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, 08th May 2019 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 student was given:

- **V1**: A solution of nitric acid with unknown concentration
- **V2**: A standard solution of sodium carbonate prepared by dissolving 5.3 g of Na_2CO_3 in 500 cm^3 of water

The student was instructed to determine the concentration of **V1** by titrating it against **V2** using methyl orange as indicator.

Instructions:

- Pipette 25.0 cm^3 of **V2** into a conical flask
- Add 2–3 drops of methyl orange
- Titrate with **V1** from the burette until the colour changes
- Repeat and calculate the average volume used

Questions

(a) State the colour change observed during titration.

(b) Write the balanced chemical and ionic equations for the reaction.

(c) Calculate the concentration of **V2** in mol/dm^3.

(d) If the average titre of **V1** was 25.0 cm^3, calculate the number of moles of HNO_3 used.

(e) Hence calculate the concentration of HNO_3 in mol/dm^3.

(f) State the mass of HNO_3 in 250 cm^3 of this acid solution. (Molar mass = 63 g/mol)

2. You are given:

- 0.2 M sodium thiosulphate (**Y1**)
- 0.1 M hydrochloric acid (**Y2**)
- Stopwatch, beaker, and a paper marked with "O"

You are to study the effect of concentration of **Y1** on the rate of reaction. Keep the volume of **Y2** constant and dilute **Y1** progressively while maintaining the total volume constant.

Questions

(a) Why does the mark "O" disappear during the reaction?

(b) Complete the following table:

Trial	Y1 (cm^3)	Water (cm^3)	Y2 (cm^3)	Time (s)
1	10	0	10	19
2	8	2	10	25
3	6	4	10	34
4	4	6	10	48
5	2	8	10	71

(c) Write the full and net ionic equations for the reaction.

(d) Explain how the concentration of **Y1** affects the rate of the reaction.

(e) List two possible errors to avoid when recording time.

3. A salt labeled **F** is suspected to be a nitrate of a heavy metal. Carry out the following tests to identify the cation and confirm the anion:

(a) Record the physical appearance of salt **F**.

(b) Heat a small amount in a dry test tube and observe the gas evolved.

(c) Dissolve a portion in water and test with aqueous sodium hydroxide dropwise and then in excess.

(d) Test another portion with aqueous ammonia dropwise and in excess.

(e) Add iron(II) sulfate and concentrated sulfuric acid down the side of the test tube.

(f) Test a fresh portion with barium chloride and dilute HCl.

Questions

(i) Record your observations and give inferences in a table.

(ii) Identify the cation and anion in salt **F**.

(iii) Write two balanced chemical equations from the above reactions.

(iv) What special test confirms the presence of a nitrate ion?