**Name: ………………………………................................................ Adm No:................. Class:..............**

**Date: ………………………………. Signature: ……………………………**

**233/3**

**CHEMISTRY**

**PAPER 3**

**JULY 2018**

**TIME: 2 ¼ HOURS**

**MOKASA II EXAMINATIONS**

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

**CHEMISTRY PAPER 3**

**INSTRUCTIONS TO THE 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****.***
* *Mathematical tables and electronic calculators may be used.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *Use the first 15 minutes of the 2 ¼ hours to ascertain you have all the chemicals and apparatus that you may need.*

**For Examiners use only**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAX. SCORE** | **CANDIDATE’S SCORE** |
| 1 | 23 |  |
| 2 | 05 |  |
| 3 | 12 |  |
| **TOTAL SCORE** | **40** |  |

1. You are provided with;

* + Sulphuric (VI) acid, solution **F**
  + 0.5M sodium hydroxide, solution **G**
  + Magnesium turnings, solid **H**

You are required to determine the concentration of sulphuric (VI) acid in moles per litre.

**Procedure I**

Measure 50cm3 of solution **F** using a measuring cylinder and place it in a 100 cm3 beaker. Stir the solution gently with a thermometer and take its temperature after every half-minute. Record your results in **Table I.**

After one and half minutes, add all of solid **H** at once. Stir the mixture gently with the thermometer and record the temperature of the mixture after every half-minute in Table **I** up to the sixth minute. Keep the solution for use in procedure **II.**

(a) **Table I**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (min) | 0 | ½ | 1 | 1 ½ | 2 | 2 ½ | 3 | 3 ½ | 4 | 4 ½ | 5 | 5 ½ | 6 |
| Temperature (0C) |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. **marks)**

(b) Draw a graph of temperature against time. **(3 marks)**



(c) Using your graph, determine the highest change in temperature, ∆T for the reaction

∆T………………. **(1 mark)**

(d) Calculate the heat change for the reaction.  **(2 marks)**

(Assume density of solution = 1.0g/cm3, s.h.c 4.2 J/g/K)

(e) Given that the molar heat of reaction of sulphuric acid with solid H is

323kJ mole-1, calculate the number of moles of sulphuric (VI) acid that were used during the reaction **(2 marks)**

**Procedure II**

Place **all** the solution obtained in procedure **I** in a clean **100m3 measuring cylinder.** Add distilled water to make 100cm3 of solution. Transfer all the solution into a beaker and shake well. Theresulting solution is ‘solution **K’**.

Fill a burette with solution **G**. Pipette 25.0cm3 of solution **K** into a conical flask. Add 2- 3 drops of phenolphthalein indicator and titrate with solution **G**. Record your results in table **II**. Repeat the titration two more times.

**Table II.**

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

**(4 marks)**

(a) Determine the average volume of solution **G** used **(1 mark)**

(b) Calculate the number of moles of sodium hydroxide, solution **G** that were used. **(2 marks)**

(c) Determine;

(i) The number of moles of sulphuric acid in 25.0cm3 of solution **K.** **(1 mark)**

(ii) The number of moles of sulphuric acid in 100cm3 of solution K**.** **(1 mark)**

(iii) Using the results from (d) and g (ii) above, calculate the total number of moles of sulphuric acid in 50cm3 of solution F. **(1 mark)**

(iv) Molarity of sulphuric (VI) acid. **(1 mark)**

2. Dissolve all of the solid G in about 10cm3 of distilled water in a boiling tube. Use the solution for tests that follows ;

1. To the first portion add Lead( II ) Nitrate the solution

|  |  |
| --- | --- |
| Observations | Inferences |
| ( ½ mark) | (1 mark) |

1. To the second portion add barium nitrate

|  |  |
| --- | --- |
| Observations | Inferences |
| ( ½ mark)) | (1 mark) |

1. Place 2 cm3 of the solution in a test-tube and add 2 drops of acidified potassium Manganate (VII); solution C.

|  |  |
| --- | --- |
| Observations | Inferences |
| ( ½ mark) | ( ½ mark) |

1. To the fourth portion 2cm3 of the solution, add half of solid sodium hydrogen carbonate provided.

|  |  |
| --- | --- |
| Observations | Inferences |
| ( ½ mark) | ( ½ mark) |

3. Youare provided with a liquid **L** suspected to be unsaturated alkanols.

Using the reagents below write down a correct procedure that can be used to determine the functional group in **L.**

* Acidified potassium manganate (VII)
* Bromine liquid
* Acidified potassium dichromate (VI)
* Bunsen burner.

|  |  |
| --- | --- |
| Test 1 | Expected observation |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Test 2 | Expected observation |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Test 3 | Expected observation |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Test 4 | Expected observation |
| ( ½ mark) | (1 mark) |

**Carry out the test described above and write the correct observation and inferences**

|  |  |
| --- | --- |
| Observation 1 | Inferences |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Observation 2 | Inferences |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Observation 3 | Inferences |
| ( ½ mark) | (1 mark) |

|  |  |
| --- | --- |
| Observation 4 | Inferences |
| ( ½ mark) | (1 mark) |