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Eastern Uni

**EASTERN UNIVERSITY, SRI LANKA - MAY 2000**  
**SECOND EXAMINATION IN SCIENCE (FIRST SEMESTER) 2000/2001**  
**CH 201 - CO-ORDINATION CHEMISTRY AND MAIN GROUP CHEMISTRY**

Answer all questions.

Time allowed: 01 Hour.

1. a) Write the IUPAC names of the following coordination compounds

- i)  $[Co(NH_3)_6]Cl_3$
- ii)  $[Co(SO_4)(NH_3)_4]NO_3$
- iii)  $Na_3[Co(NO_2)_6]$
- iv)  $[Cr(en)_3]Cl_3$
- v)  $Na_4[Co(C_2O_4)_3]$

b) Write the formula for each of the following complexes.

- i) Tetracarbonylnickel(0).
- ii) Tetrakis(pyridine)platinum(II) tetrachloroplatinate(II).
- iii) Pentamminenitritocobalt(III) sulphate.
- iv) Tetrakis(ethylenediammine)- $\mu$ -amido- $\mu$ -hydroxodicobalt(II) sulphate.

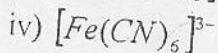
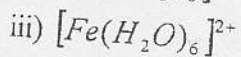
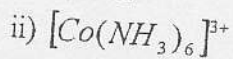
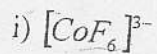
c) Briefly describe, giving at least one example in each case, the methods by which the presence of complex ions may be detected in solution.

d) i) Draw the shapes of the various d orbitals. Explain why they are split into two groups  $t_{2g}$  and  $e_g$  in an octahedral ligand field.

ii) Draw an energy level diagram to show how the degeneracy of the 3d orbitals is removed in an octahedral ligand field.

Cont.....

2) a) Calculate the Crystal Field Stabilization Energy (CFSE) of the following complexes:



( atomic number Fe = 26; Co = 27 )

What would be the expected value of magnetic moment for each of the above complexes?

b) In the crystal structure of  $\text{CuF}_2$ , the ion,  $\text{Cu}^{2+}$  is six coordinate with four F<sup>-</sup> at a distance of 1.93 Å and two F<sup>-</sup> at 2.27 Å. Explain the reason(s) for this observations.

c) What methods could be used to distinguish between cis and trans isomers of a square planar complex?

d) i) Suggest reasons for the inclusion of Hydrogen in the alkali metal group and in the halogen group of the periodic table.

ii) How does fluorine differ from the other elements in Group VII?

iii) Out line the chief points of similarities between fluorine and oxygen.