NAME ……..……ADMN NO ……CLS ……

DATE……..SIGN……..SESSION…….

233/3

CHEMISTRY

PAPER 3(PRACTICAL)

TERM TWO

TIME: 2 Hours 15 Minutes

INSTRUCTIONS TO THE CANDIDATES:-

- ***Write your name and Admission number in the spaces provided• Sign*** *and write the* ***date*** *of examination in the spaces provided*
- ***Answer all the questions in the spaces provided.***
- *Mathematical tables and electronic calculators may be used.*
- *All working* ***MUST*** *be clearly shown where necessary.*
- *Use the first 15minutes of the 2 ¼ hours to ascertain you have all the chemicals and apparatus that you may need.*

For Examiners use Only

QUESTION	MAX. SCORE	SCORE
1	12	
2	12	
3	16	
TOTAL	**40**	

This paper consists of 6 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:-
   (i) Solution Q a monobasic acid 0.15M, HA
   (ii) Solution Jc, containing 7.0g of a metal J carbonate (whose formula is $J_2CO_3.xH_2O$) in $80cm^3$ of the solution.

   You are required to:
   (a) Prepare a dilute solution of the metal J carbonate solution Jc
   (b) Determine the value of x in $J_2CO_3.xH_2O$

   Procedure I
   - Using a pipette and a pipette filler place $50.0cm^3$ of solution Jc into a 250 ml volumetric flask. Add about 150ml of distilled water. Shake well. Add more distilled water to make upto the mark. Label this as solution Jd

   Procedure II
   - Fill a burette with solution Q.
   - Using a clean pipette and pipette filler, place $25.0cm^3$ of solution Jd into a 250ml conical flask.
   - Add two drops of phenolphthalein indicator and titrate with solution Q.
   - Record your results in the table 1 below.
   - Repeat the titration two more times and complete the table I below.

   TABLE 1

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

(4 marks)

(a) Calculate the:
   (i) Average volume of solution Q used. (1 mark)

   (ii) Number of moles of the acid solution Q used (1 mark)

(b) Write an equation for the reaction that took place between the acid, HA and the metal J carbonate (1 mark)

(c) Determine the:
   (i) Number of moles of the metal carbonate in $25cm^3$ of solution Jd. (1mark)
   (ii) Number of moles of the metal carbonate in $50.0cm^3$ of solution Jc (1 mark)

(iii) Molar mass of the metal carbonate (2 mark)

(iv) Value of x in $J_2CO_3 \cdot xH_2O$ (1 mark)
(H = 1.0, C = 12.0, O = 16.0, J = 23.0)

2. You are provided with:-
   - Sodium hydroxide solution prepared by dissolving 9.6g of sodium hydroxide in water to make 200cm^3 of solution, labelled W
   - 0.6M hydrochloric acid labeled, solution H

   You are required to determine the molar heat of neutralization of sodium hydroxide with hydrochloric acid .

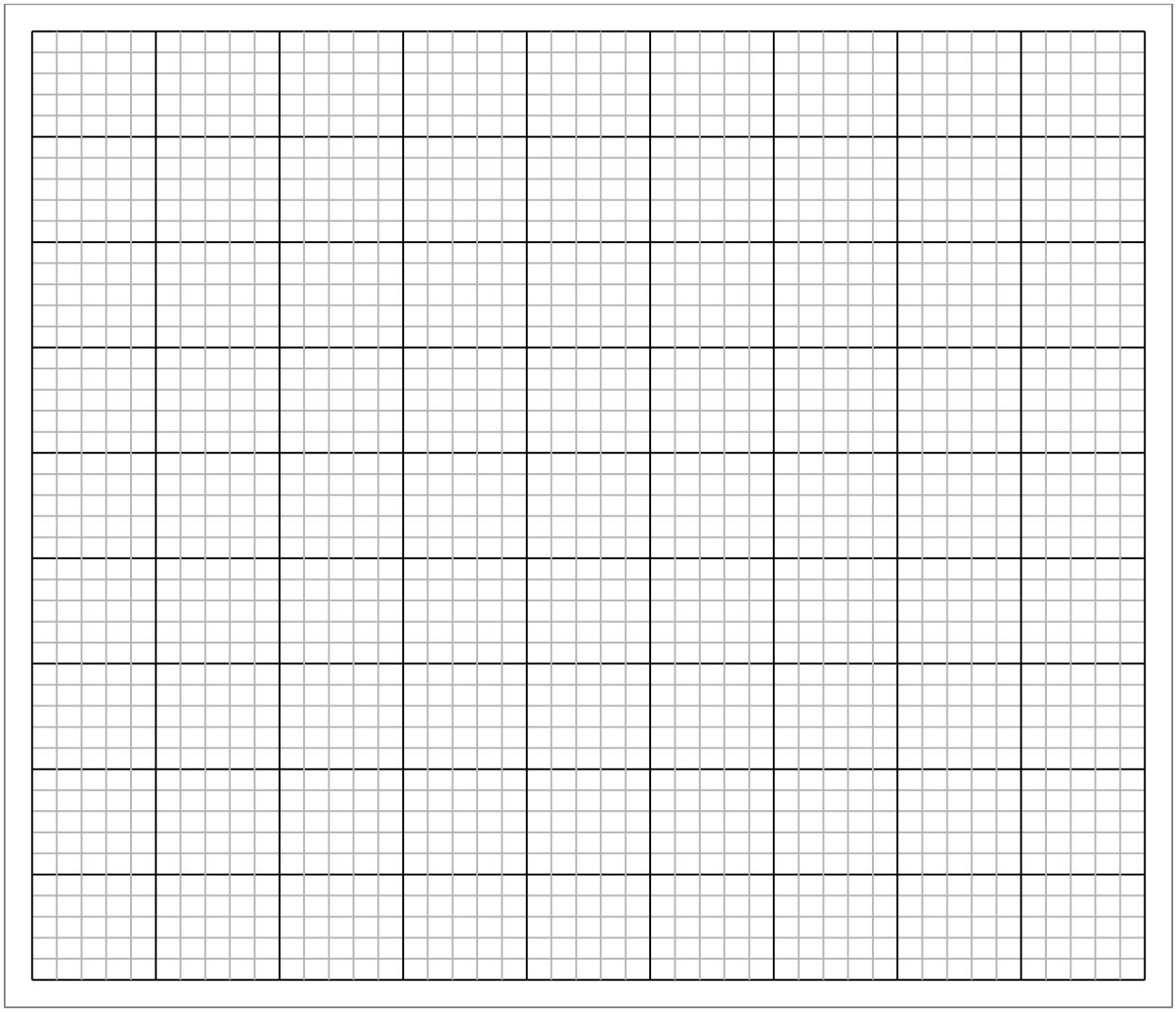
   Procedure

   Fill the burette with solution H. Pipette 25.0cm^3 of solution W into a 100ml beaker. Measure the temperature of solution W in the beaker and record it in the table below. Run out exactly 5.0cm^3 of solution H from the burette into a clean test tube. Add the solution in the test tube (solution H) into the beaker containing solution W and stir with a thermometer. Record the highest temperature of the mixture in the table 2 below. Run out another 5cm^3 of solution H into the test tube and transfer it to the mixture already obtained above. Stir with the thermometer and record the highest temperature attained. Repeat the procedure with four more portions of 5cm^3 solution H. Record your readings in the table 2 below.

   (a) Table 2 (4 mk)

Volume of H added (cm^3)	0	5	10	15	20	25	30
Volume of W used (cm^3)	25	25	25	25	25	25	25
Temperature (0^C)							

(b) On the grid provided, plot a graph of temperature (Y- axis) against volume of H used. (3 marks)



(c) From the graph determine:-

(i) The volume of H used to react with $25cm^3$ of solution W. (½ mark)

(ii) The highest temperature change (½ mark)

(d) Assuming that specific heat capacity is 4.2 $kJKg^{-1}K^{-1}$ and taking density of solution as $1gcm^{-3}$, determine enthalpy change for the reaction. (2 marks)

(e) Determine the moles of sodium hydroxide, solution W, used hence calculate the molar heat of neutralization of the solution. (2 mark)

3. You are provided with liquid N and solid F. Carry out the tests below and write your observations and inferences in the spaces provided.

a) (i) Pour a small portion of liquid N into a clean metallic spatula and ignite it using a non-luminous flame of a Bunsen burner.

Observation (½ mk)	Inferences (½ mk)

(ii) Measure 1cm^3 of liquid N into a test-tube, add about 2cm^3 of distilled water and shake. Retain the mixture for the test (iii) below.

Observation (½ mk)	Inferences (½ mk)

(iii) To the mixture in (a)(ii) above add two drops of universal indicator solution and determine its pH.

Observation (½ mk)	Inferences (½ mk)

iv)To about 2cm^3 of liquid N in a test tube add 1cm^3 of ethanol followed by 2 drops of dilute Sulphuric (VI) acid. Warm the mixture gently .

Observation (½ mk)	Inferences (½ mk)

(v) To about $1cm^3$ of liquid N in a test tube add 3 drops of acidified Potassium dichromate (VI) solution and warm.

Observation (½ mk)	Inferences (½ mk)

(vi) To about $1cm^3$ of liquid N put half a spatula of powdered Sodium carbonate.

Observation (½ mk)	Inferences (½ mk)

b)

I. Place a spatulaful of solid F in a dry test tube. Heat the solid gently .

Observations (1mk)	Inferences (1mk)

II. Put the remaining F in a boiling tube and add $10cm^3$ of distilled water. Shake the boiling tube to dissolve the solid. Divide the solution into three portions.

Observations (1mk)	Inferences (1mk)

III. Add acidified barium nitrate to the first portion

Observations (1MK)	Inferences (1mk)

IV. To the 2^{nd} portion and sodium hydroxide dropwise until in excess.

Observations (1MK)	Inferences (1MK)

V. To the 3^{rd} portion, add ammonia solution dropwise until excess

Observations (1MK)	Inferences (1MK)