Chemical Composition Summary

* We can count individual units by weighing if we know the average mass of the units. Thus, when we know the average mass of the atoms of an element as that element occurs in nature, we can calculate the number of atoms in any given sample of that element by weighing the sample.
* A mole is a unit of measure equal to 6.022 x 1023, which is called Avogadro’s number. One mole of any substance contains 6.022 x 1023 units.
* One mole of an element has a mass equal to the element’s atomic mass expressed in grams. The molar mass of any compound is the mass (in grams) a 1 mol of the compound and is the sum of the masses of the component atoms.
* Percent composition consists of the mass percent of each element in a compound:

Mass % = (mass of a given element in 1 mol of a compound/mass of 1 mol of compound) x 100%

* The empirical formula of a compound is the simplest whole number ratio of the atoms present in the compound; it can be derived from the percent composition of the compound. The molecular formula is the exact formula of the molecules present; it is always an integer multiple of the empirical formula.
* Different ways to express the same information:

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| --- | --- | --- | --- |
| Molecular Formula | Empirical Formula | Actual Masses | % Composition |
| (CH2O)n | CH2O | 0.0806 g C  0.01353 g H  0.1074 g O | 39.99% C  6.71% H  53.29% O |