NAME: _____ **CLASS:** _____

MZUZU DIOCESE

2022 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION

CHEMISTRY

Subject Number: M038/I

Wednesday, 13th July **Time Allowed: 2 hours**

01:30 – 03:30pm

PAPER I (100 marks)

Theory

Instructions:

1. **This paper contains 14 printed pages. Please check.**
2. There are **two** sections in this paper; **A** and **B**.
3. Answer **all** questions in **all** sections.
4. Write your **Name** on top of each page of your question paper.
5. 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			

Section A (70 marks)

Answer **all** questions in this section.

1. a. State two ways of presenting data for easy interpretation.

_____

_____

(2 marks)

b. Observing laboratory safety rules is important in chemistry.

i. Name two safety equipment that should be worn when using acids

_____

_____

(2 marks)

ii. What should you do if acids spill on your skin?

_____

_____

(2 marks)

c. State two ways of disposing laboratory wastes.

_____

_____

(2 marks)

2. Phosphoric acid is manufactured from calcium phosphate according to the following equation.

$$Ca_3(PO_4)_{2\,(s)} + H_2SO_{4\,(l)} \longrightarrow H_3PO_{4\,(aq)} + CaSO_{4\,(s)}$$

a. Balance the equation.

(3marks)

b. Calculate the mass in kg of phosphoric acid that would be obtained if 155kg of calcium phosphate reacted completely with the acid. (Ca = 40, P =31, S = 32, O =16, H=1)

(4 marks)

3. a. Define an acid according to Lowry-Bronsted theory.

_____

_____

(1mark)

b. Outline any **two** properties of a base.

_____

_____

(2marks)

c. Complete the following by writing the conjugate acid-base

i. H_2SO_4 + NH_3 _____ + _____

ii. HNO_3 + H_2O _____ + _____

(4 marks)

d. State one advantage of using the universal indicator to identify acids and bases over other indicators in the laboratory.

_____

_____

(1 marks)

4. An certain element could be represented as

$$^{28}_{14}X$$

a. Find the number of

(i) neutrons

_____

(1 mark)

(ii) electrons in the outermost energy level

_____

(1 mark)

b. (i) To which group of the periodic table does X belong?

_____

(1 mark)

(ii) Give a reason for your answer.

_____

(1 mark)

5. a. What do you understand by term isomerism

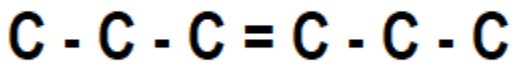
_____

_____

(1 mark)

b. Name the following isomers

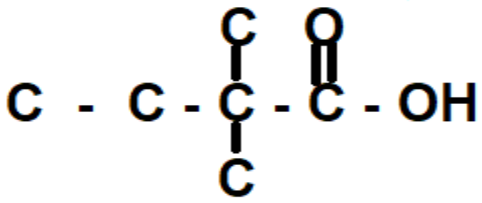
(i)



_____

(1 mark)

(ii)



_____

(1 mark)

c. Using the structures of monomer, show how polyvinylchloride (PVC) is formed.

(3 marks)

c. What type of polymer is PVC?

_____

(1 mark)

6. **a** Define the term allotropy

_____

_____

(1 mark)

b. Give a reason why graphite is able to conduct electricity?

_____

_____

_____

(2 marks)

c. State any two uses of diamond and for each use give a reason why diamond is a suitable material for that.

_____

_____

_____

_____

(4 marks)

d. Name any two chemical properties of ionic compounds

_____

_____

(2 marks)

7. a (i) Give the importance of ozone layer.

_____

_____

(1mark)

b. Write any **two** effects of global warming.

_____

_____

_____

(2marks)

c. Explain term ion exchange in relation to removal of permanent water hardness

_____

_____

_____

(2marks)

8. a. Study the chemical equation below and use it to answer questions that follow:

$$Fe(s) + CuSO_4(aq) \longrightarrow FeSO_4(aq) + Cu(s)$$

.

i. Write oxidation half equation for the reaction.

_____

(1mark)

ii. Write reduction half equation for the reaction.

_____

(1 mark)

iii. Write the net ionic equation for the reaction

_____

(1 mark)

b. Use the E^0 values given to answer the the questions that follow

Electrode reaction	E^0 (volts)
$Cu^{2+}(aq) + 2e^- \longrightarrow Cu(s)$	+0.34 V
$Fe^{2+}(aq) + 2e^- \longrightarrow Fe(s)$	- 0.44 V

i. Calculate the electromotive force for the electrochemical cell $Fe(s)|Fe^{2+}(aq)||Cu^{2+}(aq) | Cu(s)$

(3 marks)

b. Will the reaction in 4 (a) above take place. Give a reason for answer.

_____

_____

(2 marks)

9. a Define the term molarity

_____

_____

(1 mark)

b. (i) Define the term retention flow value as used in chromatography.

_____

_____

(1 mark)

(ii) Expain how you can test for water in anhydrous cobalt(II) chloride($COCL_2$).

_____

_____

_____

(3 marks)

10.a Explain how surface area of reactants affects the rate of reaction.

_____

_____

_____

(2 marks)

b. Draw the heat energy level diagram for the reaction below:

$C_{(s)} + H_2O(l) \longrightarrow CO_{(g)} + H_2(g) : \Delta H = +132kJ$

(3 marks)

(ii) Identify the type of reaction 10 b(i)

_____

(1 mark)

Section B (30 Marks)

11.a.Illustrate the **dative bond** using Ammonium ion (NH_4^+).

(3 marks)

b) 20g of sodium hydroxide pellets were dissolved in water to make 400cm3 of solution. 100cm3 of 2M sodium hydroxide solution was added to this solution. What is the molarity the solution? (Na = 23, O =16, H =1)

(7 marks)

12. With the aid of a well labelled diagram, explain how the electrolysis of concentrated sodium chloride solution occurs. In your explanation,. Include the half equations.

(10 marks)

13. a) With the aid of a well labelled diagram, explain how ethanol is prepared in the laboratory by fermentation of glucose.

_____

_____

_____

_____

_____

_____

_____

_____

(7marks)

b) Write the chemical equation for the reaction above.

_____

(3 marks)

END OF QUESTION PAPER

NB: This paper contains 14 printed pages.