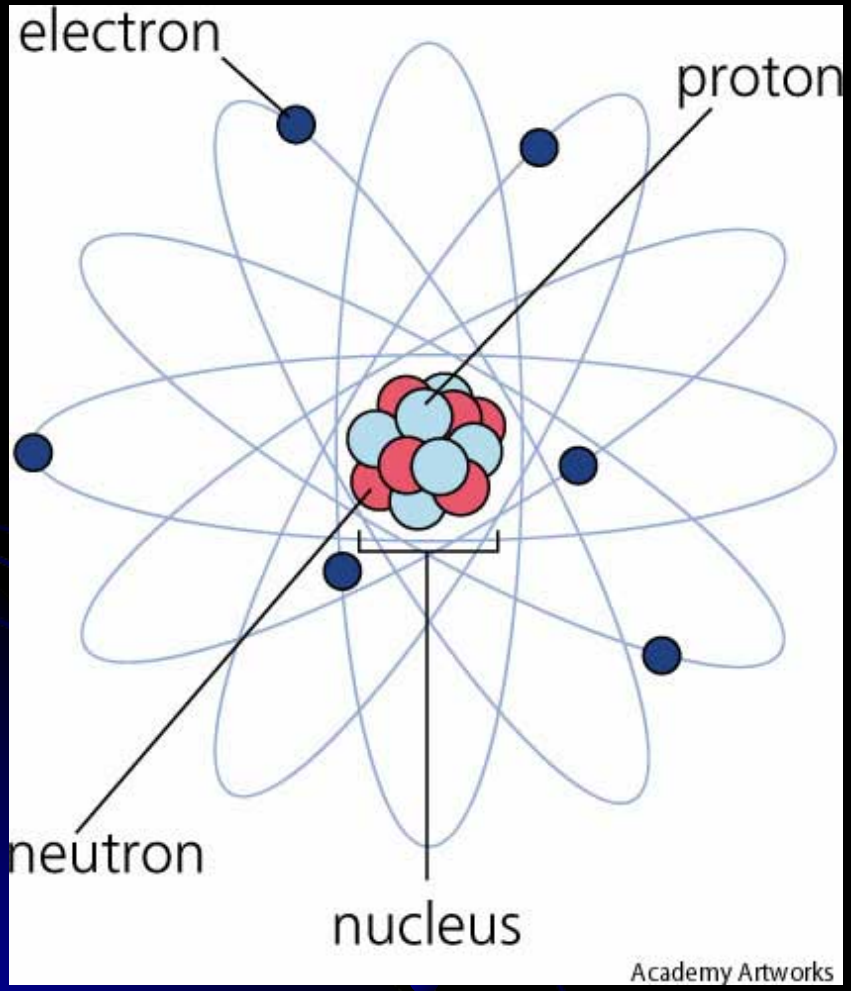
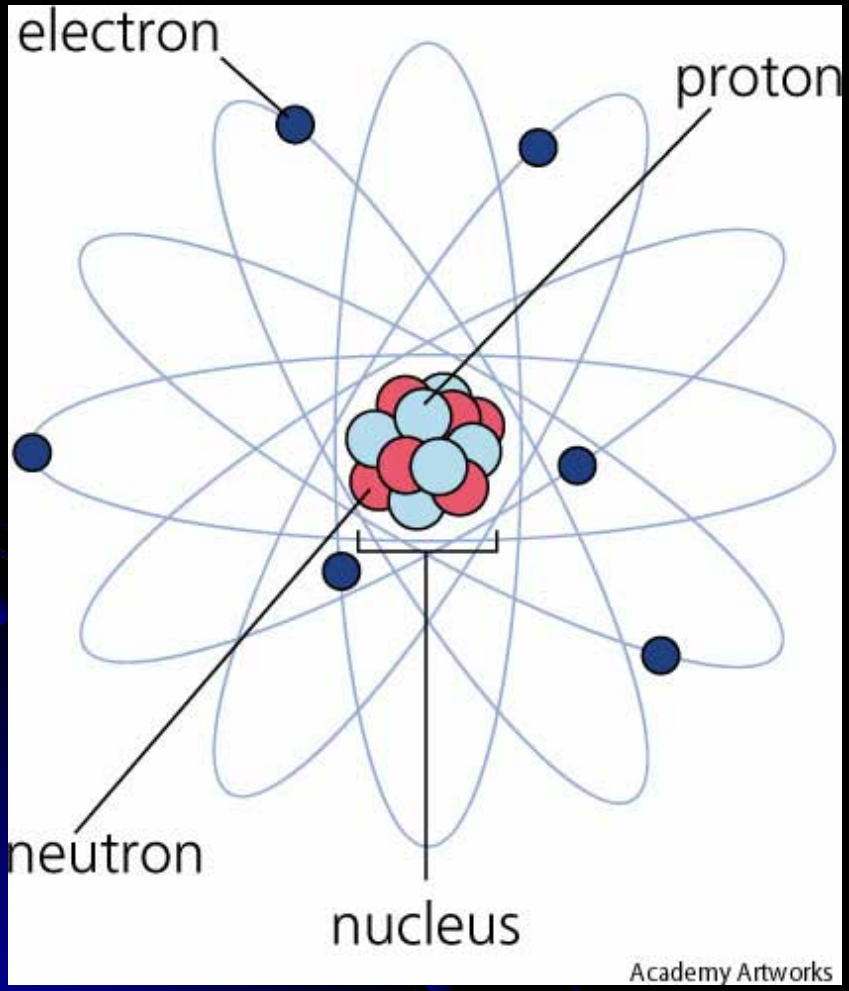
Chemistry of Life

- Matter – Anything that takes up space and has weight/mass.
- Element- basis of all substances – made up of only one atom.
- Atom – Smallest unit of an element that retains the chemical and physical properties of that element.

Diagram of an Atom



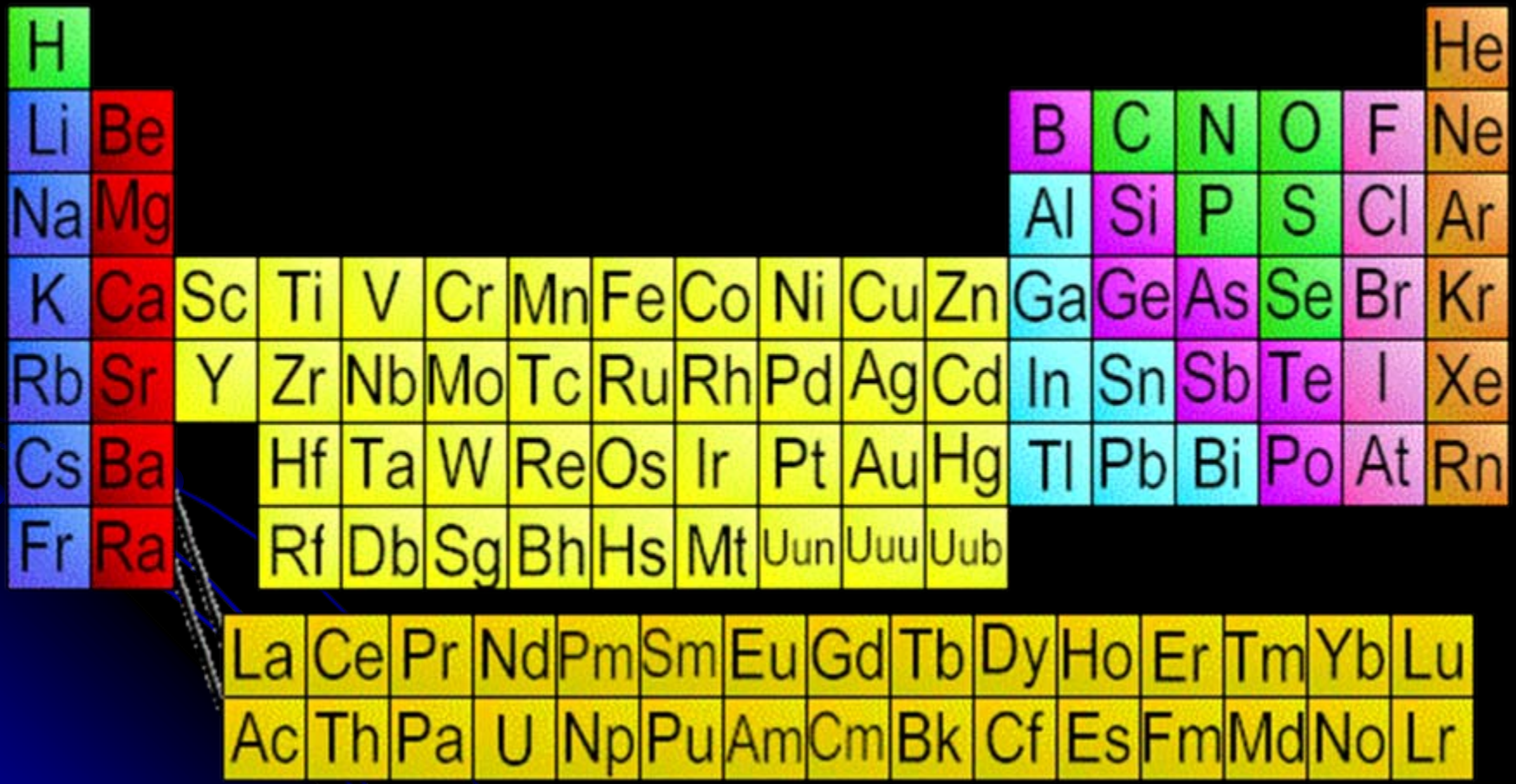
- Nucleus
  - Protons
    - + charge
    - Number of Atomic #
  - Neutrons
    - No charge
    - Add to protons for Atomic mass
- Shells-energy level
  - Electrons
    - - charge



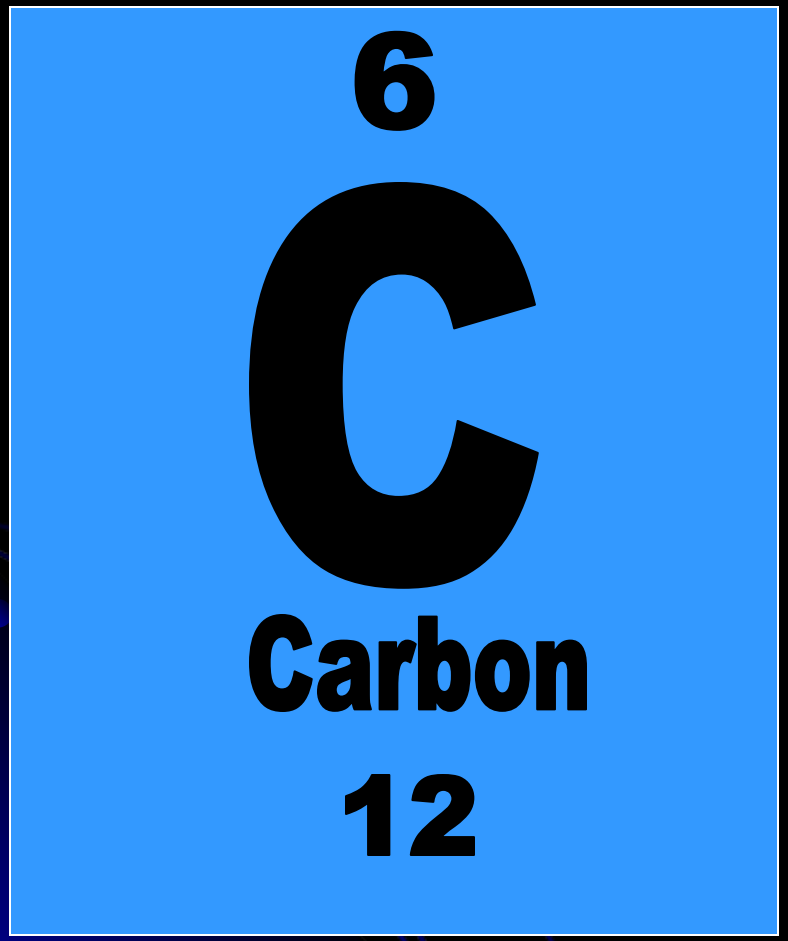
- Shells-energy level
  - Electrons
    - - charge

- 1st shell – 2 electrons
- 2nd shell – 8 electrons
- 3rd shell – 8 electrons

The Periodic Table



Carbon and its Isotopes



- Isotopes
  - Atoms of the same kind that differ in the number of neutrons. Protons stay the same

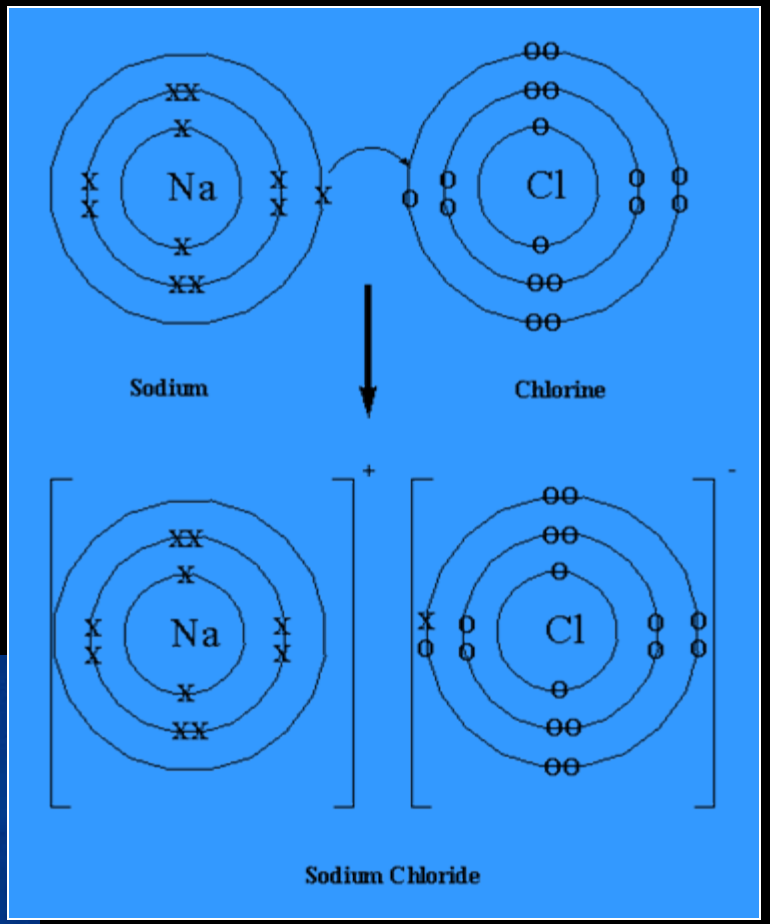
- Carbon 12
- Carbon 13
- Carbon 14

Molecules and Compounds

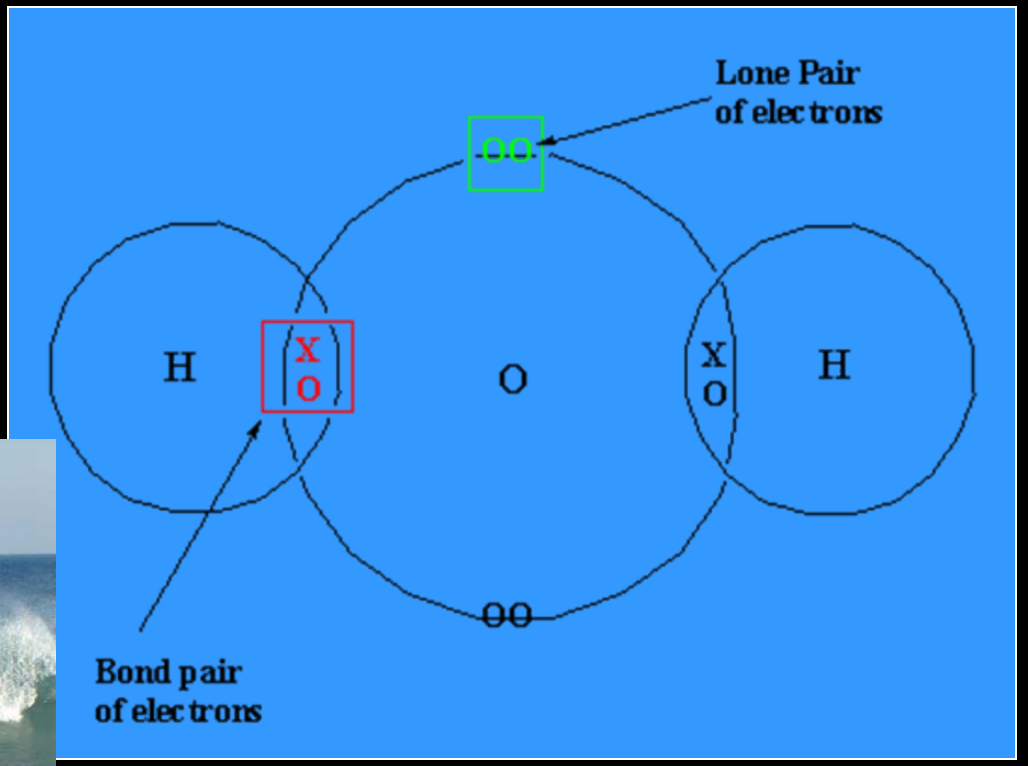
- Molecules – two or more atoms bond with each other (same or different)
- Compound – two or more different atoms bond together.

Types of Bonds

- Ionic bonds – chemical bonds in which ions (+ or -) are attracted to one another by opposite charges. Important in many body functions.



- Covalent bonds – Atoms share electrons in their outer shells



Single –
Double =
Triple ≡

Water

- The most abundant molecule in living things
- Makes up about 60-70% of total body weight
- It's a polar molecule
  - O_2 has a slight – charge
  - H_2 has a slight + charge
- Electrons spend more time circling the oxygen

- Hydrogen bond
  - + charged hydrogen is attracted to a – charged atom some distance away
  - Relatively weak and can be broken easily

Properties of Water

- Because of polarity and hydrogen bonding
- Water molecules tend to be cohesive and stick together
- Blood in our body is 92% water

Solid

- Freezes below 0° C
- Less dense water
  - floats
- Expands when it freezes
- Lakes freeze from top down protecting life below by insulating the top

Liquid

- Stays liquid at room temperature
- Temperature rises and lowers slowly

Gas

- Vaporizes at 100° C
- Takes a huge amount of heat to change to a gas
  - Sweat to cool body

The Universal Solvent

- For polar (charged) molecules
  - O^- attracted to Na^+
  - H^+ attracted to Cl^-
- Hydrophilic – interacts with water
- Hydrophobic – does not interact with water