LUKENYA UNIVERSITY

UNIVERSITY EXAMINATIONS FOR THE AWARD OF THE DEGREE OF BACHELOR OF EDUCATION

2021/2022 ACADEMIC YEAR

MAY SEMESTER 2022

UNIT CODE: LSCH 3204

UNIT TITLE: COORDINATION CHEMISTRY

DATE: AUGUST 2022 **TIME: 2 HOURS**

INSTRUCTIONS

1. Answer **question one** and **any other two** questions
2. Do **not** write anything on this question paper
3. Do **not** write in the page margins of the answer booklet
4. Begin each question answer on a new page

QUESTION 1 (COMPULSORY) (30 MARKS)

(a) Explain the bonding in coordination compounds in terms of Werner's postulates. (6 marks)

(b) Citing reasons, indicate whether Boron, F^- and Fe^{2+} ions are paramagnetic or diamagnetic (6 marks)

(c) Explain the following terms as used in the study of coordination chemistry mentioning an example for each. (8 marks)

(i) Coordination entity

(ii) Coordination sphere

(iii) Unidentate Ligands

(iv) Chelate

d) Briefly discuss the properties of soft acids and soft bases. (4 marks)

e) Explain the definition of acid and base according to Lewis and its failures. (4 marks)

f) Using your own words give the importance of studying coordination chemistry. (2 marks)

QUESTION 2 (20 MARKS)

a) Using IUPAC norms write the systematic names of the following coordination complexes.

(i) $[Co(NH_3)_6]Cl_3$

(ii) $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$

(iii) $[Ti(H_2O)_6]^{3+}$

(iv) $[Co(NH_3)_4Cl(NO_2)]Cl$

(v) $[Mn(H_2O)_6]^{2+}$

(2 marks each=10 marks)

(b) During reactions of inorganic compounds, the rates and mechanisms can be labile or inert. Explain these terms and discuss any two factors that may cause complex to be either labile or inert.

(8 marks)

(c) Expound on chain theory postulated by Blomstrand. (2 marks)

QUESTION 3 (20 MARKS)

(a) Discuss each of the following types of isomerism in reference to coordination complexes

i. Geometric or stereoisomerism

ii. Linkage isomerism

iii. Coordination isomerism

iv. Ionization isomerism

v. Solvate isomerism

(2 marks each=10 marks)

(b) Discuss the three types of ligand Substitution Mechanisms (6 marks)

(c) Differentiate between Trans influence and Trans effect in chemistry as factors that contribute to trans direction of a reaction. (4 marks)

QUESTION 4 (20 MARKS)

(a) Discuss the application of HSAB principle in chemistry and state its limitations (10 marks)

(b) Describe the limitations of valence bond theory in coordination compounds. (10 marks)

QUESTION 5 (20 MARKS)

(a) . Briefly describe the metal -ligand theories postulated in coordination chemistry.

(10 marks)

(b) .Discuss four factors that affect the extent of splitting of the d-orbitals by ligands

(8 marks)

(c) State the Limitations of Werner's Theory in development of coordination chemistry.

(2 marks)