CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF BACHELOR OF SCIENCE

CHEMISTRY

CHEM 817 : ADVANCED INORGANIC SYNTHESIS

STREAMS: BSc. **TIME: 2 HOURS**

DAY/DATE: MONDAY 20/04/2020 **11.30 A.M – 1.30 P.M.**

INSTRUCTIONS

- Answer All Questions

QUESTION ONE [20 MARKS]

a) Discuss the properties of the following central metal atom or ions that affect the stability of transition metal complexes. [6 Marks]

b) (i) Briefly explain photochemical reactions. [2 Marks]

(ii) Give three advantages of photochemical syntheses of organometallic complexes. [3 Marks]

c) Using relevant equations explain the following terms. [9 Marks]

(i) Photon energy

(ii) Molar absorbed photon energy

(iii) Quantum yield

QUESTION TWO [20 MARKS]

a) Discuss two light sources used for photochemical reactions. [4 Marks]

b) (i) Explain the Kubelka-Munk equation [3 Marks]

(ii) Give the Kubelka-Munk equation when the scattering coefficient (S) is a constant. [2 Marks]

c) Explain the following terms used in photochemical synthesis using a suitable example.

(i) Photosubstitution [3 Marks]

(ii) Photo-isomerization. [3 Marks]

(iii) Photochemical synthesis via photosensitization. [3 Marks]

d) Briefly explain the direct synthesis method of coordination compounds. [2 Marks]\

QUESTION THREE [20 MARKS]

a) Briefly discuss two properties of attached ligands that affect the stability of the transition metal complexes. [4 Marks]

b) Briefly explain the following terms using a suitable example.

i) Metal vapor synthesis (MVS) of coordination compounds. [3 Marks]

ii) Metal exchange [3 Marks]

iii) Complexation of ligands with metal precursors. [3 Marks]

c) Write short notes on the following:

i) Complexes with Metal-Carbon multiple bonds. [3 Marks]

ii) Ligand substitution [3 Marks]

d) Complete the following reaction. [1 Mark]

$$Fe + 5CO \xrightarrow[200\text{ degrees centigrade}]{200\text{ atm}} A \xrightarrow{\text{Light}} B$$