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Eastern University, Sri Lanka.

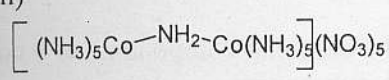
EASTERN UNIVERSITY, SRI LANKA

SECOND EXAMINATION IN SCIENCE – EXTERNAL DEGREE

1998/ 99 (Term System) (March 2010) – Re-Repeat

EXCH 201 MAIN GROUP CHEMISTRY, ANALYTICAL CHEMISTRY AND COORDINATION CHEMISTRY

Answer Four questions only **Time: 2 hours**

1) a) Write the IUPAC name of the following compounds.
   i) $[Al(OH)(H_2O)_5]^+$
   ii) $[Cr(H_2O)_6]Cl_3$
   iii) 

   b) Write the molecular formula of the following compounds.
   i) Pentaamminenitritocobalt(III) nitrate
   ii) Hexaamminecobalt(III) chloride.sulphate
   iii) Pentaamminechlorocobalt(III) ion

2) a) Draw a labeled diagram to show how the energies of d – orbitals are affected by an octahedral arrangement of ligands.

   b) Calculate the crystal field stabilization energy (in cm^{-1}) for $[Co(NH_3)_6]^{2+}$. (Δ oct = 10,200 cm^{-1})

3) a) Draw the geometrical isomer of the following compounds
   i) $[Co(en)_2(ox)]^+$ ii) $[Co(NH_3)_4Cl_2]^{2+}$

   b) The hexaquomanganese(II) ion contains five unpaired electrons, while the hexacyano-ion contains only one unpaired electron. Explain, using Crystal Field Theory.

4) a) List out five uses of hydrogen.

   b) List out four similarities and dissimilarities between elements of sub group I^A and II^A.

Turn Over

5) (i) What is meant by "solvent extraction"

(ii) V_{aq} ml of aqueous solution containing a_o mol of solute A is brought into contac with V_{org} ml of immiscible organic solvent. At equilibrium a_1 mol of solute A remains in the aqueous layer. If so, derive the following expression

$$a_1 = \frac{a_o.Vaq}{Vaq + Vorg.K}$$

Where K is the partition coefficient of A between organic layer and aqueou layer.

6) (a) (i) Write down the expression of Beer-Lambert's law and explain all the term involved.

(ii) How would you apply the Beer-Lambert's law to determine the concentratio of a solute B as the only absorbing species in an unknown sample?

(b) Draw a fully labeled diagram to show the essential components of a colorimete and explain briefly the functions of each component.

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