NAME…… INDEX……

CLASS ……

233/3
CHEMISTRY
(PRACTICALS)
JULY 2014
Time 2 ¼ hours

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KAKAMEGA COUNTY JOINT EVALUATION TEST- 2014

Instructions to candidates

- Answer all the questions in the spaces provided in the question paper.
- Mathematical tables and electronic calculators may be used
- All working must be clearly shown.

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	19	
2	15	
3	06	
	40	

1) *You are provided with*

- A mono basic acid **A**
- 0.2M sodium hydroxide solution **B**.
- 0.5g of crushed egg shell **C**
- Methyl orange indicator.

You are required to

- Dilute solution **A** with distilled water
- Standardize solution **A** with solution **B**
- Determine the content of calcium carbonate in the egg shell provided.

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Procedure I

Measure 20.0 cm^3 of solution **A** into a 250ml beaker and add 80cm^3 of distilled water using a 100ml measuring cylinder.

Shake well and label the solution as solution **D**.

Pipette25.0 cm^3 of solution B into a conical flask and titrate with solution **D**, form the burette using 3 drops of methyl orange indicator.

Record your results on the table below.

Repeat to obtain accurate results.

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

(4 MARKS)

Calculations

a) Determine the average volume of solution used. Show values being averaged. (1 MARK)

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b)

(i) Calculate the concentration of solution **D** in moles per litre (2 MARKS)

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(ii) Calculate the concentration of solution **A** in moles per litre. (1 MARK)

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Clean your burette and pipette before procedure II.

2)

Procedure II

Calcium carbonate is insoluble in water and cannot be titrated directly. Excess acid of known concentration is added to calcium carbonate material to bring about the reaction.

$$CaCO_{3(s)} + 2H^{+}_{(aq)} \longrightarrow Ca^{2+}_{(aq)} + H_2O_{(l)} + CO_{2(g)}$$

The excess acid is determined by titration.

Place all of substance **C** provide into a 250ml volumetric flask.

Add 25.0 cm^3 of solution **A** shake well and add 225 cm^3 of distilled water. Label this solution **E.**

Pipette 25.0 cm^3 of solution **E** into a conical flask titrate with solution B from the burette using 3 drops of methyl orange indicator.

Record your results in table II.

Repeat to obtain accurate values.

TABLE II

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution **B** used (cm^3)			

(4 MARKS)

c) Determine the average volume of solution **B** used (show clearly the values being averaged) (1 MARK)

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……

d) Calculate;

(i) The number of moles of sodium hydroxide solution **B** used. (1 MARK)

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(ii) The concentration of excess acid in moles per litre. (1 MARK)

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(iii) The number of moles of acid that reacted with the calcium carbonate in the sample provided (1 MARK)

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(iv) The mass of calcium carbonate present in the sample provided (1 MARK)

(Ca =40.0, C= 12.0, O =16.0)

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(v) From the results in (iv) above, calculate the percentage of calcium carbonate in the sample. (1 MARK)

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3) *You are provided with*;

Sodium hydroxide solution labeled solution **P**

Alkanoic acid solution labeled solution **Q**

Procedure

Using a clean burette, place 16cm^3 of solution **Q** into a boiling tube. Take the initial temperature of the solution in the boiling tube and record it in the table shown below. Using a clean measuring cylinder, measure 4 cm^3 of solution **P** into 100 cm^3 beaker and add it to solution **Q** in the boiling tube. Stir the mixture immediately with the thermometer and record in the table II the maximum (final) temperature reached. Repeat the experiment with the other sets of volumes of **Q** and **P** in table II and complete it.

(Rinse the thermometer and the boiling tube with distilled water after each experiment)

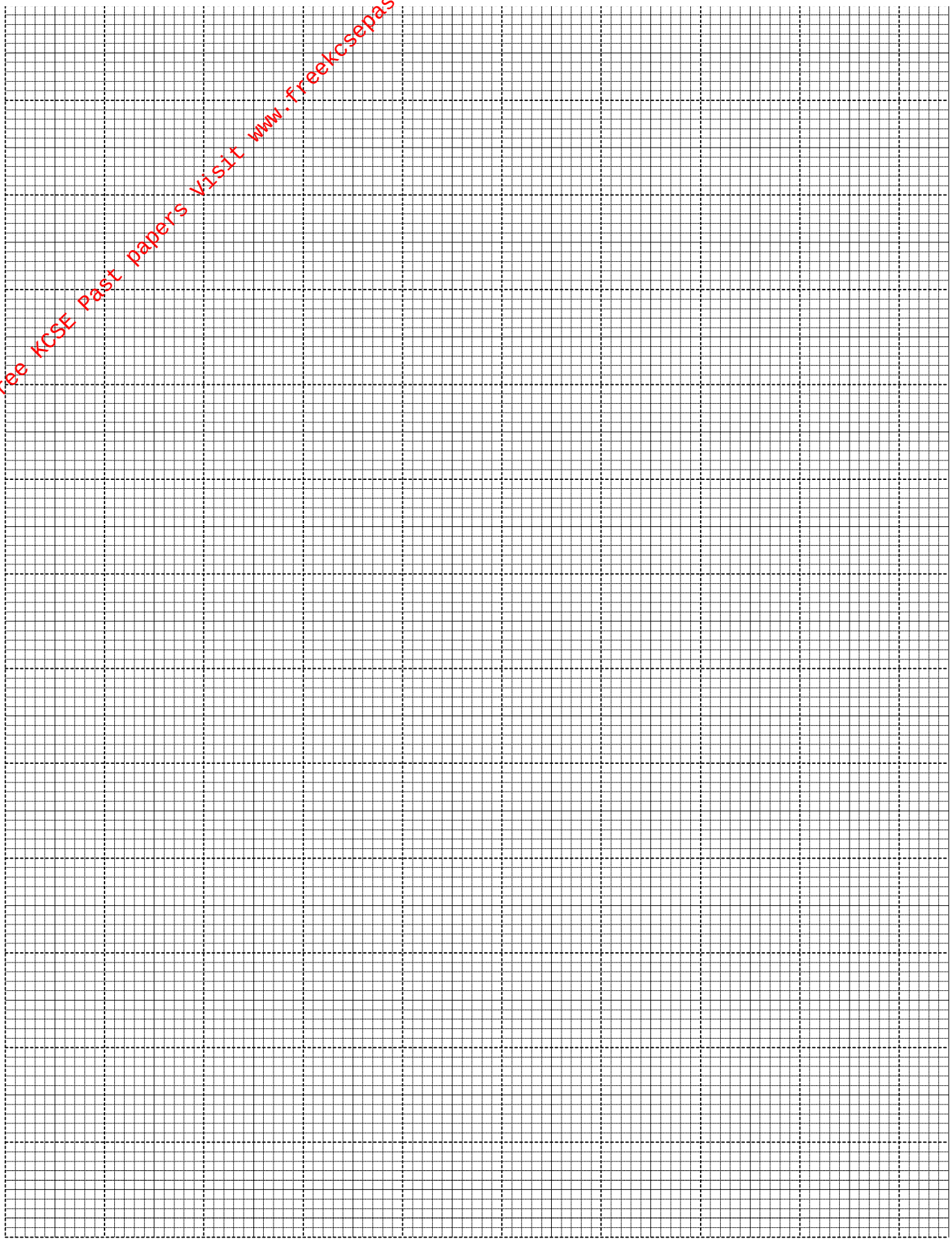
Table II

Volume of solution **Q** (cm^3)	16	12	8	6	4	2
Volume of solution **P** (cm^3)	4	8	12	14	16	18
Final temperature **(^{0}C)**						
Initial temperature**(^{0}C)**						
Change in temperature, **ΔT (^{0}C)**						

(6 MARKS)

a) On the grid provided, plot a graph of **ΔT** (vertical axis) against the volume of sodium hydroxide, solution **P.**

(3 MARKS)



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b) From the graph, determine the volume of sodium hydroxide, solution **P** required to neutralize the alkanoic acid. (1 MARK)

……

c) Calculate the volume of alkanoic acid solution used for neutralization. (1 MARK)

……

d) Calculate the

i. Ratio between the volumes of solution **P** and **Q** (1 MARK)

……

……

ii. Concentration in moles per litre of the alkanoic acid, solution **Q**.
(Assume that the volume ratio is the same as the mole ratio) (2 MARKS)

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……

4) You are provided with solid **S**. carry out the tests below. Write your observations and inferences in the spaces provided.

Place all solid **S** in a boiling tube. Add distilled water until the boiling tube is about half full. Shake the mixture thoroughly until all the solid dissolves use the solution for the tests below.

(i) To about $2cm^3$ portion of the solution in the solution in the test tube add 2-3 drops of acidified potassium manganate then warm gently.

Observation	**Inference**
(1 MARK)	(1 MARK)

(ii) To $2cm^3$ portion of the solution in a test tube, add about half –spatula end full of sodium carbonate.

Observation	**Inference**
(1 MARK)	(1 MARK)

(iii) To the third $2cm^3$ portion of the solution in a test tub add 2-3drops of 1% bromine water and warm gently.

Observation	**Inference**
(1 MARK)	(1 MARK)