STUDENT NAME _____ **SCHOOL**_____

MWANZA DISTRICT EXAMINATIONS BOARD

2024 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATIONS

CHEMISTRY

Subject Number: M038/I

Thursday, 26 March

Time Allowed: 2 hours

8:00 am-10:00 am

PAPER I

THEORY

(100 marks)

Instructions

1. **This paper contains 11 printed pages. Please check.**
2. Fill in your **Examination Name** and **School** 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 **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 number of question 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			

Section A (70 marks)
Answer **all** the questions in this section

1. a. Mention a chemical waste that is disposed of in lead boxes.

_____

(1 mark)

b. In which stage of a scientific investigation is the hypothesis accepted or rejected?

_____

(1 mark)

c. Describe how aqueous potassium bromide and potassium iodide could be distinguished.

_____

_____

_____

_____

(4 marks)

d. Workout the percentage of water of crystallization in $FeSO_4.7H_2O$. (RAMs Fe = 56, S = 32, O = 16, H = 1)

(3 marks)

2. a. Mention **two** types of covalent bonds.

_____

_____

(2 marks)

b. Explain why most covalent compounds are gaseous at room temperature.

_____

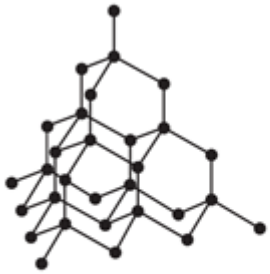
_____

_____

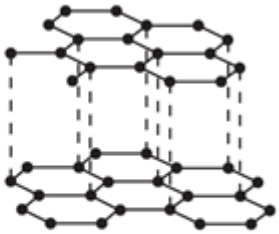
_____

(2 marks)

c. **Figure 1** shows structures of giant molecules of carbon **A** and **B**.



A



B

Figure 1

(i) Which property of carbon is displayed in the structures?

_____

(1 mark)

(ii) Which structure does **not** conduct electricity? Explain.

_____

_____

_____

_____

(3 marks)

3. a. Mention the main source of phosphorus.

_____

(1 mark)

b. Explain how sulphur is used in vulcanization process.

_____

_____

(2 marks)

c. Explain the significance of oxidation numbers of atoms.

_____

_____

(2 marks)

d. Calculate the mass of 5.1×10^{24} particles of urea ($CO(NH_2)_2$) . (RAMs C=12, O=16, N=14, H=1)

(4 marks)

4. Iodine and chlorine react according to the following chemical equation:

$$I_2 + Cl_2 \longrightarrow 2ICl$$

a. Given the bond energies below, calculate the net heat energy of the reaction.

Bond	**Energy (kJ/mol)**
I-I	151
C*l*- C*l*	242
I - C*l*	208

(3 mark)

b. Draw an energy level diagram for the reaction.

(3 marks)

5. a. Mention any **two** uses of alkanoates.

_____

_____

(2 mark)

b. Wine contains ethanol. A glass of wine was found to have a sour taste.

(i) What chemical reaction is responsible for the sour taste?

_____

(1 mark)

(ii) Write a balanced equation for the reaction.

(3 marks)

6. a. Define the term 'hard water'.

_____

_____

(1 mark)

b. Using chemical equations, describe how burning of fuels increases acidity soil.

_____

_____

_____

_____

_____

_____

_____

(5 marks)

7. a. Draw the structure of a secondary alkanol with four carbon atoms.

(2 marks)

b. **Figure 2** shows a polymer.

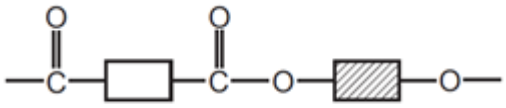


Figure 2

(i) What kind of polymerisation is used for the production of the polymer?

_____

(1 mark)

(ii) Which simple molecule is removed when the polymer is formed?

_____

(1 mark)

(iii) Mention any **two** uses of the polymer.

_____

_____

(2 marks)

8. a. The reactivity of zinc, lead and magnesium metals is follows:

magnesium	most reactive
zinc	↓
lead	least reactive

Complete the table below by writing 'reaction' or 'no reaction'.

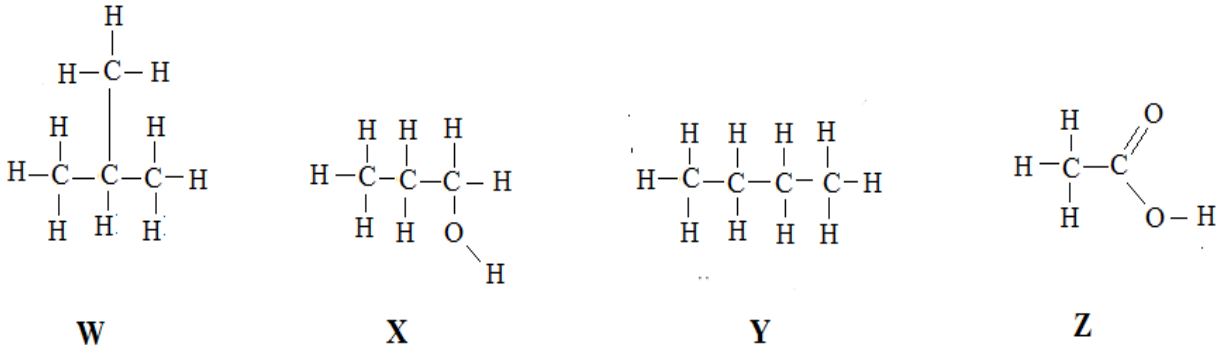
	metal		
aqueous solution	lead	magnesium	zinc
lead(II) nitrate			
magnesium nitrate			
zinc nitrate			

(3 marks)

b. The empirical formula of an organic compound is CH_2O. Find the molecular formula of the compound if its molar mass is 60 g. (RAMs for C = 12, H = 1, O = 16)

(3 marks)

9. Figure 3 shows structures of organic compounds **W**, **X**, **Y** and **Z**.



W **X** **Y** **Z**

Figure 3

a. Identify structures which are isomers. Give reason.

_____

_____

(2 marks)

b. Give the IUPAC name of **W**.

_____

(1 mark)

c. Draw the structure of a compound formed when **X** reacts with **Z**.

(3 marks)

d. What name is given to the process by which the compound drawn in c. above is produced?

_____

(1 mark)

10. a. Define the term 'greenhouse gases'.

_____

_____

(1 mark)

b. Explain how electrifying home mitigate global warming.

_____

_____

_____

(2 marks)

c. Describe the importance of physical treatment of waste.

_____

_____

_____

_____

_____

(3 marks)

SECTION B (30 marks)

Answer **all** the questions in this section

11. a. Using chemical equations, explain how nitric acid is prepared by oxidation of ammonia.

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(6 marks)

b. Describe how insoluble salts formed by precipitation can be purified.

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_____

(4 marks)

12. Using a well-labelled diagram, describe the electrolysis of aqueous sodium iodide solution. In the description, include ions present at each electrode, ions that will be discharged and the overall chemical equation.

(10 marks)

13. A student was provided with water from rain, borehole, lake and river in separate containers. Describe an experiment that could be carried out to rank the sources of water in order of their hardness.

(10 marks)

END OF QUESTION PAPER

NB: This paper contains 11 printed pages

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