NAME:_____ SCHOOL:_____

2024 M036/I

NSANJE DISTRICT MOCK

MALAWI SCHOOL CERTIFICATE OF EDUCATION EXAMINATION

CHEMISTRY

Subject Number: M036/I

Tuesday, 26 March

Time Allowed: 2 hours

8:00-10:00 am

PAPER I

(100 marks)

Theory

Instructions

1. **This paper contains 14 printed pages. Please check.**
2. This paper contains **two** sections, **A** and **B.** Section **A** consists of **nine** short answer questions while in **Section B** there **three** restricted questions.
3. Answer **all** the **twelve** questions in the spaces provided. The maximum number of marks for each answer is indicated against each question. A pencil should be used for all drawings.
4. Write your **Name and School Name** at the top of each page of your question paper in the spaces provided.
5. Use of electronic calculator is allowed.
6. In the table provided on this page, **tick** against the question number you have answered.

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

Section A (70 marks)

Answer **all** questions in this section in the spaces provided.

1. The following are formulae of some organic compounds:

   A. CH_3COCH_3

   B. CH_3CHO

   C. $CH_3CH_2CH_2COOH$

   D. $CH_3CH_2CH=CH_2$

   a. What homologous series does A belong to?

   _____

   (1 mark)

   b. Name compound B.

   _____

   (1 mark)

   c. Which compound conducts electricity?

   _____

   (1 mark)

   d. Give a reason for your answer in **1. (c)** above.

   _____

   _____

   (2 marks)

2. a. Define oxidation number.

   _____

   _____

   _____

   (1 mark)

Continued/...

b. What is the oxidation number of **Cr** in $\mathbf{Cr_2O_2^{2-}}$?

(2 marks)

c. Magnesium reacts with copper (II) sulphate solution according to the equation:

$$Mg(s) + CuSO_4(aq) \longrightarrow MgSO_4(aq) + Cu(s)$$

(i). Write down half equations

Oxidation: _____

(1 mark)

Reduction:_____

(1 mark)

(ii). Identify oxidizing agent _____

(1 mark)

d. Explain one application of precipitation reaction in our everyday life

_____

_____

_____

_____

(2 marks)

Continued/...

3. The equation below shows how ammonia is produced. Use it to answer the question that follows:

$$N_2\ (g) + 3H_2\ (g) \rightleftharpoons 2NH_3\ (g) \quad \Delta H = -92Kj/mol$$

a. Name the process above

_____

(1 mark)

b. According to the Le Charteliers principle what will happen to the reaction when

(i). pressure is increased

_____

_____

_____

(1 mark)

(ii). Temperature is increased -

_____

_____

_____

(1 mark)

c. Draw energy level diagram for the reaction.

(3 marks)

Continued/...

4. a. What is the difference between oxidation and reduction in terms of oxidation number?

_____

_____

_____

_____

(2 marks)

b. Explain how each of the following prevents rusting of iron

i. Sacrificial protection

_____

_____

_____

(1 mark)

ii. Galvanizing

_____

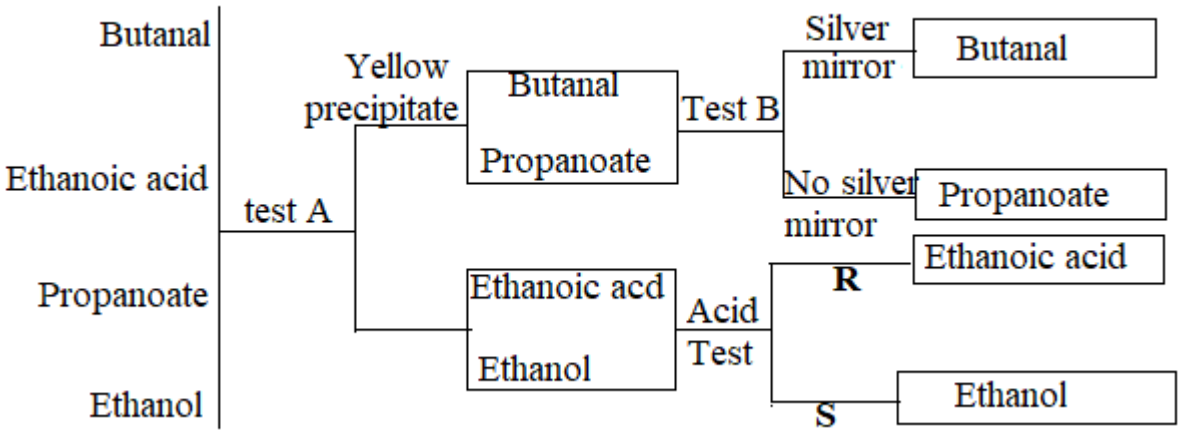
_____

_____

(1 mark)

Continued/...

5. **Figure 1** shows a flow diagram used to identify unknown organic compounds.



(a). Name the following

(i). Test A _____ **(1 mark)**

(ii). Substance used in test B _____ **(1 mark)**

(iii) Result S _____ **(1 mark)**

b. (i). State the difference between functional isomerism and chain isomerism.

_____

_____

_____

_____

(2 marks)

Continued/...

(ii). Write down **two** functional isomers of a compound with molecular formula

$C_3\ H_6O$.

(4 marks)

6. a. Describe any three benefits of recycling

(i)._____

_____

(ii)._____

_____

(iii)._____

_____

(3 marks)

Continued/...

b. Discuss any **two** ways of reducing the effects of global warming.

i._____

_____

ii._____

_____

(2 marks)

7. Oxides are classified as basic, acidic and amphoteric oxides.

a. Explain the term 'amphoteric oxides'

_____

_____

(2 marks)

b. State any two examples of amphoteric oxides

i._____

(1 mark)

ii._____

(1 mark)

c. Describe how neutralization reaction is applied in dental care?

_____

_____

(2 marks)

8. a. Outline the similarity between a hydrogen bond and an ionic bond.

_____

(1 mark)

Continued/...

b. A condensation polymer can be made from the following monomers.

$HOOC(CH_2)_4COOH$ and $H_2N(CH_2)_6NH_2$. Draw the structural formula of this polymer.

(2 marks)

9. a. Define 'electrolysis'

_____

_____

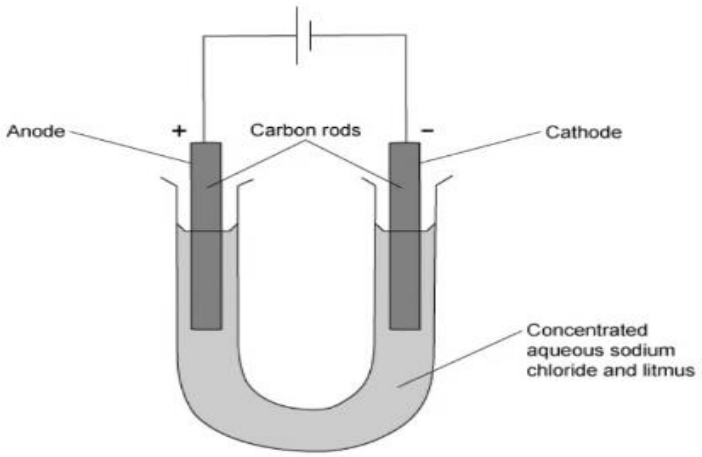
_____

_____

(2 marks)

Continued/...

b. A concentrated solution of sodium chloride was electrolysed using the apparatus below:



One observation noted was that the universal indicator turned purple at the negative electrode

i. What observation would be made at both electrodes?

_____

_____

_____

_____

(2 marks)

ii. Why did the indicator turn purple at negative electrode?

_____

_____

_____

(1 mark)

Continued/...

10. a. Calculate the percentage yield of iron in a reaction where 67.3 g of iron (III) oxide reacts with excess of carbon monoxide to produce 41.8 g of iron according to the equation:

Fe_2O_3 (s) + 3CO (g) $\longrightarrow$ 2Fe (s) + $3CO_2$ (g)

(Fe =56, C =12, O = 16)

(4 marks)

b. The reaction below shows formation of a salt by precipitation

NaCl (aq) + $AgNO_3$ (aq) $\longrightarrow$ AgCl (s) + $NaNO_3$ (aq)

i. Write the net ionic equation for the reaction above?

_____ **(2 marks)**

ii. Identify the spectator ions in the reaction

_____

(1 mark)

iii. Apart from the method above, give any other two methods of preparing salts

_____

_____

(2 marks)

Continued/...

Section B (30 marks)

11. a Describe an experiment that could be done to distinguish octane from octane.

_____

_____

_____

_____

(4 marks)

b. A hydrocarbon contains 92.3% of carbon. Work out the empirical formula of this hydrocarbon.

(4 marks)

c. The relative molecular mass of this hydrocarbon was found to be 78. Work out its molecular formula. (Ar: H=1, C= 12)

(2 marks)

Continued/...

12. With the aid of chemical equations, explain how sulphuric acid produced by contact process.

(10 marks)

Continued/...

13. Describe an experiment that could be carried out to construct the displacement table for the following metals: iron, copper, zinc and magnesium using iron sulphate solution, copper sulphate solution, zinc sulphate solution and magnesium sulphate solution. In your description, show all the material you may need.

(10 marks)

END OF QUESTION PAPER

NE: This paper contains 14 pages.