

The Mole, Molar Mass, and Elemental Composition Worksheet

1. The molecular formula of allicin, the compound responsible for the characteristic smell of garlic, is $\text{C}_6\text{H}_{10}\text{OS}_2$.
 - a. What is the molar mass of allicin?
 - b. How many moles of allicin are present in 5.00 mg of this substance?
 - c. How many molecules of allicin are in 5.00 mg of this substance?
 - d. How many S atoms are present in 5.00 mg of allicin?
2. The molecular formula of aspartame, the artificial sweetener marketed as NutraSweet[®], is $\text{C}_{14}\text{H}_{18}\text{N}_2\text{O}_5$.
 - a. What is the molar mass of aspartame?
 - b. How many moles of aspartame are present in 1.00 mg of aspartame?
 - c. How many molecules of aspartame are in 1.00 mg of aspartame?
 - d. How many hydrogen atoms are present in 1.00 mg of aspartame?
3. A solution of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$, contains 1.250×10^{21} carbon atoms.
 - a. How many atoms of hydrogen does it contain?
 - b. How many molecules of glucose does it contain?
 - c. How many moles of glucose does it contain?
 - d. What is the mass of this sample in grams?
 - e. If the density of the solution is 32 g/L, how many liters is the solution?
4. A solution of the hormone testosterone, $\text{C}_{19}\text{H}_{28}\text{O}_2$, contains 3.88×10^{21} hydrogen atoms.
 - a. How many atoms of carbon does it contain?
 - b. How many molecules of testosterone does it contain?
 - c. How many moles of testosterone does it contain?
 - d. What is the mass of this sample in grams?
 - e. If the density of the solution is 0.00142 g/mL, how many mL is the solution?
5. The allowable mass of vinyl chloride, $\text{C}_2\text{H}_3\text{Cl}$, in the atmosphere in a chemical plant is 2.0×10^{-6} g. How many molecules of vinyl chloride does this represent?
6. At least 25 μg of tetrahydrocannabinol (THC), the active ingredient in marijuana, is required to produce intoxication. The molecular formula of THC is $\text{C}_{21}\text{H}_{30}\text{O}_2$. How many carbon atoms are in 25 μg of THC?
7. The molecular formula of acetylsalicylic acid (aspirin), one of the most common pain relievers, is $\text{C}_9\text{H}_8\text{O}_4$. If a 80.0 mL solution of aspirin in water has a density of 0.075 g/mL, how many molecules of aspirin are in the 80.0 mL solution?