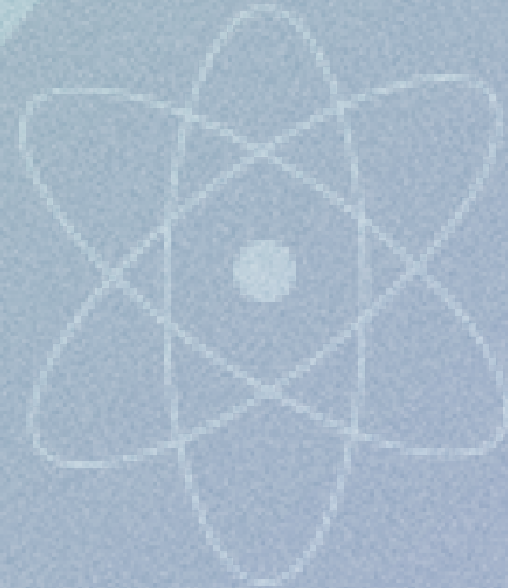


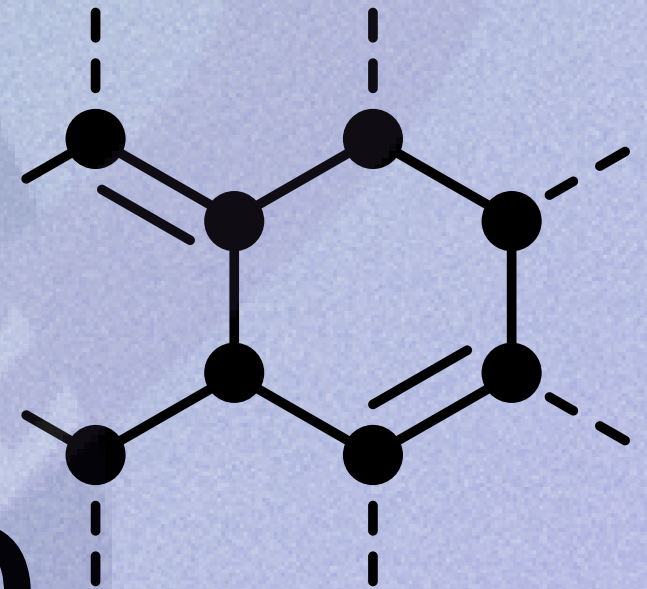
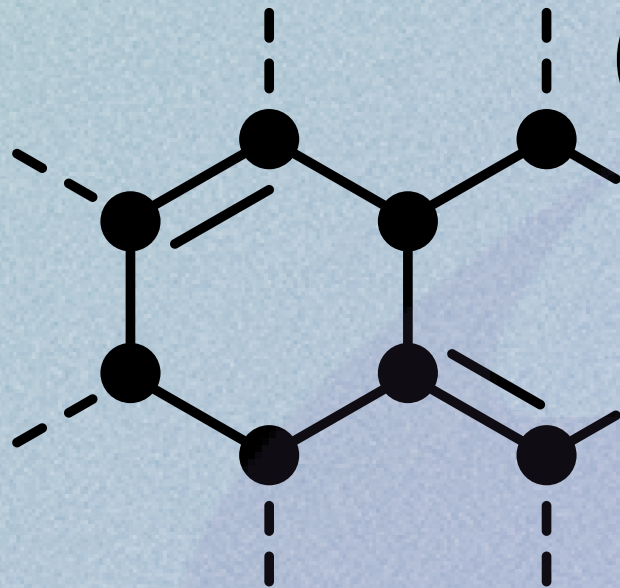


# Ch. 2: Chemistry behind life





Matter makes up  
compounds and  
elements:









**Matter – Anything that  
takes up space and  
has mass.**





Element – A substance  
that cannot be broken  
down into other  
substances by chemical  
reactions.

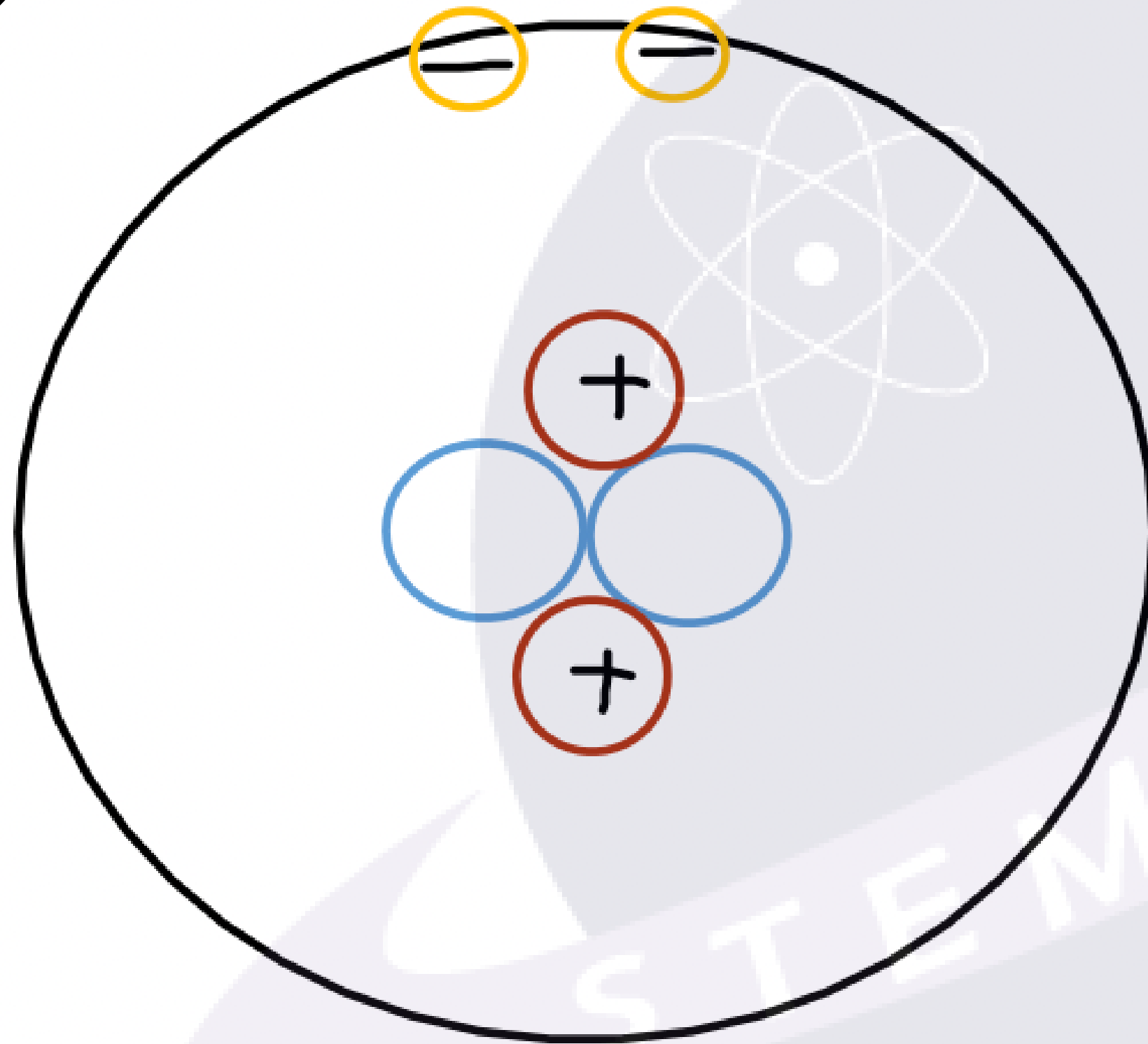
Only 20-25% are naturally  
occurring & essential to life.





Compound – A substance consisting of two or more different elements combined in a fixed ratio.





## Atom – Smallest unit of matter.

- The center of the atom consists of the nucleus.
- Electron – Negatively charged particles moving around the nucleus.
  - Valence electrons are involved in chemical bonds.
- Protons – Positively charged particles in the nucleus.
- Neutrons – Neutral particles in the nucleus.
- Bohr model:

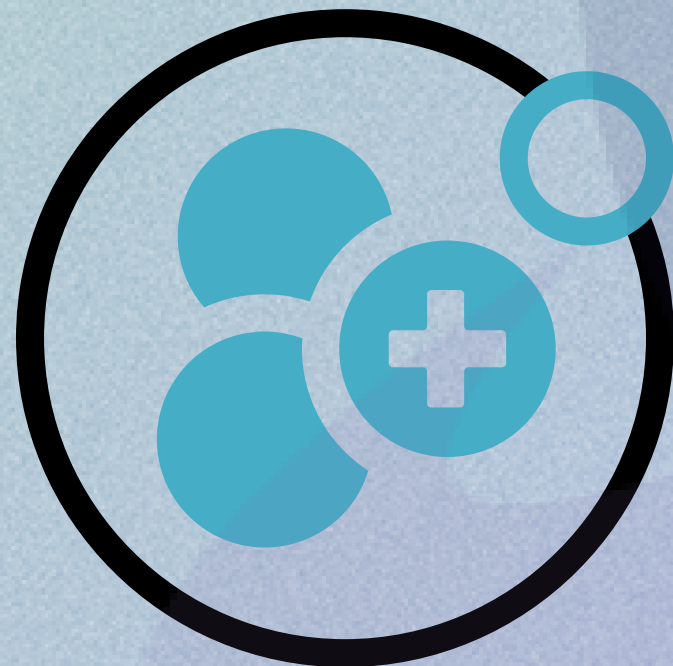


**Dalton – Unit of mass  
used to measure  
protons & neutrons.**

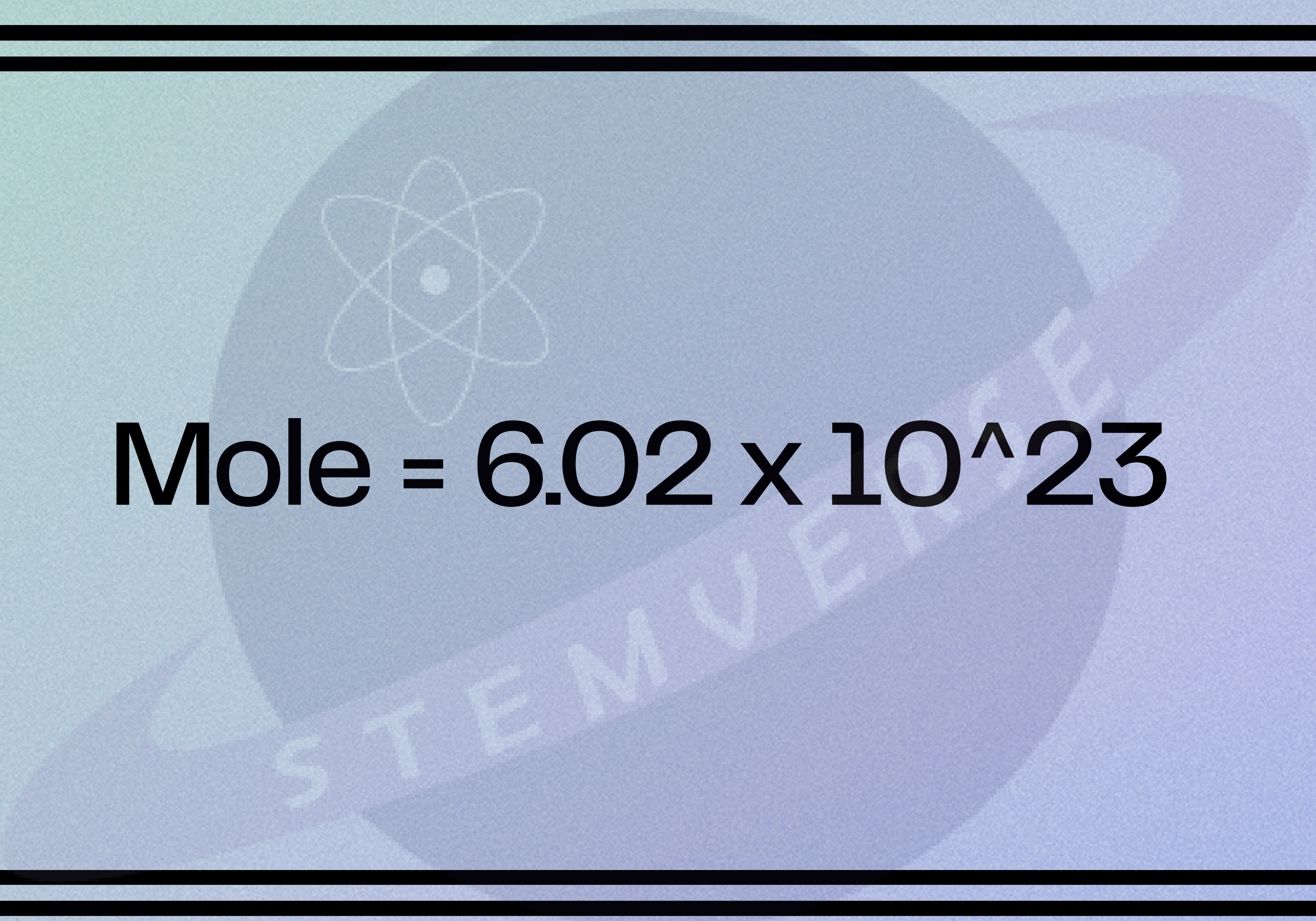




Isotopes – Atoms that have a different number of neutrons, but same number of protons.







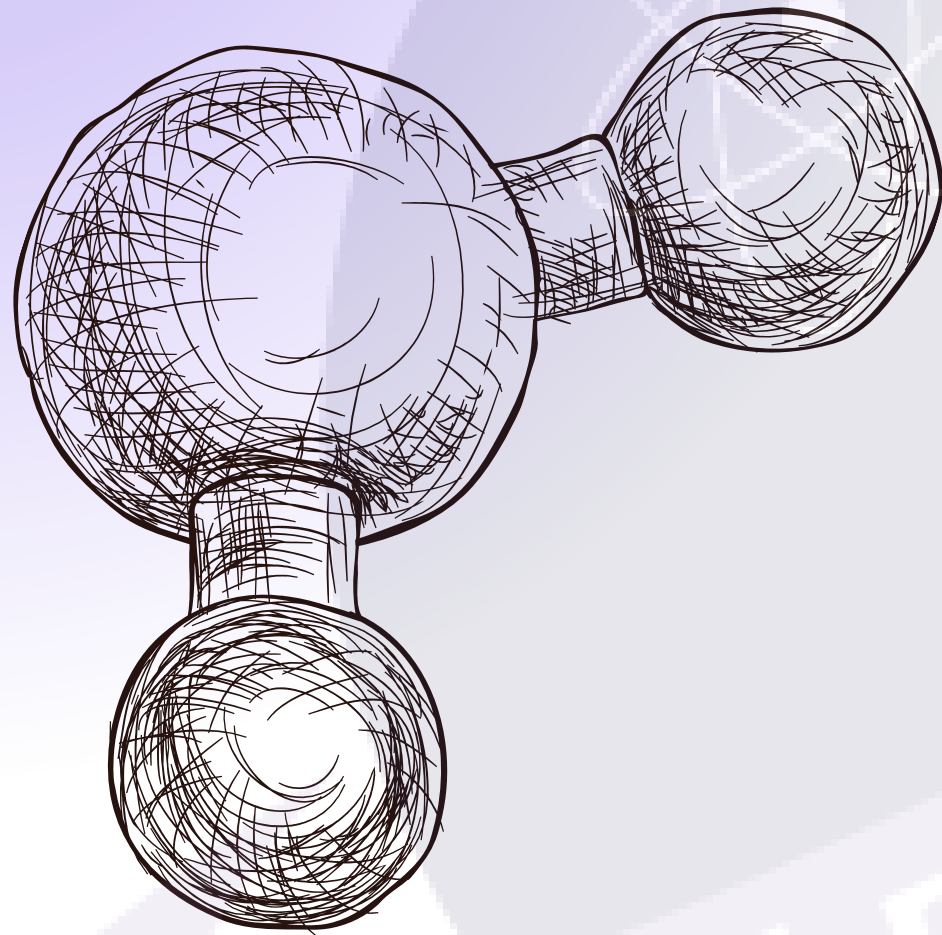
Mole =  $6.02 \times 10^{23}$





Chemical bonds – Interactions that result in atoms staying together as a result of sharing/transferring electrons.





**Covalent bonds – Occur when electrons are shared between 2 atoms.**

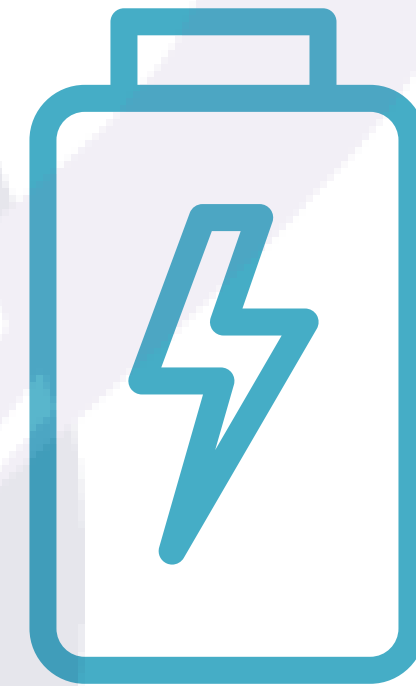
Types are single, double, non polar (electrons are equally shared), and polar (electrons are unequally shared).



# Ionic bonds – Occur when electrons are transferred.

ion – charged atoms

- cation (+)
- anion (–)
- ionic compounds (salts) – Made up of many elements held together through ionic attractions







Hydrogen bonds – Strong intermolecular force between molecules.

# Intermolecular forces – Forces between molecules.

Van der Waals interactions – Weak attractive force between molecules.



# Water has many important properties:



- Cohesion – Water sticks to itself.
- Adhesions – Water sticks to other things.
- High surface tensions – Measure of how difficult it is to stretch/break bonds.
- High specific heat – Amount of heat that must be absorbed or lost for 1 gram of the substance to change its temperature.
- Evaporative cooling – Occurs because the "hottest" molecules are the ones most likely to leave as a gas.
- Solvent – Water can dissolve polar or ionic substances.



# Acids & Bases



- Hydrogen ion ( $\text{H}^+$ )
- Hydroxide ion ( $\text{OH}^-$ )
- Hydronium ion ( $\text{H}_3\text{O}^+$ )
- Base reduces the hydrogen ion concentration, while an Acid increases it.
- Chemical equilibrium – Forward & reverse reactions continue with no effect on the concentration of the reactants and productions.
- Buffer – Resists changes in pH by accepting or donating  $\text{H}^+$  &  $\text{OH}^-$  ions.