

FACULTY: BASIC AND APPLIED SCIENCES

DEPARTMENT: PHYSICAL AND CHEMICAL SCIENCE

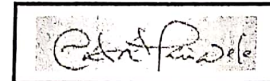
SECOND SEMESTER EXAMINATION

2016/2017 ACADEMIC SESSION

COURSE CODE: CHM 202

COURSE TITLE: Analytical Chemistry I

DURATION: 2 hours



HOD's SIGNATURE

TOTAL MARKS: 60

INSTRUCTION: Answer Any Three Questions

QUESTION ONE

- Compare and contrast Wet chemical and Instrumental methods of analysis [5marks]
- i. List the 3 major methods by which soluble analyte can be extracted from solid samples. [3marks]
- ii. Write short note on any one of the methods mentioned in b(i). [2marks]
- Consider the following reaction: $\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$
- What is the normality of sulfuric acid solution in the above reaction, if 0.248mol of the acid is dissolved in 250.0 mL of water? [4marks]
- i. What is gravimetric factor? [1mark]
- ii. Determine the gravimetric factor needed to convert the weight of AgCl to the weight of Cl?. [5marks]
- What is the weight of Chlorine that is equivalent to 20g of AgCl?

QUESTION TWO

- a. i. Give a brief definition of each of the following :
- Composite sample
 - Selective sample
 - Random sample
 - Representative sample
- ii. Predict which of the samples in question a(i) is suitable for sampling an homogeneous bulk system [5marks]
- b. i. Describe the various categories of solids that may be determined in water and waste water samples [5marks]
- ii. A sample of lake water is tested for suspended solids and the following data are obtained.
How many milligrams of suspended solids are there per liter of sample?
Volume of water used = 250.00 mL
Weight of empty, dry filter = 0.0513 g
Weight of dried Gooch crucible after filtering the water = 0.5837 g [5marks]
- c. i. Compare and contrast 'Loss on drying' and 'Weight loss' [2marks]
- ii. What is the percent loss on drying if a sample weighs 4.5027 g before drying and 3.0381g after drying [3marks]

QUESTION THREE.

- a. i. Mention any five solvents that can be used to achieve total dissolution of solid sample [3marks]
- ii. Give at least two examples of materials that each solvent mentioned in a(i) can dissolve [5marks]
- b. i. Mention the underlying factors for a successful titrimetry method of analysis. [2marks]
- ii. Differentiate between monoprotic and polyprotic acids. Give at least two examples in each case [3marks]
- c. Account for the difference between the Formula weight and Equivalent weight of H_2SO_4 . [2marks]
- d. i. With reference to any suitable example, explain the terms: analyte and matrix [2marks]
- ii. Mention the 3 analytical methods that can be employed to extract analytes from liquid samples. [3marks]

QUESTION FOUR.

- a. i. What is experimental error in analytical Science? [2marks]
- ii. Name the two major categories of error and differentiate between them [4marks]
- b. The following data were generated in an experiment involving quantitative determination of copper in brass: 134, 147, 125, 131, and 152. Use these data to determine the mean, median, deviation, standard deviation, RSD, and Coefficient of variation. If the true value of copper in the brass is 138, determine if the measurements are accurate and precise. [10marks]
- c. Differentiate between solid-liquid extraction and liquid-liquid extraction [4marks]