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**

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).

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1. You are provided with the following solutions: A 43.99 g of contaminated anhydrous sodium carbonate in 1 dm^3 of solution, denoted as A; 7.30 g of hydrochloric acid per 1 dm^3 of solution denoted as B and MO, methyl orange indicator. The instruction are:

(i) Measure 20 cm^3 of A and pour into 100 cm^3 measuring cylinder. Carefully, add distilled water up to 100 cm^3 mark, then stir. Name the resulting solution as L. Pipette 20 cm^3 or 25 cm^3 of L and pour it into a titration flask.

(ii) 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

(a) (i) What was the colour change observed during this titration experiment?

(ii) What was the volume of the pipette used?

(iii) Calculate the average volume of solution B that was used to neutralize solution L.

(b) Write a balanced chemical equation for the reaction between L and B.

(c) 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 ($Na_2S_2O_3$); solution BB containing 2 M nitric acid (HNO_3); distillated water, white sheet of paper marked X and Stopwatch. Perform the experiment by using procedures:

(i) Measure 5 cm^3 of solution AA and put it into the 100 cm3 beaker. Add 15 cm^3 of distilled water and place the beaker on top of the letter X marked on the sheet of paper provided.

(ii) Measure 5 cm^3 of BB and place it into the 100 cm^3 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^3)	20	15	10	5
Volume of Distilled water (cm^3)	0	5	10	15
Volume of BB (cm^3)	5	5	5	5
Time (s)				
1/Time (s^{-1})				

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 (cm3) against 1/time (S^{-1}). 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.

Qestions:

(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.