



National Open University of Nigeria|
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi – Abuja
Faculty of Science
Department of Pure & Applied Science
2020_2 Examination...

CHM423: Coordination Chemistry

CREDIT UNIT: 3 Units

TIME: 2 ½ HOURS

INSTRUCTION: ANSWER QUESTION ONE & ANY OTHER FOUR QUESTIONS

Question 1

Q1. a) Mention one metal complex biological molecule in plant and its central metal (3 marks)

b) Provide the IUPAC name of $K_4 [Fe(SCN)_6]$ and oxidation state of Fe therein (3 marks)

c) Give detailed account of titanium purification using complex reaction (4 marks)

d) Differentiate between cis- and trans-diamminedichloroplatinum(II) structurally (4 marks)

e) In concise term, describe valence bond theory. What are its two limitations? (4 marks)

f) Calculate the total number (N) of microstates for d^2 configuration (4 marks)

Q2. a) Differentiate between electrolyte and non-electrolyte complex (3 marks)

b) What is the full meaning of EDTA? Hence, state its function in food production

(3 marks)

c) Under substitution reaction condition complete the following equations:



Q3. a) With the aid of chemical test, distinguish between underlisted pair of complexes:



b) Distinguish between dextrorotary and leavorotatory enantiomers (4 marks)

c) What are the central metals in the following biomolecular complexes: (4 marks)

- (i) Chlorophyll
- (ii) Vitamin B₁₂
- (iii) Haemoglobin
- (iv) Myoglobin

- Q4. a) State Lenz's Law? Hence, provide the mathematical expression for it (4 marks)
- b) With the aid of complexation reaction, explain how to purify Nickel (4 marks)
- c) List two titanium complexes and one use of each in medicine (4 marks)
- Q5. a) Explain three factors affecting crystal field splitting (6 marks)
- b) Provide the IUPAC name of the following complexes
- (i) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ (2 marks)
 - (ii) $[\text{Co}(\text{H}_2\text{NCH}_2\text{CH}_2\text{NH}_2)_2\text{Cl}_2]\text{Cl}$ (2 marks)
- c) What is a racemic mixture? Hence, why is it not optically active? (2 marks)
- Q6 a) How will you prepare $\text{K}_3[\text{Rh}(\text{ox})_3]$ from kinetically inert $\text{K}_3[\text{RhCl}_6]$? (4 marks)
- b) Predict number of unpaired electron(s) in the following complexes:
- (i) $[\text{Fe}(\text{CN})_6]^{4-}$ (2 marks)
 - (ii) $[\text{V}(\text{NH}_3)_6]_2$ (2 marks)
- c) Calculate spin-only magnetic moment of $[\text{V}(\text{NH}_3)_6]_2$ at 300K (4 marks)