THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

032/2A

CHEMISTRY 2A
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

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

Instructions

1. This paper consists of **two (2)** questions. Answer **all** the questions.
2. Each question carries **twenty five (25)** marks.
3. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
4. Write your **Examination Number** on every page of your answer booklet(s).
5. You may use the following constants:
   Atomic masses: H=1, C=12, O = 16, Na = 23, S = 32, Cl =35.5.
   1 litre = 1 dm^3 = 1000 cm^3.



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1. You are provided with the following:

LL: 6.3 g of dibasic acid, $H_2C_2O_4.XH_2O$ dissolved to make 1 litre of a solution;

MM: 4.0 g of NaOH dissolved to make 1 litre of a solution.

Determine the value of X in the acid $H_2C_2O_4.XH_2O$. Proceed as follows:

(i) Fill the burette with solution **LL**.

(ii) Pipette 20/25 cm^3 of solution **MM** and put it in a conical flask.

(iii) Titrate **LL** against **MM** using two drops of POP indicator.

(iv) Repeat the titration to obtain three more titre values and record your results in a tabular form.

Questions

(a) (i) Indicate the volume of the pipette used.

(ii) Complete the table of results and compute the average volume of acid used for complete neutralization of **MM**.

(b) Calculate the molarity of the base.

(c) Write a balanced chemical equation for the reaction taking place.

(d) Calculate the molarity of the acid.

(e) Calculate;

(i) the value of X in $H_2C_2O_4.XH_2O$.

(ii) the percentage of water of crystallization in $H_2C_2O_4.XH_2O$.

2. You are provided with the following:

L1: 0.05 M sodium thiosulphate,

L2: 1.0 M nitric acid,

Stop watch,

A thermometer,

White sheet of paper marked with letter **X** on one side.

Procedure

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

(ii) Measure 20 cm^3 of solution **L2** and put it into a 100 cm^3 beaker placed on top of a sheet of paper marked letter **X**.

(iii) Measure 40 cm^3 of solution **L1,** put it into boiling test tube and heat it on a water bath until it reaches a temperature of 40 °C.

(iv) Pour the heated content of solution **L1** into a 100 cm^3 beaker placed on top of the sheet of paper marked letter **X**, and immediately start the stop watch.

(v) Swirl the content and look through it from above. Record the time taken for the letter **X** to disappear.

(vi) Repeat the procedures (i) – (v) using similar solutions at 50 °C, 60 °C, 70 °C and 80 °C as indicated in the following table of experimental data.

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Table: Experimental data

Volume of L1 (cm^3)	Volume of L2 (cm^3)	Temperature of L1 (°C)	Time (s)	Rate (1/t) (s^{-1})
40	20	40		
40	20	50		
40	20	60		
40	20	70		
40	20	80		

Questions

(a) What is the aim of the experiment?

(b) Complete filling in the data in the table.

(c) Plot a graph of temperature (°C), Y - axis against Rate (s^{-1}), X - axis.

(d) What does the shape of the graph indicate?

(e) Write the ionic equation for the reaction between **L1** and **L2**.

(f) Why did the letter **X** disappear?

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