

MZUZU DIOCESE**2019 MALAWI SCHOOL CERTIFICATE OF EDUCATION MOCK EXAMINATION****CHEMISTRY****PAPER I**

(100 marks)

DATE: 3 APRIL 2019**Time Allowed: 2hrs****07:30 – 09:30 am****Instructions:**

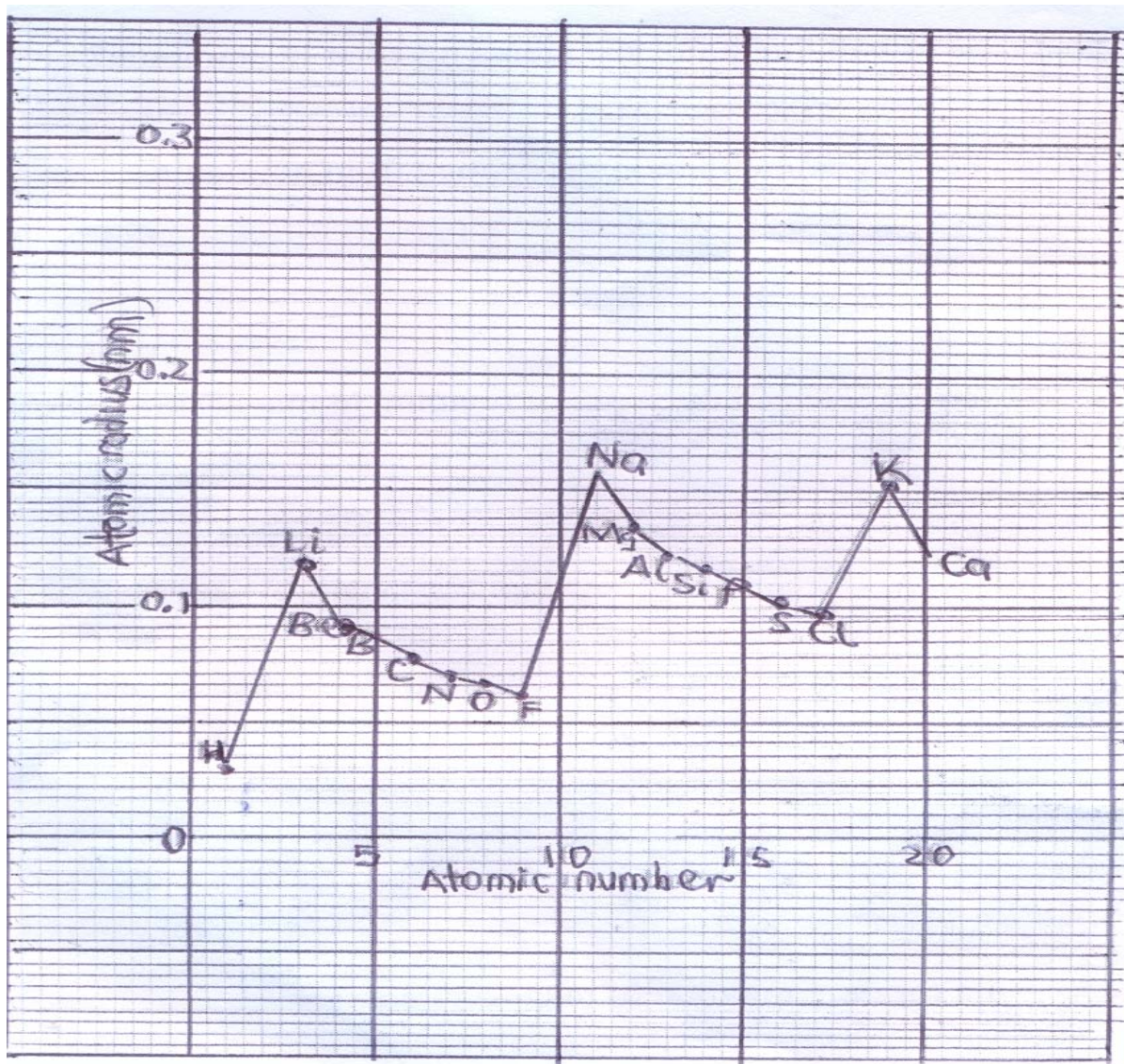
1. This paper contains 14 pages. Please check.
2. Fill in your **Name** at the top of each page.
3. This paper contains two sections A and B. In section A there are ten short answer questions while in section B there are three restricted Essay questions..
4. Answer all the thirteen questions in the spaces provided.
5. Use of electronic calculators are 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.
8. Hand in your paper to the invigilator when time is called to stop writing.

Question Number	Tick if Answered	Do not write in these columns	
1			
2			
3			
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SECTION 70 MARKS**Answer all the 10 questions in this section in the spaces provided below**

1. a. State any one branch of chemistry.

(1 mark)

b. **Figure 1** is a graph of atomic radius across the periods against atomic number for the first 20 element in the periodic table**Figure 1**

(i) Identify the atomic radius of Cl

1 mark

(ii) Why is there a sudden increase in atomic radius from Cl to K?

(1 mark)

- (iii) In terms of the periodic table explain why an atomic radius is different from an ionic size of the same element

_____ (1marks)

- c. Neon has natural isotopes with relative masses of 20amu, 21amu and 22amu and percentage abundances of 90.51%, 0.28% and 9.21%.

3 marks

- d. Element X has a mass number of 24amu and atomic number 12.

- i. To which group does element **X** belong

_____ (1 mark)

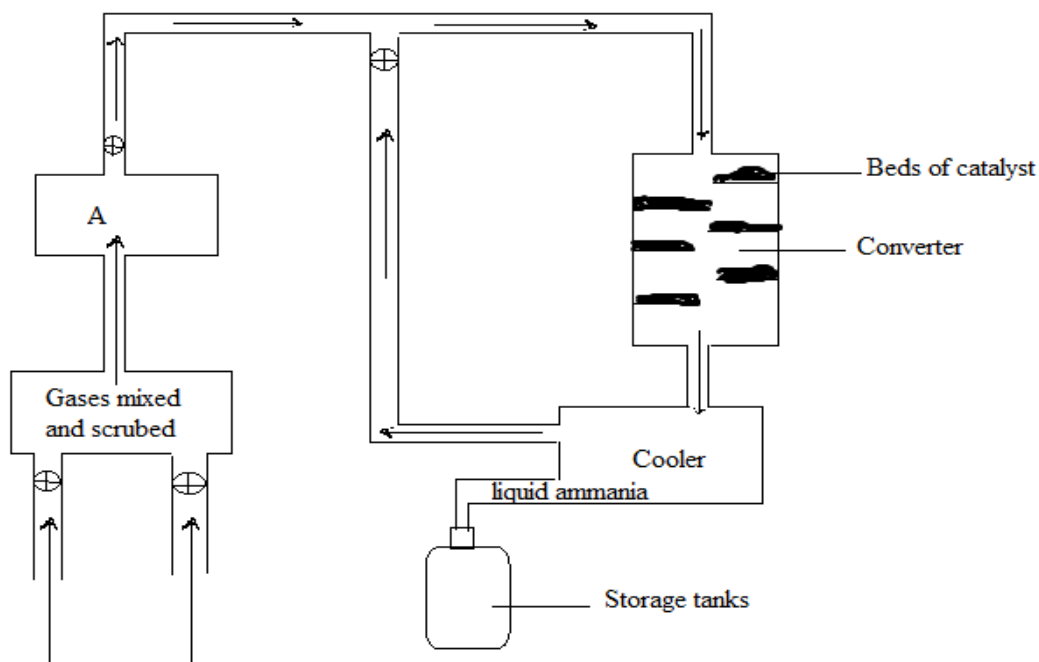
- ii. Identify element **X** in the periodic table

_____ (1 mark)

- iii. Derive a chemical formula of compound formed between element **X** and oxygen atom

(2 mark)

2. **Figure 2** below shows production of ammonia



a. i. Identify the process in **figure 2** above. _____ (1 mark)

ii. List the **two** gases which are pumped into the system

 _____ (2 marks)

b. i. Give **any one** source of phosphorous _____ (1 mark)

c. State any **one** product that is manufactured using phosphorous apart from fertilisers.

 _____ (1 mark)

d. Diamond and graphite are allotropes of carbon; explain why graphite conducts electricity while diamond does not.

 _____ (2 marks)

3. a.i. Give any **two** metals used to form stainless steel

 _____ (2 marks)

Continued: /...

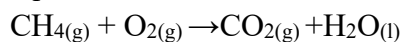
- ii. Why is stainless steel used to make surgical instruments?

_____ (1 marks)

- b. **Table 1** below shows bond energies of some elements. Use it to answer the questions below.

bond	Energy(kj/mol)
C-H	413
O=O	498
O-H	464
C=O	805

Methane reacts with oxygen to produce carbon dioxide and water according to the equation below.



- i. Use the table of bond enthalpies to calculate bond breaking energy and bond making energy.

(3 marks)

- ii. Identify the type of reaction

_____ (1 mark)

4. a. In a titration, 25cm^3 of hydrochloric acid (HCl) of an unknown concentration was titrated against 20cm^3 of 2m sodium hydroxide (2M NaOH) to which phenolphthalein was added.

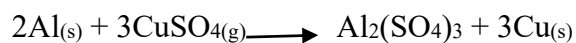
- i. Name the standard solution in the titration.

_____ (1 mark)

- ii. Give a reason for the answer in 4a(i)

(1 mark)

- b. When 2.34g of aluminium reacted with excess copper (II) sulphate solution 3.89g of copper were formed according to the equation



Calculate the percentage yield of copper in the reaction , (Al = 27, Cu = 63.5)

(4 marks)

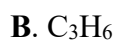
5. a. A 300 mg tablet of a drug was completely dissolved in 10ml of water. The molecular formula of the drug is $\text{C}_9\text{H}_8\text{O}_4$
i. Calculate the number of moles in the tablet (RAM: C 12, H = 1 and O = 16)

(3 marks)

ii. Calculate the molarity of the solution.

(2 marks)

6. a. **Given below are** formulae of some organic compounds **A, B, C** and **D**.



i. What kind of reaction process occurs between compound **A** and **C**.

_____ (1 mark)

ii. Name the product formed from the reaction in **a. (i)**.

_____ (1 mark)

iii. Which compound has a general formula of RCHO ?

_____ (1 mark)

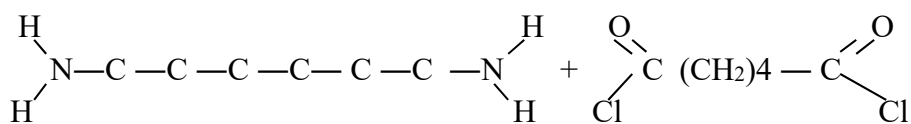
b. i. Draw **any two** isomers of butene (C_4H_8)

(2 marks)

ii. Name the isomers in **6.b.i** above

(2 marks)

- c. Polymerization of 1 – 6 diamino hexane and hexane 1 – 6 dioyl – dichloride takes place as follows



1 – 6 diamino hexane

1 – 6 dioyl - dichloride

- i. Identify the type of polymerization in the reaction
 _____ 1 mark
- ii. Name the polymer
 _____ (1 mark)
7. a. i. Describe any **two** social and economic benefits of recycling plastic wastes.

 _____ (2 marks)
- b. List down any **two** common pollutants of air

 _____ (2 marks)
- c. Explain the term ‘**ion exchange**’ in relation to the removal of permanent water hardness.

 _____ (3 marks)

- d. State any **two** mitigation measures taken to reduce CFC_s

 _____ (2 marks)

8. Ammonia is an example of a strong base.

- a. What is a “strong base”

 _____ (1 mark)

- b. Write a chemical equation to show the ionisation of ammonia in water

_____ (2 marks)

- c. Identify one conjugate acid – base pair from the equation in **8.b**.

 _____ (1 mark)

9. Given the following information, use it to answer the questions that follows

	E°/Volts
$\text{Cu}^{2+}_{(\text{aq})} + 2\text{e}^{-} \rightleftharpoons \text{Cu}_{(\text{s})}$	+0.34
$\text{O}_{2(\text{g})} + 4\text{H}^{+}_{(\text{aq})} + 4\text{e}^{-} \rightleftharpoons 2\text{H}_2\text{O}_{(\text{l})}$	+1.23
$\text{Ag}^{+}_{(\text{aq})} + \text{e}^{-} \rightleftharpoons \text{Ag}_{(\text{s})}$	+0.80
$\text{F}_{2(\text{g})} + 2\text{e}^{-} \rightleftharpoons 2\text{F}^{-}_{(\text{aq})}$	+2.87
$\text{I}_{2(\text{g})} + 2\text{e}^{-} \rightleftharpoons 2\text{I}^{-}_{(\text{aq})}$	+0.54
$\text{Mg}^{2+}_{(\text{aq})} + 2\text{e}^{-} \rightleftharpoons \text{Mg}_{(\text{s})}$	-2.36

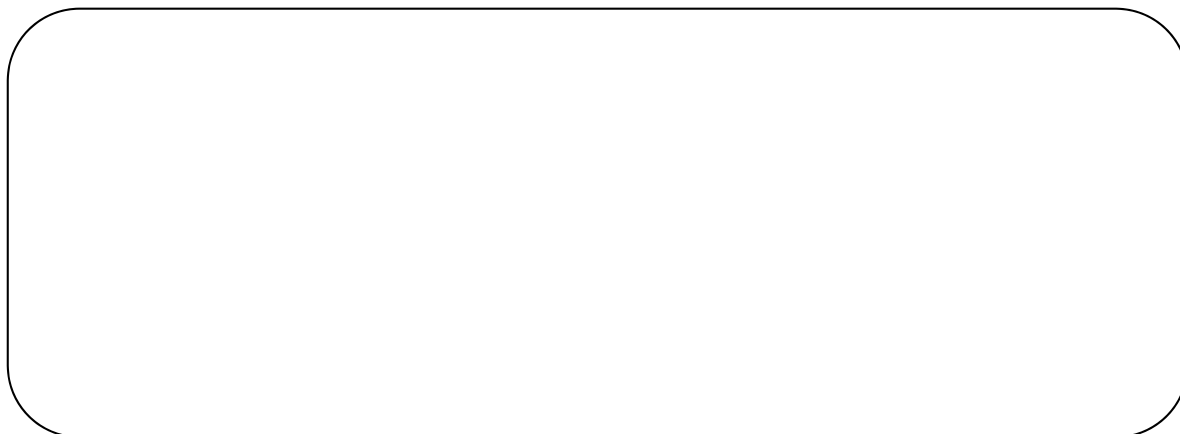
- i. Show whether the reaction of Magnesium metal with copper nitrate solution will occur or not

(2 marks)

- ii. Write the overall equation for the cell between magnesium and silver.

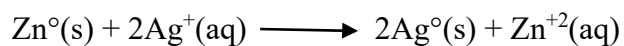
_____ (1 mark)

10. a. Work out the oxidation number of Mn in KMnO_4



(2 marks)

- b. The following is an overall equation for the reaction of zinc metal and silver ions



- i. Identify

1) An oxidizing agent

_____ (1 mark)

2) A reducing agent

_____ (1 mark)

- ii. What is the meaning of (+2) on $\text{zn}^{+2}(\text{aq})$

_____ (1 mark)

(10 marks)

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CANDIDATE NAME _____ CLASS _____

(10 marks)

End of question!