

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

**732/2C**

**CHEMISTRY 2C**  
**(ACTUAL PRACTICAL 2C)**

**Time: 3 Hours**

**Year: 2021**

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**Instructions**

1. This paper consists of **three (3)** questions.
2. Answer **all** questions.
3. Question number **one (1)** carries **twenty (20)** marks and the rest carry **fifteen (15)** marks each.
4. Cellular phones and any unauthorized materials are not allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet (s).



1. You are provided with the following solutions: A 43.99 g of contaminated anhydrous sodium carbonate in 1 dm<sup>3</sup> of solution, denoted as A; 7.30 g of hydrochloric acid per 1 dm<sup>3</sup> of solution denoted as B and MO, methyl orange indicator. The instruction are:
- Measure 20 cm<sup>3</sup> of A and pour into 100 cm<sup>3</sup> measuring cylinder. Carefully, add distilled water up to 100 cm<sup>3</sup> mark, then stir. Name the resulting solution as L. Pipette 20 cm<sup>3</sup> or 25 cm<sup>3</sup> of L and pour it into a titration flask.
  - Titrate B against L using two drops of the indicator to the end point. Repeat the procedure to obtain three more titre value and record the results in a tabular form.

#### Questions

- What was the colour change observed during this titration experiment?
    - What was the volume of the pipette used?
    - Calculate the average volume of solution B that was used to neutralize solution L.
  - Write a balanced chemical equation for the reaction between L and B.
  - Showing your procedures clearly, calculate the percentage purity of A.
2. You are provided with the following: A solution AA containing 0.3 M sodium thiosulphate (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>); solution BB containing 2 M nitric acid (HNO<sub>3</sub>); distilled water, white sheet of paper marked X and Stopwatch. Perform the experiment by using procedures:
- Measure 5 cm<sup>3</sup> of solution AA and put it into the 100 cm<sup>3</sup> beaker. Add 15 cm<sup>3</sup> of distilled water and place the beaker on top of the letter X marked on the sheet of paper provided.
  - Measure 5 cm<sup>3</sup> of BB and place it into the 100 cm<sup>3</sup> beaker containing AA and distilled water, immediately start the stopwatch.

- (iii) Swirl the contents, watch from above and observe the changes.
- (iv) Switch off the stop watch when the mark X disappears.
- (v) Record the time taken for the letter X to disappear.
- (vi) Repeat the experiment using different data as shown in the following table.

Table: Experimental Data

Experiment Number	1	2	3	4
Volume of AA (cm <sup>3</sup> )	20	15	10	5
Volume of Distilled water (cm <sup>3</sup> )	0	5	10	15
Volume of BB (cm <sup>3</sup> )	5	5	5	5
Time (s)				
1/Time (s <sup>-1</sup> )				

### Questions

- (a) Complete filling the table.
- (b) Why mark X disappeared in this experiment?
- (c) (i) Indicating the states of the reactants and the products, write a balanced chemical equation for the reaction between AA and BB  
(ii) Write the corresponding ionic equation for the reaction between AA and BB.
- (d) Plot a graph of volume of AA (cm<sup>3</sup>) against 1/time (S<sup>-1</sup>). Explain the shape of your graph.
- (e) How would the rate of reaction vary if the concentration of BB is increased while the concentration of AA is kept constant? Explain.
- (f) What does the value 1/time an?

3. Sample **Z** is a simple salt containing one cation and one anion. Carefully, carry out qualitative analysis experiment to identify the ions present in the salt based on the following tests:

- (a) Appearance of the sample.
- (b) Action of heat on the sample.
- (c) Action of concentrated sulphuric acid on the sample.
- (d) Solubility.
- (e) Action of aqueous sodium hydroxide on solution of sample Z.
- (f) Flame test on sample Z.
- (g) Action of dilute nitric acid on solution of sample Z followed by silver nitrate solution.

Questions:

- (i) Prepare a relevant Table showing the qualitative analysis results.
- (ii) Write the reaction equation for the test at experiment (c).
- (iii) Write the electronic configuration of the cation in sample Z.
- (iv) How is Z prepared in the laboratory? Support your answer with chemical reaction.
- (v) What are the two uses of sample Z? Briefly, explain.