Worksheet  Percent Composition, Empirical & Molecular Formula, & Molar Mass

Solve the following problems.  Show your work, and always include units where needed.

1. A compound is found to contain 36.5% Na, 25.4% S, and 38.1% O.  Find its empirical formula.

   \[ \text{Na}_2\text{S}O_3 \]

2. Find the empirical formula of a compound that is 53.7% iron and 46.3% sulfur.

   \[ \text{Fe}_2\text{S}_{1.5} \]

3. Analysis of a sample of a compound indicates that it has 1.04 g K, 0.70 g Cr, and 0.86 g O.  What is its empirical formula?

   \[ \text{K}_2\text{CrO}_4 \]

4. If 4.04 g of nitrogen combine with 11.46 g of oxygen to produce a compound with a molar mass of 108.0 g, what is the molecular formula of this compound?

   \[ \text{N}_2\text{O}_5 \]
5. The molar mass of a compound is 92 g. Analysis of the sample indicates that it contains 0.606 g N and 1.390 g O. Find the compound's molecular formula.

\[ \text{N}_2\text{O}_4 \]

6. An acid commonly used in the automotive industry is shown to be 31.6% phosphorous, 3.1% hydrogen, and 63.5% oxygen. Determine the empirical formula of this acid.

\[ \text{H}_3\text{PO}_4 \]

7. A solvent is found to be 50.0% oxygen, 37.5% carbon, and 12.5% hydrogen. What is the empirical formula of this solvent?

\[ \text{CH}_4\text{O} \]

8. A particular sugar is determined to have the following composition: 40.0% carbon, 6.7% hydrogen, and 53.5% oxygen. Determine the empirical formula of this sugar molecule.

\[ \text{CH}_2\text{O} \]

9. If the molar mass of the sugar in question #8 is 180.0 g, find the molecular formula of the sugar.

\[ \text{C}_6\text{H}_{12}\text{O}_6 \]
10. Ethene, a gas used extensively in preparing plastics and other polymers, has a composition of 85.7% carbon and 14.3% hydrogen. Its molar mass is 28 g. Find the molecular formula for ethane.

\[ \text{C}_2\text{H}_4 \]

Find the molar mass of each molecule.

\begin{align*}
\text{KMnO}_4 & : \quad 158.03 \text{ g/mol} \\
\text{Al(MnO}_4)_3 & : \quad 383.78 \text{ g/mol} \\
\text{FeCl}_3 & : \quad 162.20 \text{ g/mol} \\
\text{Na}_2\text{Al}_2(\text{SO}_4)_4 & : \quad 484.18 \text{ g/mol} \\
\text{C}_2\text{H}_5\text{NBr} & : \quad 122.97 \text{ g/mol} \\
\text{Hg}_2\text{SO}_4 & : \quad 497.2 \text{ g/mol} \\
\text{(NH}_4)_2\text{S} & : \quad 68.14 \text{ g/mol} \\
\text{CO} & : \quad 28 \text{ g/mol}
\end{align*}