

Empirical Formulas

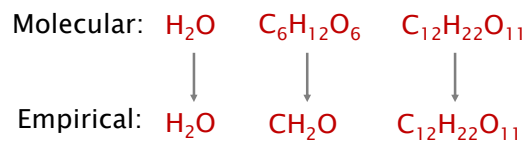
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Formulas

- ▶ **Empirical formula:** the lowest whole number ratio of atoms in a compound.
- ▶ **Molecular formula:** the true number of atoms of each element in the formula of a compound.

Formulas (continued)

Formulas for molecular compounds MIGHT be empirical (lowest whole number ratio).



Determining Empirical Formulas

1. Base calculation on 100 grams of compound. Determine moles of each element in 100 grams of compound.
2. Divide each value of moles by the smallest of the values.
3. Multiply each number by an integer to obtain all whole numbers.

Determine the Empirical Formula

- ▶ NutraSweet is 57.14% C, 6.16% H, 9.52% N, and 27.18% O. Calculate the empirical formula of NutraSweet.

Determining the Molecular Formula

- ▶ Determine the empirical formula for a compound with the following elemental composition: 40.00% C, 6.72% H, 53.29% O.

Determining the Molecular Formula

- ▶ The ratio of C:H:O has been found to be 1:2:1, thus the empirical formula is CH_2O . Again, as a reminder, this is the simplest formula for the compound, and not necessarily the molecular formula. Suppose we know that the molecular weight of this compound is 180 g/mol. With this information, the molecular formula may be determined. The formula weight of the empirical formula is 30 g/mol. Divide the molecular weight by the empirical formula weight to find a multiple:

The End

