

Formulas

Ethane

- Formula C_2H_6
- Why don't we simplify it?
- CH_3
- Structure

$$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H} \text{---} \text{C} \text{---} \text{C} \text{---} \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$

Formulas

- Empirical Formula: The simplest whole number ratio of atoms in a compound. (CH_3)
- Molecular Formula: The exact formula of a molecule, giving the number of each type of atom. (C_2H_6)

Problems

- $C_6H_{12}O_6$
- Na_2O_2
- C_4H_8
- N_2O_4

Rules for Writing Empirical Formulas

1. Determine the # of moles of each type of element.
2. Divide the # of moles of each element by the smallest # of moles from step 1.
3. If whole #s are obtained, these are the subscripts in the empirical formula. If not, multiply the #s by the smallest integer that will convert them to whole #s.

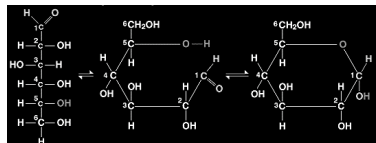
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Problems

- Given Moles
- Given Grams (Convert to moles first!)
- Given % - Assume that you have a 100-gram sample (Change % to g. Then, convert to moles!)

Glucose

- Formula $C_6H_{12}O_6$
- Why don't we simplify it?
- CH_2O
- Structure



Rules for Writing Molecular Formulas

1. Calculate the molar mass of the empirical formula.
2. Determine "n"

$$n = \frac{\text{Actual Molar Mass}}{\text{Empirical Formula Molar Mass}}$$
3. Multiply the subscripts in the empirical formula by "n".

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Problems:

1. A substance with the empirical formula CH_2 has an actual molar mass around 56. What is its molecular formula?
2. A substance with the empirical formula CH_4O has an actual molar mass around 192. What is its molecular formula?

1. Calculate the molar mass of the empirical formula.
2. Determine "n"

$$n = \frac{\text{Actual Molar Mass}}{\text{Empirical Formula Molar Mass}}$$
3. Multiply the subscripts in the empirical formula by "n".

Problems:

3. A substance with the empirical formula BH_3 has an actual molar mass of 27.68. What is its molecular formula?
4. A substance contains 3 grams N and 7 grams O. What is its empirical formula?

If its actual molar mass is around 92, what is its molecular formula?

Glucose vs. Fructose

