**Name:** ..................................................................................................**Class**........................

**Candidate’s signature**………………… **Date**……………

**Index number**……………………………………………...

**233/3**

**CHEMISTRY**

**Paper 3**

**(PRACTICAL)**

**JUNE/JULY 2014**

2 1/4 hours

**STAREHE BOYS’ CENTRE & SCHOOL**

**Kenya Certificate of Secondary Education**

**MOCK EXAMINATIONS 2014**

**INSTRUCTIONS**

***You are not allowed to start working with apparatus for the first 15 minutes of the 2***1/4 ***hours allowed in this paper.*** *This is to enable you to read the question paper and to make sure you have all the chemicals and apparatus that you may need.*

***Answer ALL questions in the spaces provided.***

***Mathematical tables and electronic calculators may be used.***

***All working MUST be clearly shown where necessary***

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| **1** | **23** |  |
| **2** | **10** |  |
| **3** | **7** |  |
| **Total** | **40** |  |

**This paper consists of 7 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.**

1. **You are provided with:**

* Solution P containing 4g of sodium hydroxide in 200 cm3 of solution.
* Solution Q which is sulphuric acid.
* Solid R.

**You are required to**

* Standardize solution Q.
* Determine the mass of solid R that reacts with the standardized solution Q.

**Procedure I**

* Fill the burette with solution Q.
* Transfer 25 cm3 of solution Q into a 250 ml volumetric flask. Add distilled water to the volumetric flask upto the 250 ml mark. Shake the flask. Transfer the solution to the 250 ml beaker provided and label this solution S.
* Drain the burette and **rinse it thoroughly**.
* Fill the burette with solution P.
* Pipette 25 cm3 of solution S into a conical flask.
* Add 2 drops of phenolphthalein indicator.
* Titrate solution P against S until a pink colour just appears.
* Repeat the above procedure and fill the table below.

Table I

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment |  |  |  |
| Final burette reading, cm3 |  |  |  |
| Initial burette reading, cm3 |  |  |  |
| Volume of solution P used, cm3 |  |  |  |

{4 marks}

a) Calculate the average volume of solution P used. (Show your working) {1 mark}

b) Calculate the molarity of sodium hydroxide solution P. {2 marks}

(Na = 23, O = 16, H = 1)

c) Calculate the number of moles of solution P used for titration. {1 mark}

d) Calculate the moles of sulphuric acid in 250 cm3 of solution S. {2 marks}

e) Hence find the molarity of the original solution Q. {1 mark}

**Procedure II**

* Rinse the burette thoroughly and fill it with solution Q.
* Transfer 50 cm3 of the solution into a 250 ml beaker.
* Add all the solid R provided to solution Q.
* Swirl the mixture until there is no more effervescence.
* Label the mixture as solution T.
* Rinse the burette thoroughly and fill it with solution T.
* Pipette 25.0 cm3 of solution P into a conical flask.
* Add 2 drops of phenolphthalein indicator.
* Titrate solution T against solution P until the solution turns just colourless.
* Repeat the titration and fill the table below.

Table II

|  |  |  |  |
| --- | --- | --- | --- |
| Experiment | I | II | III |
| Final burette reading, cm3 |  |  |  |
| Initial burette reading, cm3 |  |  |  |
| Volume of solution T used, cm3 |  |  |  |

{4 marks}

a) Calculate the average volume of solution T used. (Show your working) {1 mark}

b) Calculate the moles of sulphuric acid present in 50 cm3 of solution Q. {1 mark}

c) Calculate the number of moles of solution P used for the titration. {1 mark}

d) Calculate the moles of sulphuric acid in solution T used for the titration. {2 marks}

e) Calculate the number of moles of sulphuric acid that reacted with solid R. {2 marks}

f) Given that 1 mole of R reacts with 1 mole of sulphuric acid and the relative formula mass of R is 106, calculate the mass of solid R used in this experiment. {1 mark}

2. You are provided with:

* Acidified potassium manganate solution, U.
* Oxalic acid solution, W.

You are required to determine the effect of temperature on the reaction of potassium manganate (VII) with oxalic acid.

**Procedure**

* Using a measuring cylinder, place 10 cm3 portions of solution U into five separate test tubes in a test tube rack.
* Clean the measuring cylinder and use it to measure 10 cm3 of solution W. Transfer it into a boiling tube.
* Place the boiling tube in the water bath provided and heat W to a temperature of 40oC.
* Add the first portion of solution U to the boiling tube. Shake and at the same time start the stop-watch.
* Record the time taken for the purple colour of the mixture to decolourize in the table below.
* Repeat the experiment by using 10 cm3 of solution W at temperatures of 50oC, 60oC, 70oC and 80oC.
* Complete the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Temperature of solution W (oC) | 40 | 50 | 60 | 70 | 80 |
| Time taken for W to decolourize (t) seconds |  |  |  |  |  |
| sec-1 |  |  |  |  |  |

{5 marks}

a) Plot a graph of  against temperature on the graph paper provided. {3 marks}

b) From the graph, determine the time taken for decolourization of the mixture when the temperature of solution W was 65oC. {1 mark}

c) How does the rate of reaction of potassium manganate (VII) with oxalic acid vary with temperature. {1 mark}

3. You are provided with a mixture solid M. Carry out the tests below.

a) Place all of solid M in a boiling tube, add about 5 cm3 of water and shake well. Filter the mixture. Divide the filtrate into two portions. Retain the residue for further tests.

i) To the first portion of the filtrate, add a few drops of lead (II) nitrate solution. Warm the

mixture.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| {1 mark} | {½ mark} |

ii) To the second portion, add 1 cm3 of sodium hydroxide. Heat the mixture gently and test

the gas produced using blue and red litmus papers.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| {1 mark} | {½ mark} |

b) Scrape the residue gently from the filter paper with a spatula and place it in the test tube. Add

2 cm3 of dilute nitric acid. Divide the resulting solution into two portions.

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

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| {1 mark} | {1 mark} |

ii) To the second portion add aqueous ammonia dropwise until in excess.

|  |  |
| --- | --- |
| **Observation** | **Inference** |
| {1 mark} | {1 mark} |