

**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: 2024**

**Instructions**

1. This paper consists of **two (2)** questions. Answer **all** questions.
2. Each question carries **twenty five (25)** marks.
3. All writing 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 constants atomic masses:

H = 1, C = 12, O = 16, Na = 23, Cl = 35.5.

1 litre = 1 dm<sup>3</sup> = 1000 cm<sup>3</sup>.



1. A sample of  $500 \text{ cm}^3$  of vinegar solution consists 3 g of organic acid with a general formula  $\text{R-COOH}$  where  $\text{R}$  is an alkyl group. The amount of the acid in vinegar is determined through titration with a standard solution of a base made by dissolving 1.2 g of  $\text{NaOH}$  with distilled water to make  $500 \text{ cm}^3$  solution. Use phenolphthalein (POP) indicator to carry out the experiment using the given procedure, then answer the questions that follow.

### Procedure

- (i) Fill the burette with vinegar solution.
- (ii) Use the pipette to transfer  $25 \text{ cm}^3$  or  $20 \text{ cm}^3$  of the base solution into a clean and dry conical flask and add three drops of POP.
- (iii) Titrate the resulting mixture against vinegar solution.
- (iv) Repeat procedure (i) to (iii) to obtain three more readings and record the results in a tabular form.

### Question

- (a) Calculate:
    - (i) the concentration of the base in  $\text{mol/dm}^3$ .
    - (ii) the molarity of the organic acid.
    - (iii) the molecular mass of the organic acid.
  - (b) If  $\text{R}$  in the acid is represented by  $\text{C}_n\text{H}_{2n+1}$ , find the value of  $n$  in the formula unit.
  - (c) Write the structural formula of the acid and give its IUPAC name.
  - (d) Write the reaction between the organic acid and ethanol in the presence of  $\text{H}_2\text{SO}_4$ .
  - (e) Give two natural sources of the organic acid presents in vinegar.
2. Sample **PP** contains one cation and one anion. Carry out systematic qualitative analysis procedures, to identify the cation and anion in sample **PP**. Record carefully your experiments, observations and inferences as indicated in the experimental table.

### Experimental Table

S/N	Experiments	Observations	Inferences

### Questions

- (a) What are the cation and anion in the sample?
- (b) Write the molecular formula of the sample.
- (c) Mention two properties of the cation identified.