



**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**

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| 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 |
| DATE: JULY 2024 | PAPER: 2 |
| DURATION: 3 HOURS | MARKS: 100 |

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| SECOND OPPORTUNITY/ SUPPLEMENTARY EXAMINATION QUESTION PAPER | |
| EXAMINER: | MS. PAULINA NDINELAGO NAUPU |
| MODERATOR: | MRS. LUCIA TUYENI-KELAO KAFIDI |

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| INSTRUCTIONS |
| <ol style="list-style-type: none">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}
- 1.4 Differentiate between a homogeneous mixture and a heterogeneous mixture. {2}
- 1.5 What is the difference between an electrolyte and non-electrolyte substance? {4}

[12]

QUESTION 2

Provide the empirical formula of the following compounds.

- 2.1 C_4H_8 [2]
- 2.2 C_3N_{12} [2]
- 2.3 $C_5H_{10}O_5$ [2]
- 2.4 P_3N_5 [2]

[8]

QUESTION 3

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

- 3.1 H_2O [2]
- 3.2 $MgCl_2$ [2]
- 3.3 CO_2 [2]
- 3.4 Fe_2O_3 [2]
- 3.5 $Sr(OH)_2$ [2]
- 3.6 $C_6H_{12}O_6$ [2]

[12]

QUESTION 4

- 4.1 Consider copper (II) bromide CuBr_2 , calculate the percentage of copper and bromide {6}
- 4.2 Calculate the percentage composition of carbon in these substances.
 $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ and $\text{C}_5\text{H}_9\text{NO}_2$ {8}
- 4.2 What mass of oxygen gas is required to completely react with 25.0 grams of iron to produce iron (III) oxide, Fe_2O_3 according to the following balanced equation:
 $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$? {6}

[20]

QUESTION 5

Balance the following equations

- 5.1 $\text{Fe}_2(\text{SO}_4)_3 + \text{KOH} \rightarrow \text{K}_2\text{SO}_4 + \text{Fe}(\text{OH})_3$ [2]
- 5.2 $\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$ [2]
- 5.3 $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ [2]

[6]

QUESTION 6

Consider the following equation: $2\text{H}_2\text{S} + 3\text{O}_2 \rightarrow 2\text{SO}_2 + 2\text{H}_2\text{O}$.

- 6.1 How many moles of O_2 are needed to combine with 8.4 moles of H_2S . {4}
- 6.2 Starting with 9.2 moles of O_2 . How many moles of H_2S will you need? {4}
- 6.3 How many moles of SO_2 will you get? {4}

[12]

QUESTION 7

30g of C_3H_8 burns in air to produce 70g of CO_2 using the following reaction $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$.

7.1 Calculate the theoretical yield {4}

7.2 Calculate the percent yield {3}

[7]

QUESTION 8

2 moles of propane react with 8 moles of oxygen gas in a combustion reaction in the following equation: $1C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$.

8.1 What is the limiting reactant {7}

8.2 How many moles of carbon dioxide are formed {4}

8.3 How much of the excess reactant is left over? {6}

[17]

QUESTION 9

Write the molecular formula of each of the following acids.

9.1 Hydrosulfuric acid [2]

9.2 Iron (III) hydroxide [2]

9.3 Hydrophosphoric acid [2]

[6]

Total Marks:

100

PERIODIC TABLE OF THE ELEMENTS

| | | | | | | | | | | | | | | | | | |
|----------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------------|---------------------------|---------------------------|
| 1 | | | | | | | | | | | | | | | | | 18 |
| 1 H 1.00794 | | | | | | | | | | | | | | | | | 2 He 4.00260 |
| 2 | | | | | | | | | | | | 13 | 14 | 15 | 16 | 17 | |
| 3 Li 6.941 | 4 Be 9.01218 | | | | | | | | | | | 5 B 10.81 | 6 C 12.011 | 7 N 14.0067 | 8 O 15.9994 | 9 F 18.9984 | 10 Ne 20.179 |
| 11 Na 22.9898 | 12 Mg 24.305 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 Al 26.9815 | 14 Si 28.0855 | 15 P 30.9738 | 16 S 32.06 | 17 Cl 35.453 | 18 Ar 39.948 |
| 19 K 39.0983 | 20 Ca 40.08 | 21 Sc 44.9559 | 22 Ti 47.88 | 23 V 50.9415 | 24 Cr 51.996 | 25 Mn 54.9380 | 26 Fe 55.847 | 27 Co 58.9332 | 28 Ni 58.69 | 29 Cu 63.546 | 30 Zn 65.38 | 31 Ga 69.72 | 32 Ge 72.59 | 33 As 74.9216 | 34 Se 78.96 | 35 Br 79.904 | 36 Kr 83.8 |
| 37 Rb 85.4678 | 38 Sr 87.62 | 39 Y 88.9059 | 40 Zr 91.22 | 41 Nb 92.9064 | 42 Mo 95.94 | 43 Tc (98) | 44 Ru 101.07 | 45 Rh 102.906 | 46 Pd 106.42 | 47 Ag 107.868 | 48 Cd 112.41 | 49 In 114.82 | 50 Sn 118.69 | 51 Sb 121.75 | 52 Te 127.6 | 53 I 126.9 | 54 Xe 131.29 |
| 55 Cs 132.905 | 56 Ba 137.33 | 71 Lu 174.967 | 72 Hf 178.49 | 73 Ta 180.948 | 74 W 183.85 | 75 Re 186.207 | 76 Os 190.2 | 77 Ir 192.22 | 78 Pt 195.08 | 79 Au 196.967 | 80 Hg 200.59 | 81 Tl 204.383 | 82 Pb 207.2 | 83 Bi 208.908 | 84 Po (209) | 85 At (210) | 86 Rn (222) |
| 87 Fr (223) | 88 Ra 226.025 | 103 Lr (260) | 104 Rf (261) | 105 Db (262) | 106 Sg (263) | 107 Bh (264) | 108 Hs (265) | 109 Mt (268) | 110 Uun (269) | 111 Uuu (272) | 112 Uub (269) | | 114 Uuq | | 116 Uuh | | 118 Uuo |

4

Lanthanides:

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|----------------------------|---------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| 57 La 138.906 | 58 Ce 140.12 | 59 Pr 140.908 | 60 Nd 144.24 | 61 Pm (145) | 62 Sm 150.36 | 63 Eu 151.96 | 64 Gd 157.25 | 65 Tb 158.925 | 66 Dy 162.50 | 67 Ho 161.930 | 68 Er 167.26 | 69 Tm 166.934 | 70 Yb 173.04 |
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Actinides:

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| 89 Ac 227.028 | 90 Th 232.038 | 91 Pa 231.036 | 92 U 238.029 | 93 Np 237.048 | 94 Pu (244) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (251) | 99 Es (252) | 100 Fm (257) | 101 Md (258) | 102 No (259) |
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