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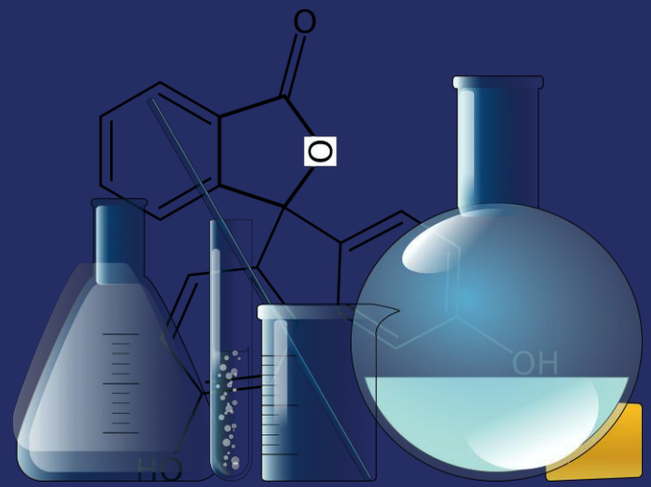
Chemistry Without Tears Work Book - 1

Raphael Foster Ayittey



Raphael Foster Ayittey

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For Senior High Schools

Genesis
Global Publication

CHEMISTRY WITHOUT TEARS

WORKBOOK - 1

FOR SENIOR HIGH SCHOOLS

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CHEMISTRY WITHOUT TEARS

WORK BOOK – 1

by

Raphael Foster Ayittey

PREFACE

This book, ***'CHEMISTRY WITHOUT TEARS WORK BOOK - 1'*** covers detailed of the subject matter in Chemistry that is expected of students in second year by Chemistry Examiners. The work book gives students dominion over adequate and wide-range coverage of likely examinations on every topic in the syllabus. It must be noted that the questions/items in this workbook are mostly new ones and not entirely past questions of WAEC. Students are therefore advised to use this study guide together with past questions in Chemistry set and used by WAEC over the years. The workbook would serve as question bank for both students and teachers. This workbook is not a book to replace or displace textbooks. Students must read and treat topics in their textbook first especially ***'CHEMISTRY WITHOUT TEARS TEXT BOOK- ZEV SERIES -1'*** before consulting the appropriate chapters of this workbook. The book again is not to replace or displace subject teacher generated tests/exercises/quizzes items for his students. To avoid temptation, answers to the questions in this workbook are not attached to the book. This would corrupt students' effort to work test items first before checking for the answers. The book is designed in line with the topics treated in the textbook.

Teachers copy of the chemistry without tears workbook – 1 contained the answers to the questions in the workbook.

NOTE FOR STUDENTS

We have similar goals: Yours is to learn chemistry, mine is to do everything possible tohelp you learn. It is going to require some work on your part, but the following secrete should prove useful:

1. Read the notes on each topic carefully. Take your time to understand each paragraph and know what is about.

2. Work the problems: There are no short cuts here, working problems is the only way to learn chemistry. There are over 200 worked examples in this book and more in the work book -1 to show you how to approach examination questions.

3. Revise before examinations/tests. Human beings tend to forget some of the things that he or she has learnt with time. It is therefore advisable to do intensive revision 2-7 days before an examination/test. Complacency can cost you. [Proverbs 16:3]

I would appreciate learning from you about your experiences with this book or suggestions for improvement in future edition.

The best way to ensure that ou understand the concepts of chemistry is to solve many problems/questions on each topic.

DEDICATION

This book is dedicated to my family and all serious students in Chemistry Kingdom.

ACKNOWLEDGENT

Although I am responsible for all that finally went down into this book, no one is a reserviour of knowledge. Hence the following individuals deserve appreciation for their useful suggestions and illustrations.

First of all, I am thankful to Almighty YAHWEH for given me the strength and wisdom to bring out this work. Apostle Kadmiel E.H Agbalenyoh –The missionary-in-charge of Seventh Day Congregation of Theocracy; Daddy! Receive my gratitude for your prayers and care.

I am indebted to my students of West Africa Senior High School and Theocracy Senior High School as well as my devoted private students who encouraged me to put my rich knowledge in chemistry into this book.

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION OF CHEMISTRY

LESSON ONE – CHEMISTRY AS A DISCIPLINE

ESSAY TYPES

Q1. Where did the word *'chemistry'* come from?

……
……**[3marks]**

Q2. Explain why chemistry is a central science of other related subjects.

……
……**[3marks]**

Q3. What is matter?

……
……**[2marks]**

Q4. List three specific activities in your life in which chemistry play an important role.

……... **[1mark]**

…….. …… **[1mark]**

……..……**[1mark]**

Q5. What is chemistry?

……
…… **[2marks]**

Q6. (a) Who is a chemist?

……**[2marks]**

(b) State two works of chemists.

(i) ……**[1mark]**

(ii) … ……. .**[1mark]**

Q7. State four (4) important things chemistry has done.

……**[1mark]**

……**[1mark]**

……**[1mark]**

……**[1mark]**

Q8. Explain why chemistry is difficult to students at the introductory level?

……..……

……**[3marks]**

Q9. Name four (4) other subjects apart from science where chemistry has a central position.

1. ……..**[1]** 2. …….. **[1]**

3. …… **[1]** 4. ……..…**[1]**

CORRECTION

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LESSON TWO (2) – BRANCHES OF CHEMISTRY

Q1. List three professions apart from chemist in which a knowledge of chemistry is useful and important.

……**[1]**

…… **[1]**

…… **[1]**

Q2. State and explain any two branches of chemistry.

STATE: 1. …… **[1]** 2. …… **[1]**

EXPLAINATION:

1. ……
   ……**[2]**
2. ……
   ……**[2]**

Q3. Identify **two** applied chemistry professions and explain the chemistry they practice.

PROFESSION:

1……...**[1]** 2…… **[1]** 3. ……**[1]**

Chemistry they practice

1..…….. **[2]**

2. ……..……..…**[2]**

3. ……..……..…**[2]**

Q4. (a) Explain the following terms:

(i) Pure chemistry

……
……..…**[3]**

(ii) Applied chemistry

……
……...…**[3]**

(b) State two (2) examples of applied chemistry

1. …… **[1]** 2. ……...……**[1]**

Q5. State four (4) careers in chemistry

(i)……**[1]** (ii)…… **[1]**

(iii)……..… **[1]** (iv)……...……**[1]**

Q6. State two (2) importance of chemistry

(i) ……**[1]** *(ii)*…….... **[1]**

Q7. State 2 objectives of studying chemistry

(i) …….. **[2]**

(ii…….. **[2]**

CORRECTION

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CHAPTER TWO – MEASUREMENT

LESSON ONE – MEASUREMENT OF PHYSICAL QUANTITIES

Q1. What is measurement?

……
……**[2]**

Q2. Distinguish between ***fundamental*** and ***derived*** quantities

……
……
……
……
……**[4]**

Q3. Name the SI units for expressing the following quantities:

(i) Length: ……**[1]**
(ii) Temperature: ……**[1]**
(iii) Energy: ……**[1]**
(iv) Mass: …… **[1]**
(iv) Pressure: ……**[1]**
(v) Density: …… **[1]**

Q4. Which quantity can the following instrument be used to measure?

(i) Thermometer……**[1]**
(ii) Electronic balance……**[1]**
(iii) Stop watch……**[1]**
(iv) Measuring cylinder……**[1]**
(v) Pipette ……**[1]**
(vi) Burette ……**[1]**

Q5. What is meniscus?

……**[2]**

CORRECTION

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LESSON TWO - SIGNNIFICANT FIGURES, PRECISION AND ACCURACY IN MEASUREMENT

Q1. What is significant figure?

……
……**[2]**

Q2. What is the number of significant figures in each of the following?

(i) 4876g……**[1]**
(ii) 20.3gcm^{-3} ……**[1]**
(iii) 0.000004cm ……**[1]**
(iv) 70m ……**[1]**

Q3. (a) Explain the term *precision*

……..**[2]**

(b) Which of the following titration results are more precise to ***21.20cm³?***

20.90cm³, 21.10cm³ and 21.30cm³. ……**[1]**

Q4. (a) Explain the term accuracy? ……**[2]**

(b) Which of the following titration results are more accurate to ***21.20cm³?***

20.90cm³, 21.10cm³ and 21.30cm³. ……**[1]**

CORRECTION

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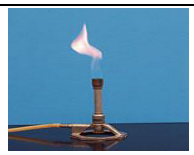
LESSON THREE- LABORATORY EQUIPMENT OR APPARATUS AND THEIR USES

Q1. Identify the following laboratory apparatus and state their uses.

APPARATUS	NAME	USES
A 		
B 		
C 		
D 		
E 		
F 		
G 		
H 		

I 		
J 		

CORRECTION

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LESSON FOUR –SCIENTIFIC METHODS

Q1. (a) What is a scientific method?

……
……..**[2]**

(b) List the steps involve in scientific methods.

……

……

……

……..**[5]**

Q2. What are the instruments used to identify the problems in scientific method?

……
……
……..**[3]**

Q3. State **two** importance of the scientific methods

……..**[2]**
……..**[2]**

Q4. State **three** attitudes of a good chemist

……..**[1]**
……..**[1]**
……..**[1]**

Q5. State **three** ways by which one can be very good record keeper

……..**[1]**
……..**[1]**
……..**[1]**

Q6. Explain the following terms as applied to scientific method:

(i) Hypothesis……
……..**[2]**

(ii) Theory……
…… **[2]**

(iii) Law……
……..**[2]**

(iv) Analysis……
……..**[2]**

CORRECTION

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Q1. Write a brief note on the following discoveries

(i) *Oxygen:*

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……... **[4]**

(ii) *Penicillin:*

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……...……**[4]**

(iii) *Radioactivity:*

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……...**[4]**

CORRECTION

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CHAPTER THREE- BASIC SAFETY LABORATORY PRACTICES

LESSON ONE - SAFETY RULES IN THE LABORATORY

Q1. (a) State five safety rules which must be observed in a chemistry laboratory.

……
……
……
……
……**[10]**

(b) Explain what will happen to a student who refuses to obey each of these rules stated in 1(a)

……
……
……
……
……**[10]**

Q2. Explain why is not advisable to walk barefooted in the laboratory.

……
……
……
……**[2]**

Q3. Why is it wrong to add water to concentrated acid?

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……**[2]**

CORRECTION

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LESSON TWO - HAZARD SIGNS AND SYMBOLS

Q1. Draw or sketch the following hazard symbols to represent the following:

i. danger.

……
……
……
……**[3]**

ii. toxic.

……
……
……
……
……..……..**[3]**

iii. oxidizing.

……
……
……
……**[3]**

iv. highly flammable.

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……**[3]**

CORRECTION

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LESSON THREE- LABORATORY EMERGENCIES

1. What do you understand by term first aid?

   ……
   ……...……**[2]**
2. State four items found in first aid box.

   ……
   ……
   ……..**[4]**
3. Give step by step account of how you will treat a cut caused by a broken beaker.

   ……
   ……
   ……
   ……....…**[6]**
4. How will you quench a fire caused by paper using carbon dioxide fire extinguisher?

   ……
   ……
   ……
   ……...……**[6]**

CORRECTION

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LESSON FOUR - PERSONAL PROTECTIVE EQUIPMENT

Q1. Explain the term *personal protective equipment.*

……
……**[3]**

Q2. Why should personal protective equipment be worm?

……
……**[2]**

Q3. List four personal protective equipment

1. ……**[1]**
2. ……**[1]**
3. ……**[1]**
4. ……**[1]**

Q4.(a) What is chemical storage?

……
……**[2]**

Q4(b). Explain why should some chemicals not to be stored in alphabetical order in the laboratory?

……
……
……**[4]**

Q5. List three fire quenching equipment in the laboratory.

……
……
……**[3]**

Q6. State any four types of fire extinguisher.

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CORRECTION

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SECTION TWO

CHAPTER FOUR – STRUCTURE OF THE ATOM

LESSON ONE [PARTICULATE NATURE OF MATTER]

Q1. Define each of the following terms:

(a) An atom: ……..….**[2]**
(b) A molecule: ……..……**[2]**
(c) An ion: ……..……..**[2]**
(d) Atomicity: ……..……**[2]**

Q2. Mention one element which is

(i) Monatomic: ……..….**[1]**
(ii) Diatomic: ……**[1]**
(iii) Tetratomic: ……**[1]**

Q3. List the **three** basic building units of matter

……**[1]** ii. …… **[1]** Iii. ……**[1]**

Q4. Classify the following as *atoms, molecules or ions;*

NO_3^- , H_2, W, He, Fe^{2+}, Fe, H_2O, NH_3, NH_4^+.

ATOM	MOLECULE	ION
[1]	**[1]**	**[1]**
[1]	**[1]**	**[1]**
[1]	**[1]**	**[1]**

Q5. State any three evidence that show that matter contain particles.
……
……
……**[3]**

CORRECTION

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LESSON TWO– GROSS FEATURES (MAIN PARTS) OF THE ATOM]

Q1. Name the subatomic particles.

i. …… **[1]** ii. ……..**[1]** iii. ……..**[1]**

Q2. Complete the table below

Particles	Relative masses	Relative charges	Location
Electron	**[1]**	**[1]**	**[1]**
Neutron			**[1]**
Proton			**[1]**

Q3. State **two** postulates of Dalton's atomic theory which had later been disproved.

……..**[2]**
……..**[2]**

Q4. Give reason(s) why two of the Dalton's atomic theory have been disproved.

……
……
……
……**[2]**

Q5. (a) Describe briefly Rutherford's alpha particle scattering experiment and state the observations made.

Description:.....
.....
.....
.....**[4]**

Observations made:……
……
……**[2]**

(b) How were the results of Rutherford's experiment used to establish the structure of the atom?

……
……
……
……**[4]**

Q6. What are cathode rays?

……
……..……..**[2]**

(b) What is the effect of an electric field on cathode rays?

……
……..…….. **[2]**

Q7. (a) Explain why Thomson pumped out air from the discharged tube?

……
……..…….. **[3]**

(b) What happened when current was passed through the discharged tube used by J.J Thomson?

……
……..…..**[2]**

(c)Under what condition should gases conduct electricity?

……...**[2]**

State **two** observations and corresponding conclusions that could be drawn from J.J Thomson's cathode-ray experiment.

Observations:

1……..……..……
……..… **[2]**

2.……
……..…**[2]**

Conclusions:……
……
……
……
……..…. **[4]**

(e) Name the particles generated in the cathode – ray experiment.

……
……...**[2]**

CORRECTION

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LESSON THREE (3) - WAVE NATURE OF THE ATOM

Q1. Define the following terms.

(i) Continuous spectrum.

……
……
……**[2]**

(ii) Line spectrum:

……
……
……**[2]**

Q2. State any two deductions from the spectrum of an atom.

……
……
……**[2]**

Q3. Briefly describe the Bohr's model of the atom.

……
……
……
……
……**[5]**

Q4. Describe the following quantum numbers

(i) Principal quantum number(***n)***……
……
……
…… **[3]**

(ii) Angular momentum or Azimuthal quantum number (***l)***……
……
……**[3]**

(iii) Magnetic quantum number (m_l)

……
……
……**[3]**

(iv) Spin quantum number (m_s)

……
……
……**[3]**

Q5. What are *atomic orbitals*?

……
……**[2]**

Q6. Explain with the aid of diagrams, the *shapes* and *directions* of the **s**and **p** orbitals.

……
……
……
……
……
……**[6]**

Q7. Complete the following table

Subshell	**Numbers of orbitals**	**Maximum number of electrons**
p		
d		
s		

[6]

Q8. Arrange the following orbitals in order of increasing energy. Give reason(s) for your arrangement.

3d, 4s, 2s, 3p, 2p.

……
……
……**[4]**

CORRECTION

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LESSON FOUR (4) ELECTRON CONFIGURATION

Q1. (a) Name **three** rules that govern the filling of orbitals in an atom.

……
……
……**[6]**

(b) State each of the rules you named in Q1(a).

1……
……
……
2……
……
……
3……
……
……**[6]**

Q2. Write and draw the electron configuration for **each** of the following ions and element:

(i) $_{13}Al^{3+}$

……
……
……**[4]**

(ii) $_{16}S^{2-}$

……
……
……**[4]**

(iii) $_{24}Cr$

……
……
……**[4]**

(iv) $_{26}Fe^{3+}$

……
……
……**[4]**

Q3. Consider the following electron configuration

[He] $2s^1$
[Ar] $5s^1\ 4d^3$
[Ar] $4s^2\ 3d^{10}\ 4p^4$

(a) In each case, indicate, whether the given configuration describes an atom in the ground state or an existed state.

……
……
……**[6]**

(b) State your reason in each case.

……
……
……
……..…..**[6]**

Q4. (a) What is an isoelectronic series?

……
……..…..**[2]**

(b)State any three species that are isoelectronic with **Argon(Ar)**.

……
……..**[3]**

CORRECTION

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LESSON FIVE (5) -REPRESENTATION OF ATOM AND SUBATOMIC PARTICLES

Q1. Define the following terms:

(a) Atomic number:

……
……**[2]**

(b) Mass number:

……
……**[2]**

(c) Nuclide:

……
……**[2]**

(d) Nucleon:

……
……**[2]**

(e) Isotopes:

……
……**[2]**

Q2. An atom has six protons and seven neutrons in it nucleus. Find the following:

(i) Mass number:

……
……**[2]**

(ii) Number of electrons:

……
……**[2]**

Q3. Complete the following table.

Particle	Number of protons	Number of electrons	Number of neutron
$^{7}_{3}Li$		3	
$^{39}_{19}K^{+}$	19		
$^{14}_{7}N^{3+}$			7

[6]

Q4. How many protons and neutrons are present in **each** of the following species?

(α) $^{40}_{18}Ar$: Proton……**[1]** Neutron……**[1]**
(β) $^{27}_{13}Al^{3+}$: Proton……,**[1]** Neutron……**[1]**

Q5. Name two elements that exhibit isotopy.

……**[2]**

CORRECTION

LESSON SIX (6) - RELATIVE ATOMIC MASS CALCULATIONS

Q1. Define *relative atomic mass*.

……
……..……...**[2]**

Q2. The element Q has two naturally occurring isotopes $^{35}_{17}Q$ and $^{37}_{17}Q$ with relative abundance of 75.5% and 24.5% respectively.

(i) What phenomenon is exhibited by the element Q above?
……..……**[1]**

(ii) What accounts for the difference in the mass number of the element Q.
……..….**[1]**

(iii) What do the subscripts and the superscripts in the symbols of the isotopes of Q represent?
……
……..……..**[2]**

(iv) Calculate the relative atomic mass of the element Q.

……
……
……
……
……**[6]**

Q2. An element ***X*** with relative atomic mass 210.2 has two isotopes ^{210}**X** and ^{212}**X**. What is the relative abundance of each of the isotopes?

……
……
……
……
……...……..**[6]**

Q3. Consider the following table

Atom	Relative abundance (%)
^{20}Ne	90.48
^{21}Ne	0.27
^{22}Ne	9.25

(i) What phenomenon is exhibited by Ne?
……..**[2]**

(ii) Name one other element that exhibits such phenomenon
……..**[1]**

(iii) Use the information in the table to calculate the relative atomic mass of Ne.

……
……

……
……
…….. **[6]**

Q4. If an element is composed of isotopes, what is the factor that influences the value of its relative atomic mass? ...
....**[3]**

Q5. Lithium exists as $^{6}_{3}\boldsymbol{Li}$ and $^{7}_{3}\boldsymbol{Li}$ in the ratio, 2 : 25. Calculate the relative atomic mass of the lithium.
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…….**[6]**

CORRECTION

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LESSON SEVEN (7) – MASS SPECTROMETER

Q1. What is mass spectrometry?

……
……**[2]**

Q2. What instrument is used to measure mass spectrometry?

……**[2]**

Q3. List four essential features of the mass spectrometer.

……
……
……**[4]**

Q4. Give a brief description of the mass spectrometer.

……
……
……
……
……
……
……
……**[7]**

(b) Show how the mass spectrometer could be used to determine the relative atomic mass of an element.

……
……
……
……
……
……
……**[5]**

Q5. When air is studied in mass spectrometer, the most intense lines obtained are for masses 28 and 32. Explain.

……
……
……
……**[4]**

(b) What other lines would be expected?

……**[2]**

Q6. What is a mass spectrum?

……
……**[2]**

(b) State two deductions that could be made from the mass spectrum of a monatomic element.

……

……
……**[2]**

Q7. State two uses of mass spectrometer.

……
……**[2]**

CORRECTION

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CHAPTER FIVE (5)

PERIODIC CHEMISTRY (PERIODICITY I)

LESSON ONE (1) – MEANING OF PERIODIC CHEMISTRY AND PERIODICITY I

Q1. (a) What is periodic chemistry?

……
……**[2]**

(b) State two importance of periodic chemistry.

1. ……..**[1]**

2. ……**[1]**

Q2. Explain the following terms:

(i) Valence shell electron.
……
……**[2]**

(ii) Core shell electron.
……
……**[2]**

Q3. Complete the table below.

Shell	1	2	3	4
Letters represent	K	L	M	N
Maximum number of electron	……	8	……..	32

[2]

CORRECTION

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LESSON TWO (2) – DEVELOPMENT OF PERIODIC TABLE

Q1. Briefly explain how the following scientists developed the periodic table.

(i) *Johann Dobereiner:*

……
……
……
……**[3]**

(ii) *John Alexander Reina Newlands:*

……
……
……
……**[3]**

(iii) *Dmitri Ivanovich Mendeleev:*

……
……
……
……**[3]**

(iv) *Julius Lothar Meyer:*

……
……
……
……**[3]**

(v) *Henry Gwyn-Jeffreys Moseley:*

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……
……**[3]**

Q3. Explain the following terms:

(i) Group of an element.

……
……**[2]**

(ii) Period of an element.

……
……**[2]**

Q4. What is the name given to the following group of elements?

(i) Group I element: ……**[1]**
(ii) Group II element: ……**[1]**
(iii) Group III element: ……**[1]**
(iv) Group IV element: ……**[1]**
(v) Group V element: ……**[1]**
(vi) Group VI element: ……**[1]**
(vii) Group VII element: ……**[1]**
(viii) Group VIII element: ……**[1]**

Q5. State **one** physical property of each of the following:

(i) Alkaline metals: ……**[1]**
(ii) Alkaline earth metals: ……**[1]**
(iii) Halogen: ……**[1]**
(iv) Noble gases: ……**[1]**
(v) Transition metals: ……**[1]**

Q6. State **one** chemical property of each of the following:

(i) Alkaline metals: ……**[1]**
(ii) Alkaline earth metals: ……**[1]**
(iii) Halogen: ……**[1]**
(iv) Noble gases: ……**[1]**
(v) Transition metal: ……**[1]**

Q7. Explain and give two examples of the following terms:

(i) Metals.
……
……**[3]**
(ii) Non-metals.
……
……**[3]**
(iii) Metalloid.
……
……**[3]**

Q8. State two characteristics of the following:

(i) Metals.
……
……**[2]**
(ii) Non-metals.
……
……**[2]**
(iii) Metalloid.
……
……**[2]**

Q9. Explain why hydrogen can be placed in group one and group seven on the periodic table.
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……**[3]**

CORRECTION

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LESSON THREE (3) – PERIODIC PROPERTY

Q1. What is meant by the term *periodic property of elements*?

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……**[2]**

Q2. State the modern periodic law.

……...
……...……..**[2]**

Q3. State **three** periodic atomic properties of elements.

……
……**[3]**

Q4.(a) Explain the following terms:

(i) Nuclear charge.

……
……...……**[2]**

(ii) Screening effect/ shielding effect.

……
……..……**[2]**

(b) Explain how the above factors vary on the periodic table.

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……...……..**[4]**

Q5. (a) Define the following term:

(i) Atomic size/ radius.

……
……..……..**[2]**

(ii) Ionic size/radius.

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……....……**[2]**

(b) Indicate how the above terms vary along a given group and period.

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……...……..**[4]**

Q6. Arrange the species below in order of increasing size. Give reasons for your answer.

$_{20}Ca^{2+}$, $_{16}S^{2-}$, $_{19}K^{+}$.

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……
……**[3]**

CORRECTION

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LESSON FOUR (4) – IONIZATION ENERGY

Q1. (a) Explain the following terms.

(i) *First ionization energy*.

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……..**[2]**

(ii) *Second ionization energy*.

……
……..……**[2]**

(iii) *Third ionization energy*.

……
……..……..**[2]**

(b) Indicate how each of the above terms vary on the periodic table.

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……..……**[6]**

(c) Explain why the first ionization energy of sodium is lower than that of magnesium but the second ionization energy of magnesium is much lower than that of sodium.

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……..……**[4]**

Q2. Arrange the following in decreasing order of ionization energy and give reason:

Potassium (K), lithium (Li), sodium (Na)

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……..**[4]**

CORRECTION

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LESSON FIVE (5) – ELECTRON AFFINITY

Q1. (a) Define the term electron affinity.

……
……..……**[2]**

Predict how electron affinity varies on the periodic table.

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……..…..……..**[3]**

CORRECTION

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LESSON SIX (6) - ELECTRONEGATIVITY

Q1. (a) Define the term electronegativity.

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……**[2]**

(b) Predict how electronegativity varies on the periodic table.

……
……
……..……..**[3]**

Q2. Give two differences between electron affinity and electronegativity.

Electron Affinity	Electronegativity

[4]

CORRECTION

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LESSON SEVEN (7) ATOMIZATION ENERGY – EAT

Q1. (a) Define atomization energy.

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……**[2]**

(b) Predict how atomization varies on the periodic table.

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……**[3]**

CORRECTION

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CHAPTER SIX (6) - PERIODICITY II

LESSON ONE (1) - PHYSICAL PROPERTIES OF THE ELEMENTS IN PERIOD 2 AND 3

Q1. Complete the table below

Element	Electron configuration	Physical state	Appearance	Units	Bonding between unit	Metallic character
Li	$1S^2\ 2S^1$	…… …	……	……	Metallic	Metallic
Be	$1S^2\ 2S^2$	S	White	atom	Metallic	Metallic
B	.....	S	Black	atom	……	…….
Na	[Ne] $3S^1$	……	silvery	……..	…….	Metallic
Mg	……		……	Atom	Metallic	……
Cl	[Ne] $3S^23P^5$	G	……..	……	Van der Waals	…….

[15]

Q2. State one physical property of each of the following elements:

(i) Lithium ……...……...**[1]**
(ii) Chlorine: ……...**[1]**
(iii) Boron: ……..…….**[1]**
(iv) Fluorine: ……...…….**[1]**

Q3. Complete the following reactions:

$Be + O_2 \rightarrow$ ……**[2]**
$B + O_2 \rightarrow$ ……**[2]**
$BeO + H_2O \rightarrow$ ……..**[2]**
$B + Cl \rightarrow$ ……...……**[2]**

CORRECTION

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LESSON TWO (2) CHEMICAL PROPERTIES OF THE ELEMENTS IN PERIOD 2 AND 3

Q1. Give one example each of:

(i) An amphoteric oxide ……..……....**[1]**

(ii) A hydride which evolves hydrogen gas when treated with water……..……**[1]**

(iii) A tetraoxocarbonate (IV) salt which is readily decomposed…….……...…**[1]**

(iv) A chloride salt which is readily hydrolyzed by water……...**[1]**

Q2. Write equations to illustrate each of the following:

(i) Reaction of water with CaH_2 ……**[2]**

(ii) Reaction of $AlCl_3$ with water ……**[2]**

(iii) The amphoteric behaviour of ZnO_2 ……**[2]**

CORRECTION

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CHAPTER SEVEN (7) -CHEMICAL BONDING

LESSON ONE – MEANING OF CHEMICAL BONDING

Q1. (a) What is chemical bonding?

……
……**[2]**

(b) What happens when a bond is formed?

……
……**[2]**

(c) Why should chemical bonds be formed?

……
……**[2]**

(d) What do chemical bonds formations involve ?

……
……**[2]**

Q2. State the octet rule.

……
……**[2]**

CORRECTION

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LESSON TWO – TYPES OF CHEMICAL BONDING

Q1. Distinguish between *interatomic bond* and *intermolecular bond*.

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…… ……..……**[4]**

Q2.(a) State the **three** types of interatomic bonds.

……
……..……..**[3]**

(b) State any two types of intermolecular bonds.

……
……..……..**[2]**

Q3. State the electron theory of bonding.

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……..……..**[2]**

CORRECTION

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LESSON THREE – IONIC OR ELECTROVALENT BONDING

Q1. (a) Define *ionic bond.*

……
……**[2]**

(b) What type(s) of bond exist(s) in

(i) Magnesium oxide? ……**[1]**

(ii) Ammonium ion? ……**[1]**

Q2. Explain any two factors that affect the formation of ionic bond.

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……
……**[4]**

Q3. Sodium combines with chlorine to form sodium chloride crystals. Draw the electronic structure of the sodium ion and the chlorine ion.

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……
……
……**[4]**

Q4. (a) What is a lattice?……**[2]**

(b) Mention one factor that affects the lattice energy of a compound.

……**[1]**

(c) Which of NaCl and $MgCl_2$ has a higher lattice energy? Explain your answer.

……
……
……**[3]**

(d) State the type of bond in the compound CCl_4.

……**[1]**

Q5. Use the electron dots to show the bonding in

(α) Carbon (IV) oxide: ……**[3]**

(β) Water: ……**[3]**

CORRECTION

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LESSON FOUR – LATTICE ENTHALPY

Q1. Explain **briefly** each of the following observations:

(a). Solid ionic compounds do not conduct electric current.

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……
……**[3]**

(b). The melting points of sodium chloride crystals is higher than that of paraffin wax.

……
……
……**[3]**

(c). Crystals of NaCl dissolve in water.

……
……
……**[3]**

(d) NaCl is more ionic than NaI.

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……
……**[3]**

CORRECTION

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LESSON FIVE – ENTROPY

Q1. (a) Explain the term ***entropy***.

……..……..**[2]**

(b) State two factors that influence entropy.

……..……..**[2]**

(c) Explain the two factors you have stated in (b) above.

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……..…..**[4]**

CORRECTION

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LESSON SIX – COVALENT BONDING

Q1. (a) Define covalent bond.

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……..……**[2]**

(b) Explain briefly the formation of covalent bond.

……
……...……
……
……**[3]**

Q2.(a) Give two properties of covalent compounds.

……
……..……..….**[2]**

(b) State two factors that affect the covalent bond.

……
…….....**[2]**

Q3. Explain the following terms:

(i) Bonding electron:

……
…….....…….**[2]**

Non – bonding electron:

……
……..**[2]**

(ii) Lone pair:

……
……..……**[2]**

(iii) Bond length:

……
……..……**[2]**

Q4. Explain the following terms and give one example each:

(i) Non-polar covalent bond.

……
……
……
……..……**[3]**

(ii) Polar covalent bond.

……
……
……..….**[3]**

(iii) Dative covalent bond.

……
……
……..……**[3]**

Q5. Explain the difference between a covalent bond and dative/coordinate covalent bond.

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……
……**[4]**

Q6. Consider the following pairs of bonds:

C-N and C-H

C-O and C-N

C-F and C-O

(i) Which bond in each pair is more polar?

……
……**[2]**

(ii) Arrange the bonds in increasing order of polarity.

……
……
……
……**[2]**

CORRECTION

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LESSON SEVEN - POLARIZATION

Q1. (a) Explain the term polarization.

……
……
……..……..**[2]**

(b) What does the polarization of a bond depends?

……
……
……..……**[2]**

Q2. Using the table below, arrange the following compounds in decreasing order of ionic character and give reasons for the order. *PH_3, $GeCl_4$, CsF.*

Atom	Electronegativity	Arrangement
Cl	3.0	
P	2.1	
H	2.1	
Ge	1.8	
F	4.0	
Cs	0.7	

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……
……..……**[5]**

Q3. Define polarizing power.

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……..……..**[2]**

CORRECTION

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LESSON EIGHT- VARIATION OF POLARIZATION ON THE PERIODIC TABLE

Q1. Explain the variations of polarization of the elements on the periodic table:

(i) Down the group:

……
……
……
……
……**[3]**

(ii) Across the period:

……
……
……
……**[3]**

Q2. Explain briefly the following terms:

(i) Anion polarizing power.

……
……**[3]**

(ii) Cation polarizing power.

……
……**[3]**

Q3. Consider the following compounds: ***HF, HCl, HBr, HI***

(i) Arrange the compounds in increasing order of polar character.

……
……**[3]**

(ii) Explain your answer.

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……
……**[4]**

CORRECTION

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LESSON NINE - VARIATION OF POLARIZATION ON THE PERIODIC TABLE

Q1. What is metallic bond?

……
……**[2]**

Q2. State and explain what metallic bond depends on.

……
……
……
……**[3]**

Q3. Explain the trends of metallic bond strength on the periodic table.

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……
……**[3]**

Q4. State three physical properties of metal.

……
……**[3]**

CORRECTION

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LESSON TEN - BONDS BETWEEN PARTICLES

Q1. Explain the following;

(i) Intramolecular bond.

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……
……**[2]**

(ii) Intermolecular bond.

……
……
……**[2]**

(iii) Hydrogen bonding.

……
……
……**[2]**

Q2. State any three compounds that exist as hydrogen bonding.

……
……**[2]**

CORRECTION

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LESSON ELEVEN – VAN der WAALS FORCES

Q1. With the aid of an illustration explain the following terms

(i) Dipole – Dipole.

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……
……**[3]**

(ii) Dipole – Induced – Dipole.

……
……
……**[3]**

(iii) Induced-Dipole- Induced-Dipole.

……
……
……**[3]**

Q2. Explain the trends of Van der Waals forces.

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……**[4]**

CORRECTION

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CHAPTER EIGHT - HYBRIDIZATION

LESSON ONE – MEANING AND OCCURANCE OF HYBRIDIZATION

Q1. Explain the following terms:

(a) Hybridization.

……
……
……..……**[2]**

(b) Atomic orbitals.

……
……
……..…… **[2]**

(c) Hybrid orbitals.

……
……
……..…..…. **[2]**

Q2. What causes hybridization?

……
……
……**[2]**

Q3. What effect does hybridization has on bond?

……
……..…..**[2]**

Q4. Draw the shape of ***S*** and ***P*** orbitals.

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……
……**[4]**

CORRECTION

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LESSON TWO –TYPES OF OVERLAP ORBITALS (COVALENT BOND)

Q1. How do the following bonds form?

(i) Sigma (σ) bond.

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……
……
……...……**[2]**

(ii) Pi (π) bond.

……
……
……
……...…**[2]**

Q2. State two characteristics each of sigma bond and pi bond.

(i) Sigma (σ) bond:

……
……...……**[2]**

(ii) Pi (π) bond:

……
……..**[2]**

Q3. State two differences between sigma bond and pi bond.

SIGMA BOND	PI BOND

[4]

CORRECTION

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LESSON THREE– VALENCE BOND THEORY (VBT) AND TYPES OF HYBRIDIZATION

Q1. State the postulates of the valence bond theory.

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……
……
……**[4]**

(b) Explain how the valence bond theory accounts for the existence of cis- trans isomers.

……
……
……
……**[4]**

Q2. Explain the following types of hybridization.

(i) *Sp hybridization:*
……
……**[2]**

(ii) *Sp^2hybridization:*……
……**[2]**

(iii) *Sp^3hybridization:*……
……**[2]**

Q3. State the nature of the following types of hybridization.

(i) *Sp hybridization:*……
……
……**[3]**

(ii) *Sp^2 hybridization:*……
……
……**[3]**

(iii) *Sp^3 hybridization:*……
……
……**[3]**

Q4. (a) Draw the full structure of ***but – 2 – ene*** showing all the individual bonds and indicate the values of all the different bond angles in the structure.

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……
……**[6]**

Q4(b) With the aid of the appropriate diagram, indicate how the C=C double bond in an alkene is formed.

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……..……..**[4]**

Q5. (a) Give the type of hybridization shown by the central atoms in the following compounds.

(i) NH_3: ……...……...**[1]**
(ii) H_2O: ……**[1]**
(iii) BCl_3: ……...……..…..**[1]**

(b) Deduce the shapes of the molecules in (a) above.

……
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……
……
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……
……..……....**[6]**

Q6. Explain the observations that: CO_2 is a linear molecule but H_2O is not.

(C =6, O=8).

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……**[4]**

CORRECTION

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LESSON FOUR - STRUCTURE OF GRAPHITE AND DIAMOND

Q1. State four differences between diamond and graphite.

Diamond	**Graphite**

[8]

Q2. State one use of diamond and graphite.

……
……
……**[4]**

Q3. Explain the following observations;

(i) Diamond is hard substance but graphite is soft.

……
……
……
……**[3]**

(ii) Diamond is non-conductor of electricity but graphite is conductor if electricity.

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……
……**[3]**

(iii) Diamond is unreactive but graphite is reactive.

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……
……**[3]**

CORRECTION

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CHAPTER NINE (9) - CONSERVATION OF MATTER AND STOICHIOMETRY

LESSON ONE – CARBON – 12 SCALE AND ATOMIC MASS UNIT

Q1. (a) What is a carbon – 12 scale?

……
……**[2]**

(b) Write down ***three*** isotopes of carbon.

……**[3]**

(c) State three importance of a carbon – 12 scale.

……
……
……**[6]**

Q2. Explain why oxygen is used as a reference scale for measurement.

……
……**[3]**

Q3. What is atomic mass unit?

……
……**[2]**

Q4. What is atomic mass?

……
……**[2]**

Q5. The atomic mass of stable isotopes of copper, $^{63}_{29}Cu$ (69.09%) and $^{65}_{29}Cu$ (30.91%) are 62.93 amu and 64.9278 amu respectively. Calculate the average atomic mass of copper.

……
……
……
……
……**[6]**

Q6. The atomic mass of the two stable isotopes of boron, $^{10}_{5}B$(19.78%) and $^{11}_{5}B$(80.22%) are 10.0129 amu and 11.0093 amu, respectively. Calculate the average atomic mass of boron.

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……**[6]**

CORRECTION

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LESSON TWO – RELATIVE ATOMIC MASS AND RELATIVE MOLECULAR MASS

Q1. (a)Explain relative atomic mass.

……
……**[2]**

(b) State any two differences between relative atomic mass and atomic mass unit.

Relative atomic mass	Atomic mass unit

[4]

Q2. The atomic mass unit of carbon-12 is 1.6603×10^{-24}g. If the mass of an atom is 5.313×10^{-23}g, determine its relative atomic mass.

Q3. Explain the following terms:

(i)Relative molecular mass:

……
……**[2]**

(ii)Formula mass:

……
……**[2]**

Q4. (a) Why it is that relative atomic mass and relative molecular mass has no unit.

……
……**[2]**

(b)Determine the relative molecular mass for the following:

(i) Na_2CO_3:

……
……**[2]**

(ii) ClO_3^- :

……
……**[2]**

(iii) $C_6H_{12}O_6$:

……
……**[2]**

(iv) NH_3 :

……
……**[2]**

(v) $CuSO_4 . 5H_2O$:

……
……..……..**[2]**

[Relative atomic masses (A_r) are: H=1.0, O=16.0, C=12.0, Na=23.0, Cl=35.5, N=14.0 , Cu = 64, S=32]

CORRECTION

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LESSON THREE – AMOUNT OF SUBSTANCE

Q1. (a) Define the following terms:

(i)*Mole* of a substance:

……

……..……..……**[2]**

(ii)Avogadro's Constance:

……

……..……..**[2]**

(b) State the stable entities in the following:

(i) Oxygen gas: ……..……**[1]**

(ii) Calcium chloride solid: ……..…**[1]**

(iii) Sugar: ……**[1]**

Q2. . Calculate the number of :

(i)Oxygen molecules in 0.5mol oxygen gas,O_2

……

……

……

……....……**[3]**

(ii)Oxygen atoms in 0.5mol oxygen gas,O_2 . [L =$6.02X10^{23}$ mol^{-}]

……

……

……

……...……**[3]**

Q3. You are given 12.04×10^{23} molecules of ammonia gas, NH_3.

Calculate the amount of the following in it:

(i) Ammonia molecules,

……

……

……

……..……**[4]**

(ii) (ii) hydrogen atoms. (L=$6.02 \times 10^{23} mol^{-1}$)

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……..……**[4]**

CORRECTION

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LESSON FOUR – MOLAR QUANTITY

Q1. What is molar mass?

……
……**[2]**

Q2. What is molar volume?

……
……**[2]**

Q3. Calculate the:

(i)Amount of substance in 2.8 dm^3 of CO_2 at stp.

……
……
……
……**[3]**

(ii)Mass of gas in 2.8 dm^3 of CO_2 at stp.

……
……
……**[3]**

number of molecules of the gas in 2.8 dm^3 of CO_2 at stp.

……
……
……**[3]**

(V_m=22.4dm^3 mol^{-1} , C = 12 , O = 16)

Q4. State Avogadro's law.

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……
……**[2]**

CORRECTION

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LESSON FIVE (5) – FARADAY CONSTANT

Q1. What is Faraday constant?

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……
……**[2]**

Q2.(a) Calculate the total charge in coulombs carried by 3 mole electrons.

……
……
……
……**[4]**

Q2. (b) How many electrons carry a total charge of 193,000C?

……
……
……
……**[4]**

Q3. Calculate the time needed to pass 0.5 mole electrons using a current of 25A.

……
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……
……..……..**[4]**

CORRECTION

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LESSON SIX(6) – QUANTITY OF SOLUTION

Q1. Define the following.

(i) Solute.

……

……..……**[2]**

(ii) Solvent.

……

……...……**[2]**

(iii) Solution.

……

……..……**[2]**

(iv) Suspension.

……

……..……..**[2]**

(v) Aqueous solution.

……

……..……..**[2]**

Q2. Give an example of each of the following:

(i) Liquid in liquid solution. ....……**[1]**

(ii) Liquid in gas solution... ……...……**[1]**

(iii) Solid – liquid solution…….……**[1]**

(v) Gas in liquid solution... ……..……..…..**[1]**

(vi) Gas – gas solution… ……..……..**[1]**

(vii) Solid – solid solution. ....……..**[1]**

CORRECTION

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LESSON SEVEN (7) –AMOUNT CONCENTRATION OR MOLARITY

Q1. Define molarity.

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……..…..**[2]**

Q2. Calculate the mass of sodium chloride in 200cm^3 of 0.5 $moldm^{-3}$ of NaCl solution.

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……**[4]**

Q3. 100cm^3 of 0.1 mol dm^{-1} of NaOH is mixed with 100cm^3 of 0.15mol dm^{-3} of NaOH, calculate the concentration of the resulting solution.

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……**[6]**

Q4. 10 g of Na_2CO_3 are dissolved in water and the solution made up to 300 cm^3. Find the concentration in moles per dm^3 of the solution. [Na=23, O = 16, C = 12]

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……**[6]**

CORRECTION

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LESSON EIGHT (8) – MASS CONCENTRATION

Q1. (a)Define mass concentration.

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……**[2]**

(b) Write down the relationship between ***m, ρ and v.***

……**[2]**

Q2. Explain the following:

(i)2% (W/W) of $AgNO_3$.

……
……**[2]**

(ii) 0.034% (V/V).

……
……**[2]**

(iii)36%(W/V) of HCl.

……
……**[2]**

Q3. Calculate the concentration in g dm^3 of 0.75M Na_2CO_3 solution.

[Na=23 , C=12 , O=16].

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……**[4]**

Q4. You are given Na_2CO_3. XH_2O solution in which 107.25g of the salt dissolved in 500cm^3 solutions. The concentration is 0.75M. Calculate

(i)The concentration in g.dm^3 of the solution.

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……**[4]**

(ii) The molar mass of the compound.

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……**[3]**

(iii) The value of X.

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……
……**[2]**

[Na=23, O=16, C=12, H=1]

Q5. 20cm³ of eye drop of 0.5% $(\frac{w}{v})$ concentrationis purchased in a chemist's shop. Determine the mass of the active chemical in the 10cm³.

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……..……..**[6]**

CORRECTION

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LESSON NINE (9) –MOLAL/ MOLALITY,CONCENTRATION AND MOLE FRACTION

Q1. (a) What is Molar concentration or molality?

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……**[2]**

(b) Write down the relationship between ***b, n*** and***m.***

……..

(c) Calculate the molality of 8 g of NaOH dissolved in 400 g of water. [Na=23, O=16,H=1].

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……**[4]**

(d) What is the molality of 16g of NaCl that dissolved in 500 g of water? [Na=23, Cl=35.5].

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……**[4]**

Q2. (a) What is mole fraction?

……
…….. **[2]**

Q3. Calculate the mole fraction of 8g NaOH dissolved in a mixture of 1.7g of NH_3 and 5.3g of Na_2CO_3. [Na=23, O=16, H=1, C=12, N=14].

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……**[8]**

Q4. 2 g of $AgNO_3$ is dissolved in 100g of water. Calculate the

(a) Molality.

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……**[4]**

(b) Mole fraction of $AgNO_3$ in the solution. [Ag = 108, N = 14, O = 16].

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……**[4]**

CORRECTION

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LESSON TEN – PREPARATION OF SOLUTION

Q1. Explain the following terms:

(i)*Assay* .

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……..……**[2]**

(ii)*Standard solution.*

……

……..…….. **[2]**

(iii)*stock solution.*

……

……..……. **[2]**

(iv)Dilution factor.

……

……..……**[2]**

Q2. (a) What does assay includes?

……**[2]**

(b) What happens when a solution is diluted?

……

……..……**[2]**

Q3. (a) Write down the relation for calculating dilution factor.

……

……...……..**[2]**

(b) 25cm^3 of 2$moldm^{-3}$ KOH solution is diluted to 500cm^3. What is the new concentration after dilution?

……

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……..……**[4]**

Q4. A 250 cm^3 solution of $K_2Cr_2O_7$ with concentration 0.025 $mol.dm^{-3}$ is to be prepared from a stock solution with concentration 0.04$mol.dm^{-3}$. Calculate the volume of the stock solution required.

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……..……....**[8]**

CORRECTION

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LESSON ELEVEN - USING THE KNOWLEDGE OF ASSAY OF STOCK SOLUTION TO CALCULATE CONCENTRATION

Q1. Write down the formula for calculating the concentration of stock solution.

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……..……....**[3]**

Q2. Calculate the concentration of a stock trioxonitrate (V) acid (HNO_3) which has mass density of 1.50gcm^{-3} and has purity of 70% [$M_{(HNO3)}$ = 63].

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……..……**[6]**

Q3. (a) Calculate the concentration of a stock tetraoxosulphate (VI) acid (H_2SO_4) which has mass density of 2.50g.cm^{-3} and has purity of 98%.

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……..……...……..**[6]**

(b) what volume of the stock acid should be taken to prepare 250cm^3 of 2M of the acid solution. [H=1 S=32 O=16].

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……..……. **[6]**

CORRECTION

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LESSON TWELVE - PERCENTAGE YIELD

Q 1. Explain the following terms:

(i) Reaction or actual yield.

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……**[3]**

(ii) Theoretical yield.

……

……**[3]**

(iii) Percentage yield.

……

……**[3]**

(iv) Limiting reagent.

……

……**[3]**

(v) Excess reagent.

……

……**[3]**

Q 2. Calculate the mass of magnesium that can be obtained from the reaction between 4.8 grams of magnesium and 4.8 grams of sulphur.

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……**[6]**

CORRECTION

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LESSON THIRTEEN - PREPARATION OF STANDARD SOLUTION

Q1. Describe how you or your teacher prepared a known concentration of Na_2CO_3 solution.

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……**[10]**

Q2. Describe how you prepared a 250cm^2 solution of Na_2CO_3 with concentration 0.010 $mol.dm^{-3}$ in the laboratory. [Na=23, O=16, C=12].

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……**[10]**

CORRECTION

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LESSON FOURTEEN - STANDARDIZATION OF SOLUTION

Q1. What is a standardized solution?

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……..**[3]**

Q2. (a) What is a primary standard solution?

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……...……**[3]**

(b) State three properties of a primary standard solution.

……
……
……..**[6]**

(c) Give three examples of a primary standard solution.

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……....……**[3]**

Q3. (a) (a) What is a secondary standard solution?

……
……....……**[3]**

(b) State three properties of a secondary standard solution.

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……..…..**[6]**

(c) Give three examples of secondary standard solution.

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……....……**[3]**

Q4. Explain briefly why a given mass of sodium hydroxide pellets cannot be used to prepare a standard solution.

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……...**[3]**

CORRECTION

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CHAPTER TEN (10) - CHEMICAL FORMULAE AND CHEMICAL EQUATIONS

LESSON ONE – CHEMICAL COMPOUNDS FORMULA AND OXIDATION NUMBER

Q1. Explain the following terms:

(i)*Chemical compound*

……
……**[2]**

(ii)*Valency*……
…… **[2]**

(iii)*Radical*……
……**[2]**

(iv)*Atomicity of an element*

……
……**[2]**

Q2. Complete the table below

Element	Atomicity
Aluminium	
Hydrogen molecules	
Ozone	

[3]

3. Write the chemical formulae of the following compounds.

(i) Iron (III) Chloride ……..…….. **[2]**

(ii) Sodium sulphide ……**[2]**

(iii)Lead (II) bromide. …… **[2]**

4(a) What is *oxidation number*?

……**[2]**

4(b)(ii) Find the oxidation number of the underlined elements:

(α) $K\underline{Mn}O_4$

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……..**[3]**

(β) $\underline{Cr_2}O_7^{2-}$

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……**[3]**

CORRECTION

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LESSON TWO – NAMING OF BINARY COMPOUNDS, OXOANIONS, OXOACIDS AND HYDRATED COMPOUNDS

Q1, Name the following compound

(i)Mg_3N_2

……

……..**[3]**

(ii)Cu_2O

……

……..……**[3]**

(iii)MnO_4^-

……

……..**[3]**

(v)HCO_3^-

……

……..**[3]**

(vi)HNO_3

……

……..….**[3]**

(vii)H_3PO_4

……

…….. **[3]**

(viii)$Na_2CO_3.7H_2O$

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……..……**[3]**

(ix)$FeSO_4.5H_2O$

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……..……**[3]**

CORRECTION

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LESSON THREE –DETERMINATION OF CHEMICAL FORMULAE

1. Explain the following terms:

(a) Empirical formula

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……..……..**[3]**

(b) Molecular formula

……
……..……..**[3]**

(c) Structure formula

……
……..……..**[3]**

2. 2.7 g of a gaseous hydrocarbon, which contains 11.1% of hydrogen, occupies a volume of 1.12 dm^3 at s.t.p. [C =12 , H = 1 , molar volume of gas at s.t.p (Vm) = 22.4dm^3]

What is the

(i) Percentage composition of carbon in the compound?

……
……
……
……**[2]**

(ii) Empirical formula of the compound?

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……
……**[8]**

(iii) Molar mass of the compound?

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……
……**[4]**

(iv) Molecular formula of the compound?

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……**[4]**

CORRECTION

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LESSON FOUR –WRITING CHEMICAL EQUATION

1. Explain the following terms:

(a) chemical equations

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……**[3]**

(b) chemical reaction

……
……**[3]**

(c)chemical reactant

……
……**[3]**

(d) chemical product

……
……**[3]**

2. Write chemical equation for the following and indicate the reactant(s) and product(s)

(a) Hydrogen chloride reacts with sodium hydroxide to produce sodium chloride and water.

……
……**[4]**

(b) Iron reacts with chlorine to produce iron(III) chloride.

……
……**[4]**

CORRECTION

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LESSON FIVE - LESSON FOUR - WRITING AND BALANCING CHEMICAL EQUATION

1. Explain the following chemical reactions:

(a) *synthesis reaction*

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……**[3]**

(b) *decomposition reaction*

……
……
……**[3]**

(c) *displacement reaction*

……
……
……**[3]**

(d) *precipitation reaction*

……
……
……**[3]**

(e) *acid reaction.*

……
……
……**[3]**

(f) *combustion reaction*

……
……
……**[3]**

2. Balance the following compounds:

(a) $C_3H_8 + O_2(g) \rightarrow CO_2(g) + H_2O(l)$

……
……
……
……**[4]**

(b) $Na(s) + H_2O(l) \rightarrow NaOH(aq) + H_2(g)$

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……
……**[4]**

3. State the following laws:

(a) Law of conservation of matter or mass

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……

……
……..……..**[3]**

(b) Law of definite or constant proportions

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……
……**[3]**

(c)Law of multiple proportion

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……**[3]**

4. Briefly describe an experimental test to demonstrate the law of conservation of mass.

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……..……**[10]**

5. The data below is the analysis of two compounds in an experiment. Study it carefully and use it to answer the questions that follow.

	Copper (I) oxide	**Copper (II) oxide**
Mass of oxide/g	4.07	3.90
Mass of copper/g	3.73	3.32

Calculate the mass of copper which combine with 1 g of oxygen in

(i)Copper (I) oxide

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……
……..
..……..……**[5]**

(ii)copper (II) oxide

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……
……..….**[5]**

(iii)Calculate the ratio of the different masses of copper which combined with 1 g of oxygen each.

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……**[7]**

CORRECTION

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CHAPTER ELEMENT (11) - NUCLEAR CHEMISTRY

LESSON ONE - MEANING OF NUCLEAR CHEMISTRY AND ISOTOPE

Q1. What is nuclear chemistry?

……
……**[2]**

Q2. What are the constituents of nucleus?

……
……**[2]**

Q3. Define the following terms:

(a) Parent nuclide

……
……**[2]**

(b) Daughter nuclide

……
……**[2]**

(c) Radioactive element

……
……**[2]**

Q4. Identify the ***parent*** and ***daughter(s)*** *nuclide* from the following reactions.

$^{222}_{86}Rn \rightarrow {}^{X}_{84}Po + {}^{4}_{2}He$ ……**[2]**

$^{214}_{83}Bi + {}^{0}_{-1}e \leftarrow {}^{Y}_{82}Pb$. ……**[2]**

Q5. Briefly explain what causes a nucleus to emit radiation.

……
……**[3]**

Q6. What is meant by transmutation?

……
……**[2]**

CORRECTION

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LESSON TWO (2) – RADIOACTIVITY

Q1. Define the following term:

(i)Radioactivity……
……...….**[2]**

(ii)Nature radioactivity
……
……...**[2]**

(iii)Artificial radioactivity
……
……...…**[2]**

b. Write down nuclear equation to illustrate the following

i. *Natural radioactivity* ……...……**[2]**

ii. *Artificial radioactivity* ……...……**[2]**

Q2. State the differences between **natural radioactivity** and **artificial radioactivity**

natural radioactivity	**artificial radioactivity**

[6]

CORRECTION

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LESSON THREE (3) – RADIATION

Q1. Complete the following table:

Type of radiation	Charge	Penetrating power
Alpha		
Beta		Medium
Gamma		

[5]

Q2. (a)State the different radiations emitted by radioactive elements.

……..**[3]**

(b) State the nature of **each** of the radiations stated in (a) above.

……
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……..……**[6]**

(b) Give **two** characteristics of **each** of the radiations stated in (a) above

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……..……**[6]**

(c) Arrange the radiations you have stated in (a) in

(α) Increasing order of penetration ability

……**[2]**

(β) Decreasing order of ionization ability

……**[2]**

Q3. What is the nature of each of the following radiations?

(α) Alpha……..…..……**[2]**

(β)Beta……..……..….**[2]**

(γ) Gamma…….……...……..**[2]**

(b) Why are gamma rays more injurious to health than alpha rays.

……**[2]**

Q4. Explain what is meant by ***nuclear transmutation.***

……
……**[2]**

Q5. Explain the following terms:

(i) Positron:

……
……**[2]**

(ii) Electron capture:

……
……**[2]**

Q6. Name one instrument used to detect radioactivity.

……**[2]**

Q7. Describe briefly how ***Geiger Muller Counter*** is used to detect radiations.

……
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……**[6]**

Q8. Complete the following nuclear reactions:

$^{14}_{7}N + {}^{1}_{0}n \rightarrow {}^{14}_{6}C +$……**[1]**

$^{226}_{}Ra \rightarrow {}^{4}_{2}\alpha + {}^{}_{86}A$ ……**[1]**

CORRECTION

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LESSON FOUR (4) - NUCLEAR STABILITY

Q1. (a) State **two** factors that determine the stability of a nuclide.

……
……..……..**[2]**

(b) Explain how **each** of the factors you have stated in (a) affects the stability of the nuclide.

……
……
……**[6]**

Q2. Why nuclei of some atoms are stable but others are not?

……
……
……**[3]**

Q3, What radiation is emitted when there is neutron rich?

……
……..……**[2]**

Q4. What happen when beta process occur?

……
……..……..……**[3]**

Q5. What process occurs when there is proton rich?

……
……..……..**[3]**

Q6. What happen when beta process occur?

……
……..……..……..**[3]**

CORRECTION

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LESSON FIVE (5) – HALF-LIFE OF A NUCLIDE

Q1. Define Half – life of a nuclide.

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……**[2]**

Q2. 2.0g of bone dug from a cemetery is found to give 250 carbon-14 disintegrations per second. If the half-life of carbon-14 is 5700 years, how old is the bone if the initial rate of disintegrations of carbon -14 is 155 carbon-14 disintegration per second.

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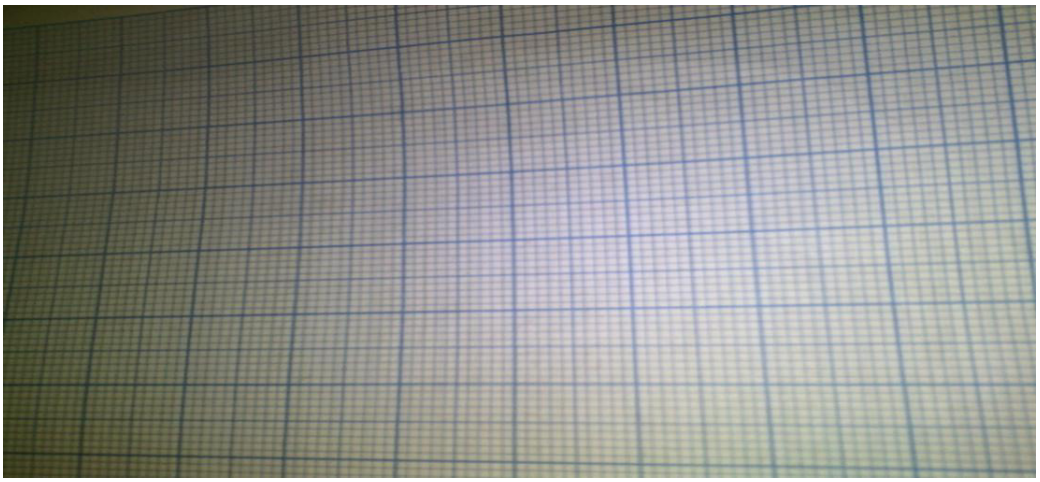
……
……**[5]**

Q3. The decay rate measured by a Geiger-Muller counter for radioactive sodium ^{24}Na at different times is given below

Activity/counts^{-1}	100	92	85	78	72	66	61
Time/hour	0	20	40	60	80	100	120

(i) Plot a graph of Activity against Time. **[10]**



(ii) From the graph what is the time when the activity is 57?

(iii) From the graph what is the activity when the time 97?

Q4. Explain the following statement:

The half-life of $^{210}_{82}Pb$ is 20.4 years.

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……**[3]**

CORRECTION

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LESSON SIX (6)- NUCLEAR REACTIONS

Q1. Define each of the following term:

(i)Nuclear fusion.

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……..**[2]**

(ii)Nuclear fission.

……

……..**[2]**

(iii)Spontaneous fission.

……

……..**[2]**

(iv)Induced fission.

……

……

……..….**[2]**

(v)Uranium fission.

……

……..…….**[2]**

Q2. State two (2) uses of nuclear fission

……..…**[2]**

……..**[2]**

Q3. Distinguish between nuclear fission and nuclear fusion.

Nuclear fission	Nuclear fusion
……	……
……	……
……	……
……	……
……	……**[6]**

Q4. State two uses of nuclear fusion.

……..**[2]**

……..**[2]**

Q5. (a) What is nuclear reactor?

……

……**[2]**

(b). State two uses of nuclear reactor.

1. ……..……..**[2]**

2……..……..**[2]**

Q6. What is nuclear reaction?

……
……..……..**[2]**

(b) State two differences between nuclear reactions and chemical reactions.

Nuclear reaction	Chemical reaction
……	……
……	……
……	……
……	……**[6]**

CORRECTION

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LESSON SEVEN (7)- APPLICATION OF NUCLEAR CHEMISTRY

Q1. State three (3) applications of radioactivity.

……**[1]**
……**[1]**
……**[1]**

Q2.(a) Give three peaceful uses of radioactivity.

……**[1]**
……**[1]**
……**[1]**

(b) State three harmful effects of radioactivity.

i. ……**[1]**

ii. ……**[1]**

iii. ……**[1]**

Q3. State one use of nuclear chemistry in the following areas:

(i)Medical or Health uses. ……**[1]**
(ii)Industrial uses. ……**[1]**
(iii)Agricultural uses. ……**[1]**
(iv)Energy uses. ……**[1]**

CORRECTION

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CHAPTER TWELVE (12) – STATES OF MATTER

LESSON ONE – MEANING OF MATTER AND KINETIC THEORY OF MATTER

Q1. (a) Explain the term matter

……
……**[2]**

(b) State the entities that are made up of matter.

……
……**[3]**

(c)List down the three states of matter.

……
……**[3]**

(d) Write down the 'fourth' state of matter and ***briefly*** explain how is formed.

……
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……
……**[4]**

Q2. State two physical states in which matter depends.

……
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……
……**[4]**

Q3. What is kinetic theory of matter?

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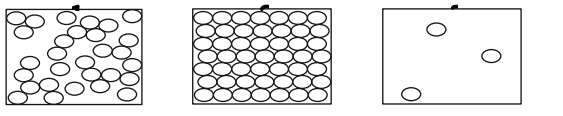
……**[3]**

Q4.The kinetic theory suggests different arrangements for the atoms or molecules in the three states of matter. The e diagrams below show how evidence suggests the particles are arranged in the three states of matter.



A B C

Whatarethethreestatesshown?

A = …….. **[1]** B = …….. **[1]** C= ……..**[1]**

Q5. State the postulate of kinetic theory of matter.

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……..…..**[6]**

Q6. Explain why the three states of matter are different from each other.

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……**[4]**

CORRECTION

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LESSON TWO – CHARACTERISTICS OF SOLID STATES OF MATTER

Q1. State any three characteristics of solid state of matter.

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……**[6]**

Q2. Explain the term melting point of a substance.

……
……
……**[3]**

Q3. State the factor(s) that affect the melting point of solid.

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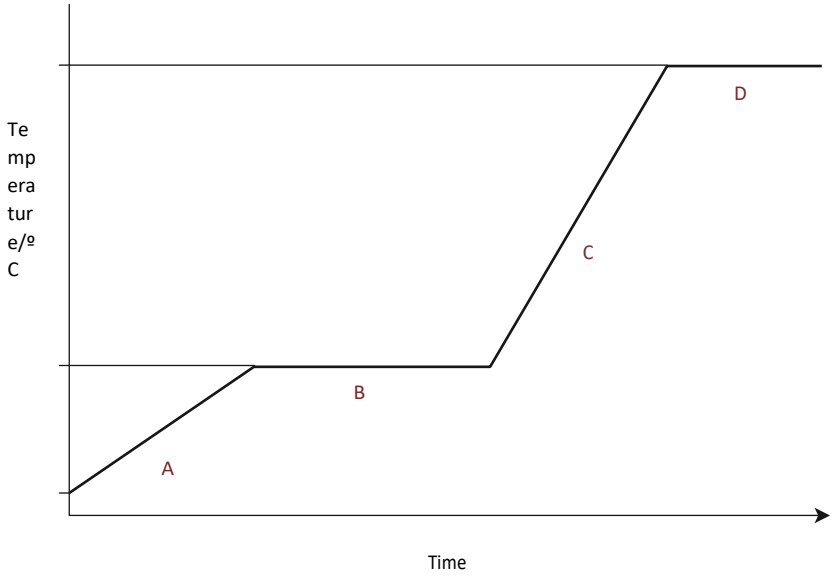
……**[4]**

Q4. The graph shows the heating curve for a metal that is solid at room temperature (25 °C). The metal has been heated until it turns to vapour.



Which part of the graph represents the period of time when the metal is melting?

……**[2]**

Q5. By using the kinetic theory explain what happens to the particles of a solid when heated.

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……**[6]**

CORRECTION

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LESSON THREE – CHARACTERISTICS OF LIQUID STATES OF MATTER

Q1. State any three characteristics of liquid state of matter.

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……..……..**[6]**

Q2. Explain why liquids have irregular shape or take the shape of its container?

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……**[6]**

Q3. Explain the following terms:

(i)Vapour pressure

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……..……..**[3]**

(ii)Saturated vapour pressure

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……...……**[3]**

(iii)Boiling point of a substance

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……...……**[3]**

Q4. State two differences between evaporation and boiling.

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……..……..**[6]**

Q5. Explain how the boiling point of water is determined.

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CORRECTION

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LESSON FOUR – CHARACTERISTICS OF GASEOUS STATES OF MATTER

Q1. State five characteristics of gas.

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……**[10]**

Q2. Explain the following terms:

(i)Condensation

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……**[3]**

(ii)Sublimation

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(iii)Deposition

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……**[3]**

Q3. Give two examples of substance that can sublime.

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……**[2]**

Q4 Explain what happens as solid naphthalene changes to the liquid state and from the liquid.

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……**[5]**

CORRECTION

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LESSON FIVE – EVIDENCE FOR THE KINETIC THEORY OF MATTER

Q1. List four(4) evidence that support the kinetic theory of matter.

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……..……**[4]**

Q2. Explain the diffusion of a gas.

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……..…..**[3]**

Q3. State two factors that determine the rate of diffusion.

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……..…..**[4]**

Q4. State Graham's law of diffusion of a gas.

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……**[3]**

Q5. Arrange the following gases in order of increasing rate of diffusion *He, CH_3CH_3 and F_2.* Give reason for the order.

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……**[4]**

CORRECTION

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LESSON SIX – APPLICATION OF GRAHAM'S LAW OF DIFFUSION

Q1. If 380cm^3 of hydrogen gas diffuse in 1 hour. How long will it take 600cm^3 of a gas G, whose vapour density is 30, diffuse under the same conditions if the relative molecular mass of hydrogen is 2?

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…… **[10]**

Q2. Describe briefly an experiment to demonstrate Graham's law of diffusion.

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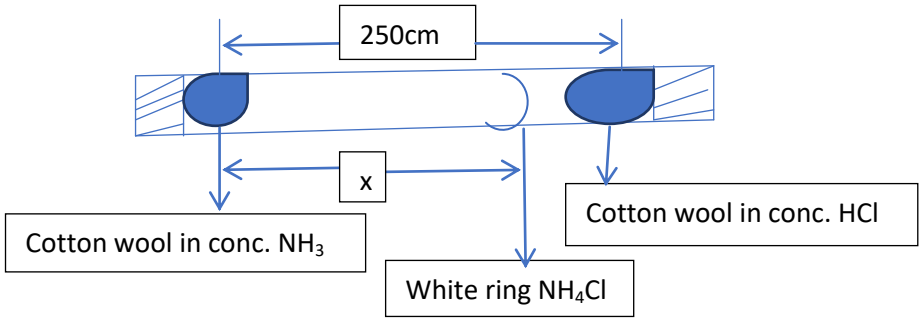
……**[9]**

Q3. Consider the set up in the diagram below:



Calculate the distance x at which the white ring of NH_4Cl will form.

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……**[10]**

CORRECTION

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LESSON SEVEN – PRINCIPLS OF GASES AND GAS LAWS (BOYLE'S LAW)

Q1. State two principles of gases.

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……**[4]**

Q2.(a) State Boyle's law.

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……..……**[3]**

(b) Write down mathematical expression for Charles law.

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……..….**[2]**

Q3. Show any two graphical representations of Boyle's law.

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……..……..**[6]**

Q4. 575cm^3 of a gas M has a pressure of 97kPa. What will be its volume if the pressure is reduced to 95kPa?

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……....**[7]**

CORRECTION

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LESSON EIGHT (8) – CHARLES LAW

Q1. (a) State Charles' law.

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……**[3]**

(b) write down mathematical expression for Charles law.

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……**[2]**

Q2. Show graphical representation of Charles law.

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……**[6]**

Q3. At 44°C a sample of a given gas occupies 350cm^3? Find the new volume at 100°C if the pressure remains constant.

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……**[9]**

Q4. A certain mass of hydrogen occupies 6.00dm^3 at 137°C. What will be the new volume if the temperature is changed to -83°C, with pressure remain the same.

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……**[10]**

CORRECTION

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LESSON NINE (9) – DALTON'S LAW OF PARTIAL PRESSURE AND AVOGADRO'S LAW

Q1. State Dalton's law of partial pressure.

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……**[3]**

Q2. Give mathematical expression of Dalton's law of partial pressure.

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……..……**[2]**

Q3. Explain Dalton's law of partial pressure using kinetic theory of gases.

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……**[5]**

Q4. A mixture of gases, whose total pressure is 80kPa, contains 4g of methane (CH_4), 3.0g of ethane (C_2H_6) and 22.0g of propane (C_3H_8) at 0°C. Calculate the partial pressure of each gas.

[C=12, H= 1].

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……..……**[10]**

Q5. If 550cm^3 of a gas was collected over water at a temperature of 298K and a pressure of 110kPa, determine the pressure of the gas [saturated vapour pressure of water at 298K = 38kPa]

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……..……**[10]**

Q6. State Avogadro's law.

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……..……**[3]**

Q7. State Avogadro's law mathematically.

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……**[2]**

CORRECTION

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LESSON TEN (10 a) – THE GENERAL GAS LAW/EQUATION AND IDEAL GAS EQUATION

Q1. Represent mathematically general gas law.

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Q2. Hydrogen gas is contained in a 360cm^3 glass bulbs at stp. Calculate its new pressure if it is carefully transformed into a glass bulb of volume 340cm^3 at 40°C.

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……..……..**[10]**

Q3. Show that **PV = nRT**, where P=pressure, V=volume, n=amount of substance, R=gas constant and T=temperature.

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……...…….….**[7]**

Q4. A mixture of gases with a total pressure of 120kNm^{-2} consists of 0.025 moles of oxygen, 0.175 moles of hydrogen and 0.67 moles of nitrogen at 25°C. Calculate the total volume of the gaseous mixture. [R = 8.314JK^{-1}mol^{-1}]

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CORRECTION

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LESSON TEN (10b) – THE GENERAL GAS LAW/EQUATION AND IDEAL GAS EQUATION

Q1. Show that **PV =** $\frac{mRT}{M}$**,** where the variables have their usual meaning.

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……**[6]**

Q2. At 80°C and a pressure of 214629Pa, methane occupies a volume of 4860cm^3. Calculate the relative molecular mass of the gas if it has a mass of 3.42g at stp.

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……**[9]**

Q3. State the variations of the gas density.

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……**[4]**

Q4. State the relationship between the gas density and ideal gas equation.

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……**[4]**

Q5. Find the density of oxygen gas at 35°C and 0.9898atm. [R=0.0821, M= 32.0]

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……**[6]**

Q6. State two differences between ideal gas and real gas.

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……**[6]**

Q7. A gas R deviates significantly from ideal behaviour.

(a)What causes the deviation?

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……**[3]**

(b)How can the deviation be corrected?

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……..…..**[3]**

(c)Under what conditions can Y show ideal behaviour?

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……**[2]**

Q8. Plot a graph of PV against P for an ideal gas and a real gas.

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……**[6]**

CORRECTION

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LESSON ELEVEN (11) – PREPARATION OF GASES

A – GENERAL PROPERTIES OF GASES

Q1. State four general physical properties of gases.

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Q2. State four general chemical properties of gases.

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……....**[8]**

B – NH_3 GAS PREPARATION

(i)List two chemicals used in the laboratory preparation of ammonia gas.

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……...……**[4]**

(ii)Write a balanced equation for the laboratory preparation of ammonia gas.

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……...……**[4]**

(iii)Mention the chemical that can be used to dry ammonia gas.

……...……**[2]**

(iv)Name the method of collection of the gas.

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(v)List two chemical properties of ammonia gas.

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……...….**[4]**

(vi)State two uses of the gas.

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……...……**[4]**

CORRECTION

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C – H_2 GAS PREPARATION

(i)List two chemicals used in the laboratory preparation of hydrogen gas.

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……...……**[2]**

(ii)Write a balanced equation for the laboratory preparation of hydrogen gas.

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……...……**[4]**

(iii)Mention the chemical that can be used to dry hydrogen gas.

……...…**[3]**

(iv)Name the method of collection of the gas.

……...……**[2]**

(v)List two chemical properties of hydrogen gas.

……
……**[4]**

(vi)How can the gas be tested?

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……...……**[4]**

(vii)State two uses of the gas.

……
……...**[4]**

D – O_2 GAS PREPARATION

(i)List two chemicals used in the laboratory preparation of ammonia gas.

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……...……...……**[4]**

(ii)Write a balanced equation for the laboratory preparation of ammonia gas.

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……...……**[4]**

(iii)Mention the chemical that can be used to dry ammonia gas.

……...……**[3]**

(iv)Name the method of collection of the gas.

……...……...…**[2]**

(v)List two chemical properties of ammonia gas.

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……...……...…**[4]**

(vi)How can the gas be tested?
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……...……..**[2]**

(vii)State two uses of the gas.
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CORRECTION

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E – HCl GAS PREPARATION

(i)List two chemicals used in the laboratory preparation of hydrogen chloride gas.

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……...…..……**[4]**

(ii)Write a balanced equation for the laboratory preparation of hydrogen chloride gas.

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……...……...…**[4]**

(iii)Mention the chemical that can be used to dry hydrogen chloride gas.

……...……...…….**[3]**

(iv)Name the method of collection of the gas.

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(v)List two chemical properties of hydrogen chloride gas.

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……..……..[4]

(vi)State two uses of the gas.
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……..……..[4]

F- SO_2 GAS PREPARATION

(i)List two chemicals used in the laboratory preparation of Sulphur (iv) gas.

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……..……[4]

(ii)Write a balanced equation for the laboratory preparation of Sulphur (iv) gas.

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……..……[4]

(iii)Mention the chemical that can be used to dry Sulphur (iv) gas.

……..……[3]

(iv)Name the method of collection of the gas.

……..……[2]

(v)List two chemical properties of Sulphur (iv) gas.

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……[4]

(vi)State two uses of the gas.
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……..……..[4]

G- CO_2 PREPARATION

(i)List two chemicals used in the laboratory preparation of carbon (iv) gas.

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……..……..[4]

(ii)Write a balanced equation for the laboratory preparation of carbon (iv) gas.

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……...……...……**[4]**

(iii)Mention the chemical that can be used to dry carbon (iv) gas.

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(iv)Name the method of collection of the gas.

……**[4]**

(v)List two chemical properties of carbon (iv) gas.

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……...……**[4]**

(vi)How can the gas be tested?

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……...……**[3]**

(vii)State two uses of the gas.

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……...**[4]**

CORRECTION

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