Molecular vs Empirical Formulas

Empirical formulas are the ratio of atoms in a molecule

Molecular formulas are the COMPLETE number of atoms in an element.

Examples

Empirical formula of CH

This means that for every atom of carbon, there is one atom of hydrogen.

Molecular formulas with the same ratio -

acetylene - C_2H_2 benzene - C_6H_6

Other examples of different compounds with the same empirical formula

ethylene C_2H_4

butene C_4H_8

cyclohexane C_6H_{12}

What is the common empirical formula?

The empirical formula of hexane is C_3H_7. Its molecular weight is 86.2 amu. What is the molecular formula of hexane?

The compound ethylene glycol is often used as an antifreeze. It contains 38.7% carbon, 9.75% hydrogen, and the rest oxygen. The molecular weight of ethylene glycol is 62.07 g. What is the molecular formula of ethylene glycol?

Simplifying ratios:

If you ever get a ratio like 0.137 : 0.343,

divide all numbers by the smallest and
determine the whole number ratio.

Remember: %'s are done by mass and ratios
are done by mols.