NAME……..…… **INDEX NO**…….....……..…..

SCHOOL…….. **CANDIDATE'S SIGNATURE**……..…..

DATE……..……..

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233/3
CHEMISTRY
(PRACICAL)
PAPER 3
JULY/AUGUST 2014
TIME: 2¼ HOURS

KURIA WEST SUB-COUNTY JOINT EXAMINATION - 2014

Kenya Certificate of Secondary Education
CHEMISTRY
PAPER 3
(PRACTICAL)
TIME: 2¼ HOURS

INSTRUCTIONS TO CANDIDATES:

(*a*) *Write your **name** and **number** in the spaces provided **above**.*
(*b*) ***Sign** and write the **date** of examination in the spaces provided **above**.*
(*c*) *Answer **ALL** the questions in the spaces provided.*
(*d*) *Mathematics tables and electronic calculators may be used.*
(*e*) *All working must be clearly shown where necessary.*
(*f*) *The first 15 minutes should be used to go through the questions.*

FOR EXAMINER'S USE ONLY:

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

1. You are provided with:
   - Solution B_1 containing 3.15g of a dibasic acid represented as H_2A dissolved to make 250cm³ of a solution.
   - Solution B_2, 0.2M sodium hydroxide.
   - Phenolphthalein indicator.

You are required to:
(i) Titrate solution B_1 against solution B_2.
(ii) Determine the molecular mass of the organic acid.

Procedure:
Fill the burette with sodium B_1.
Add 1 to 2 drops of phenolphthalein indicator into the solution in the conical flask and then titrate with solution B_1.
Pipette 25.0cm³ of solution B_2 sodium hydroxide into a conical flask.
Record your results in the table 1 **below**.

TABLE 1	1	2	3
Final burette reading			
Initial burette reading			
Volume of solution B_1 (cm³)			

(4mks)

(i) Calculate the average volume of solution B_1 used. (Show your working clearly). (1mk)

(ii) Write an equation for the reaction between the acid H_2A and solution hydroxide. (1mk)

(c) Calculate:-
(i) The concentration of the acid solution B_1 in moles per litre. (2mks)

(ii) The concentration of acid B_1 in grams per litre. (1mk)

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(iii) The relative molecular mass of the acid B_1. (1mk)

(d) Given that the formula of the acid is $H_2A.XH_2O$. Calculate the value of X. (H = 1.0, O = 16.0, A = 88.0). (2mks)

2. You are provided with:-
- Acid D, labeled solution D.
- 2.0M sodium hydroxide, solution G.

You are required to:-
Determine the:-
(i) reaction ratio between sodium hydroxide and acid D/
(ii) molar heat of neutralization of acid D with the alkali sodium hydroxide (solution G).

Procedure:
Fill a clean burette with solution D. Place 5cm³ of solution D into a 100ml beaker. Measure the initial temperature of solution D in the beaker and record it in table 2. Using a 10ml or a 50ml measuring cylinder, measure 25cm³ of solution G. Add it to solution D in the beaker and immediately stir the mixture gently with the thermometer. Record the maximum temperature reached in table 2. Repeat the experiment with other sets of volumes of solution D and G and complete the table

TABLE 2

Volume of solution D (cm³)	5	9	13	17	21	25
Volume of solution G (cm³)	25	21	17	13	9	5
Maximum temperature (°C)						
Initial temperature (°C)						
Change in temperature, ΔT (°C)						

(a) On the grid provided, plot a graph of ΔT (vertical axis) against the volume of solution D. (3mks)

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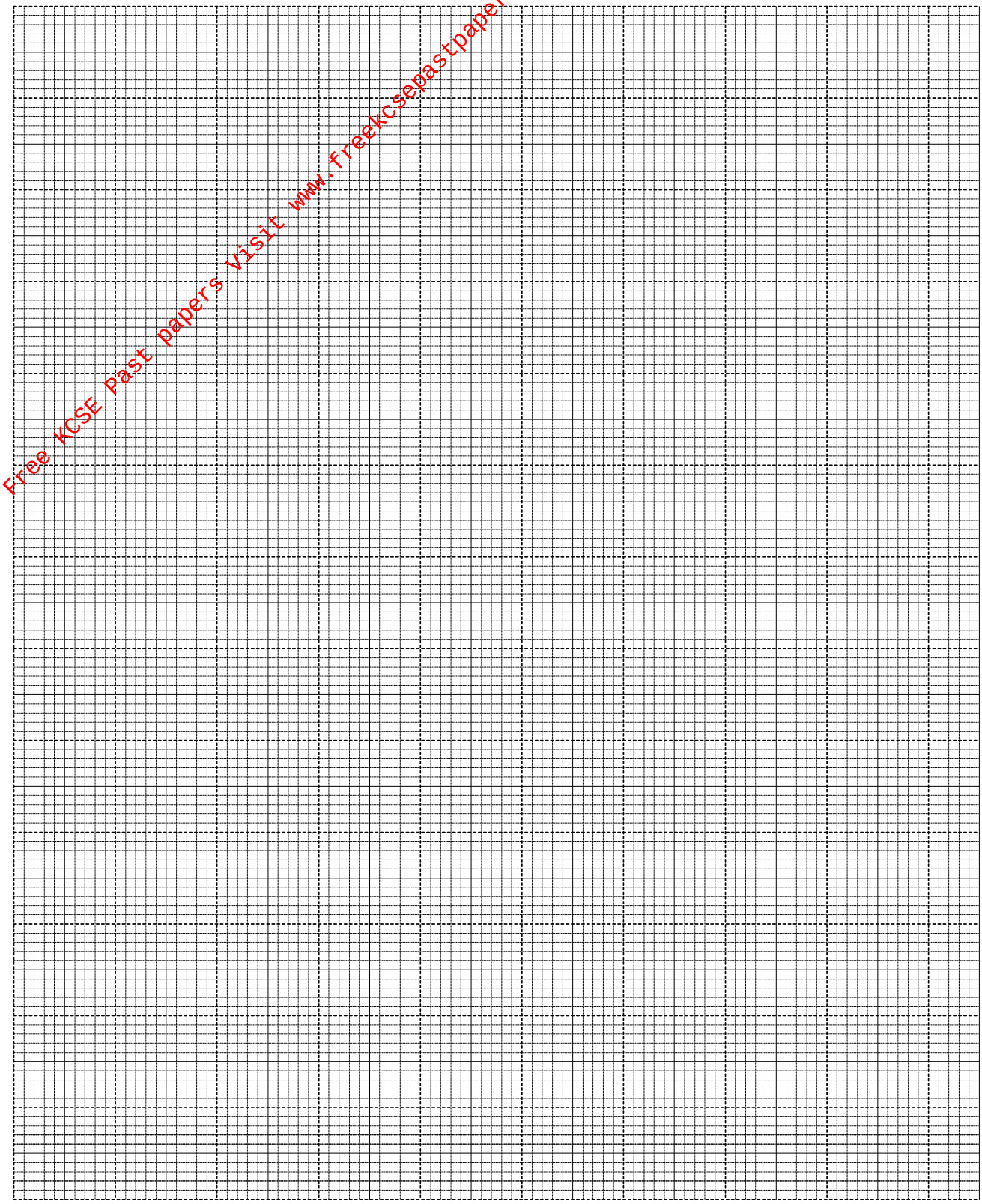

(b) From the graph, determine the volume of solution D which gave the maximum change. (1mk)

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(c) Determine the volume of G that reacted with the volume of solution D in (b) above. (1mk)

(d) Calculate the:-

(i) reacting ratio between sodium hydroxide and acid D.
(Assume that the volume ratio is the same as the mole ratio). (1mk)

(ii) the number of moles of sodium hydroxide, solution G used. (1mk)

(iii) the molar heat of neutralization between sodium hydroxide and the acid.
(Density of the solution = $1gcm^{-3}$)
sp. ht. capacity = $4.2kJkg^{-1}k^{-1}$) (2mks)

3. (a) You are provided with solution Q.

(i) To about $1cm^3$ of Q add drops of 2.0M sodium hydroxides.

Observation	Inferences
(½mk)	(½mk)

(ii) Dip a metallic spatula in solution Q and burn it directly on a non-luminous flame.

Observation	Inferences
(½mk)	(½mk)

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(iii) To about 1cm³ of Q add three drops of 1.0M barium nitrate solution provided and keep the mixture.

Observation	Inferences
(1mk)	(1mk)

(iv) To the mixture in (iii) above add a few drops of 2.0M hydrochloric acid drop wise till in excess.

Observation	Inferences
(1mk)	(1mk)

(v) To about 1cm³ of Q add three drops of acidified potassium dichromate (VI) solution.

Observation	Inferences
(½mk)	(½mk)

(b) (i) To about 2cm³ of solution B_1 in a test tube add 2-3 drops of bromine water.

Observation	Inferences
(1mk)	(1mk)

(ii) To about 2cm³ of solution B_1 in a test tube add 2-3 drops of acidified of potassium manganate (VII) solution.

Observation	Inferences
(1mk)	(1mk)

(iii) To the remaining solution B_1 test with both blue and red litmus.

Observation	Inferences
(1mk)	(1mk)