Name…… **Index No……/…….**

School…… **Date ……..…**

Candidate's Signature…….

233/3

CHEMISTRY

Paper 3

(Practical)

2 Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above and sign
- Answer ALL the questions in the spaces provided.
- Mathematical tables and electronic calculators may be used
- All working MUST be clearly shown where necessary

FOR EXAMINER USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	15	
2	14	
3	11	
	40	

This paper consists of 8 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

1. You are provided with :-
   - Sulphuric (IV) solution P
   - 0.25M sodium hydroxide
   - Solid R

   You are required to determine the concentration of sulphuric (VI) acid in molar per litre

PROCEDURE I

Using a buretted, place 50.0cm^3 of sulphuric (VI) acid, solution P in a 100ml beaker. Measure the temperature of the solution after every half – minute and record the values in table 1 .At exactly 1 ½ minute, add solid R to the acid. Stir, the mixture gently with the thermometer ensuring the solid is intake the solution and note the temperature of the mixture after every half – minute and record the values in table 1.

Time (minute)	0	½	1	1 ½	2	2 ½	3	3 ½	4	4 ½	5	5 ½	6
Temperature (°C)													

b) Plot a graph of temperature (y – axis) against time. (3mks)

ii) Using the graph, determine the highest change in temperature. (1mk)

iii) Calculate the heat change for the reaction (Assume that the specific heat capacity of the mixture is $4.2g^{-1}\ k^{-1}$ and density of the mixture is $1g/\ cm^3$. (2mks)

iv) Given that the molar heat of reaction of sulphuric (VI) acid with solid R is 320 kJ mol^{-1}, calculate the number of moles of sulphuric acid that were used during the reaction.(2mks)

PROCEDURE II

Transfer ALL the contents of the 100 ml.beaker used in procedure I into a 250ml. Volumetric flask. Add distilled water to make up to the mark. Label this solution Q. Rinse the burette throughout it with sodium hydroxide. Using a pipette and a pipette filler, place 25.0 cm^3 of solution Q into a 250ml. Conical flask. Add two or three drops of phenolphthalein indicator and titrate against sodium hydroxide. Record your results in table 2. Repeat titration two more time and complete table 2.

	I	**II**	**III**
Final burette reading			
Initial burette reading			
Volume of sodium hydroxide used (cm^3)			

(4mks)

c) Calculate the :-

I i) Average volume of sodium hydroxide used

ii) the number of moles of :-

I Sodium hydroxide used. (1mk)

II Sulphuric (VI) acid in 250 cm^3 of solution Q (2mks)

III Sulphuric (VI) acid in 250cm^3 of solution Q. (1mk)

d) Use part b(iv) and C (III) above to calculate the total number of moles of sulphuric (VI) in 50cm^3 of solution P.

e) Calculate the concentration of the original sulphuric (VI) acid solution P in moles per litre' (2mks)

2. You are provided with solid S. Carry out the test below write your observation and inference in the spaces provided.

a) Place half of solid S in a clean dry test – tube and heat gently. Test any gases produced with both blue and red litmus papers.

Observation	**Inference**
(2mks)	(2mks)

b) i) Transfer all of the remaining solid S into a dry boiling tube. Add about $10cm^3$ of distilled water and shake well.

Observation	**Inference**
(2mks)	(2mks)

ii) To the 2^{nd} portion add a few drops of lead (II) nitrate solution followed by

Observation	**Inference**

(2mks)	(2mks)

iii) Place about $2cm^3$ of the solution in a test tube and add Barium Nitrate followed by 5 drops of Nitric (V) acid

Observation	**Inference**
(2mks)	(2mks)

iv) To the third portion add sodium hydroxide until in excess

Observation	**Inference**
(2mks)	(2mks)

v) To the fourth portion add 6 drops hydrogen peroxide add shake well

Observation	**Inference**
(2mks)	(2mks)