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, 17th October 2011 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.
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, Cl = 35.5.
   1 litre = 1 dm^3 = 1000 cm^3.

1. You are provided with the following:

PP: Solution containing 3.65 g of HCl per dm^3 of the solution.

VV: Solution containing 7.15 g of hydrated sodium carbonate ($Na_2CO_3.xH_2O$) in 0.5 dm^3 of the solution.

MO: Methyl orange indicator.

Procedure:

Put solution **PP** into the burette. Pipette 20 cm^3 or 25 cm^3 of solution **VV** in a titration flask. Add two drops of methyl orange indicator. Titrate solution **VV** against **PP** from the burette until a colour change is observed. Note the reading of the burette. Repeat the procedure to obtain three more readings and record your results in a tabular form.

Questions:

(a) (i) Determine the average titre volume.

(ii) _____ cm^3 of solution **VV** required _____ cm^3 of solution **PP** for complete reaction.

(iii) State one indicator other than methyl orange which would be suitable in this experiment and state why do you think it is suitable.

(b) Predict the effect if each of the following conditions were applicable in this Experiment:

(i) The pipette used was not rinsed with sodium carbonate.

(ii) The air space at the burette tip was not removed before titration.

(c) Write a balanced chemical equation of the reaction between solution **PP** and **VV**.

(d) (i) Calculate the concentration of **PP** in moles/dm^3.

(ii) Find molarity of solution **VV**.

(e) Deduce the value of x in $Na_2CO_3xH_2O$. **(20 marks)**

2. You are provided with the following materials:
RR: A solution of 0.2M $Na_2S_2O_3$ (sodium thiosulphate);
GG: A solution of 0.1M HCl;
Stopwatch;
Distilled water.

Procedure:

(i) Using 10 cm^3 measuring cylinder, measure 2 cm^3 of **RR** and 8 cm^3 of water and pour the content in the 100cm^3 beaker.
(ii) Use different measuring cylinder to measure 10 cm^3 of **GG** and pour it into the beaker containing **RR** and distilled water and, immediately start the stop watch. Swirl the beaker twice.
(iii) Place the beaker with the contents on top of a piece of paper marked **X** with blue or black pen.
(iv) 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 letter **X** is invisible.
(v) Record the time taken for the letter **X** to disappear completely.
(vi) Repeat the experiment as shown in Table 1.
(vii) Record your results in tabular form as shown in Table 1.

Table 1: Table of results

Exp. No.	Vol. of **GG** (cm^3)	Vol. of **RR** (cm^3)	Vol. of Distilled water (cm^3)	Time (sec)	$\frac{1}{t}(s^{-1})$
1	10	2	8		
2	10	4	6		
3	10	6	4		
4	10	8	2		
5	10	10	0		

Questions:

(a) Complete filling the table of results (Table 1).
(b) Write a balanced equation for reaction between **RR** and **GG**.
(c) What is the product which causes the solution to cloud the letter **X**?
(d) Plot a graph of 1/t against the volume of the thiosulphate.
(e) Use the graph to explain how variation of concentration affects the rate of chemical reaction.

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

S/n	Experiment	Observation	Inference
(a)	Observe the appearance of sample K.		
(b)	Put a little sample of K in a test tube then add some distilled water, then shake.		
(c)	Heat a little K in a dry test tube.		
(d)	Put a little sample of K in a test tube then add dilute hydrochloric acid.		
(e)	To a little sample of K in a test tube add distilled water and stir. Divide the resulting solution into two portions and add the following: (i) $MgSO_4$ solution to the first portion.		
	(ii) NaOH solution and warm gently to the second portion.		

Conclusion:

(i) Give names of the ions present in sample **K** .

(ii) Cation present in sample **K** is _____ and anion is _____.

(iii) Show the reactions taken place in (d).

(15 marks)