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, 14 May 2009 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 R: 0.05 M calcium hydroxide solution

Solution S: A solution prepared by dissolving 0.820 g of a monoprotic organic acid HX in 250 cm^3 of solution

Indicator: Phenolphthalein

(a) Pipette 25.0 cm^3 of solution S into a clean conical flask and add 2–3 drops of phenolphthalein. Titrate it with solution R from a burette until a permanent colour change appears. Repeat the titration three times.

(b) Record the burette readings and volume used for each titration in a suitable table.

(c) Calculate the average volume of calcium hydroxide solution used.

(d) Write the balanced chemical equation for the reaction between calcium hydroxide and the acid HX.

(e) Calculate the number of moles of calcium hydroxide used.

(f) From your results, determine the number of moles and concentration of HX in solution S.

(g) Determine the molar mass of HX and suggest the identity of element X if it is a common halogen.

2. You are to investigate how temperature affects the rate of reaction between sodium sulphite solution and dilute hydrochloric acid. The reaction produces sulphur dioxide gas. The materials provided include:

- 10 cm^3 of sodium sulphite solution (constant for all trials)
- 10 cm^3 of dilute hydrochloric acid
- Water baths set to the following temperatures: 20°C, 30°C, 40°C, and 50°C
- Stopwatch and conical flasks

Procedure:

(i) Preheat both reactants separately to the set temperature using a water bath.

(ii) Quickly mix the two solutions in a conical flask and start the stopwatch immediately.

(iii) Record the time taken for the reaction to produce enough gas to extinguish a small flame or turn limewater milky.

(iv) Repeat the experiment for each of the four temperatures.

Trial	Temperature (°C)	Time for visible reaction (s)
1	20	
2	30	
3	40	
4	50	

(a) Complete the table above after performing the experiment.

(b) Calculate the rate of reaction as 1/t for each trial.

(c) Plot a graph of rate of reaction (1/t) against temperature.

(d) Describe the relationship between temperature and rate of reaction.

(e) Write the ionic equation for the reaction.

(f) State the role of sodium sulphite in the reaction.

(g) Give one reason why reactions are faster at higher temperatures.

3. You are provided with a white solid labelled Salt W. Carry out the following tests to identify the ions present.

Test	**Observation**	**Inference**
(a) Appearance of the solid		
(b) Solubility in cold water		
(c) Add dilute sulphuric acid to a portion of the solid		
(d) Heat a portion of the solid in a dry test tube		
(e) Flame test using a clean wire		
(f) Add aqueous ammonia dropwise, then in excess		
(g) Add iron(III) chloride to solution of W		

(a) Complete the table with observations and inferences.

(b) Identify the cation and anion present in Salt W.

(c) Write two balanced chemical equations confirming the presence of the identified ions.