

**THE UNITED REPUBLIC OF TANZANIA  
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA  
DIPLOMA IN SECONDARY EDUCATION EXAMINATION**

**732/2A**

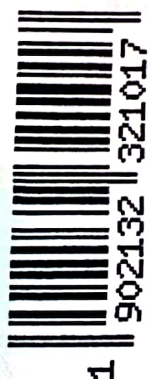
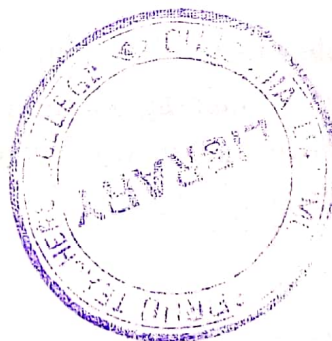
**CHEMISTRY 2A  
(ACTUAL PRACTICAL A)**

**Time: 3 Hours**

**Thursday, 16<sup>th</sup> May 2019 a.m.**

**Instructions**

1. This paper consists of **three (03)** questions.
2. Answer **all** questions.
3. Question **one (1)** carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
4. Qualitative Analysis Guide Sheet may be used after a thorough check by the supervisor.
5. Cellular phones, programmable calculators and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. You may use the following constants:  
Atomic masses: H = 1, C = 12, O = 16, Na = 23, Cl = 35.5.  
1 litre = 1 dm<sup>3</sup> = 1000 cm<sup>3</sup>.



1. You are provided with the following:

**QP:** A solution made by dissolving 3g of  $\text{H}_2\text{C}_2\text{O}_4 \cdot \text{WH}_2\text{O}$  in  $0.5 \text{ dm}^3$ .

**RS:** A solution made by dissolving 2g NaOH in  $1 \text{ dm}^3$ .

**POP:** Phenolphthalein indicator.

Carry out a volumetric analysis and then answer the questions that follow:

- (a) Use relevant table of results to show titre data regarding burette reading.
- (b)
  - (i) What was the colour change?
  - (ii) Specify the volume of the pipette used and calculate the mean titre volume.
- (c) Write a balanced chemical equation between solution **QP** and **RS**.
- (d) Calculate:
  - (i) Molarity of solution **RS**.
  - (ii) Concentration of solution **QP** in  $\text{g/dm}^3$ .
  - (iii) Molar mass of **QP**.
  - (iv) The value of W in  $\text{H}_2\text{C}_2\text{O}_4 \cdot \text{WH}_2\text{O}$ .

2. You are provided with the following:

**A:** A solution of 0.5M sodium thiosulphate.

**B:** A solution of 0.1M sulphuric acid.

Glass stirring rod.

White piece of paper.

Stop watch.

### Procedure

- (i) Using a blue /black pen, put a mark 'X' on a white sheet of paper and using masking tape, attach it to the bottom outer part of a  $50 \text{ cm}^3$  so that the mark 'X' is visible through the solution when viewed from the mouth of the beaker.
- (ii) Use a measuring cylinder to measure exactly  $10 \text{ cm}^3$  of solution **A** and put it into the beaker with the glued paper.
- (iii) Use another measuring cylinder to measure  $10 \text{ cm}^3$  of solution **B** and pour into the beaker containing solution **A**; and immediately start the stopwatch. Using a glass rod stir the reaction mixture and record the time taken in seconds for the cross to disappear completely.

- (iv) Repeat the procedures (ii) and (iii), but this time vary the concentration of solution A by diluting with distilled water as shown in Table 1.

Table 1: Experimental data.

Volume of $\text{S}_2\text{O}_3^{2-}$ ( $\text{cm}^3$ )	Volume of $\text{H}_2\text{O}$ ( $\text{cm}^3$ )	Volume of $\text{H}_3\text{O}^+$ ( $\text{cm}^3$ )	t (sec)	$[\text{S}_2\text{O}_3^{2-}] \text{ M}$	$1/[\text{S}_2\text{O}_3^{2-}]$	Log $[\text{S}_2\text{O}_3^{2-}]$
8	2	10				
6	4	10				
4	6	10				
2	8	10				

### Questions

- Complete the table.
  - Using your results, draw the following graphs:
    - $[\text{S}_2\text{O}_3^{2-}]$  (y-axis) against time (x-axis).
    - $1/[\text{S}_2\text{O}_3^{2-}]$  (y-axis) against time (x-axis).
  - From the graphs:
    - Comment on the shape of graphs drawn.
    - Determine the order of reaction with respect to  $[\text{S}_2\text{O}_3^{2-}]$ .
3. You are provided with a sample D which contains one cation and one anion.
- Carry out qualitative analysis tests to identify the cation and anion present in the sample using the format and reagents provided in Table 2.

Table 2: Experimental results

Sn	Experiment	Observation	Inference
(i)	Observe the appearance of sample D.		
(ii)	Using nichrome wire heat the solid sample on a flame.		
(iii)	Heat the solid sample in a clean and dry test tube.		
(iv)	To the solid sample in a test tube add dilute HCl. If no reaction warm gently.		



<b>Sn</b>	<b>Experiment</b>	<b>Observation</b>	<b>Inference</b>
(v)	To the sample solution in a test tube add $\text{BaCl}_2$ solution. If the precipitates form, add dilute $\text{HCl}$ .		
(vi)	To a sample solution in a test tube add ammonium oxalate solution.		

- (b) Write the conclusion of the results indicating the following:
- Cation and anion present in sample **D**.
  - Molecular formula of sample **D**.
- (c) Write an equation for the reaction which took place in experiment (iii).