Bamenda Archdiocesan Examination Board (BAEBOC)	SUBJECT CODE NUMBER 0715	PAPER NUMBER 2
MOCK G.C.E. EXAMINATION	SUBJECT TITLE AND SYLLABUS **CHEMISTRY**	
ADVANCED LEVEL	DATE **MARCH 2026**	
FOR EXAMINER'S USE ONLY NAME OF EXAMINER: ..... SIGNATURE OF EXAMINER:..... DATE:.....	FOR OFFICIAL USE ONLY	FOR EXAMINER'S USE ONLY

CANDIDATE NUMBER	
DATE/SIGNATURE	

THREE HOURS

Answer ALL the six questions in this booklet.
The questions are divided into three sections: Section A, Section B and Section C.

The mark allocation is indicated for each question. Each question carries 20 marks.

Verify that this booklet contains six questions, no questions are repeated and there are no blank pages. Inform the invigilator in case this booklet contains less than six questions, questions are repeated or there are blank pages so that the booklet should be changed.

In calculations you are advised to show all the steps in your working, giving your answer at each stage.

All necessary working must be shown. No marks will be awarded for answers without brief statements showing how the answers have been obtained.

Useful Data
Na=23, C=12,0=16, Avogadro number, 6.02×10^{23}
1 mole of gas = $24000cm^3$ ($24dm^3$)

TURNOVER

SECTION A: PHYSICAL AND GENERAL CHEMISTRY

C= 12, H =1, O =16, S =32, Al =26 , Avogadro constant = 6.02×10^{23}

1) a) What do you understand by;

i) Amount of substance

ii) Mole ratio

2mks

b) A solution was made by dissolving 9.0g of hydrated aluminium Sulphate $[Al_2(SO_4)_3.6H_2O]$ in $250cm^3$ of solution. Calculate

i) The number of moles of the hydrated aluminium Sulphate

ii) The number of Sulphate ions in solution

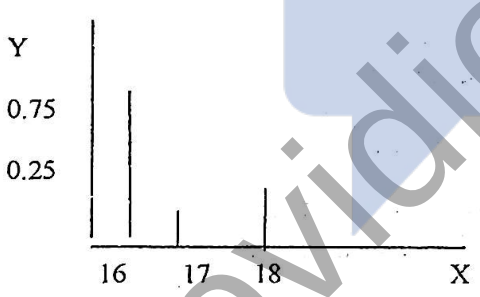
iii) The concentration of the aluminum in the hydrated aluminum Sulphate in mol/dm^3

4mks

c) A sample of oxygen consisting mainly of the isotopes oxygen-16 and was enrich with oxygen-18. The composition of the mixture was 0.75 oxygen-16 and 0.25 oxygen-18

i) Calculate the RAM of oxygen in the sample volume.

ii) The mass spectrum sketch of the sample of vaporize oxygen is shown below



What do the axes x and y represent ? X _____ Y _____

iii) What part of the mass spectrometer ensures that the path travelied by the isotopes differ?

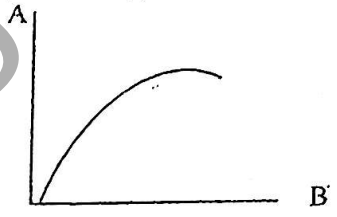
4mks

d) When excess lumps of Barium Carbonate are added to dilute hydrochloric acid the following reaction takes place.

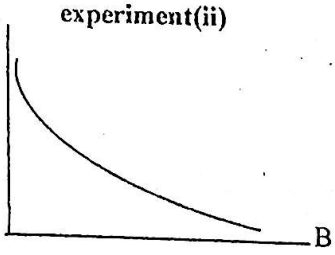
$BaCO_{3(S)} + 2HCL_{aq} \longrightarrow BaCl_{2(aq)} + H_2O + CO_{2(g)}$

Two experiments were carried out to follow the rate of this reaction. The result were plotted as follows

experiment (i)



experiment(ii)



i) What would have been plotted on the axis in experiment I and II?
Experiment I _____ Experiment II_____

ii) State with a reason what would happen to the total volume of carbonate given off if powder barium carbonate were used.

_____

iii) When the experiment is performed at a higher temperature will the rate of collision increase or decrease? Explain

_____ **4mks**

e)i) State Hess's law of heat summation

_____

ii) What is a thermometric titration?

_____

iii) Give thermochemical equations to represent the following processes: for magnesium or chlorine

Combustion _____

Atomization _____

Hydration _____

Lattice energy _____ **4mks**

Total= 20mks

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2)a)i) what is a phase diagram?

_____

ii) Sketch a phase diagram for the variation of vapour pressure with composition for ethanol and water mixture.

iii) What type of phase diagram is represented in (ii) above?

_____ **3mks**

b)i) State Raoult's law.

_____

ii) When is a mixture of two miscible liquids said to be ideal?

_____

iii) Give an example of a liquid that is miscible with hexane.

_____ **3mks**

c) Consider the equilibrium reaction

$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_3$ $Kc = M$

What happens to the equilibrium constant, M, when

i) The reaction is reversed ?

_____

ii) The moles of the reactants and products are halved?

_____

iii) What will be the effect on the equilibrium position when pressure is doubled?

3mks

d)i) State the Lewis theory of acid-base reaction.

ii) Which of the following is solely Lewis acid-base reaction

x; $NH_{3(aq)} + H_3O^{+} \longrightarrow NH_4^{+} + H_2O$

Y; $2NH_{3(aq)} + Cu^{+}_{(aq)} \longrightarrow [Cu(NH_3)_2]^{+}_{(aq)}$

iii) What is a strong base? Give an example

iv) Determine the pH of the following solution

A: A solution of 0.10 Mole dm^{-3} of phosphoric acid (H_3PO_4)

B: A solution of 0.01 $moldm^{-3}$ benzoic acid (C_6H_5CooH) of $Ka = 6.0x10^{-5}$

6mks

e)i) What is a covalent bond?

ii) Select from the element sulphur, nitrogen, oxygen, hydrogen, copper; two elements that could form:

-A compound or ion formed involving at least a dative covalent bond. -

- An element that will not form a bond with its atoms, by sharing electrons

3mks

f) i) what is a crystal?

ii) Give three types of crystal lattice

iii) Which of the three crystal lattices has loose spacing?

3mks

Section B; Inorganic Chemistry

3)a) Some elements of periods 2 and 3 of the periodic table are lithium, carbon, fluorine, sodium, Aluminium, Magnesium, and Silicon.

i) State a property that can be used to put the elements into different groups .

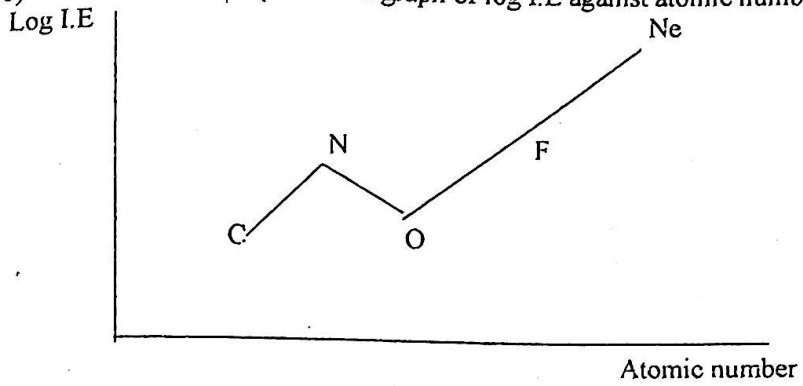
ii) Pair the elements into the different periods.

iii) In the P.T, why are lithium and magnesium diagonally placed?

iv) Explain in terms of bonding why magnesium has a higher melting temperature than sodium.

5mks

b) The sketch below represents a graph of log I.E against atomic number for some elements.



I) state and explain why N and Ne are found at the positions on the graph.

ii) Plot on the sketch the next two elements after Neon (Ne) .

c) Consider the complex ion $[Co(NH_3)_2Cl_2(C_2O_4)]^-$

i) What is the oxidation number of the complex?

3mks

ii) Give the formula and name of each ligand in the ion.

iii) What is the coordination number of the metal atom?

3mks

d.i) Give the complex formula of diaquadicyanocopper (ii)

ii) What type of isomerism does it exhibit?

iii) Give the isomers.

3mks

e) Nitrogen and sulphur react with oxygen to form their dioxides

i) Write equation in each case to form the dioxides of the two elements.

ii) Nitrogen dioxide disproportionate in water

- What is disproportionation

- Write a disproportionation reaction for nitrogen dioxide in water

iii) Give one industrial use of a named compound of sulphur

5mks

Total = 20mks

4) The element chlorine and Bromine are members of the halogen family

a)i) Give the general outer electronic configuration of the halogens

ii) The Oxo-acid of chlorine and bromine are $HClO_3$ and $HBrO_3$. Which one is a stronger acid? Explain

iii) The equation for the reaction of a bromate with a bromide is given below.

$BrO_3^- + Br^- + H^+ \longrightarrow Br_2 + H2o$

Give the oxidation state of bromine in BrO_3^-

Which of the reactants is the oxidizing agent?

Write a balanced equation for the reaction

5marks

B) Define

i) Atomic radius

ii) Atomic number

iii) Explain how atomic radius varies down the group 1 and 2 and between the two groups.

Down

Between

4mks

ci) Complete the table below by giving the formula of the oxides and chlorides of the elements

Element	Li	Be	B	Na	P	Cl
Oxide						
Chloride						

ii) Which of the chlorides could form a dimer?

Draw the structure of the dimer

6mks

e) The following elements are in the same group of the periodic table

carbon, silicon, germanium, tin and lead. The oxides of the elements are CO, CO_2, SiO_2, GeO, SnO , SnO_2 PbO and PbO_2.Choose from the oxides two that are:

i) Acidic

ii)—Amphoteric

iii) The most stable oxides of carbon and lead.

vi) Show with an equation the acidic property of one of the acidic oxides.

5mks

Total = 20mks

Section C Organic Chemistry

5)a) Organic compounds exhibit variety of multiple bonds.

i) Using hydrocarbons, illustrate the multiple bonds in some organic molecules

Hydrocarbon	Bond type	Example

b) Define

i) Carbocation

ii) Carbanion

iii) Electrophile

iv) Which is more likely to be attacked by an electrophile? A carbocation or a cabanion? Explain.

4mks

c) The hydrolysis of a hydrocarbon is given below, $(CH_3)_3C\text{-}Br + OH^- \dashrightarrow (CH_3)_3C\text{-}OH + Br^-$

i) What type of hydrolysis is represented by the reaction?

ii) Give the mechanism of the reaction.

3mks

d) (i) State the Markovnikoff rule.

ii) Show how the rule is applied with an organic compound

iii) What type of organic reaction is applied by the Markovnikoff rule?

3mks

e) (i) Give the systematic name of the compound $CH_3CH{=}CHCH(OH)CH_3$

ii) This compound can produce stereoisomers. Give the different stereoisomers of the compound.

3mks

f) An organic compound with the formula CH_3CHO, belong to a homologous family of compounds.

(i) What is a homologous family?

(ii) State qualitatively how the amount of carbon and Hydrogen can be obtained from this compound.

(iii) Another compound consists of 55 % of carbon, 9% of hydrogen and oxygen. If 0.15g of the compound when vaporized in a suitable apparatus, occupied a volume of $57cm^3$ at 125°c and 1×10^5 NM^{-2}, determine

-The empirical formula

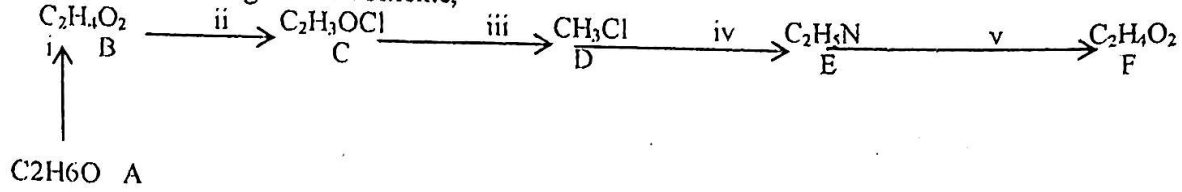
- The molecular mass

The molecular formula

4mks

Total =20mks

6) Given the following reaction scheme;



a) Complete the table below by stating the functional group and name of compounds A, B, C, D, E.(5mks)

	Functional group	Name of compound
A		
B		
C		
D		
E		

b) Give the reagent and reaction conditions for the steps (i) to (v) **5mks)**

i)

ii)

iii)

iv)

v)

5mks

c) In not more than three steps show how the following conversions can be carried out.

(i) Ethanoic acid ($C_2H_4O_2$) to methylamine (C_2H_5N)

(ii) Benzene (C_6H_6) to benzoic acid ($C_6H_5CO_2H$)

4mks

d) Distinguish between the following pairs of compounds.

(i) Methanoic acid and ethanoic acid

(ii) Ethene and ethane

(iii) But-1-yne and But-2-yne

3mks

e) (i) Why are amines considered to be bases?

(ii) Place the following amines in the increasing order of their basic strength. Explain the trend.

$(CH_3)_2NH$, CH_3NH_2, $(CH_3)_3N$.

2mks

Total= 20mks