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, 16th 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^3 = 1000 cm^3.

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1. You are provided with the following:
QP: A solution made by dissolving 3g of $H_2C_2O_4\ WH_2O$ in 0.5 dm^3.
RS: A solution made by dissolving 2g NaOH in 1 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 g/dm^3.
(iii) Molar mass of **QP**.
(iv) The value of W in $H_2C_2O_4\ WH_2O$.

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 cm^3so 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 10cm^3 of solution **A** and put it into the beaker with the glued paper.

(iii) Use another measuring cylinder to measure 10cm^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.

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(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 $S_2O_3^{-2}$ (cm^3)	Volume of H_2O (cm^3)	Volume of H_3O^+ (cm^3)	t (sec)	$[S_2O_3^{-2}]$ M	$1/[S_2O_3^{-2}]$	Log $[S_2O_3^{-2}]$
8	2	10				
6	4	10				
4	6	10				
2	8	10				

Questions

(a) Complete the table.

(b) Using your results, draw the following graphs:
(i) $[S_2O_3^{-2}]$ (y-axis) against time (x-axis).
(ii) $1/[S_2O_3^{-2}]$ (y-axis) against time (x-axis).

(c) From the graphs:
(i) Comment on the shape of graphs drawn.
(ii) Determine the order of reaction with respect to $[S_2O_3^{-2}]$.

3. You are provided with a sample **D** which contains one cation and one anion.

(a) 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.		

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Sn	Experiment	Observation	Inference
(v)	To the sample solution in a test tube add $BaCl_2$ solution. If the precipitates form, add dilute HCl.		
(vi)	To a sample solution in a test tube add ammonium oxalate solution.		

(b) Write the conclusion of the results indicating the following:

(i) Cation and anion present in sample **D**.

(ii) Molecular formula of sample **D**.

(c) Write an equation for the reaction which took place in experiment (iii).

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