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 **Friday, 15th 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 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, S= 32.
   1 litre = 1 dm^3 = 1000 cm^3

1. You are provided with the following solutions:

T: Containing 1.825 g of hydrochloric acid in 0.50 dm^3 of solution;

Z: Containing 3.575 g of pure hydrated sodium carbonate, $Na_2CO_3.xH_2O$ per 0.25 dm^3 of solution;

Methyl orange indicator.

Questions

(a) Is the use of phenolphthalein indicator for this experiment as suitable as the methyl orange? Give a reason for your answer.

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

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

(ii) With state symbols, write a balanced molecular equation and the corresponding ionic equation for the reaction between **T** and **Z**.

(d) Showing your procedures clearly, determine the value of x in the formula $Na_2CO_3.xH_2O$ and hence name the compound.

2. You are provided with the following:

P_1: 0.5 $moldm^{-3}$ sodium thiosulphate;

P_2: 0.1 $moldm^{-3}$ hydrochloric acid;

Distilled water;

Stop watch;

Plain paper.

The aim of this experiment is to investigate the effect of concentration on the rate of chemical reaction between sodium thiosulphate and hydrochloric acid.

Procedure

(i) Write a clear letter X on a white piece of paper.

(ii) Place a small beaker (100 cm^3) on top of the letter X such that the letter is visible when viewed from above.

(iii) Measure 30 cm^3 of **P_1** and put into the beaker in (ii) above.

(iv) Measure 10 cm^3 of **P_2** and pour it into a beaker containing solution **P_1** in (iii) above and simultaneously start the stop-watch/clock.

(v) Swirl the reaction mixture only once and note the time taken for the letter X to disappear completely.

(vi) Repeat procedure (ii) to (v) by varying the volume of **P_1** and distilled water as indicated in Table 1.

Table 1

Experiment	Volume of P_1 (cm^3)	Volume of water (cm^3)	Volume of P_2 (cm^3)	Time t, for the cross to disappear (s)
1	30	0	10	
2	25	5	10	
3	20	10	10	
4	15	15	10	

Questions

(a) Complete Table 1.

(b) Why did the solution become opaque after mixing P_1 and P_2?

(c) With state symbols, write the ionic equation for the reaction.

(d) List four factors which can affect the reaction in (c).

(e) Plot a graph of volume P_1 against time.

(f) Inspect your graph and comment on the effect of concentration on the rate of chemical reaction.

Sample **N** contains one cation and one anion. Using systematic qualitative analysis procedures, record carefully your experiments, observations and inferences as indicated in Table 2 and finally identify the anion and cation in sample **N**.

Table 2

S/n	Experiment	Observation	Inference

Conclusion

(i) The cation present in sample **N** is _____.

(ii) The anion present in sample **N** is _____.