**KASSU JOINT EXAMINATIONS 2024**

**KENYA CERTIFICATE OF SECONDARY EDUCATION**

**CHEMISTRY**

**(PRACTICAL)**

**21/4 HOURS**

**233/3**- **-Paper 3**

**NAME…………………………………………………ADM. NO…………………CLASS………….…**

**INDEX NUMBER……………………………………. DATE……………………SIGNATURE………….**

**INSTRUCTIONS TO CANDIDATES:**

* *Write your name, admission number, index number and class in the spaces provided above.*
* *Indicate the date of exam and sign off in the spaces provided above.*
* *Answer all the questions in the spaces provided below each question.*
* *KNEC Mathematical tables and silent electronic calculators may be used.*
* *All working must be clearly shown where necessary.*
* *Candidate should take the first 15 minutes to go through the instructions.*

**FOR EXAMINER`S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE`S SCORE** |
| **1** | **22** |  |
| **2(a)** | **10** |  |
| **(b)** | **8** |  |
| **Grand Total** | **40** |  |

1. You are provided with

* **Solid A**
* **2.0M** hydrochloric acid solution **B**
* **0.1M** Sodium hydroxide solution **D**

You are required to determine the enthalpy change **∆H**. for the reaction between solid **A** and one mole of hydrochloric acid.

**Procedure 1**

Using a burette, place 20.0cm3 of 2.0M hydrochloric acid, solution **B** in a 100ml beaker. Measure the temperature of the solution after every half-minute and record the values in **table 1**. At exactly **2 minutes**, add all of solid **A** to the acid. Stir the mixture gently with thermometer. Measure the temperature of the mixture after every **half-minute** and record the values in **table 1.** **Retain the mixture for use in** **Procedure II.**

**Table 1 (5marks)**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (min) | 0 | 1/2 | 1 | 11/2 | 2 | 21/2 | 3 | 31/2 | 4 | 41/2 | 5 |
| Temperature (c) |  |  |  |  |  |  |  |  |  |  |  |

1. Plot a graph of temperature (y-axis) against time. **(3marks)**
2. Using the graph determine the change in temperature, **∆T (1mark)**

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1. Calculate the heat change for the reaction. (Assume that the specific heat capacity of the mixture of the mixture is 4.2Jg-1K-1 and the density of the mixture is 1g/cm3). **(2marks)**

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**Procedure II**

Rinse the burette thoroughly and fill it with sodium hydroxide solution **D**. Transfer all the contents of the 100 ml beaker used in **procedure 1** into a 250ml volumetric flask. Add distilled water to make up to the mark. Label this **solution C**. Using pipette and a pipette filler, place **25.0 cm3** of solution C into a 250ml conical flask. Add two or three drops of phenolphthalein indicator and titrate against sodium hydroxide until a permanent pink colour just appears. Record your results in table. Repeat titration **two more times** and complete table 2.

**Table 2**  **(4marks).**

|  |  |  |
| --- | --- | --- |
| I | II | III |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Average volume **of D used** (cm3) |  |  |  |

Calculate the:

1. Average volume of sodium hydroxide **solution D** used. **(1mark)**

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1. The number of mole of:
2. Sodium hydroxide **solution D used.** **(1mark)**

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1. Hydrochloric acid in **25** cm3 of solution **C**. **(1mark)**

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1. Hydrochloric acid in **250** cm3 of solution **C**. **(1mark)**

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1. Hydrochloric acid in 20.0 cm3 of solution **B**. **(1mark)**

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1. Hydrochloric acid that reacted with sold **A**. **(1mark)**

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1. Calculate the **Molar enthalpy** of reaction between solid **A** and one mole of hydrochloric acid.

(**2marks)**

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1. (I) You are provided with **solid Q**. Carry out the tests below and record your observations

and inferences in the spaces provided.

1. Strongly heat a spatula-end full of **solid Q** in a dry test tube.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1mark)** | **(1/2mark)** |

1. (i) Place the remaining **solid Q** in a boiling tube. Add 10 cm3 of distilled water. Divide the solution into five portions.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1/2mark**) | **(1mark)** |

(ii) To the first portion, add universal indicator solution.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1/2mark)** | **(1/2mark)** |

1. To the second portion, add aqueous lead (II) nitrate solution.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1/2mark)** | **(1mark)** |

1. To the third portion, add dilute nitric (V) acid followed by barium nitrate solution..

|  |  |
| --- | --- |
| Observation | Inference |
| **(1mark)** | **1/2mark)** |

1. To the forth portion, add few drops of sodium hydroxide until in excess.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1mark)** | 1. **mark)** |

1. To the firth portion, add few drops of aqueous ammonia until in excess.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1 mark)** | 1. **mark)** |

**(II)** You are provided with **solid R.** carry out the tests below and record your

observations and inferences.

1. Place a spatula-end full of **solid R** in dry boiling tube and add about 10 cm3 of distilled water. Shake thoroughly and divide the solution into **five** portions.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1 mark)** | **(½ mark)** |

1. (i) Test the first portion with the universal indicator solution provided.

|  |  |
| --- | --- |
| Observation | Inference |
| **(½ mark)** | **(½ mark** |

(ii) to the second portion, add a few drops of acidified potassium manganate (VII) solution.

|  |  |
| --- | --- |
| Observation | Inference |
| **(½ mark)** | **(1 mark)** |

1. To the third portion, add few drops of bromine water.

|  |  |
| --- | --- |
| Observation | Inference |
| **(½ mark)** | **(½ mark)** |

1. To the fourth portion, add all the sodium hydrogen carbonate provided.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1 mark)** | **(1mark)** |

1. To the fifth portion in a boiling tube, add 5cm3 of ethanol followed by few drops of concentrated sulphuric (VI) acid. Warm the mixture.

|  |  |
| --- | --- |
| Observation | Inference |
| **(1/2 mark)** | **(1/2 mark)** |

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