Name…………………………………………..Index No. …………ADM……….

School ………………………………………Date……. ………………………..

233/3
CHEMISTRY
PAPER 3
PRACTICAL
June 2017
Time: 2 ¼ Hours

MID-YEAR EXAMINATION
Kenya Certificate of Secondary Education (K.C.S.E)

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 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 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 required.

• ALL working MUST be clearly shown where necessary

• Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

QUESTION	Max Score	Candidate Score
1	18	
2	14	
3	08	
TOTAL	40	

1. You are provided with:

   0.7 M sulphuric (VI) acid, solution A

   0.5 M sodium hydroxide, solution B

   Magnesium ribbon, solid C

   You are required to determine the:

   -The temperature change when magnesium reacts with excess sulphuric (VI) acid

   -Number of moles sulphuric (VI) acid that remain unreacted

   -Number of moles of magnesium that reacted

   Procedure1:

   i)   Using a burette measure 50 cm^3 of solution A and place it in a 100ml beaker.

   ii)   Stir the solution gently with the thermometer making and take its temperature after every half a minute.

   iii)   Record your results as shown in table I.

   Table I

   a)

 | Time (min) | 0 | ½ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 |
   |---|---|---|---|---|---|---|---|---|---|---|---|
   | Temperature(°C) | | | | | | | | | | | |

   (3 marks)

   iv)   After one and half (1½) minutes, put the magnesium ribbon, solid C, in the 50 cm^3 of solution B.

   v)   Stir the mixture gently with the thermometer and record the temperature of the mixture after every half-minute as shown in the table above up to the fifth minute. **Keep the resulting solution for use in procedure 2**

   Plot a graph of temperature against time.   (3 marks)

2
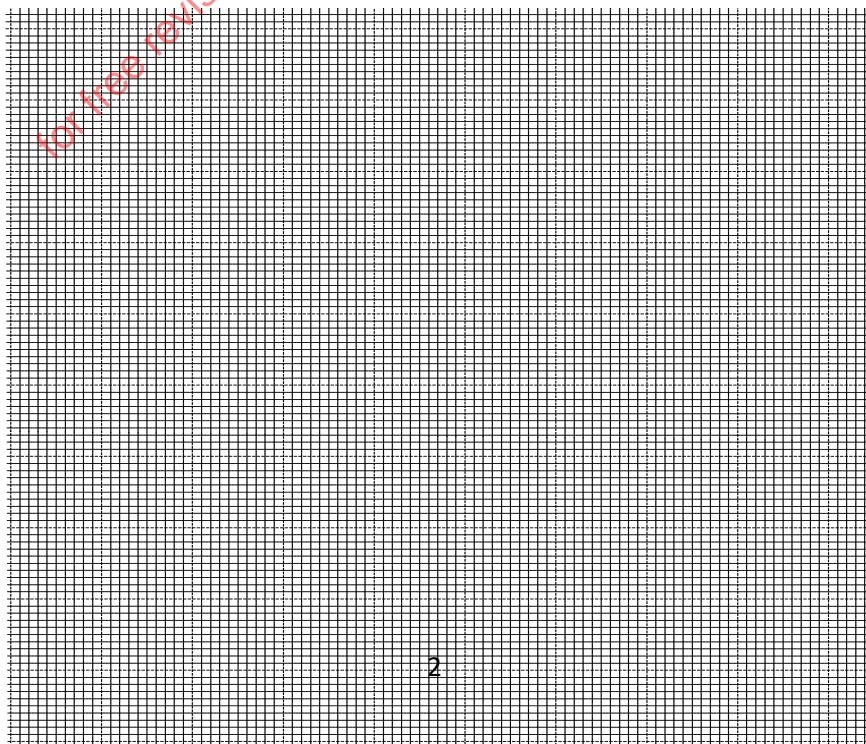
Use the results in the table to determine the highest change in temperature (ΔT) for the reaction. (1 mark)

<u>Procedure 2:</u>
Transfer all the solution obtained in procedure 1 into a 250 ml conical flask. Clean the burette and use it to place 50 cm^3 of distilled water into the beaker used in procedure 1. Transfer all the 50 cm^3 into the 250 ml conical flask containing the solution from procedure 1. Label this as solution D. Empty the burette and fill it with solution B. Pipette 25 cm^3 of solution D and place it into an empty 250 ml conical flask. Add 2-3 drops of phenolphthalein indicator and titrate solution B against solution D. Record the results in table II. Repeat the titration of solution B against solution D and complete table II.

b)

Table II

	I	II	III
Final burette reading (cm^3)			
Initial burette reading (cm^3)			
Volume of solution C used (cm^3)			

(4 marks)

i) Calculate the average volume of solution C used. (1 mark)

ii) Calculate the number of moles of:
   I. 0.5 M sodium hydroxide used. (1 mark)

   II. Sulphuric (VI) acid in 25 cm^3 of solution D (1 mark)

   III. Sulphuric (VI) acid in 100cm^3 of solution D (1 mark)

   IV. Sulphuric (VI) acid in 50 cm^3 of solution D (1 mark)

V.   Sulphuric acid that reacted with magnesium   (1 mark)

VI.   Magnesium that reacted   (1 mark)

2. You are provided with solid F. Carry out the following tests and write your observations
    and inferences in the spaces provided.
    (a) Place all of solid F in a boiling tube. Add about 10 cm³ of distilled water and shake
        thoroughly. Filter the mixture into another boiling tube.

    Retain the residue for use in test (b) below.

    i)   Describe the colour of the residue and filtrate.   (1 mark)

          Residue……………………………………………

          Filtrate…………………………………………….
    ii)   To about 2 cm³ of the filtrate in a test tube, add a few drops of acidified
          potassium chromate (VI) solution.

Observations	Inferences
(1 mark)	(1 mark)

    iii) To about 2 cm³ of the filtrate, add sodium hydroxide drop wise until in excess.
          b)

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Observations	Inferences
(1 mark)	(1 mark)

i) Place about a third (⅓) of the residue on a metallic spatula and burn it in a Bunsen burner flame.

Observations	Inferences
(1 mark)	(1 mark)

ii) Place the remaining residue in a test tube and add about 5 cm^3 of dilute nitric (V) acid

Observations	Inferences
(1 mark)	(1 mark)

iii) Describe how to test for lead (II) ions in the solution obtained in b (ii) above.

Observations	Inferences
(2 marks)	(1 mark)

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iv) Carry out the test in b (iii) above.

Observations	Inferences
(1 mark)	(1 mark)

3. You are provided with solid T. Carry out the experiments below. Write your observations and inferences in the spaces provided.
   a) Place about a third (⅓) of solid T on a metallic spatula and burn it in a Bunsen burner flame.

Observations	Inferences
(1 mark)	(1 mark)

   b) Place the remaining amount of substance T in a boiling tube and add about 10 cm^3 of distilled water. Divide the mixture into 4 portions.
   i) To the first portion, add the magnesium ribbon provided.

Observations	Inferences
(½ mark)	(½ mark)

   ii) To the second portion, determine the pH.

Method used	Inferences
(2 marks)	(1 mark)

iii)   To the third portion, add acidified potassium manganate (VII) solution.

Observations	Inferences
(½ mark)	(½ mark)

iv)   To the fourth portion, add acidified potassium chromate (VI) solution.

Observations	Inferences
(½ mark)	(½ mark)