

KCSE MOCKS

CHEMISTRY PAPER 3

Consists 3 KCSE Mock set Exams.
(Class of KCSE March 2021)

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PRE-MOCK 1

Confidential

Chemistry paper 3

In addition to the fittings and apparatus found in a chemistry laboratory, each candidate will require:

- About 120cm³ of solution A
- About 120cm³ of solution B
- About 100cm³ of solution C
- One pipette 25.0 ml
- One pipette filler
- One volumetric flask 250ml
- One burette 0-50ml
- Two conical flasks
- 8 clean dry test tubes
- Test tube rack
- One thermometer -10 to 110° C
- Two boiling tubes
- About 0.5g of solid Y
- About 0.5g of solid Z
- One blue and one red litmus paper
- One 10ml measuring cylinder
- About 500cm³ of distilled water in a wash bottle
- One test tube holder
- About 0.2g of solid sodium carbonate
- One blue and one red litmus papers
- One spatula
- 7 labels

Access to

- Methyl orange indicator
- Bunsen burner
- 2M aqueous ammonia supplied with a dropper
- 0.05M lead II nitrate solution supplied with a dropper
- 2M aqueous hydrochloric acid supplied with a dropper
- Acidified potassium manganate (VII) supplied with a dropper
- Acidified potassium dichromate (VI) supplied with a dropper.
- Bunsen burner

Preparations

1. Solution A is prepared by dissolving 50cm³ of 1.84g/cm³ (98%) concentrated sulphuric VI acid in about 600cm³ of distilled water and diluting to one litre of solution.
2. Solution B is prepared by dissolving 8.0g of anhydrous sodium carbonate in about 500cm³ of distilled water and diluting to one litre of solution.
3. Solution C is prepared by dissolving 60.0g of sodium hydroxide pellets in about 700cm³ of distilled water and diluting to one litre.
4. Acidified potassium dichromate VI is prepared by dissolving 25g of solid Potassium dichromate in 200cm³ of 2M Sulphuric VI acid and diluting with distilled water to make one litre of solution
5. Acidified Potassium manganate (VII) is prepared by dissolving 3.2g of solid Potassium manganate (VII) in 200cm³ in 200cm³ of 2M sulphuric (VI) acid and diluting with distilled water to make one litre of solution.
6. Solid Y is a mixture of ammonium sulphate and hydrated aluminium sulphate in the ratio 1:1.7. Solid Z is glucose

PRE-MOCK 1

Name..... School

Admission number----- Class-----

Stream..... Signature-----

233/3

CHEMISTRY

Paper 3

PRACTICAL

2 hours 15 minutes

KCSE PRE-MOCK 1

CHEMISTRY PAPER 3

Instructions to candidates

- 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 time allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and the apparatus that you may need.
- Mathematical tables and silent calculators may be used.
- All working must be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Question	Maximum Score	Candidate's score
1	23	
2	09	
3	08	
Total		

Question One

You are provided with

- Aqueous sulphuric VI acid labelled **solution A**
- **Solution B** containing 8.0 g per litre of sodium carbonate
- An aqueous solution of substance C, labelled **solution C**

You are required to determine the:

- Concentration of solution A
- Enthalpy of reaction between sulphuric VI acid and substance C

PROCEDURE

- A. Using a pipette and a pipette filler, place 25.0 cm³ of **solution A** into a 250ml volumetric flask. Add distilled water to make 250cm³ of solution. Label this **solution D**. Fill the burette with solution D. Clean the pipette and use it to place 25cm³ of **solution B** into a conical flask, then add 2 drops of methyl orange indicator provided and then titrate with solution D. Record your results in **table 1**. Repeat the titration 2 more times and complete the table.

Table 1

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

(3 marks)

Calculate the:

- a). Average volume of solution D used.

(1 mark)

b). Concentration of sodium carbonate in solution B. (Na = 23, O =16, C=12).

(1mark)

c). Concentration of sulphuric VI acid in solution D.

(2 marks)

d). concentration of sulphuric VI acid in solution A

(2 marks)

B. Label six test tubes as 1,2,3,4,5 and 6. Empty the burette, clean and fill it with **solution A**. From the burette, place 2cm^3 of solution A into test tube number 1, from the same burette place 4cm^3 of solution A into test tube number 2. Repeat the process for test tube numbers 3,4,5 and 6 as shown in table 2. Clean the burette and fill it with **solution C**. From

the burette, place 14 cm³ of solution C into a boiling tube. Measure the initial temperature of solution C and record it in **table 2**. Add contents of test tube number 1 to the boiling tube containing solution C. Stir the mixture with the thermometer. Note and record the highest temperature reached in table 2. Repeat the process with the other volumes of solution C given in **table 2** and complete the table

Table 2

Test tube number	1	2	3	4	5	6
Volume of solution A (cm ³)	2	4	6	8	10	12
Volume of solution C (cm ³)	14	12	10	8	6	4
Initial temperature of solution C (°C).						
Highest temperature of mixture (°C).						
Change in temperature ΔT (°C)						

(6 marks)

- i. On the grid provided, draw a graph of ΔT (vertical axis) against volume of solution A used.

(3marks) ii.

From the graph, determine:

- a). The maximum change in temperature

(1 mark)

b). The volume of solution A required to give the maximum change in temperature.
(1 mark)

iii. Calculate the :

a). Number of moles of sulphuric VI acid required to give the maximum change in temperature.
(1 mark)

b). Molar enthalpy of reaction between sulphuric VI acid and substance C , in kiloJoules per mole of sulphuric VI acid used.

(Assume the specific heat capacity of the solution is 4.2 J/g/K and density of the solution is 1g/cm³)
(2 marks)

Question Two.

You are provided with **solid Y**. Carry out the following tests and write observations and inferences in the spaces provided.

a). Place about one half of solid Y in a dry test tube and heat it strongly. Test any gas produced using blue and red litmus papers.

Observations	Inference.
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1 mark	1 mark

b). Place the rest of solid Y in a boiling tube. Add about 10cm³ of distilled water. Shake well and use 2cm³ portions for each of the tests below.

To one portion add aqueous ammonia dropwise until excess.

Observations	Inferences
1 mark	1 mark

ii). To the second portion add 1cm³ of hydrochloric acid

Observations	Inference
1 mark	2 marks

iii). To the third portion, add two drops of lead (II) nitrate and heat the mixture to boiling.

Observations	Inference
1 mark	1 mark

Question Three

You are provided with an organic compound solid Z. Carry out the following tests. Record the observations and inferences in the spaces provided,

- a. Place all solid Z in a boiling tube. Add about 10cm³ of distilled water and shake. Retain the solution for use in procedure (b) (i), (ii) and (iii)

Observations	Inferences
1 mark	1 mark

- b. Use about 2cm³ portions of the mixture in a test tube for tests (i), (ii) and (iii)
- i. To the first portion, add all the sodium carbonate provided.

Observations	Inferences
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1 mark	1 mark

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

Observations	Inferences
1 mark	1 mark

- iii. To the third portion, add about 2cm³ of acidified Potassium dichromate (VI) , heat the mixture to boiling and allow to stand for 2 minutes.

Observations	Inferences
1 mark	1 mark

MOCK 1

NAME: INDEX.NO:

SCHOOL: CANDIDATES SIGN:

DATE:

233/3

**CHEMISTRY PAPER 3
PRACTICAL
FORM 4**

**KCSE MOCK 1
KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)**

Instructions to candidates

1. Write your name, index number and school in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. Answer **ALL** the questions in section in the spaces provided.
4. **ALL** working **MUST** be clearly shown.

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE SCORE
1	18	
2	12 ½	
3	9 ½	
TOTAL	40	

1. You are provided with:

- Solution A, Dilute hydrochloric acid

- Solution B, made by dissolving 0.5g of sodium hydroxide in water and made to 250cm³ of solution
- Solid C, Magnesium ribbon
- Phenolphthalein in indicator

You are required to:

- Standardize solution A
- Determine the rate of reaction between solution A and magnesium

PROCEDURE

- Measure exactly 10cm³ of solution A using a burette and transfer into a 250ml volumetric flask. Top up to the mark using distilled water. Label this solution D.
- Drain the remaining solution A in the burette, rinse the burette thoroughly and fill the burette with solution D.
- Pipette 25cm³ of solution B into a conical flask. Add three drops of phenolphthalein indicator
- Titrate solution D with solution B. Record your results in the table below. Repeat procedure (i) to (iv) to complete the table. (3 marks)

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

- Calculate the average volume of solution D used (1 mark)

(b) Calculate:

- Number of moles of solution B used (1½ marks)

- Number of moles of solution D in 250cm³ of solution (1½ marks)

- Molarity of solution A (1 mark)

PROCEDURE II

- (i) Cut solid C into equal pieces, each 2cm long.
- (ii) Using a burette, measure 12cm³ of solution A, into a clean boiling tube.
- (iii) Drop one piece of solid C into the boiling tube containing solution A and start stopwatch immediately. Stop the stopwatch when all solid C has just reacted. Record your results in the table below.
- (iv) Repeat steps (ii) and (iii) above using 10cm³, 8cm³, 6cm³ and 4cm³ of solution A. Top up each with distilled water to make 12cm³ of solution and complete the table below. (4 marks)

Volume of solution A (cm ³)	Volume of distilled water (cm ³)	Concentration of solution a (moles/l	Time(s)	$\frac{I}{t} (s^{-1})$
12	0			
10	2			
8	4			
6	6			
4	8			

- (a) Plot a graph of $\frac{I}{t}$ (y – axis) against the concentration of solution A (3 marks)
- (b) From the graph, determine the time taken for the reaction to reach completion when 1.5 moles of solution A are used (2 marks)
- (c) Comment on the shape of the graph (1 mark)
2. You are provided with solid Q. Carry out the tests below and record your observations and inferences in the spaces provided.

- (a) Strongly heat a spatula-end full of solid Q in a dry test tube (1 mark)

Observation	Inference

- (b) (i) Place the remaining solid Q in a boiling tube. Add 10cm³ of distilled water. Divide the solution into five portions. (2 marks)

Observation	Inference

- (ii) To the first portion, add aqueous lead (II) nitrate solution (1 mark)

Observation	Inference

- (iii) To the second portion add dilute nitric (V) acid, followed by barium nitrate solution (2marks)

Observation	inference

- (iv) To the third portion add a few drops of sodium hydroxide until excess observation (2marks)

Observation	Inference

- (v) To the fourth portion, add a few drops of aqueous ammonia until is excess. (2 marks)

Observation	Inference

- (vi) To the fifth portion, add a few drops of hydrochloric acid (1½ marks)
Warm the contents.

Observation	Inference

3. You are provided with solid R. carry out the tests below and record your observations and inferences.

- (a) Place a spatula-end full of solid R in a dry boiling tube and add about 10cm³ of distilled water. Shake thoroughly and heat to boil. Divide the solution into five portions. (1½ marks)

Observation	Inference

- (b) (i) Test the first portion with the universal indicator solution provided. (1½ marks)

Observation	Inference

- (ii) To the second portion, add a few drops of acidified potassium manganate (VII) solution (2 marks)

Observation	Inference

- (iii) To the third portion, add a few drops of bromine water (2 marks)

Observation	Inference

- (iv) To the fourth portion, add half spatula of sodium hydrogen carbonate (1 mark)

Observation	Inference

- (v) To the fifth portion in a boiling tube, add 5cm³ of ethanol followed by a few drops of concentrated sulphuric (VI) acid. Warm the mixture. (1 ½ Marks)

Observation	Inference

POST MOCK 1

CHEMISTRY PAPER 3 CONFIDENTIAL

In addition to the common laboratory apparatus and fittings, each candidate shall be supplied with the following

- 60 cm³ of 0.5M copper (II) sulphate labeled *solution K*
- 2.5g of *Solid L*
- 90cm³ of acidified potassium manganate(VII), labelled as *Solution M*
- 60 cm³ of 2M sulphuric (VI) acid, *H₂SO₄*
- 2ml of *solution X*
- 2ml of *solution Y*
- 2ml of *solution Z*
- About 8 cm³ of *Liquid E* in a stoppered test tube
- About 2g of *solid Q* in a stoppered container
- Burette
- Pipette and pipette filler
- Three conical flasks
- 10ml measuring cylinder.
- 250 ml plastic beaker
- 250 ml volumetric flask with a stopper
- 1 label
- Stop watch
- Clean glass rod/looped nichrome wire
- Clean and dry Metallic spatula
- Thermometer (-10-110°C)
- four test tubes
- test tube holder
- Filter paper
- Filter funnel
- Retort stand
- white tile
- 10ml measuring cylinder.
- 50ml measuring cylinder.

Access to the following:

- Distilled water
- Bunsen burner
- Acidified potassium dichromate (VI) supplied with a dropper.
- 2M Barium nitrate solution supplied with a dropper.
- 2M lead (II) nitrate supplied with a dropper
- 2M Nitric (V) acid supplied with a dropper
- Sodium hydrogen carbonate solid supplied with a spatula

Note

- Solid Q is Na_2SO_3
- Liquid E is ethanol
- Solution K is prepared by accurately weighing 125g of hydrated copper (II) sulphate and making up to 1000 cm³ of solution
- Solution M is prepared by accurately weighing 3.2g of KMnO_4 . then dissolving in 100ml of 2M sulphuric acid and topping up to 1000ml of the solution
- Solution X is 2M potassium nitrate
- Solution Y is made by dissolving One Spatulaful of **blue Toss** detergent in 100ml of **distilled water (do not use tap water)** then **filter**
- Solution Z is 2M copper (II) sulphate solution

POST MOCK 1

Name.....

Index No.....

Class: Adm no:.....

Date.....

233/3

CHEMISTRY PRACTICAL

PAPER 3

TIME: 2 ¼ HOURS

KCSE POST MOCK 1

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

Chemistry 233/3

2 ¼ Hours

INSTRUCTIONS TO CANDIDATES

- Write your **name** and **index number** in the spaces provided.
- **Sign** and write the **date** of examination in the spaces provided.
- Answer **all** the questions in the spaces provided in the question paper in **English**.
- 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 you need.
- All working **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	22	
2	10	

3	08	
TOTAL	40	

Question 1

You are provided with the following reagents:

- **Solution K**- Copper (II) sulphate solution
- **Solid L**- Iron powder
- **Solution M**- Acidified Potassium Manganate (VII) solution, containing 0.8g of Potassium Manganate (VII) in 250cm³ of the solution.

You are required to determine the *molar heat of displacement* of copper in a solution of its ions by iron metal.

Procedure I

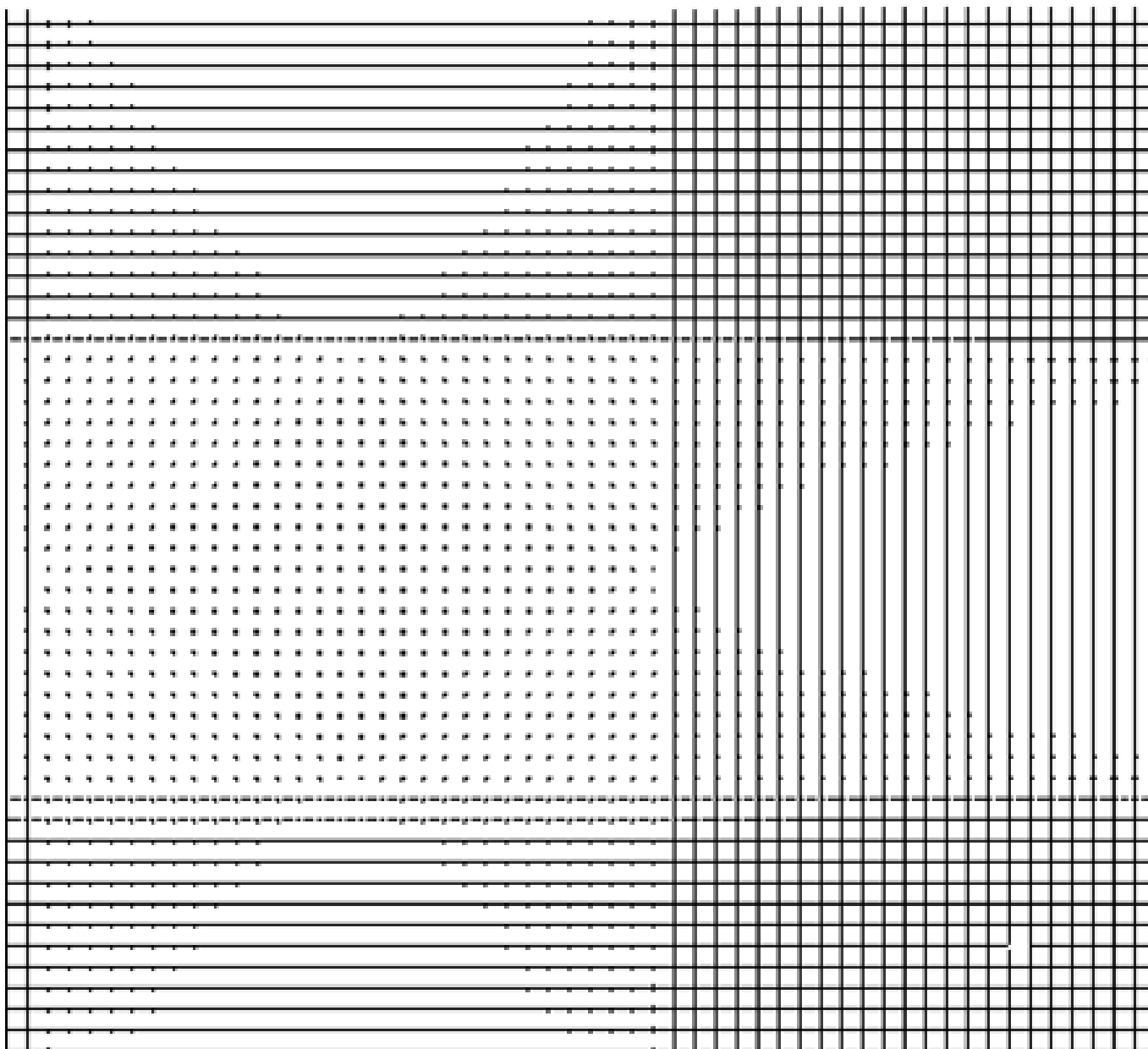
- Place 50cm³ of **Solution K** in a 100cm³ plastic beaker using a burette.
- Measure the constant temperature of the solution and record it in the **Table 1** below.
- Add all of the **Solid L** provided at once and start a stop watch immediately.
- Using a thermometer, Stir the mixture **thoroughly and continuously** and record the temperature of the mixture after every **one minute** in the table 1.
- **Retain** the resultant mixture for use in the next **Procedure II**.

Table 1

Time (Min)	0	1	2	3	4	5	6	7	8	9	10
Temperature(°C)											

(3 marks)

- (i) Plot a graph of temperature (vertical axis) against time on the grid provided below. (3 marks)



(ii) From the graph you have drawn, determine the;

a) highest change in temperature, ΔT (1 mark)

b) time taken for the reaction to completely occur (1 mark)

(iii) Calculate the heat change for the reaction. (Take density of the solution to be 1g/cm^3 and specific heat capacity of the solution to be

4200kJ/Kg/K)
(2 marks)

Procedure II

- Swirl the mixture obtained in procedure I above and filter into a 250mL volumetric flask.
- Thoroughly rinse the beaker with 20cm³ of distilled water and ensure all the mixture has been transferred onto the filter paper.
- Add 50cm³ of 2M Sulphuric (VI) acid to the filtrate mixture in the volumetric flask.
- Add more distilled water to the solution in the volumetric flask to the mark. Mix the contents thoroughly and label this solution as **Solution N**.
- Fill the burette with **Solution M**.
- Place 25 cm³ of **Solution N** into a 250 cm³ conical flask using a pipette and a pipette filler.
- Titrate **Solution N** against **Solution M** until the **first permanent pink** colour is seen.
- Record your results in **Table 2** below.
- Repeat the titration **twice** and complete **Table 2**.

Table 2

Titre	I	II	III
Final burette reading(cm ³)			
Initial burette reading(cm ³)			
Volume of solution M used(cm ³)			

- (i) What is the average volume of **Solution M** used?

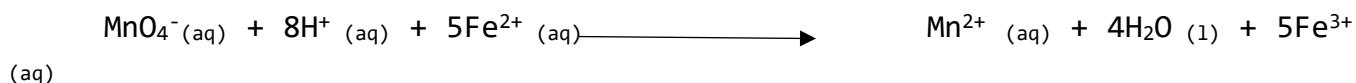
(3
marks)
(1 mark)

(ii) Calculate the molarity of **Solution M**, KMnO_4 (1 mark)
(K=39, Mn=55, O=16)

(iii) Calculate the number of moles of:
a) Potassium manganate (VII) used, **solution M** (1 mark)

b) Iron (II) ions in 25cm^3 of **solution N** (1 mark)

The equation for the reaction is:



c) Iron (II) ions in the 250cm^3 of **solution N** (1 mark)

(iv) Determine the molar heat of displacement of copper from a solution of its ions by iron metal
(2 marks)

(v) Draw an energy level diagram for the reaction (2 marks)

Question 2

- (a) You have been provided with solutions X, Y and Z. Carry out the flame tests for each and indicate the colour of the flames and inferences below.

Ions	Flame colour	Inference
X		
Y		
Z		

(3 marks)

- (b) You are provided with **Solid Q**. Carry out the tests below and Write your observations and inferences in the spaces provided.

i) Place all **Solid Q** in a clean test tube. Add about 8cm³ of distilled water and shake. Divide the solution into 3 portions

Observation	Inference
 (1/2 mark)	 (1/2 mark)

ii) To the first portion add a few drops of Lead (II) nitrate solution and warm

Observation	Inference
 (1 mark)	 (1 mark)

(iii) To the first portion add a few drops of Barium nitrate solution followed by few drops of dilute hydrochloric acid

Observation	Inference
 (1 mark)	 (1 mark)

iv) To the third portion add a few drops of acidified potassium dichromate (VI) then warm gently

Observation	Inference
 (1 mark)	 (1 mark)

3. You have been provided with **Liquid E**.

i) Place about 2cm³ of the **Liquid E** in a clean test tube. Add an equal amount of distilled water and shake the mixture. Allow to settle.

Observation	Inference
 (1 mark)	 (1 mark)

ii) Place about 2cm³ of the **Liquid E** in a clean test tube. Add a half spatulaful of sodium hydrogen carbonate.

Observation	Inference
 (1 mark)	 (1 mark)

iii) To about 2cm³ the **Liquid E** add 3 drops of acidified potassium dichromate (VI) solution and warm gently

Observation	Inference
 (1 mark)	 (1 mark)

iv) Take a few drops of **Liquid E** on a **clean and dry** metallic spatula and ignite over a non-luminous Bunsen flame

Observation	Inference
 (1 mark)	 (1 mark)

