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 **Wednesday , 14th November 2018 a.m.**

Instructions

1. This paper consists of **three** (3) questions. Answer **all** questions.
2. Question 1 carries **twenty** (20) marks and the rest carry **fifteen** (15) marks each.
3. Qualitative Analysis Guidance Pamphlets may be used after a thorough check by a supervisor.
4. Cellular phones, calculators and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. You may use the following constants:
   Atomic masses:
   H = 1, C = 12, O = 16, Na = 23, S = 32.
   1 litre = 1 dm^3 = 1000 cm^3.

1. You are provided with the following solutions:
   X: A 0.5 M sulphuric acid solution;
   Y: A monovalent metal hydroxide made by dissolving 4.00 g of MOH in distilled water to make up to 1000 cm^3 of solution;
   MO: Methyl orange indicator.

Procedure

(i) Measure exactly 20 cm^3 of **X** by using 100 cm^3 measuring cylinder. Carefully add distilled water to 100 cm^3 mark then stir. Call this solution $\mathbf{X_1}$. Fill $\mathbf{X_1}$ into a burette.

(ii) Titrate $\mathbf{X_1}$ against 20.00 cm^3 or 25.00 cm^3 of **Y** using two drops of the indicator; obtain three accurate values. Record your results in a tabular form.

Questions

(a) (i) The colour change at the end point was from ____ to ____.
(ii) ____ cm^3 of **Y** required _____ cm^3 of $\mathbf{X_1}$ for complete reaction.

(b) Write a balanced chemical equation for the reaction between $\mathbf{X_1}$ and **Y**.

(c) Calculate the following:
(i) Molarity of $\mathbf{X_1}$ and of **Y**;
(ii) Molar mass of **Y**;
(iii) Atomic mass of **M**.

(d) Identify metal **M** and write its electronic configuration.

(e) State two properties of each of **X** and **Y**.

2. You are provided with the following:
   $\mathbf{H_1}$: A solution of 0.25 $moldm^{-3}$ $Na_2S_2O_3$;
   $\mathbf{H_2}$: A solution of 2 M HCl;
   Distilled water; stop watch; thermometer and a plain paper marked **X**.

Procedure

Place 150 cm^3 of water in the 250 cm^3 beaker and use this as your water bath; heat the water to 80°C. Measure 10 cm^3 of $\mathbf{H_1}$ and 25 cm^3 of water and pour the contents into the 100 cm^3 beaker. Put the beaker with the contents into a hot water bath. When the contents attain a temperature of 70 °C, place the beaker on top of the mark **X** on the paper provided. Add 10 cm^3 of $\mathbf{H_2}$ and immediately start the stop watch. Swirl the beaker twice and look vertically on top of the beaker so as to see **X** through the bottom of the beaker. Stop the clock when **X** is invisible. Record the time taken for **X** to disappear completely. Repeat the experiment at different temperatures as shown in the Table 1.

Table 1

Exp. No.	Temperature of $\mathbf{H_1}$ (°C)	Time (sec)	Rate $\frac{1}{t}$ (s^{-1})
1	70		
2	60		
3	50		
4	40		
5	Room temperature		

Questions

(a) Fill Table 1.

(b) Write a balanced equation for reaction between H_1 and H_2.

(c) Which product causes the solution to cloud the letter **X**?

(d) Plot a graph of rate $(\frac{1}{t})$ against temperature.

(e) What conclusion can you draw from this experiment?

3. Sample **N** is a simple salt containing one cation and one anion. Carefully carry out all the experiments described in Table 2. Record all your observations and make appropriate inferences to identify the cation and anion present in sample **N**.

Table 2

S/N	Experiments	Observation	Inference
(a)	Appearance of the solid sample **N**.		
(b)	Put a spatulaful of the sample **N** in a test tube and heat.		
(c)	Add dilute hydrochloric acid to the solid sample **N**. .		
(d)	Perform flame test on the sample.		
(e)	Dissolve the sample in water. Divide the resulting solution into two portions:		
	(i) Add sodium hydroxide to the first portion.		
	(ii) Add few drops of magnesium sulphate solution to the second portion, then warm.		

Conclusion

(i) The cation is _____ and the anion is _____.

(ii) The sample **N** is _____.

(iii) Write chemical equations (with state symbols) to show reactions which took place in the experiments (b) and (c).

(iv) Describe three uses of sample **N**.