

Chemistry – Unit 4 Worksheet 4

Answer the following questions on your own piece of paper. Be sure to show all mathematical work and reasoning and use complete sentences in explanations.

1. Table sugar is a compound known as sucrose. Sucrose is composed of the elements carbon, hydrogen, and oxygen. Analysis of a 20.0 g of sucrose from a bag of sugar finds that the sugar is composed of 8.44 g of carbon, 1.30 g of hydrogen, and 10.26 g of oxygen.
 - a. Express, as fractions, the ratio of the mass of each element to the total mass of the sample.
 - b. Using these ratios, calculate the percent composition by mass of each element in the compound.
2. A similar chemical analysis is performed on a 500.0 g sample of the sugar isolated from a sample of pure sugar cane. Analysis shows this sample contains 211.0 g of carbon, 32.5 g of hydrogen, and 256.5 g of oxygen.
 - a. Determine the percent composition by mass of each element in the sugar cane sample.
 - b. Could the sugar in this sample be sucrose? Justify your conclusion.
3. A similar chemical analysis is performed on a 200.0g sample of the sugar found in corn syrup. This sample contains 80.0g of carbon, 13.3 g of hydrogen and 106.7 g of oxygen.
 - a. Determine the percent composition by mass of each element in the sugar cane sample.
 - b. Could the sugar in corn syrup be sucrose? Justify your conclusion.
4. A 1.0 g sample of hydrogen reacts completely with 19.0 g of fluorine to form a compound of hydrogen and fluorine.
 - a. What is the percent by mass of each element in the compound?
 - b. What mass of hydrogen would be present in a 50 g sample of this compound?
 - c. Justify your answer to b.
5. Explain how the previous examples help to illustrate the Law of Definite Proportions.

6. Two compounds of hydrogen and oxygen are tested. Compound I contains 15.0 g of hydrogen and 120.0 g of oxygen. Compound II contains 2.0 g of hydrogen and 32.0 g of oxygen.
- Determine the ratio of the mass of oxygen to the mass of hydrogen in each of the compounds.
 - Why are the compounds not the same?
 - What is significant about these mass ratios?
 - If compound I is water, what could be the formula of compound II?
7. Nitrogen and oxygen combine to form a variety of compounds. The following data were collected for three different compounds of nitrogen and oxygen:

Analysis Data of Nitrogen & Oxygen Compounds	
Compound	Mass of Nitrogen that combines with 1.00 g of Oxygen
A	1.750 g
B	0.8750 g
C	0.4375 g

- Additional evidence shows that the formula of compound B is NO. Sketch particle diagrams of molecules of all three compounds.
 - Justify your representations above.
8. Explain how the examples in questions 6 and 7 help to illustrate the Law of Multiple Proportions.