



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE
AND TECHNOLOGY**

UNIVERSITY EXAMINATION 2012/2013

**3RD YEAR 1ST SEMESTER EXAMINATION FOR THE
DEGREE OF BACHELOR OF EDUCATION SCIENCE WITH IT
(SCHOOL B ASED-MAIN)**

COURSE CODE: SCH 310

TITLE: ANALYTICAL CHEMISTRY (SB)

DATE: 29/4/2013

TIME: 14.00-16.00PM

DURATION: 2HOURS

INSTRUCTIONS

- 1) This paper contains FIVE [5] questions.**
- 2) Answer question ONE [1] COMPULSORY and ANY other TWO [2] questions.**
- 3) Write ALL answers in the booklet provided.**

Question A [20 marks]

1. a. Describe the following terms as used in titrimetric analysis (4 marks)
- i. Volumetric analysis
 - ii. Gravimetric analysis
 - iii. Coulometric analysis
 - iv. End point analysis
- b. determine the percentage (%) sodium carbonate based on the following information:
Sample weight- 0.5000 g; method: Titration to methyl orange end point using 22.12 ml of 0.1200 M HCl (4 marks)
- c. Calculate the %F in a 92.5 mg sample if it requires 19.80 ml of 0.0500 M calcium perchlorate for titration. (4 marks)
- d. Differentiate between: (6 marks)
- i. Descriptive and inductive errors
 - ii. Systematic and random errors
 - iii. Normality and Molarity
- e. Define the term photoluminescence and briefly describe its two forms (5 marks)
- f. i. What is voltametry (1 mark)
- ii. Draw a sample cell used in polarography and give a brief description of how it works (6 marks)

SECTION B (40 marks) Answer any two questions

2. a. What is chromatography? (2 marks)
- b. Briefly comment on the plate theory in column chromatography (5 marks)
- c. Describe the retention volume and retention time and give their mathematical relationship in chromatography (5 marks)
- d. What does the term resolution mean in chromatography? (2 marks)
- e. Name at least six factors accounted for by the Rate theory of chromatography for column performance (6 marks)

3. a. What is analytical chemistry? (2 marks)
- b. Name and define the two general areas of analytical chemistry (4 marks)
- c. Name six approaches and give brief conceptual description of the methods applied in analysis of samples (12 marks)
4. a. ICP-MS is a spectrophotometric technique for sample analysis.
- i. What do the initials ICP-MS stand for? (1 marks)
- ii. What is spectrophotometry? (2 marks)
- iii. What are its main applications? (4 marks)
- b. What is a nuclear electron spin and in which area of spectropotometry is it commonly applied? (3 marks)
- c. State the Beer-Lambert's law (2 marks)
- d. State four factors to consider when programing the temperature for gas chromatographic analysis (8 marks)
5. Draw a scheme of gas chromatography instrument and discuss how it functions in the separation of a sample mixture and subsequent qualitative and quantitative analysis of sample components. (20 marks)

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