Name:……………………………………………………………Index No:…………………………….

School:……………………………………….Venue……………Adm no:…………Class:………………………

Candidate's Signature:………………………

Date: …………………………………………………

233/3
CHEMISTRY PRACTICAL
Paper 3
JUNE 2023
TIME: *2 ¼* **HOURS**

KASSUJET JOINT EXAMINATIONS 2023

Kenya Certificate of Secondary Education (K.C.S.E)
233/3
Chemistry Practical
Paper 3
2 ¼ **Hours**

INSTRUCTIONS TO CANDIDATES:

- Answer all the questions in the spaces provided in the question paper.
- You are **NOT** allowed to start working within the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you read the question paper and make sure you have all the chemicals and apparatus that you may need.
- All working **MUST** be clearly shown.
- Mathematical tables and silent scientific calculators may be used.
- This paper consists of **6 printed** pages.
- Candidates should check to ascertain that all papers are printed as indicated and that no questions are Missing

For Examiner's Use Only:

Question	Maximum score	Candidate's score	Examiner's initials
1	**22**		
2	**10**		
3	**8**		
Total score	**40**		

*This question paper has **6** printed pages. Confirm that all the pages are printed as indicated and **No** questions are missing.*

1. (a) You are provided with the following solutions:
   - **Solution P**, 1M hydrochloric acid
   - **Solution Q**, 1M sodium hydroxide

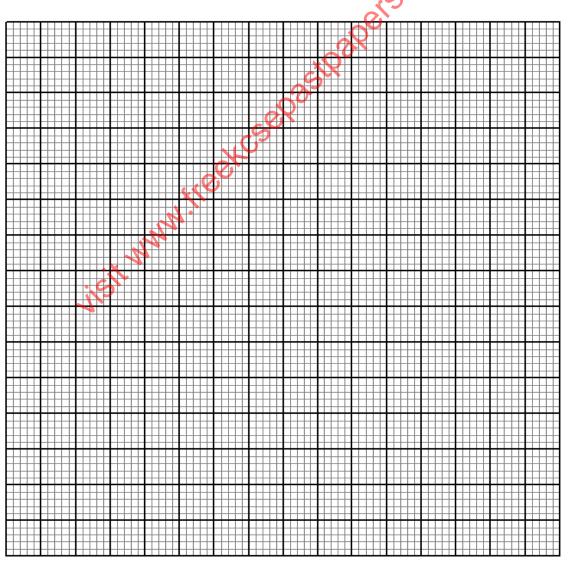   You are required to determine the molar heat of neutralization of hydrochloric acid.

Procedure

Measure 23cm³ of P and put in a 100ml beaker. Measure its temperature and record in the table I in the first column. Using a measuring cylinder, measure 5cm³ of Q and add to P in the beaker. Stir with the thermometer and record the final steady temperature. Continue adding 5cm³ of Q at a time and recording the temperature until 35cm³ of P has been added and complete the table.

Table I

Volume of Q added (cm³)	0	5	10	15	20	25	30	35
Temperature (°C)								

(4marks)

 (i) Plot a graph of temperature (vertical axis) against volume of sodium hydroxide, solution Q added.   *(3 marks)*

(ii) From your graph determine:
    I. Volume of 1M NaOH needed to neutralize 23cm^3 of 1M HCl   *(1mark)*

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....

    II. Rise in temperature ΔT.   *(1mark)*

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(iii)Calculate the amount of heat evolved in the above reaction. (Take specific heat capacity of solution to be 4.2J/g/^{o}C, density of solution 1glcm^3)   *(2 marks)*

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(iv) Calculate the number of moles of HCl used.   *(1mark)*

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(v)   Hence, determine the molar heat of neutralization of hydrochloric acid.
                                                                          (2 marks)

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(b) You are provided with:
- **Solution A**, sodium hydroxide

-**Solution C**, 0.1M hydrochloric acid

You are required to:

- Dilute solution **A** with distilled water
- Standardize the diluted solution **A** with solution **C**.

Procedure:

Fill the burette with solution C.

Pipette 25cm^3 of solution A into a 250cm^3 conical flask. Measure 175cm^3 of distilled water using a 100cm^3 measuring cylinder and add it to solution A in the conical flask. Shake well. Label this as solution **D**. Pipette 25cm^3 of solution **D** into a 250cm^3 conical flask. Titrate with solution **C** using two drops of phenolphthalein indicator. Record your results in **table II** below. Repeat this procedure to obtain consistent values.

Table II

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

(4 marks)

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

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(b)   Calculate the concentration, in moles per liter, of the sodium hydroxide in solution **D**.

(2mark)

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(c)   Calculate the concentration, in moles per litre, of the sodium hydroxide solution **A**.

(1mark)

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2. You are provided with **solid E**. Carry out the tests below and, record your observations and inferences in the spaces provided

    a) Place half of solid E in a boiling tube add 10cm^3 of distilled water and shake

Observations	Inference
(1mark)	*(1mark)*

    b)

i) To about 1cm^3 of solution Add **2M NaOH** dropwise in excess

Observations	Inference
(1mark)	*(1mark)*

ii) To about 1cm^3 of solution in a test tube and add 2-3 drops of **acidified Barium nitrate**

Observations	Inference
(1mark)	*(1mark)*

iii) To about 1cm^3 of solution, add 4-5 drops of acidified **potassium manganate (VII) solution**

Observations	Inference
(1 mark)	*(1mark)*

iv) Dip a clean glass rod in the remaining portion of the solution and ignite on a nonluminous flame.

Observations	Inference
(1 mark)	*(1mark)*

3. You are provided with solid **K**. Carry out the tests below and write your observation and inferences in the spaces provided.

(a)   Place a spatula full of solid **K** on a clean metallic spatula and ignite it in a non-luminous flame.

Observation	Inferences
(½ mark)	*(½ mark)*

(b)   Place the remaining solid **K** in a clean boing tube. Add about 6cm^3 of **distilled water** and shake. Divide the resulting solution into three portions.

Observation	Inferences
(1 mark)	*(1 mark)*

(i)   To the first portion and 2 drops of **acidified potassium manganate (VII).**

Observation	Inferences
(1 mark)	*(1 mark)*

(ii)   To the second portion, add all of the **solid sodium carbonate** provided.

Observation	Inferences
(1 mark)	*(1 mark)*

(iii)   Using the third portion, determine the pH.

Observation	Inferences
(½ mark)	*(½ mark)*