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

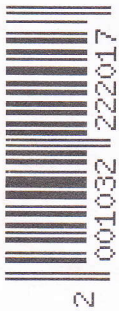
032/2B

CHEMISTRY 2B
PRACTICAL B
(For Both School and Private Candidates)

Time: 2:30 Hours **Year: 2020**

Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Each question carries **twenty five (25)** marks.
3. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. You may use the following constants:
   Atomic masses: H=1, C=12, O = 16, Na = 23, S = 32.
   1 litre = 1 dm^3 = 1000 cm^3.



1. An impure sulphuric acid has been purchased for use in Chemistry laboratory. A solution was made by dissolving 7.0 g of the impure acid in distilled water to make 1 dm^3 of the solution and labelled **K**. You are required to determine the purity of the sulphuric acid, using a solution **L** made by dissolving 4.0 g of sodium hydroxide in distilled water to make 1 dm^3 of solution. Follow the procedures below and then answer the questions that follow:

Procedure

(i) Put the impure acid, **K** into a burette.

(ii) Titrate the impure acid, **K** against solution **L** using two drops of (POP) or methyl orange (MO) indicator. Obtain three titre values.

(iii) Record your results in tabular form.

Questions

(a) Why both phenolphthalein (POP) and methyl orange (MO) indicator are suitable for this titration?

(b) How much volume of the acid was required for complete neutralization reaction with 25 cm^3 or 20 cm^3 of the base?

(c) Write a balanced chemical equation for this reaction.

(d) Calculate the molarity of the acid and the base.

(e) Calculate the percentage purity of the acid.

2. You are provided with the following:

$\mathbf{N_1}$: 0.13 M sodium thiosulphate;

$\mathbf{N_2}$: 2.0 M hydrochloric acid;

$\mathbf{N_3}$: Distilled water;

Stop watch;

A piece of white paper.

Procedure

(i) Place a 100 cm^3 beaker on top of letter **X** such that the letter **X** is visible when viewed from above.

(ii) Measure 2 cm^3 of $\mathbf{N_1}$ and 8 cm^3 of $\mathbf{N_3}$ using 10 cm^3 measuring cylinder and pour them into the beaker in (i).

(iii) Using another 10 cm^3 measuring cylinder measure 10 cm^3 of $\mathbf{N_2}$ and pour into the 100 cm^3 beaker containing $\mathbf{N_1}$ and $\mathbf{N_3}$ and immediately start the stop watch/clock.

(iv) Swirl the content, observe it from above and record the time taken for letter **X** to disappear completely.

(v) Repeat steps (i) – (iv) by varying the volume of $\mathbf{N_1}$ and $\mathbf{N_3}$ as indicated in the following table:

Table: Experimental Data

Volume of N_1 (cm^3)	Volume of N_3 (cm^3)	Volume of N_2 (cm^3)	Time (s)
2	8	10	
4	6	10	
6	4	10	
8	2	10	
10	0	10	

Questions

(a) Complete filling the Table.

(b) (i) Plot a graph of volume of N_1 (vertical axis) against time (horizontal axis) taken for the letter **X** to disappear completely.

(ii) What does the shape of the graph indicate?

(c) Why did the letter **X** disappear?

(d) Write the electronic configuration of the product which causes the solution to be cloudy (milky).

(e) Write the ionic equation for the reaction between N_1 and N_2.

(f) Why N_3 was added to N_1?