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, 19th November 2014 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:
   D: Containing 1.46 g of hydrochloric acid in 0.40 dm^3 of solution;
   F: Containing 2.0 g of impure sodium hydroxide contaminated with sodium chloride, in 0.5 dm^3;
   Phenolphthalein and methyl orange indicators.

Questions

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

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

(c) (i) _____ cm^3 of **F** required _____ cm^3 of **D** for complete reaction.
(ii) Write a balanced chemical equation for the reaction between **D** and **F**.

(d) Showing your procedures clearly, calculate the percentage by mass of sodium chloride in impure base.

2. You are provided with the following:
   Solution **C** containing 0.5 M sodium thiosulphate ($Na_2S_2O_3$);
   Solution **E** containing 0.1 M nitric acid (HNO_3);
   Distilled water;
   Plain paper marked **X**;
   Stopwatch.

Procedure

(i) Measure 10 cm^3 of solution **C** and put into 100 cm^3 beaker provided.
(ii) Measure 10 cm^3 of solution **E** and put into 100 cm^3 beaker containing solution **C**, and immediately start the stopwatch.
(iii) Swirl the contents and place the beaker on top of letter **X** on the plain paper provided. Watch from above and observe the changes.
(iv) Switch off the stopwatch when the mark **X** disappears.
(v) Record the time taken for the letter **X** to disappear.
(vi) Repeat the experiment using different data as shown in Table 1.

Table 1: Table of Results

Experiment	**Vol. of E (cm^3)**	**Vol. of C (cm^3)**	**Vol. of Distilled water (cm^3)**	**Time (s)**
1	10	10	0	
2	10	8	2	
3	10	6	4	
4	10	4	6	

Questions

(a) What is the aim of the whole experiment?

(b) Complete Table 1.

(c) Giving reason(s), identify the experiment in which the reaction was:
(i) fast
(ii) slow.

(d) With state symbols, write the ionic equation for the reaction between **C** and **E**.

(e) List any three factors affecting the reaction in 2(d).

(f) (i) Plot a graph of volume of **C** against time.
(ii) What can you conclude from the graph?

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

Table 2: Table of results

S/n	Experiment	Observation	Inference

Conclusion:

(i) The cation in sample **Y** is _____.
(ii) The anion in sample **Y** is _____.
(iii) The chemical formula of sample **Y** is _____.