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, 15th May 2013 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 a solution labeled **L1**, which is a solution of nitric acid of unknown concentration. She was also given a solution labeled **L2**, which contains 5.3 g of sodium carbonate (Na_2CO_3) dissolved in 1 dm^3 of solution. Using methyl orange as the indicator, she was instructed to determine the concentration of **L1** through titration.

Procedure:

She pipetted 25.0 cm^3 of solution **L2** into a conical flask, added 2–3 drops of methyl orange, and titrated it with **L1** from the burette until the endpoint was reached. She repeated the titration three more times and obtained consistent readings.

Questions

(a) What colour change was observed at the end point of the titration?

(b) What volume of acid was delivered on average from the burette?

(c) Write the balanced chemical and ionic equations for the reaction between nitric acid and sodium carbonate.

(d) Calculate the number of moles of sodium carbonate used in each titration.

(e) Using your answer in (d) and the average titre value of 25.0 cm^3, calculate the concentration of nitric acid in mol/dm^3.

2. In a study of the effect of temperature on reaction rate, two solutions were used:

- Solution **S1**: 0.1 M sodium thiosulphate
- Solution **S2**: 0.1 M hydrochloric acid

A student mixed 10 cm^3 of **S1** and 10 cm^3 of **S2** in a beaker placed over a paper marked with a black cross. The time taken for the cross to disappear due to sulfur precipitate was measured using a stopwatch. This experiment was repeated at 30°C, 40°C, 50°C, 60°C, and 70°C using the same volumes.

Questions

(a) Record the temperature in Kelvin for each trial if the °C values are 30, 40, 50, 60, and 70.

(b) Explain why the cross disappears during the reaction.

(c) Complete a table with time(s) for each temperature (assume shorter times at higher temperatures).

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

(e) Plot a graph of temperature (K) against reaction time (s).

(f) What is the effect of temperature on the speed of the reaction, based on your graph?

3. A white salt labeled **M** was given for qualitative analysis. Perform tests to determine the ions present in the salt.

Tests to Perform:

(a) Heat a small amount of dry salt **M** in a dry test tube and observe any changes.

(b) Dissolve a small portion in water and divide the solution into three test tubes.

(c) To the first portion, add sodium hydroxide solution dropwise, then in excess.

(d) To the second portion, add aqueous ammonia dropwise, then in excess.

(e) To the third portion, add dilute hydrochloric acid followed by barium chloride solution.

(f) To a new portion, add silver nitrate followed by dilute nitric acid.

Questions

(i) Construct a results table showing your observations and the inferences for each test.

(ii) Suggest the identity of the cation and the anion in salt **M**.

(iii) Write balanced chemical equations for two of the observed reactions.

(iv) Write an equation for the reaction between the salt **M** and sodium carbonate solution.