

NAME: .....

INDEX NO: .....

SCHOOL .....

DATE: .....

CANDIDATE'S SIGN.....



**SERIES 27 EXAMS**

233/3  
CHEMISTRY  
PAPER 3  
PRACTICAL  
TIME: 2 ¼ HOURS

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

Chemistry  
Paper 3  
Practical

**INSTRUCTIONS TO THE CANDIDATES**

- Write your **name school** and **index number** in the spaces provided
- **Sign** and write the **date** of examination in the spaces provided
- Answer **all** the questions in the spaces provided.
- You are not allowed to start working with apparatus for the first 15minutes of the 2 ¼ hrs allowed for this paper. This time is enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need
- Mathematical tables and electronic calculators may be used.
- All working **MUST** be clearly shown where necessary.
- Mathematical tables and electronic calculator may be used.

**FOR EXAMINERS USE ONLY**

QUESTION	MAX. SCORE	CANDIDATE'S SCORE
1	26	
2	14	
<b>TOTAL SCORE</b>	<b>40</b>	

This paper consists of 5 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

(1) **You are provided with**

- 2.0g of sodium carbonate solid **H**

- 2M HCl solution **C**

- 0.1M sodium hydroxide solution **D**

**You are required to determine:**

(i) Number of moles of sodium carbonate solid **H**.

(ii) The molar heat of reaction between sodium carbonate and hydrochloric acid.

**Procedure I**

Using burette place 30cm<sup>3</sup> of 2M HCl solution **C** into a 100cm<sup>3</sup> beaker. Stir gently with a thermometer and take the temperature of the acid after every half a minute for 1 ½ minutes. Record your readings in table I. At exactly 2 minutes add all of solid **H** to the acid, stir gently and continue taking the temperature every ½ minute up to the 4<sup>th</sup> minute. Record your readings in table I.

**NB: PRESERVE THE SOLUTION FOR THE NEXT PROCEDURE**

(i) **table I**

Time in Min	0	½	1	1 ½	2	2 ½	3	3 ½	4
Temperature (°C)									

(3mks)

(ii) On the grid provided plot a graph of temperature (y – axis) against time

(3mks)

(iii) From the graph, determine the change in temperature ( $\Delta T$ ) and show it on the graph. (2mks)

### **Procedure II**

Transfer **all** the solution obtained in procedure I into 250ml volumetric flask. Rinse both the beaker and thermometer with distilled water and add to volumetric flask. Add more distilled water to make up to the mark. Label this as solution **A**. Empty the burette and rinse with distilled water and fill it with solution **A**. Pipette 25cm<sup>3</sup> of solution **D** into 250ml conical flask. Add 2-3 drops of phenolphthalein indicator and titrate with solution **A**. Record the results in table II. Repeat the titration two more times and complete the table II below.

b (i) **table II**

	<b>I</b>	<b>II</b>	<b>III</b>
Final burette reading (cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of solution <b>A</b> used (cm <sup>3</sup> )			

(4mks)

ii) Calculate the average volume of solution **A** used (1mk)

(iii) Calculate the number of moles of solution **D** (sodium hydroxide) in 25cm<sup>3</sup> of solution (2mks)

(iv) Calculate the number of moles of solution **A** used. (2mks)

(c) Calculate the number of moles of HCl in

(i) 250cm<sup>3</sup> of solution **A** (2mks)

(ii) 30cm<sup>3</sup> of solution **C** (2mks)

(d) Calculate:

(i) The number of moles of HCl used in the reaction with NaOH, solution **B** (2mks)

(ii) Moles of Na<sub>2</sub>CO<sub>3</sub> in solid **H** (2mks)

(e) Calculate the molar heat of reaction between Na<sub>2</sub>CO<sub>3</sub> and HCl in kJ / mole. (3mks)

(Assume the specific heat capacity of solution = 4.2J g<sup>-1</sup> k<sup>-1</sup> and density of solution is 1.0g/cm<sup>3</sup>)

2. You are provided with a solid **Q**. Carry out the tests below. Record your observations and inferences in the spaces provided.

(i) Place the whole of solid **Q** in a boiling tube.

Add about 10cm<sup>3</sup> of distilled water. Divide the resulting solution in to six portions.

(ii) To the 1<sup>st</sup> portion add few drops of sodium hydroxide until in excess.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

(iii) To the second portion, add three drops of potassium iodide solution.

OBSERVATIONS	INFERENCE
( 1mk)	( 1mk)

(iv) To the 3<sup>rd</sup> portion, add few drops of ammonia solution until in excess.

OBSERVATIONS	INFERENCE
( 1mk)	( 1mk)

(v) To the fourth portion, add few drops of universal indicator and determine the pH of solution.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

(vi) To the 5<sup>th</sup> portion, add three drops of Barium chloride solution.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)

(vii) To the 6<sup>th</sup> portion, add two drops of Lead (II) Nitrate solution.

OBSERVATIONS	INFERENCE
(1mk)	(1mk)