



EASTERN UNIVERSITY, SRI LANKA

FIRST SEMESTER SECOND EXAMINATION IN SCIENCE

2009/2010 (JUNE – JULY 2011)

CH 201: COORDINATION CHEMISTRY AND MAIN GROUP CHEMISTRY
(Proper & Repeat)

Answer all questions

Time Allowed: One hour

1. (a) Indicate the type of isomerism exhibited by the following complexes and draw structures for these isomers.
- $[\text{Cr}(\text{H}_2\text{O})_6]_3\text{H}_2\text{O}$
 - $[\text{Co}(\text{en})_3]\text{Cl}_3$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$
 - $\text{PtCl}_2(\text{NH}_3)(\text{H}_2\text{O})$
- (b) Define the following terms with suitable example. (30 Marks)
- Ligand
 - John-Teller effect
- (c) What are the limitations of the valence bond theory? (30 Marks)
- (d) Give the IUPAC names of following co-ordination compounds. (20 Marks)
- $[\text{Co}(\text{ONO})(\text{NH}_3)_5]\text{SO}_4$
 - $[\text{Cr}(\text{NH}_3)_6]\text{Cl}$
 - $[\text{Co}(\text{C}_2\text{O}_4)(\text{en})_2]\text{Cl}$
 - $\text{H}[\text{AuCl}_4]$
2. (a) Explain why the $\text{Co}(\text{NH}_3)_6^{3+}$ ion is a diamagnetic, low spin complex, whereas the CoF_6^{3-} ion is a paramagnetic, high spin complex. (20 Marks)
- (b) Draw energy level diagrams and indicate the occupancy of the d -orbitals in the following complexes: (20 Marks)
- d^6 , octahedral, low-spin
 - d^8 , square planar

Contd.

(c) Calculate the crystal field stabilization energy for a d^8 ion such as Ni^{2+} in octahedral and tetrahedral complexes. Use units of Δ_0 in both cases. Which is the most stable? State if any assumptions made. (20 Marks)

(d) Hydrogen can be placed with alkali metals or with halogens. Give four reasons for each and explain why it is placed in period I. (20 Marks)

(e) Give the properties in which lithium resembles with Mg. (20 Marks)