



Chemistry

Name: _____

Section _____ EMPIRICAL FORMULAS Date: _____

Determining empirical and molecular formulas.

1. The empirical formula of a compound is NO_2 . Its molecular mass is 92 g/mol. What is its molecular formula?

$$\begin{aligned}\text{NO}_2: & 1(14.0067 \text{ g/mol}) + 2(15.9994 \text{ g/mol}) = 46.0055 \text{ g/mol} \\ 92 \text{ g/mol} & \div 46 \text{ g/mol} = 2 \\ 2 (\text{NO}_2) & = \text{N}_2\text{O}_4\end{aligned}$$

N_2O_4

2. The empirical formula of a compound is CH_2 . Its molecular mass is 70. g/mol. What is its molecular formula?

$$\begin{aligned}\text{CH}_2: & 1(12.011 \text{ g/mol}) + 2(1.00794 \text{ g/mol}) = 14.027 \text{ g/mol} \\ 70. \text{ g/mol} & \div 14 \text{ g/mol} = 5 \\ 5 (\text{CH}_2) & = \text{C}_5\text{H}_{10}\end{aligned}$$

C_5H_{10}

3. The empirical formula of a compound is CH_2O . Its gram formula mass is 60. g/mol. What is its molecular formula?

$$\begin{aligned}\text{CH}_2\text{O}: & 1(12.011 \text{ g/mol}) + 2(1.00794 \text{ g/mol}) + 1(15.9994 \text{ g/mol}) = 30.026 \text{ g/mol} \\ 60. \text{ g/mol} & \div 30. \text{ g/mol} = 2 \\ 2 (\text{CH}_2\text{O}) & = \text{C}_2\text{H}_4\text{O}_2\end{aligned}$$

$\text{C}_2\text{H}_4\text{O}_2$

4. The empirical formula of a compound is $\text{C}_4\text{H}_{10}\text{O}$. Its gram formula mass is 74 g/mol. What is its molecular formula?

$$\begin{aligned}\text{C}_4\text{H}_{10}\text{O}: & 4(12.011 \text{ g/mol}) + 10(1.00794 \text{ g/mol}) + 1(15.9994 \text{ g/mol}) = 74.123 \text{ g/mol} \\ 74 \text{ g/mol} & \div 74 \text{ g/mol} = 1 \\ \text{C}_4\text{H}_{10}\text{O} & = \text{C}_4\text{H}_{10}\text{O}\end{aligned}$$

$\text{C}_4\text{H}_{10}\text{O}$

5. A compound with a molecular mass of 88 g/mol has an empirical formula of $\text{C}_2\text{H}_4\text{O}$. What is its molecular formula?

$$\begin{aligned}\text{C}_2\text{H}_4\text{O}: & 2(12.011 \text{ g/mol}) + 4(1.00794 \text{ g/mol}) + 1(15.9994 \text{ g/mol}) = 44.053 \text{ g/mol} \\ 88 \text{ g/mol} & \div 44 \text{ g/mol} = 2 \\ 2 (\text{C}_2\text{H}_4\text{O}) & = \text{C}_4\text{H}_8\text{O}_2\end{aligned}$$

$\text{C}_4\text{H}_8\text{O}_2$

6. Write the empirical formula for C_6H_8 .

C_3H_4

7. Write the empirical formula for $\text{C}_6\text{H}_{12}\text{O}_6$.

CH_2O