

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ANALYTICAL CHEMISTRY**

**SCH 2351: CLASSICAL METHODS OF ANALYSIS**

**DATE:DECEMBER 2015 TIME: 2 HOURS**

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

QUESTION ONE (30 MARKS)

a. i. List four solid substances used as drying agents.

ii. Give four ways in which a solid sample would change during grinding operations.

iii. Give six requirements of a material to be used as a primary standard.

b. i. What is ‘titration error’

ii. List four colour indicators used in tritrimetry

iii. Give four instrumental methods used to detect the equivalence point during a titration.

c. i. What is a ‘Colloidal Suspension?’

ii Give three methods of inducing coagulation of a colloidal suspension

iii. Give four properties of an ideal product for gravimetric analysis.

d. i. What is a buffer solution

ii. Define the buffer capacity of a solution.

iii. Explain the limitations of buffers.

iv. Find the pH of a solution prepared by dissolving 1.26g of glycerine amide hydrochloride (BH+) plust 0.12g of glyccine amide (B) in 100 ml of water. Glycine amide hydrochloride (BH+) formular mass is 110.543, pKa=8.20, Glycine amide (B) f mass is 74.083.

e. i. List four precautions taken in the location of a weighting room.

ii. Give four materials used for filter media.

iii. Distinguish between class A and class B volumetric flasks.

QUESTION TWO (20 MARKS)

a i Give six favorable characteristics of using teflen non stick labware.

ii. Describe the steps followed in drying an organic liquid with a solid drying agent.

b. i. What is ’homongeneous precipitation’?

ii. Give three advantages of homogeneous precipitation of a crystalline precipitate.

c. i. Explain briefly how combustion analysis is applied for elemental analysis of an organic compound for carbon and hydrogen content.

ii. An organic compound weighing 5.372 mg produced 12.645mg of carbon dioxide and 2.238 mg of water upon combustion. Find the percentage of carbon and hydrogen in the sample.

QUESTION THREE

a. i. What is the difference between direct titration and back titration?

ii. Give the principles of Karl Fisher method of moisture determination.

b. i. Sketch a plot of pH versus volume of base added during the titration of a weak acid with a strong base.

ii. Explain how the plot above (i) is used to estimate the dissociation constant of the acid.

iii. Why is it not possible to titrate carbonic acid to the second equivalence point using indicators or a pH meter.

c. i. Briefly explain the factors to consider in the selection of a buffer.

ii. A solution of 0.05m phosphoric acid is prepared in water. Calculate the pH of this solution. (k1=7.5x10-3 k2=6.2x10-8, k3=2x10-12)

iii. Sketch a plot of pH dependence on the volume of potassium hydroxide added to the 0.05 m phosphoric acid (prepared above ii)

QUESTION FOUR (20 MARKS)

a. i. Explain the term ‘freeze drying’

ii. Explain briefly the principles of each of the following stages during freeze drying

-Preefreezing

-Primary drying

-Secondary drying.

iii. Give four areas where freeze drying is applied.

b. Explain briefly the determination of chloride ion in water sample using titrations.