nAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

Department of Agriculture and Natural Resources Sciences

QUALIFICATIONS : BACHELOR OF AGRICULTURE BACHELOR OF HORTICULTURE	
QUALIFICATIONS CODE: 07BAGA & 07BHOR	**LEVEL:** NQF LEVEL 5
COURSE CODE: ICA511S	**COURSE NAME:** INTRODUCTION TO CHEMISTRY
DATE: JUNE 2022	**SESSION:** JUNE
DURATION: 3 HOURS	**MARKS:** 120

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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MODERATOR:	MRS. LUCIA TUYENI-KELAO KAFIDI

INSTRUCTIONS
1. Answer all questions
2. Type clearly and neatly
3. Number the answers clearly
4. Report all your answers to the correct significant figures

PERMISSIBLE MATERIALS
1. Scientific calculator

ATTACHMENT:
1. Periodic Table

THIS QUESTION PAPER CONSISTS OF 4 PAGES *(Excluding this front page)*

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QUESTION 1

Define the following terms: [14]

    i.   Atoms

    ii. Element

    iii. Molecules

    iv. Precision

    v. Accuracy

    vi. Conversion factor

    vii) Periodic table

QUESTION 2

Work on the following questions: [13]

a) The distance between NUST and UNAM 48km. What is the distance between NUST and UNAM in centimeters   {3}

b) A rock has a mass of 20.5 g and a volume of 15.05 cm^3. What is its density?   {5}

c) A rock has a density of 18.3 g/cm^3. If you have a rock bar with a volume of 43.9 cm^3, what is its mass?   {5}

QUESTION 3

State the four Dalton's theory and give an example/illustration of each theory.   [8]

QUESTION 4

a)   Magnesium has three isotopes with mass numbers 24, 25, and 26.   **[14]**

    i.   Write the complete chemical symbol (superscript and subscript) for each
        {3}

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

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

QUESTION 5

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

    i) C_4H_8

    ii) C_3N_{12}

    iii) $C_5H_{10}O_5$

    iv) P_3N_5

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

    i) H_2O

    ii) $MgCl_2$

    iii) CO_2

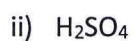   iv) Fe_2O_3

    v) $Sr(OH)_2$

    vi) $C_6H_{12}O_6$

QUESTION 6

a) What is the mass of 0.30 moles $Mg(NO_3)_2$ [5]

b) Balance the following equations   [11]

i) $Fe_2(SO_4)_3 + KOH \longrightarrow K_2SO_4 + Fe(OH)_3$

ii) $Mg + N_2 \longrightarrow Mg_3N_2$

iii) $C_3H_8 + O_2 \longrightarrow CO_2 + H_2O$

c) Calculate the formula weight (FW) of the following substances Potassium bromide
                                                                           [9]

i) CH_3COOH

ii) H_2SO_4

iii) $KMnO_4$
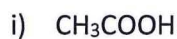
QUESTION 7

Calculate the percentage composition of carbon in the following substances.   **[10]**

    a) $C_{12}H_{22}O_{11}$ **{5}**

    b) $C_5H_9NO_2$ **{5}**

QUESTION 8

2 moles of propane reacts with 8 moles of oxygen gas in a combustion reaction in the following equation: $1C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$.   **[16]**

    a) What is the limiting reactant   **{6}**

    b) How many moles of carbon dioxide are formed   **{5}**

    c) How much of the excess reactant is left over?   **{5}**

Total Marks: **120**

Periodic Table of the Elements

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1.01																	2 He 4.00
3 Li 6.94	4 Be 9.01											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 51.99	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.63	33 As 74.92	34 Se 78.97	35 Br 79.90	36 Kr 84.80
37 Rb 84.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.95	43 Tc 98.91	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.90	54 Xe 131.25
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.09	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po [208.98]	85 At 209.99	86 Rn 222.02
87 Fr 223.02	88 Ra 226.03	89-103	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [268]	110 Ds [269]	111 Rg [272]	112 Cn [277]	113 Uut unknown	114 Fl [289]	115 Uup unknown	116 Lv [298]	117 Uus unknown	118 Uuo unknown

57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm 144.91	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.06	71 Lu 174.97
89 Ac 227.03	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu 244.06	95 Am 243.06	96 Cm 247.07	97 Bk 247.07	98 Cf 251.08	99 Es [254]	100 Fm 257.10	101 Md 258.1	102 No 259.10	103 Lr [262]