Chemistry I

Name _____

Date _____ Per ____

Worksheet # C43: Percent Composition, Empirical Formulas, and Molecular Formulas

1. What is the percent composition of SO_2?

S: $\frac{32.1}{64.1}$ O: $\frac{32}{64.1}$

S = 50 %

O = 50 %

2. What is the percent composition of calcium phosphate?

Ca: $\frac{3(40.1)}{310.3}$ P: $\frac{2(31)}{310.3}$ O: $\frac{8(16)}{310.3}$ $Ca_3(PO_4)_2$

Ca = 38.8 %

P = 20.0 %

O = 41.2 %

3. Determine the empirical formula of a compound that is 52.11% carbon, 13.14% hydrogen, and 34.75% oxygen.

C: $\frac{52.11}{12} = 4.34$ $\frac{4.34}{2.17} = 2$

H: $\frac{13.14}{1.01} = 13.01$ $\frac{13.01}{2.17} = 6$

O: $\frac{34.75}{16} = 2.17$ $\frac{2.17}{2.17} = 1$

C_2H_6O

4. Since iron can be either Fe^{+2} or Fe^{+3}, iron chloride can be either $FeCl_2$ or $FeCl_3$. If a certain red compound is 34.43% iron and 65.57% chlorine, then which is it: $FeCl_2$ or $FeCl_3$?

Fe: $\frac{34.43}{55.8} = 0.617$ $\frac{0.617}{0.617} = 1$

Cl: $\frac{65.57}{35.5} = 1.847$ $\frac{1.847}{0.617} = 3$

$FeCl_3$

5. What is the empirical formula of a compound that is 34.6% gallium, 17.8% carbon, and 47.6% oxygen?

Ga: $\frac{34.6}{69.7} = 0.496$ $\frac{0.496}{0.496} = 1$

C: $\frac{17.8}{12} = 1.483$ $\frac{1.483}{.496} = 3$

O: $\frac{47.6}{16} = 2.975$ $\frac{2.975}{.496} = 6$

C_3O_6Ga

6. What is the percent composition of potassium chlorate? (This is the white fireworks powder, $KClO_3$.)

K = 31.9 %

Cl = 29.0 %

O = 39.1 %

K: $\frac{39.1}{122.6}$ Cl: $\frac{35.5}{122.6}$ O: $\frac{3(16)}{122.6}$

7. What is the empirical formula of a compound that is 21.43% cobalt, 37.83% chromium, and 40.74% oxygen?

Co: $\frac{21.43}{58.9} = 0.3638$ $\frac{0.3638}{0.3638} = 1$

Cr: $\frac{37.83}{52.0} = 0.7275$ $\frac{0.7275}{0.3638} = 2$

O: $\frac{40.74}{16} = 2.5463$ $\frac{2.5463}{0.3638} = 7$

$CoCr_2O_7$

8. The beautiful green mineral malachite is 57.48% copper, 5.43% carbon, 36.18% oxygen, and 0.913% hydrogen. What is its empirical formula?

Cu: $\frac{57.48}{63.5} = 0.9052$ $\frac{.9052}{.4525} = 2$

C: $\frac{5.43}{12} = 0.4525$ $\frac{.4525}{.4525} = 1$

O: $\frac{36.18}{16} = 2.2613$ $\frac{2.2613}{.4525} = 5$

H: $\frac{0.913}{1.01} = 0.904$ $\frac{.904}{.4525} = 2$

$Cu_2CO_5H_2$