

## Percent Composition and Molecular Formula Worksheet Key

1. What's the empirical formula of a molecule containing 65.5% carbon, 5.5% hydrogen, and 29.0% oxygen?  $C_3H_3O$  mass = 55 g/mole
2. If the molar mass of the compound in problem 1 is 110 grams/mole, what's the molecular formula?  $C_6H_6O_2$
3. What's the empirical formula of a molecule containing 18.7% lithium, 16.3% carbon, and 65.0% oxygen?  $Li_2CO_3$
4. If the molar mass of the compound in problem 3 is 73.8 grams/mole, what's the molecular formula?  $Li_2CO_3$

*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.  $C_4O_2H_8$
6. A compound with an empirical formula of  $C_4H_4O$  and a molar mass of 136 grams per mole.  $C_8H_8O_2$
7. A compound with an empirical formula of  $CFBrO$  and a molar mass of 254.7 grams per mole.  $C_2F_2Br_2O_2$
8. A compound with an empirical formula of  $C_2H_8N$  and a molar mass of 46 grams per mole.  $C_2H_8N$

*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.  $CH_2O$
10. The molar mass for question #9 was determined by experiment to be 60.0 g/mol. What is the molecular formula?  $C_2H_4O_2$
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?  $C_6H_7N$
12. The molar mass of aniline is 93 g/mol. What is its molecular formula?  $C_6H_7N$
13. Calculate the mass percent of carbon, nitrogen and oxygen in acetamide,  $C_2H_5NO$ . %C **40.668** %H **8.533** %N **23.713** %O **27.086**
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?  $PCl_3$
15. When 2.5000 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.  $Hg_2O$
16. The compound benzamide has the following percent composition. What is the empirical formula?  
C = 69.40 % H= 5.825 % O = 13.21 % N= 11.57 %  $C_7H_7NO$
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 % H= 6.844 % O = 46.56 % N= 13.59 %

$C_3H_7NO_3$  empirical formula

$C_3H_7NO_3$  molecular formula