Student name: _____

MAGODI CHRISTIAN PRIVATE SECONDARY SCHOOL

MALAWI SCHOOL CERTIFICATE OF EXAMINATION

2019-2020 END OF TERM ONE EXAMINATION

CHEMISTRY

FORM 4

Paper I

Tuesday 17th December, 2019 (100 Marks) Time allowed: 2 hours

Instruction

1. **This paper contains 15 pages. Please check.**
2. Answer **all** questions in the spaces provided. Marks are indicated against each part of the question.
3. Write your **name** on **all** pages.
4. In the table provide on this page, **tick** against the question number you have answered.
5. At the end of the examination, hand in your paper to the invigilator

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

Turn Over//

1. (a). Mention three allotropes of sulphur

_____

_____

_____(3 marks)

(b). (i). Define allotrope

_____

_____ (2 marks)

(ii). List two allotropes of carbon

_____

_____(2 marks)

(iii). Differentiate the two allotropes of carbon mentioned in 1.(b)(ii).

_____

_____

_____

_____(4 marks)

(iv). Give one use for each allotropes mentioned above

_____

_____

_____

_____(4 marks)

2. (a). Define chemistry

_____ (1 mark)

(b). Write down the three branches of chemistry

_____

_____

_____(3 marks)

(c). Give two safety rules and regulations in the laboratory

_____

_____ (2marks)

(d). Write down any two laboratory symbols and its meaning.

_____

_____

_____(4 marks)

3. (a). Give two parts of a chemical equation

_____

_____ (2 marks)

(b). Give the meaning of the following symbols:

(i). S. _____ (1 mark)

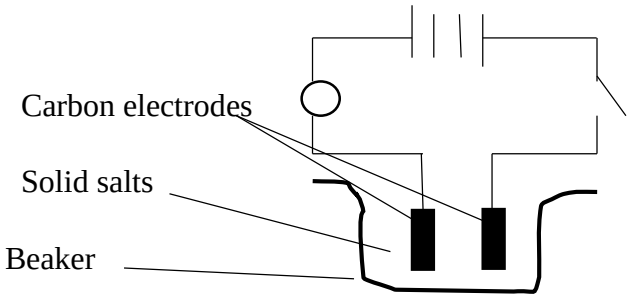
(ii). ℓ. _____ (1mark)

(iii). aq. _____ (1 mark)

(c). Balance the following equation $NH_{3(g)} + HNO_{3(g)} + H_2O_{(l)}$

(4 marks)

(d). **Figure 1** dhows an apparatus for testing electrical conductivity if ionic and covalent compounds.



(i). Which one of the following compounds: Sugar or salts is:

(a). Ionic Compound _____(1 mark)

(b). A covalent compound _____ (1 mark)

(ii). Which of the following substances and states conduct electricity

(a). Solid salt

(b). Aqueous solution of salt

(iii). Explain your observation in 3(d)(ii)

_____

_____

_____

_____(4 marks)

Table 1 shows a periodic table. Use it to answer questions bellow;

I	II	III	IV	V	VI	VII	VIII
							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	S	P	S	Cl	Ar

4. (a). Differentiate a family from a period

_____

_____ (2 marks)

(b). Draw the atomic structure of aluminum

(4 marks)

(c). Write the electron configuration for:

(i). Na. _____ (1 mark)

(ii). P. _____ (1 mark)

(iii). Ca. _____ (1 mark)

(iv). Ar. _____ (1 mark)

(d). Give two elements (atoms) that are diatomic

_____

_____ (2 marks)

(e). What is the trend of reactivity in group 1 elements

_____

_____ (2marks)

5. (a). Define chemical bolding

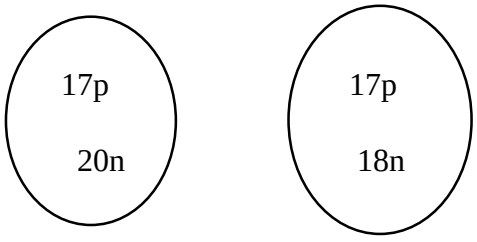
_____(1 mark)

(b). Mention two types of chemical bonding

_____

_____ (2 marks)

(c). **Figure 2** below is a diagram showing nuclei of two atoms



(i). Explain why these atoms react the same way?

_____

_____

_____(3 marks)

(ii). What are atoms of this type called?

_____ (1 mark)

(iii). To which period of the periodic table could each belong?

_____ (1 mark)

(iv). Explain your answer in 5(c) (iii)

_____

_____ (2 marks)

6. (a). **Table 2** shows particles found in the atoms four elements

ELEMENT	PROTONS	NEUTRONS	ELECRTONS	MASS NUMBER
Hydrogen(H)	1			1
Carbon(C)			6	12
Nitrigen (N)	7	7		
Sodium (Na)		12	11	

(i). Complete the table by filling the missing numbers

_____

_____

_____

_____ (4 marks)

(ii). Which element in the table will easily form an ionic compound?

_____ (1 mark)

(iii). Give a reason for your answer to 6(a) (ii)

_____

_____ (2 marks)

(b).(i). What type of bond will be formed between Hydrogen and Chlorine

_____ (1 mark)

(ii). Give a reason for your answer

_____

_____ (2 marks)

(iii). Draw the bonding between H and Cl using the last shells only

(3 marks)

(c). Which of one of the two compound A and E would have lower boiling point? Give a reason for your answer

_____

_____ (2 marks)

(vi). Name two examples of vector quantities

_____

_____ (2 marks)

7. (a). State the difference between distance and displacement

_____

_____ (2 marks)

(b). Define the term fermentation

_____(1mark)

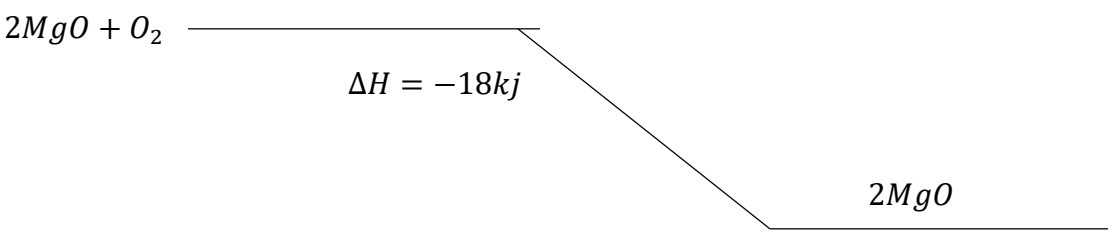
(c). Write a word equation for fermentation of sugar

_____

_____

_____ (3 marks)

(d). Figure 6 below is energy level diagram for the reaction between magnesium and oxygen



(i) Determine the reaction

_____ (1 mark)

(ii) Give reason for your answer above

_____

_____ (2 marks)

(iii). What is the difference between endothermic and exothermic reaction

_____

_____(2 marks)

(iii) Give reasons why bond breaking endothermic and bond making exothermic

_____

_____

_____

_____ (4 marks)

8. (a)(i). What is meant by empirical formula of a compound

_____ (1 mark)

(ii). Workout the empirical formula of a compound that has the following perecentage composition by mass of elements; $C = 40\%, H = 6.67\%,$ $and \quad O = 53.33\%$ $(RAM\ C = 12, H = 1, O = 16)$

(6 marks)

(ii). Give the reaction between methane (CH_4) and oxygen (O_2) produces Carbondioxide (CO_2) and water (H_2O) is exothermic and dissolving of ammonium nitrate (NH_4NO_3) is endothermic. Draw energy level diagram to illustrate the difference mentioned

(6 marks)

(b). (a). What is a more?

_____

_____ (1 mark)

(b). calculate the volume of 0.1m sodium hydroxide that is needed to neutralize $20cm^2$ of 0.1 m hydrochloric acid

(3 marks)

9. (a). Describe any three factors affecting the rate of the reaction

_____

_____

_____ (6 marks)

(b). Define the rate of the reaction

_____

_____ (1mark)

(c). Describe the following:

(i). Collision theory

_____

_____ (1mark)

(ii). Collision frequency

_____

_____ (1 mark)

10. a. Define the following

(i). Reversible reaction

_____

_____ (1mark)

(ii). Activation energy

_____

_____ (1mark)

`(c). (i). Define an acid

_____

_____ (1mark)

(ii). Write down an equation and identify the conjugate acid-base pair from that equation.

(iii). Explain the difference between strength and concentration of an acid

_____

_____ (1mark)

(iv). Explain any one way of regulating PH in different environments

_____

_____ (1marks)

11. (a). Describe any one way of preparing salts

_____

_____ (1mark)

(b). Describe monobasic acids

_____

_____ (1mark)

(c). What are spectator ions?

_____

_____ (1mark)

(d). Identify the spectator ions in this equation

$Ba^{2+} + 2cl^{-} + 2Na^{+} + CO_3^{-} \longrightarrow 2Na^{+} + 2Cl^{-} + BaCo3$

12. (a). List applications of precipitation reactions

_____

$\longrightarrow$

_____ (2marks)

(b). What is a precipitate?

_____ (1mark)

(c). Define oxidation and reduction in terms of electron transfer

_____

_____ (1mark)

(d). Given equation $Cu\ 2^{+} + Zn \qquad Zn^{2+} + Cu$

(i). Which substance is reduced

_____ (1mark)

(ii). Which substance is oxidized

_____ (1mark)

(iii). Identify oxidizing and reducing agents in the reaction

_____

_____ (2marks)

(e). Work out the oxidation number of S in So_4^{2-}

13. (a). Describe Endothermic and Exothermic reactions in terms of temperature change, heat change and energy changes

_____

_____

_____ (3mark).

(b). Draw energy level diagram for the exothermic reaction , include heat change and direction of the arrow.

(2marks)

(c). Define the following:

(i). Enthalpy

_____

_____ (1mark)

(ii). Enthalpy change

_____

_____ (1mark)

(iii). Bond energy.

_____

_____ (1mark)

14. (a). Give any two examples of endothermic and two of exothermic reactions.

_____

_____

_____

_____(4marks).

15. a. Given the total energy to break the bonds as 678 kj/mol, and energy out to form the Bonds as 862 kj/mol' ($heat\ energy = energy\ in\ to\ break\ the\ bonds - energy\ out\ fo\ form\ the\ bnd$).

(i) . Is the reaction exothermic or endothermic?

_____

_____ (1mark)

(ii). Give a reason for the answer above.

_____

_____ (2 marks)

(iii). How is hydronium ion formed

_____

_____ (1mark)

(b). (i). How many moles are there in 1.6g of oxygen?

_____

_____ (1mark)

(ii). How can temperature affect the position of the equilibrium

_____

_____ (2marks)

END OF QUESTION PAPER

NB: this paper contains 15 printed pages.