

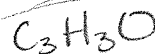
Extra Practice - Percent Composition and Molecular Formula Worksheet

1. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?

$$C - 5.458 \text{ mol} = 3$$

$$H = 5.5 = 3$$

$$O = 1.81 = 1$$



2. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?

$$\frac{110}{(36+3+16)} = 2 \times \text{C}_3\text{H}_3\text{O}$$



3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?

$$\text{Li } 2.69 \approx 2$$

$$\text{C } 1.358 \approx 1$$

$$\text{O } 4.0625 \approx 3$$



4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?

$$\frac{73.8}{73.8} = 1$$



Write the molecular formulas of the following compounds:

5. A compound with an empirical formula of C_2OH_4 and a molar mass of 88 grams per mole.

$$44$$

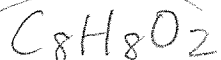
$$88/44 = 2$$



6. A compound with an empirical formula of $\text{C}_4\text{H}_4\text{O}$ and a molar mass of 136 grams per mole.

$$68$$

$$136/68 = 2$$



7. A compound with an empirical formula of CFBrO and a molar mass of 254.7 grams per mole.

8. A compound with an empirical formula of $\text{C}_2\text{H}_8\text{N}$ and a molar mass of 46 grams per mole.

$$46$$

$$46/46 = 1$$



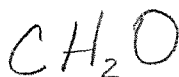
Answer the following questions:

9. The percentage composition of acetic acid is found to be 39.9% C, 6.7% H, and 53.4% O. Determine the empirical formula of acetic acid.

$$39.9/12 = 3.325 \approx 1$$

$$6.7/1 = 6.7 \approx 2$$

$$53.4/16 = 3.3375 \approx 1$$



10. The molar mass for question #9 was determined by experiment to be 60.0 g/mol. What is the molecular formula?

$$\frac{60}{(12+2+16)} = 2$$



- ~~11. Aniline, a starting material for urethane plastic foams, consists of C, H, and N. Combustion of such compounds yields CO_2 , H_2O , and N_2 as products. If the combustion of 9.71 g of aniline yields 6.63 g H_2O and 1.46 g N_2 , what is its empirical formula?~~

- ~~12. The molar mass of aniline is 93 g/mol. What is its molecular formula?~~

13. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide, C_2H_5NO .

$$C = \frac{24}{59} = 40.7\% \quad N = \frac{14}{59} = 23.7\% \quad O = \frac{16}{59} = 27.1\%$$

$$H = 8.47\%$$

14. A 50.51 g sample of a compound made from phosphorus and chlorine is decomposed. Analysis of the products showed that 11.39 g of phosphorus atoms were produced. What is the empirical formula of the compound?

$$11.39/30.974 = 0.3677 / 0.3677 = 1$$

$$39.12/35.45 = 1.10 / 0.3677 = 3$$

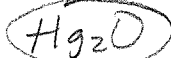


15. When 2.50 g of an oxide of mercury, (Hg_xO_y) is decomposed into the elements by heating, 2.405 g of mercury are produced. Calculate the empirical formula.

$$\frac{2.405}{2.50} = 96.2\%$$

$$0.23760 / 0.2376 = 1$$

$$200.59 = 0.4796 / 0.2376 = 2$$



16. The compound benzamide has the following percent composition. What is the empirical formula?

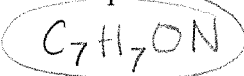
$$C = 69.40\% \quad H = 5.825\% \quad O = 13.21\% \quad N = 11.57\%$$

$$\frac{69.40}{12} = 5.783 = 7$$

$$\frac{5.825}{1} = 5.825 = 7$$

$$\frac{13.21}{16} = 0.8256 = 1$$

$$\frac{11.57}{14} = 0.8264 = 1$$



17. A component of protein called serine has an approximate molar mass of 100 g/mole. If the percent composition is as follows, what is the empirical and molecular formula of serine?

$$C = 34.95\% \quad H = 6.844\% \quad O = 46.56\% \quad N = 13.59\%$$

$$\frac{34.95}{12} = 2.9125 = 3$$

$$\frac{6.844}{1} = 6.844 = 7$$

$$\frac{46.56}{16} = 2.91 = 3$$

$$\frac{13.59}{14} = 0.9707 = 1$$

