CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN CHEMISTRY

CHEM 816: ADVANCED INORGANIC REACTION MECHANISM

STREAMS: BSC. CHEM **TIME: 3 HOURS**

DAY/DATE: THURSDAY 19/12/2024 **2.30 P.M. – 5.30 P.M.**

INSTRUCTIONS:

- **Answer all the questions**

QUESTION ONE (20 MARKS)

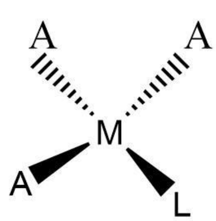
a) Differentiate between thermodynamic stability and kinetic stability (4 marks)

b) Discuss the outer orbital and inner orbital complexes according to the Valence Bond Theory (4 marks)

c) Write short notes on the labile and inert complexes according to the Crystal Field Stabilization Energy (3 marks)

d) Discuss two factors affecting the kinetic stability or lability of non-transition metal complexes (4 marks)

e) Using the following complexes, draw the Berry-Pseudo rotation in the ligand displacement of square Planar complexes (5 marks)



QUESTION TWO (20 MARKS)

a) Write the three assumptions of the calculations of Crystal Field Stabilization Theory (3 marks)

b) Discuss the following ligand displacement mechanism in octahedral complexes:

  i) Dissociative or SN1mechanism (3 marks)

  ii) Associative or SN2 mechanism (3 marks)

c) Using a suitable example discuss metal aquo complexes (3 marks)

d) Discuss two important reaction of metal aquo complexes (4 marks)

e) Using suitable equation differentiate between Base and Acid hydrolysis (4 marks)

QUESTION THREE (20 MARKS)

a) Discuss ligand displacement reaction in Square Planar Complexes using a suitable example (3marks)

b) Discuss:

  i) Trans effect (3 marks)

  ii) Thermodynamic trans effect or Trans influence (3 marks)

c) Write short notes on Inner Sphere reactions (3 marks)

d) i) Discuss Outer Sphere reactions (3 marks)

  ii) Write three criteria on how to recognize outer sphere reactions (3 marks)

e) Using a suitable example discuss complementary redox reactions (2 marks)

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