NAME: …… CLASS:…….. ADM. NO. ……..

CHEMISTRY PRACTICAL
Paper 3
Time: 2 ¼ hours

M O K A S A J O I N T E V A L U A T I O N E X A M I N A T I O N

MARCH/APRIL 2013

Kenya Certificate of Secondary Education

CHEMISTRY PRACTICAL

PAPER 3

Instructions to Candidates

- 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 the chemicals and apparatus that you may need.
- All working **MUST** be clearly shown where necessary.
- Mathematical tables may be used
- Electronic calculators **MUST NOT** be used.

For Examiner's Use Only

Question	Maximum Score	Score
1	23	
2	17	
TOTAL SCORE	**40**	

This paper consists of 7 printed pages

Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

Turn over

1. You are provided with:

Magnesium ribbon, solid **A**
0.7M hydrochloric acid, solution **B**
0.3M sodium hydroxide, solution **C**
Distilled water

You are required to determine the:

(i) Temperature change when magnesium reacts with excess hydrochloric acid.
(ii) Number of moles of hydrochloric acid that remain unreacted.
(iii) Number of moles of magnesium that reacted
(iv) Molar heat of reaction between magnesium and hydrochloric acid.

Procedure I

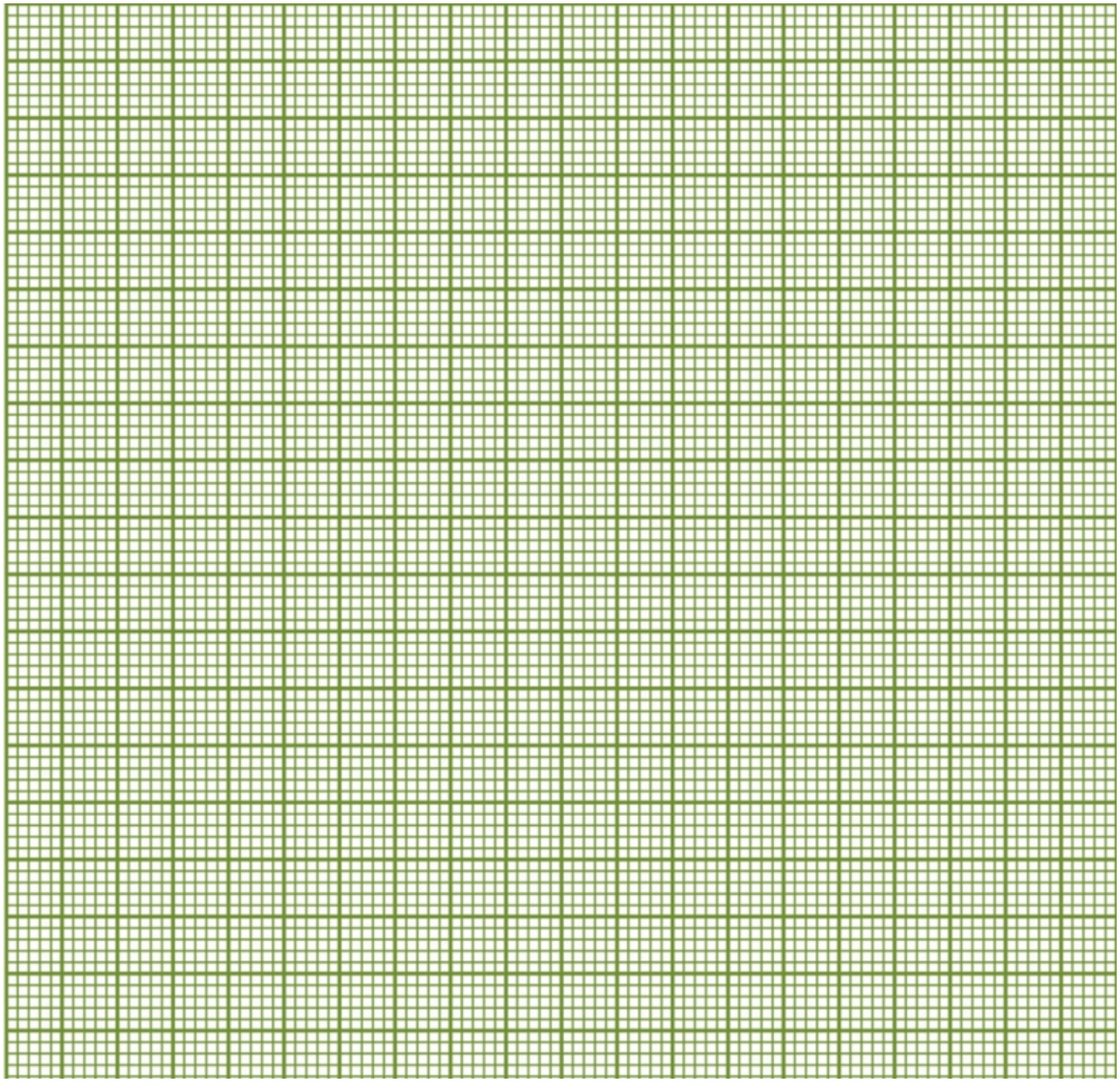
Using a burette, measure 50cm^3 of solution **B** and place it in a 100ml beaker. Measure the temperature of solution **B** in the 100ml beaker and record the value in table 1. Put the magnesium ribbon in the 50cm^3 of solution **B** in the 100ml beaker and **immediately** start a stop watch/clock. Stir the mixture continuously with the thermometer making sure that the magnesium ribbon remains inside the solution as it reacts. Measure the temperature after every 30 seconds and record the values in table 1. Continue stirring and measuring the temperature to complete table 1.
Retain the mixture for use in procedure II.
(a)

Table 1

Time (sec)	0	30	60	90	120	150	180	210	240	270	300
Temperature (^oC)											

(4 marks)

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



(i) On the graph, show the maximum change in temperature, ΔT, and determine its value. **(1 mark)**

Value of ΔT

……

Procedure II

Transfer **all** the solution obtained in procedure 1 into a 250ml conical flask. Clean the burette and use it to place 50 cm^3 of distilled water into the beaker used in procedure 1. Transfer all the 50 cm^3 of water into the 250ml conical flask containing the solution from procedure 1. Label this as solution **D**. Empty the burette and fill it with solution **C**. Pipette 25cm^3 of solution **D** and place it into an empty 250ml conical flask. Add **two** drops of phenolphthalein indicator and titrate solution C against solution **D**. Record the results in table 2. Repeat the titration of solution **C** against solution **D** 2 more times to complete table 2.

(b)

Table 2

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

(4 marks)

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

(ii) Calculate the number of moles of:

I 0.3M sodium hydroxide used **(1 mark)**

II Hydrochloric acid in 25cm^3 of solution **D** **(1 mark)**

III Hydrochloric acid in 100cm^3 of solution **D** **(1 mark)**

IV Hydrochloric acid in $50cm^3$ of solution **B** **(1 mark)**

V Hydrochloric acid that reacted with magnesium **(1 mark)**

VI Magnesium that reacted **(2 marks)**

(c) Using your answer in VI above, determine the molar heat of reaction between magnesium and hydrochloric acid.
(Assume the heat capacity of the solution is $4.2Jg^{-1}deg^{-1}$ and density is $1.0g/cm^3$)

(3 marks)

2. (a) You are provided with solid E. Carry out the test below. Record your observations and inferences in the spaces provided.

(i) Dissolve half of solid **E** in about $10cm^3$ of distilled water in a boiling tube. Use the solution for the tests below.

I. To about $2cm^3$ of the solution, add aqueous sodium hydroxide dropwise until in excess.

Observations	**Inferences**
(2 marks)	**(1 mark)**

II. To a second portion ($2cm^3$), add aqueous ammonia dropwise until in excess.

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

III. Heat about one half of solid E in a dry test-tube.

Observations	**Inferences**
(2 marks)	**(1 mark)**

IV. To a third portion ($2cm^3$) add four drops of aqueous potassium iodide.

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

(b) You are provided with an organic liquid **F**. Carry out the tests below. Write your observations and inferences in the spaces provided.

(i) To $2cm^3$ of liquid **F**, add 2 cm^3 of water. Shake and allow the mixture to stand for about one minute.

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

(ii) To $2cm^3$ of liquid **F**, add 5 drops of bromine water.

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

(iii) To $2cm^3$ of liquid **F**, add sodium hydrogen carbonate.

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

(iv) To 2cm^3 of liquid **F**, add a few drops of acidified potassium manganate (VII) solution.

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