

THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

FIRST SEMESTER EXAMINATION

CH314 – ADVANCED ANALYTICAL CHEMISTRY

TUESDAY 31st MAY 2022 – 8:20 AM

TIME ALLOWED: 2 HOURS

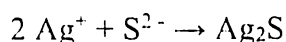
INFORMATION FOR CANDIDATES:-

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) Define the term precipitation gravimetry. [1 mark]
- b) What are the optimum conditions that are required to maintain supersaturation as low? [3 marks]
- c) What precautions would be considered in the washing process? [3 marks]
- d) The silver content of 20 mL 0.1 M of Ag^+ solution is precipitated as Ag_2S using 0.05 M solution of S^{2-} according to the following complete reaction:



Calculate the volume of S^{2-} solution that is required for complete precipitation of Ag^+ .

[4 marks]

- c) Define the following terms in a gravimetric analysis with ONE example each:
- (i) Post-precipitation
 - (ii) Precipitating agent
 - (iii) Gravimetric factor

[6 marks]

(Total = 17 marks)

- f) a) What is the principle of EDTA titrations? [3 marks]
- b) Describe the properties of metallochromic indicators. [3 marks]
- c) Explain the importance of masking and de-masking agents with suitable examples [4 marks]

(Total = 10 marks)

- g) a) Explain Beer-Lambert's law of absorption. [4 marks]
- b) The concentration of yeast t-RNA in an aqueous solution is $10 \mu\text{g/mL}$. The absorbance is found to be 0.209 when this solution is placed in 1.00 cm cuvette and 258 nm radiation is passed through it.
- i) Calculate the specific absorptivity, including units, of yeast t-RNA.

- ii) What will be the absorbance, if the solution is diluted to 5 $\mu\text{g/mL}$?
- iii) What will be the absorbance, if the path length of the original solution is increased to 5.00 cm?

[6 marks]

(Total = 10 marks)

- h) a) Which factors influence the optical properties of suspension and particle size in nephelometry and turbidimetry? [2 marks]
- b) Describe the principle and theory of nephelometry and turbidimetry. [2 marks]
- c) How does an Atomic Absorption Spectroscopy(AAS) work? Explain the importance of hollow cathode lamp in AAS. [4 marks]
- d) Explain the method solid phase extraction(SPE) and write its advantages and disadvantages. [5 marks]

(Total = 13 marks)

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