NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES SCIENCES

DEPARTMENT OF AGRICULTURAL SCIENCES AND AGRIBUSINESS

QUALIFICATIONS: BACHELOR OF SCIENCE IN AGRICULTURE BACHELOR OF SCIENCE IN HORTICULTURE	
QUALIFICATIONS CODE: 07BAGA 07BHOR	**LEVEL:** 7
COURSE CODE: ICA511S	**COURSE NAME:** INTRODUCTION TO CHEMISTRY
SESSION: JUNE 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 120

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER:	MS. PAULINA NDINELAGO NAUPU
MODERATOR:	MRS. LUCIA TUYENI-KELAO KAFIDI

INSTRUCTIONS

1. Answer all the questions.
2. Write neatly and clearly.
3. Mark all answers clearly with their respective question numbers.
4. All written work MUST be done in blue or black ink.
5. No books, notes and other additional aids are allowed.

PERMISSIBLE MATERIALS

1. Calculator
2. Examination paper
3. Examination script

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Excluding This Front Page)

QUESTION 1

1.1 What is the difference between precision and accuracy in measurement? {2}

1.2 What is the difference between a significant figure and a non-significant figure? {2}

1.3 What is the difference between a pure substance and a mixture? {2}

[6]

QUESTION 2

2.1 Differentiate between a homogeneous mixture and a heterogeneous mixture. {2}

2.2 What is the difference between a physical change and a chemical change? {2}

2.3 What is an ionic bond and what charges does it form? {2}

2.4 What is the relationship between molarity and molality? {2}

[8]

QUESTION 3

3.1 What is the molarity of a solution that contains 0.25 moles of glucose dissolved in 500 mL of water? {5}

3.2 How many milliliters of a 1.5 M solution of hydrochloric acid are needed to prepare 500mL of a 0.25 M solution? {6}

[11]

QUESTION 4

4.1 Calculate the molarity of a solution made by dissolving 23.4 g of sodium sulfate (Na_2SO_4) in enough water to form 125 mL of solution. {6}

4.2 A 25.00 mL sample of a hydrochloric acid solution of unknown concentration was titrated with 0.100 M sodium hydroxide solution. It took 37.55 mL of the sodium hydroxide solution to reach the endpoint.
Using this equation, $HCl + NaOH \rightarrow NaCl + H2O$, what is the molarity of the hydrochloric acid solution? {6}

[12]

QUESTION 5

Magnesium has three isotopes with mass numbers 24, 25, and 26.

5.1 Write the complete chemical symbol for each {3}

5.1 How many neutrons are in an atom of each isotope? {3}

5.3 Draw the ionic bond between magnesium and bromide. Clearly show how electron are transferred/shared/lost and the resulting ions {8}

[14]

QUESTION 6

Provide the empirical formula of the following compounds. [8]

6.1 C_4H_8

6.2 C_3N_{12}

6.3 $C_5H_{10}O_5$

6.4 P_3N_5

QUESTION 7

For each of the following identify it as either ionic or molecular compound. For ionic, indicate the charges of each element. [12]

7.1 H2O

7.2 MgCl2

7.3 CO2

7.4 Fe2O3

7.5 Sr(OH)2

7.6 C6H12O6

QUESTION 8

Indicate the type of each of the following chemical reactions [5]

8.1 $2Na+Cl_2 \rightarrow 2NaCl$

8.2 $H_2CO_3 \rightarrow H_2O + CO_2$

8.3 $2KCl \rightarrow 2K + Cl_2$

8.4 $S+O_2 \rightarrow SO_2$

8.5 $C_5H_{12} + O_2 \rightarrow H_2O + CO_2$

QUESTION 9

Name the formula of each of the following acids [6]

9.1 Hydrosulfuric acid

9.2 Iron (III) hydroxide

9.3 Hydrophosphoric acid

QUESTION 10

Balance the following chemical equations [8]

10.1 $C + SO_2 \rightarrow CS_2 + CO$

10.2 $Xe + F_2 \rightarrow XeF_6$

10.3 $Ag + H_2S \rightarrow Ag_2S + H_2$

10.4 $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$

QUESTION 11

Consider the following equation: $2H_2S + 3O_2 \rightarrow 2\ SO_2 + 2\ H_2O$

11.1 How many moles of O_2 are needed to combine with 8.4 moles of H_2S {5}

11.2 Starting with 9.2 moles of O_2,

11.2.1 How many moles of H_2S will you need? {5}

11.2.2 How many moles of SO_2 will you get? {5}

[15]

QUESTION 12

3.2 moles of N_2 reacts with 5.4 moles H_2 in the following chemical reaction:

$N_2 + 3H_2 \rightarrow 2NH_3$

12.1 What is the limiting reactant {5}

12.2 How many moles of ammonia are formed {5}

12.3 How much of the excess reactant in moles is left over? {5}

[15]

Total Marks: 120

Periodic Table of the Elements