THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
DIPLOMA IN SECONDARY EDUCATION EXAMINATION

732/2A **CHEMISTRY 2A**
(ALTERNATIVE A PRACTICAL)

Time: 3 Hours ***Tuesday, 18th May 2010 a.m.***

Instructions

1. This paper consists of **three** questions.
2. Answer **all** the questions.
3. Question number one carries 40 marks and question two and three carries 30 marks each.
4. You are allowed to use qualitative analysis guide pamphlets for answering question number 3.
5. Cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).
7. The following constants might be useful in your calculations:

   Atomic mass:

   Na = 23, O = 16, H = 1, C= 12, K = 39, Mn = 55, S = 32

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1. You are provided with the following:

T1: A solution containing 40 g of $Na_2S_2O_3.5H_2O$ dm^{-3}.

T2: A solution of dilute HCl

T3: Distilled water

A stop watch.

Procedure:

(a) Using blue or black pen write a clear letter x on a piece of white paper and place a small beaker on top of the letter x such that the letter x is visible through the solution.

(b) Put 10 cm^3 of **T1** into the beaker followed by 5 cm^3 of **T2** and start the stop watch. Stir gently and record the time taken for the letter x to disappear in the solution.

(c) Repeat the above procedures by using various amounts of **T1** and distilled water **T3** as indicated in the table below.

Table of Results:

Volume of T1 (cm^3)	Volume of H_2O (cm^3)	Volume of T2 (cm^3)	$\frac{[S_2O_3]}{M}$	t(sec)	$\left[S_2O_3^{2-}\right] \times t$ (sec)	$\frac{1}{t}$ (sec^-)
10	0	5				
8	2	5				
6	4	5				
4	6	5				

(d) Complete the table above.

(e) Plot a graph of $\left[S_2O_3^{2-}\right]$ against t.

(f) Plot a graph of $\frac{1}{t}$ against $\left[S_2O_3^{2-}\right]$.

(g) From your graphs what is the effect of $\left[Na_2S_2O_3\right]$ on the rate of reaction?

(h) What is the order of reaction with respect to $\left[Na_2S_2O_3\right]$?

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2. You are provided with the following solutions:

A: A solution of 5.032 g of dibasic organic acid of anhydrous salt with molecular mass 90 made to one litre of aqueous solution.

B: A solution of 0.1 M NaOH

C: Phenolphthalein indicator.

Procedure:

(a) Pipette 20 cm^3 or 25 cm^3 of **A** into a conical flask.

(b) Add to it few drops of **C.**

(c) Put **B** into the burette.

(d) Titrate **B** against **A** until the colour change is observed.

Table of results:

Titration Number	Pilot	1	2	3
Final volume (cm^3)				
Initial volume (cm^3)				
Volume used (cm^3)				

(a) The volume of pipette used was _____ cm^3

(b) The volume of burette was _____ cm^3

For complete neutralization _____ cm^3 of **A** required _____ cm^3 of solution **B**

(c) Write a balanced equation for the reaction taking place between **A** and **B.**

(d) Calculate the

(i) molarity of **A.**

(ii) concentration of **A** in gdm^{-3}.

(iii) number of moles of water of crystallization per mole of hydrated dibasic organic acid.

3. Sample **W** is a compound containing **one anion** and **one cation**. Using qualitative analysis techniques, identify the two ions and hence deduce the name of the compound.

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