

Eastern University, Sri Lanka

Second Year First Semester Examination in Science-2008/2009

(May/July 2012)

External Degree

EXTCH201 COORDINATION CHEMISTRY AND MAIN GROUP CHEMISTRY

(Proper and Repeat)

Answer all questions

Time: 01 hour

1. (a) Define the following terms.

- i. Ligand
- ii. Co-ordination number

(10 Marks)

(b) Discuss the following isomerisms in co-ordination compounds.

- i. Ionisation Isomerism
- ii. Hydrate Isomerism
- iii. Linkage Isomerism

(30 Marks)

(c) Write down the structures of following polynuclear complexes.

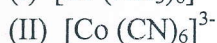
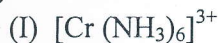
- i. Decaammine- μ -hydroxodichromium(III) bromide
- ii. Tetrakis(ethylenediammine)- μ -amido- μ -hydroxo-dicobalt(III) sulphate
- iii. Tetracarbonylnickel(0)

(15 Marks)

(d) i. Give the postulates of Valence-Bond theory (VBT) of co-ordination compounds.

(05 Marks)

ii. Discuss the formation of following complex ions by using the valence-bond theory.



(20 Marks)

(e) Briefly explain the following by using the Crystal Field Theory.

- i. While $[\text{Co}(\text{NH}_3)_6]^{3+}$ is diamagnetic
- ii. While $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is strongly paramagnetic $[\text{Fe}(\text{CN})_6]^{3-}$ is less paramagnetic

(20 Marks)

Contd...

2. (a) Calculate crystal field stabilization energy (CFSE) (in Δ_o) for d^5 (tetrahedral) in a strong ligand field. (20 M)
- (b) Explain the magnetic moment of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is 5.92 B.M and that of $[\text{Fe}(\text{CN})_6]^{3-}$ is 1.73 B.M by using the Crystal Field theory. (20 M)
- (c) Draw a energy level diagram and indicate the occupancy of the d -orbitals in the following complexes.
a. d^6 , octahedral, high-spin
b. d^8 , square planar (20 M)
- (d) Give four reasons for each why the hydrogen can be placed with alkali metals as well as with halogens also. Explain why it is placed in period 1. (20 M)
- (e) Give the properties in which lithium resembles with Mg. (10 M)
- (f) List out five uses of hydrogen. (10 M)
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