

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

032/2A

**CHEMISTRY 2A
PRACTICAL A**

(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, Cl =35.5.
1 litre = 1 dm³ = 1000 cm³.



1. You are required to standardize dilute hydrochloric acid using standard aqueous sodium carbonate of 0.1 M concentration. Proceed as follows:

- (i) Pour a small amount (about 2 cm³) of solutions **AX** and **AY** into separate test tubes and add two drops of phenolphthalein (POP) or methyl orange (MO) indicator to identify the dilute hydrochloric acid and 0.1 M sodium carbonate solution given.
- (ii) Fill the burette with the acid solution.
- (iii) Using a pipette, measure out 20 cm³ or 25 cm³ of the base solution and put it into a clean titration or conical flask.
- (iv) Titrate the acid (in the burette) against the base using two drops of methyl orange (MO) as an indicator and obtain three titre volumes. Record your results in a tabular form.

Questions

- (a) Which is an acid or base between **AX** and **AY**?
- (b) What is the mean titre volume of the acid?
- (c) Write a balanced chemical equation for this reaction.
- (d) Calculate molarity of the acid.
- (e) Calculate the mass of the acid dissolved in one litre of the solution.

2. You are provided with the following:

P₁: 0.50 M sodium thiosulphate,

P₂: 0.10 M hydrochloric acid,

P₃: Distilled water,

Stop watch,

Plain white paper marked **X**.

Theory

Sodium thiosulphate and hydrochloric acid react quantitatively, and gradually the solution changes from colourless to opaque, thus, the reaction can be used to evaluate various chemical kinetics parameters.

Procedure

- (i) Place a 100 cm³ beaker on top of letter **X** such that the letter **X** is visible when viewed from above.
- (ii) Using a measuring cylinder measure 5 cm³ of **P₁** and pour into the 100 cm³ beaker in (i). Add 20 cm³ of **P₃**.
- (iii) Measure 25 cm³ of **P₂** and pour it into the beaker containing solution **P₁** and **P₃** in (ii) and immediately start the stop watch/ clock.
- (iv) Observe the letter **X** from the mouth of the beaker and record the time taken for the letter **X** to disappear completely.
- (v) Repeat the steps (i) – (iv) by varying the volumes of **P₁** and **P₃** as indicated in the following experimental data table:

Table: Experimental Data

Volume of P_1 (cm^3)	Volume of P_3 (cm^3)	Volume of P_2 (cm^3)	Time (s)	Rate of reaction ($1/t$)(s^{-1})
5	20	25		
10	15	25		
15	10	25		
20	5	25		
25	0	25		

Questions

- (a) Complete filling the Table.
- (b) What is the aim of the experiment?
- (c) Write the electronic configuration of the product which causes the solution to be cloudy (milky).
- (d) Write the balanced ionic equation for the reaction between P_1 and P_2 indicating all the state symbols.
- (e) Plot a graph of volume of P_1 against the rate of reaction.
- (f) What can you conclude from the graph?