RAMAKRISHNA MISSION VIDYAMANDIRA

(A Residential Autonomous College under University of Calcutta)

First Year

First-Semester Examination, December 2010

Date : 18-12-2010 **CHEMISTRY (General)** Full Marks : 25

Time : 10am – 11am **Paper - I**

UNIT – I

(Answer <u>any three</u> questions)

1. a) HF is a monobasic acid but how does it form salts like KHF_2?
   b) Predict the structures of the following compounds by VSEPR rule.
   (i) BeF_2, (ii) NF_3, (iii) CF_4 [2+3]

2. a) Give the IUPAC names of the following coordination compounds.
   (i) $[Co(NH_3)_5Cl]Cl_2$ (ii) $Na_2[Fe(CN)_5NO]$
   b) What are metal chelates? Give an example. Give one use of a metal chelate in analytical chemistry. [2+3]

3. a) Compare the thermal stability of the alkaline earth metal carbonates.
   b) Write down the Werner's theory. Illustrate it with an example. [2+(2+1)]

4. a) What do you mean by radius ratio rule?
   b) Using the radius ratio rule, determine the coordination numbers of both the cation and the anion in CsBr. The radii of the ions (Å) are as follows : $Cs^+ = 1{\cdot}69$, $Br^- = 1{\cdot}95$ [2+3]

5. a) Define Lattice energy and mention its applications.
   b) Calculate the lattice energy of sodium chloride from the data given below:

Sublimation energy of sodium	=	109
Ionisation energy of sodium	=	496
Dissociation energy of chlorine	=	244
Electron affinity of chlorine	=	–348
Heat of formation of sodium chloride	=	–411

(The energy values are given in KJ/mole unit) [2+3]

UNIT – II

(Answer <u>any two</u> questions)

6. a) What is Tollen's reagent? How is it prepared?
   b) A compound having molecular formula $C_7H_6O_3$ gives the following reactions :
   i) It gives a deep violet colour with alcoholic $FeCl_3$.
   ii) It evolves CO_2 from a saturated solution of $NaHCO_3$
   iii) It decomposes on heating to give phenol.
   Deduce the structure of the compound giving reasons. [2+3]

7. a) Write down the reactions for the test of nitrogen as a special element in Lassaigne's test.
   b) Why a sample of organic compound containing nitrogen, is necessary to boil the Na-metal extract with conc. HNO_3 before the $AgNO_3$ test for chlorine element? [3+2]

8. a) How will you detect the nitro group in p-nitroaniline?
   b) What happens when—
      i) Alcoholic solution of phenol reacts with freshly prepared ferric chloride solution.
      ii) p-hydroxy-m-methoxy benzaldehyde reacts with Tollen's reagent. [2+(1½+1½)]