CHEMISTRY PP3 2024 KCSE MOCK

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SERIES 1 CONFIDENTIAL PAPER

CHEMISTRY

INSTRUCTION TO SCHOOLS

In addition to the fittings and apparatus found in Chemistry Laboratory, each student will require the following:

1. 1.5g of solid **T**
2. About 150cm^3 of solution **B**
3. About 100cm^3 of solution **R**
4. About 2.0g Solid Q, 2.0g solid **B**
5. About 400cm^3 of distilled water
6. One burette
7. One 25cm^3 pipette
8. One 100cm^3 measuring cylinder
9. 1 blue and 1 Red litmus papers
10. One filter funnel
11. 4 conical flasks (250cm^3)
12. One thermometer (0-50^{0}C or 0 – 100^{0}C)
13. One metallic spatula
14. One test tube holder
15. 2 boiling tubes
16. 6 test tubes
17. Boiling tubes
18. One dropper
19. 10cm^3 measuring cylinder
20. Filter paper
21. Phenolphthalein indicator

BENCH REAGENTSF/ACCESS REAGENTS

1. 2M Sodium hydroxide
2. 2M $H_2SO_{4(aq)}$, 2M $NH_{3(aq)}$, 2M $Ba(NO_3)_{2(aq)}$
3. Solid Sodium hydrogen Carbonate
4. 2M acidified Potassium Manganate (VII) solution
5. Bromine water
6. Source of heat
7. Concentrated sulphuric acid supplied with a dropper
8. Sodium hydrogen Carbonate

NOTES

1. Preparation of solution B: (0.2M NaOH)

(i) Dissolve 4.0g of sodium hydroxide in distilled water and make it up to one litre of solution.

(ii) Take 200cm^3 of the sodium hydroxide solution prepared in (i) above and dilute it with distilled water to make up one litre of solution **B**.

2. Preparation of solution R: (0.01MH_2SO_4)

(i) Dissolve 56cm^3 of concentrated sulphuric acid in about 500cm^3 of distilled water, Shake well and make it up to one litre with distilled water.

(ii) Take 10cm^3 of the sulphuric acid solution prepared in (i) above and dilute it by adding distilled water to make it up to one litre of solution **R**.

3. Bromine water is prepared by adding **1cm^3 of liquid bromine** in 100cm^3 of distilled water and shaking well in a **fume cupboard**. Label this as bromine water.
4. **Solids:**

T is Benzoic acid ($C_7H_6O_2$)

Q is Maleic acid ($C_4H_4O_4$)

b – Zinc Sulphate hdrated

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

SERIES 1 2024 KCSE MOCK

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

233/3
CHEMISTRY PRACTICAL
PAPER 3
TIME: 2 ¼ HOURS

Instructions to Candidates

1. *Write your name and Admission number in the spaces provided in the question paper.*
2. *Sign and write the date of the examination in the spaces provided above.*
3. *Answer* **ALL QUESTIONS** *in the spaces provided on the question paper.*
4. *You are* ***NOT*** *allowed to start working with the apparatus for the first* ***15 minutes*** *of the* ***2 hours*** *allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.*
5. *All working* **MUST** *be clearly shown where necessary.*
6. *Mathematical tables and electronic calculators may be used*

For Examiner's Use Only

Question	Maximum Score	Students Score
1	21	
2	12	
3	07	
TOTAL SCORE	**40**	

This paper consists of ***7 printed pages****. Candidates should check the question paper*

1. You are provided with:

- A monobasic acid **solid T**.
- Sodium hydroxide, **solution B**.

- 0.01M **solution R** of a dibasic acid H_2A.

You are required to:

(i) Prepare a saturated solution of **solid T**.

(ii) Standardized the sodium hydroxide **solution B** using **solution R**.

(iii) Determine the solubility of **solid T** in water at room temperature.

Procedure

(a) Place all the **solid T** provided into a **dry** conical flask. Measure out 100cm^3 of distilled water using a measuring cylinder and add it to the **solid T**. Shake thoroughly and leave it to stand.

(b) Fill a burette with solution **B**. Pipette 25cm^3 of solution R into a conical flask. Titrate with solution **B** using phenolphthalein indicator. Record the readings in the table below. Repeat to obtain three accurate readings.

Table A

	1	2	3
Final burette readings (cm^3)			
Initial burette reading (cm^3)			
Volume of **B** used (cm^3)			

(4 marks)

(a) Calculate the average volume used(cm^3). (1 mark)

(b) Calculations:

(i) Write the equation for the reaction of the dibasic acid H_2A with sodium hydroxide. (1 mark)

(ii) Calculate the concentration of sodium hydroxide solution **B** in moles per litre.

(2 marks)

(c) Measure the temperature of the solution of **solid T**. Using a **dry** filter paper and a dry filter funnel, filter the solution into a **dry** conical flask. Measure 10cm^3 of the filtrate into a conical flask; add 25cm^3 of distilled water using a measuring cylinder. Shake well and then titrate with the sodium hydroxide **solution B**, using phenolphthalein indicator.

Record the recording in the **table** below.

Repeat to obtain three accurate readings.

Temperature of solution T _____ ^{0}C. (1 mark)

Table B

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **B** used(cm^3)			

(4 marks)

(d) Calculate the average volume used(cm^3). (1 mark)

(e) Calculations

(i) Calculate the number of moles of **acid T** in 10cm^3 of the filtrate. (3 marks)

(ii) Calculate the number of moles of **acid T** in 100cm^3 of solution of **acid T**.
(2 marks)

(iii) Given that the molecular formula of acid **T** is 122,determine the solubility of solid **T**
(C = 12.0, H = 1.0, O = 16.0) (2 marks)

2. You are provided with solid **B**. Carry out the tests below and record your observations and inferences in the spaces provided. (10 marks)

(i) Place half a spatula full of solid B in a clean dry test-tube and heat gently then strongly and test using litmus papers.

Observations	**Inferences**
(1 mark)	(1 mark)

(ii) Place the rest of solid **B** in a boiling tube and add about $5cm^3$ of distilled water and shake well. Divide the resulting mixture into four portions for the tests below:

Observations	**Inferences**
(1 mark)	(1 mark)

(a) To the first portion add sodium hydroxide solution dropwise until excess.

Observations	**Inferences**
(1 mark)	(1 mark)

(b) To a second portion add 2-3 drops of dilute Sulphuric (VI) acid.

Observations	**Inferences**
(1 mark)	(1 mark)

(c) To the third portion add aqueous ammonia dropwise until in excess.

Observations	**Inferences**
(1 mark)	(1 mark)

(d) To the fourth portion add 2-3 drops of barium nitrate solution.

Observations	Inferences
(1 mark)	(1 mark)

3. You are provided with solid **Q**. Carry out the tests and record your observations and inferences in the spaces provided.

(i) Place the solid in a boiling tube. Add about $6cm^3$ of distilled water and shake the mixture well. Divide the solution into 3 portions.

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

(ii) To about $2cm^3$ of the solution, add all the sodium hydrogen carbonate.

Observations	Inferences
(1 mark)	(1 mark)

(iii) To about $2cm^3$, add 2 drops of acidified potassium manganate (VII) solution.

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

(iv) In another $2cm^3$, add 2 drops of bromine water.

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

SERIES 2 CONFIDENTIAL PAPER

CONFIDENTIAL

CHEMISTRY - PAPER 3

1.0M hydrochloric acid, solution Y
0.5M sodium hydroxide solution Z
Solid X 1g sodium carbonate
Solid L Hydrated aluminium sulphate
Solid M paraffin wax
2 boiling tubes
Thermometer
Stopwatch
Tripod stand
250ml glass beaker
6 test tubes
Test tube rack
Test tube holder
Spatula
PH chart
Blue litmus paper
Red litmus paper
Burette
Pipette
100cm^3 measuring cylinder
100cm^3 beaker
Solid S: Mallleic acid
Burette stand

Access
2M sodium hydroxide
0.5M lead (II) nitrate
Aqueous sodium sulphate
Bromine water
Source of heat
Phenolphthalein indicator
Universal indicator

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3

CHEMISTRY

Paper 3

Time: 2 Hours

SERIES 2 2024 KCSE MOCK

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

Instructions to candidates:

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- Answer **ALL** 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. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.
- All workings **MUST** be clearly shown where necessary.
- Mathematical tables and silent electronic calculators may be used.

For Examiners use only.

Question	Maximum Score	Candidate's Score
1	14	
2	09	
3	17	
Total marks	**40**	

1. You are provided with the following:

- 1.0M Hydrochloric acid; solution Y
- 0.5M Sodium hydroxide; solution Z

Anhydrous sodium carbonate of unknown mass; solid X

You are required to determine the mass of sodium carbonate that was used in the reaction.

Procedure

Using a measuring cylinder, measure 60cm^3 of 1M hydrochloric acid, solution Y and transfer into 100cm^3 beaker. Add all sodium carbonate (solid X) and stir gently until there is no effervescence. Transfer the solution into a clean 100ml measuring cylinder and add distilled water to make 100cm^3 of the solution. Transfer the solution onto 250cm^3 beaker and shake. Label this solution F.

Fill the burette with solution Z. Pipette 25.0cm^3 of solution F and transfer to a conical flask. Add 3 drops of Phenolphthalein indicator and titrate with solution Z. Record your results in the table 1 below. Repeat the procedure to complete the table.

(a).Table 1. **(4 marks)**

Final burette readings (cm^3)	I	II	III
Initial burette reading (cm^3)			
Volume of solution Z (cm^3)			

(i). Determine the average volume of solution Z. (1 mark)

_____

_____

(ii).Calculate the number of moles of sodium hydroxide (solution Z) used. (1 mark)

_____

_____

_____

_____

_____

_____

(iii). Find the number of moles of hydrochloric acid in 25.00cm^3 of solution F (2 marks)

_____

_____

_____

(iv). Determine the number of moles of hydrochloric acid in 100cm^3 of solution F (2 marks)

_____

_____

_____

Calculate the number of moles of hydrochloric acid in the original 60cm^3 of solution Y. (1 mark)

(v). Calculate the number of moles of hydrochloric acid in the original 60cm^3 of solution Y.
(1 mark)

_____

_____

_____

(vi). Calculate the number of moles of hydrochloric acid that reacted with sodium carbonate.
(1 mark)

_____

_____

_____

(vii). Determine the mass of sodium carbonate that reacted with the acid (Na=23, C=12, O=16)
(2 marks)

_____

_____

_____

2. A. You are provided with

7. Solid M
8. A thermometer
9. A test tube

You are required to determine the melting point of solid M

PROCEDURE

a). Place 150cm^3 of tap water in a 200 ml or 250 ml beaker

b). Heat the water to near boiling.

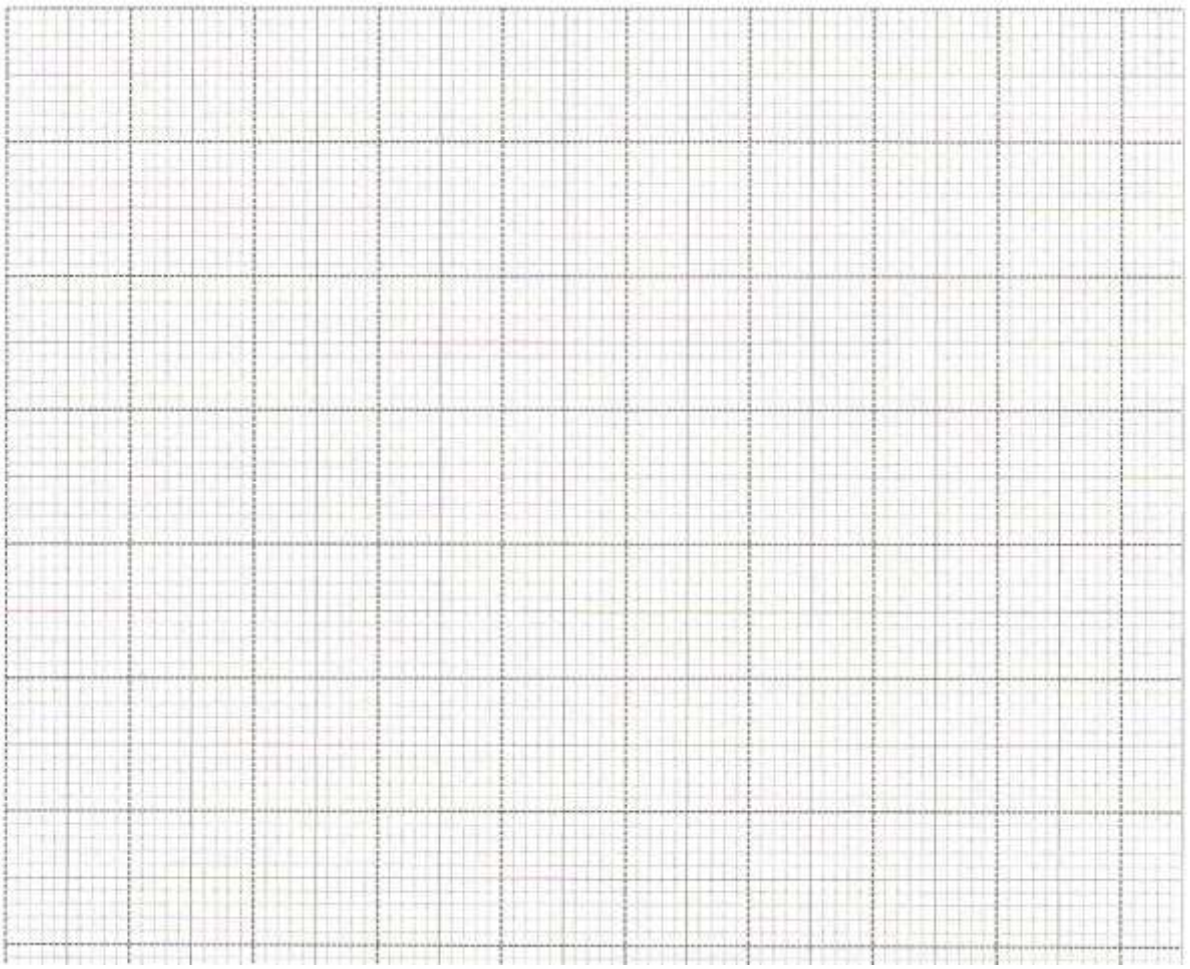
c). Insert a thermometer in the test tube containing solid M and take its temperature then record it in the table below under time 0.

d). Using a test-tube holder, immerse the test-tube containing solid M into the hot water (Ensure that half of the test-tube is immersed) and immediately start a stop Watch/clock and record the temperature of the contents of the test-tube after every Half-minute and complete the table.

e). Dip the thermometer into the hot bath to clean it then wipe it with tissue paper (4 marks)

Time (Min)	0	½	1	1 ½	2	2 ½	3	3 ½
Temperature (°C)								

(i). On the grid provided, plot a graph of time, (Horizontal axis) against temperature. (3 marks)



(ii). From the graph, determine the melting point of solid M. (1 mark)

_____

_____

(iii). Name the type of heat change at the melting point. (1 mark)

_____

_____3. (a). You are provided with solid L.

Carry out the tests below and record your observations and inferences in the spaces provided.

(i). Heat gently then strongly half of solid L in a clean dry test tube, test any gas produced using red and blue litmus papers

Observations	**Inferences**

[1 mark]	[1 mark]

Take the remainder of solid L and put into a boiling tube. Add about $10cm^3$ of distilled water and shake. Divide the solution into 3 portions.

(ii). To the first portion, add aqueous sodium hydroxide dropwise until in excess.

Observations	Inferences
[1 mark]	[1 mark]

iii). To the second portion, add about $5cm^3$ of aqueous sodium sulphate.

Observations	Inferences
[1 mark]	[1 marks]

(iv). To the third portion, add about $2cm^3$ of lead (II) nitrate.

Observations	Inferences
[1 mark]	[1 marks]

3.(b). You are provided with solid S perform the following tests and record your observations and inferences in the spaces provided.

(a). Put half of the solid on a clean METALLIC SPATULA ignite it in a non-luminous flame.

Observations	Inferences

[1/2 mark]	[1/2 mark]

(b). Put the remaining solid in a clean boiling tube, add water and shake thoroughly. (Retain this mixture for test bi-biii)

Observations	Inferences
[1 mark]	[1 mark]

(b).(i). In about $2cm^3$ of the mixture add 2 drops of bromine water.

Observations	Inferences
[1 mark]	[1 mark]

(ii). in about $5cm^3$ of the mixture add both blue and red litmus paper.

Observations	Inferences
[1 mark]	[1 mark]

(iii). use the remaining mixture to determine the pH of the mixture.

observations	Inferences
[1 mark]	[1 mark]

SERIES 3 CONFIDENTIAL PAPER

Instruction to schools,

- No one should have access to this paper except teacher in charge of Chemistry.
- Great care **must** be taken to ensure the information herein does not reach the candidate either directly or indirectly.

In addition to fittings and chemical found in chemistry lab, each candidate will require the following;

1. 120$cm^3$of solution A
2. 90cm^3 of solution B
3. 90cm^3 of solution C
4. 40cm^3 of solution D
5. 40cm^3 of solution E
6. 40cm^3 of starch
7. About 0.5g of solid F
8. About 1g of solid G
9. About 0.5g of solid $NaHCO_3$
10. About 500cm^3g distilled water
11. One 25ml pipette
12. One 50ml burette
13. One stopwatch
14. Two 250ml conical flask
15. Six dry test tubes in a rock
16. Two boiling tube.
17. One metallic spatula
18. Two measuring cylinder
19. Two filler paper
20. Four labels

Access to;

1. Bunsen burner
2. Phenolphthalein indicator supplied with a dropper.
3. 2m hydrochloric acid supplied with a dropper
4. 1m sodium sulphate supplied with a dropper
5. 2m sodium hydroxide supplied with a dropper
6. Acidified potassium manganate vii supplied with a dropper
7. Freshly prepared bromine water supplied with a dropper.

Preparation

10. Solution A is made of dissolving 10.08g of oxalic acid in water to make 1L solution.

11. Solution B is made of dissolving 8g of sodium hydroxide pellets in 500cm^3 of distilled water, shake and…….. then it up to 1L using 1000ml volumetric flask.
12. Solution C is made by dissolving 33.2g of potassium iodide and make 1L of solution.
13. Solution D is made of dissolving 49.63g of sodium thiasulphate and make it to 1L.
14. Solution E is 20volume hydrogen peroxide.
15. Starch indicator is made of placing 10g of starch in about 500cm^3 of warm water and diluting to one liter of solution.
16. Solid F is 1g of $Ba(OH)_2\ 8H_2O$.
17. Solid G is 0.5g malleic acid
18. Acidified potassium manganate vII is prepared by dissolving 3.2g of potassium manganate VII in 200cm^3 of $2MH_2SO_4$ and topping it up to 1L using distilled water.

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

SERIES 3 2024 KCSE MOCK

CHEMISTRY PRACTICAL

Paper - 233/3
Time: 2¼ hours

INSTRUCTIONS TO CANDIDATES

- Write your name and Index number in space provided above
- Sign and write the date of examination in space provided above.
- Answer **All** questions in the space provided in question paper
- You are **Not** allowed to start working with the apparatus for the first 15 minutes of 2¼ hours. This is to ensure you read questions paper and make sure you have all chemicals and apparatus you may need.
- All working **Must** be Cleary shown where necessary.
- Silent calculator may be used
- Candidate to answer questions in English.

FOR EXAMINER'S USE ONLY

Question	Maximum marks	Candidate's score
1	10	
2	11	
3	19	
Total score	40	

This paper consists of 7 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no pages are missing.

Q1. You are provided with:

- Solution A: dibasic acid $H_2C_2O_4 \bullet XH_20$ containing 2.52g in 250cm^3 of solution.
- Solution B: 0.2MNaOH.

You are required to determine the value of X in the formula $H_2C_2O_4 \bullet XH_20$ (H=1, C=12, O=16)

Procedure

Fill the burette to the mark with solution A, pipette 25cm^3 of solution B into a clean dry conical flask. Titrate solution A against solution B using phenolptherine as indicator. Repeat the titration to obtain consistent results and fill table below.

	I	**II**	**III**
Find burette readings			
Initial burette reading			
Volume of solution A used (cm^3)			

21. Calculate the average volume of solution A. (5mks)

22. Calculate the Molarity of the solution A. (2mks)

23. Calculate the relative formula mass of the acid solution A and hence the volume X in $H_2C_2O_4 \bullet XH_2O$. (3mks)

Q2. You are provided with;

8. Solution C: 0.2M potassium iodide solution

9. Solution D: 0.2M sodium thiosulphate solution
10. Solution E: Hydrogen peroxide
11. Starch indicator solution.

You are required to determine the effect of concentration on rate of a reaction.

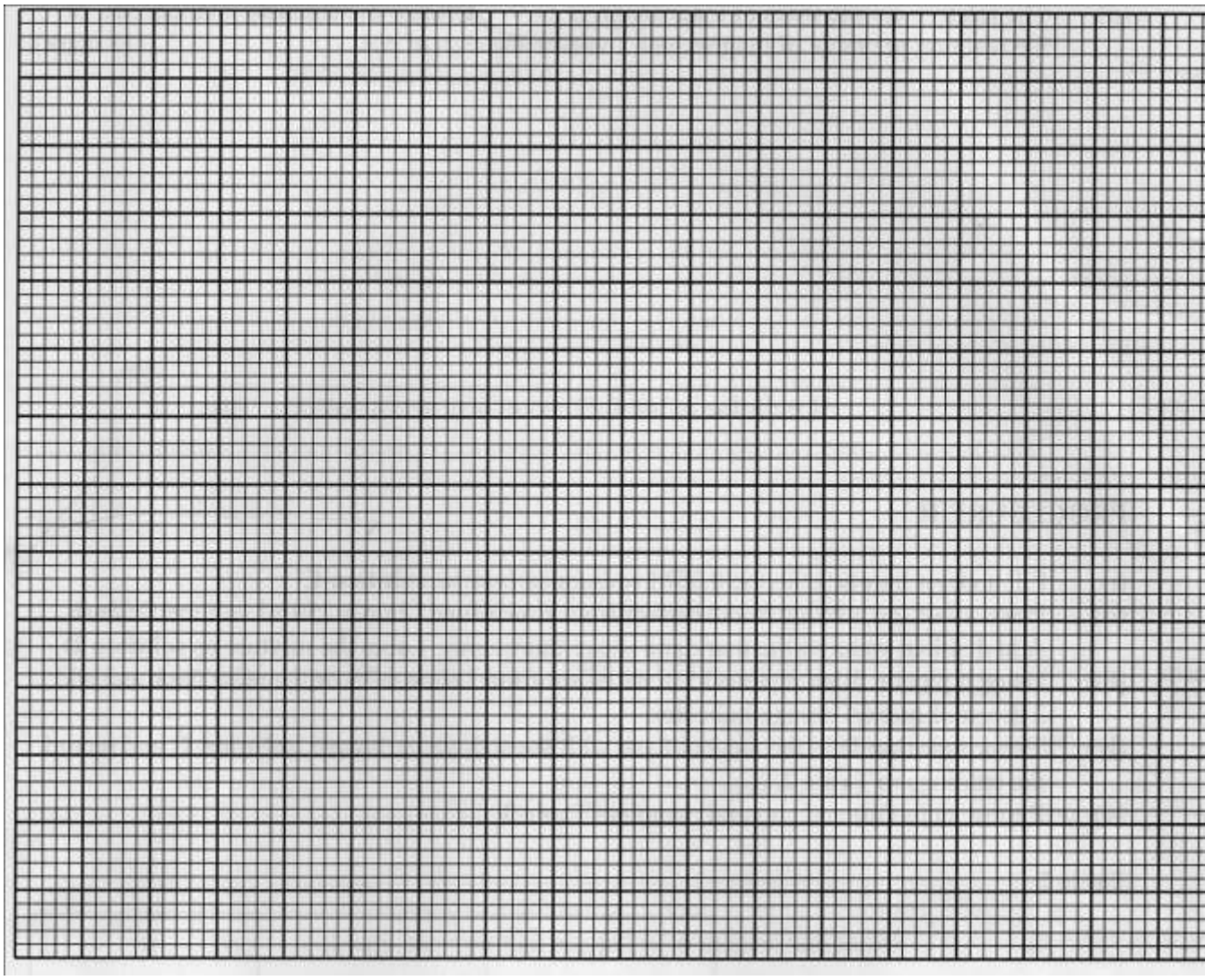
Procedure

Transfer 10cm^3 of potassium iodide into test tube labeled C using a burette 5xm^3 of sodium thiosulphate into test tube labeled D and 2cm of hydrogen peroxide into test tube labeled E. Using 10ml measuring cylinder and clean it before using it to measure next solution.

Transfer solution B into clean conical flask followed by 5cm^3 of fleshly prepared starch solution. Simultaneously add solution C and solution E to the conical flask and immediately start to turn blue black. Record your results in the table that follows. Repeat the process using different volumes of solution E and complete table below.

set	**Volume of solution C (cm^3)**	**Volume of solution D (cm^3)**	**Volume of solution E (cm^3)**	**Volume of starch (cm^3)**	**Time for**	**$^1/_t$ sec^{-1}**
1	10	5	2	5		
2	10	5	3	5		
3	10	5	4	5		
4	10	5	2	5		
5	10	5	6	5		

- Plot the graph of $^1/_t$ sec $^{-1}$ versus volume of H_2O_2 used. (6mks)



- From the graph determine the time taken for the black to appear if volume of hydrogen peroxide solution E and cm is 4.5cm^3. (3mks)

- Explain the effect of concentration to rate of reaction. (1mks)

Q3. a) you are provided with solid F. Carry out the following tests and record the observations and inferences in the space provided.

i) Place about one third solid F into clean dry test tube and heat it strongly.

Observation	Inference
(1mk)	(1mk)

ii) Place the remaining solid F in a boiling tube. Add about 10cm^3 of distilled water. Shake the mixture thoroughly for about one minute. Filler and divide the filtrate into four portions.

Observation	Inference
(½mk)	(½mk)

iii) To the first portion add two drops of phenolphthalein indicator.

Observation	Inference
(1mk)	(1mk)

iv) To the second portion, add two drops of hydrochloric acid.

Observation	Inference
(1mk)	(1mk)

v) To the third portion, add about three drops of sodium sulphate solution.

Observation	Inference
(1mk)	(1mk)

vi) To the last portion, add drops of sodium hydroxide drop wise until is excess.

Observation	Inference
(1mk)	1mk)

b) You are provided with solid G. Carry out the following tests and record observation and inferences in space provided.

i) Place about one third of sodium G into clean metallic spatula and burn it in a Bunsen burner flame.

Observation	Inference
(1mk)	(1mk)

ii) Place the remaining Place the remaining of solid G in a boiling tube. Add about $10cm^3$ of distilled water and shake. Divide the mixture four portions.

Observation	Inference
(½mk)	(½mk)

iii) To the first portion of mixture in test tube and solution $NaHCO_3$ provided.

Observation	Inference
(½mk)	(½mk)

iv) To the second portion add three drops of acidified potassium manganate VII.

Observation	Inference
(1mk)	(1mk)

v) To the last portion add three drops of bromine water.

Observation	Inference
(1mk)	(1mk)

SERIES 4 CONFIDENTIAL PAPER

CHEMISTRY PRACTICAL

231/3

PAPER 3

This document must not be seen by the candidates whatsoever

80cm^3 of 0.5M lead (II) nitrate solution F

60cm^3 of 1M Potassium Iodide solution

2g of solid A supplied in a stoppered container

1g of solid P

2cm of magnesium ribbon

Thermometer

One 250ml glass beaker

One boiling tube

One test-tube holder

One stop watch

10ml measuring cylinder

100ml measuring cylinder

One dropper

30cm ruler

10 labels

Test tube rack

10 test tubes

Substance W – calcium chloride

Distilled water in a wash bottle

Solution E (aqueous sodium carbonate)

Tripod stand and wire gauze.

Substance W I g of calcium chloride supplied in a stoppered container.

Access to

19. Bunsen burner
20. Acidified potassium dichromate (VI)
21. Tissue paper
22. Ethanol
23. 2M ammonia solution
24. 2M sodium hydroxide solution
25. Bromine water

Notes:

Substance P - maleic acid

Substance A – sodium tetraborate decahydrate(sodium borax

Substance W – calcium chloride

Preparation of solutions

- Solution E is obtained by dissolving 21.2g of sodium carbonate in 600cm^3 of distilled water and diluting it to 1dm^3 of solution (0.2M Sodium Carbonate)

- Acidified potassium dichromate (VI) is prepared by dissolving 25g of solid $K_2Cr_2O_7$ in 200cm^3 of 2M H_2SO_4 and diluting with distilled water to make one litre of solution.

- Bromine water is done by taking 1cm^3 of bromine liquid and diluting with distilled water to make 100cm^3 of the solution in the fume chamber.

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3

CHEMISTRY

PAPER 3

PRACTICAL

2 ¼ Hours

SERIES 4 2024 KCSE MOCK

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

INSTRUCTIONS TO CANDIDATES

vii) Write your name and Index Number in the spaces provided above.
viii) Sign and write date of examination in the spaces provided above.
ix) Answer all questions in the spaces provided in the question paper.
x) All workings must be clearly shown where necessary. Mathematical tables and silent electronic calculators may be used.

For Examiners use only.

Question	Maximum Score	Candidates Score
1	10	
2	13	
3	17	

This paper consists of 6 Printed pages. Candidates should check the question paper to ensure that all the Papers are printed as indicated and no questions are missing.

Q1. You are provided with :2g of substance A labelled solid A

24. You are required to determine the solubility of substance A in water.

Procedure 1

26. Place 200cm^3 of tap water in a 250ml beaker and keep it for use in step (VI)
27. Place all the substance A in a dry boiling tube boiling.
28. Using a burette measure 10.0cm^3 of distilled water and add to substance A in the boiling tube.
29. While stirring the mixture in the boiling tube with a thermometer, warm the mixture using a Bunsen burner until the temperature rises to 65℃. Stop warming the mixture.
30. Allow the mixture to cool while stirring with the thermometer.
31. When the temperature drops to 60℃ , start the stop watch / clock, place the boiling tube in a beaker with tap water prepared in step (i) above.
32. **Co**ntinue stirring and record the temperature of the mixture after two minutes then thereafter record the temperature of the mixture after every one minute interval and complete the table 1. **Table 1.**

Time in minutes	0	2	3	4	5	6	7	8	9	10
Temperature (℃)	60									

(4mks)

a) On the graph provided, plot a graph of temperature (vertical axis) against time. (3mks)

b) Using the graph, determine the temperature (T) when 2.0g of substance A dissolves completely in 10cm^3 of distilled water. (1mk)

c) Calculate the solubility of substance A in grammes per 100g of water at temperatures (T)
(2mks)

2. You are provided with:

- 1M Potassium iodide solution
- 0.5m Lead (II) nitrate solution
- Ethanol

You are required to determine the formulae of lead (II) iodide and the equation for the reaction between lead (II) nitrate and potassium iodide.

Procedure

Take 5 test tube and label them 1, 2,3,4,5 and 6,7. Using a burette add to separate test tube volumes of aqueous potassium iodide and aqueous lead (II) nitrate as shown in the table below; followed by 3-4 drops of ethanol. Stir and allow to settle. Measure the height of the precipitate in each test tube in mm and record the measurements in the table below.

Test tube no	1	2	3	4	5	6	7	8
Volume of KI (cm^3)	2	3	4	5	6	7	8	9
Volume of $Pb(NO_3)_2$ cm^3	10	9	8	7	6	5	4	3
Height of the precipitate (mm)								

- Plot a graph of height of the precipitate against the volume of lead (II) nitrate. (4mks)
- Use your graph to
    - Find the maximum height of the precipitate formed. (1mk)
    - Determine the volume of the 0.5M $Pb(NO_3)_2$ used in b (i) above (1mk)
    - Determine the volume of 1M Potassium Iodide that completely reacts with 0.5M Pb $(NO_3)_{2\,(aq)}$ Potassium iodide solution. (2mks)
    - Use your answer in b(ii) above to determine the number of moles iodide ions which reacts with one mole of lead (II) ions hence determine the formulae of lead (II) iodide.

      (2mks)

3. You are provided with

- Substance W 0.5g
- Sodium hydroxide
- Aqueous ammonia
- Solution F – aqueous lead (II) Nitrate
- Distilled water in wash bottle
- Source of heat

12. Describe the appearance of substance W

13. Add $10cm^3$ water to substance W

Observation	Inference
$(^1/_2\ mk)$	$(^1/_2\ mk)$

14. Substance W is suspected to be calcium chloride.
From the reagent provided and results in procedure (b) above select and describe four tests that could be carried out consequently to confirm substance W is calcium chloride. Write the results and expected observation in the spaces provided. (6mks)

Test 1	Expected observation
(1mk)	(1mk)

Test 2	Expected observation
(1mk)	(1mk

Test 3	Expected observation

(1mk)	(1mk)

15. Carry out the tests described in (c) above using substance W and record the observations and inferences in the spaces provided.

i) Test 1

Observation	Inference
	(1mk)

ii) Test 2

Observation	Inference
	(1mk)

iii) Test 3

Observation	Inference
	(1mk)

4. You are provided with substance P. Carry out the following test and record your observation and inferences in the spaces provided. Use above $2cm^3$ of portion of substance P in a test tube for each tests a, b, c and d

- Add about 2 or 3 drops of bromine water.

Observation	Inference
$(^1/_2\ mk)$	$(^1/_2\ mk)$

- Add about 1cm^3 of acidified potassium dichromate (VI) warm the mixture.

Observation	Inference
(1mk)	(1mk)

- Add about 1cm^3 of solution to E (aqueous sodium carbonate provided)

Observation	Inference
$(\ ^1/_2\ mk)$	$(\ 1mk)$

- Add the piece of magnesium ribbon provided

Observation	Inference
$(\ ^1/_2\ mk)$	$(1mk)$

SERIES 5 CONFIDENTIAL PAPER

233/3
CHEMISTRY PRACTICAL

CONFIDENTIAL

Each candidate will require the following

16. About 30cm^3 of solution B
17. Exactly 1.8 g of solid A in a stoppered container
18. About 30cm^3 of solution C
19. Phenolphthalein indicator with a dropper
20. One thermometer (-10-110^{0}c)
21. one 100ml measuring cylinder
22. One 100ml plastic beaker
23. Two labels
24. One 250 ml volumetric flask
25. About 500cm3 of distilled water in a wash bottle
26. 5 dry test tubes
27. One boiling tube
28. One test-tube holder
29. Two 250 ml conical flask
30. 1 stopwatch
31. One burette
32. One complete retort stand
33. About i.0 g of solid M in a stoppered container
34. About 0.5g of solid (sodium carbonate) in a stopered container
35. One pipette (25ml)
36. I spatula
37. One pipette filler

Common reagents

- 2M aqueous Ammonia solution with a dropper
- 2M aqueous lead (ii) nitrate solution with a dropper
- 2M aqueous barium nitrate solution with a dropper
- Access to source of heat
- Acidified potassium manganate (vi) solution with a dropper
- acidified potassium dichromate (vi) solution with a dropper

N/B

33. Solid A- zinc metal powder
34. solid M –zinc (ii) nitrate

35. Solid N – Panadol powder (fine, crushed powder)
36. note: panadol tablets should be bought from a chemist

Preparation

Solution B- 2.0 sulhuric (vi) acid
Solution C- 1.0 m sodium hydroxide

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3
CHEMISTRY PRACTICA
TIME: 2H 30MIN

SERIES 5 2024 KCSE MOCK

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- sign and write the date of the examination in the spaces provided above
- answer all the question in the spaces provided in question paper
- Your not allowed to start working with the apparatus for the first 15 minutes of $2\frac{1}{4}$hours allowed for this paper. This time is to allow to read the question paper and make sure you have all chemical and apparatus that you may need.
- All working must be clearly shown where necessary
- KNEC Mathematical tables and silent non programmable electronic calculators may be used.
- Candidates should check the question paper to a ascertain that all the pages are printed as indicated and that no questions are missing
- Candidates should answer the questions in English

FOR EXAMINERS USE ONLY

Question	Maximum Score	Candidates Score
1	21	
2	12	
3	7	
Total score	40	

1.You are provided with solid A
2.0 M sulphuric (vi) acid solution B
1.0 M sodium hydroxide solution C
Phenolphthalein indicator
You are required to determine the heat of reaction between solid A and sulphuric (vi) acid

Procedure 1
Using a measuring cylinder place 25cm3 of 2M sulphuric (vi) acid solution into a 100ml beaker. Stir the acid gently with a thermometer and take its temperature at intervals of ½ a minute. Record the reading in the table below. At exactly 2 minutes add all solid a at once. Take the temperature at an interval of ½ minutes up to the seventh minute. Record the your result in the table 1.**preserve the content for procedure II**

TABLE 1

Time (minute)	0	1/2	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7
Temperature (^{0}c)					x										

(5mks)

38. On the graph paper provided, plot a graph of temperature against time (3mks)

39. From the graph, determine the highest temperature change (ΔT) show on the graph (1mk)

40. Determine the heat change for this reaction (assume the density of the solution is 1.0g /cm^3 and specific heat capacity =4.2J/g/K (2mks)

Procedure 11
Transfer all the content into a 250ml volumetric flask, add distilled water to make up to the mark. Label the solution D. using a 100ml measuring cylinder measure 20cm3 of 1.0M of sodium hydroxide solution. Label the solution E .fill the burette with sodium hydroxide (solution E).using a pipette and pipette filler, transfer 25.0cm^3 of solution D into a 250 ml conical flask. Add 2-3 drops of phenolphthalein indicator and titrate D against solution E. Record your result in the table II. Repeat the titration and complete table Ii

Table II

EXPERIMENT	1	2	3
final burette reading(cm^3)			
Initial burette reading (cm^3)			
Volume of solution E used (cm^3)			

(4mks)

d i. Calculate the average volume of E used (1mk)

ii determine the concentration of E in moles per litre (1mk)

e. Determine

i. The number of moles of sulphuric (vi) acid in 25cm^3 of solution D (1mk)

ii. The number of moles of sulphuric (vi) acid in 25cm^3 of solution B (1mk)

f. Calculate the molar enthalpy change of reaction between solid A and sulphuric (vi) acid (2mks)

2. Your are provided with
Solid M
Aqueous Ammonia
Barium nitrate solution
Lead (ii) nitrate solution
Distilled water
Solid M is suspected to be Zinc chloride

37. From the reagent provided, select and describe three test that could be carried out consecutively to confirm if solid M is zinc (ii) chloride. Write the test and the expected observation in the spaces provided

Test 1	Expected observations
1/2mk	1/2mk

Test II	Expected observations
1mk	1mk

Test III	Expected observations
1mk	1mk

Test IV	Expected observations
1mk	1mk

B. Carry out the test described in (A) above using solid M and record the observation and inferences in the spaces provided

Test 1

Observation	Inferences
1/2mk	1/2mk

Test II

Observation	Inferences
1(mk)	1(mk)

Test III

Observation	Inferences
1(mk)	1(mk)

Test IV

Observation	Inferences
1(mk)	1(mk)

3. Your are provided with an organic compound solid N. Carry out the following test. Record the observations and inferences in the spaces provided

a) Place all solid N in a boiling tube. Add about $10cm^3$ of distilled water and shake Retain the solution for use in procedure B (I,ii,iii)

observation	inferences
1(mk)	1(mk)

b. Use about $2cm^3$ portions of the mixture in a test tube for I,ii,iii

i. To the first portion, add all the solid sodium carbonate provided

Observation	Inferences
1(mk)	1(mk)

ii. To the second portion, add two drops of acidified potassium manganate (vii) and warm the mixture

Observation	Inferences
1(mk)	1(mk)

iii. To the third portion, add about 2cm3 of acidified potassium dichromate (vi) warm the mixture

observation	inferences

1/2(mk)	1(/2mk)

SERIES 6 CONFIDENTIAL PAPER

CHEMISTRY

CONFIDENTIAL

In addition to the fittings and apparatus in the laboratory each candidate should have following .

38. Solid A in a stoppered boiling tube.
39. Solution B (about 70cm^3)
40. Solution C (about 100cm^3)
41. 100ml measuring cylinder
42. 250ml conical flask
43. White tile
44. Pipette and pipette filler
45. Burette
46. Retort stand
47. Distilled water in wash bottle
48. Glass rod
49. Two labels
50. Two dry boiling tubes
51. Six dry test tubes in a rack
52. Clean and dry spatula
53. 10ml measuring cylinder
54. 250ml volumetric flask
55. Filter paper
56. Solid E
57. Solid F
58. Empty 250 ml plastic beaker

Access to

- 2M NaOH Solution supplied with dropper
- 2M $NH_{3\,(aq)}$ solution supplied with a dropper
- Barium nitrate solution supplied with dropper.
- 2M nitric(v)acid supplied with a dropper
- Sodium sulphate solution supplied with dropper.

- Potassium iodide solution
- Bunsen burner flame(Non-luminous)
- Acidified $KMnO_4$
- Universal indicator paper
- Full range pH chart(pH 1-14)
- Phenolphthalein indicator

NOTES

25. Solid A(4.5g of oxalic acid which is accurately weighed)
26. Solution B (0.2M sodium hydroxide solution)
27. Solution C (0.1M Hydrochloric acid solution)
28. Solid E (About 1g mixture of $ZnSO_4$ and $PbCO_3$ in the ration of1:1)
29. Solid F (About 0.5g maleic acid)

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3

CHEMISTRY

PAPER 3

(PRACTICAL)

2 ¼ hours

SERIES 6 2024 KCSE MOCK

CHEMISTRY PRACTICAL 233/3

(Kenya Certificate of Secondary Education)

Instructions

- *Write your name, admission number and class in the spaces provided above.*
- *Sign and write the date of examination in the spaces provided above.*
- *Spend the first 15 minutes of the 2 ¼ hours to read through the paper and make sure you have all the apparatus and chemicals required.*
- *Answer **all** the questions in the spaces provided in the question paper.*
- *Electronic calculators may be used.*
- *All working **must** be clearly shown where necessary.*
- *This paper consists of **7** printed pages. Confirm this and that no questions are missing.*

For Examiner's Use Only

Question	Maximum Score	Candidate's score
1	20	

2	**10**	
3	**10**	
Total	**40**	

41. You are provided with;

- 4.5g of Solid A in a boiling tube
- Solution B, sodium hydroxide
- 0.1M monobasic acid, solution C.

You are required to;

- Determine molarity of solution B,
- Determine the solubility of solid A

Procedure I

iv) Using a measuring cylinder, place 50cm^3 of solution B into a clean 250ml beaker. Add 100cm^3 of distilled water to the solution and label it as solution D.

v) Fill the burette with solution C

vi) Using a pipette filler, place 25cm^3 of solution D into a 250ml conical flask. Add two drops of phenolphthalein indicator.

vii) Titrate solution D with solution C and record your results in table 1 below

viii) Repeat the titration two more times and complete table 1.

Table 1

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution C used (cm^3)			

(4mks)

- Calculate the average volume of solution C used. (1mk)

……
……
……..

- Calculate moles of solution C used in the experiment. (1mk)

  ……

  ……

- Calculate moles of solution D used. (1mk)

  ……

  ……

  ……

- Calculate molarity of solution D. (1mk)

  ……

  ……

- Calculate molarity of solution B. (2mks)

  ……

  ……

  ……

Procedure II

(i) Using measuring cylinder, add 20cm^3 of distilled water to solid A in the boiling tube. Using a glass rod, stir the mixture thoroughly for about three minutes.

(ii) Filter the mixture obtained into 250ml volumetric flask and top it to the mark with distilled water. Label the filtrate as solution A.

(iii) Clean the burette and fill it with solution A.

(iv) Using a pipette filler, place 25cm^3 of solution D into 250ml conical flask. Add two drops of phenolphthalein indicator.

(v) Titrate solution D with solution A and record your results in table 2 below.

(vi) Repeat the titration two more times and complete table 2.

Table 2

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution A used (cm^3)			

(4m (4mks)

- Calculate the average volume of solution A used. (1mk)

  ……

  ……

  ……

- Calculate the number of moles of solution D used. (1mk)

……
……
……

- Calculate the number of moles of solution A used given that 2 moles of solution A requires one mole of solution D for complete neutralization. (1mk)

……
……
……

- Determine the number of moles of solution A in $250cm^3$ (1mk)

……
……
……

- Determine the solubility of solid A given that the density of the solution formed is $1g/cm^3$ and the RFM of A = 126. (2mks)

……
……
……

42. You are provided with solid E. carry out the tests below. Write your observations and inferences in the spaces provided.

xi) Place all solid E into a boiling tube and add $10cm^3$ of distilled water. Shake the boiling tube and filter into a clean test-tube . Keep the residue for test (b). Divide the filtrate into three portions.

Observations	Inferences
(1mk)	(1mk)

59. To the first portion, add 2M NaOH drop wise until in excess.

Observations	Inferences

(1mk)	(1mk)

60. To the second portion, add 2M ammonia solution drop wise until in excess.

Observations	Inferences
(1 mk)	(1mk)

61. To the third portion, add three drops of barium nitrate solution followed by $2cm^3$ of 2M HNO_3.

Observations	Inference
(1 mk)	(1mk)

xii) Place the residue into a clean test-tube. Add about $5cm^3$ of 2 M HNO_3 and shake until all the solid dissolves. Divide the solution into three portions.

i. To the first portion, add 2M NaOH drop wise until in excess.

Observations	Inferences
(1mk)	(1mk)

ii. To the second portion, add three drops of sodium sulphate solution.

Observations	Inferences
(1mk)	(1mk)

iii. To the third portion, add three drops of potassium iodide solution.

Observations	Inferences
(1mk)	(1mk)

43. You are provided with solid F. Carry out the tests below. Record your observations and inferences in the spaces provided.
    - Burn half spatula endful of solid F in anon-luminous flame of a Bunsen burner.

Observations	Inferences

(1mk)	(1mk)

- Transfer the remaining solid F into a clean boiling tube and add about $5cm^3$ of distilled water. Shake until all the solid dissolves. Divide the solution into two portions.

30. To the first portion add 3 drops of acidified potassium Manganate (VII) solution.

Observations	Inferences
(1mk)	(1mk)

31. Test the pH of the second portion using a universal indicator paper.

Observations	Inferences
(1mk)	(1mk)

SERIES 7 CONFIDENTIAL PAPER

CONFIDENTIAL TO SCHOOLS

Each candidate will require

- Solution B about 60 cm^3 of 1.1 M hydrochloric acid solution.
- Solution C about 100 cm^3 of 0.2M sodium hydroxide solution.
- One 250 ml volumetric flask.
- One 100 ml measuring cylinder
- 50 ml Burette
- 25ml pipette.
- 2 conical flasks
- Retort stand
- Filter funnel
- 2.5g of solid F
- 500ml of distilled water
- 100ml plastic beaker
- Thermometer
- 1 spatula-ful of solid D
- ½ spatula of solid E
- Six test tubes in a rack
- Red litmus paper
- Blue litmus paper
- Metallic spatula
- 1 lable

ACCESS TO

- 1M NaOH
- 1M NH_4OH
- Barium chloride soln. ($BaCl_2$)

- 0.5M NaCl
- Universal indicator soln.(pH 4 to 11)
- Sodium carbonate solid
- $KmnO_4$.
- Phenolphthalein indicator
- Source of heating

NOTES

- Solid A — Exactly 0.31 of Zinc carbonate.
- Solid D-AluminiumSulphate
- Solid E-Maleic acid
- Solid F-anhydrous sodium carbonate
- $BaCl_2$-dissolve 4g of solid in $1dm^3$ of solution.

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3

CHEMISTRY

PAPER 3

TIME: 2 ¼ HOURS.

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

SERIES 7 2024 KCSE MOCK

INSTRUCTIONS TO CANDIDATES:

- *Answer all the questions in the spaces provided in the question paper.*
- *You are **NOT** allowed to start working with 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 calculators may be used.*

For Examiner's Use Only:

Question	Maximum score	Candidates score

1	13	
2	10	
3	17	
Total score	40	

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

Missing

1 **You are provided with**

32. Solid **A**: 0.31 g of a carbonate (MCO_3).
33. Solution **B**: l.1M hydrochloric acid
34. Solution **C:** 0.2M sodium hydroxide.
35. Phenolphthalein indicator.

You are required to:

(i) Determine the molar mass of the carbonate

(ii) Determine the relative formula mass and hence formula of the carbonate.

PROCEDURE

xiii) Measure 50 cm^3 of solution **B** using a measuring cylinder. Transfer the entire solid A provided into a 250cm^3 volumetric flask. Transfer 50 cm^3solutions B into 250cm^3volumetric flask containing solid **A** and swirl the contents until the entire Solid dissolves and no more effervescence occurs. Add more distilled water up to the 250cm^3 mark and label this solution **D**.

xiv) Pipette 25.0cm^3 of solution **D** and transfer to a conical flask. Add two drops of phenophthalein indicator and titrate with solution **C**from the burette. Record your results in table I below.

xv) Repeat the titration to get two more concordant values.

TABLE 1

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of C used (cm^3)			

(4 mks)

(a) Calculate;

(i) The average volume of solution **C** used.
(1mk)

(ii) The moles of solution **C** in the volume in (i) above. (1mk)

(iii) The moles of **D** that reacted with **C**. (1mk)

(iv) The moles of hydrochloric acid in 250 cm^3 of solution D (1mk)

(v) The moles of hydrochloric acid in 25cm^3 of B. (1mk)

(vi) Calculate the moles of HCl which reacted with the carbonate (1mk.. (1mk)

(vii) Calculate the moles of the carbonate that reacted with the acid (1mk)

(viii) Determine the relative formula mass of the carbonate and the value of M. (1mks)

2) You are provided with 2.5g of a hydrous sodium carbonate labeled F. You are required to determine the enthalpy of solution of solid F.

Procedure

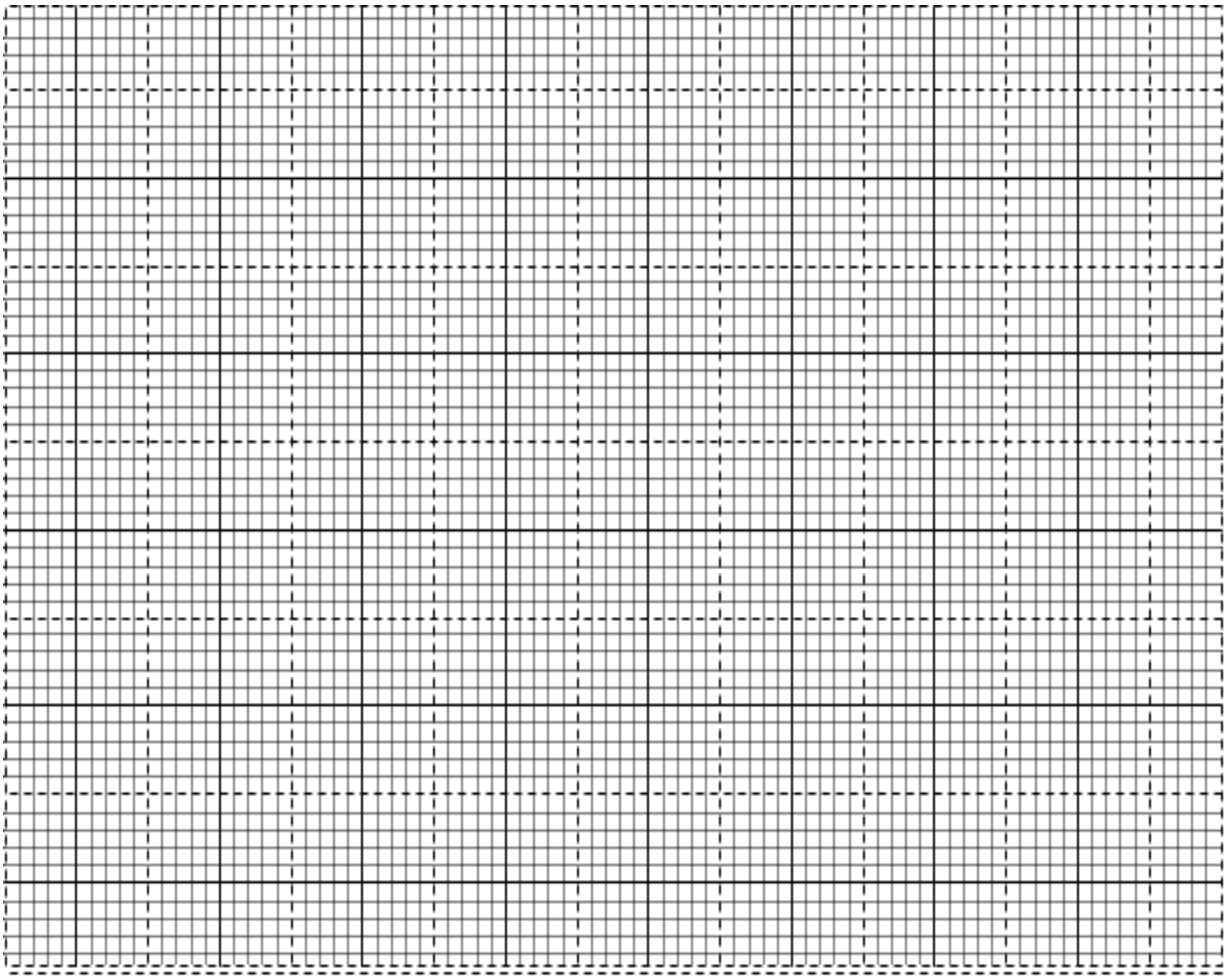
Using 50m1 measuring cylinder place 25cm^3 of water into l00ml plastic beaker. Stir the water gently with a thermometer and take its temp after every half-minute. Record the reading in the table below. At exactly 2 minutes add all solid F to the water at once. Stir well with the thermometer as you take the temperature ofto the mixture after every half- minute upto the 4thminute.

Table III

Time (min)	**0**	**½**	**1**	**1 ½**	**2**	**2 ½**	**3**	**3 ½**	**4**
Temp ^oC									

3mks

(a) On the grid provided plot a graph of temp against time. (3mks



(b) From the graph determine the change in temp (ΔT) (1mk)

(c) (i) Calculate the number of moles of solid F used in the experiment (Na= 23,C=12, 0=16) (1mk)

(ii) Calculate the molar enthalpy of solution. (Density of solution lgcm^{-3}, specific heat capacity of solution is 4.2Jg^{-1}K^{-1} (2mks)

3). You are provided with solid D. Carry out the following tests and write down all the observations and Inferences.

44. Place a half spatulafull of solid in a dry test tube and heat gently then strongly.Test any gas produced using red and blue litmus papers.

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

(b) Place the remaining solid D in a boiling tube and add about 10cm^3 of water shake Vigorously then divide the mixture into four portions.

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

(c) To the 1st portion add four drops of barium chloride solution

Observations	**Inferences**

(1mk)	(1mk)

(d) To the 2nd portion add sodium hydroxide solution drop wise till in excess.

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

(e) To the third portion add aqueous ammonia solution drop wise till excess about $1cm^3$

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

(f) To the fourth portion add 3 drops of sodium chloride

Observations	Inferences
(1mk)	(1mk)

II. You are provided with substance E. Carry out tests on it.

(i) Place about one thirdof solid E on a metallic spatulaand ignite it in a flame.

Observations	Inferences
(1mk)	(1mk)

(ii) Place the remaining solid E boiling tube add about 5 cm^3 of distilled water. Shake the contents and divide into 3 portions.

(a) To portion one add 3 drops of Universal indicator

Observations	**Inferences**
(½ mk)	(½ mk)

(b) To second portion all sodium carbonate provided

Observations	**Inferences**
(½ mk)	(½ mk)

(c) To third portion add 2 drops of acidified potassium manganate (VII) solution. Warm the mixture

Observations	**Inferences**
(½ mk)	(½ mk)

SERIES 8 CONFIDENTIAL PAPER

CHEMISTRY 233/3 PRACTICAL
CONFIDENTIAL TO SCHOOLS

Each candidate will require

62. Solution A 100cm^3
63. Solution B 150 cm^3
64. Solution C 100cm^3
65. Burette
66. 25ml pipette
67. 2 conical flasks
68. Retort stand
69. Filter funnel
70. Pipette filler
71. 100ml of distilled water
72. Thermometer
73. 1 Spatula – full of solid D
74. About 10ml liquid E
75. 4g solid F (weighed exactly)
76. 2 boiling tubes
77. Six test tubes in a rack
78. Test tube holder
79. Metallic spatula

ACCESS TO

- 1M NaOH
- 1M NH_4OH
- 0.1M NaCl
  Acidified $K_2Cr_2O_7$
- $KMnO_4$- use some amount of solution B
- Source of heating

NOTES

45. **Solid A**
    Dissolve 7.0g Ferrous Sulphate ($FeSO_4.7H_2O$) in 50ml of $1MH_2SO_4$, dilute to 1dm^3 with water.
    (Should be prepared in the morning of the exam day)

46. **Solution B**
    Dissolve 0.8g of $KMnO_4$ in 50cm^3 of $1MH_2SO_4$. Dilute to 1 dm^3 with water.

47. **Solution C**
    Measure 3cm^3 of 20vol. H_2O_2
    Dissolve in 1dm^3 of solution.

48. **1M H_2SO_4**
    Measure 55cm^3 of conc. H_2SO_4 add to about 200cm^3 of water, stir, dilute to 1 dm^3

49. **Solid D**
    Aluminium Nitrate

50. Solid F
    Potassium Chlorate ($KClO_3$)

51. Acidified $K_2Cr_2O_7$
    Dissolve 0.3g of $K_2Cr_2O_7$ in 50cm^3 of 1MH_2SO_4. Dilute to 1 dm^3 with water.

52. Liquid E
    Ethanol.

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3
CHEMISTRY
PRACTICAL
PAPER 3
TIME: 2¼ HOURS.

SERIES 8 2024 KCSE MOCK

Kenya Certificate of Secondary Education.

233/3
CHEMISTRY
PAPER 3
PRACTICAL
TIME: 2¼ HOURS.

INSTRUCTIONS TO CANDIDATES.

- Write your name and index number in the spaces provided above.
- Sign and write the date of exam in the spaces above.
- Answer **ALL** the questions in the spaces provided.
- You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
- Use the 15 minutes to read through the question paper and not the chemicals you require
- Mathematical tables and electronic calculators may be used.
- All working **MUST** be clearly shown where necessary.
- This paper consists of 6 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1	13	
2	14	

3	13	
Total score	40	

1. You are provided with;

- Solution A containing 6.95g of Iron II Sulphate heptahydrate R.F.M = 278 in 250cm^3 of solution
- Solution B of potassium manganate (VII)
- Solution C of hydrogen peroxide.

You are required to

- Standardize the potassium manganate (VII) solution C
- Determine the concentration of hydrogen peroxide solution C.

PROCEDURE I

Pipette 25cm^3 of solution A into a conical flask.

Fill the burette with solution B. Titrate this solution against solution A until the first permanent pink colour appears. Record your results in table I and repeat the procedure to fill the table 1 below.

Table 1

II	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution B used (cm^3)			

(4 marks)

- Calculate the average volume of solution B used

(1 marks)

……

……

……

……

……

……

- Given that the equation for the reaction is

$Mno^{-}_{4(aq)} + 5Fe^{2+}_{(aq)} + 8H^{+}_{(aq)} \longrightarrow Mn^{2+}_{(aq)} + 5Fe^{3+}_{(aq)} + 4H_2O_{(l)}$

Calculate

- The number of moles of Iron II sulphate solution A used

  (1mark)

……

……

……

- The number of moles of solution B that reacted.

  (1mark)

……

……

……

- The concentration of the potassium manganate (VII) solution B in moles per litre.

  (1mark)

……

……

……

PROCEDURE II

Pipette 25cm^3 of hydrogen peroxide, solution C into a conical flask. Fill the burette with solution B. Titrate this solution against solution C until the first permanent pink colour appears. Record results in table II.

TABLE II

Titre number	I	II	III

Final burette reading cm^3			
Initial burette reading cm^3			
Volume solution B used cm^3			

(4marks)

xvi) Work out average volume of potassium manganate (VII) solution B used.

(1mark)

……

……

……

xvii) Given that the equation for the reaction is

$2MnO^-_{4\,(ag)} + 5H_2O_{(aq)} + 6H^+_{(aq)} \longrightarrow 2Mn^{2+}_{(aq)} + 8H_2O_{(l)\,(aq)} + 5O_{2(aq)}$

Calculate

53. The number of moles of Potassium Manganate (VII) solution B that reacted.

(1mark)

……

……

……

54. The number of moles of hydrogen peroxide solution C that reacted.

(1mark)

……

……

……

55. The concentration of hydrogen peroxide solution C in moles per dm^3(mol dm^{-3})

(1mk)

……

……

……

2. You are provided with 4g of Solid F.
You are required to determine the solubility of solid F at different temperatures.

PROCEDURE

36. Carefully transfer all solid F in a clean boiling test tube and using a burette, add $15cm^3$ of distilled water. Heat the mixture while stirring with a thermometer to about 85^0C. when all

the solid has dissolved, allow the solution to cool while stirring with the thermometer. Note the temperature at which the crystals of solid F first appear. Record this temperature in Table III.

37. Transfer 5cm^3 of distilled water to the contents in the boiling tube. Warm the mixture while stirring with the thermometer until the solid dissolve. Allow the mixture to cool while stirring. Note and record the temperature at which crystals first appear.
38. Repeat procedure (b) two or more times and record the temperatures in table III.
39. Complete table III by calculating the solubility of solid F at the different temperatures.

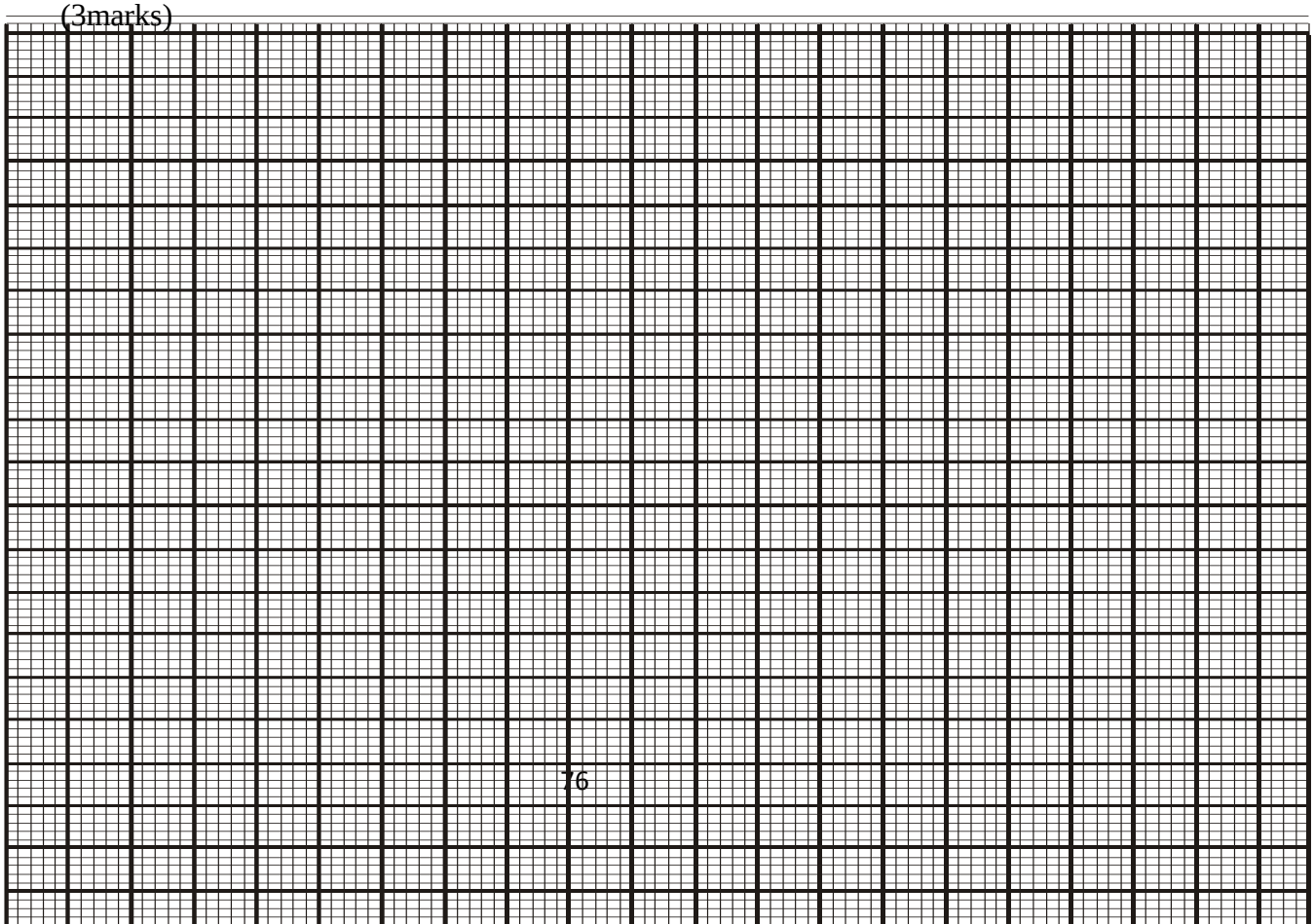
TABLE III

Volume of water in the boiling tube (cm^3)	Temperature at which crystals of solid F first appear.	Solubility of solid F in g / 100g of water.
15		
20		
25		
35		
40		

(6marks)

- On the grid provided plot a graph of solubility of solid F (vertical axis) against temperature (horizontal axis).

(3marks)



- Using your graph, determine the temperature at which 15g of solid F, would dissolve in 100cm^3 of water.
  (1mark)

  ……

  ……

  ……

  ……

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  ……

3. **You are provided with solid D. carry out the following tests and write down all the observations and inferences.**

- Place half spatula end full of solid D in a dry test tube. Heat gently then strongly until there is no further change.

Observations	inferences
(1mark)	(1mark)

- Place the remaining solid D in a test tube, add about $10cm^3$ of distilled water and shake vigorously. Divide the mixture into four portions.

o To the 1st portion, add 2M sodium hydroxide solution drop wise until in excess.

Observations	inferences
(1mark)	(1mark)

o To the 2nd portion, add ammonia solution drop wise till in excess.

Observations	inferences
(1mark)	(1mark)

iii. To the fourth portion add 4 drops of sodium chloride.

Observations	inferences
(1mark)	(1mark)

i. **You are provided with liquid E, Carry out the following tests on it.**

iv. Place about one spatula end full of liquid E on a metallic spatula and ignite it in a Bunsen burner flame.

Observations	inferences
(1mark)	(1mark)

v. To $2cm^3$ of liquid E add 3 drops of acidified $KMnO_4$. Solution B.

Observations	inferences
(1mark)	(1mark)

vi. To $2cm^3$ of liquid E add 3 drops of acidified $K_2Cr_2O_7$.

Observations	References
(1mark)	(1mark)

SERIES 9 CONFIDENTIAL PAPER

233/3
CHEMISTRY
(PRACTICAL)
PAPER 3

CONFIDENTIAL

Per Student

- Solution A (100ml)
- Solution B (100ml)
- Phenolphthalein indicator
- 3 conical flasks
- Funnel
- Burette
- Pipette
- Clamp
- Stand
- CBI (g) – $NaHCO_{3(s)}$
- Clean spatula
- Test- tubes (5)
- Litmus papers (2 blue and 2 red)
- Distilled water
- Solid Q – 1g $(NH4)_2\ SO_4.FeSO_4.\ 6H_2O$ and NaCl (ration 1:1)
- 1 boiling tube

Access to;

- 2M ammonia solution
- 2M Sodium hydroxide solution
- Source of heat
- Silver nitrate solution (0.05M)
- Dilute nitric acid (0.1M)
- Dilute hydrochloric acid (0.1M)
- Dilute Barium nitrate solution (0.1M)
- Conc. Nitric acid in dropper bottles
- White tile

- Test tube holder

0. Solution A is prepared by dissolving 6.3g of $H_2C_2O_4$. $2H_2O$ in 400cm^3 of water and topped upto one litre of solution.
1. Solution B is prepared by dissolving 4g of Sodium hydroxide in 400cm^3 of water and topped upto one litre of solution.

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3
CHEMISTRY
PRACTICAL
PAPER 3
TIME: 2¼ HOURS.

SERIES 9 2024 KCSE MOCK

Kenya Certificate of Secondary Education

233/3
CHEMISTRY
PAPER 3
PRACTICAL
TIME: 2¼ HOURS.

INSTRUCTIONS TO CANDIDATES

2. Write your name and index number in the spaces provided above.
3. Answer **ALL** the questions in the spaces provided.
4. You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
5. Use the 15 minutes to read through the question paper and note the chemicals you require
6. Mathematical tables and electronic calculators may be used.
7. All working **MUST** be clearly shown where necessary.

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1	17	
2	8	
3	15	

Total score	40	

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

- Solution A is prepared by dissolving 6.3g of the organic acid $H_2C_2O_4.nH_2O$ in water to make a litre of the solution.
  Solution B: 0.1M NaOH solution
  Phenolphthalein indicator
  Clamp and stand
  Burette and pipette.

  You are required to determine the value of n in the organic acid $H_2C_2O_4.\ nH_2O$
  Procedure.
  Fill the burette with solution A and adjust the volume to zero mark.

  Add 2 to 3 drops of phenolphthalein indicator and titrate solution A against solution B until thecolour just permanently changes. Record your results in the table below. Repeat the procedure two more times to obtain concordant results.
  56.

Titration	**1**	**2**	**3**
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution A used (cm^3)			

4 marks

57. Calculate the average volume of solution A used.
1mark

58. Calculate the moles of sodium hydroxide in the volume of solution B used.
2marks

59. Given that solution B - Sodium hydroxide and solution A organic acid react in the ration of 2:1, calculate the number of moles of the organic acid –solution A used?
2marks

60. Calculate the moles of organic acid solution A used per litre of solution
2marks

61. Calculate the relative formula masses of the organic acid solution A
3marks

62. Calculate the value of n in $H_2C_2O_4.nH_2O$(H=1, C=12, O=16)
3marks

- You are provided with CBI. Carry out the test below. Write your observation and inferences in the spaces provided.

xviii) Using a clean spatula, heat about one third of the solid CBI in a non- luminous Bunsen burner flame.

Observation	Inferences

1mark **1mark**

xix) Put a half spatula endful of CBI in a test tube. Heat gently and then strongly. Test for any gas produced using litmus papers.

Observation	Inferences

1mark **1mark**

xx) Put 2cm^3 of dilute hydrochloric acid into a test tube. Add ¼ endful of CBI into the test tube.
Test for any gas procedure.

Observation	Inferences

2marks

2marks

- You are provided with solid Q, carry out the test below. Record your observations and inferences in the table. Identify any gas (es) evolved.

  Place all the solid Q provided into boiling tube and add distilled water until the tube is ¼ full. Divide it into five portions.

  40. To the 1st portion add ammonia solution drop wise until excess.

Observation	Inferences
1mark	**1mark**

41. (i) To the 2nd portion add sodium hydroxide solution dropwise until in excess. Keep the resulting
mixture for the next test.

Observation	Inferences
1mark	**1mark**

ii) Warm the preserved mixture from b (i) above

Observation	Inferences

1mark **1mark**

42. i) To the 3rd portion add silver nitrate solution. Preserve the mixture for the next test.

Observation	Inferences

1mark **1mark**

ii) To the preserved mixture in c (i) above add diluted nitric acid.

Observation	Inferences

1mark **1mark**

43. To the 4th portion add dilute Barium nitrate solution followed by dilute nitric acid.

Observation	Inferences

1mark **1mark**

44. To the 5th portion add 2-3 drops of conc. Nitric acid.
Warm the mixture and allow to cool. Add sodium hydroxide solution dropwise until in excess.

Observation	Inferences

1mark **1mark**

SERIES 10 CONFIDENTIAL PAPER

CHEMISTRY PRACTICAL CONFIDENTIAL

Provide each student with the following items:

- 2.1g of solid Anhydrous Na_2CO_3 weighed accurately labeled **W**
- Thermometer (-10°C-110°C)
- 5 test-tubes
- 80cm^3 of 0.2M NaOH labeled solution **V**
- 70cm^3 of 1M HCl labeled solution **Y**
- 100cm^3 plastic beaker
- Phenolphthalein indicator supplied with a dropper
- Two conical flasks
- Burrete (50cm^3)
- Pipette (25cm^3)
- 100cm^3 measuring cylinder
- Pipette filler
- 2 spatula endful of solid **N**
- Means of labeling
- White tile
- Distilled water.
- Stand

Access to:

63. 2M $Pb(NO_3)_2$ with a dropper
64. 2M HCL, with a dropper
65. 2M NH_3 solution, with a dropper
66. 2M $Ba(NO_3)_2$ solution, with a dropper
67. 2M NaOH solution, with a dropper

N/B - Solid **N** is Aluminium sulphate

Name:……ADM……...

SCHOOL……INDEX…….

DATE……SIGN……..TARGET……

233/3

CHEMISTRY

PAPER 3

TIME: 2 ¼ HOURS.

Chemistry

Paper 3

INSTRUCTIONS TO CANDIDATES:

- *Answer all the questions on the spaces provided.*
- All workings must be clearly shown where necessary
- *Mathematical tables, and calculators may be used.*

For Examiner's Use Only:

Question	Maximum score	Candidate's score
1	24	
2	16	
Total	**40**	

This paper consists of 4 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing.

1. ***You are provided with the following;***

ix) 2.1g of solid sodium carbonate solid **W**.

x) Hydrochloric acid solution **Y**

xi) 0.2M sodium hydroxide, solution **V**

This question has two parts:

PART 1

Measure 60cm^3 of solution Y hydrochloric acid and transfer into a plastic beaker and measure its temperature T_1,……^oC

Take all the 2.1g sodium carbonate and transfer into the solution in the beaker. Stir with the thermometer and record final temperature reached, T_2……^0C

(½ mk)

Keep the mixture for part II and label it X.

Calculations

(a) Determine the rise in temperature

(1mk)

Δt……

(b) Determine the amount of heat evolved by the solution (density =1g/cm^3, specific heat capacity of solution = 4.2kJ$Kg^{-1}K^{-1}$) (2mks)

(c) If the acid was in excess, determine the number of moles of sodium carbonate (Na = 23, O=16, H=1)

(2mks)

(d) Calculate the number of moles of hydrochloric acid which reacts (2mks)

(e) Determine the molar heat of reaction of sodium carbonate (2mks)

PART II

To the mixture in part I(X) add 20cm^3 of distilled water and mix well. Transfer the solution in the burette. Pipette 25cm^3 of NaOH, solution **V**, into the conical flask and titrate with solution **X** using phenolphthalein indicator. Repeat the titration two more times and complete the table below:

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of **X** used (cm^3)			

(i) Determine the average volume of **X** used

(1mk)

(ii) Calculate the number of moles of NaOH in $25cm^3$ of solution **V** (2mks)

(iii) Determine the number of moles of hydrochloric acid that reacted with moles of $25cm^3$ of sodium hydroxide

(2mks)

(iv) Determine the number of moles of hydrochloric acid in 80cm^3 of **X** (2mks)

(v) What is the total number of moles of hydrochloric acid in the original 60cm^3 of HCL (1mk)

(vi) Hence determine the concentration of hydrochloric acid, solution **Y** in moles per litre (2mks)

2. You are provided with solid **N**. carry out the tests below, write your observations and inferences in the spaces provided.

Test	Observation	Inferences
(a) Take a spatula endful of **N** in a test-tube and add distilled water until half-filled. Shake well and divide the solution into 5 portions	(1mk)	(1mk)
(b) To the first portion add 2M NaOH solution drop wise until in excess	(2mks)	(1mk)
(c)To the 2nd portion add 2M $NH_{3(aq)}$ drop wise until in excess	(2mks)	(1mk)
(d) To the 3rd portion add 3drops of 2M HCl solution	(1mk)	(1mk)
(e) To the 4th portion add about $1cm^3$ of 2M $Pb(NO_3)_2$ solution	(1mk)	(2mks)
(f) To the 5th portion add about $1cm^3$ of 2M $Ba(NO_3)_2$ solution followed by dilute nitric acid.		

	(2mks)	(1mk)