PG – 346

I Semester M.Sc. Degree Examination, Jan./Feb. 2014
(2010-11 Scheme) (NS)
CHEMISTRY
C – 101 : Inorganic Chemistry – I

Time : 3 Hours Max. Marks : 80

Instruction : *Answer question No. **1** and **any five** of the remaining.*

1. Answer **any ten** of the following : **(10×2=20)**

   a) Explain Bent's rule.

   b) How are $\sigma-$, $\Pi-$ and $\delta-$ molecular orbitals formed ?

   c) The electronegativities of A, B, C and D are 3.8, 3.3, 2.8 and 1.3 respectively. Place the compounds AB, AD, BD and AC in order of increasing covalent character.

   d) Explain why Li^+ has higher hydration energy than that of K^+.

   e) What is synergic bond ? Explain with an example.

   f) How is S_4N_4 obtained ? Draw its structure.

   g) What are molecular sieves ? Give the composition of ZSM-5.

   h) Explain the term super acids with an example.

   i) Give the significance of the term 'n/p ratio'.

   j) A borane has a *styx* code 4120. Name the borane and draw its structure.

   k) What are Lewis acids and bases ? Explain with examples.

   l) With respect to sulfur, explain the term polymorphism.

2. a) What is meant by partial ionic character of covalent bonds ? How is this related to electronegativity ?

   b) Outline the concept of VSEPR model. Based on it, discuss the shapes of ClF_3, SF_4 and BrF_5.

   c) Draw the resonance structures for $OC\bar{N}$ and $CN\bar{O}$ and assign formal charges.

(4+4+4=12)

P.T.O.

3. a) Explain why crystals of ionic compounds are relatively hard and brittle.
   b) Using Slater's rule, calculate the effective nuclear charge experienced by one of the d-electrons in vanadium.
   c) Depict a Walsh diagram for AH_2 molecule and based on it explain the shape of water molecule. **(4+4+4=12)**

4. a) How are trimeric and tetrameric cyclophosphazenes prepared ? Write the structure of the trimer and explain its bonding.
   b) Discuss the structure and bonding in borazine.
   c) Explain the leveling effect of solvents. **(5+4+3=12)**

5. a) Describe critically the preparation, properties and structure of heteropoly acids of molybdenum.
   b) Give the classification of condensed phosphates and mention their characteristics.
   c) Write a short note on shell model. **(5+4+3=12)**

6. a) How does N_2O_4 auto-ionize ? Discuss its role in preparing anhydrous metal nitrates.
   b) Discuss the classification and structures of silicates.
   c) Explain Wade's rules and their use in the classification of boranes and carboranes. **(3+5+4=12)**

7. a) Based on HSAB concept, explain the following :
   Will Cu^{2+} react more strongly with HO^- or NH_3 ? With O^{2-} or S^{2-} ?
   b) Write briefly on the reactions studied in bromine trifluoride solvent.
   c) Give a comprehensive note on liquid drop model of nucleus. **(4+4+4=12)**
