

Commonly Used Concentration Units

Unit	Definition	Comments
Molarity (M)	$\frac{\text{moles of solute}}{\text{one liter of solution}}$	Most commonly used by chemists in reference to liquid solutions.
Molality (m)	$\frac{\text{moles of solute}}{\text{one kilogram of solvent}}$	Used in systems with variable temperatures, because mass is independent of temperature; one of the few concentration units to rely explicitly on the amount of solvent, rather than solute.
Mass percent (m/m%)	$\frac{\text{mass of solute}}{\text{mass of solution}} \times 100\%$	Mass units for solute and solvent must be the same; commonly used in solid solutions and industrial processes.
Volume percent (v/v%)	$\frac{\text{volume of solute}}{\text{volume of solution}} \times 100\%$	Volume units for solute and solvent must be the same; volume percent is convenient to use when one liquid is dissolved in another.
Parts per million (ppm)	$\frac{\text{mass of solute}}{\text{mass of solution}} \times 10^6$	Used for dilute solutions.
Parts per billion (ppb)	$\frac{\text{mass of solute}}{\text{mass of solution}} \times 10^9$	Tip: For aqueous solutions, solution density is close enough to water that you can assume they are the same, so $\frac{g \text{ solute}}{mL \text{ solution}} \times 10^6 = \text{ppm}$
Mole fraction (χ)	$\chi_A = \frac{\text{mol } A}{\text{total moles of all substances}}$	Used primarily for gases