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?

\[ 162.12 \]

(b) How many moles of allicin are present in 5.00 mg of this substance?

\[ 3.08 \times 10^{-5} \]

(c) How many molecules of allicin are present in 5.00 mg of this substance?

\[ 1.85 \times 10^{19} \]

(d) How many sulfur atoms are present in 5.00 mg of allicin?

\[ 3.71 \times 10^{19} \]

2. A sample of glucose, \( \text{C}_6\text{H}_{12}\text{O}_6 \), contains \( 5.77 \times 10^{20} \) atoms of carbon.

(a) How many atoms of hydrogen does the sample contain?

\[ 1.15 \times 10^{21} \]

(b) How many molecules of glucose does the sample contain?

\[ 9.62 \times 10^{19} \]

(c) What is the mass of the sample?

\[ 0.0288 \]

3. Calculate the percent composition of Oxygen in the following compounds: calcium carbonate, lead (II) hydroxide, acetic acid, and magnesium phosphate.

\[ 47.96 \%, 13.27\%, 53.33\%, 48.70\% \]

4. Adrenaline, a hormone secreted into the bloodstream in times of danger or stress is 59.0% carbon, 7.1% Hydrogen, 26.2% oxygen and 7.7% nitrogen. The molar mass of adrenaline is 180 g/mol. Calculate the molecular formula of adrenaline.

\[ \text{C}_9\text{H}_{13}\text{O}_3\text{N} \]
5. The characteristic odor of pineapple is due to ethyl butyrate, a compound containing carbon, hydrogen and oxygen. Combustion of 2.78 mg of ethyl butyrate produces 6.32 mg of CO\(_2\) and 2.58 mg of water. The molar mass of ethyl butyrate is 116.16 g/mol. Determine the molecular formula of ethyl butyrate.

\[ \text{C}_6\text{H}_{12}\text{O}_2 \]

6. Epsom salts, a substance used as a strong laxative by veterinarians, is a hydrate of magnesium sulfate. When 5.061 g of the hydrate is heated all the water of hydration is lost leaving 2.472 g of the anhydrate. Determine the formula of this hydrate and name the hydrate.

\[ \text{MgSO}_4 \cdot 7\text{H}_2\text{O} \]