**Name: ……………………………………………………………** **Index No.:……………………................**

**School: …………………………………………………………. Candidate’s Sign:……………………...**

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

**233/3**

**CHEMISTRY**

**PAPER 3**

**PRACTICAL**

**JULY/AUGUST - 2015**

**TIME: 2 ¼ HOURS**

**TRANS-NZOIA COUNTY JOINT EVALUATION EXAM – 2015**

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

**CHEMISTRY**

**PAPER 3**

**2 ¼ HOURS**

**INSTRUCTIONS TO THE CANDIDATES**

* Write your ***name*** and ***index* *number***  in the spaces provided above.
* ***Sign*** and write the ***date*** of examination in the spaces provided.
* Answer ***all*** questions in the spaces provided.
* 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 you may need.
* KNEC mathematical table and silent non-programmable electronic calculators may be used.
* All workings ***must*** be clearly shown where necessary.
* Candidates should answer the questions in ***English*.**

**For Examiner’s Use Only:-**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
| 1  |  21 |  |
| 2  | 13 |  |
| 3 | 06 |  |
| **Total** | **40** |  |

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

***Candidates should check the question paper to ascertain that all pages are printed as indicated.***

 ***And that no questions are missing.***

**1**. ***You are provided with:-***

* Solution H; which is 0.02M Potassium Manganate (VII) which is acidified.
* Solution G; which is a mixture of Sodium Oxalate, Na2C2O4 and oxalic acid, H2C2O4

***You are required to:-***

i) Determine the solubility of Sodium Oxalate at room temperature.

ii) Determine the effect of temperature on the rate of reaction of Potassium Manganate (VII) and

 oxalic acid.

***Procedure I***

 i) Pipette 25.0cm3 of solution H into a clean conical flask. Heat the contents to about 700c.

 ii) Titrate the hot solution against solution G to a colourless end point.

 ***Record your results in table I***

 iii) Repeat steps (i) and (ii) two more times to obtain consistent titres.

 **Keep the remaining solution G and H for procedure II**

 **Table I**

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

 (3 mks)

 (a) Work out the average volume of solution G used. (1 mk)

 (b) (i) Calculate the number of moles of potassium manganate (vii) in 25.0 cm3 of solution H.

(1 mk)

 (ii) Given the following reactions:-

 Na2C2O4(aq) 2Na+ (aq) +C2O 42- (aq)

 C2O 42-(aq) + 2H+(aq) H2C2O4(aq)

 2KMnO4(aq) + 5H2C2O4(aq)+ 3H2SO4(aq) K2SO4(aq) + 2MnSO4(aq) + 8H2O(l) + 10CO2(g)

 I. Calculate the number of moles of oxalic acid that reacted with Potassium Manganate (VII)

 (1 mk)

 II. Determine the mass of oxalic acid in the average volume used.

  *(H2C2O4.2H2O) (H= 1.0, C= 12.0, O = 16.0)* (1 mk)

 (c) Given that solution G was prepared by dissolving 7.68 g of the mixture of oxalic acid and

 sodium oxalate in 1000cm3 of a solution.

1. Using your answer in b (ii) II work out the mass of oxalic acid in 1000 cm3 of solution G. (1 mk)
2. From your answer above, calculate the mass of sodium oxalate in 1000 cm3 of the mixture. (1 mk)
3. Hence calculate the solubility of sodium oxalate in g/100g of water. (2 mks

**Procedure II**

i) Using a measuring cylinder, transfer 5.0 cm3 of solution H into a clean boiling tube.

ii) Using the burette measure 5 cm3 of oxalic acid, solution G into five test tubes labelled 1 – 5

iii) Heat solution H until it reaches 800C.

iv) To the hot solution in (iii) add 5.0 cm3 of solution G from test tube 1 and start the stop watch at

 the same time. Stir the mixture using the thermometer and record time taken for the purple colour to

 disappear.

 v) Repeat procedure (i) – (iv) at the temperatures shown using contents of test tubes 2, 3, 4 and 5

 respectively.

 **Table II**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Temperature before mixing 00c | 80 | 70 | 60 | 50 | 40 |
| Time taken for purple colour to disappear in (sec) |  |  |  |  |  |
| $^{1}/\_{time}$(sec-1) |  |  |  |  |  |

 (4 mks)

 (d) On the grid provided, plot a graph of 1/ t (y – axis) against temperature at which the purple

 colour disappear. (3mks)

 (e) What does $^{1}/\_{t}$ represent in this experiment. (1 mk)

 …………………………………………………………………………………………………..

(f) From the graph:

 i) Determine the time taken for the purple colour to disappear at 47.50C. (1mk)

 ii) How does temperature change affect $^{1}/\_{t}$ in this experiment? Explain. (1 mk)

 ………………………………………………………………………………………………

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**2.** You are provided with 10 cm3 of solution J, which contains two cations and one anion. Carry out

 the tests below and record your observations and inferences in the spaces provided.

a) Add 20 cm3of 2M aqueous sodium hydroxide to all of solution P provided. Shake well and filter

 the mixture into conical flask. Retain both the residue and filtrate.

|  |  |
| --- | --- |
| **Observations** | **Inferences** |
|  (1 mk) |  (1 mk) |

b) i) To about 2cm3 of the filtrate, add 2M Nitric acid drop wise until in excess.

 (i.e. about 1cm3 of the acid).. Retain the mixture.

|  |  |
| --- | --- |
| **Observations** |  **Inferences** |
|   |   (1 mk) |

Divide the mixture in b (i) above into two portions.

 ii) To the first portion, add aqueous sodium hydroxide drop wise until in excess.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  (1 mk)  |   (1 mk) |

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

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  (1 mk)  |   (1mk)  |
|  |  |

(c) To 2 cm3 of the filtrate, add 3 drops of Potassium iodide

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  (1 mk)  |   (1 mk) |

(d) To 2 cm3 of the filtrate, add 3 drops of acidified Barium nitrate solutions.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  (1 mk)  |   (1 mk) |

(e) To the residue in (a), add 8 cm3 of dilute nitric acid and allow it to filter into a boiling tube.

 i) To 2 cm3 of this filtrate, add aqueous ammonia drop wise until in excess.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  (1 mk)  |   (1 mk) |

**3.** You are provided with solid K. Place all the solid K in the boiling tube. Add 10 cm3 of distilled water and shake well. Divide the resulting mixture into four portions.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|  ( ½ mk)  |   (½ mk) |

a) To the first portion add 2 drops of universal indicator. Compare the result with the PH chart.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|   ( ½ mk)  |  ( ½ mk) |

b) To the second portion add two drops of Bromine water.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|   ( ½ mk)  |  (½ mk) |

c) To the third portion add drops of acidified potassium manganate (VII) solution H.

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|   (1 mk)  |  (1 mk) |

d) To the fourth portion add, a little amount of NaHCO3

|  |  |
| --- | --- |
|  **Observations** | **Inferences** |
|   (½ mk)  |  (½ mk) |