

NAME.....ADM NO.....CLASS.....
DATE.....SIGN.....

233/3

CHEMISTRY

PAPER 3

PRACTICAL

MARCH/APRIL 2017

2¼ HOURS

FORM FOUR JOINT EVALUATION 2017

Kenya Certificate of Secondary Education

CHEMISTRY 233/3

PAPER 3

PRACTICAL

2¼ HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name and admission number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. Answer all the questions in the spaces provided in the question paper
4. 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 that you may need.
5. All working MUST be clearly shown where necessary.
6. Mathematical tables and silent electronic calculators may be used.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	15	
2	10	
3	15	
TOTAL SCORE	40	

Q.1 You are provided with

- i) 4grams oxalic acid labelled solid P (RMM 126) in a boiling tube.
- ii) Distilled water

You are required to determine the solubility of solid P.

Procedure

- a) Fill the burette with distilled water. Using the burette, add 5cm^3 of solid P in the boiling tube. Heat the mixture in a water bath while stirring using a thermometer to about 70°C until all the solid dissolves.
- b) Allow the solution to cool while stirring with the thermometer (cooling can be accelerated by putting the boiling tube in a beaker containing cold water) note the temperature at which crystals of P start to appear, record this temperature in table (1)
- c) Using the burette add 3.0cm^3 of distilled water to the contents of the boiling tube, heat the mixture while stirring with the thermometer until all the solid dissolves while in the hot water bath.
- d) Allow the mixture to cool while stirring and note the temperature at which crystals of solid P start to appear.
- e) Repeat the procedure (c) and (d). Three more times each time recording the temperature in the table.
- f) Complete the table by calculating the solubility of solid P at different temperatures.

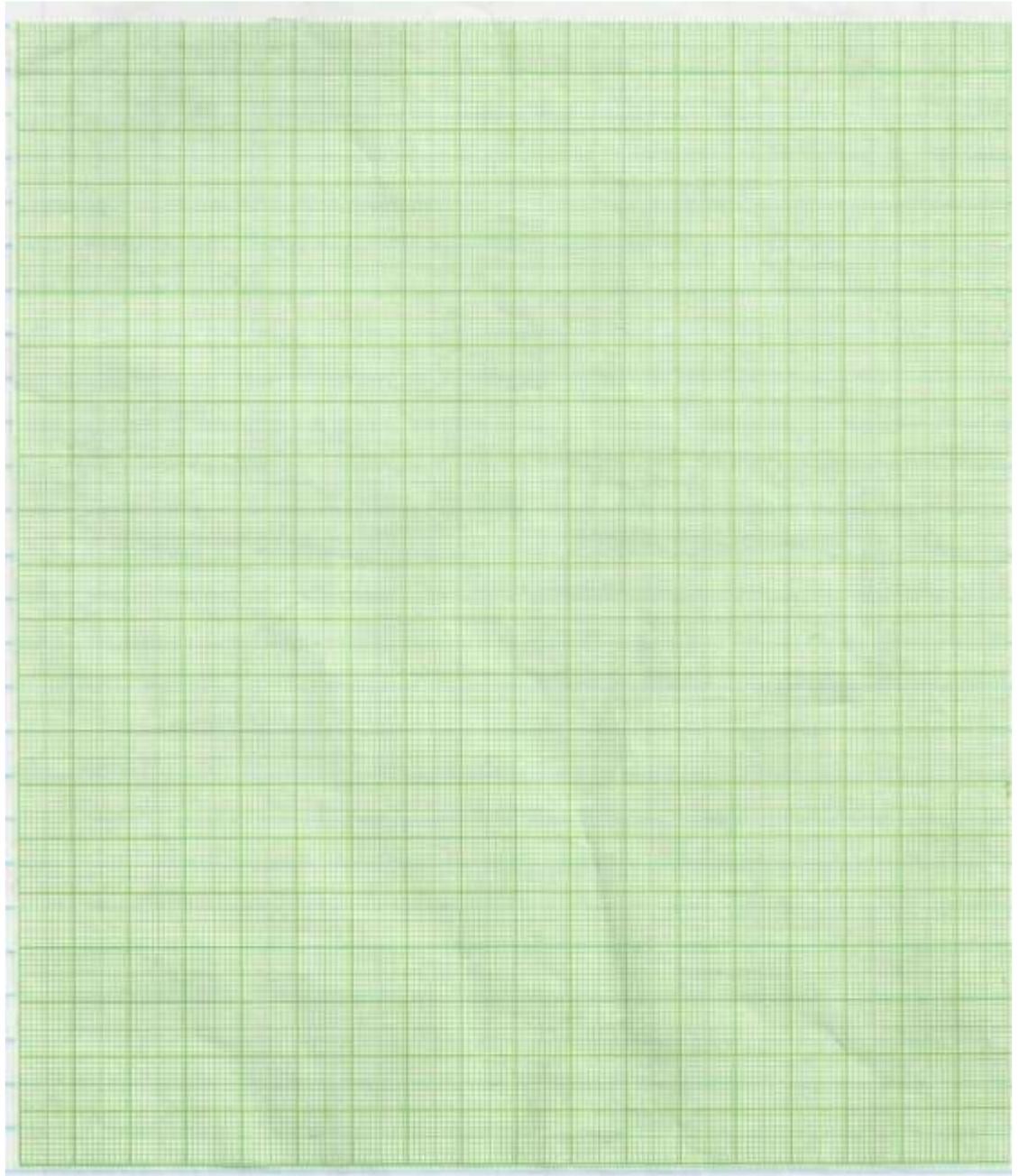
NB: Solubility of a substance is the mass of that substance that dissolves in 100 grams of water at a particular temperature. Solubility can also be expressed in mole dm^{-3} .

Table (i)

Mass of solid p in grams	Volume of water in the boiling tube cm ³	Temperature at which crystal of P first appear °c	Solubility of P	
			g/100g water	Mol dm ⁻³
4	5			
4	8			
4	11			
4	14			
4	17			

(8mks)

- a) On the grid provided, plot a graph of solubility of P in mol dm⁻³ against temperature °c. (3mks)



- b) From the graph,
- i) deduce the solubility of solid P in g/100g water at 45⁰c. (2mks)

 - ii) The temperature at which solubility of P is 3.5mol/dm³. (1mk)

c) State why a burette was used in the measurement of the volume of water instead of a measuring cylinder. (1mk)

Q.2 You have been provided with;

- hydrochloric acid solution B
- 0.100M sodium carbonate solution C
- Methyl orange indicator

You are required to standardize hydrochloric acid solution B using sodium carbonate solution C.

Procedure

Measure 10.0cm³ of solution B using a measuring cylinder and transfer it into a 250ml volumetric flask. Add distilled water to make up to the mark, shake well. Label this solution D.

Fill the burette up to the 0.00cm³ mark with solution D from the volumetric flask. Transfer 25cm³ of solution C in to a clean conical flask. Add 3 drops of methyl orange indicator. Titrate solution D against solution C until the colour turns pink.

Repeat and complete the table (ii) below

Table ii

	i	ii	iii
Final burette reading (cm ³)			
Initial burette reading (cm ³)			
Volume of solution D used (cm ³)			

(4marks)

Calculate the;

1. Average volume of solution D used in the experiment. (1mk)
2. Number of moles of sodium carbonate solution C used in this experiment. (1mk)
3. Number of moles of HCl solution D in the average titre. (2mks)

4. Concentration of solution D in mol dm^{-3} . (1mk)

5. Concentration of HCl in the original solution B in moles per litre. (2mks)

Q3.

I) You are provided with a solid labelled W. Carry out the following tests record the observation and make inferences in the spaces provided.

a) Take $\frac{1}{3}$ of solid W, place it in a test tube and heat it strongly. Test any gases produced.

Observation	Inference
1mk	1mk

b) Put the remaining portion of W in a clean boiling tube, add about 10mls of distilled water and shake to dissolve the solid. Divide the solution into three portions

Observation	Inference
$\frac{1}{2}$ mk	$\frac{1}{2}$ mk

i) To the first portion, add sodium hydroxide solution dropwise until in excess.

Observation	Inference
1mk	1 mk

- ii) To the second portion, add aqueous ammonia drop wise until in excess.

Observation	Inference
1mk	1 mk

- iii) To the third portion, add three drops of Barium nitrate solution followed by few drops of dilute nitric acid and shake.

Observation	Inference
1mk	1 mk

II) You are provided with solid Z. Carry out tests and write your observations and inferences in the spaces provided.

- i) Take one third portion of solid Z using a metallic spatula and ignite it on a Bunsen burner flame.

Observation	Inference
1mk	1 mk

- ii) Take the remaining portion of Z, add about 10mls of distilled water and shake the mixture to dissolve.

Observation	Inference
½ mk	½ mk

- iii) Divide the mixture in (ii) above in two portions. To the first portion, add three drops of Bromine water and shake.

Observation	Inference
1mk	1 mk

- iv) To the second portion, add a spatula of sodium hydrogen carbonate.

Observation	Inference
$\frac{1}{2}$ mk	$\frac{1}{2}$ mk