

## CHEMISTRY Paper-V

### (Inorganic Chemistry-B)

**Time Allowed : 3 Hours**

**Max. Marks : 22**

**Note:** Attempt five questions in all, including question No. 9 (Unit - V) which is compulsory and selecting one question each from Units I-IV.

#### Unit-I

- (a) Draw neat diagram for NaCl and CsCl structure. What is the basic difference between the two structures ?

(b) What are stoichiometric compounds ? Discuss the Frenkel defects. 2,2
- (a) What are semiconductors ? Discuss mechanism of intrinsic and extrinsic semiconductors.

(b) (i) What are the limitations of radius ratio rule ?

(ii) A solid is made up of two elements X and Y. Atomic Y are in CCP arrangement while atoms X occur all the tetrahedral sites. What is the formula of the compound ? 2,2

#### Unit-II

- (a) What is hydrogen bond ? Discuss two types of hydrogen bonds. Give two examples of each type.

(b) Calculate the lattice energy of KCl crystal from the following data

Sublimation energy of K (S) = 102.5 kJ/mol

Dissociation energy of Cl<sub>2</sub> (D) = 230.5 kJ/mol

Ionization energy of K (g) (I) = 450.6 kJ/mol

Electron affinity of Cl(g) (E) = -350.2 kJ/mol

Heat of formation of KCl (4H<sub>2</sub>) = -420.4 kJ/mol. 2,2

4. (a) Why solubilities of halides of silver in water are low while that of alkali-metal halides are very high ?
- (b) Explain different types of van der Waals forces. 2,2

### Unit - III

5. (a) (i) Boron forms no compounds in unipositive state but lithium in unipositive state is quite stable.

(ii) What happens when boric acid is heated to redness ? Write the reaction.

(b) Discuss the structure of borazine. Why is it called inorganic benzene. 2,2

6. (a) Explain the following :

(i) [AlF<sub>6</sub>]<sup>3-</sup> exists whereas [BF<sub>6</sub>]<sup>3-</sup> does not.

(ii) How do the carbides CaC<sub>2</sub> and Al<sub>4</sub>C<sub>3</sub> differ ?

(b) (i) Define diagonal relationship. Give resemblance between boron and silicon.

(ii) What are fluorocarbons ? Name one fluorocarbon which is used as a refrigerant. 2,2

### Unit - IV

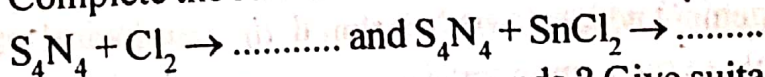
7. (a) Discuss the structure of OF<sub>2</sub>. Why is the bond angle of OF<sub>2</sub> molecule smaller than that of Cl<sub>2</sub>O ?

(b) (i) Write two reactions of H<sub>2</sub>SO<sub>4</sub> acts as an oxidising agent.

(ii) Why SF<sub>6</sub> has zero dipole moment while SF<sub>4</sub> has non-zero dipole moment ? 2,2

8. (a) (i) Write formulae of oxoacids of chlorine. Explain the trend of their acid strength giving reason.

(ii) Complete the reaction :



(b) (i) What are interhalogen compounds ? Give suitable example.

(ii) I<sub>3</sub><sup>-</sup> is known whereas F<sub>3</sub><sup>-</sup> is not known. Why ? 2,2

### Unit - V

9. (a) The radii of Mg<sup>++</sup> and O<sup>--</sup> are 0.66 Å and 1.40 Å. Predict the probable type of the site occupied by Mg<sup>++</sup> ions.

(b) Cu<sup>+</sup> and Na<sup>+</sup> are of the same size but CuCl is insoluble while NaCl is soluble in water. Explain.

- (c) How many pentagonal and hexagonal faces are present in  $C_{70}$  and  $C_{76}$  fullerenes ?
- (d) Which out of  $CCl_4$  and  $SiCl_4$  can be easily hydrolysed and why ?
- (e) Why bleaching action of  $SO_2$  is temporary process ?
- (f) Why concentrated nitric acid becomes yellow on exposure to sunlight ?

$6 \times 1 = 6$