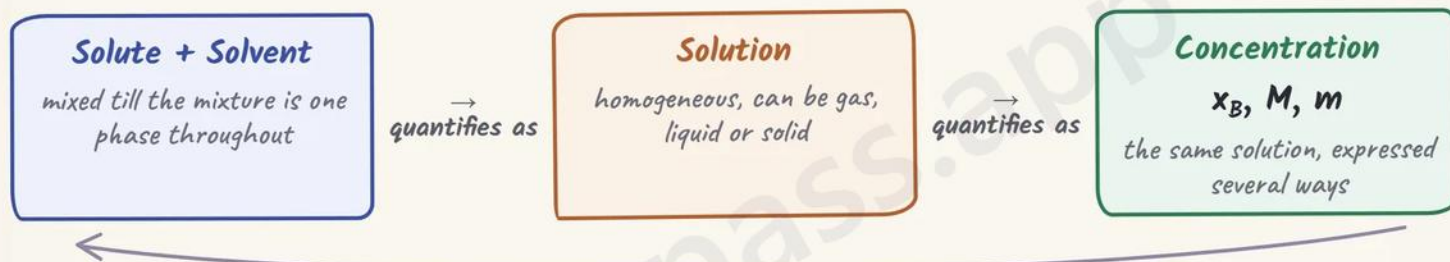


Solutions

one phase, many components, and how much of each decides everything



and back: from any two of these you can get the others, once density and molar mass are known

Types of solutions

- solvent is usually the component present in the **larger amount**; it sets the physical state of the solution
- any phase can dissolve in any phase: gas-in-gas, gas-in-liquid, liquid-in-liquid, solid-in-liquid, solid-in-solid, and more
- a solution is gaseous, liquid or solid depending only on what state the SOLVENT is in

Molarity vs molality *

Molarity M

- moles of solute per litre of **solution**
- $M = \frac{n_B}{V(L)}$
- changes with temperature**, volume expands on heating

Molality m

- moles of solute per kg of **solvent**
- $m = \frac{n_B}{w_A(kg)}$
- temperature independent**, mass doesn't change on heating

molality is the one used wherever temperature shifts during the measurement. That's why every boiling/freezing-point formula uses m , never M

Henry's law

- $p = K_H x$, partial pressure of a gas over a solution is proportional to its mole fraction dissolved in it
- bigger K_H means lower solubility** at the same pressure. K_H is specific to that gas, solvent and temperature
- K_H **rises with temperature**, so dissolved gas escapes faster from a warm drink than a cold one
- applications: soda bottled under CO_2 pressure, scuba tanks and the bends, thin air giving low pO_2 at altitude

solvent is just the larger-amount component. Everything else here, concentration units, Henry's law, is about how much of the other one is mixed in