

NAME INDEX NUMBER

SIGNATURE

DATE

233/3
CHEMISTRY
PAPER 3
PRACTICAL
JULY/AUGUST 2016
TIME: 2¼ HRS

NYANDARUA SOUTH FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education (K.C.S.E)

CHEMISTRY

Paper 3

PRACTICAL

July/August 2016

Time: 2¼ hours

1016/1016/1016

INSTRUCTIONS TO CANDIDATES

- a) *Answer all the questions in the spaces provided.*
- b) *All working must be clearly shown where necessary.*
- c) *Mathematical tables and silent non-programmable calculators may be used.*

FOR EXAMINERS USE ONLY

Questions	Max. Score	Candidate's Score
1	21	
2	9	
3	10	
TOTAL	40	

a) You are provided with:

- Sodium hydroxide solution E
- 0.25M dibasic acid (H_2A) solution F
- Dilute hydrochloric acid solution G.

You are required to:

- Standardize sodium hydroxide solution E using solution F.
- Determine the heat of reaction of hydrochloric acid solution G with sodium hydroxide solution E.
- Determine the concentration of hydrochloric acid in moles per litre.

Procedure 1

Using a pipette and a pipette filler, measure and transfer 25cm^3 of dibasic acid (H_2A) solution F into a clean conical flask. Add 2-3 drops of phenolphthalein indicator and titrate it with sodium hydroxide solution E from the burette.

Record your results in the table below.

(4 marks)

TABLE 1

	1	2	3
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution E used			

b) Determine the average volume of solution F used.

(1 mark)

c) Determine the number of moles of dibasic acid (H_2A) solution F used.

(1 mark)

d) Determine the number of moles of sodium hydroxide, solution E used.

(2 marks)

e) Determine the molarity of sodium hydroxide, solution E in moles per litre.

(1 mark)

Procedure II

Measure 20cm^3 of solution G using a 25ml measuring cylinder and transfer it into a 100ml plastic beaker. Record the initial temperature of solution G.

Fill the burette with solution E, (sodium hydroxide) upto the 0.0 mark.

From the burette add 5cm^3 of solution E to solution G in the beaker. Stir gently with the thermometer and record the new temperature in the table below.

Continue adding 5cm^3 portions of solution E recording new temperature after each addition.

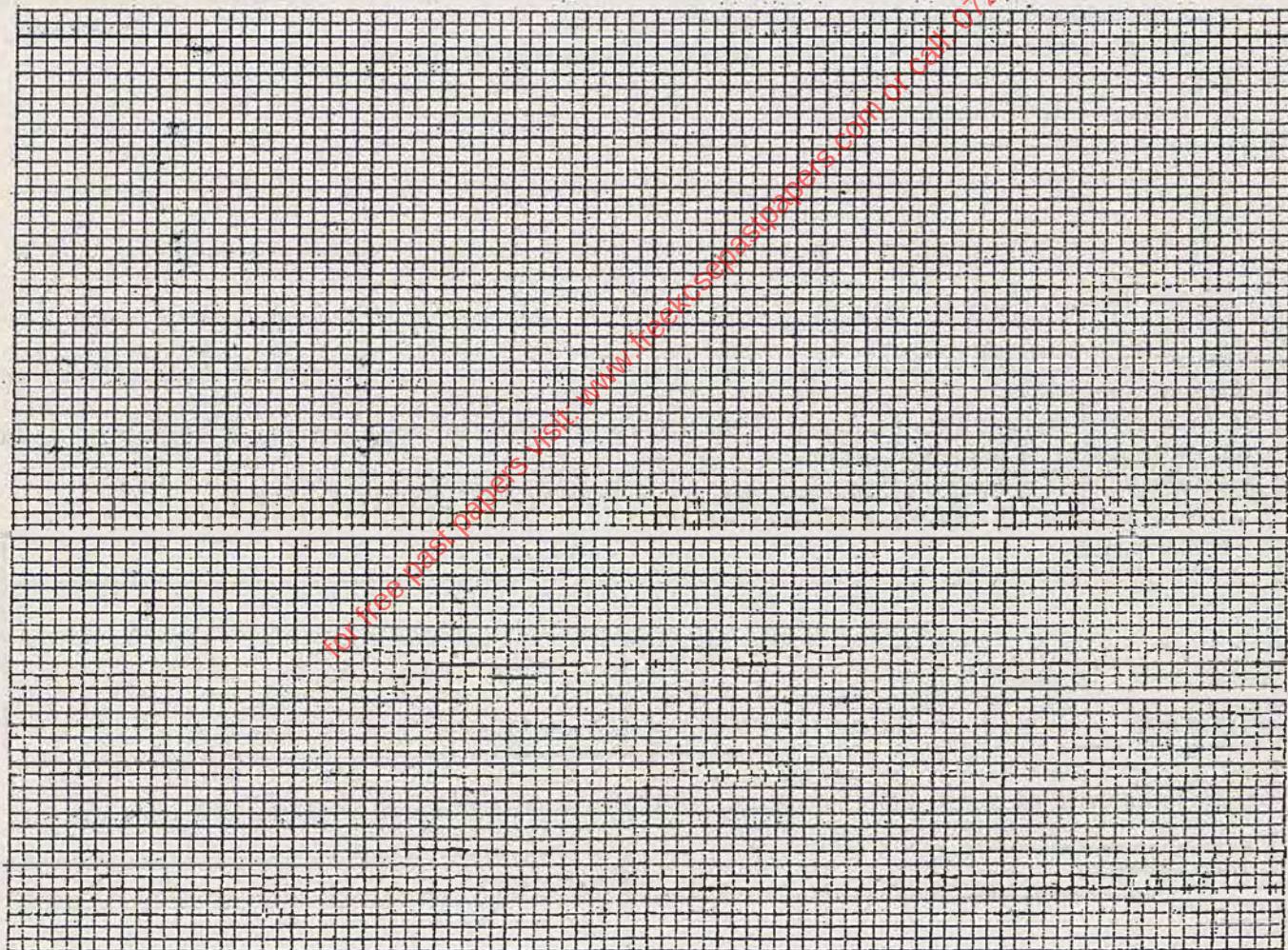
Table 2

Volume of E added (cm^3)	0	5	10	15	20	25	30	35
Temperature of mixture ($^{\circ}\text{C}$)								

(3 marks)

a) Plot a graph of temperature (y-axis) against volume of sodium hydroxide (solution E) added.

(3 marks)



b) From the graph determine the

(i) Maximum temperature rise ΔT .

(1 mark)

- ii) Volume of sodium hydroxide required for complete neutralisation of 20cm^3 of hydrochloric acid solution G. (1 mark)

- c) Calculate the heat evolved when 20cm^3 of solution G neutralised the volume of solution E in b(ii) above. (2 marks)

- d) Given that the molar heat of neutralisation of hydrochloric acid is 57.5kJmol^{-1} , determine the concentration of hydrochloric acid in moles per litre. (2 marks)
(Specific heat capacity = 4.2kJ/kg/K . Density of the mixture = 1g/cm^3)

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

a) Place all of solid X in a boiling tube. Add 15cm^3 of distilled water and shake until all the solid dissolves. Label this as solution Q.

i) To about 2cm^3 of solution Q in a test tube, add 4 drops of 2M sulphuric (VI) acid.

Observation	Inference
(1 mark)	(1 mark)

ii) To about 2cm^3 of solution Q in a test tube, add 2M sodium hydroxide dropwise until in excess.

Observation	Inference
(1 mark)	(1 mark)

iii) To about 2cm^3 of solution Q in a test tube add 4 drops of solution T provided.

Observation	Inference
 (1 mark)	 (2mark)

iv) To about 2cm^3 of solution Q in a test tube add 2 drops of aqueous potassium iodide. (1 mark)

Observation	Inference
 (1 mark)	 (1 mark)

3. You are provided with liquid S. Carry out the tests below. Write your observations and inferences in the spaces provided.

a) Ignite about 3 drops of S in a watch glass.

Observation	Inference
 (1 mark)	 (1 mark)

b) To about 2cm^3 of liquid S in a test tube add about 2cm^3 of distilled water.

Observation	Inference
 (1 mark)	 (1 mark)

c) To about 2cm^3 of liquid S in a test tube add all sodium hydrogen carbonate provided.

Observation	Inference
 (1 mark)	 (1 mark)

d) To about 2cm^3 of liquid S in a test tube add 3 drops of potassium manganate (VII) solution.

Observation	Inference
 (1 mark)	 (1 mark)

e) To about 2cm^3 of liquid S in a test tube add 3 drops of potassium dichromate (VI) solution.

Observation	Inference
 (1 mark)	 (1 mark)

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