

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

FIRST SEMESTER EXAMINATION

CH314 – ADVANCED ANALYTICAL CHEMISTRY

TUESDAY 8th JUNE 2021 – 12:50 PM

TIME ALLOWED: 2 HOURS

INFORMATION FOR CANDIDATES:-

1. You will have 10 minutes to read the question paper. You **MUST NOT** begin writing in the answer book during this time
2. **ANSWER ALL QUESTIONS**
3. All answers **MUST** be written on the answer book provided
4. Calculators are permitted in the examination room. Lecture notes, notebooks plain papers and textbooks are **NOT** allowed
5. Mobile phones are not allowed. **SWITCH OFF THE MOBILE PHONES**
6. Show all workings and calculations in the answer book.
7. **DRAW the STRUCTURES** clear and visible
8. **DO NOT** over write
9. Write your name and number clearly on the front page. **DO IT NOW**

MARKING SCHEME:

Total 50 marks

1. a) Describe relative supersaturation (RSS). What are the optimum conditions that are required to maintain supersaturation as low? [4 marks]
- b) Why does precipitation needs a digestion process? [3 marks]
- c) In the gravimetric determination of Zn (At. wt. = 65) sample, Zn is precipitated as $Zn_2[Fe(CN)_6]$ (Mwt. = 342).
- (i) Calculate the weight of Zn in a sample which gives 0.35 g of precipitate.
- (ii) Calculate the weight of the precipitate, which can be produced by a sample containing 0.5 g of Zn. [4 marks]
- d) Define the following terms as encountered in a gravimetric analysis:
- (i) Occlusion.
- (ii) Co-precipitation.
- (iii) Surface adsorption. [6 marks]
- (Total = 17 marks)
2. a) How does pH affect the stability of metal complexes? [3 marks]
- b) How would you classify the types of EDTA titrations? [3 marks]
- c) Distinguish between Iodimetric and Iodometric titrations with respect to Iodine (I_2). [4 marks]
- (Total = 10 marks)
3. a) Explain Beer-Lambert's law of absorption. [4 marks]
- b) The absorbance of an iron thiocyanate solution containing 0.005 mg Fe/mL was reported as 0.49 at 540 nm.
- i) Calculate the molar absorptivity of iron thiocyanate on the assumption that a 1.00 cm cuvette was used.

ii) What will be the absorbance, if the original solution is placed in a 5.00 cm cuvette?

iii) What will be the absorbance, if the solution is diluted to twice its original volume (1 cm cuvette)?

[6 marks]

(Total = 10 marks)

4. a) Explain how chemical interferences would be encountered during the AAS analysis, citing with an example?

[4 marks]

b) Write any FIVE major applications of UV spectroscopy.

[5 marks]

c) How does an AAS work? Explain the importance of hollow cathode lamp in AAS.

[4 marks]

(Total = 13 marks)

END
