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

032/2C

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

Time: 2:30 Hours **Wednesday, 24th October 2012 a.m.**

Instructions

1. This paper consists of **three (3)** questions. Answer **all** the 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 the supervisor.
4. Cellular phones and calculators 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, Cl = 35.5
   1 litre = 1 dm^3 = 1000 cm^3

1. **You are provided with the following solutions:**

   E: Containing 2.45 g of sulphuric acid in 500 cm^3 of solution;

   F: Containing monovalent metal M (MOH) which was made by dissolving 2.00 g of M hydroxide in 1 litre of distilled water;

   Methyl orange indicator.

   Questions:

   (a) **What** colour change is observed when methyl orange is added to a solution containing monovalent metal M?

   (b) Write a balanced chemical equation for the reaction between **E** and **F**.

   (c) Titrate the acid (in a burette) against the base (in a conical flask) using two drops of your indicator and obtain three titre values.

   (d) (i) _____ cm^3 of acid required _____ cm^3 of base for complete reaction.

   (ii) Showing your procedures clearly, identify metal M in MOH.

   (e) State any four real life applications of this practical.

   (20 marks)

2. You are provided with the following materials:

   SS: A solution of 0.27M $Na_2S_2O_3$ (sodium thiosulphate);

   PP: A solution of 2M HCl;

   Distilled water;

   Stopwatch;

   Thermometer;

   Heat source/ burner.

   Procedure:

   Place a 150 cm^3 of water in the 200 cm^3 beaker and heat water to 80^0C. This is your water bath. Use 10 cm^3 measuring cylinder to measure 10 cm^3 of **SS** and 30 cm^3 of water. Pour the contents in the 100 cm^3 beaker and put it in a hot water bath. When the contents attain a temperature of 70^oC, add 10 cm^3 of **PP**, immediately start the stop watch. Swirl the beaker twice. Place the beaker with the contents on top of a piece of paper marked **X**. Look down vertically through the mouth of the beaker so as to see the cross at the bottom of the beaker. Stop the clock when the cross is invisible. Record the time taken for the letter **X** to disappear completely. Repeat the experiment as indicated in Table 1.

   Record your results as in Table 1.

Table 1: Table of results

Exp. No.	Temperature	Time (sec)	Rate $[\frac{1}{t}(s^{-1})]$
1	Room Temperature of Solution		
2	40		
3	50		
4	60		
5	70		

Questions:

(i) Complete Table 1.
(ii) Write a balanced equation for reaction between **SS** and **PP**.
(iii) What is the product which causes the solution to cloud the letter **X**?
(iv) Plot a graph of rate $(\frac{1}{t})$ against temperature (t).
(v) What conclusion can you draw from this experiment? **(15 marks)**

3. Sample **Z** is a simple salt containing one cation and one anion. Carry out the experiments described below. Record carefully your observations, make appropriate inferences and finally identify the anion and cation present in sample **Z**.

Table 2: Table of results

S/n	Experiment	Observation	Inference
(a)	Appearance of sample **Z**.		
(b)	Perform flame test on sample **Z**.		
(c)	To a little sample add concentrated sulphuric acid.		
(d)	Heat a little sample **Z** in a test tube.		
(e)	Put a little sample in dry test tube followed by distilled water and divide the solution into four portions.		
	(i) To the first portion add sodium hydroxide drop by drop till excess.		
	(ii) To the second portion add aqueous ammonia drop by drop till in excess.		
	(iii) To the second portion add potassium ferrocynide solution till in excess.		
	(iv) To the fourth portion add dilute hydrochloric acid followed by $BaCl_2$ solution.		

Conclusion:

(i) The cation in sample **Z** is _____ and the anion is _____.
(ii) The formular of the sample **Z**_____.
(iii) The chemical name of **Z** is _____. **(15 marks)**