

Chemical concentrations cheat sheet

Molarity (M) is mol solute/L solution

This is what we use most commonly in biochemistry

A mole (mol) is just 6.02×10^{23} copies of the molecule, and 1M is 1 mol/L

Molality (m) is mol solute/kg solvent

Good for when you're drastically changing temperature (since volume is temperature-dependent) or when components interact so volumes don't add

Mole fraction, X , is mol something/total mol

Note: mol fraction of one solute will decrease if you stuff in more other solutes, even though the molarity of that solute stays constant

Partial pressure is the mole fraction times total pressure

This is used to report gas concentrations, and tells you the amount of pressure contributed by a component of the gas (which is directly related to how much of it there is (Dalton's law of partial pressures))

% w/w

weight-weight percentage
$$\frac{\text{weight solute}}{\text{weight solution}} \times 100\%$$

% v/v

volume-volume percentage
$$\frac{\text{volume solute}}{\text{volume solution}} \times 100\%$$

% w/v

weight-volume "percentage"
$$\frac{\text{g solute}}{\text{mL solution}} \times 100\%$$

**ppm (parts per million) &
ppb (parts per billion)**

Multiply one of those ratios by 1 million (10^6) or 1 billion (10^9), respectively

1 ppm = 1 mg/kg or 1 mg/L

Good for reporting amounts of super dilute things like contaminants

Can rewrite as
g solute/100 mL solution
1% = 1 g/100 mL

**Relative concentrations of
stock solutions**

Concentration relative to the final, "working" concentration - e.g. 10X is 10 times more concentrated than you want to use it at