



Lead City University, Ibadan
Faculty of Sciences
Department of Biochemistry

COURSE PARTICULARS

Course Title: Introductory Analytical Chemistry

Course code: CHM 213

No. of Units: 3

Status: Compulsory

LECTURER DETAILS

Name: Mrs. Oni O.S.
Qualifications: B.Sc, PGD, M.Sc
Phone: 08033890897
Email: sallyufan@yahoo.com
Area of Specialization: Analytical/Industrial chemistry

Name: Dr. S. Alayande
Qualifications:
Phone:
Email:
Area of Specialization:

COURSE DESCRIPTION

- Introduction to analytical chemistry
- Theory of Errors
- Statistical treatment of data
- Introduction to sampling
- Methods of analysis
- Separation methods of analysis

COURSE OBJECTIVES

- To explore topics such as experimental design
- To have an understanding of sampling
- To learn how to interpret experimental results.

ASSESSMENT

Class Attendance	5marks
Test(s) and Assignments	25marks
Final Examination	70marks

LECTURE PLAN

Week	Topic
1st	Introduction to Analytical chemistry and course content
2 nd - 3 rd	Theory of Errors
4 th -5 th	Introduction to sampling
6-7 th	Separation methods
8 th	Chemical methods of analysis- volumetric method
9 th	Chemical methods of analysis- physiochemical method
10 th	Chemical methods of analysis - gravimetric method
11 th -12 th	Optical methods of analysis

READING LIST

- Holler, J. F and Grouch S. Fundamentals of Analytical Chemistry 9th edition (2013). Skoog and West.
- Christian G, Analytical Chemistry 6th edition (2004) Wiley International edition.

TUTORIAL QUESTIONS

- A laboratory procedure calls for 250 mL of an approximately 0.10 M solution of NH₃. Describe how you would prepare this solution using a stock solution of concentrated NH₃ (14.8 M).

b. Calculate the molarity of a potassium dichromate solution prepared by placing 9.67 g of K₂Cr₂O₇ in a 100-mL volumetric flask, dissolving, and diluting to the calibration mark.
- A sample of an ore was analyzed for Cu²⁺ as follows. A 1.25-g sample of the ore was dissolved in acid and diluted to volume in a 250-mL volumetric flask. A 20-mL portion of the resulting solution was transferred by pipet to a 50-mL volumetric flask and diluted to volume. An analysis showed that the concentration of Cu²⁺ in the final solution was 4.62 ppm. What is the weight percent of Cu in the original ore?

b. Explain the difference between systematic and random errors
- Which of the following methods for preparing a 0.0010 M solution from a 1.0 M stock solution provides the smallest overall uncertainty?

(a) A one-step dilution using a 1-mL pipet and a 1000-mL volumetric flask.

(b) A two-step dilution using a 20-mL pipet and a 1000-mL volumetric flask for the first dilution and a 25-mL pipet and a 500-mL volumetric flask for the second dilution.
- What is the 95% confidence interval for the amount of aspirin in a single analgesic tablet drawn from a population where μ is 250 mg and σ is 25? What is the 95% confidence interval for the amount of aspirin in a single analgesic tablet drawn from a population where μ is 250 mg and σ is 25?

b. What is the relation between the standard deviation and the precision of a procedure?
- List and explain three sources of Indeterminate error

b. The results of an analysis are 39.97g compared with the accepted value of 37.06g. what is the error in parts per thousand.

6. The following replicate weighings are obtained 29.8,30.2,28.6 and 29.7 mg. Calculate the standard deviation of the individual value.
b. What is the relation between standard deviation and accuracy?
7. An is an analysis to determine the concentration of Cu in an industrial plating bath uses a procedure for which Zn interferent. When a sample containing 128.6 ppm Cu is carried through a separation to remove Zn, the concentration of Cu remaining is 127.2 ppm. When a solution of Zn is carried through the separation, a concentration of 4.3 ppm remains. Calculate the
a. recoveries for Cu and Zn
b. the separation factor
8. The concentration ratio of Cu to Zn in the plating bath is 7:1. Analysis of the standard solutions containing only Cu or Zn give the following standard equations.
 $S_{Cu} = 1250 \times \text{ppm Cu}$
 $S_{Zn} = 2310 \times \text{ppm Zn}$
a. What error is expected if no attempt is made to remove Zn before analyzing for Cu?
b. What is the error if the separation is carried out?
9. A 3.96×10^{-4} solution of compound A exhibited an absorbance of 0.624 at 238 nm in a 1.000-cm cuvet; a blank solution containing only solvent had an absorbance of 0.029 at the same wavelength. Find the molar absorptivity of compound.
b. What is the difference between luminescence and chemiluminescence
10. State the principles underlying the following spectroscopic methods.
 - Refractometry
 - Polarimetry
 - NMR
b. What are the exceptions to BEER-LAMBERTS law