



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

A. M. E. C. E. A

MAIN EXAMINATION

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AUGUST – DECEMBER 2018 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCE (CHEMISTRY)

PART TIME PROGRAMME

CHEM 308: ANALYTICAL CHEMISTRY I

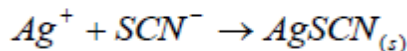
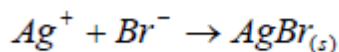
Date: DECEMBER 2018

Duration: 2 Hours

INSTRUCTIONS: Answer Question ONE and ANY OTHER TWO Questions

- Q1. a) Differentiate between the following terms used during the process of analysis.
- Retention time and retardation factor
 - Macro and micro analysis
 - Relative error in pph and in ppt
 - Nucleation and induction period
 - Standardization and standard solution
- [10 Marks]**
- b) Analytical chemistry is a multidisciplinary field of study. Answer the following questions that relate to this field;
- What are its two branches?
 - State two roles of an analytical chemist
 - Explain random sampling in analytical chemistry
 - Describe how systematic errors can be identified in analytical chemistry
 - List two factors that would be considered in selecting methods of analysis
- [10 Marks]**
- c) The distribution coefficient for a metal chelate partitioning between water and chloroform is 6.4. Calculate the fraction of chelate remaining when 25.0mL of $4.3 \times 10^{-2}M$ of the metal chelate is shaken with
- One 10.0mL portion of chloroform
 - Two successive 5.0mL portions of chloroform
- [10 Marks]**

- Q2. a) 30 mL of chloride solution was analyzed by adding 5mL of 0.05 M silver nitrate solution. The excess silver nitrate was back titrated with 4mls of 0.05 M potassium thiocyanate solution. Calculate the bromide concentration showing your approach by using both millimoles.



[10 Marks]

- b) A sample weighing 0.6g contains silver (FW 108). A solution containing chloride ions (FW 35) was used in determining the amount of silver in the coin. What is the percentage of silver in the coin if the precipitate weighed 550mg?

[10 Marks]

- Q3. a) i) Explain five characteristics of a primary standard [5 Marks]
 ii) List two characteristics of a titration [2Marks]
 iii) Use arbitrary figures to show how the dilution equation is applied [3 Marks]

- b) State the reason why the following are performed

- i) Quantitative analysis
- ii) Sample pretreatment
- iii) Precipitate digestion
- iv) Blank analysis
- v) Method Validation

[10 Marks]

- Q4. a) An analyte can be qualitatively or qualitatively determined in a sample. List and briefly describe the 5 processes/steps involved in analyzing the analyte [10 Marks]

- b) In a series of experiments on the determination of tin in foodstuffs, samples were boiled with hydrochloric acid under reflux for different times. The results are shown below

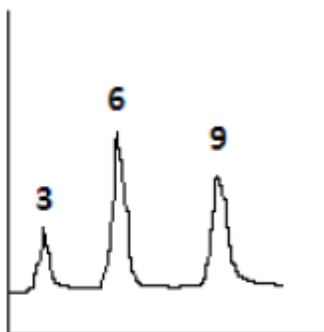
Refluxing time (min)	Tin found (mg/kg)
30	55,57,59,56,56,59
75	57,55,58,59,59,59

- Does the mean amount of tin found differ significantly for the two boiling times? [10 Marks]

- Q5. a) State one difference between the following
- Specific and selective precipitating reagent
 - Personal and methodic sources of errors
 - Crystalline and colloidal particles
 - Biological and environmental samples
 - Accuracy and precision ?

[10 Marks]

- b) The diagram below was obtained during chromatography (L = 30cm). Study it and answer the questions which follow



- What is the name given to the diagram
- What name is given to the value 3, 6 and 9
- Calculate the R_f for any two peaks if all peaks had a base width of 0.2
- Name the peaks as X,Y,Z and arrange them in order of increasing concentration
- Calculate the number of theoretical plates for the 1st peak

[10 Marks]

END