

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

032/2A

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

Time: 2:30 Hours

Year: 2023

Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Each question carries **twenty five (25)** marks.
3. All writings should be in **blue** or **black** ink, except for diagrams which must be in pencil.
4. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. You may use the following atomic masses:

H=1, O = 16, Na =23, Cl = 35.5.



1. You are asked to determine the concentration of sodium hydroxide contaminating drinking water source in a certain village. In order to investigate the problem, a sample from the village water source (containing NaOH) has been brought in the chemistry laboratory for you to carry out a volumetric analysis. You are also given a standard solution of 1.825 g hydrochloric acid dissolved in 0.5 dm^3 of the solution. Use methyl orange (MO) and litmus papers as indicators.

Procedure

- Pour about 2 cm^3 of solution **V1** into a test tube, use litmus papers to test if it is an acidic or a basic solution.
- Discard the content and wash the test tube.
- Repeat the procedure (i) and (ii) using solution **V2**.
- Titrate the acid (in the burette) against the sample solution (sodium hydroxide) using **MO** up to the end point. Repeat the procedure to obtain three more readings and record your results in a tabular form.

Questions

- What was the volume of the pipette used?
 - Calculate the average volume of the acid used.
 - What were the changes on the litmus papers?
 - Indicating all the state symbols, write a balanced chemical equation for the neutralization reaction between **V1** and **V2**.
 - Write an ionic equation for the reaction.
 - Showing your procedures clearly, calculate the concentration in g/dm^3 of the claimed component (sodium hydroxide).
2. You are provided with the following:
- RR:** a solution containing 0.2 M sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3$);
- SS:** a solution containing 1.0 M hydrochloric acid (HCl);
- Distilled water;
- Plain paper marked **M**;
- Stopwatch.

Procedure

- Measure 4 cm^3 of **RR** and put it into the 50 cm^3 beaker. Add 6 cm^3 of distilled water.
- Measure 10 cm^3 of **SS** and put it into the 50 cm^3 beaker containing **RR** and distilled water, and immediately start the stopwatch.
- Swirl the contents and place the beaker on top of the letter **M** marked on the plain paper provided. Watch from above and observe the changes.
- Switch off the stop watch when the mark **M** disappears.
- Record the time taken for the letter **M** to disappear.
- Repeat the experiment using different data as shown in the following table.

Table: Experimental Data

Experiment	1	2	3	4
Volume of RR (cm ³)	10	8	6	4
Volume of Distilled Water (cm ³)	0	2	4	6
Volume of SS (cm ³)	10	10	10	10
Time (s)				

Questions

- (a) What is the aim of this experiment?
- (b) Complete filling the table.
- (c) Giving reason(s), identify the experiment in which the reaction was:
- (i) slow
 - (ii) fast.
- (d) (i) Indicating the state symbols of the reactants and products, write a balanced chemical equation for the reaction between **RR** and **SS**.
(ii) Write the ionic equation for the reaction.
- (e) How does the concentration of **RR** affect the time for the mark **M** to disappear?
- (f) (i) Plot a graph of volume of **RR** against time.
(ii) What can you conclude from the graph?