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

732/2A **CHEMISTRY 2A**

(ACTUAL PRACTICAL A)

Time: 3 Hours **Thursday, 11 May 2017 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. You are provided with the following:

Solution A: 0.05 M sodium hydroxide solution

Solution B: A diprotic acid H_2X of unknown concentration

Phenolphthalein indicator

(a) Pipette 25.0 cm^3 of solution B into a clean conical flask. Add 2–3 drops of phenolphthalein and titrate against solution A taken in a burette. Repeat the titration to obtain three consistent readings.

(b) Record the initial and final burette readings for each titration in a well-labeled table and calculate the volume of solution A used.

(c) Determine the average volume of solution A used in the titration.

(d) Write a balanced chemical equation for the neutralization reaction.

(e) Calculate the number of moles of sodium hydroxide used in the average titration.

(f) Using your results, calculate the concentration of solution B in mol/dm^3.

(g) If 1.89 g of acid H_2X was used to prepare 250 cm^3 of solution B, calculate the molar mass of the acid.

(h) Identify the likely element X in H_2X if it is a common inorganic element.

2. You are provided with:

T1: Sodium thiosulphate solution (20 g/dm^3)

T2: Dilute hydrochloric acid (1.0 M)

T3: Distilled water

A stopwatch, a white paper marked "X", and other necessary materials

(a) Place the paper marked "X" on the bench and put a clean 50 cm^3 beaker on top. Mix volumes of T1 and T3 as shown below. Then quickly add 10 cm^3 of T2, start the stopwatch immediately and record the time taken for the mark "X" to disappear.

Experiment	Volume of T1 (cm^3)	Volume of T3 (cm^3)	Volume of T2 (cm^3)
1	2	8	10
2	4	6	10
3	6	4	10
4	8	2	10

(b) Record the time taken for the cross to disappear in each case.

(c) Complete the table by calculating the rate of reaction using 1/t for each experiment.

(d) Plot a graph of rate of reaction (1/t) against volume of T1 used.

(i) Describe the shape of your graph and what it suggests about the relationship between rate and concentration.

(ii) State the order of the reaction with respect to sodium thiosulphate.

(iii) Write the balanced ionic equation for the reaction that takes place.

(iv) State the name of the substance responsible for the cloudiness during the reaction.

(v) Suggest one way the experiment can be improved to determine the order with respect to hydrochloric acid.

3. You are provided with a white crystalline solid labeled Sample W. Carry out the following tests and record your observations and inferences.

(a) Observe the physical appearance of the sample.

(b) Test the solubility of the sample in cold water.

(c) Add a few drops of dilute hydrochloric acid to a small portion of W in a test tube.

(d) Add concentrated sulphuric acid to a fresh portion of W.

(e) Perform a flame test using a platinum wire dipped in the solid.

(f) To a small amount of W, add aqueous sodium hydroxide dropwise and then in excess.

(g) To another portion, add aqueous ammonia dropwise and then in excess.

(h) Record your observations and write appropriate inferences in a clearly structured table.

(i) Identify the cation and the anion present in Sample W.

(j) Write two balanced chemical equations to support your identification of the ions present.