# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College under University of Calcutta)**

**B.A./B.Sc. SECOND SEMESTER EXAMINATION, MAY 2015**

**FIRST YEAR**

Date : 22/05/2015 **CHEMISTRY (Honours)**

Time : 11 am – 12 noon Paper : II Full Marks : 25

## Group – C

### Unit - I

[*Answer **any one** question*]

1. a) What is Bent's rule? Illustrate with an example how it correlates with VSEPR theory. [2+1]

   b) Calculate the limiting ratio for the coordination number 8. From the radius $\frac{r_+}{r_-}$ value CdS(0·52) and HgS(0·55), it is expected to adopt the NaCl structure, but they are actually crystlline with ZnS structure. Explain. [2+2]

   c) Using appropriate rule, predict the position of O and F atoms in the structure of $OSF_4$. [3]

   d) Draw the possible resonance structures of $NO_3^-$ and indicate with reasons which one will make the greatest contribution in real structure. [3]

2. a) Using VSEPR theory, write the possible structures of $ClF_3$ and predict the most favoured structure with reason. [3]

   b) Discuss the differences between Schöttky and Frenkel defects with examples. [3]

   c) The formation of NaCl is described by the following equation

   $$Na(s) + \frac{1}{2}Cl_2(g) \rightarrow NaCl(s)$$

   Establish the formation of NaCl(s) from Born-Haber cycle. [3]

   d) ZnO on heating turns yellow but becomes white on cooling. Explain. [2]

   e) Show the limiting radius ratio of a planar trigonal lattice is 0·155. [2]

### Unit - II

[*Answer **any one** question*]

3. a) Au can form $Au^-$ (auride) despite a metal. Explain this. [3]

   b) BeO is water insoluble but dissolves in the presence of $BeSO_4$. Write down the structure of the product which bears the responsibility of enhanced solubility of BeO. [2]

   c) Mention the important differences of Li from the remaining Group 1 metals. [2]

   d) Crown-4 selectively complexes with $Li^+$, Crown-5 complexes with $Na^+$ and Crown-6 complexes with $K^+$. Explain. [3]

   e) Discuss the complex formation ability of $M^{2+}$ ions where M = Be to Ba. [2]

4. a) What is inert pair effect? give example. [2]

   b) Discuss the structure of basic beryllium acetate. [2]

   c) Compare the $E^o$ values for $M^+_{aq} + e \rightleftharpoons M^o$ for M = Li to Cs and draw the conclusion on reducing power of M with reasons. [3]

   d) What happens when (give balanced equations)—

   i) KCN is added to copper sulphate solution.

   ii) Silver nitrate solution is added to sodium thiosulphate solution. [3]

   e) Which one is stronger acid among the following : $Na(H_2O)^+_x$ and $Ag(H_2O)^+_x$. Give reasons. [2]

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