Name _____ Honors Chemistry ___/___/___

Combustion Analysis

Homework: Solve the following problems. It will be collected and graded on correctness. You must show all of your work.

1. A compound containing the elements C, H, N and O is analyzed. When a 2.1106 g sample is burned in excess oxygen, 3.2017 g of $CO_2(g)$ is formed. The combustion analysis also showed that the sample contained 0.1710 g of hydrogen.

(a) Determine the mass, in grams, of C in the 2.1106 g sample of the compound.

(b) When the compound is analyzed for N content only, the mass percent of N is found to be 32.16%. Determine the mass, in grams of N in the original 2.1106 g sample of the compound.

(c) Determine the mass, in grams, of oxygen in the original 2.1106 g sample of the compound.

(d) Determine the empirical formula of the compound.

(e) The molecular mass of the compound is 174.2 g/mol. Determine the molecular formula of the compound.

2. Answer the following questions about a pure compound that contains only carbon, hydrogen, and oxygen. A 0.7549 g sample of the compound burns in $O_2(g)$ to produce 1.9061 g of $CO_2(g)$ and0.3370 g of $H_2O(g)$.

(a) Calculate the individual masses of C, H, and O in the 0.7549 g sample.

(b) Determine the empirical formula for the compound.

3. Answer the following questions that relate to the analysis of chemical compounds. A compound containing the elements C, H, N, and O is analyzed. When a 1.2359 g sample is burned in excess oxygen, 2.241 g of $CO_2(g)$ is formed. The combustion analysis also showed that the sample contained 0.0648 g of H.

(a) Determine the mass, in grams, of C in the 1.2359 g sample of the compound.

(b) When the compound is analyzed for N content only, the mass percent of N is found to be 28.84 percent. Determine the mass, in grams, of N in the original 1.2359 g sample of the compound.

(c) Determine the mass, in grams, of O in the original 1.2359 g sample of the compound.

(d) Determine the empirical formula of the compound.

(e) The molecular mass of the compound is 194.2 g/mol. Determine the molecular formula of the compound.

4. Answer the following questions that relate to the analysis of chemical compounds. A compound containing the elements C, H, N, and O is analyzed. When a 1.2359 g sample is burned in excess oxygen, 3.050 g of $CO_2(g)$ is formed. The combustion analysis also showed that the sample contained 0.0862 g of H.

(a) Determine the mass, in grams, of C in the 1.2359 g sample of the compound.

(b) When the compound is analyzed for N content only, the mass percent of N is found to be 4.62 percent. Determine the mass, in grams, of N in the original 1.2359 g sample of the compound.

(c) Determine the mass, in grams, of O in the original 1.2359 g sample of the compound.

(d) Determine the empirical formula of the compound.

(e) The molecular mass of the compound is 303.3 g/mol. Determine the molecular formula of the compound.

5. Answer the following questions about a pure compound that contains only carbon, hydrogen, and nitrogen. A 0.8890 g sample of the compound burns in $O_2(g)$ to produce 1.7781 g of $CO_2(g)$ and 1.0918 g of $H_2O(g)$.

(a) Calculate the individual masses of C, H, and N in the 0.8890g sample.

(b) Determine the molecular formula for the compound if the molecular mass is 88.18 g/mol.

We will go over this one in class. I will work it out and explain how it is solved. Copy all of my work and explanations.

The combustion of 1.380 grams of a compound in excess oxygen which contains C, H, O and N yields 1.720 grams of CO_2 and 1.180 grams of H_2O. Another sample of the compound with a mass of 22.340 grams is found to contain 6.750 grams of O. The molecular mass of the compound is determined to be 318.39 g/mol.

(a) Determine the mass, in grams, of C in the 1.380 g sample of the compound.
(b) Determine the mass, in grams, of H in the 1.380 g sample of the compound.
(c) Determine the mass, in grams, of O in the 1.380 g sample of the compound.
(d) Determine the mass, in grams, of N in the 1.380 g sample of the compound.
(e) Determine the empirical formula of the compound.
(f) Determine the molecular formula of the compound.