CANDIDATE NUMBER: _____

CENTRAL EAST EDUCATION DIVISION

2023 MALAWI SCHOOL CERTIFICATE OF EDUCATION
MOCK EXAMINATION

CHEMISTRY

Tuesday, 28th March

Subject Number: M036/I

Time allowed: 2 hours

8:00 -10:00 a.m.

PAPER I

(100 marks)

Instructions

1. **This paper contains 10 printed pages. Please check.**
2. Fill your **Examination Number** at the top of each page.
3. This paper contains two sections **A** and **B**. In **Section A,** there are **ten** short answer questions while in **section B** there are **three** restricted essay questions**.**
4. Answer all the **thirteen questions** in the spaces provided.
5. Use of electronic calculators is allowed.
6. The maximum number of marks for each answer is indicated against each question.
7. In the table provided on this page, ***tick*** against the question number you have answered.

Question Number	Tick questions answered	Do not write in these columns	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
Total			

TURN OVER!

SECTION A : (70 MARKS)

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Answer ***all*** questions

1a. Define a "***pure substance***"

_____

_____**(1 mark)**

b. **Table1** shows substances **A, B, C, D** and **K** with their relative flow values **(R_f)**

Table 1

Substance	**Relative flow values (R_f)**
A	0.2, 0.7, 0.8
B	0.35
C	0.65, 0.4
D	0.85
K	0.81, 0.10

i. Classify the substances in the table above as "**pure"** or "**impure**".

1) ***pure substances***: _____

2) ***impure substances***: _____ **(5 marks)**

ii. Work out the distance moved by the solvent front in substance **D** if the distance moved by the substance is 40mm.

(3 marks)

c. Describe how we can test hydrogen gas.

_____

_____

_____ (**2 marks)**

2a. Distinguish ***oxidation reaction*** from ***reduction reaction*** in terms of electron transfer.

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_____**(2 mark)**

b. The following is a chemical equation for the reaction between magnesium, Mg and silver nitrate, $AgNO_3$.

$Mg_{(s)} + 2AgNO_{3(aq)} \longrightarrow Mg(NO_3)_{2(aq)} + 2Ag_{(s)}$

(i) Write oxidation half equation.

_____ **(2 marks)**

(ii) Identify a reducing agent in **2b.**

_____ **(1 mark)**

(iii) Work out the oxidation number of Cr in dichromate ion, $Cr_2O_7^{2-}{}_{(aq)}$

(2 marks)

3a.i. Define an acid according to the **Lowry – Bronsted theory**.

_____

_____ **(1 mark)**

ii. Identify acid – base conjugates pairs in the equation below.

$HCl(aq) + H_2O(l) \longrightarrow H_3O^+(aq) + Cl^-(aq)$

1) _____

2) _____ **(2 marks)**

b. Complete the equation by filling in conjugate acid and base.

$CH_3COOH(aq) + H_2O(aq) \rightleftharpoons$ _____ + _____

(2 marks)

4a. Define the term "***rate of reaction***".

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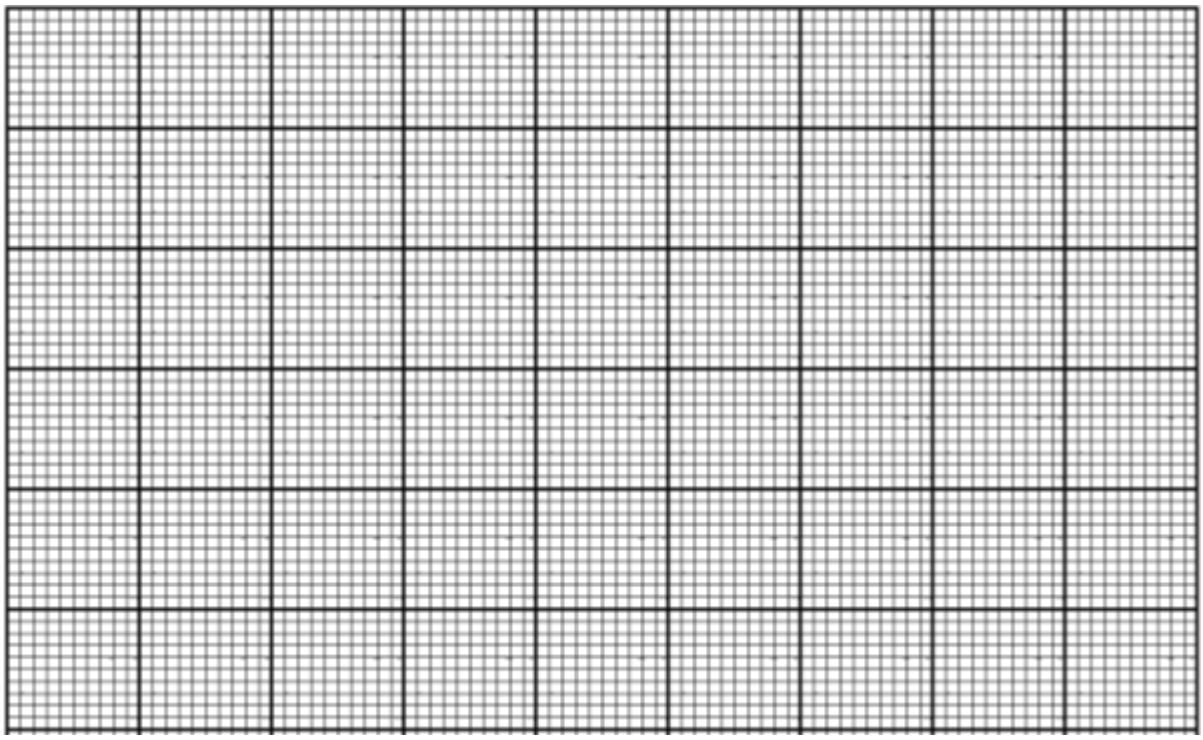
_____ **(1 mark)**

b. **Table 2** below shows the volume of gas produced during a certain reaction within a specified time. Use it to answer the questions that follows:

Table 2

Volume of gas produced (cm^3)	0	15	27	28	30	30
Time (s)	0	5	20	25	30	45

(i) Plot the graph of volume of gas produced against time in seconds.



(4 marks)

(ii) Calculate the rate of reaction after 5 seconds.

(2 marks)

5a. Draw a structure of pentanol **($C_5H_{11}OH$)** showing a tertiary alcohol.

(2 marks)

bi. Complete the following chemical reaction.

$CH_3CH_2COCH_2 + NaHSO_3 \rightarrow$

(1 mark)

(ii) Name the type of the reaction.

_____ **(1 mark)**

6a. State the difference between an ***isomer*** and a ***conformer***.

_____

_____

_____ **(2 marks)**

b. Write any ***three*** isomers of pentanoic acid and name them using IUPAC naming rules.

(6 marks)

7a. Give any **two** properties of thermosetting plastics.

_____

_____ **(2 marks)**

b. Explain why thermosoftening plastics melt when subjected to heat.

_____

_____**(2 marks)**

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8a. Define the term "***greenhouse gases***".

_____
_____ **(1 mark)**

b. Mention ***any two*** examples of greenhouse gases

_____
_____
_____ **(2 marks)**

c. Give any ***two*** benefits of recycling.

_____
_____ **(2 marks)**

d. Explain how hot water from industries pollute water?

_____
_____
_____ (**2 marks)**

9. **Figure 1** is a diagram of atomic nuclei of elements **K** and **M**.

K **M**

Figure 1

a.i. Name the type of bonding that exits between **M** and **K**
_____ **(1 mark)**

ii. Explain how metallic bond is formed.

_____
_____
_____ **(3 marks)**

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iii. Outline any ***three*** properties of the compound formed in **9a.**

_____

_____

_____

_____ **(3 marks)**

b. i. Define the term "***alloy***".

_____

_____**(1 mark)**

ii. Give any ***two*** properties of stainless steel as an alloy.

_____

_____ **(2 marks)**

c.i. Explain why carbon element is regarded as an allotrope.

_____

_____ **(1 mark)**

ii. Mention any ***two*** properties of silicon dioxide.

_____

_____

_____ **(2 marks)**

10a. Define the term "***limiting reagent***".

_____

_____ **(1 mark)**

b. Urea, $(NH_2)_2CO$ is prepared by reacting ammonia with carbon dioxide in the following chemical equation.

$$NH_3(g) + CO_2(g) \rightarrow (NH_2)_2CO(aq) + H_2O(l)$$

In one process, 637.2g of NH_3 is treated with 1142g of CO_2.

Determine the limiting reagent in the reaction. (RAM: N =14, C =12, O =16, H = 1)

(3 marks)

SECTION B : (30 Marks)

11. With an aid of a flow chart, describe an Ostwald process including necessary chemical equations.

(10 marks)

12a. Define the term "**standard solution**".

_____

_____ **(1 mark)**

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b. Explain how 500cm^3 of a **0.2 M** sodium Chloride solution can be prepared using sodium chloride crystals. The explanation should include all the necessary mathematical calculations. (Relative atomic mass of Na = 23 and Cl = 35.5).

_____ **(9 marks)**

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13. Describe an experiment that could be done to prepare soap in the laboratory.

_____ **(10 marks)**

END OF QUESTION PAPER!