Name: …… Index No. ……

Candidate's Sign. ……..……..

Date: ……...

233/3

CHEMISTRY

Paper 3

TIME: 2 ¼ HOURS

MODEL07102022001

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

Chemistry Paper 3
Practical
TIME: 2 ¼ HOURS

INSTRUCTIONS TO THE CANDIDATES:-

- ***Write your name** and **index number in the spaces provided***
- *Answer **all** the questions in the spaces provided.*
- *Mathematical tables and silent electronic calculators may be used.*
- *All working **MUST** be clearly shown where necessary.*
- *Use the first 15 minutes of the 2 ¼ hours to ascertain that you have all the chemicals and apparatus that you may need.*

For Examiners use Only

QUESTION	MAX. SCORE	CANDIDATE'S SCORE
1	14	
2	10	
3	16	
TOTAL SCORE	**40**	

This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

You are provided with:-

- Zinc powder, solid **S**
- 0.5M HCl, solution **B.**
- 0.25M NaOH, solution **C**
- Distilled water

You are required to determine the :

(i) Number of moles of hydrochloric acid that remain unreacted.

(ii) Number of moles of zinc powder that reacted

Procedure

Using a burette, measure $50cm^3$ of solution **B** and place it in 100ml beaker. Put all of the solid **S** in the $50cm^3$ of solution **B** in the 100ml beaker. Leave the content in the beaker to react for about 5minutes. Filter the solution using filter paper and funnel into a 250ml Volumetric flask and top up to the mark with distilled water: Lable this solution as solution **D**.

Empty the burette and fill it with solution **C**. Pipette $25cm^3$ of solution **D** and place it into an empty 250ml conical flask. Add two drops of methyl orange indicator and titrate solution **C** against solution **D**.

Record the result in the table 1 below. Repeat the titration of solution **C** against solution **D** and complete the table 1 below

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution C used (cm^3)			

(5mks)

(a) Calculate the average volume of solution **C** used (1mk)

(b) Calculate the number of moles of:

(i) Sodium hydroxide used (1mk)

(ii) Hydrochloric acid, in $25cm^3$ of solution **D** used (1mk)

(iii)Hydrochloric acid in 250cm^3 of solution **D** used (1mk)

(iv)Hydrochloric acid in 50cm^3 of solution **B** (1mk)

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(v)Hydrochloric acid that reacted with Zinc powder (2mks)

(vi)Calculate the mass of Zinc that reacted (R.A.M of Zn= 65) (2mk)

2. You are provided with the following:

(i) 2M sodium hydroxide, solution **P**

(ii) 2M Hydrochloric acid, solution **Q**

You are required to determine the molar enthalphy of neutralization of the acid using sodium hydroxide.

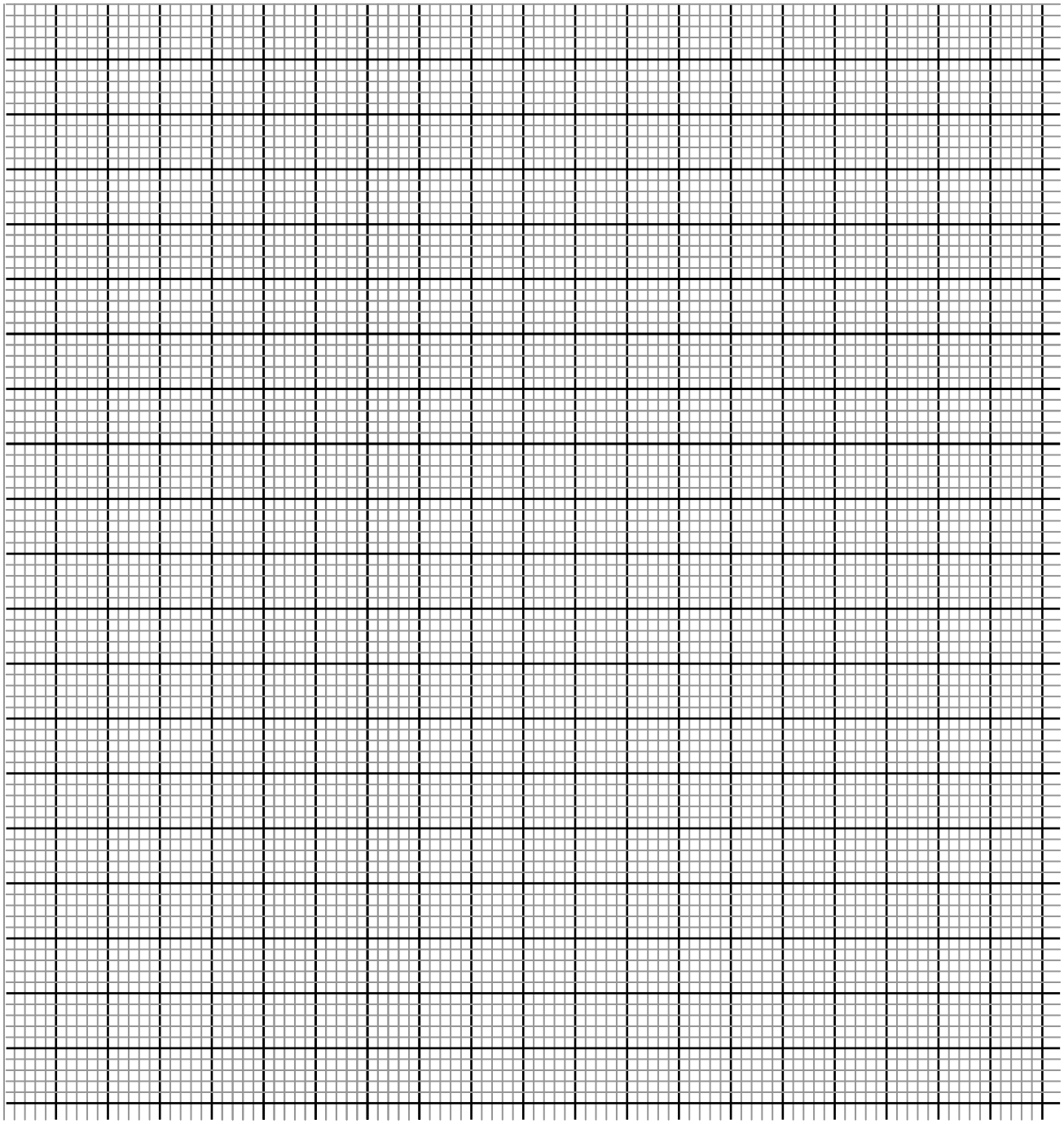
Procedure

Measure exactly 40cm^3 of solution **Q** into a clean 250ml plastic beaker.

Record the temperature of this solution in the table below. Measure 10cm^3 of sodium hydroxide solution, solution **P** and add it to the hydrochloric acid, solution **Q** in the plastic beaker. Stir with the thermometer and record the maximum temperature reached. Repeat the above procedure adding 10cm^3 portions of sodium hydroxide until the total volume of the solution is 100cm^3

Volume of acid (cm^3) **(Q)**	40	40	40	40	40	40	40
Volume of **NaOH** added (cm^3) **(P)**	0	10	20	30	40	50	60
Temperature (^{0}**C**) of solution							

(a) Plot the graph of temperature rise (**Y- axis**) against volume of sodium hydroxide added (3mks)



From your graph;

(i) Determine the expected temperature rise $\Delta\mathbf{T}$ (1mk)

(iii) Calculate the molar enthalpy of neutralization for this reaction.

(take C = 4.2kJkg^{-1}k^{-1}, density of solution 1g/cm^3) (2mks)

3. You are provided with solid **W** and solution **K.** You are required to carry out the tests prescribed in solid **W** and solution **K**. Write your observation and inferences accordingly.

(a) Place all solid **W** in a boiling tube

(i) Add about $10cm^3$ of distilled water to solid **W**, and shake

OBSERVATION	**INFERENCE**
(1mk)	(1mk)

ii) Divide the product in (i) into four equal portions. Add 5 drops of 2M sodium hydroxide solution to the first portion

OBSERVATION	**INFERENCE**
(½ mk)	(1mk)

(iii)Add 2-3 drops of lead (ii)nitrate solution to the second portion.

OBSERVATION	**INFERENCE**
(½ mk)	(½ mk)

(iv) To the third portion, add 2-3 drops of barium (ii) chloride provided followed by 5 drops of 2M hydrochloric acid. Shake the mixture well.

OBSERVATION	**INFERENCE**
(1mk)	(1mk)

(v) Add 5 drops of acidified potassium dichromate (vi) to the fourth portion

OBSERVATION	**INFERENCE**

(1mk)	(1mk)

(b)(i) To about $2cm^3$ of solution **K**, add few drops of sodium hydroxide till in excess.

OBSERVATION	**INFERENCE**
(1mk)	(½ mk)

(ii)To about $2cm^3$ of solution **K**, add 2-3drops of Barium chloride solution

OBSERVATION	**INFERENCE**
(1mk)	(1mk)

(iii) To about $2cm^3$ of solution **K**, add $2cm^3$ of bromine water provided

OBSERVATION	**INFERENCE**
(1mk)	(½ mk)

(iv) To about $2cm^3$ of the solution **K**, add 2-3 drops of lead (ii) nitrate solution.

OBSERVATION	**INFERENCE**
(1mk)	(½ mk)