NAME…….. INDEX NO…….....

233/3 **CANDIDATE'S SIGN……**
CHEMISTRY
PAPER 3 **DATE……**
(PRACTICAL)
JULY/AUGUST, 2016
TIME: 2¼ HOURS

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATION – 2016

Kenya Certificate of Secondary Education
CHEMISTRY
PAPER 3
(PRACTICAL)
TIME: 2¼ HOURS

INSTRUCTIONS TO CANDIDATES:

1. Write your **name** and **index number** in the spaces provided **above**.
2. **Sign** and write the **date** of examination in the spaces provided **above**.
3. Answer **ALL** questions in the spaces provided for each question.
4. You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all chemicals and apparatus that you may need.
5. All working must be clearly shown where necessary.
6. Mathematical tables and silent electronic calculators may be used.
7. This paper consists of **7** printed pages.
8. Candidates should check the question paper to ascertain that all the pages are printed and that no questions are missing.

FOR EXAMINER'S USE ONLY:

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	12	
2	11	
3	17	
TOTAL SCORE	40	

1. You are provided with:
   - Solution A – 2.0M Hydrochloric Acid.
   - Solution C – a solution containing 12g/dm³ of sodium hydroxide contaminated with sodium nitrate.
   - Phenolphthalein indicator.

   You are required to prepare a dilute solution of hydrochloric acid solution A and use it to determine the purity of sodium hydroxide in solution C.

   PROCEDURE
   - Using a pipette and a pipette filler place 25cm³ of solution A into a 250ml volumetric flask.
   - Add distilled water to make 250cm³ of solution. Label this solution B.
   - Pipette 25cm³ of solution B into a 250ml conical flask. Add 2 drops of phenolphthalein indicator.
   - Fill the burette with solution C and titrate with solution B until there is a permanent colour change.
   - Repeat the titration two more times and complete the table below.

	1	2	3
Final burette reading (cm³)			
Initial burette reading (cm³)			
Volume of C used (cm³)			

(3 marks)

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

(b) Calculate the number of moles in

(i) 250cm³ of solution B. (2 marks)

(ii) 25cm³ of solution B. (1 mark)

(c) Calculate the

(i) Number of moles of sodium hydroxide in the average volume of solution C used. (2 marks)

(ii) Mass of sodium hydroxide in 1dm³ of solution C. (2 marks)

(iii) Percentage purity of the sodium hydroxide. (1 mark)

2. You are provided with:
- Sulphuric (VI) acid, solution F.
- 0.2g magnesium, solid G.

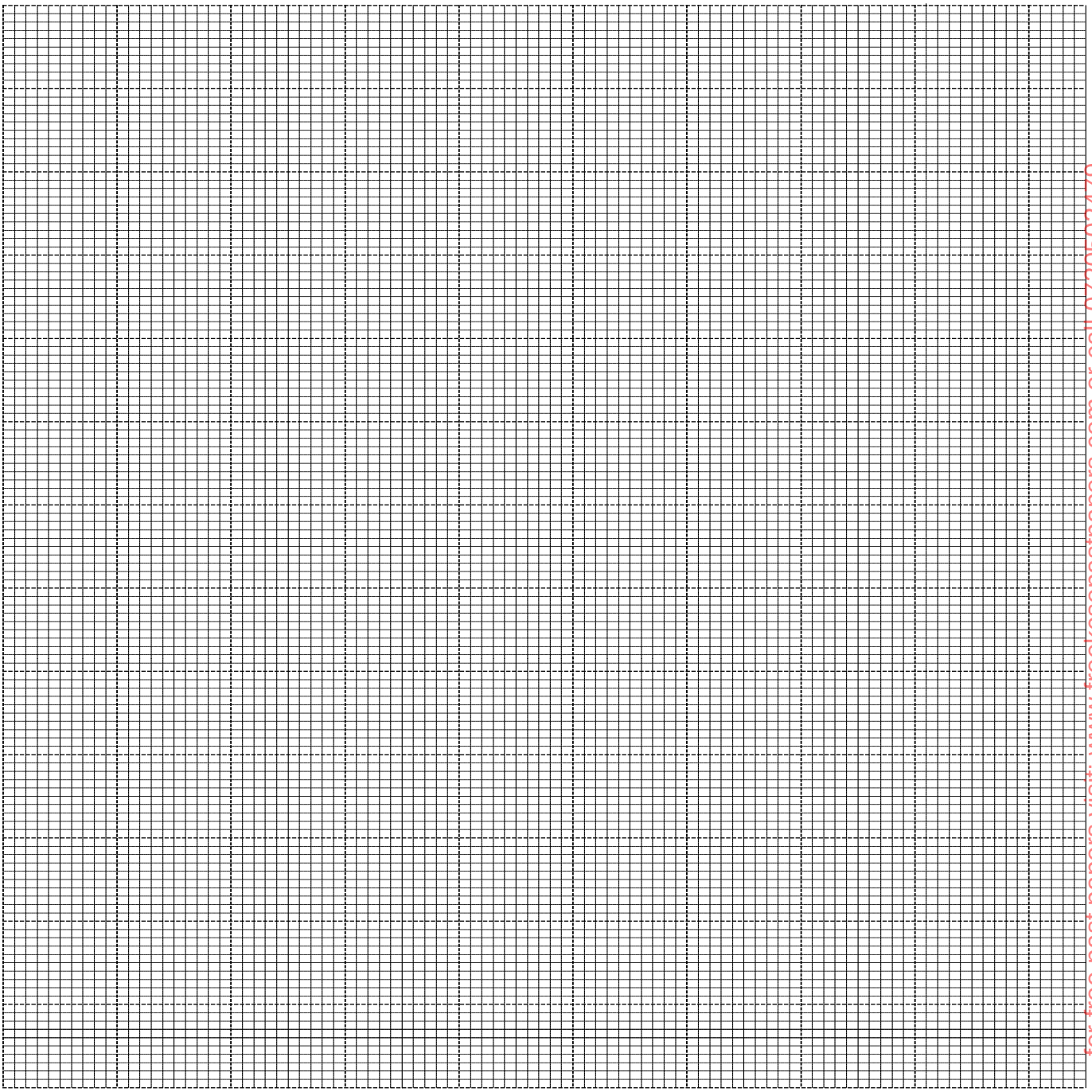
You are required to determine the molar heat of reaction, ΔH between magnesium the acid.

PROCEDURE:
- Measure 50cm³ of solution F using a measuring cylinder and place it in a 100cm³ beaker.
- Stir the solution gently with a thermometer and take it's temperature after every half-minute.
- Record your results in Table III below.
- After one and half minutes, add all of solid G at once. Stir the mixture gently with the thermometer and record the temperature of the mixture after every half-minute in table III up to the sixth minute.

Table III

Time (min)	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
Temperature (°C)													

(a) In the grid provided, plot a graph of temperature (vertical axis) against time. (3 marks)



(b) From the graph determine the change in temperature, ΔT. (1 mark)

(c) Calculate the heat change for the reaction using the expression. (Heat change = mass of solution x 4.2 x ΔT – assume density of solution = 1.0g/cm^3). (2 marks)

(d) Calculate the molar heat of reaction of sulphuric (VI) acid with magnesium. (Mg = 24.0). (2 marks)

3. I You are provided with solid J. Carry out the test below to identify the compound.

(a) Place ½ spatula of solid J in a hard test tube and heat strongly until no further change. Test the gas produced with litmus paper.

Observation	Inference
(1mk)	(1mk)

(b) Place the remaining solid J into a clean boiling tube. Half fill it with distilled water and shake well. Divide the solution into four portions.

Observation	Inference
(1mk)	(1mk)

(i) To the first portion add dilute sodium hydroxide solution dropwise till in excess.

Observation	Inference
(1mk)	(1mk)

(ii) To the second portion add ammonia solution dropwise till in excess.

Observation	Inference
(1mk)	(½mk)

(iii) To the third portion add drops of dilute barium nitrate.

Observation	Inference
(½mk)	(1mk)

(iv) To the fourth portion add a few drops of dilute nitric acid followed by lead (II) nitrate solution and warm.

Observation	Inference
(½mk)	(½mk)

II (7 marks)

You are provided with solid H. Carry out the tests below.

Write your observations and inferences in the spaces provided.

(a) Place about a spatulaful of solid H on a metallic spatula and burn it using a Bunsen burner.

Observation	Inference
(½mk)	(1mk)

(b) Place the remaining solid H in a boiling tube. Add about 10cm³ of distilled water and shake well. Retain the mixture for use in the tests below.

Observation	Inference
(½mk)	(½mk)

(c) Divide the solution in (b) above into three portions.

(i) To the first portion, add a small amount of solid sodium hydrogen carbonate.

Observation	Inference
(1mk)	(1mk)

(ii) To the second portion, add 1cm³ of acidified potassium dichromate (VI) and warm.

Observation	Inference
(½mk)	(1mk)

(iii) To the third portion, add two drops of acidified potassium manganate (VII).

Observation	Inference
(½mk)	(½mk)