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**University Examinations 2015/2016**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE PHYSICAL OPTION

**SCH 2304: ANALYTICAL CHEMISTRY I**

**DATE: NOVEMBER, 2015 TIME:** $2$**HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions.*

**QUESTION ONE – (30 MARKS)**

1. Define the following terms as used in chemical methods of analysis; (5 Marks)
2. Versatility
3. Sensitivity
4. Selecivity
5. Techniques
6. Calibration
7. (i) What do you understand by the term sample pre-treatment? (1 Mark)

(ii) State three sample pre-treatment procedures carried out during chemical analysis.

(3 Marks)

1. Quality control (QC) is meant to ensure satisfactory quality and consistency.
2. What does quality control comprise? (2 Marks)
3. State three criteria for results to be considered of sufficiently high quality.(3 Marks)
4. A solution containing 12.6g oxalic acid ( C2H2O4. 2H2O per 500 ml had a density of 1.105 g $ml^{-1}$. Calculate:
5. Weight percentage of oxalic acid (2 Marks)
6. Molality (2 Marks)
7. Normality (3 Marks)
8. Molarity (2 Marks)
9. Mole fraction$\left[C=12, H=1, 0=16\right]$ (2 Marks)
10. (i) What do you understand by an analytical method of analysis. (1 Mark)

 (ii) State four factors that you should take into account when selecting the most appropriate analytical method. (4 Marks)

**QUESTION TWO (20 MARKS)**

a) Distinguish between (i) Robustness and ruggedness (2Marks)

 (ii) Accuracy and precision. (2 Marks)

(iii) F-test and T- test (2 Marks)

b) State three advantages of instrumental methods over classical methods of chemical analysis. (3 Marks)

c) (i) What do you understand by the term interferences as used in analytical procedures.

1 Mark)

(ii) Briefly discuss four separation procedures employed on interferences. (6 Marks)

d) Briefly explain how analytical chemistry is applied in the following.

1. Clinical and biological studies (2 Marks)
2. Control and monitoring of pollutants. (2 Marks)

**QUESTION THREE (20 MARKS)**

a) (i) Distinguish between determinate and indeterminate errors. (2 Marks)

 (ii) Name three basic sources of determinate errors. (3 Marks)

b) State four requirements of a chemical standard. (4 Marks)

c) What do you understand by the following terms;

1. Hypothesis (1 Mark)
2. Theory (1 Mark)
3. Law (1 Mark)

d) State three conditions for an ideal washing liquid of precipitate. (3 Marks)

e) Briefly, describe the following types of analysis. (3 Marks)

1. Gravimetric
2. Titrimetric
3. Volumetric
4. Name two optical methods of analysis. (2 Marks)

**QUESTION FOUR (20 MARKS)**

a) Distinguish between chromatography and electrophoresis. (2 Marks)

b) State three effects to consider during the storage of samples. (3 Marks)

c) For the following type of sample, state the method of sample decomposition and dissolution. (4 Marks)

1. Soil dissolution
2. Geotological
3. Metallurgical
4. Organic materials with inorganic analytes

d) State three principal uses of reference materials in analysis. (3 Marks)

e) (i) What is significance test? (1 Mark)

 (ii) How are significance test useful? (3 Marks)

f) Explain the property measured and principal area of application to the following spectrometric techniques.

1. Atomic absorption spectrometry (AAS) (2 Marks)
2. Nuclear magnetic resonance spectrometry(NMR) (2 Marks)