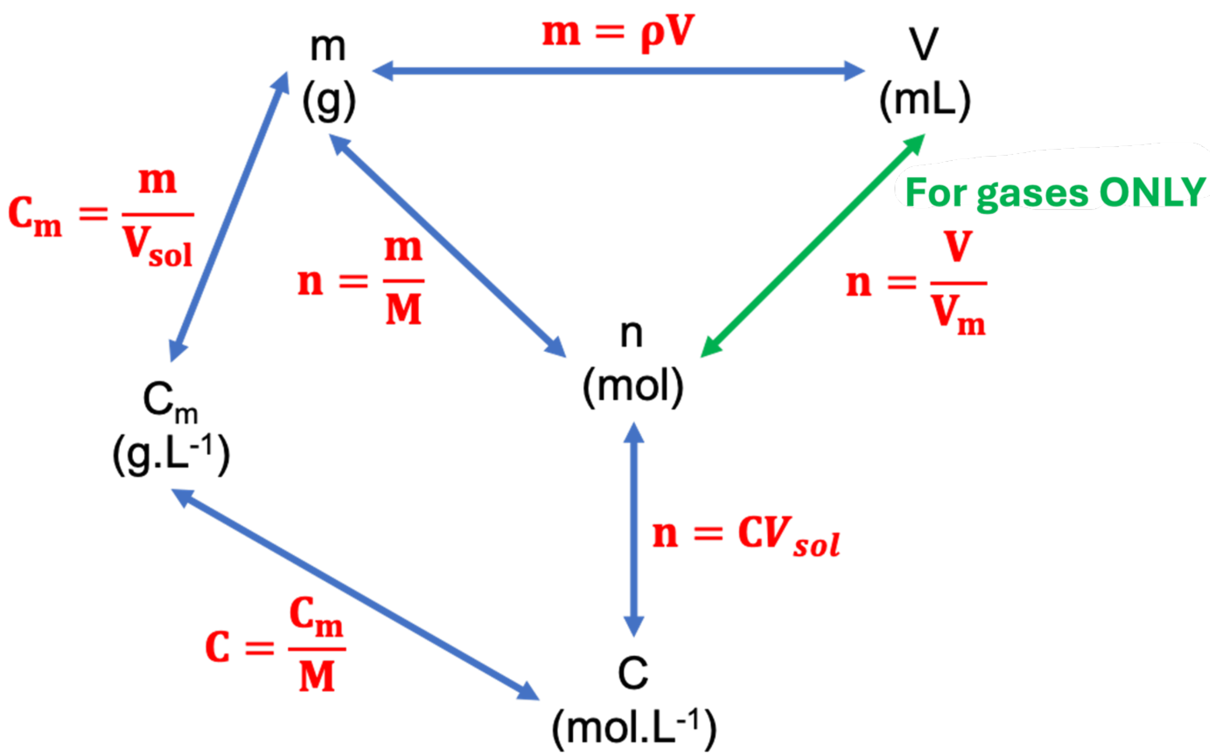
The mole, a relevant unit of measurement in chemistry



- n : quantity of the chemical species, in mol
- m : mass of the chemical species, in g
- V : volume of the chemical species, in mL or in L
- C : molar concentration of the chemical species, in $mol.L^{-1}$
- C_m : mass concentration of the chemical species, in $g.L^{-1}$
- ρ : density of the chemical species, in $g.mL^{-1}$, in $kg.L^{-1}$ or in $g.L^{-1}$
- M : molar mass of the chemical species, in $g.mol^{-1}$
- V_m : molar volum of a gas, in $L.mol^{-1}$
- V_{sol} : volum of the solution in which the chemical species is dissolved

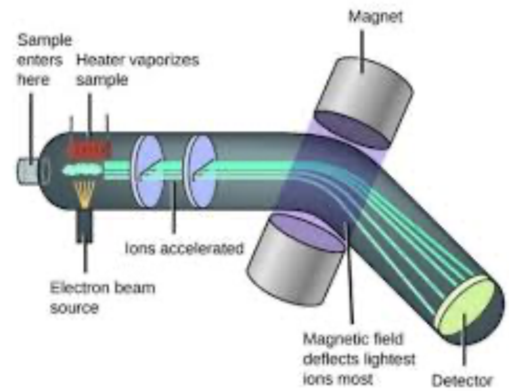
HL Note: Relative atomic mass of an element (on the example of chlorine)

The sample of an element is usually not made of one unique isotope, but a mix of the different isotopes naturally present.
The molar mass (AKA relative atomic mass) of an element depends on their isotopic abundance (percentage of each individual isotope). This can be determined by using the technic of mass spectroscopy.

A sample of the element is vaporized (turned into a gas) and ionized (each atom is turned into an ion).

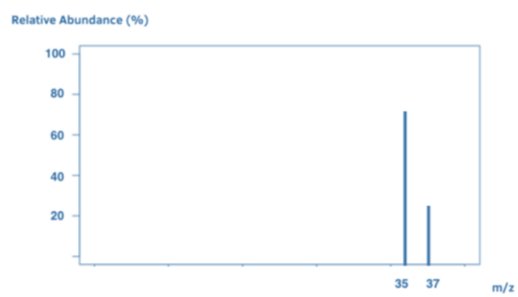
Ex: $Cl \xrightarrow{electrons} Cl^{+}$

Ions are then sent through a magnetic field, which separates them by mass: each isotope will give a distinct peak.



The intensity of these peaks, recorded by a detector, is proportional to the abundance of that isotope in the sample.

Ex:



Chlorine appears to be constituted of two isotopes, $^{35}_{17}Cl$ and $^{37}_{17}Cl$, with a ratio of 75% of Cl-35 and 25% of Cl-75

The relative atomic mass is then calculated as the weighted average of isotope masses, using their relative abundances and their atomic mass numbers.

Ex: $M(Cl) = \frac{\%(^{35}_{17}Cl)\times A(^{35}_{17}Cl)+\%(^{37}_{17}Cl)\times A(^{37}_{17}Cl)}{100} = \frac{75\times 35+25\times 37}{100} = 35.5\ g.mol^{-1}$