CHEMISTRY 116 - Fall 2021
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Worksheet Week 2 - Chapter 3.1 - 3.6

1. Naturally occurring gallium is composed of the following two isotopes:

isotope	isotopic mass
gallium-69	68.925581
gallium-71	70.924707

a) How many electrons and neutrons does an atom of ^{69}Ga have?
b) What is the group number for ^{69}Ga?
c) What is the fractional abundance of ^{69}Ga? [0.6011]

2. Naturally occurring lithium is composed of two isotopes:

isotope	isotopic mass	% natural abundance
lithium-6	6.01512	7.42
lithium-7	7.01600	92.58

a) Determine the average atomic mass of lithium from this data [6.942]

b) Use only 6.942 as the average atomic mass of lithium and the two Li isotopic masses and determine the natural abundance of both isotopes. [7.4 Li-6, 92.6 Li-7]

c) Use only 6.942 as the average atomic mass of lithium and the data for Li-6 and determine the isotopic mass of Li-7. Repeat for Li-6 using the Li-7 isotopic mass. [7.016 for Li-7, 6.02 for Li-6]

3. a) What is the mass in grams of 1.35 mol S. [43.3 g]

b) The number of moles of S atoms in 98.6 g S [3.08 mol]

c) The number of S atoms in 98.6 g S. [1.85×10^{24} atoms]

d) The mass in g of one S atom. [5.3245×10^{-23} g]

4. $N_o = 6.0221420 \times 10^{23}$. Difluorohexane ($C_6H_{12}F_2$) has a density of 0.90 g mL^{-1}. Determine
a) percent composition [C, 58.995; H, 9.901; F, 31.104]

b) mass of 2.00 mol [244 g]

c) volume of 1.00 mol [140. mL]

d) mass that contains 3.0×10^{23} hydrogen atoms [5.1 g]

e) mass that contains 6.0 g of carbon [10. g]

5. A compound of C, H, and O consists of 40.92 mass % C. What is its empirical formula, if, upon combustion of 31.70 g, 12.97 g of H_2O are produced? [$C_3H_4O_3$]

6. Determine the empirical formula of a compound of C, H, and O that consists of 4.58 mass % H if upon combustion of 31.70 g of this compound 47.52 g of CO_2 are produced. [$C_3H_4O_3$]

7. A compound is known to contain only P and S. Determine its empirical formula if the P in 2.500 g of the compound is converted into 5.050 g of $Mg_2P_2O_7$. [P_4S_3]

8. If there are four hydrogens in the empirical formula of a compound known to contain 5.30 mass percent H, what is the molar mass of the empirical formula? [76. 1 g mol^{-1}]

9. When 98.96 g of a compound known to contain only carbon, hydrogen, and chlorine are burned in pure oxygen, 88.04 grams of carbon dioxide, 36.04 grams of water, and some gaseous chlorine are formed.

a) What is the empirical formula of the compound?

b) If 0.300 mol of the compound has a mass of 29.7 grams, what is the molecular formula? [$C_2H_4Cl_2$]

10. An anti-turmor drug known to contain only Pt, N, Cl, and H has the composition: 65.01% Pt and 2.03% H. Analysis of 2.0000 g of the drug yielded 0.4726 g Cl. Find the empirical formula.

[$PtN_2H_6Cl_2$]