**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:

1. Using a burette measure 50 cm3 of solution A and place it in a 100ml beaker.
2. Stir the solution gently with the thermometer making and take its temperature after every half a minute.
3. 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(oC) |  |  |  |  |  |  |  |  |  |  |  |

(3 marks)

1. After one and half(1½) minutes, put the magnesium ribbon, solid C, in the 50 cm3 of solution B.
2. 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)



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

Procedure 2:

Transfer all the solution obtained in procedure 1 into a 250 ml conical flask. Clean the burette and use it to place 50 cm3 of distilled water into the beaker used in procedure 1. Transfer all the 50 cm3 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 cm3 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.

|  |  |  |
| --- | --- | --- |
| I | II | III |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution C used (cm3) |  |  |  |

b)

Table II

(4 marks)

1. Calculate the average volume of solution C used. (1 mark)
2. Calculate the number of moles of:
3. 0.5 M sodium hydroxide used. (1 mark)
4. Sulphuric (VI) acid in 25 cm3 of solution D (1 mark)
5. Sulphuric (VI) acid in 100cm3 of solution D (1 mark)
6. Sulphuric (VI) acid in 50 cm3 of solution D (1 mark)
7. Sulphuric acid that reacted with magnesium (1 mark)
8. Magnesium that reacted (1 mark)
9. You are provided with solid F. Carry out the following tests and write your observations and inferences in the spaces provided.
10. 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**.

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

Residue…………………………………………

Filtrate………………………………………….

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

Inferences

Observations

(1 mark)

(1 mark)

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

b)

Inferences

Observations

(1 mark)

(1 mark)

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

Inferences

Observations

(1 mark)

(1 mark)

1. Place the remaining residue in a test tube and add about 5 cm3 of dilute nitric (V) acid

Inferences

Observations

(1 mark)

(1 mark)

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

Inferences

Observations

(2 marks)

(1 mark)

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

Inferences

Observations

(1 mark)

(1 mark)

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

Inferences

Observations

(1 mark)

(1 mark)

1. Place the remaining amount of substance T in a boiling tube and add about 10 cm3 of distilled water. Divide the mixture into 4 portions.
2. To the first portion, add the magnesium ribbon provided.

Inferences

Observations

(½ mark)

(½ mark)

1. To the second portion, determine the pH.

Inferences

Method used

(2 marks)

(1 mark)

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

Inferences

Observations

(½ mark)

(½ mark)

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

Inferences

Observations

(½ mark)

(½ mark)

**CONFIDENTIAL**

**CHEMISTRY**

**PRACTICAL**

**JUNE 2017**

**KASSU JET**

**INSTRUCTIONS TO SCHOOLS:**

In addition to usual provisions and fitting in the science laboratory each candidate is expected to have the following.

- One pipette

- One burette

- One pipette filler

- About 60 cm3 of solution A

- About 100 cm3 of solution B

- 3 cm of solid C (magnesium ribbon)

- Two 250ml conical flask

- One boiling tube

- 10ml measuring cylinders

- A stop watch/clock

- 500ml distilled water provided in wash bottle

- Means of labeling

- One 100ml glass beaker

- About 1.0g of solid F

- Metallic spatula

- Filter paper

- One filter funnel

- At least 5 dry clean test tubes

- 2 dry boiling tubes

-Acidified potassium chromate (VI) solution

-Acidified potassium manganate (VII)

- Bromine water

- Solid T (maleic acid about 2g)

- -10-110 oC thermometer

**Access to:**

- Source or means of heating

- 2M NaOH supplied with a dropper

- 2M NH4OH supplied with a dropper

- Potassium iodide solution

- Dilute nitric v acid

- Universal indicator paper and a pH chart

-1 cm of magnesium ribbon

**Notes**

- Solution A is 0.7 M sulphuric (VI) acid

-Solution B is 0.5 M sodium hydroxide

- Solid F is a mixture of sodium sulphite and lead (II) carbonate in the ratio 1:1

- Solid T is maleic acid