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: 2022**

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 provided with solutions **BB** and **CC**. One solution is acidic, while the other solution is basic. The acidic solution contained 3.06 g/dm^3 sulphuric acid (**H_2SO_4**), while the basic solution contain 2 g of impure sodium hydroxide (**NaOH**) in 500 cm^3 of distilled water. Perform the following procedures, and then answer the questions that follow:

    (i) Pour about 2 cm^3 of solution **BB** into a test tube and use litmus paper to test if it is acidic or a basic.
    (ii) Discard the content and wash the test tube.
    (iii) Repeat the steps (i) and (ii) using solution **CC**.
    (iv) Titrate the acid solution (in the burrete) against the base solution (in the titration flask) using methyl orange (**MO**) as an indicator up to the end point.
    (v) Repeat the step (iv) to obtain three more readings and record the results in a tabular form.

    Questions

    (a) (i) What was the volume of the pipette used?

    (ii) Calculate the average volume of the acid used to neutralize the base.

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

    (b) Write a balanced chemical equation for the the reaction between solutions **BB** and **CC**.

    (c) Calculate the percentage of impurity of sodium hydroxide.

2. Determine the effect of temperature on the rate of chemical reaction. Study the reaction between sodium thiosulphate and hydrochloric acid. The chemicals provided are labeled as **FF**, containing 0.2 M sodium thiosulphate solution and **EE**, containing 0.1 M hydrochloric acid solution.You are also provided with thermometer, stopwatch/ stop clock and a sheet of white paper marked X.

    Proceed as follows:

    (i) Place 50 cm^3 beaker on top of cross X on the plain sheet of paper provided such that the cross X is visible through the mouth of the beaker

when viewed from above.

(ii) Prepare a water bath using 250 cm^3 or a 300 cm^3 beaker.

(iii) Measure exacctly 10 cm3 of solution **FF** and 10 cm^3 of **EE** and pour into separate boiling test tubes.

(iv) Put the two boiling test tubes into the water bath in step (ii) and warm the contents to 40^{o}C.

(v) Pour the hot solutions **FF** and **EE** into the 50 cm^3 beaker in step (i) and immediately start the stopwatch/clock. Record the time taken in seconds for the cross to disappear completely.

(vi) Repeat the procedures stated in (iii) to (v) at different temperatures of 50^{o}C, 60^{o}C and 70^{o}C and record your readings as shown in the following table.

Table*:* Experimental Data

Temperature (^{0}C)	**Time (sec)**	$\frac{1}{time}\left(Sec^{-1}\right)$
40		
50		
60		
70		

Questions

(a) Complete filling the table.

(b) What does $\frac{1}{time}$ in the table represent?

(c) Write a balanced chemical equation for the reaction between **EE** and **FF**.

(d) What is the name of the product causing the solution to turn cloudy making the letter X to disappear?

(e) Plot graph of temperature against $\frac{1}{time}$

(f) From the graph what do you conclude about the effect of increasing temperature on the rate of reaction?