



National Open University of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science
Department of Pure & Applied Science
2023_2 EXAMINATIONS

CHM423: Coordination Chemistry

CREDIT UNIT: 3 Units

TIME: 3 HOURS

INSTRUCTION: ANSWER QUESTION ONE AND ANY OTHER FOUR QUESTIONS

QUESTION 1

- (a) Discuss infrared spectroscopy as an example of vibrational spectroscopy used in the investigation of complexes (6 marks)
- (b) Explain the reaction of metal salts as an example of the preparation and reaction of complexes (4 marks)
- (c) Distinguish between the stability of a complex and thermodynamic stability of a complex. (4 marks)
- (d) Give a concise account of the assumptions of Valence Bond Theory (VBT) on the formation of complexes. (8 marks)

Question 2

- Q2 a) Describe the preparation of $K_3[Rh(ox)_3]$ from kinetically inert $K_3[RhCl_6]$? (4 marks)
- b) Identify the number of unpaired electron(s) in the complexes listed below:
- (i) $[Fe(CN)_6]^{4-}$ (2 marks)
- (ii) $[V(NH_3)_6]^{2+}$ (2 marks)
- c) What is the spin-only magnetic moment of $[V(NH_3)_6]^{2+}$ at 300 kelvin? (4 marks)

Question 3. Copy and complete the Table below regarding coordination compounds (12 marks)

Complex	Central Metal/Ion	Anion/Molecule	Valence of the Metal
$[Ni(CO)_4]$	_____	_____	_____
$[Fe(CN)_6]^{3-}$	_____	_____	_____
$[Ag(NH_3)_2]^+$	_____	_____	_____
$[Cu(H_2O)_6]^{2+}$	_____	_____	_____

Question 4

- (a) Explain the term optical isomerism. (4 marks)
- (b) Distinguish between dextrorotatory and levorotatory enantiomers. (4 marks)
- (c) Explain the crystal field theory (4 marks)

Question 5

- (a) Distinguish between Electrolyte and non- electrolyte complexes based on the work of Werner (7 marks)
- (b) Explain the application of coordination compounds in medicine (5 marks)

Question 6

- (a) Discuss the absorptions in the near-infrared region (4 marks)
- (b) Explain the purification of metals as one of applications of coordination compounds (4 marks)
- (c) Discuss the factors affecting crystal field splitting (4 marks)