Name…… **Index no** …….....

School: …….. **Candidate's Sign**……..……

Date: ……..…

233/3
CHEMISTRY
PAPER 3
(PRACTICAL)
JULY/ AUGUST 2011
TIME: 2 ¼ HOURS

Kenya Certificate of Secondary Education (K.C.S.E.)

Chemistry
Paper 3
Practical

INSTRUCTIONS TO CANDIDATES

- Write **your name**, **index number** and **school** in the spaces provided above
- **Sign** and **write** the date of examination in the spaces provided.
- 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.	10	
3.	15	
TOTAL	**40**	

This paper consists of 7 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**
- 0.5M Sodium hydroxide, Solution **B**
- 0.04g of metal **C** (R.A.M)

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 it 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)	
Initial temperature (^oC)	

($1^1/_2$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) Calculate the molar enthalpy change for the reaction.

$C_{(s)} + 2H^+_{(aq)} \rightarrow C^{2+}_{(aq)} + H_{2(g)}$ Given $Q=\frac{Mc\Delta T}{1000n}$, where n is the no. of moles of C that reacted.

(s.h.c= $4.2Jg^{-1}k^{-1}$, density of solution=$1g/cm^3$) (2mks)

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 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) Find 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.

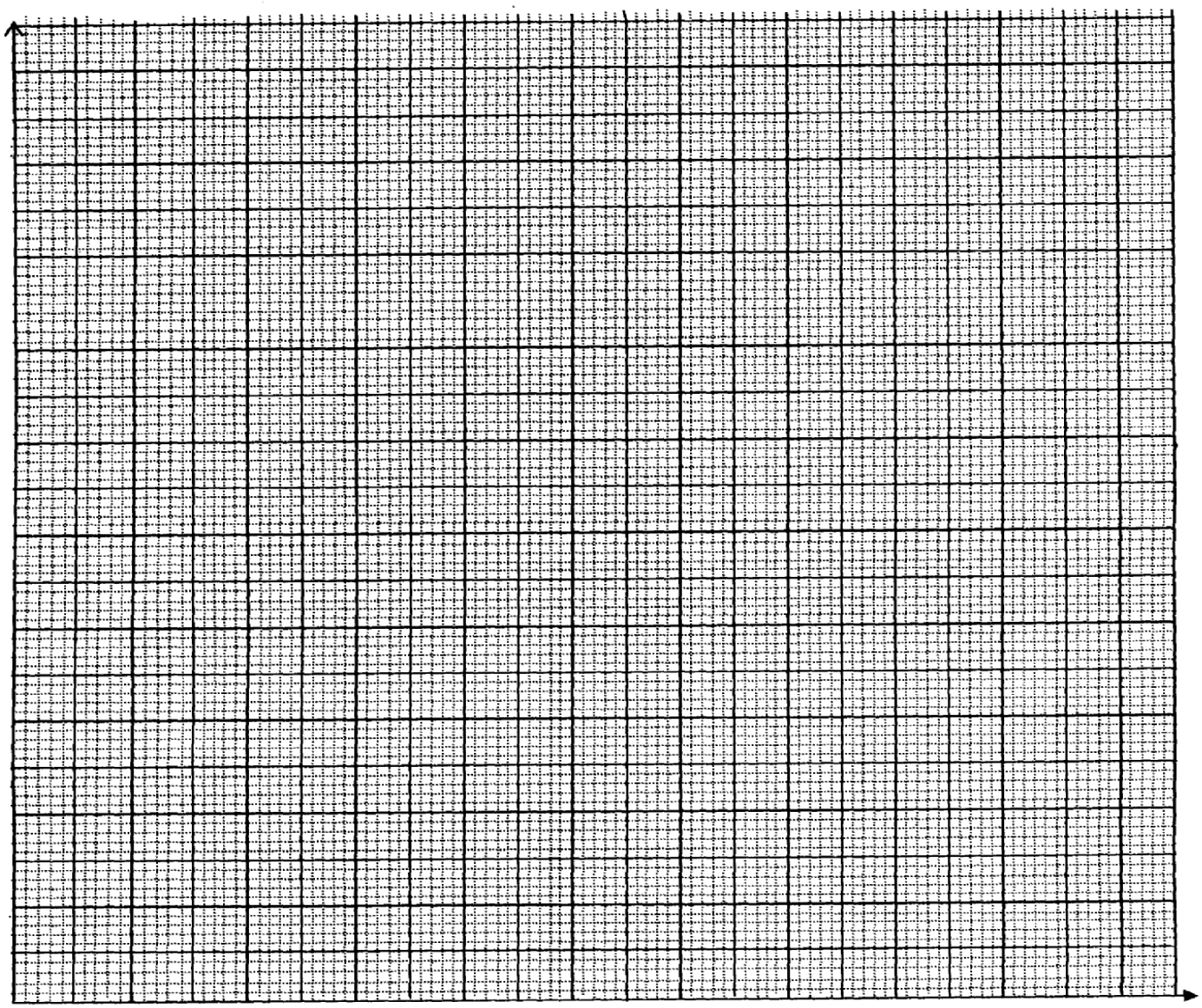
Shake the beaker and immediately place it on the cross. Observe the cross (X) through the solution (from the top) and record the time (t) in seconds taken for the cross to be longer visible.

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

Table III

Experiment	1	2	3	4	5
Volume of solution **D** (cm^3)	20	20	20	20	20
Volume of solution **E** (cm^3)	20	17.5	15	12.5	10
Volume of water (cm^3)	0	2.5	5	7.5	10
Time taken for X to disappear					
$^1/_{time}$ (sec^{-1})					

(a) Plot a graph of 1/time (y-axis) against volume of solution **E.** (4mks)



(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.

Observations	**Inferences**
(1mk)	(1mk)

Divide the solution into 4 portions.

(i) To the first portion add 2-3 drops of sodium hydroxide until in excess.

Observations	**Inferences**
(1mk)	(1mk)

(ii) To the second portion add 2-3 drops of aqueous ammonia until 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 nitrate followed by dilute nitric acid.

Observations	**Inferences**
(1mk)	(1mk)

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

Observations	**Inferences**
(1mk)	(1mk)

II. Put the remaining solid **H** in a clean test tube. Add distilled water and shake well. Add more water to about $^3/_4$ full. Divide the solution into three portions.

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

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)