present.
  - hcp & bcc
  - bcc& ccp
  - hcp& ccp
  - bcc& simple cubic
- In which of the arrangement octahedral voids are formed
  - Hcp
  - bcc
  - fcc
  - simple cubic

### III) FILL IN THE BLANKS

- The C.N of each sphere in hcp is ----- while that of bcc is \_\_\_\_\_.
- An octrahedral void is -----times larger than a tetrahedral void.
- ABAB... type of packing is called----- where as ABCABC...type of packing is called fcc.
- For bcc,  $r=3^{1/2} a /4$ , then for fcc,  $r=-----$ .

Ans: I) a-4, b-1, c-3, d-2

II) 1-d, 2-8, 3-d, 4-c

III)

- 12 & 8;
- two
- HCP
- $\sqrt{2} a/4$

CONCEPT: CLASSIFICATION OF SOLIDS

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A) Match the following

	COLUMN-A		COLUMN-B
a)	Ionic crystal	1	Graphite
b)	Metallic crystal	2	Ice
c)	Covalent crystal	3	MgO
d)	Non polar crystal	4	Gold
e)	Hydrogen bonded crystal	5	Dry ice

B) Multiple choice questions.

- Which of the following is a network solid?
  - $I_2$
  - $SO_2$  (solid)
  - Diamond
  - Argon
- Which of the following is not an electrical conductor?
  - Ar
  - Mg
  - TiO
  - $H_2O$
  - only b)
  - only c)
  - a & d
  - b, c & d
- Which of the following is not a characteristic of a crystalline solid?
  - True solid
  - long range order
  - isotropic in nature
  - definite heat of fusion
- A solid is very hard, electrical insulator in solid state as well as in molten state & melts at extremely high temperature. It may be
  - covalent solid
  - metallic solid
  - molecular solid
  - ionic solid
- Iodine molecules are held in crystals by
  - London forces
  - coulombic forces
  - dipole- dipole interactions
  - covalent bonds

C: FILL IN THE BLANKS ( BY CHOOSING APPROPRIATE WORDS GIVEN IN THE BRACKET)(isotropy, valence electrons, amorphous)

- Graphite is a good conductor due to presence of -----.
- Glass is a ----- solid as it shows fluidity.
- If the electrical conductivity is same in all direction through a solid the substance is an amorphous solid & this property is called -----.

ANS

A: a-3 b-4, c-1, d-5, e-2

B: 1-c, 2-iii, 3-c, 4-a, 5-a

C:

- Free electrons
- Pseudo solid
- Isotropy

CONCEPT: DEFECTS IN CRYSTALS

A) Match the following

	COLUMN-A		COLUMN-B
a)	Schottky defect	1	Crystals become coloured
b)	Doping silicon with aluminium	2	n-type of semiconductors are formed
c)	Doping silicon with arsenic	3	NaCl with $\text{Sr}^{+2}$ & some cationic sites vacant.
d)	Heating NaCl crystal in presence of sodium vapour.	4	Density of the crystals decreases
e)	Impurity defects	5	p- type of semiconductore is formed

Ans: a-4, b-5, c-2, d-1, e-3

B) Multiple choice question

- Which kind of defects are introduced by doping?
  - dislocation defect
  - Schottky defect
  - Frenkel defect
  - Electronic defects
- Which of the following is also known as dislocation defect?
  - Schottky defect
  - Frenkel defect
  - nonstoichiometric defect
  - simple interstitial defect
- Which of the following defects are shown by AgBr
  - Schottky defect
  - Frenkel defect
  - metal excess defect
  - metal deficiency defect
- a & b
  - c & d
  - a & c
  - b & d
- To get an n-type of semiconductor from silicon it should be doped with a substance with valence -----electrons
  - 1
  - 2
  - 3
  - 5
- Schottky defect is observed in the crystal when
  - some cations move from their lattice sites to interstitial sites
  - equal number of cations and anions are missing from the lattice
  - some lattice sites are occupied by the electrons
  - some impurity is present in the lattice

Ans: 1 a 2d 3 a 4 d 5b

FILL IN THE BLANKS

- NaCl crystals have some yellow colour is due to the presence of -----.
- The process of adding impurities to a crystalline substance so as to change its properties like conductivities etc is called -----
- Frenkel defect is shown by crystals having low coordination number & ----- difference in the size of the cations & anions.
- Schottky defect in ionic crystals always results in ----- of density.
- crystal defect is produced when NaCl is doped with  $\text{MgCl}_2$ .

Ans: ( F-centre ,doping, large, decrease, impurity defect)

## UNIT-1: TOPIC: SOLID STATE : worksheet for class-xii

FILL IN THE BLANKS/ CHOOSE THE CORRECT ANSWER

<b>CONCEPT- Defects chap-solid state</b> <b>CH-SOLID STATE CARD -7</b> [1×5=5M]	<b>CONCEPT- Defects chap-solid state</b> <b>CH-SOLID STATE CARD -8</b> [1×5=5M]
28# The excess of lithium in LiCl makes it pink is due to ----- 29 # The compound that shows both Schottky and Frenkel defect is ----- 30# Doping ----- (minimizes , maximizes) the forbidden energy gap . 31# The forbidden energy is maximum in ----- ( Ge , Mg , NaCl , Ge doped with In ) 32# Which one show metal excess defects ( FeO , ZnO) 28- f centres, 29- AgBr; 30-min; 31-NaCl, 32-ZnO	33# When an electron is trapped in an anion vacant centre , it is called -----. 34# Si , Ge can be doped with a group ----- elements to produce p-type semiconductor. ( Gp- 12,13,14,15) 35# Solar cell is an efficient ----- ( photo-diode , photo-triode) 36# Diode acts as a ----- ( rectifier , amplifier) 37# ----- oxide is like metallic cu in its conductivity and appearance . 33-F centre; 34-13gp, 35- photo-diode, 36-a rectifier, 37-
<b>CONCEPT- Defects chap-solid state</b> <b>CH-SOLID STATE CARD -9</b> [1×3=3M]	<b>CONCEPT- Defects chap-solid state</b> <b>CH-SOLID STATE CARD -10</b> [1×3=3M]
38# The process of adding an appropriate amount of suitable impurity to increase the conductivity of a intrinsic semi-conductor like S , Ge is called 39# When in a substance the magnetic moments of the domains are aligned in parallel and antiparallel directions in unequal numbers , the phenomenon observed is called ----- . (ferromagnetism, anti-ferromagnetism, ferrimagnetism) 40# In which type of semi-conductor , electron holes are moving towards negatively charged plate under the influence of electric field ? ( p-type , n-type) <u>Ans:</u> 38-doping, 39-ferrimag, 40- p-type	41# If an atom is missing from its lattice site and it occupies the interstitial site , the electrical neutrality as well as the stoichiometry of the compound are maintained . This type of defect is called ----- defect . 42# The set of molecular orbitals generated due to overlap of atomic orbitals having very close in energy is called ----- 43# Frenkel defect is shown by the crystals having ----- (high , low) co-ordination number and ---- ( large , small) difference in the size of the cations and the anions . <u>Ans:</u> 41-frenkel, 42-energy band, 43-low
<b>CONCEPT- Amorphous and crystalline solids</b> <b>CH-SOLID STATE CARD -11</b> [1×6=6M]	<b>CH-SOLID STATE---MISCELLANEOUS</b> <b>CARD -12</b> [1×5=5M]
44# ----- is a covalent crystal ( Iodine , NaCl , ice , Carborundum) 45# Which one will show anisotropy ? ( quartz , paraffin wax , rubber , quartz glass ) 46# ---- solids conducts electricity in molten state but not in solid state. ( molecular , ionic , metallic , covalent) 47# ----- solids have very high melting point ( molecular , ionic , metallic , covalent) 48# Solar cell is an efficient ----- ( photo-diode , photo-triode) 49# Photovoltaic material is ----- ( Amorphous silicon , Pure silicon crystal) 50# Some of the glass from ancient civilizations which are with us are milky in appearance due	<b>WRITE TRUE OR FALSE .</b>  51# In end-centred unit cell of an atomic substance there are four atoms per unit cell. [     ]  52# In rock-salt structure, the number of formula units per unit cell is four. [     ]  53# Schottky defects disturb the ratio of cations and anions in the compound .  54# NaCl is a paramagnetic substance. [     ]  55# A compound having radius ratio (r+/r-) in the

<p>to ---- 44-carborundum, 45-quartz, 46-ionic, 47-ionic, 48-photo diode 49- amorphous silicon, 50- flowing of glass followed by crystallisation, 51-f, 52-t, 53- f, 54- f, 55-t</p>	<p>range 0.732—1 generally  has CsCl structure. [     ]</p>
<p><b>CH-SOLID STATE---MISCELLANEOUS</b> <b>CARD -13</b> [1×5=5M]</p>	<p><b>CH-SOLID STATE---MISCELLANEOUS</b> <b>CARD -14</b> [1×5=5M]</p>
<p><b>WRITE TRUE OR FALSE .</b></p> <p><b>56#</b> Fe<sub>3</sub>O<sub>4</sub> is ferrimagnetic .Among the three type of arrangement , hcp,ccp,and bcc, the most efficient packing is bcc. [   ]</p> <p><b>57#</b> If the radius ratio is in the range 0.225—0.414 the cation prefers to be present in an octahedral void. [     ]</p> <p><b>58#</b> Diamond is an example of atomic solid. [   ]</p> <p><b>59#</b> Orthorhombic unit cell has least symmetry [ ]</p> <p><b>60#</b> F-centre is a type of stoichiometric defect.[ ] 56-f, 57-f, 58-t, 59-f, 60-t</p>	<p><b>WRITE TRUE OR FALSE .</b></p> <p><b>61#</b> 14 kinds of space lattices are possible in the crystal. [     ]</p> <p><b>62#</b> Pure alkali halides show Frenkel Defects . [   ]</p> <p><b>63#</b> When temperature increases conductivity of semi-conductor decreases. [   ]</p> <p><b>64#</b>Frenkel defect is shown by ionic substance in which there is a large difference in the size of ions[ ]</p> <p><b>65#</b> The existence of different chemical compounds in the same crystalline form is called allotropy. [   ] 61-t, 62-t, 63-f, 64-t, 65-f</p>

answersQ.26#	Q.27#	Q.28#	Q.29#	Q.30#
diamagnetic	ZnO	F-Centre ,Electron trapped in anion vacant centre	AgBr	minimizes
Q.31#	Q.32#	Q.33#	Q.34#	Q.35#
NaCl	ZnO	F-centre	13	Photo-diode
Q.36#	Q.37#	Q.38#	Q.39#	Q.40#
Rectifier	ReO <sub>3</sub>	Doping	Ferrimagnetism	p-type
Q.41#	Q.42#	Q.43#	Q.44#	Q.45#
Frenkel defect	Bands	Low	Carborundum	quartz
Q.46#.	Q.47#	Q.48#	Q.49#	Q.50#
ionic	covalent	photo-diode	Amorphous silicon	Due to some crystallization