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

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

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



[**SERIES 30 EXAMS**](https://teacher.co.ke/notes/)

**233/3**

**CHEMISTRY**

**PRACTICAL**

**PAPER 3**

**Chemistry**

**Practical**

**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 15minutes of the 2 ¼ hours to ascertain you have all the chemical sand apparatus that you may need.*

**For Examiners use Only**

|  |  |  |
| --- | --- | --- |
| **QUESTION** | **MAX. SCORE** | **SCORE** |
| 1 | 13 |  |
| 2 | 10 |  |
| 3 | 17 |  |
| **TOTAL** | **40** |  |

*This paper consists of 4 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

1. ***You are provided with***

* Hydrogen peroxide solution A
* Potassium iodide solution B
* Sodium thiosulphate solution C
* Dilute sulphuric acid solution D, Starch solution E

 **You are required to show:**

 How the rate of reaction of hydrogen peroxide with potassium iodide varies with

 concentration of hydrogen peroxide.

 **Procedure:**

 Label 200ml beakers X and Y, using a clean burette, place 30.0cm3 of solution A into beaker X.

 Using 10mls measuring cylinder place 5.0cm3 of solution B into beaker Y, followed by 5.0cm3 of solution

 C, 5.0cm3 of solution D and then 2.0cm3 of solution E starch and shake the contents. Pour the contents of

 beaker X into beaker Y and start the stop clock/watch. Note the time taken for the blue colour to appear.

 Record the time in the space provided in the table below. Clean beaker Y, and repeat the procedure with

 the volume of water solutions A,B,C,D and E as shown in the table below for experiment 2 to 5.

**Table 1**

|  |  |  |  |
| --- | --- | --- | --- |
| **Beaker X** | **Beaker Y** | **Time** |  |
| **Experiment** | **Hydrogen peroxide solution A**  | **Water** | **Potassium iodide solution B** | **Sodium thiosulphate solution C** | **Dilute sulphuric (VI) acid D** | **Starch solution E** | **(t)****(sec)** | **1** **t****(sec-1)** |
| 1 | 30 | 0 | 5.0 | 5.0 | 5.0 | 2.0 |  |  |
| 2 | 25 | 5 | 5.0 | 5.0 | 5.0 | 2.0 |  |  |
| 3 | 20 | 10 | 5.0 | 5.0 | 5.0 | 2.0 |  |  |
| 4 | 15 | 15 | 5.0 | 5.0 | 5.0 | 2.0 |  |  |
| 5 | 10 | 20 | 5.0 | 5.0 | 5.0 | 2.0 |  |  |

a) Complete the table by computing it. (5mks)

b) Plot a graph of receprical of time 1 sec-1 vertical axis against volume of hydrogen peroxide used.(4mks)

 t



 c) From your graph determine the time the reaction would take if the volume of hydrogen peroxide

 used is 18.0cm3 (2mks)

 d) How does the concentration of hydrogen peroxide affect its rate of reaction with potassium iodide.

 (2mks) ………………………………………………………………………………………………………………

2. ***You are provided with:***

* Anhydrous sodium carbonate Q
* 1.0M hydrochloric acid solution R
* Thermometer

 ***You are required to determine the molar heat of solution of Q using two procedures.***

 **Procedure 1.**

 Place 50ml of distilled water in 100ml plastic beaker Note the temperature of the water and record it in

 table II below Add all the solid Q to the water in the plastic beaker and stir gently with the thermometer

 and record the final temperature of the solution in the table below. Keep the resulting solution for

 procedure (II)

|  |  |
| --- | --- |
| Final temperature /oC (T2)Initial temperature /oC (T1)Temperature change (ΔT) |  |

1. (i) What is the enthalpy change for the reaction? (assume the density of the solution is 1.0g/cm3 and

 specific heat capacity = 4.2Jg-1K-1) (2mks)

 ………………………………………………………………………………………………………………

 ………………………………………………………………………………………………………………

 **Procedure II**

 Transfer the contents of the beaker into 25ml volumetric flask. Rinse both the beaker and the thermometer

 with distilled water and add to the volumetric flask.

 Add more water to make up to the mark. Label this solution Q. Fill the burette with solution R. Pipette

 25mls of solution Q into a conical flask. Add 2-3 drops of methyl orange indicator and titrate with solution

 R from the burette.

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

 Record your readings in table (III) below. Repeat the titration two or more times. Complete the table

 below. (4mks)

 (b) Calculate the average volume of solution R used. (1mk)

 (c) Determine the number of moles of solution Q that reacted with solution R (2mks)

 (d) Calculate the number of moles of solid Q used in the procedure 1.

 (1mk)

 (e) Calculate the heat of solution of anhydrous sodium carbonate. (2mks)

3. (a) You are provided with solid S. Carry out the tests below. Record your observation and inference in the

 spaces provided. Put solid S in a clean boiling tube and add about 10mls of distilled water and shake

 well. Divided into five portions.

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

1. To the first portion add sodium hydroxide dropwise until excess

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

1. To the second portion, add 2M ammonia solution dropwise

|  |  |
| --- | --- |
| **Observations** | **inference** |
| (1½mk) | (1mk) |

 (iii)To the third portion, add 2.0cm3 of 0.5m Barium chloride followed by 5.0cm3 of 2M hydrochloric acid.

|  |  |
| --- | --- |
| **Observations** | **inference** |
| (1½mk) | (1mk) |

 (iv) To the fourth portion, add 3 drops of acidified potassium manganate (VII) solution

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

 b) You are provided with solid T. Carry out the tests below to identify the ions present.

 Put the whole of solid T into a boiling tube and add about 10mls of distilled water and shake well.

 Divided into four portions.

(i) To the first portion, add 2-3 drops of universal indicator NOTE the pH

|  |  |
| --- | --- |
| **Observations** | **inference** |
| (½mk) | (1mk) |

 (ii) To the second portion, add 2.0cm3 of sodium carbonate solution

|  |  |
| --- | --- |
| **Observations** | **inference** |
| (½mk) | (1mk) |

(iii) To the third portion add 2-3 drops of acidified dichromate (VI) solution

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

(iv) To the fourth portion, add 2.0cm3 of freshly prepared iron (II) solution

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