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

732/2 **CHEMISTRY 2A**

(PRACTICAL 2A)

Time: 3 Hours **Year: 2024**

Instructions.

1. This paper consists of sections of **Three (3)** questions.
2. Answer **all** questions.
3. Cellular phones are **note** allowed in the examination room.
4. Write your **examination Number** on every page of your answer booklet(s).

Answer **All** questions.

1. An acidic compound with a coded chemical formula HX is useful for small scale industries; therefore, it has to be identified and its exact concentration must be known. A beaker labeled **C** contains a solution prepared by dissolving 0.9125 g of HX in 100 cm3 of solution. You are also provided with a standard solution in a beaker labeled **D** prepared by dissolving 1.00 g of NaOH in 250 cm3 of solution and methyl orange as an indicator. Perform the activities listed in the procedure in order to identify the concentration of HX.

   Procedure:
   (i) Pipette 20 cm3 or 25 cm3 of solution **D** and transfer it into a titrating flask. Add three drops of methyl orange indicator in the titrating flask.
   (ii) Titrate this mixture with solution **C** until a permanent colour change is observed.
   (iii) Repeat procedures (i) - (ii) for three times.

   Questions

   (a) (i) What is the volume of the pipette used?
   (ii) Present your results in an appropriate table of results.
   (b) Calculate the average titre volume of **C**.
   (c) With state symbols included, write a balanced chemical equation for the reaction between solutions contained in bottles labeled **C** and solution **D**.
   (d) Calculate the concentration of NaOH in solution **D** in moles per dm3.
   (e) Identify element X in compound HX.
   (f) Write a balanced chemical equation representing the reaction which will occur when X is reacted with water.

2. You are given an assignment to find out the order and molecularity of different substances in the laboratory. The teacher gave you the following material in order to help you determine the molecularity and order of reaction through experiment.
   P1: Solution containing 40 g dm^{-3} of $Na_2S_2O_3 \cdot 5H_2O$;
   P2: A solution of 0.5 M H_2SO_4;
   Distilled water, stopwatch, white paper with a mark "**X**" and other relevant materials.
   Perform the experiment using the following procedure and answer the questions that follow:

   Procedure:
   (i) Put white paper with a mark "X" on a working bench and place a 50 cm^3 beaker on top of mark X in such a way that the mark is clearly seen from the top of the beaker.
   (ii) Measure 2 cm^3 of **P1** and 8 cm^3 of distilled water and transfer them in the beaker placed on white paper with mark "**X**".
   (iii) Measure 10 cm^3 of **P2** and pour it into the beaker containing **P1** and distilled water and immediately start the stopwatch.
   (iv) Record the time taken to cause enough precipitation to cloudy the mark "**X**".
   (v) Repeat procedure (i) to (iv) twice except that instead of 2 cm^3 of **P1** and 8cm^3 of distilled water in procedure (ii), use 4 cm^3 and 8 cm^3 of **P1** and 6 cm^3 and 2 cm^3 of distilled water respectively.

Questions

(a) Compete the following table:

Table of results

Experiment	**P1 (cm^3)**	**Water (cm^3)**	**P2 (cm^3)**	**Time t (s)**	**Rate (1/t) (s^{-1})**
1	2	8	10		
2	4	6	10		
3	8	2	10		

(b) Write the balanced ionic equation representing the reaction taking place in this experiment.
(c) Find the value of molecularity from the ionic equation in part (b).
(d) Plot a graph of as a function of volume of sodium thiosulphate.
(e) From the graph in part (d), give the order of reaction with respect to sodium thiosulphate.

3. Ms. Maturo brought sample **N** of unknown salt in your laboratory and asked you to identify the cation and the anion present in the sample. This is very important for her salt factory. In the process of identification of the sample, base your procedure on the listed tests and then answer the questions that follow:
   (i) Appearance of sample **N**.
   (ii) Action of heat on sample **N** in a test tube.
   (iii) Action of dilute sulphuric acid on the solid sample.
   (iv) Action of concentrated sulphuric acid on solid sample.
   (v) Flame test.
   (vi) Solubility of the sample.
   (vii) Confirmatory test for the anion.

Questions

(a) Prepare a relevant table showing the qualitative analysis results.
(b) What are the cation and anion present in the unknown sample?
(c) Write the reaction equation to indicate what took place in test (iii)