

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

032/2C

CHEMISTRY 2C
(ACTUAL PRACTICAL C)

(For Both School and Private candidates)

Time: 2:30 Hours

Year: 2022

Instructions

1. This paper consists of **two (2)** questions.
2. Answer **all** questions.
3. Each question carries twenty **five (25)** marks.
4. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
5. Cellular phones, and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet (s)

Atomic masses: H=1, C=12, O=16, Na=23.

1litre = $1dm^3 = 1000cm^3$



1. You are provided with solutions **UU** and **VV**: Pour about 2 cm^3 of solution **UU** into a test tube; add 2 to 3 drops of methyl orange (**MO**) indicator to test whether it is an acidic or basic solution. Empty the test tube and wash it. Repeat the procedure using solution **VV**.

The acidic solution you have identified is a solution of 0.1 M nitric acid. The basic solution was made by dissolving 2.65 g of Na_xCO_3 in a 0.5 dm^3 of a solution. Titrate the acid solution (from the burette) against the base solution (in titration flask) using methyl orange (**MO**) as an indicator up to the end point. Repeat the procedure to obtain three more burette readings. Record your results in a tabular form.

Questions

- (a) (i) What was the volume of the pipette used?
(ii) Calculate the average titre volume.
 - (b) If the mole ratio between the base and acid for the reaction is 1:2 respectively, determine the following:
 - (i) Concentration of Na_xCO_3 in mol/dm^3 and g/dm^3
 - (ii) Molecular mass of Na_xCO_3
 - (iii) The value of x and hence replace it in the formula Na_xCO_3 .
 - (c) Write a balanced chemical equation for the reaction between **UU** and **VV**.
 - (d) What is the significance of the indicator in this experiment?
2. Determine the effect of concentration on the rate of chemical reaction. The chemicals provided are **C** which contained 10.0 g of sodium thiosulphate in 500 cm^3 litre of solution and **H** which contained 2 M nitric acid solution. You are also given a stopwatch and a piece of white paper marked X and distilled water.

Provided as follows

- (i) Place a 100 cm^3 beaker on top of cross X on the plain paper such that the cross X is visible through the mouth of the beaker when viewed from above.
- (ii) Measure 25 cm^3 of C and pour it into a beaker in step (i).

- (iii) Measure 5 cm³ of H and pour it into a beaker containing C in step (ii) and instantly start the stop watch.
- (iv) Stear the mixture with a glass rod while keep on observing the cross from above: record the time taken for the cross to dissapear completely.
- (v) Repeat the procedures (ii) – (iv) for different concentration of C as indicated in the following table.

Table: Experimental Data

Volume of C (cm³)	Distilled water (cm³)	Volume of H (cm³)	Time taken for the cross to disappear (sec).
25	0	5	
20	5	5	
15	10	5	
10	15	5	
5	20	5	

- (a) Complete filling the Table.
- (b)(i) Using the data in the table, plot a graph of volume (cm³) against time (s).
 - (ii) What does the shape of the graph indicate?
- (c) Write the ionic equation for the reaction between **C** and **H**.
- (d) Why did the cross **X** disappear?
- (e) From the graph, what do you conclude about the effect of increasing concentration on the rate of reaction?