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

**Candidate’s Signature: …………..…………........ Class: ………………………………….. Date:……………………………………………**

**233/3**

**CHEMISTRY**

**Paper 3**

**PRACTICAL**

**Oct 2024**

**Time: 2 ¼ Hours**

**MOI GIRLS’ HIGH SCHOOL – ELDORET**

***Kenya Certificate of Secondary Education (KCSE)***

**Form Four Trial Examinations**

233/3

CHEMISTRY

Paper 3

PRACTICAL

**Instructions to Candidates**

* *Write your name and index number in the spaces provided above.*
* *Sign and write the date of the examination.*
* *Answer* ***all*** *the questions in the spaces provided in the question paper.*
* *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 that you may need.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *Mathematical tables and silent electronic calculators may be used.*

**FOR EXAMINER’S USE ONLY**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum Score** | **Candidate’s Score** |
| 1 | 18 |  |
| 2 | 10 |  |
| 3 | 12 |  |
| **Total Score** | **40** |  |

1. You are provided with:

* Solid A
* 2M hydrochloric acid solution B
* 0.1M Sodium hydroxide

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

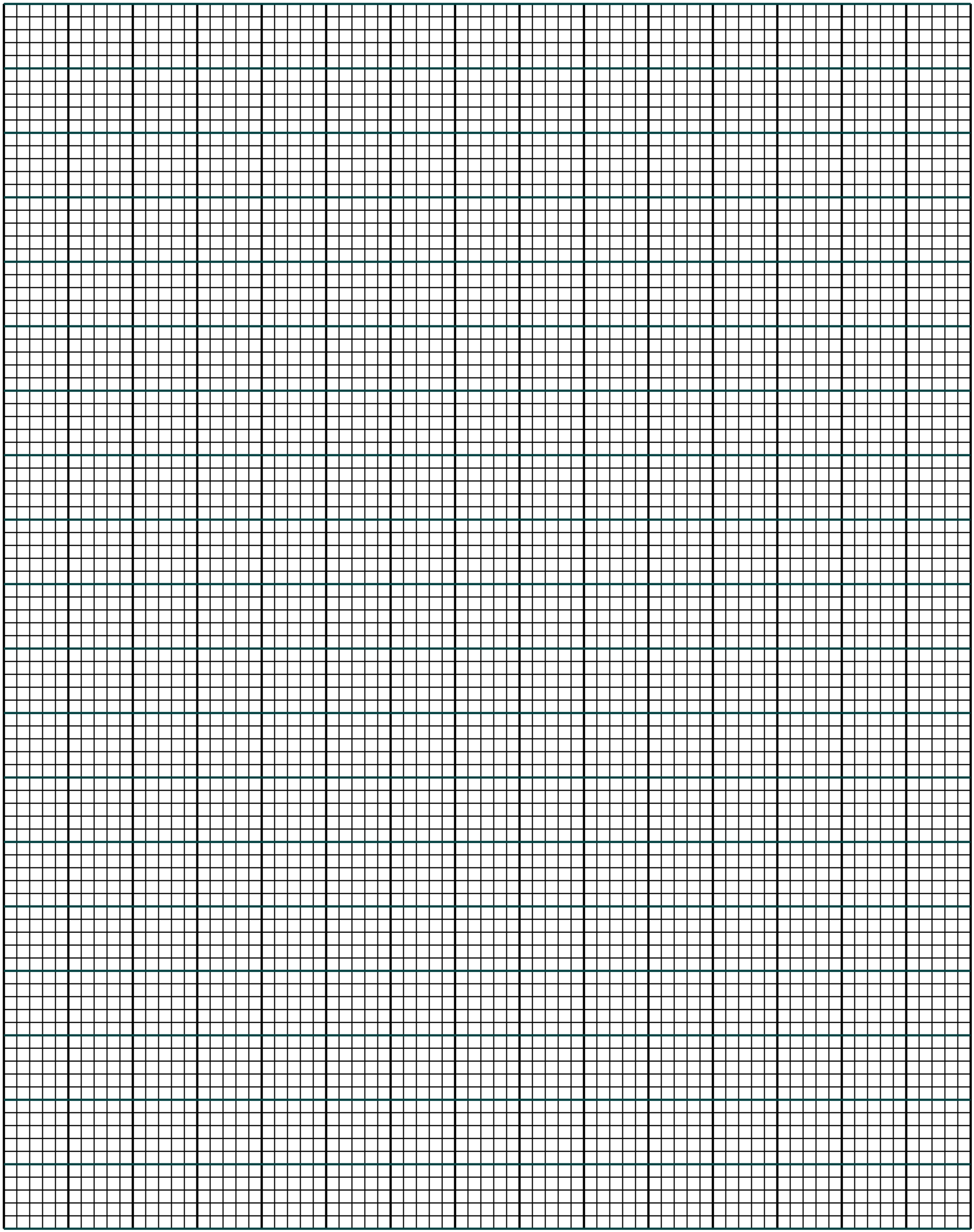
**Procedure I**

* Using a burette, place 20.0cm3 of 2M hydrochloric acid solution B into a 100ml plastic beaker.
* Measure the temperature of the solution after every half minute and record the values in table I below.
* At exact 2 minute add all of solid A to the acid, stir the mixture gently with the thermometer and measure the temperature of the mixture after every half minute and record the values in table I. (**Retain the mixture for use in procedure II)**

Table 1 (3 marks)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (min) | 0 | ½ | 1 | 1½ | 2 | 2½ | 3 | 3½ | 4 | 4½ | 5 |
| Temperature (°C) |  |  |  |  | X |  |  |  |  |  |  |

1. Plot a graph of temperature (Y-axis) against time (3 marks)



1. Using the graph, determine the change in temperature (1 mark)
2. Calculate the heat change for the reaction (C = 4.2J/g/k, density of solution = 1g/cm3) (1 mark)

**Procedure II**

Fill the burette with sodium hydroxide upto 0.0 mark

* Transfer all the content of the 100ml beaker used in procedure I into 250ml volumetric flask. Add distilled water upto the mark. Label it solution C
* Using a pipette, place 25cm3 of solution C into 250ml conical flask, add two or three of phenolphthalein indicator and titrate against sodium hydroxide.
* Record your results in table 2. Repeat the titration two more times and complete the table below.

1. Table 2 (3 marks)

|  |  |  |  |
| --- | --- | --- | --- |
|  | I | II | III |
| Final burette reading |  |  |  |
| Initial burette reading |  |  |  |
| Volume of NaOH |  |  |  |

1. Calculate;
2. Average volume of sodium hydroxide used (1 mark)
3. The number of moles of;

I Sodium hydroxide used (1 mark)

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

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

IV Hydrochloric acid in 20cm3 of solution B (1 mark)

V Hydrochloric acid that reacted with solid A (1 mark)

1. Calculate the enthalpy of reaction between solid A and one mole of hydrochloric acid. (1 mark)

2. You are provided with an organic compound labelled solid L. Use it to answer questions that follow.

1. Place half filled spatula of solid L into a boiling tube and add all the **absolute** **ethanol** provided, shake the mixture thoroughly. Divide the resulting solution into 3 portions of about 2cm3.
2. To the 1st portion add half filled spatula of sodium hydrogen carbonate provided.

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

1. The 2nd portion. Determine the pH.

|  |  |
| --- | --- |
| Method (1 mark) | Inference (1 mark) |
|  |  |

1. To the 3rd portion add 3 drops of acidified potassium manganate VII.

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

1. Place the remaining solid L into a boiling tube add 10cm3 of water and boil the mixture. Divide the solution formed while hot into 3 portions of about 2cm3.
2. To the 1st portion add the remaining sodium hydrogen carbonate

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

1. To the 2nd portion add 3 drops of acidified potassium manganate VIII

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

1. To the 3rd portion add 3 drops of bromine water

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

3. You are provided with solid M. Use it to answer questions that follow, record your observations and inferences in the spaces provided.

1. Heat half filled spatula of solid M into a dry test tube heat it strongly and test any gases produced using litmus papers.

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

1. Transfer the remaining solid M into a clean boiling tube, add about 15cm3 of water and shake. Retain the solution for use in part (c)

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

1. Divide the solution formed into 4 portions of about 2cm3 each.
2. To the 1st portion add NaOH dropwise until in excess.

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

1. To the 2nd portion add 3 drops of Barium chloride

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

1. To the 3rd portion add all the chlorine water provided (source of chlorine). Retain the solution for use in test (iv)

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

1. To the solution formed in test (iii) above add 3 drops of starch solution

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