THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

32/2A

CHEMISTRY 2A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 2:30 Hours **Tuesday, 11th November 2014 a.m.**

Instructions

- This paper consists of **three (3)** questions. Answer **all** the questions.
- Question 1 carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
- Qualitative Analysis Guidance Pamphlets may be used after a thorough check by the supervisor.
- Cellular phones and calculators are **not** allowed in the examination room.
- Write your **Examination Number** on every page of your answer booklet(s).
- You may use the following constants:
  Atomic masses:
  H = 1, C = 12, O = 16, K = 39.
  1 litre = 1 dm^3 = 1000 cm^3.

1. You are provided with the following solutions:

H: Containing 6.3 g of hydrated oxalic acid, $(COOH)_2.XH_2O$ in $1dm^3$ of solution.

M: Containing 1.4 g of potassium hydroxide in 0.5 dm^3 of the solution.

Phenolphthalein indicator.

Questions

(a) Titrate the acid (in a burette) against the base (in a conical flask) using th drops of the indicator and obtain three titre values.

(b) (i) _____ cm^3 of **M** required _____ cm^3 of **H** for complete reaction.

(ii) The colour change at the end point was from_____ to_____.

(iii) Is the use of methyl orange indicator in this experiment as suitable as the use phenolphthalein? Give a reason for your answer.

(c) Showing your procedures clearly, determine the value of X in the formu $(COOH)_2.XH_2O$ given that the equation for the reaction $(COOH)_{2(aq)} + 2KOH_{(aq)} \rightarrow (COOK)_{2(aq)} + 2H_2O_{(l)}$.

(d) State any four precautions you would observe to ensure accuracy in this experiment.

(20 mark

2. You are provided with the following:

Solution **Z** containing 1 M sodium thiosulphate ($Na_2S_2O_3$);

Solution **T** containing 0.1 M nitric acid (HNO_3);

Distilled water;

Piece of paper marked **X**;

Stop-watch.

Procedure

(i) Using measuring cylinder, measure 5 cm^3 of solution **Z** and put into 100 cm^3 beaker.

(ii) Measure 5 cm^3 of solution **T** and put into 100 cm^3 beaker containing solution **Z**, an immediately start the stop–watch.

(iii) Swirl the contents in the 100 cm^3 beaker and put the beaker on top of mark **X** on the pie of the paper. Watch the mixture from the above and observe changes.

(iv) Switch off the stop-watch when the mark **X** disappears.

(v) Record the time taken for the letter **X** to disappear.

(vi) Repeat procedures (i) to (v) using the data shown in Table 1.

Table 1

Experiment	**Vol. of T (cm^3)**	**Vol. of Z (cm^3)**	**Vol. of Distilled water (cm^3)**	**Time (s)**
1	5	5	0	
2	5	4	1	
3	5	3	2	
4	5	2	3	

Questions

(a) Complete Table 1.

(b) Write a balanced equation for reaction between **T** and **Z**.

(c) What substance was produced during the reaction which obscured letter **X**?

(d) Plot the graph of volume of $Na_2S_2O_3$ solution against time (s).

(e) What conclusion can you draw from this experiment? **(15 marks)**

Sample **Q** is a simple salt containing one cation and one anion. Carry out the experiments described below. Record carefully your observations, inferences and finally identify the anion and cation present in sample **Q**.

Table 2

S/n	Experiment	Observation	Inference
(a)	Observe the appearance of sample **Q.**		
(b)	Dissolve a little sample **Q** in distilled water in a test tube, stir and then boil.		
(c)	Put a spatulaful of sample **Q** in a test tube then add concentrated sulphuric acid and warm.		
(d)	Put a spatulaful of sample **Q** in a test tube and then add dilute nitric acid. Divide the resulting solution into three portions and add the following: i. NaOH solution till in excess to the first portion.		
	ii. KI solution till in excess to the second portion.		
	iii. $AgNO_3$ solution followed by dilute HNO_3 and then NH_3 solution to the third portion.		

Conclusion

(i) The cation in sample **Q** is _____.

(ii) The anion in sample **Q** is _____.

(iii) The formula of the compound **Q** is_____.

(iv) The name of compound **Q** is _____. **(15 marks)**