NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF CLINICAL HEALTH SCIENCES

QUALIFICATION : BACHELOR OF MEDICAL LABORATORY SCIENCES BACHELOR OF HEALTH SYSTEMS INFORMATION MANAGEMENT BACHELOR OF ENVIRONMENT HEALTH SCIENCES BACHELOR OF HUMAN NUTRITION	
QUALIFICATION CODE: 08BMLS 07BHIS 08BEHS 08BOHN	**LEVEL: 5**
COURSE CODE: HSC511S	**COURSE NAME:** HEALTH SCIENCE CHEMISTRY
SESSION: JUNE 23	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**DR MPINGANA AKAWA**
MODERATOR:	**DR MARIUS MUTORWA**

INSTRUCTIONS
1. Answer ALL the questions. 2. Write clearly and neatly. 3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Pen
2. Non-programmable calculator

THIS QUESTION PAPER CONSISTS OF 9 PAGES (Including this front page and the periodic table)

SECTION A [60]

QUESTION 1: Multiple Choice Questions

- *There are 20 multiple choice questions in this section. Each question carries 3 marks.*
- *Answer ALL questions by selecting the letter of the correct answer.*
- *Choose the best possible answer for each question, even if you think there is another possible answer that is not given.*

1.1 The number of significant figures in 0.010:

A. is 4
B. is 3
C. is 2
D. is 1

1.2 Write the following number 0.000004013 using scientific notation.

A. 4.013×10^{-6}
B. 4.013
C. 4.013×10^{6}
D. 4.01×10^{7}

1.3 Do the following calculation and give the answer to the correct number of significant figures?

$$\frac{2.568 \times 5.8}{4.186}$$

A. 0.36
B. 3.6
C. 3.558
D. 0.6

1.4 A toddler with a fever has a temperature of 103^0 F. What is this temperature reading in Celsius?

A. 39.4^0 C
B. 37.1^0 C
C. 42.7^0 C
D. 35.3^0 C

1.5 List the following ions in order of decreasing ionic radius: N^{3-}, Na^{+}, F^{-}, Mg^{2+}, O^{2-}.

A. Na^{+}, Mg^{2+}, N^{3-}, O^{2-}, F^{-}
B. Mg^{2+}, Na^{+}, F^{-}, O^{2-}, N^{3-}
C. F^{-}, O^{2-}, N^{3-}, Mg^{2+}, Na^{+}
D. Mg^{2+}, Na^{+}, N^{3-}, O^{2-}, F^{-}

1.6 Give the full electron configuration of the following element: Ca^{+2}.

A. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6 4s^2$
B. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
C. $1s^1\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$
D. $1s^2\ 2s^2\ 2p^5\ 3s^2\ 3p^6$

1.7 Balance the following equation by providing the missing coefficients:

$\_Na_2SiO_3(s) + \_HF\ (aq) \rightarrow H_2SiF_6\ (aq) + \_NaF(aq) + \_H_2O(l)$

A. 1, 8, 2, 3
B. 2, 6, 2, 3
C. 1, 8, 1, 2
D. 2, 4, 3, 2

1.8 How many moles are in 4.6×10^{24} of sulfur atoms?

A. 2.8 moles
B. 7.6 moles
C. 6.7 moles
D. 76.0 moles

1.9 How many grams of Na_2SO_4, are required to make 0.350 L of 0.500 M Na_2SO_4?

A. 24.9 g Na_2SO_4
B. 23.4 g Na_2SO_4
C. 34.9 g Na_2SO_4
D. 28.9 g Na_2SO_4

1.10 Which of the following is the right combination of oxidation numbers for the following compound: Mn_2O_7.

A. Mn = +2, O = +7
B. Mn = +14, O = -2
C. Mn = +7, O = -2
D. Mn = +2, O = -7

1.11 From the following list select the elements that are metals:

I. Fe, II. S, III. Si, IV. Na, V. U, VI. Hg

A. II, III
B. I, III, IV, V,
C. I, IV, V, VI
D. III, IV, V

1.12 How many moles are there in 24.0g of C?

A. 4.1 moles C
B. 2.0 moles C
C. 3.2 moles C
D. 3.4 moles C

1.13 How many molecules are in 0.63 moles of molecules?

A. 8.3×10^{21} molecules
B. 4.1×10^{26} molecules
C. 3.8×10^{24} molecules
D. 3.8×10^{23} molecules

1.14 How many liters are required to make 800mL of a 2.0M H_2SO_4 solution, starting with a 6.0M stock solution?

A. 26.1 L
B. 0.62 L
C. 0.26 L
D. 12.4 L

1.15 Which one of the following name-formula combinations is NOT correct?

A. Mercury (I) nitrate, $HgNO_3$
B. Calcium phosphate, $Ca_3(PO_4)_2$
C. Copper (II) sulfate pentahydrate, $CuSO_4 \cdot 5H_2O$
D. Hydrofluoric acid, HF(aq)

1.16 If 10 mL of 1 M HCl was required to titrate a 20 mL of NaOH solution of unknown concentration to its endpoint, what was the concentration of the NaOH?

A. 0.5 M
B. 1 M
C. 1.5 M
D. 2 M

1.17 What is the percentage composition of calcium in calcium hydroxide, $Ca(OH)_2$?

A. 40%
B. 43%
C. 54%
D. 69%
E. 74%

1.18 Which of these would be least soluble in water?

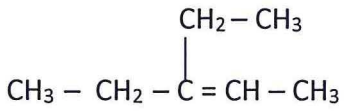
A. Ethanol (CH_3CH_2-OH)
B. Butanol ($CH_3CH_2CH_2CH_2$-OH)
C. Pentanol ($CH_3CH_2CH_2CH_2CH_2$-OH)
D. Hexanol ($CH_3CH_2CH_2CH_2CH_2CH_2$-OH)
E. Octanol ($CH_3CH_2CH_2CH_2CH_2CH_2CH_2CH_2$-OH)

1.19 The alcohol shown below is a:

$(CH_3)_2CHOH$

A. Primary alcohol
B. Secondary alcohol
C. Tertiary alcohol
D. Allylic alcohol

1.20 What is the name of the following alkene according to the IUPAC rules?



A. 2-ethyl-3-pentene
B. 3-ethyl-2-pentene
C. 3-methyl-2-pentene
D. 3- pentene -2- ethyl

END OF SECTION A

SECTION B [40]

QUESTION 2

2.1 Compute the following and report answers to correct number of significant figures and answer should be in scientific notation. [3]

a) $(0.62 + 0.532) - 0.5$

b) $(3.250 \times 10^2) \times (2.30 \times 10^4)$

c) $0.000440 \times 17.22 \div 203{,}000$

QUESTION 3

3.1 A student was determining the density of the solid object as shown in the **Fig 3.1** below.

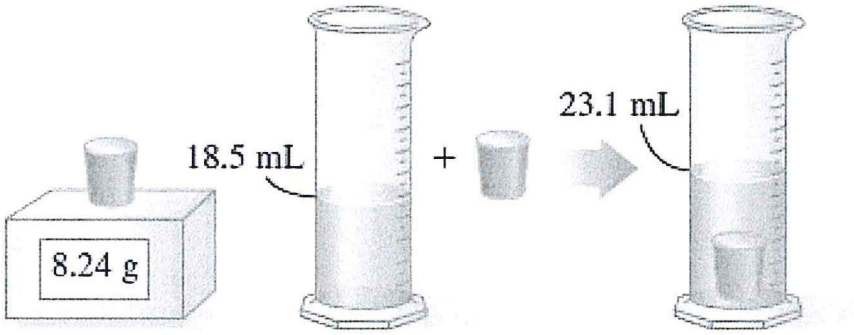


Fig 3.1

a) What is the density of the solid object that is weighed and submerged in water? [4]

b) Express the density in SI units (kg/m^3) [2]

c) Express the answer in scientific notation [1]

QUESTION 4

4.1 A molecular compound, with a molecular mass of 80.063 g/mol is composed of 40.05% S and 59.95% O, by mass.

a) What is the molecular formula of this compound? [5]

b) Give the name of the compound. [2]

QUESTION 5

5.1 34.0 g of Aluminium reacts with 39.0 g of chlorine gas to form aluminium chloride.

a) Write a balanced equation of this reaction [2]

b) Determine the limiting reagent [3]

c) How many grams of aluminium chloride will be produced from 34.0g of aluminium and 39.0g of chlorine gas? [5]

QUESTION 6

6.1 For the reaction of aqueous silver nitrate ($AgNO_3$) solution and aqueous sodium iodide (NaI) solution write the balanced:

a) Molecular equation of the reaction [3]
b) The complete ionic equation of the reaction [3]
c) The net ionic equation of the reaction [2]

QUESTION 7

7.1 For each of the following, give the corresponding name or formula [5]

a) Copper (I) sulphate
b) Dichlorine heptoxide
c) $Co_3(PO_4)_2$
d) P_4S_6
e) chromium (VI) oxide

END OF THE EXAMINATION QUESTIONS

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 Hydrogen 1.008																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.933	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.732	32 Ge Germanium 72.61	33 As Arsenic 74.922	34 Se Selenium 78.09	35 Br Bromine 79.904	36 Kr Krypton 84.80
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molibdenum 95.94	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.71	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.904	54 Xe Xenon 131.29
55 Cs Cesium 132.905	56 Ba Barium 137.327	57-71 Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.987	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103 Actinides	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Uut Ununtrium unknown	114 Fl Flerovium [289]	115 Uup Ununpentium unknown	116 Lv Livermorium [298]	117 Uus Ununseptium unknown	118 Uuo Ununoctium unknown

57 La Lanthanum 138.906	58 Ce Cerium 140.115	59 Pr Prasodymium 140.908	60 Nd Neodymium 144.24	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.966	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.50	67 Ho Holmium 164.930	68 Er Erbium 167.26	69 Tm Thulium 168.934	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]