



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTE OF OPEN, DISTANCE AND E-LEARNING

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 301: COORDINATION AND ORGANOMETALLIC CHEMISTRY

DATE: Friday 8th July, 2011

TIME: 11.00 a.m. – 1.00 p.m.

INSTRUCTIONS

Answer *ALL* questions.

1. (a) Identify the co-ordination complexes in the following substances and, in case, draw the structure of the species described as co-ordination complex:-
(i) $\text{FeSO}_4 \cdot 6\text{H}_2\text{O}$ (ii) Na_3AlF_6 (iii) $\text{Cr}(\text{NH}_3)_4(\text{H}_2\text{O})_2 \cdot 2\text{Cl}$
(iv) K_3TiCl_6 (v) CsReO_4 [20 marks]
2. Give an example of:-
(i) A square planar complex and
(ii) Three types of octahedral complexes which show geometrical isomerism and, in each case, give specific examples of the complexes showing the isomerism and the systematic IUPAC way of naming these complexes. [20 marks]
3. (a) The cobalt complex, $[\text{Co}(\text{CNCH}_3)_6]^{2+}$ is organometallic. On the other hand, the complex, $[\text{Co}(\text{NCCH}_3)_6]^{2+}$ is not. Explain. [5 marks]
(b) Give examples of three substances which can be described as organometallic containing
(i) Iron as the central atom
(ii) Nickel as the central atom
(iii) Magnesium as the central atom briefly how each of them can be prepared. [15 marks]
[Total for Q3... 20 marks]
4. Outline briefly the crystal field theory stating clearly how its strong and weak points. [10 marks]

5. (a) Write a balanced chemical equation to show the products formed when NiCO_3 is dissolved in dilute sulphuric acid. [6 marks]
- (b) A portion of the solution formed is made strongly acidic with concentrated hydrochloric acid. To another portion, excess potassium cyanide is added.
- (i) Write equations to show reactions taking place in each case. [6 marks]
- (ii) Write the formulae and draw structures of the complexes formed in each case. [12 marks]
- (iii) Suggest with reasons, which of these complexes are likely to be paramagnetic or diamagnetic. [6 marks]
- [Total for Q4... 30 marks]

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