**Vocabulary: Moles**



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* Atomic mass – the mass of an atom, expressed in *unified atomic mass units* (u).
* Avogadro constant – the number of atoms or molecules in a *mole* of a substance.
	+ The Avogadro constant has a numerical value of 6.02214076 × 1023.
* Conversion factor – a ratio or fraction that is numerically equal to one, which is used to multiply or divide a quantity when converting from one unit to another.
	+ For example, the conversion factor for moles to grams of CO2 is:



This conversion factor is equivalent to one because one mole of carbon dioxide has a mass of 44.01 grams.

* Dimensional analysis – a technique that is used to change the units of a quantity without changing the quantity’s value.
	+ In dimensional analysis, a quantity is multiplied by one or more conversion factors.
* Dimensional analysis is also known as the factor-label method.
* Molar mass – the mass of one mole of a substance.
	+ The molar mass of an element (or compound) in grams has the same numerical value as its atomic (or molecular) mass in unified atomic mass units.
	+ For example, the molecular mass of an oxygen molecule (O2) is 32 u; therefore, its molar mass is 32 g/mol.
* Mole – the SI unit of amount of substance.
	+ One mole contains 6.02214076 × 1023 particles.
	+ The mass in grams of one mole of any substance is the same as its atomic (or molecular) mass in unified atomic mass units.
* Molecular mass – (M) the mass of a molecule, expressed in unified atomic mass units.
	+ Molecular mass is found by adding together the masses of all the atoms that make up the molecule.
* Scientific notation – a convenient method of writing very large or very small numbers.
* A number expressed in scientific notation consists of a coefficient between 1 and 10 multiplied by a power of 10.
	+ For example, in scientific notation 41,600,000 is written as 4.16 × 107.
* Significant figures – digits in a value that indicate the accuracy of an initial measurement, and express the confidence we have in that measurement.
* A measurement should be recorded with a number of significant figures that reflects the resolution of the instrument.
* Examples of significant figures include the following:
	+ 345 has three significant digits because all non-zero digits are significant.
	+ 5.300 has four significant digits because all zeroes that follow digits to the right of the decimal point are significant.
	+ 0.0023 has two significant digits because zeros to the left of a non-zero digit are not significant.
	+ In scientific notation, all digits in the coefficient are significant.
* When doing a calculation such as converting from moles to grams, the number of significant figures in the answer should match the lowest number of significant figures of the measured quantities.
	+ For example, 3.45 moles of carbon (molar mass 12.011 g/mol) is equal to 41.4 grams. (The values for both moles and grams are expressed to three significant figures.)
* Unified atomic mass unit – (u) the SI unit of atomic and molecular mass.
	+ An atomic mass unit is equal to 1.66 × 10-24 g, or $\frac{1}{12}$ the mass of a C-12 atom.
	+ The mass of a proton or neutron is approximately 1 u.
	+ The unified atomic mass unit is also known as the dalton (Da).