

**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, 11<sup>th</sup> 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<sup>3</sup> = 1000 cm<sup>3</sup>.

1. You are provided with the following solutions:

**H:** Containing 6.3 g of hydrated oxalic acid,  $(\text{COOH})_2 \cdot \text{XH}_2\text{O}$  in  $1\text{dm}^3$  of solution.

**M:** Containing 1.4 g of potassium hydroxide in  $0.5\text{ dm}^3$  of the solution.  
Phenolphthalein indicator.

### Questions

- Titrate the acid (in a burette) against the base (in a conical flask) using drops of the indicator and obtain three titre values.
- $\text{cm}^3$  of **M** required  $\text{cm}^3$  of **H** for complete reaction.
  - The colour change at the end point was from \_\_\_\_\_ to \_\_\_\_\_.
  - Is the use of methyl orange indicator in this experiment as suitable as the use of phenolphthalein? Give a reason for your answer.
- Showing your procedures clearly, determine the value of **X** in the formula  $(\text{COOH})_2 \cdot \text{XH}_2\text{O}$  given that the equation for the reaction is  

$$(\text{COOH})_{2(aq)} + 2\text{KOH}_{(aq)} \rightarrow (\text{COOK})_{2(aq)} + 2\text{H}_2\text{O}_{(l)}$$
- 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 ( $\text{Na}_2\text{S}_2\text{O}_3$ );

Solution **T** containing 0.1 M nitric acid ( $\text{HNO}_3$ );

Distilled water;

Piece of paper marked **X**;

Stop-watch.

### Procedure

- Using measuring cylinder, measure  $5\text{ cm}^3$  of solution **Z** and put into  $100\text{ cm}^3$  beaker.
- Measure  $5\text{ cm}^3$  of solution **T** and put into  $100\text{ cm}^3$  beaker containing solution **Z**, and immediately start the stop-watch.
- Swirl the contents in the  $100\text{ cm}^3$  beaker and put the beaker on top of mark **X** on the piece of the paper. Watch the mixture from the above and observe changes.
- Switch off the stop-watch when the mark **X** disappears.
- Record the time taken for the letter **X** to disappear.
- Repeat procedures (i) to (v) using the data shown in Table 1.

Table 1

Experiment	Vol. of T ( $\text{cm}^3$ )	Vol. of Z ( $\text{cm}^3$ )	Vol. of Distilled water ( $\text{cm}^3$ )	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  $\text{Na}_2\text{S}_2\text{O}_3$  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. $\text{AgNO}_3$ solution followed by dilute $\text{HNO}_3$ and then $\text{NH}_3$ 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)