THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2B **CHEMISTRY 2B**

(ACTUAL PRACTICAL B)

(For Both School and Private candidates)

Time: 2:30 Hours **Year: 2021**

Instructions

1. This paper consists of **two (2)** questions**.**
2. Answer **all** questions**.**
3. Each question carries twenty **five (25)** marks**.**
4. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
5. Cellular phones, and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet (s)

Atomic masses: H=1, C=12, 0=16, Na=23.

$1litre = 1dm^3 = 1000cm^3$

1. You are given two unlabeled beakers containing solution of an acid and an alkali. Identify the solutions (acid and alkali) by pouring about 2 cm^3 of each solution into separate test tubes and adding few drops of phenolphthalein indicator (**POP**) in both test tubes. Label the identified alkali as **A** and the acid as **C**. Given the information that, solution **A** contained 5.6 g of pure potassium hydroxide in 1 dm^3 of solution and solution **C** had 6.0 g of an impure sulphuric acid in 1 dm^3 .

   Answer the following questions:

   (a) What was the colour of phenolphthalein indicator (**POP**) indicator in solution **A** and **C**, respectively?

   (b) Titrate the acid (in a burette) against the alkali (in a conical flask) using two drops of phenolphthalein indicator (**POP**) as an indicator. Repeat the process and obtain three titre values. Record the results in a tabular form.

   (c) What was the volume of the pipette used?

   (d) What was the colour change at the end point?

   (e) Calculate the average volume of the acid used.

   (f) Showing your procedures clearly, determine the percentage purity of the sulphuric acid.

2. Determine the effect of concentration on the rate of chemical reaction. Study the reaction between sodium thiosulphate and hydrochloric acid. The chemicals provided are labelled as **QQ** containing 3.16 g/dm^3 sodium thiosulphate solution, **TT** containing 7.3 g/dm^3 hydrochloric acid solution, and distilled water. You are also provided with a stop watch and a piece of white paper marked X on which a 100 cm^3 beaker containing the reaction mixture.

   Proceed as follows:

   (i) Place 100 cm^3 beaker on top of the sheet labelled by letter X in such a way that the letter X is visible when viewed from above.

   (ii) Using measuring cylinder, measure 50 cm^3 of solution **QQ** and pour it

into a 100 cm3 beaker placed on the top of a sheet of paper marked letter X.

(iii) Measure 10 cm^3 of solution **TT** and put it into a 100 cm^3 beaker containing a solution **QQ** and immediately start a stopwatch.

(iv) Swirl the contents in the 100 cm^3 beaker and stop the stopwatch.

(v) Record the time taken for the mark X to disappear.

(vi) Repeat the experiment using the data in the following table:

Table*:* Experimental Data

Conc. of **QQ** after adding water (g/dm^3)	Volume of **QQ** (cm^3)	Volume of distilled water (cm^3)	Volume of **TT** (cm^3)	Time taken for the mark X to disappear in sec.
20.066	50	00	10	
16.432	40	10	10	
12.324	30	20	10	
8.216	20	30	10	
4.108	10	40	10	

Questions:

(a) Complete the table by filling the empty column.

(b) Write a balanced chemical equation for the reaction between sodium thiosulphate and hydrochloric acid.

(c) Which substance from the chemical reaction in part (b) produced obscured the mark X?

(d) Use the data in the experiment table to draw a concentration-time graph, by allocating time on x-axis and concentration on the y-axis.

(e) What conclusion can you draw from the concentration-time graph and regarding the disappearance of mark X.