# 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)

**Duration: 2:30 Hours** **Year: 2025**

### Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Each question carries **twenty five (25)** marks.
3. All writings must be in **blue** or **black** ink, **except** drawings which must be in pencil.
4. Communication devices 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, C = 12, O = 16, Na = 23.

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1. You are required to conduct an experiment involving a monovalent metal carbonate solution **D**. This solution is made by dissolving 3.45 g of the metal carbonate in distilled water to make 250 $cm^3$ solution.

To analyse the carbonate content, you will perform a titration using solution N, which contains 1.46 g of hydrochloric acid per 0.2 $dm^3$ of solution. Additionally, you are provided with a methyl orange (**MO**) indicator.
Follow the outlined procedure and answer the questions based on your observation and calculations.

**Procedure**

(i) Pour solution **N** into the burette.
(ii) Pipette 25 $cm^3$ or 20 $cm^3$ of **D** and transfer into conical flask.
(iii) Add 2 to 3 drops of **MO** indicator into the flask and titrate the resulting mixture with **N** until colour change.
(iv) Repeat procedure (ii) and (iii) three more times and record your results in tabular form.

**Questions**

(a) What is the colour change of the reaction?
(b) What volume of the acid required for complete reaction with the carbonate?
(c) Identify the type of reaction in this experiment.
(d) Write a balanced chemical equation for the reaction between **D** and **N**.
(e) Calculate;
  (i) the molarity of **N**.
  (ii) the molarity of **D**.
  (iii) the molecular weight of the carbonate.
  (iv) the atomic mass of the monovalent metal in the carbonate.
(f) Write the ionic symbol for the metal in **D**.

2. A cat has been found dead after consuming a certain solid chemical from opened bottle in the laboratory. It is unfortunate that the bottle label was also destroyed by rats and the investigator decided to name the solid residues as sample **T**. Carry out qualitative analysis experiments to identify the ions present in the sample which killed the cat based on the following tests:

(i) Appearance of the sample **T**.
(ii) Action of heat on the sample **T**.
(iii) Solubility of the sample **T**.
(iv) Action of dilute hydrochloric acid on the solid sample **T**.
(v) Action of concentrated sulphuric acid on the solid sample **T**.
(vi) Action of aqueous sodium hydroxide on the solution sample **T**.
(vii) Action of barium chloride on the solution sample **T**.
(viii) Do confirmatory test for the cation and anion.

Questions

(a) Prepare a table showing the qualitative analysis results.

(b) Identify the cation and the anion in the solid.

(c) Write the chemical formula of the solid.

(d) Write a balanced chemical equation for the reaction in experiment (ii).

(e) Write two uses of sample **T** in daily life.

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