Name…… **Index No……..**

School…… **Candidate's sign…….**

Date…….

233/3
CHEMISTRY
(PRACTICAL)
Paper 3
2 ¼ Hours

INSTRUCTIONS TO THE CANDIDATES:-

- **Write your name and index 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 15 minutes of the 2 ¼ hours to ascertain you have all the chemical sand apparatus the you may need.**

FOR EXAMINER'S USE ONLY

QUESTION	MAX. SCORE	SCORE
1	17	
2	14	
3	09	
TOTAL	40	

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

1. You are provided with;
   Solution A; (xM hydrochloric acid)
   Solution B; (1M Sodium hydroxide solution)
   You are required to:
   - Determine the concentration of the HC1 in moles/litre.
   - Determine the molar heat of neutralization of the hydrochloric acid.

   Procedure

1. Using a clean measuring cylinder measure 50.0cm3 of solution B into a plastic cup/beaker provided.
2. Measure and record in the table below the temperature of solution B.
3. Fill the burette with solution A.

Note: You are required to add solution A into solution B in portion of exactly 5.0cm^3 each.

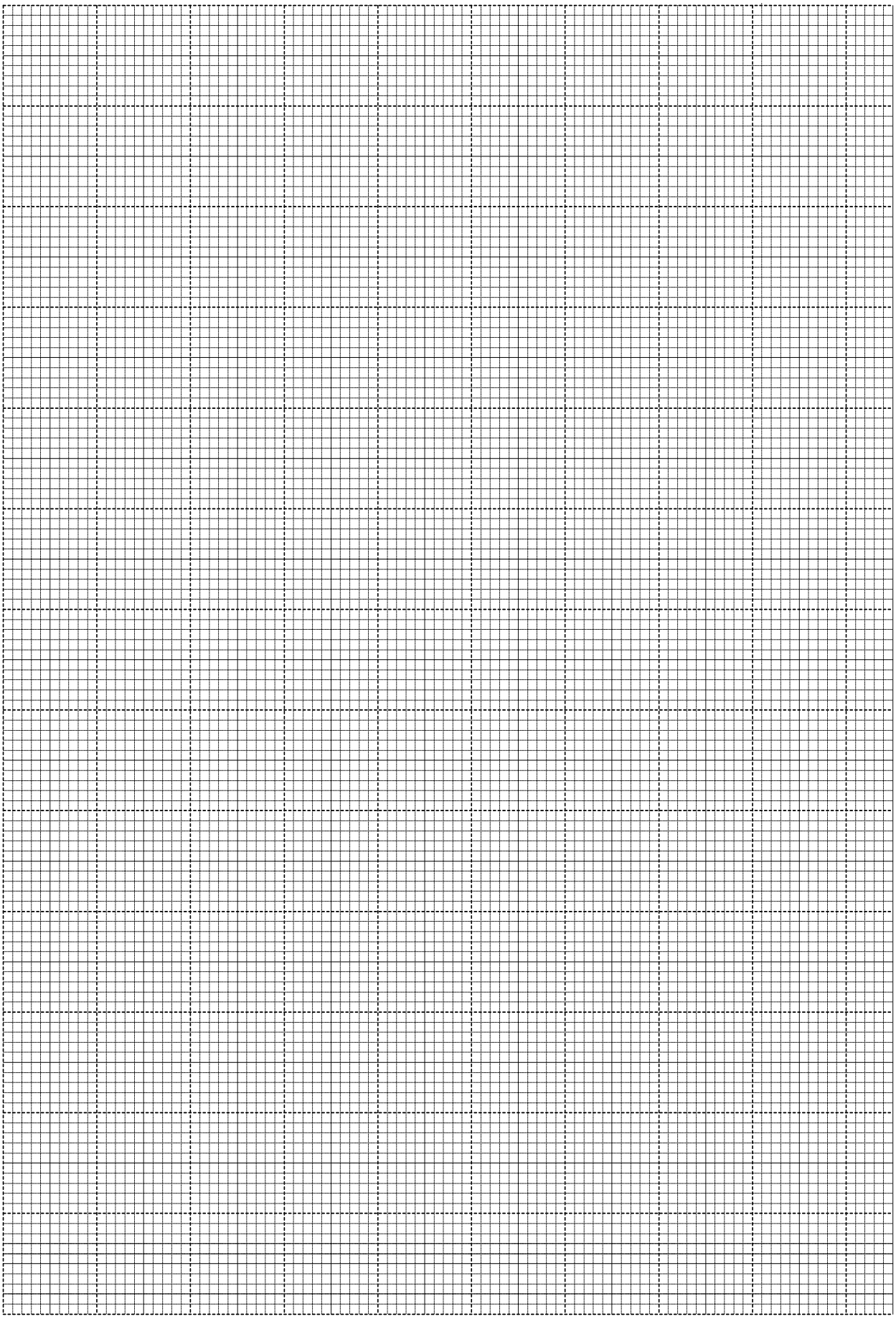
4. Add the first 5.0cm^3 portion of solution A to solution B in the beaker. Stir the mixture with a thermometer and record the highest temperature attained.
5. Add the other 5.0cm^3 portion of solution B, stirring the mixture and record the highest temperature attained after each addition. Continue until a total volume of 50cm^3 has been added.

Volume of solution A added (cm^3)	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
Tempetature^{0}C											

(6mks)

Questions

(a) Plot a graph of temperature against the volume of a solution A added. (3mks)



(b) From the graph, determine the volume of solution A that reacted completely with the 50 cm^3 of solution B. (lmk)

(c) Calculate the concentration of solution A in moles/litre. (2mks)

(d) From the graph determine the maximum temperature rice when solution B is fully neutralized. (1mk)

(e) Calculate the molar heat of neutralization of solution A (hydrochloric acid). (4mks)

2. (a) Place all solid R provide into a clean boiling tube then add about 5 cm^3 of distilled water. Shake the contents thoroughly then filter. Retain both the filtrate and residue.

Observation	Inferences
(1mk)	(1mk)

(b) Divide the filtrate into four equal portion. To the first portion, add sodium hydroxide solution until in excess.

Observation	Inferences
(1mk)	(1mk)

(c) To the second portion, add about 2cm^3 of Barium Chloride Solutions.

Observation	Inferences
(1mk)	(1mk)

(d) To the third portion, add 2 or 3 drops of lead II nitrate solution provided followed by about 2cm^3 of 2M nitric acid then shake the mixture.

Observation	Inferences
(1mk)	(1mk)

(e) To the fourth portion, add about1cm^3 of dilute sulphuric (vi) acid.

Observation	Inferences
(1mk)	(1mk)

(f) (i) Transfer all the residue into a clean boiling tube, then add about 2 cm^3 of 2M nitric acid add about 5 cm^3 of distilled water when all the solid has dissolved.

Observation	Inferences

(1mk)	(1mk)

(ii) Divide the resultant product obtained in f (i) above into three equal portions. Add sodium hydroxide solution drop wise until in excess.

Observation	Inferences
(1mk)	(1mk)

(iii) To the second portion, add ammonia solution drop wise until in excess.

Observation	Inferences
(1mk)	(1mk)

(iv) To the third portion, add a few drops of potassium iodide solution.

Observation	Inferences
(1mk)	(1mk)

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

a) Place about half of solid F on a metallic spatula and burnt it using a non-luminous

Flame	
Observation	Inferences

(1mk)	(1mk)

(b) Place the remaining solid F in a clean boiling tube and add about $10cm^3$ of water and shake thoroughly.

i) To about $2cm^3$ of the solution F, put the universal indicator paper

Provided	
Observation (½ mk)	Inferences (½ mk)

(ii) To about $2cm^3$ of solution F, add $2cm^3$ of acidified potassium dichromate (VI) and warm to boiling

Observation	Inferences
(1mk)	(1mk)

(iii) To about $2cm^3$ of solution F, add three drops of bromine water

Observation	Inferences
(1mk)	(1mk)

(iv) To about $2cm^3$ of solution F, add three drops of acidified potassium manganate (VII) solution; then warm

Observation	Inferences
(1mk)	(1mk)