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

732/2A

CHEMISTRY 2A
(ACTUAL PRACTICAL A)

Time: 3 Hours DR. MYOTA .F. CB Wednesday, 17th May 2011 a.m.

Instructions

This paper consists of **three (3)** questions.

Answer **all** questions.

Question 1 carries **forty (40)** marks and the rest carry **thirty (30)** marks each.

A qualitative analysis guide pamphlet for answering question number 3 may be used.

Cellular phones are **not** allowed in the examination room.

Mathematical tables and non-programmable calculators may be used.

Write your **Examination Number** on every page of your answer booklet(s).

The following constants might be useful in your calculations

Atomic masses:

H = 1; C = 12; O = 16; Na = 23; S = 32; K = 39; Mn = 55; Fe = 56.

1 Litre = $1dm^3 = 1000cm^3$.

Gas constant, R = 8.314 $Jmol^{-1}$.

This paper consists of 4 printed pages.

1. You are provided with the following reagents:

ZA: A standard solution of 0.02M $KMnO_4$ (potassium permanganate);

ZB: A solution of unknown concentration of $FeSO_4.YH_2O$;

ZC: Dilute sulphuric acid (1M H_2SO_4);

Procedure:

(i) Fill the burette with **ZA**.

(ii) Pipette out 20 cm^3 (or 25 cm^3) of **ZB** into a clean conical flask. Add to it 20 cm^3 to the same conical flask.

(iii) Titrate this solution against **ZA** until permanent colour change is observed.

(iv) Repeat procedure (i) - (iii) so as to get three more readings.

(v) Record your results in tabular form as shown in Table 1.

Table 1: Titration results

Titration No.	Trial	1	2	3
Final volume (cm^3)				
Initial volume (cm^3)				
Volume used (cm^3)				

Questions:

(a) From the experiment:
- (i) Determine the average titre value.
- (ii) Write the half Redox reaction equation between **ZA** and **ZB**.
- (iii) Write overall balanced ionic equations for the reaction.
- (iv) State which species was oxidized and which one was reduced.

(b) Calculate the concentration of:
- (i) $KMnO_4$ in g/dm^3.
- (ii) $FeSO_4.YH_2O$ in mol/dm^3.
- (iii) Concentration of $FeSO_4$ in g/dm^3.

You are provided with the following materials:

PQ: A solution of 80 g sodium thiosulphate ($Na_2S_2O_3$) in 1dm^3;

PR: A solution of 0.1M HCl;

PS: Distilled water;

Stopwatch;

Two 10 cm^3 measuring cylinders.

Procedure:

(i) Use a blue or black pen to write a letter **V** on a white piece of paper.

(ii) Place a small beaker (50 - 100cm^3) on top of a written letter such that the letter is visible through the solution.

(iii) Use a measuring cylinder to measure 2 cm^3 of **PQ** and 8 cm^3 of **PS** and then put them in a small beaker on top of the letter **V**.

(iv) Using another measuring cylinder, measure 10 cm^3 of **PR** and put it into the beaker containing **PS** and **PQ**. Immediately start the stopwatch.

(v) Record the time taken for the letter **V** to disappear completely.

(vi) Repeat the experiment as shown in Table 2.1

Table 2.1: Summary of procedure

Experiment No.	Vol. of $Na_2S_2O_3$ (cm^3) (PQ)	Vol. of H_2O (cm^3) (PS)	Vol. of HCl (cm^3) (PR)
1	2	8	10
2	4	6	10
3	6	4	10
4	8	2	10

Record your results in tabular form as shown in Table 2.2.

Table 2.2: Experimental results

Experiment No.	Vol. of PR (cm^3)	Vol. of PQ (cm^3)	Vol. of PS (cm^3)	Time (sec)	$\frac{1}{t}(s^{-1})$
1	10	8	2		
2	10	6	4		
3	10	4	6		
4	10	2	8		

Questions:

(a) Write a balanced chemical equation for the reaction between **PQ** and **PR**.

(b) What is the reaction product which causes the solution to cloud the letter **V**?

(c) Calculate the order of reaction with respect to the concentration of the acid.

3. Compound **J** contains **one cation** and **one anion**. Perform a systematic qualitative analysi experiment to identify the ions present in salt **J.** Write a chemical formula of **J.**