Name……Adm. No. ……..Index no ……..

Class: …….. Candidate's Sign……

Date: ……

CHEMISTRY 233/3
PAPER 3
(PRACTICAL)
SEPTEMBER 2021
TIME: 2 ¼ HOURS

MOMALICHE SCHOOLS KCSE TERM I MOCK SEPTEMBER 2021

MOMALICHE 3 CYCLE 8

INSTRUCTIONS TO CANDIDATES

- Fill in your details above.
- Write **your answers in ENGLISH**
- Answer **all** the questions in the spaces provided in the question paper.
- You are not allowed to start working with the apparatus for the first **15 minutes** of the 2 ¼ hours allowed for this paper.
- All working **must** be clearly shown.
- Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY:

Question	Maximum Score	Candidate's Score
1.	15	
2.	11	
3.	14	
TOTAL	40	

This paper consists of 8 printed pages. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

Question 1.

You are provided with:

- Hydrochloric acid, solution **A**
- 0.4M Sodium hydroxide, Solution **B**
- 0.1g of **divalent** metal **C**

You are required to determine;

(i) Molar enthalpy change for the reaction between metal **C** and hydrochloric acid.

(ii) the Molarity of Acid **A**.

Procedure I

Using a measuring cylinder, place 100cm^3 of acid A in a 250ml plastic beaker. Record its temperature as T_1. put metal **C** into the beaker and stir using the thermometer. Record the highest temperature attained as temperature T_2 in table **I** below.

(Label this solution as **F** and **preserve it** for procedure II)

Table I

Final temperature (^oC) T_2	
Initial temperature (^oC) T_1	

($1^1/_2$mks)

(a) Determine the temperature change, ΔT^oC ($^1/_2$mk)

(b) How many moles of **C** were used in the experiment (C=24.0) (1mk)

(c) i) Calculate the enthalpy change for the reaction. (1mk)

(s.h.c = 4.2kJ$kg^{-1}k^{-1}$, density of solution=1g/cm^3

ii) Calculate the molar enthalpy change for the reaction
(1mk)

Procedure II

Fill the burette with solution **F**. Pipette 25cm^3 of solution **B** into a conical flask. Add 3 drops of phenolphthalein indicator. Run the solution in the burette into the conical flask until the pink colour just disappears. Record your readings in the table **II** below. Repeat the above procedure to obtain concordant results and complete the table.

Table II

	I	II	III
Final burette readings (cm^3)			
Initial burette readings (cm^3)			
Volume of solution **F** used (cm^3)			

(4mks)

(a)Determine the average volume of solution **F** used
(1mk)

(b) Calculate:

(i) The number of moles of solution **B** used.
(1mk)

(ii) The number of moles of hydrochloric acid in solution **F** that reacted with $25cm^3$ of solution B.

(1mk)

(iii) The number of moles of hydrochloric acid in $100cm^3$ of solution **F**.

(1mk)

(iv) The initial number of moles of hydrochloric acid in $100cm^3$ of solution **A**.

(1mk)

(v) The molarity of Hydrochloric acid, solution **A**.

(1mk)

Question 2

You are provided with:

(a) Sodium thiosulphate containing 40g/litre, solution **D**.

(b) 2M Hydrochloric acid, solution **E**.

You are required to:

Determine the rate of reaction between sodium thiosulphate and Hydrochloric acid.

Procedure:

Into a 100ml glass beaker, place 20cm^3 of **D**. Using a pencil, Mark a cross (X) on a white paper. Place a beaker containing solution **D** on the cross X. Add 20cm^3 of solution **E** into solution **D** and at the same time start a stop watch.

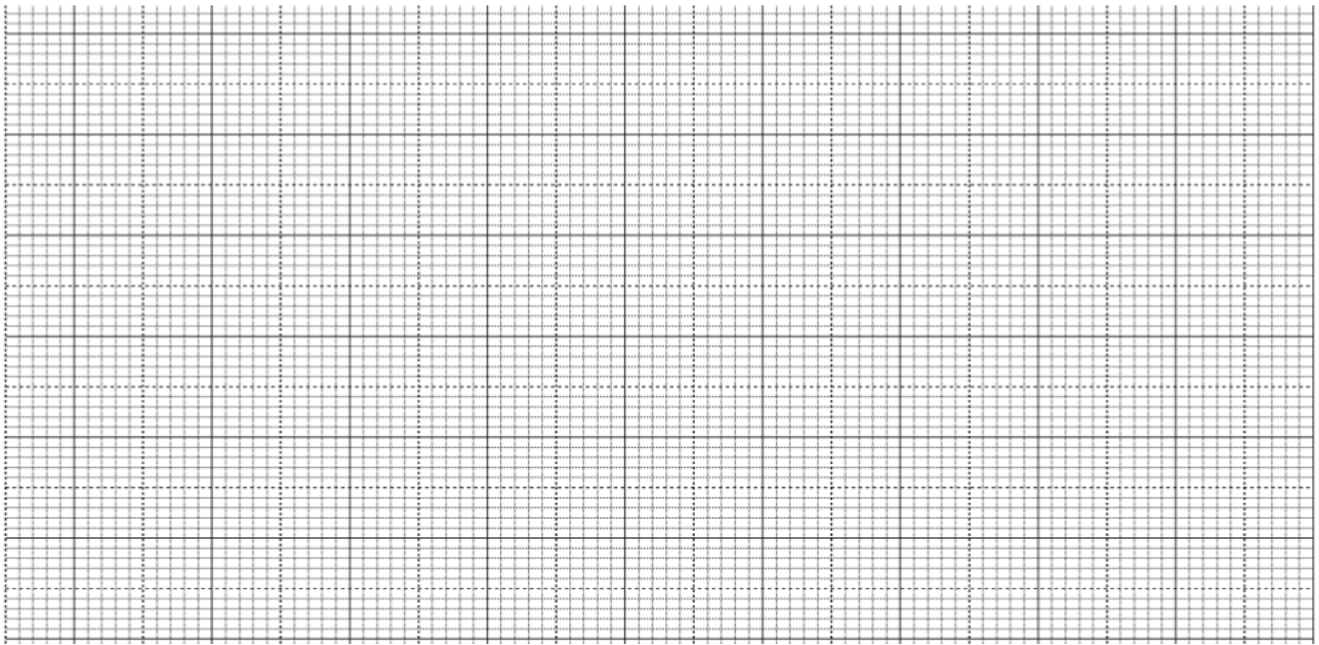
Shake the beaker and immediately place it on the cross. Observe the cross (X) through the solution (from the top) and record the time (t) in seconds taken for the cross to be longer visible.

Repeat the procedure using the other solutions of **E** diluted with water as indicated in the table III below.

Table III (5mk)

Experiment	1	2	3	4	5
Volume of solution **D** (cm^3)	20	20	20	20	20
Volume of solution **E** (cm^3)	20.0	17.5	15.0	12.5	10.0
Volume of water (cm^3)	0.0	2.5	5.0	7.5	10.0
Time taken for X to disappear					
$^1/_{time}$ (sec^{-1})					

(a) Plot a graph of 1/time (y-axis) against volume of solution **E.** (3mks)



(b) (i) From the graph, determine the time taken for the cross (X) to be invisible at 16.5cm^3 of solution **E**.
(1mk)

(ii) If the volume of solution **E** in b (i) above was diluted using 3.5cm^3 of water, what would be the concentration of **E** in the mixture in moles/litre.
(1mk)

(c) Explain the shape of the graph. (1mk)

Question 3.

Procedure:

You are provided with solid **G** and **H**. Carry out the tests and record your observation and inferences in spaces provided.

(a) Place all solid **G** in a clean boiling tube. Add about 10cm^3 of distilled water and shake well. Divide the solution into 4 portions.

(i) To the first portion add sodium hydroxide dropwise till in excess.

Observations	Inferences
(1mk)	(1mk)

(ii) To the second portion add aqueous ammonia dropwise till in excess.

Observations	Inferences
(1mk)	(1mk)

(iii) To the third portion add 3 drops of dilute hydrochloric acid, solution E.

Observations	Inferences
($^1/_2$mks)	($^1/_2$mks)

(iv) To the fourth portion, add 3 drops of Lead (II) nitrate solution followed by dilute nitric (IV) acid.

Observations	Inferences
(1mk)	(1mk)

(b) I. Using a clean metallic spatula, ignite about one third of solid H in a Bunsen burner flame.

Observations	Inferences

(1mk)	(1mk)

II. Put the remaining solid **H** in a clean boiling tube tube. Add about 8ml distilled water and shake well. Divide the solution into three portions.

(i) Determine the pH of the solution using universal indicator paper.

Observations	Inferences
($^1/_2$mks)	($^1/_2$mks)

(ii) To the second portion, add 2drops of acidified Potassium Manganate (VII) solution.

Observations	Inferences
(1mk)	(1mk)

(iii) To the third portion add sodium hydrogen carbonate solid.

Observations	Inferences
(1mk)	(1mk)

END