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 **note** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

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 dm^3 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 cm^3 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/dm^3.

(d) Using an average titre of 25.0 cm^3, calculate the number of moles of HCl used.

(e) Use the mole ratio to determine the number of moles of NaOH in 25.0 cm^3.

(f) Calculate the concentration of NaOH in mol/dm^3 and g/dm^3 (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.