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, 20th November 2013 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 Sheet 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,   N = 14,   O = 16,   K = 39,   S = 32.
   1 litre = 1 dm^3 = 1000 cm^3.

1. You are provided with the following solutions:
   FF: Containing 5.6 g of pure potassium hydroxide per 1 dm^3 of solution;
   GG: Containing 6.0 g of impure sulphuric acid per 1 dm^3 of solution;
   Methyl orange and phenolphthalein indicator.

Questions

(a) (i) What is the suitable indicator for the titration of the given solutions? Give a reason for your answer.

   (ii) Can litmus paper be used as an indicator in this experiment? Justify your answer.

   (iii) Explain how you will rinse the apparatus (burette and pipette) before doing the titration?

(b) Write a balanced chemical equation for the reaction between **FF** and **GG**.

(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, determine the percentage purity of sulphuric acid.
   (20 marks)

2. You are provided with the following materials:
   SS: A solution of 0.1 M $Na_2S_2O_3$ (sodium thiosulphate);
   PP: A solution of 2 M HCl;
   Distilled water;
   Stopwatch;
   Thermometer; Piece of paper marked **X**;
   Heat source/ burner.

Procedure

Place a 150 cm^3 of water in the 250 cm^3 beaker and heat water to 80^0C. This is your water bath. Measure 10 cm^3 of SS and 30 cm^3 of water and pour the contents in the 100 cm^3 beaker. Put it in a hot water bath. When the contents attain a temperature of $60°C$, add 10 cm^3 of PP and 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 at different temperatures as indicated in Table 1.

Table 1: Table of results

Experiment	Temperature	Time (sec)
1	60	
2	50	
3	40	
4	Room temperature	

Questions

(i) Complete Table 1.

(ii) Write a balanced reaction equation for reaction between SS and PP.

(iii) Plot a graph of time against the temperature.

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

(v) What conclusion can you draw from the results of this experiment?   (15 marks)

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)	Heat a little sample **Z** in a test tube.		
(c)	Put a little sample in a dry test tube followed by dilute hydrochloric acid and divide the solution into three portions.		
	(i) To the first portion add NaOH till in excess.		
	(ii) To the second portion add freshly prepared $FeSO_4$ solution followed by conc. H_2SO_4 slowly added through the side of the test tube.		
	(iii) To the third portion add ammonia solution till in excess.		

Conclusion

(i) The cation in sample **Z** is _____ and anion is _____.

(ii) The name of sample **Z** is _____.   (15 marks)

(iii) Write the chemical formula of sample **Z**.