RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY-JUNE 2013

FIRST YEAR

Date : 21/5/2013 **CHEMISTRY (Honours)**

Time : 11 am – 1 pm Paper : II Full Marks : 25

Group – C

Unit - I

Answer **any one** question :

1. a) Write Bent's rule. Applying Bent's rule, discuss the shape and hybridisation of ClF_3. [2+2]
   b) Give an elementary idea about stoichiometric defects in ionic crystals. What are the consequences of such defects? [2+2]
   c) Find out the limiting radius ratio for tetrahedral coordination in a closed packed lattice. [2]
   d) Comment on the following : [1½×2]
      i) K^+ and F^- have similar ionic radius value but one posses higher hydration energy.
      ii) Solubility of $NaClO_4$ and $KClO_4$ in water.

2. a) Write down the limitations of VSEPR theory. [3]
   b) Define Lattice energy and write down the Born-Lande equation for NaCl type crystal. Explain the terms present. [1+2+1]
   c) The NO_2^- and NO_2^+ have different shapes and bond angles. Discuss their structures and bond angles. Compare them with the neutral NO_2 molecule. [4]
   d) Explain the effect of polarising power and polarisability on the properties of ionic compounds. [2]

Unit - II

Answer **any one** question :

3. a) How can you extract Beryllium from one of its most important ore. Write down the composition of the ore and the reactions involved in the above mentioned extraction. [2+1+1]
   b) The sequence of stability constants of the complexes between Group-1 cations and 18-crown-6 ether follows the order : $K^+ > Rb^+ > Cs^+$; $Na^+ > Li^+$. Give an explanation. [3]
   c) How is sodide ion (Na^-) stabilised in solution? [2]
   d) Write notes on 'hydrides'. [3]

4. a) Describe the structure and bonding of beryllium (II) chloride in vapour state and in solid state. [1+2]
   b) What do you mean by (i) purple of cassius and (ii) fulminating gold? [2]
   c) Write notes on the comparative studies of coinage metals with respect to physical properties and compound formation. [4]
   d) From your knowledge of the chemistry of Calcium and the general trends in group-2, predict the chemistry of radium. Confine your answer to a discussion on the following : [3]
      i) reactivity of radium metal (excluding its radioactivity)
      ii) the mature and reactivity of its oxide and hydride
      iii) the solubility of sulphate with respect to that of barium.