Solid State

SET Self Evaluation Test - 5

1. Particles of quartz are packed by

(a) Electrical attraction forces

(b) Vander Waal's forces

(c) Covalent bond forces

(d) Strong electrostatic attraction forces

2. Crystals of covalent compounds always have **[BHU 1984]**

(a) Atoms as their structural units

(b) Molecules as structural units

(c) Ions held together by electrostatic forces

(d) High melting points

3. Wax is an example of

(a) Ionic crystal (b) Covalent crystal

(c) Metallic crystal (d) Molecular crystal

4. Among the following which crystal will be soft and have low melting point

(a) Covalent (b) Ionic

(c) Metallic (d) Molecular

5. In zinc blende structure, zinc atom fill up

(a) All octahedral holes

(b) All tetrahedral holes

(c) Half number of octahedral holes

(d) Half number of tetrahedral holes

6. Which ion has the lowest radius from the following ions

[Kurukshetra CEE 1998]

(a) Na^+ (b) Mg^{2+}

(c) Al^{3+} (d) Si^{4+}

7. The second order Bragg's diffraction of $X-$rays with $\lambda = 1\ \mathring{A}$ from a set of parallel planes in a metal occurs at an angle of 60^o. The distance between the scattering planes in the crystal is **[CBSE PMT 1**

(a) $0.575\ \mathring{A}$ (b) $1.00\ \mathring{A}$

(c) $2.00\ \mathring{A}$ (d) $1.15\ \mathring{A}$

8. The edge length of the unit cell of $NaCl$ crystal lattice is $552\ pm$. If ionic radius of sodium ion is $95\ pm$, what is the ionic radius of chloride ion **[KCET 1998]**

(a) $190\ pm$ (b) $368\ pm$

(c) $181\ pm$ (d) $276\ pm$

9. The ionic radii of Rb^+ and I^- are 1.46 Å and 2.16Å. the most probable type of structure exhibited by it is

[UPSEAT 2004]

(a) $CsCl$ type (b) ZnS type

(c) $NaCl$ type (d) CaF_2 type

10. The coordination number of a cation occupying a tetrahedral hole is

(a) 6 (b) 8

(c) 12 (d) 4

11. If a electron is present in place of anion in a crystal lattice, then it is called

(a) Frenkel defect

(b) Schottky defect

(c) Interstitial defects

(d) $F-$centre

Answers and Solutions

(SET -5)

1. (c) Quartz is a covalent solid in which constituent particles are atoms which are held together by covalent bond forces.

2. (a) Constituent particles of covalent compounds are atoms.

3. (d) Iodine crystals are molecular crystals, in which constituent particles are molecules having interparticle forces are Vander Waal's forces.

4. (d) Molecular crystals are soft and have low melting point.

5. (d) In zinc blende (ZnS) half number of tetrahedral holes are filled by zinc atoms.

6. (d) All are the iso-electronic species but Si^{4+} has high positive charge so have lowest radius.

7. (d) $2d\sin\theta = n\lambda$ or $2 \times d \times \sin 60° = 2 \times 1\,Å$

or $2 \times d \times 0.8660 = 2$

or $d = 1.15\,Å$ $(\sin 60° = \sqrt{3}/2$ or $0.8660)$.

8. (c) Distance between centres of Na^+ and Cl^-

$r_{Na^+} + r_{Cl^-} = 276\ pm$ or $95 + r_{Cl^-} = 276\ pm$

or $r_{Cl^-} = 276 - 95 = 181\ pm$

9. (c) $\frac{r_{c^+}}{r_{a^-}} = \frac{1.46}{2.16} = 0.676$

It permits co-ordination number 6 and octahedral structure of type $NaCl$.

10. (d) The co-ordination number of a cation occupying a tetrahedral hole is 4.

11. (d) When electrons are trapped in anion vacancies, these are called *F*-centres.

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