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, 12 May 2015 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 P: A 0.1 M solution of sodium hydroxide

Solution Q: A solution prepared by dissolving 0.950 g of a metallic nitrate (MNO_3) in 250 cm^3 of distilled water

Indicator: Methyl orange

(a) Using a pipette, measure 25.0 cm^3 of solution Q into a conical flask and add 3 drops of methyl orange. Titrate with solution P from a burette until the solution turns from orange to yellow. Repeat the titration to get three consistent readings.

(b) Record the titration results clearly in a table and calculate the average volume of sodium hydroxide used.

(c) Write a balanced chemical equation for the reaction between sodium hydroxide and MNO_3.

(d) Calculate the number of moles of NaOH used during titration.

(e) Determine the number of moles and concentration of MNO_3 in solution Q.

(f) Using the total mass of MNO_3 used to prepare the solution, calculate its molar mass.

(g) Deduce the likely identity of metal M if it is a reactive alkali earth metal.

2. You are provided with:

Hydrogen peroxide solution (H_2O_2), freshly prepared manganese(IV) oxide powder (MnO_2), and distilled water.

You are to study how the amount of MnO_2 affects the rate of oxygen gas evolution during the decomposition of hydrogen peroxide.

Procedure:

- In each experiment, place 10 cm^3 of hydrogen peroxide solution in a conical flask.
- Add different amounts of MnO_2 (as shown in the table) quickly and start timing.
- Use a glowing splint to test the presence of oxygen.
- Stop the stopwatch when bubbling ceases and record the time taken.

Experiment	**Mass of MnO_2 (g)**	**Volume of H_2O_2 (cm^3)**	**Time for bubbling to stop (s)**
1	0.1	10	
2	0.2	10	
3	0.4	10	
4	0.6	10	

(a) Complete the table by conducting the experiment and recording the time for bubbling to stop.

(b) For each trial, calculate the rate of reaction as 1/t and complete the table.

(c) Plot a graph of rate (1/t) against mass of MnO_2.

(d) What is the relationship between the rate of reaction and the amount of catalyst?

(e) Write the balanced chemical equation for the decomposition of hydrogen peroxide.

(f) What is the role of MnO_2 in this experiment?

(g) State two safety precautions to observe when handling hydrogen peroxide.

3. A white powder labelled Substance Y is suspected to be an ionic compound. Carry out the following tests to identify the ions present.

Test	Observation	Inference
(a) Appearance of substance Y		
(b) Solubility in cold water		
(c) Perform a flame test using a platinum wire		
(d) Add dilute nitric acid to a small amount of Y		
(e) Add barium nitrate solution to the above solution		
(f) Add sodium hydroxide to a fresh portion of Y		
(g) Add excess sodium hydroxide to the above solution		

(a) Complete the table above by recording your observations and inferences.

(b) Identify the cation and anion present in substance Y.

(c) Write two ionic equations for confirmatory tests of these ions.