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

032/2A

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

Time: 2:30 Hours   Tuesday, 10th November 2015 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 solutions:

   G: Containing 0.1 mole hydrochloric acid per dm^3 of solution;
   B: Containing 2.65 g M_2CO_3 per 0.5 dm^3 of solution;
   Methyl orange indicator.

Questions

(a) Titrate **G** (in burette) against **B** (in a conical flask) using two drops of your indicator obtain three titre values. Record your data in a tabular form.

(b) (i) _____ cm^3 of **B** required _____ cm^3 of **G** for complete reaction.

   (ii) Write a balanced chemical equation between **B** and **G** and the correspon ionic equation with state symbols.

   (iii) Showing your procedures clearly, calculate the molar mass of M_2CO_3 and he identify element M.

2. You are provided with the following:

   U: A solution containing 79 g of sodium thiosulphate in one litre;
   V: A solution containing 0.1 $moldm^{-3}$ hydrochloric acid;
   T: Distilled water;
   Stopwatch;
   Plain paper marked X.

Procedure

(i) Place a 100 cm^3 beaker on top of letter X on a plain paper provided.

(ii) Measure 8.0 cm^3 of **U** and 2 cm^3 of **T** and put them in the beaker in (i).

(iii) Measure 10 cm^3 of **V** and put it into a beaker containing **U** and **T**; immediately start stop watch and observe the changes from above.

(iv) Record the time taken for the disappearance of letter X.

(v) Repeat steps (i) to (iv) using the data shown in Table 1.

Table 1

Number of experiment	Volume of V (cm^3)	Volume of U (cm^3)	Volume of T (cm^3)	Time (t) in seconds	$\frac{1}{t}$ (sec^-)
1	10	8	2		
2	10	6	4		
3	10	4	6		
4	10	2	8		
5	10	1	9		

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.

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(d)   With state symbols, write the balanced chemical equation for the reaction between **U** and **V**.

(e)   List four factors which can affect the rate of chemical reaction.

(f)   Write the electronic configuration of the product which causes the solution to cloud letter **X**.

(g)   What can you conclude from the data obtained?

3.   Sample **M** contains one cation and one anion. Using systematic qualitative analysis procedures, carry out the experiment and record carefully your observations, inferences and finally identify the anion and cation present in the sample **M**. Record your work in a tabular form as shown in Table 2.

Table 2

S/n	Experiment	Observation	Inference

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