

Name ..... Index No. ....

School .....

233/3

**CHEMISTRY**

Paper 3

(Practical)

July/August 2016

Time : 2¼ Hours

Candidates signature .....

Date .....

## KERICHO WEST FORM 4 JOINT EVALUATION

### Kenya Certificate of Secondary Education

**CHEMISTRY**

Paper 3

July/August 2016

Time : 2¼ Hours

#### INSTRUCTIONS TO CANDIDATES

- \* Write your name and index number in the spaces provided.
- \* Sign and write the date of examination in the spaces provided.
- \* Answer **ALL** questions in the spaces provided in the question paper.
- \* You are **NOT** allowed to start working with the apparatus for the first 15 minutes of the 2¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus you may need.
- \* Mathematical tables and silent electronic calculators may be used.
- \* All working must be clearly shown where necessary.
- \* This paper has **8** printed pages.
- \* Candidates should check the questions paper to ascertain that all pages are printed as indicated and that no questions are missing.

#### For Examiner's Use Only

Question	Maximum score	Candidate's score
1	12	
2	13	
3	15	
<b>Total score</b>	<b>40</b>	

1. You are provided with :
- solid A - 0.31g of a carbonate ( $\text{MCO}_3$ )
  - solution B - 1.1M hydrochloric acid
  - solution C - 0.2M sodium hydroxide
  - methyl orange indicator

You are required to :

- i) Determine the molar mass of the carbonate
- ii) Determine the relative formula mass of the carbonate and hence the value of M

Procedure

- Measure  $50\text{cm}^3$  of solution B using a measuring cylinder. Transfer all the solid A provided into a  $250\text{cm}^3$  volumetric flask. Transfer  $50\text{cm}^3$  solution B into  $250\text{cm}^3$  volumetric flask containing solid A and stir the contents until the entire solid dissolves and no more effervescence occurs. Add more distilled water up to the  $250\text{cm}^3$  mark and label this solution D
- Pipette  $25.0\text{cm}^3$  of solution D and transfer to a conical flask. Add two drops of methyl orange indicator and titrate with solution C. Record your results in table 1 below.
- Repeat the titration to get two more concordant values.

Table 1

	I	II	III
Final burette reading ( $\text{cm}^3$ )			
Initial burette reading ( $\text{cm}^3$ )			
Volume of solution C used ( $\text{cm}^3$ )			

Calculate :

(4 marks)

- i) The average volume of solution C used.

(1 mark)

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- ii) The moles of solution C in the volume in (i) above.

(1 mark)

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- iii) The moles of D that reacted with C.

(1 mark)

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iv) The moles of hydrochloric acid remaining after reaction with the carbonate. (1 mark)

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v) The moles of hydrochloric acid that reacted with the carbonate. (1 mark)

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vi) The moles of carbonate that reacted. (1 mark)

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b) Determine the relative formula mass of the carbonate and the value of M. (2 marks)

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2. You are provided with :
- Solution R - sodium thiosulphate containing 79g of the solute in 1000cm<sup>3</sup> of solution
  - Solution S - hydrochloric acid
- You are required to :
- Determine how rate of reaction between sodium thiosulphate and hydrochloric acid varies with temperature
  - Determine the concentration of hydrochloric acid solution S

Procedure

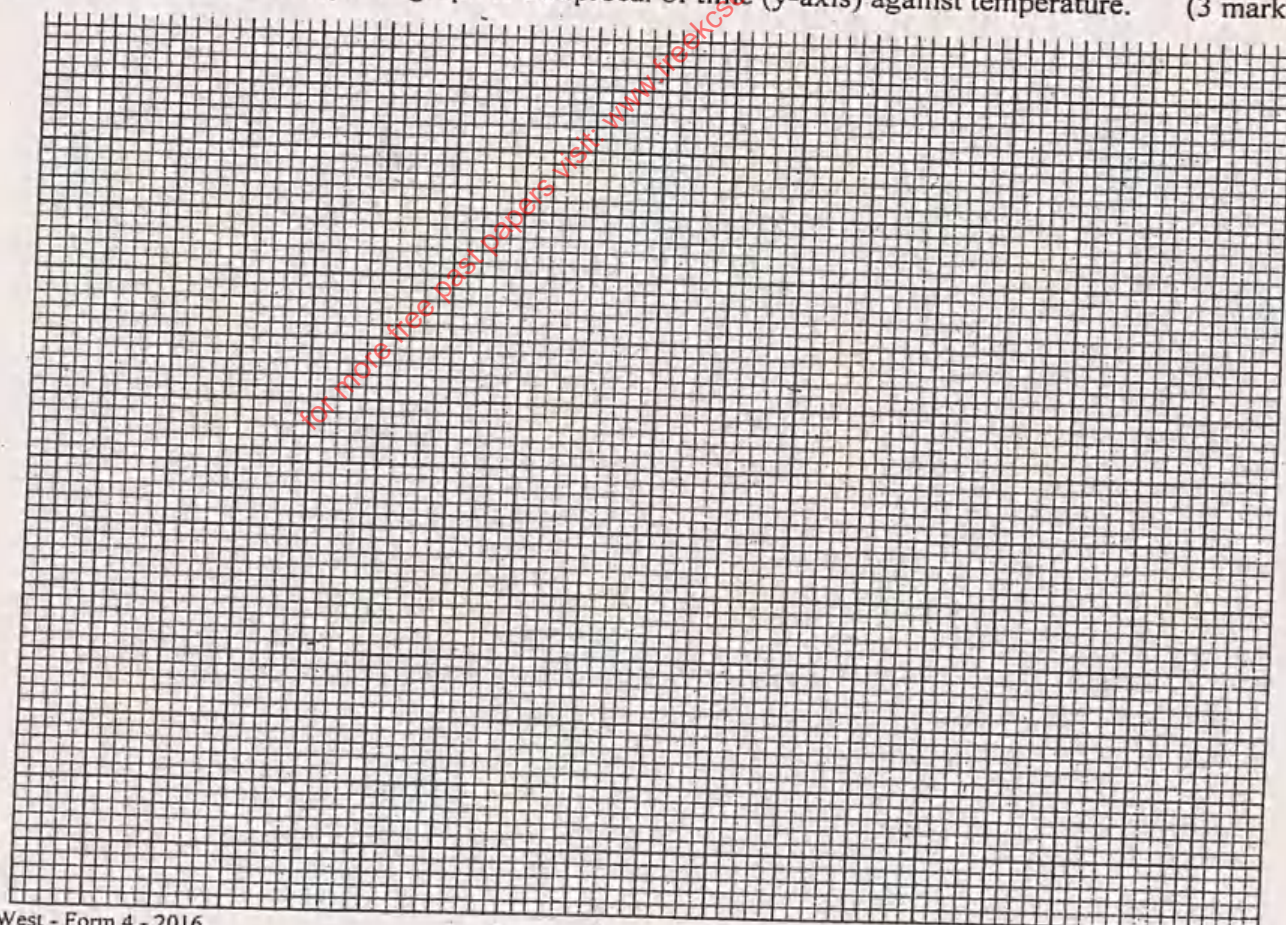
Using a measuring cylinder, transfer exactly 10cm<sup>3</sup> of solution R into a conical flask. Make a cross (x) on a white piece of paper and place the flask on the cross (x) on the paper. Using another clean measuring cylinder measure 10cm<sup>3</sup> of solution S and note its temperature, transfer the solution S into conical flask containing R and immediately start the stop watch. Swirl the mixture and record the time taken for the cross (x) to be blocked. Repeat the procedure at varying temperatures and fill the table below.

(4 marks)

Table 2

volume of R (cm <sup>3</sup> )	10	10	10	10	10	10
Volume of S (cm <sup>3</sup> )	10	10	10	10	10	10
Temperature of S (°C)	25	30	40	50	60	70
Time taken for cross to be blocked (s)						
Reciprocal of time $\frac{1}{\text{time}}$ or $\frac{1}{t}$						

- a) Using the table above plot a graph of reciprocal of time (y-axis) against temperature. (3 marks)



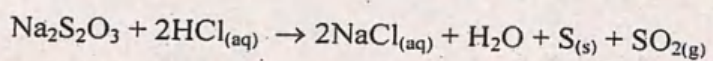


b) from the graph determine the time required for the reaction to be complete at 55°C. (1 mark)

c) What will be the temperature for the reactions when time taken for complete reaction is 15 seconds. (1 mark)

d) How does the rate of reaction vary with varying temperature ? Explain. (1 mark)

e) Given the equation for the reaction in the flask to be



i) Calculate the moles of sodium thiosulphate that are in 10cm<sup>3</sup> of solution R. (1 mark)

ii) Work out the moles of hydrochloric acid that reacted with 10cm<sup>3</sup> of R. (1 mark)

iii) What is the concentration of the hydrochloric acid. (1 mark)



3. I. You are provided with solid M. You are required to carry out the tests below and write your observations in the spaces provided. Identify any gas or gases produced.
- a) Place solid M into a boiling tube. Add distilled water while shaking until the boiling tube is half full. Divide the resultant mixture into three portions.

Observations	Inferences
(1mk)	(1mark)

- b) To the 1st portion, add nitric acid followed by Barium (II) nitrate solution.

Observations	Inferences
(1mk)	(1mark)

- c) Dip one end of the filter paper strip into potassium dichromate solution and then remove it. Place the dipped end of the filter paper at the mouth of the test tube of 2nd portion and warm the contents of the test tube gently.

Observations	Inferences
(1mk)	(1mark)

- d) Clean a metallic spatula and rinse with distilled water. Place a little of the solution in the 3rd test tube on the spatula and burn it with a non-luminous flame.

Observations	Inferences
(1mk)	(1mark)



II. You are provided with solid V. You are required to carry out the tests indicated below.  
 Place a spatulaful of solid V in a boiling tube. Add about 6cm<sup>3</sup> of distilled water and shake well.  
 Divide the mixture into four portions in test tubes.

a) To the first portion, add three drops of potassium manganate (VII) solution.

Observations	Inferences
(1mk)	(1mark)

b) To the second portion, add few drops of bromine water.

Observations	Inferences
(1mk)	(1mark)

c) To the third portion, add one spatulaful of sodium carbonate.

Observations	Inferences
(1mk)	(1mark)

d) Test the PH of the solution in the fourth portion using universal indicator solution provided.

Observations	Inferences
(½mk)	(½mark)