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

032/2B

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

Time: 2:30 Hours **Monday, 14th November 2016 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:
   A: Sodium hydroxide solution, 0.05 moldm^{-3};
   B: Ethanoic acid solution of unknown concentration;
   POP: Phenolphthalein indicator.

   Procedure:
   (i) By using **POP**, titrate **B** against **A** until the end point is reached.
   (ii) Record the results in a tabular form.

   Questions
   (a) (i) State the volume of the pipette and the burette used.
   (ii) State the colour change at the end point.
   (iii) Find the average volume of B used.
   (b) Calculate the number of moles of sodium hydroxide used in the titration.
   (c) Write an equation for the reaction of sodium hydroxide with ethanoic acid.
   (d) (i) Calculate the number of moles of ethanoic acid present in 1 dm^3.
   (ii) Deduce the number of moles of ethanoic acid present in 25 cm^3.
   (iii) Convert the value of moles of ethanoic acid calculated in d(ii) into grams of ethanoic acid.

2. You are provided with the following:
   G_1: A solution of 0.13 M sodium thiosulphate;
   G_2: A solution of 2 M hydrochloric acid;
   G_3: Distilled water;
   Stop watch; a piece of white paper and a thermometer.

   Procedure
   (i) Put a small beaker (100 cm^3) on top of the cross on the paper provided in such a way that the mark is seen through the solution when viewed from above.
   (ii) Measure 2 cm^3 of **G_1** and 8 cm^3 of **G_3** using measuring cylinder of 10 cm^3 and put them in the beaker at (i).
   (iii) Using another measuring cylinder measure 10 cm^3 of **G_2** and pour into the beaker containing **G_1** and **G_3** and immediately start a stop watch.
   (iv) Swirl the mixture and look through it from the above, record the time taken for the cross to disappear.
   (v) Repeat the procedures for different sets of concentration shown in Table 1.

Table 1

Volume of G_2 (cm^3)	Volume of G_1 (cm^3)	Volume of G_3 (cm^3)	Time taken for the cross to disappear (sec.)	Rate of reaction $\frac{1}{t}$ (sec^{-1})
10	2	8		
10	4	6		
10	6	4		
10	8	2		
10	10	0		

Questions

(a) Complete Table 1.

(b) (i) Plot a graph of volume of G_1 (vertical axis) against time taken for the cross (X) to disappear.

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

(c) Write the ionic equation for the reaction between G_1 and G_2.

(d) Why did the cross disappear?

(e) Describe two factors which can affect the rate of the given reaction.

3. Sample **J** is a simple salt which contains one cation and one anion. Carefully carry out the experiments instructed below on the sample **J**. Make appropriate observations and inferences, and hence identify the ions present in the sample **J**.

S/n	Experiment	Observation	Inference
(a)	Observe the appearance of sample **J**.		
(b)	Transfer about 0.5 g of **J** in a dry test tube, then heat.		
(c)	To a little sample **J** in a dry test tube, add 3 drops of concentrated H_2SO_4, warm gently then add small pieces of copper turnings.		
(d)	Dissolve sample **J** in distilled water and divide the resulting solution into four portions. (i) Add ammonia solution till no further change to the first portion.		
	(ii) Add sodium hydroxide solution to the second portion.		
	(iii) Add freshly prepared iron(II) sulphate solution followed by concentrated sulphuric acid down the side of test tube to the third portion.		
	(iv) Add potassium hexacyanoferrate(III) solution to the fourth portion.		

Conclusion

(i) The cation in **J** is _____.

(ii) The anion in **J** is _____.

(iii) The formula for sample **J** is _____.

(iv) The name of sample **J** is _____.

(v) Write the equation for the reaction that took place at (b).