NAME   …………………...…..…………..   DATE:……………………

INDEX NO.   ………….…………………...…..…   SIGNATURE   …………..…………..

233/3
CHEMISTRY
PRACTICAL
PAPER 3
TIME: 2¼ HOURS.

LANET JOINT EVALUATION (LANJET 2022)

FORM 4
SEPTEMBER 2022
Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES
o   Write your name and index number in the spaces provided above.
o   Answer **ALL** the questions in the spaces provided.
o   You are not allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed time for the paper.
o   Use the 15 minutes to read through the question paper and note the chemicals you require
o   Mathematical tables and electronic calculators may be used.
o   All working **MUST** be clearly shown where necessary.

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1	24	
2	11	
3	5	
Total score	40	

This paper consists of 6 printed pages.
Candidates should check to ensure that all pages are printed as indicated and no questions are missing

1. You are provided with:
* Dilute Sulphuric (vi) acid labeled solution A.
* Solution B containing 8g/litres of anhydrous sodium carsonate.
* Aqueous sodium hydrogen labeled solution C.

You are required to determine:
* Concentration of solution A in moles/litre.
* Enthalpy of reaction between sulphuric (iv) acid solution A and solution C.

Procedure

a) Using a pipette, place $25cm^3$ of solution A into a clean $250cm^3$ volumetric flask then add distilled water to the mark to make it 250 cm^3. Label this solution A_1. Place solution A1 in the burette place 25cm3 of solution B into clean conical flask using pipette then 2 days of methyl orange indicator and titrate it using solution A_1, from the burette and record your results in table 1 below. Repeat the titration two more times to complete table I.   (4mks)

	I	II	III
Find burette readings (cm3)			
Initial burette readings			
Volume of solution A_1used			

Calculate;
i) Average volume of solution A_1.   (1mk)

ii) Concentration of solution B.   (2mks)
(Na = 23 O = 16 C= 12)

iii) Concentration of solution A1 that reacted with $25cm^3$ of solution B.   (2mks)

iv) Concentration of sulphuric (iv) acid solution A. (2mks)

b) Label six test tubes as 1, 2, 3, 4, 5 and 6. Empty burette and fill it with solution A. From the burette place 2cm^3 of solution A into test tube number 1. From the same burette, place 4cm^3 of solution A into test tube 2. Respeat the procedure for test tube number 3, 4, 5 and 6 as shown in table below. Clean the burette and fill it with solution C. From the burette, place 14cm^3 of solution C into boiling tube. Measure the initial temperature of solution C and record it in the table below. Add it to test tube number 1 to the boiling tube containing solution C. Stir the mixture with thermometer and note the highest temperature reached in table below. Repeat the procedure with other volumes of solution C given in table II below and complete it.

Table II

Test tube number	1	2	3	4	5	6
Volume of solution A cm^3	2	4	6	8	10	12
Volume of solution C cm^3	14	12	10	8	6	4
Initial temperature of solution C (^{0}C)						
Highest temperature of mixture (^{0}C)						
Temperature charge ΔT (0C)						

(6mks)

i) On the grid provided, plot the graph of temperature charge ΔT against volume of solution A used. (3mks)
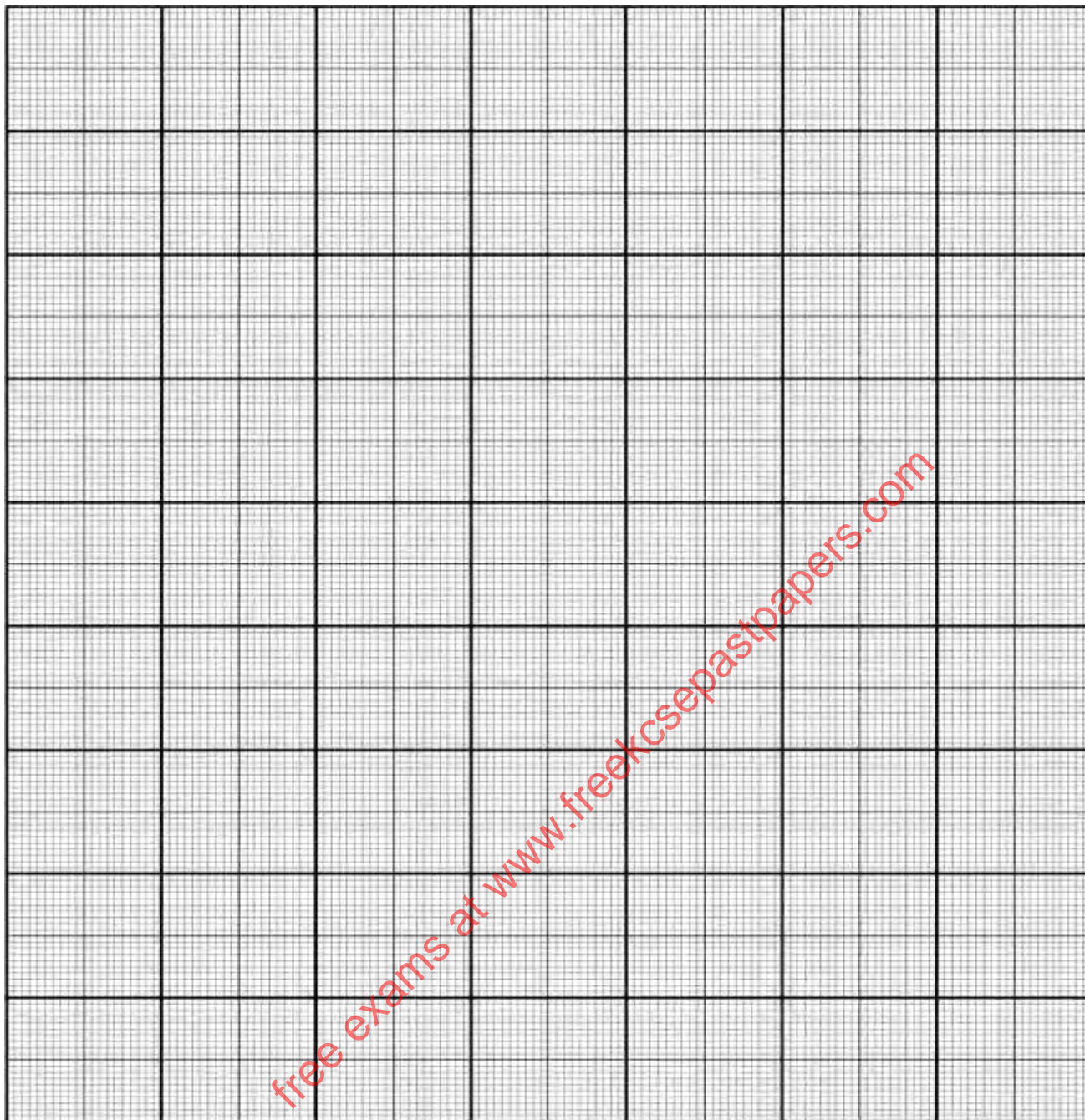
ii) From the graph, determine;

a) The maximum temperature charge.   (1mk)

b) The volume of solution A required to give the maximum change in temperature.   (1mk)

iii) Calculate;

a) Moles of sulphuric acid required to give maximum charge in temperature. (1mk)

b) Molar enthalpy of reaction between sulphuric acid and solution C. Assume C = 4.2Jg-1K-1 density of solution 1g/cm3. (1mk)

2. You are provided with solid D. Carry out tests below and write your observations and inferences in spaces provided.

a) Describe the appearance of solid D. (1mk)

b) Place all solid D in clean dry test tube and heat it strongly until no further change occurs. Test any gas produced with both red and blue litmus paper. Allow the residue to cool and use it for test C below.

Observations	Inferences
(2mks)	(2mks)

c) Add about 10cm^3 of 2MHCl to the residue and shake for about 3 minutes. Keep the mixture for test (d)

Observation	Inferences
(1mk)	(1mk)

d) i) Place about 2cm^3 of the mixture in a test tube then add aqueous ammonia until excess.

Observation	Inferences
(1mk)	(1mk)

ii) To the rest of the mixture add all solid E provided and shake the mixture well then filter.

Observation	Inferences
(1mk)	(1mk)

iii) To the filtrate add three drops of hydrogen peroxide then excess drops of ammonia solution.

Observation	Inferences
(1mk)	(1mk)

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

a) Place all solid F in a boiling tube, add about $8cm^3$ of distilled water and shake the mixture well. (Retain the mixture for test b)

Observation	Inferences
(1mk)	(1mk)

b) i) To about $2cm^3$ of mixture, add acidified potassium chromate VI and warm the mixture.

Observation	Inferences

(1/2 mk)   (1/2 mk)

ii) To about 2cm^3 of the mixture, add two drops of acidified potassium manganate VII.

Observation	Inferences

(1mk)   (1mk)

iii) To the last portion, add universal indicator provided and match with pH chart.

Observation	Inferences

 (1/2 mk)   (1/2 mk)

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