

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

732/2B

**CHEMISTRY 2B
(ACTUAL PRACTICAL B)**

Time: 3 Hours

Wednesday, 11st May 2016 a.m.

Instructions.

1. This paper consists of **three (3)** questions.
2. Answer **all** questions
3. Question number 1 carries 20 marks and the rest carry 30 marks.
4. Cellular phones 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. A technician prepared a solution coded **S1** by dissolving an unknown mass of sodium hydroxide pellets in water. Another solution, coded **S2**, was made by dissolving 3.65 g of hydrochloric acid in 1 dm³ of water. You are required to determine the concentration of solution **S1** by titrating it with **S2** using methyl orange as the indicator.

Instructions:

- Fill the burette with solution **S2**
- Pipette 25.0 cm³ of **S1** into a conical flask
- Add 2–3 drops of methyl orange and titrate to the end point
- Repeat the titration and record the average volume of acid used

Questions

- (a) State the colour change observed during titration.
- (b) What is the balanced chemical equation between **S1** and **S2**?
- (c) Calculate the concentration of **S2** in mol/dm³.
- (d) Using an average titre of 25.0 cm³, calculate the number of moles of HCl used.
- (e) Use the mole ratio to determine the number of moles of NaOH in 25.0 cm³.
- (f) Calculate the concentration of NaOH in mol/dm³ and g/dm³ (Molar mass of NaOH = 40 g/mol).
- (g) Suggest two reasons why the technician used pellets of NaOH instead of prepared solution.

2. You are given:

- 0.2 M potassium iodide labeled **W1**
- 0.2 M hydrogen peroxide labeled **W2**
- 0.1 M sulfuric acid labeled **W3**
- Starch indicator
- Stopwatch

Equal volumes of **W1**, **W2**, and **W3** are mixed in a clean beaker. A few drops of starch solution are added, and the time for the blue-black colour to appear is recorded. The procedure is repeated at 25°C, 35°C, 45°C, 55°C, and 65°C.

Questions

- (a) What causes the blue-black colour during the reaction?
- (b) Complete the following table by filling in the temperature in Kelvin and suggest reasonable times.

Temperature (°C)	Temperature (K)	Time (s)
25		72
35		52
45		36

55		24
65		14

- (c) Write the net ionic equation for the reaction between hydrogen peroxide and iodide.
- (d) Plot a graph of temperature (K) against time (s).
- (e) Explain how temperature affects the reaction rate based on the data above.
- (f) If the reaction was done at 15°C, what would be the expected trend in time? Explain.

3. A salt labeled **Y** is suspected to be a sulphate of a transition metal. Perform the following tests to identify the ions present:

- (a) Observe and record the appearance of salt **Y**.
- (b) Heat a small amount in a test tube and record observations.
- (c) Dissolve a portion in water and test with aqueous sodium hydroxide.
- (d) Test a second portion with aqueous ammonia solution.
- (e) Test a third portion with barium chloride followed by dilute hydrochloric acid.
- (f) Test a fresh solution with silver nitrate followed by dilute nitric acid.

Questions

- (i) Construct a table to show observations and inferences.
- (ii) What is the identity of the cation and anion present in salt **Y**?
- (iii) Write a balanced chemical equation for the reaction with barium chloride.
- (iv) Give one distinguishing property of the salt that confirms it is a transition metal compound.