NAME:……………………………………….………INDEX

…………………..…...DATE……..……..…

SCHOOL: ……………………………………………………

SIGNATURE………………………………

233/3
CHEMISTRY
PAPER 3 / PRACTICAL

INSTRUCTIONS TO CANDIDATES

- ❖ *Write your name, index number, name of the school and the date in the spaces provided.*
- ❖ *You are required to spend 15 minutes of the 2¼hrs reading through the paper and make sure you have all the apparatus and chemicals needed for the practical.*
- ❖ *Answer all the questions in the spaces provided after each question*
- ❖ *Electronic calculators and mathematical tables may be used*
- ❖ *All working must be clearly shown where necessary.*

For Examiners Use Only

Question	Maximum score	Candidate's Score
1	13	
2	12	
3	15	
Total	40	

1. You are provided with solution P, 0.1M Hydrochloric acid. Solution Q, Sodium hydroxide solution, phenolphthalein indicator. You are required to standardize a dilute solution Q with solution P.

    PROCEDURE (I)

    (i)   Using a pipette and a pipette filter place $25cm^3$ of solution Q in a 250ml volumetric flask. Add about $200cm^3$ of distilled water. Shake the mixture and add distilled water to make up to the mark. Label this as solution R.

    (ii)   Fill the burette with solution P. Using a pipette and pipette filter, place $25cm^3$ Of solution R into a 250ml conical flask. Add 2 drops of phenolphthalein indicator and titrate solution P with solution R. Record your results in the table. Repeat the titration two or more times and complete the table.

Titration number	1	2	3
Final burette reading (cm^3)			
Initial burette reading(cm^3)			
Volume of solution P used (cm^3)			

(4mks)

Calculate

a) Average volume of solution P used.   (1mk)

b) The number of moles of Hydrochloric acid that reacted with $25cm^3$ of solution R.   (1mk)

c) The number of moles of Sodium hydroxide in $25cm^3$ of solution R   (1mk)

d) The number of moles of Sodium hydroxide contained in $250cm^3$ of solution R.   (2mks)

2

e) The number of moles of Sodium hydroxide contained in $1000cm^3$ of solution R.   (2mks)

f) The Molarity of Sodium hydroxide in solution Q.   (2mks)

Q2. You are provided with the following reagents and apparatus:

 a) $250cm^3$ plastic beaker wrapped with a tissue paper.

 b) Thermometer

 c) $100cm^3$ measuring cylinder

 d) Distilled water in a wash bottle

 e) Solution C, 2M Hydrochloric acid

 f) Solution D, 2M Sodium hydroxide

You are **required** to determine the molar heat of solution C by solution D.

PROCEDURE

 - Measure $50cm^3$ of solution C and transfer into $250cm^3$ lagged beaker (wrap the beaker with tissue paper and hold it in place using rubber band) and note the temperature and record in the table below.

 - Rinse the measuring cylinder before using it to measure 50cm3 of solution D, measure and also record in the table.

 - Carefully stirring with a thermometer, add solution D to solution C and note the final temperature attained by the mixture. Record the temperature in the table below.

                                                                                          (4mks)

 Table of result

Temp. of solution C (^{0}c)	
Temp. of solution D (^{o}c)	
Final temp. of mixture (^{o}c)	

3

Change in temp. ΔT	

a) Calculate the average temperature of solution C and D (1mk)

b) Write down the Ionic equation for the reaction (1mk)

c) Calculate the heat of reaction (specific heat capacity is 4.2 J /g /K, and density of the solution is 1g / cm^3. (2mks)

d) Calculate the number of moles of Hydrochloric acid used. (1mk)

e) Calculate the molar heat of mole neutralization. (1mk)

f) Sketch energy level diagram to represent the Enthalpy change. (1mk)

Q3. You are provided with sold U. Carry out the following tests and record your observations and inference in the spaces provided

a) Place all the solid in a dry boiling tube. Add about 10cm^3 distilled water and shake. Filter the solution and retain both filtrate and residue. Divide the residue and filtrate into two portions each.

Observation	Inference
(1mk)	(1mk)

b) To the first filtrate add dilute Sodium hydroxide solution.

Observation	Inference
(½mk)	(1mk)

c) To the second filtrate add Lead (II) nitrate then warm gently.

Observation	Inference
(1mk)	(½mk)

d) To the 1st residue in a test-tube heat gently then strongly

Observation	Inference
(3mks)	(1mk)

e) To the 2nd residue, add dilute Nitric acid then divide the resulting solution into two parts.

Observation	Inference
(1mk)	(1mk)

f) (i) To the 1st part, add solution hydroxide solution drop-wise then in excess.

Observation	Inference
6 (1mk)	(1mk)

(ii) To the 2nd part, add aqueous hydroxide ammonia solution drop-wise until in excess.

Observation	Inference
(1mk)	(1mk)