**NAME……………………………………………………….. INDEX NO……………………........................**

**233/3 CANDIDATE’S SIGN………….….….….…..**

**CHEMISTRY**

**PAPER 3 DATE……….…………………………………**

**(PRACTICAL)**

**TIME: 2¼ HOURS**



[**SERIES 1 EXAMS**](https://teacher.co.ke/notes/)

**INSTRUCTIONS TO CANDIDATES:**

* Answer **ALL** questions in the spaces provided for each question.
* You are **NOT** allowed to start working with the apparatus for the first 15 minutes

of 2¼ hours. This time enables you to read the questions and ensure you have all

the chemicals and apparatus that you may need.

* All working must be clearly shown where necessary.
* Mathematical tables and silent electronic calculators may be used.
* This paper consists of **6** printed pages. Ensure that the question paper has all the

pages and no questions are missing.

**FOR EXAMINER’S USE ONLY:**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAXIMUM** **SCORE** | **CANDIDATES** **SCORE** |
| **1** | **19** |  |
| **2** | **12** |  |
| **3** | **09** |  |
| **TOTAL SCORE** | **40** |  |

*Chemistry Paper 3 Turnover*

1. You are provided with

 - **Solution A**, a saturated solution of sodium ethanedioate, Na2C2O4 (sodium oxalate).

 - **Solution B**, aqueous potassium manganate (VII).

 - **Solution C**, 0.1M ammonium iron (II) sulphate.

 - 1M sulphuric (VI) acid.

**Procedure I**

**Fill** the burette with **solution B**.

Pipette 25cm³ of **solution C** into a conical flask and add 5cm³ of 1M sulphuric (VI) acid

using a measuring cylinder.

Titrate **solution C** using **solution B** until a **permanent pale pink** colour **just** appears.

**Repeat** the procedure and complete **table A** below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table A** | I | II | III |  |
| Final burette reading (cm³) |  |  |  |  |
| Initial burette reading (cm³) |  |  |  |  |
| Volume of B used (cm³) |  |  |  | (4mks) |

(a) Calculate the average volume of solution B used. (1mk)

(b) The reaction between manganate (VI) and iron (II) ions is shown by the ionic equation.

 ![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) ® ![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) + 3H2O(l)

 (i)Calculate the number of moles of C used. (1mk)

 (ii) Calculate the number of moles of B used. (1mk)

*Chemistry Paper 3 2*

 (iii) Calculate the number of moles of B per litre. (1mk)

**Procedure II**

 Measure the temperature of **solution A** and record it in the space provided below.

Using a measuring cylinder, measure **2cm³ of** **solution A** into a conical flask and **dilute** it by

adding 75cm³ of distilled water. **Label this solution D**.

**Fill** the burette with **solution B**. Using pipette filler pipette 25cm³ of solution D into a conical

flask and add 5cm³ of **1M sulphuric acid** using a measuring cylinder.

**Heat** the solution to about 60°C and titrate while still hot with B until a **permanent pink colour**

**just** appears. Record your results in the **table B** below. **Repeat** this procedure to complete

the table.

Temperature of solution A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ °C.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table B** | I | II | III |  |
| Final burette reading (cm³) |  |  |  |  |
| Initial burette reading (cm³) |  |  |  |  |
| Volume of B used (cm³) |  |  |  | (4mks) |

 (c) (i) Calculate the average volume of B used. (1mk)

 The reaction between manganate (VII) ions and ethanedioate ions is given by the

ionic equation below.

![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) ® ![](data:application/x-msmetafile;base64...) + ![](data:application/x-msmetafile;base64...) + 8H2O(l)

 (ii) Calculate the number of moles of manganate (VII) ions in average volume of

B used. (1mk)

*Chemistry Paper 3 3*

 (iii) Calculate the number of moles of ethandioate ions in 25cm³ of solution D. (1mk)

1. Calculate the number of moles of ethandioate ions in 100cm³ of solution D. (1mk)

(v) How many moles of ethandioate ions are in 25cm³ of solution A used? (1mk)

(vi) Given that the molecular formula of sodium ethandioate is Na2C2O4, calculate its solubility in grams per 100g of water at room temperature (Na = 23, C = 12, O = 16).

(Assume the density of solution is 1g/cm³). (2mks)

*Chemistry Paper 3 4*

2. You are provided with **solid G**. Carry out the tests below. Write your observations and inferences

in the spaces provided.

1. Place about **half** of solid G in a clean dry test tube and heat it strongly.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. Place the **remaining** solid G in a boiling tube. Add **10cm³** of distilled water. Shake the

mixture for 1 minute. **Filter** the mixture.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. **Dip** blue and red litmus papers into the filtrate.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. To about 2cm³ of **filtrate**, add 3 drops of **dilute hydrochloric acid**.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. To about 2cm³ of **filtrate**, add drops of 2M sulphuric (VI) acid.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. To about 1cm³ of filtrate, add 5cm³ of dilute sodium hydroxide **(excess)**.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

*Chemistry Paper 3 5*

3. You are provided with **liquid F**. Carry out the tests below and write your observations and

Inferences in the spaces provided.

1. Place **one drop** of liquid F on a metallic spatula and **burn** it using a Bunsen burner.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. Place about 2cm³ of the **remaining** liquid F in a test tube. Add 3cm³ of distilled water and shake the mixture well.

|  |  |
| --- | --- |
| Observation | Inference |
| (½mk) | (½mk) |

(c) (i) To about 2cm³ of the remaining liquid F, add **a small amount** of sodium

 hydrogen carbonate.

|  |  |
| --- | --- |
|  Observation | Inference |
| (1mk) | (1mk) |

1. To about 1cm³ of liquid F, add 1cm³ of **acidified potassium dichromate (VI)**.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

1. To about 2cm³ of the mixture, add two drops of **bromine water**.

|  |  |
| --- | --- |
| Observation | Inference |
| (1mk) | (1mk) |

*Chemistry Paper 3 6*