

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

233/3  
CHEMISTRY  
Paper 3  
(Practical)  
2018  
Time: 2 ¼ Hours  
FORM THREE

Candidate's Signature.....  
Date: .....

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

Chemistry  
Paper 3  
(Practical)  
Time: 2 ¼ Hours

**INSTRUCTIONS TO CANDIDATES**

- Write your name and Admission number in the spaces provided.
- Sign and write the date of examination in the spaces provided.
- Answer *all* the 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 2 ¼ 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 need.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators may be used.

For examiners use only

Question	Maximum Score	Candidate's Score
1		
2		
<b>TOTAL</b>	<b>40</b>	

This paper consists of 6 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

**QUESTION 1**

*You are provided with*

- 1.0M hydrochloric acid, solution S

- 0.5 M sodium hydroxide, solution **S**
- Anhydrous Sodium Carbonate of unknown mass; solid **V**

**Procedure**

Measures 60cm<sup>3</sup> portion of 1M hydrochloric acid using a measuring cylinder and transfer it to 100cm<sup>3</sup> beaker. Add all sodium carbonate (solid **V**) to the acid in the beaker and stir gently. Leave the mixture until there is no effervescence

Transfer the mixture into a clean 100ml measuring cylinder and add distilled water to make 100cm<sup>3</sup> of the solution. Transfer all the solution into 250cm<sup>3</sup> beaker and shake well. Label this solution **W**

Fill the burette with solutions **S** pipette 25.0cm<sup>3</sup> of solution **W** and transfer to a conical flask. Add 3-2 drops of methyl orange indicator and titrate with solution **S**

(a) Repeat the titration to get two more concordant values

Table 1

(5mks)

Titration	1	2	3
Final burette readings (cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of solution <b>S</b> used (cm <sup>3</sup> )			

(b) Determine the average volume of solutions used

(c) Calculate the number of moles of Sodium hydroxide (solution **S**) used

(2mks)

(d) Find the number of moles of hydrochloric acid in 25.0cm<sup>3</sup> of solution **W**

(2mks)

(e) Determine the number of moles of hydrochloric acid in 100cm<sup>3</sup> of solution **W**

(2mks)

(f) Calculate the number of moles of hydrochloric acid in the original 60cm<sup>3</sup> of solution (2mks)

(g) Calculate the number of moles of hydrochloric acid reacted with sodium carbonate (1mk)

(h) Determine the mass of sodium carbonate that reacted with acid (Na=23, C=12, O=16) (2mks)

2. You are provided with  
3.0g of salt **Y** (3.0g)  
You are required to determine the solubility of salt **Y** in water at different temperatures

**Procedure**

1. Place all salt Y into a clean boiling tube
2. Transfer 4cm<sup>3</sup> of distilled water from 10cm<sup>3</sup> measuring cylinder into the boiling tube containing salt Y. insert the thermometer into the boiling tube
3. Heat the mixture of salt and water carefully until all the salt dissolves and the solution is clear . Remove the boiling tube from the flame and allow it to cool while stirring with the thermometer carefully and gently

**NOTE:** The temperature at which the crystals first appear. Record this temperature in the table

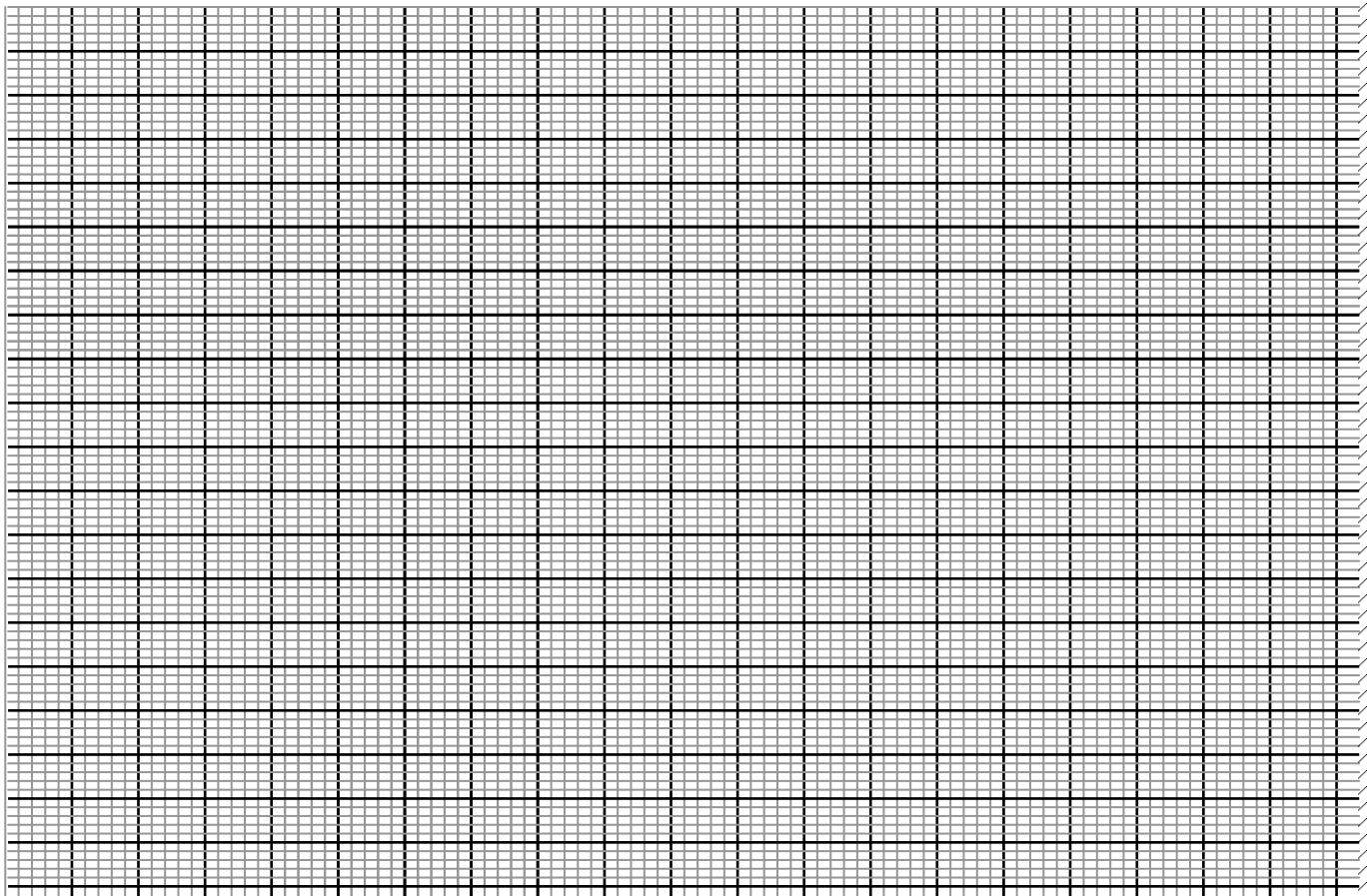
5. using the same mixture from (4) above add from a 10cm<sup>3</sup> measuring cylinder 1cm<sup>3</sup> of more water and repeat procedures 3 and 4 above. Carry out fur more experiments and ether your results in the table below

**NOTE:** You may hasten cooling for the first two temperature readings bt pouring cold water from the tap on the sides of the boiling tube.

- (a) Fill in the missing volumes of solubility of salt in grams per 100g of water (3mks)

Volume of water added cm <sup>3</sup>	4	5	6	7	8	9
Crystallization of temperature °C						
Solubility of salt Y in g/100 water						

- (b) Plot a graph of solubility of salt Y with crystallization temperature (3mks)



- (c) Use your graph to determine the solubility of salt Y in water at 55°C (1mk)

3. You are provided with:

**SOLID F**

Carry out the tests below

Write your observations and inferences in the spaces provided

- (i) Using a clean spatula heat half spatula full of F in a non-luminous flame

Observations	Inference
(1mk)	(1mk)

Place the remaining **F** into a boiling tube, and add about 10cm<sup>3</sup> of water, stir and filter (keep the residue for vi)

(ii) To portion are add sodium hydroxide drop wise till excess

Observations	Inference
(1mk)	(1mk)

(iii) To the second portion add ammonia solution drop wise till excess

Observations	Inference
(1mk)	(1mk)

(iv) To the third portion add Lead (II) Nitrate solution the warm

Observations	Inference
(1mk)	(1mk)

(v) To the fourth portion add barium chloride solution then followed by dilute hydrochloric acid

Observations	Inference
(1mk)	(1mk)

(vi) Dissolve the residues into about 5cm<sup>3</sup> of 2M HCl<sub>(aq)</sub>

Observations	Inference
(1mk)	(1mk)

(b) You are provided with solid **L**. Carry out the tests below write your observation and inferences in the spaces provided.

(i) Place little of solid **L** in a clean metallic spatula and ignite with a Bunsen flame

Observations	Inference
(1mk)	(1mk)

(ii) Add all the remaining solid **L** into a test tube. Add 10cm<sup>3</sup> of distilled water and shake.

Observations	Inference
(1mk)	(1mk)

(iii) Add 2cm<sup>3</sup> of **L** into a test tube and test PH

Observations	Inference
(1mk)	(1mk)

(iv) Add 2cm<sup>3</sup> of **L** into a test tube and Potassium Manganate VII and warm

Observations	Inference
(1mk)	(1mk)

(v) Add 2cm<sup>3</sup> of **L** into a test-tube and add sodium hydrogen carbonate

Observations	Inference
(1mk)	(1mk)