

Name.....

Index No.....

Class: Adm no:.....

Date.....

233/3

CHEMISTRY PRACTICAL

PAPER 3

November, 2020

TIME: 2 ¼ HOURS

MOKASA I JOINT EXAMINATIONS 2020

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 250cm^3 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

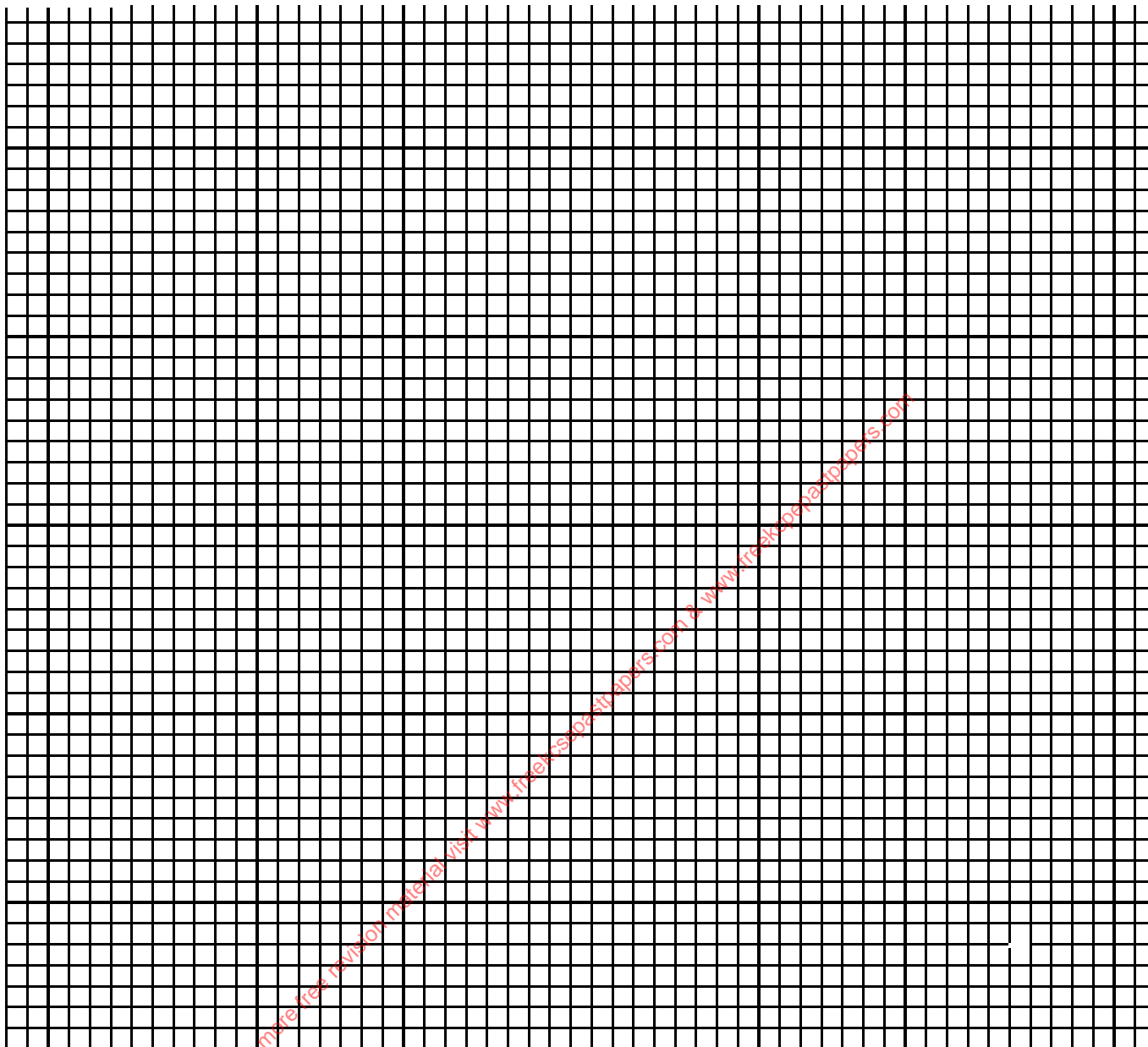
- Place 50cm^3 of **Solution K** in a 100cm^3 plastic beaker using a burette.
- Measure the constant temperature of the solution and record it in the **Table 1** below.
- Add all of the **Solid L** provided at once and start a stop watch immediately.
- Using a thermometer, Stir the mixture **thoroughly 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($^{\circ}\text{C}$)											

(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)			

(3
marks)
(1 mark)

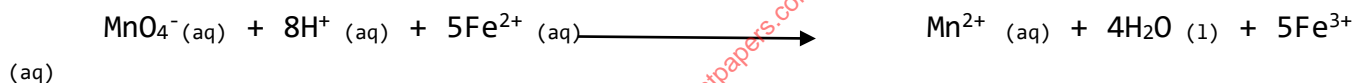
- (i) What is the average volume of **Solution M** used?

(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)

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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)

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