NAME: …………………………………………………… INDEX NO: ……………....……………

SCHOOL …………………………………………………… CANDIDATE'S SIGNATURE………..

DATE: ………………………………...…..………….

233/3
CHEMISTRY
PAPER 3
Practical
Time: 2 Hours

INSTRUCTIONS TO THE CANDIDATES

- *You are not allowed to start working with the apparatus in the first 15minutes of the 2 ¼ ours allowed for this paper. This time is to enable you ensure that you have all the apparatus and reagents required.*
- *Answer **ALL the** questions in this question paper in the spaces provided.*
- *Mathematical tables and silent non-programmable calculators may be used*

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	**22**	
2	**09**	
3	**09**	
Total Score	**40**	

This paper consists of 5 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

1. You are provided with
   - Magnesium ribbon, **solid A**
   - **0.5M** aqueous sulphuric(vi)acid, **solution B**
   - **0.3M** aqueous sodium hydroxide, **solution D**

You are required to determine the molar heat of reaction of sulphuric(vi)acid with magnesium.
Procedure I

Using a burette place $40cm^3$ of solution **B** in to a 100ml beaker.Measure the temperature of solution **B** in the 100ml beaker and record it in **table I**. Put the magnesium ribbon in the solution in the 100ml beaker and immediately start a stop watch clock. Stir the solution continuously with the thermometer making sure that the magnesium ribbon remains in the solution as it reacts. Measure the temperature after every 30 seconds and record the values in the **table I**. Keep the resulting mixture for use in procedure II

Table I

Time (seconds)	0	30	60	90	120	150	180	210	240	270	300
Temperature (^{O}C)											

(4mks)

(i) Plot the graph of temperature (vertical axis) against time (3mks)

(ii) From the graph determine the maximum change in temperature, ΔT.   (1mk)

(iii) Calculate the heat change during the reaction of sulphuric (vi) acid with magnesium(Assume the specific heat capacity of the solution is 4.2Jg $^{-1}$ k $^{-1}$ and density of the solution is 1.0gcm $^{-3}$)   (2mks)

ProcedureII

Transfer all the mixture obtained in procedure I into a 250ml volumetric flask. Rinse the beaker and add to the volumetric flask. Add more distilled water to make the volume to the mark. Label this **solution C.** Empty the burette and fill it with **solution C.** Using a pipette and pipette filter place 25.0cm^3 of **solution D** into a 250ml conical flask. Add two drops of phenolphthalein indicator and titrate **solution D** with **solution C**. Record your results in table II. Repeat the titration two more times and complete table II

(b)

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

What is the average volume of **solution C** used?   (1mk)

(c) Calculate the number of moles of sulphuric (vi) acid in the

(i) Volume of solution **C** used   (2mks)

(ii) 250cm^3 of **solution C**   (1mk)

(iii) 40cm^3 of **solution B.**   (1mk)

(d) Determine moles of sulphuric (vi) acid that reacted with magnesium   (1mk)

(e) Determine the molar heat of reaction of sulphuric (vi) acid with magnesium   (2mks)

2. You are provided with solid **E**. Carry out the test below and record your observations and inferences in the spaces provided.
   a) Add about 2cm^3 of 2M hydrochloric acid to all the solid **E** provided in a boiling tube. Test the gas by bringing the glass rod dipped in calcium hydroxide solution to the mouth of the boiling tube.

OBSERVATIONS	INFERENCE
(2mks)	(1mk)

   b) Filter the mixture obtained in (a) above into a test tube. Add about 4cm^3 of distilled water into the filtrate and divide the resultant solution into three portions.
      (i) To the first portion add 2M aqueous sodium hydroxide dropwise till in excess.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

      (ii) To the second portion add 2M aqueous ammonia dropwise till in excess.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

      (iii) To the third portion add all the solid **F** provided.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

3. You are provided with solid **G**. Carry out the tests below and record your observations and inferences in the spaces provided.
   a) Place half of the solid provided in a clean metallic spatula and ignite in the non-luminous flame of Bunsen burner.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

   b) Add about 5cm^3 of distilled water to the remaining portion of solid **G** in a boiling tube and shake to dissolve. Divide the resultant solution into three portions for the tests below.
   (i) To the first portion, add three drops of acidified potassium dichromate (vi) solution and warm.

OBSERVATIONS	INFERENCE
(1mk)	(2mks)

   (ii) To the second portion, add two drops of methyl orange solution.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

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(iii) To the third portion add a small amount of solid sodium carbonate.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)