

NAME: .....

INDEX NUMBER:.....

SCHOOL: .....

CANDIDATE'S SIGNATURE: .....

DATE: .....

**LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM**  
*Kenya Certificate of Secondary Education – K.C.S.E*

**233/3**

**CHEMISTRY Paper 3**  
**(PRACTICAL)**  
**August 2022**  
**Time: 2 ¼ Hours**

**INSTRUCTIONS TO CANDIDATES**

- Write your name and Index Number in the spaces provided above.
- Sign and write date of examination in the spaces provided above.
- Answer all questions in the spaces provided in the question paper.
- All workings must be clearly shown where necessary. Mathematical tables and silent electronic calculators may be used.

**For Examiners use only.**

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	12	
2	11	
3	17	
Total core	40	

*This paper consists of 7 Printed pages.*  
*Candidates should check the question paper to ensure that all the Papers are printed as indicated and no questions are missing*

1. You are provided with:-  
 Solution A, 0.5M hydrochloric acid  
 1g solid B, Calcium hydroxide

You are required to determine the solubility of  $\text{Ca}(\text{OH})_2$  and its percentage purity.

Procedure:

Transfer all solid B into a 100ml beaker. Measure accurately using a clean measuring cylinder  $50\text{ cm}^3$  of water and transfer this carefully into the volumetric flask. Shake gently and measure a second portion of  $40\text{ cm}^3$  water and add this to the resulting solution in the volumetric flask. Filter the solution into a beaker and label this solution D.

Place solution A in the burette, pipette  $25.0\text{ cm}^3$  of solution D into a  $250\text{ cm}^3$  conical flask and titrate using methyl orange indicator. Record your result in table below and repeat the titration carefully to obtain consistent results.

Table	1	2	3
Final burette reading ( $\text{cm}^3$ )			
Initial burette reading ( $\text{cm}^3$ )			
Volume of A used ( $\text{cm}^3$ )			

(4mks)

Calculate the:

- (a) Volume of solution A used. ( 1mk)

.....  
 .....  
 .....

- (b) Number of moles of the solution A reacted. ( 1mk)

.....  
 .....  
 .....

- (c) Number of moles of solution D in the  $25\text{ cm}^3$  (1<sup>1</sup>/<sub>2</sub>mks)

.....  
 .....  
 .....

(d) Number of moles of solution D in the 90 cm<sup>3</sup> of the solution D. (1mk)

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.....

(e) Mass of calcium hydroxide that dissolved in 90cm<sup>3</sup> of water. (1½mks)

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.....

(f) Determine the solubility of calcium hydroxide at the room temperature. (1mks)

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.....  
.....

(g) Determine the percentage purity the of calcium hydroxide. (1mks)

2. You are provided with:

- A solution of sodium hydroxide labeled B.
- A solution of sulphuric(VI)acid labeled C.

You are required to determine the concentration of the alkali using the following procedure.

**PROCEDURE:**

- (i) Using a measuring cylinder, Place 40cm<sup>3</sup> of sodium hydroxide solution into a 250 ml plastic beaker.
- (ii) Measure 60cm<sup>3</sup> of sulphuric (VI) acid solutionm using a measuring cylinder.

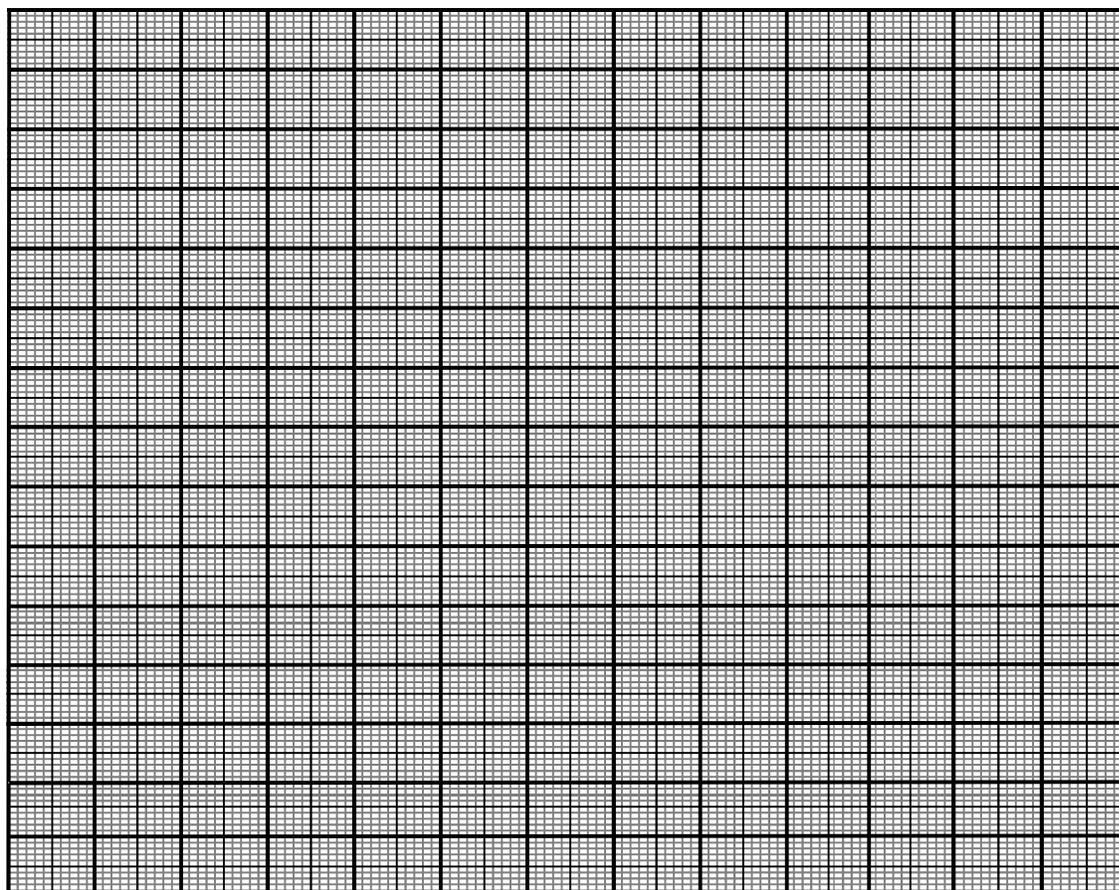
- (iii) Determine the temperature of sodium hydroxide solution at half a minute intervals for two minutes and record it in the table below.
- (iv) At 2 ½ minutes, place the 60cm<sup>3</sup> of solution C into the plastic beaker while stirring and resume taking the temperature in the 3<sup>rd</sup> minute up to 7 minutes.
- (v) Complete the table below. (3mks)

**TABLE III**

Time in minutes	0	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Temperature in °C					X				

Time in minutes	5.0	5.5	6.0	6.5	7.0
Temperature in °C					

- (a) Plot a graph of temperature against time. (3 mks )



(b) From the graph, determine the highest temperature change. (1 mks)

(c) Determine the heat evolved in this experiment (Density of solution =  $1 \text{ g/cm}^3$  specific heat capacity of solution =  $4.2 \text{ Jg}^{-1} \text{ K}^{-1}$ ) (1 mks)

(d) Given that the molar heat of neutralization is  $56 \text{ KJ/mole}$ , determine the number of moles of sodium hydroxide used in the neutralization reaction above. (2 mks)

(e) Determine the morality of sodium hydroxide. (1 mks)

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

a) Place about a half of solid S in a dry test tube. Heat the solid gently and then strongly for about 2 minutes. Test any gases produced with blue and red litmus papers.

Observations	Inference
(2mks)	(1mk)

b) Put the remaining portion of solid S a dry boiling tube add about 10cm<sup>3</sup> of distilled water. Divide the resultant mixture into the six equal portions, of about 2 cm<sup>3</sup> each.

Observations	Inference
(1mk)	(1mk)

i) To the first portion; add aqueous ammonia drop wise until in excess.

Observations	Inference
(1mk)	(1mk)

ii) To the second portion, add 2-3 drops of aqueous potassium iodide.

Observations	Inference
(1mk)	(1mk)

iii) To the third portion, add aqueous sodium hydroxide drop wise until in excess.

Observations	Inference
(1mk)	(1mk)

iv) To the fourth portion, add about 2-3 drops of dilute nitric (v) acid solution.

Observations	Inference
(1mk)	(1mk)

v) To the fifth portion, add 2-3 drops of Lead (II) nitrate solution.

Observations	Inference
(1mk)	(1mk)

vi) To the sixth portion, add 2-3 drops of Barium nitrate solution.

Observations	Inference
(1mk)	(1mk)