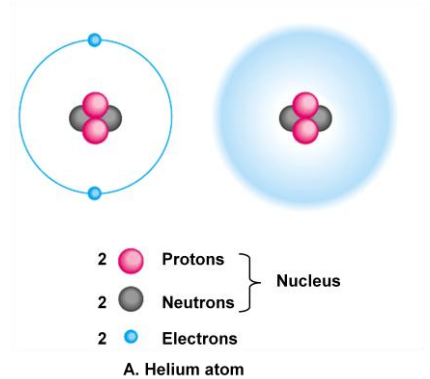
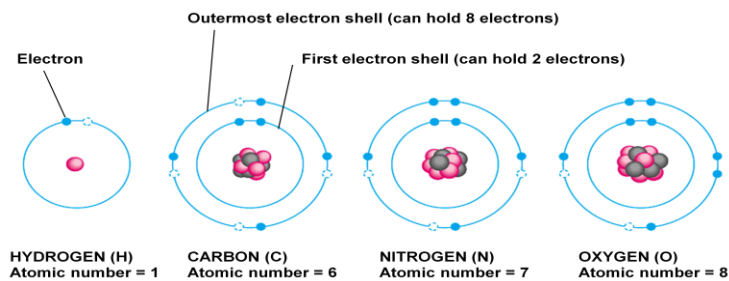


# Biochemistry Notes A

- An atom is made up of \_\_\_\_\_ and \_\_\_\_\_ located in a central nucleus
- The nucleus is surrounded by \_\_\_\_\_
- Each atom is held together by attractions between the \_\_\_\_\_ charged protons and \_\_\_\_\_ charged electrons
- Atoms are electrically \_\_\_\_\_ because they have the same number of positive protons and negative electrons
- Let's draw a diagram of a **fluorine** atom

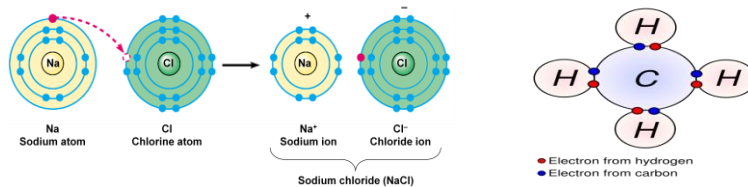


- Atoms of each element are distinguished by a specific number of protons = \_\_\_\_\_
- The number of \_\_\_\_\_ may vary for atoms of the same element
- Variant forms of an element are called \_\_\_\_\_
- Some isotopes are \_\_\_\_\_
- Electrons are arranged in shells
  - The \_\_\_\_\_ shell determines the chemical properties of an atom
  - In most atoms, a full outer shell holds \_\_\_\_\_ electrons
- Atoms whose shells are \_\_\_\_\_ tend to react with other atoms and gain, lose, or share electrons



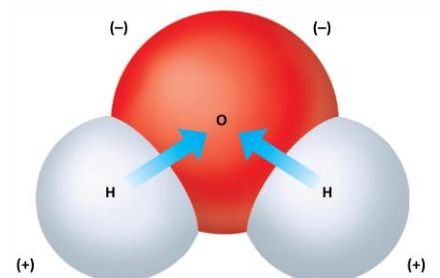
**3 types of chemical bonds:** atoms can improve their \_\_\_\_\_ by bonding with other elements

**1. IONIC BOND:** forms when electrons are \_\_\_\_\_ or \_\_\_\_\_ from unstable atoms which create stable charged atoms called \_\_\_\_\_. These stable ions are held together because of the attraction between \_\_\_\_\_ charges.



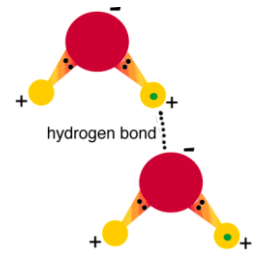
**2. Covalent Bond:** forms when electrons are \_\_\_\_\_ between unstable atoms. When atoms are bonded by covalent bonds they form a \_\_\_\_\_.

- \_\_\_\_\_ electron sharing creates polar molecules
  - Water has atoms with different electronegativities
  - Oxygen attracts the shared electrons more strongly than hydrogen
  - So, the shared electrons spend more time near oxygen
  - The result is a \_\_\_\_\_ **covalent bond**



- In  $H_2O$  the oxygen atom has a slight \_\_\_\_\_ charge and the hydrogens have a slight \_\_\_\_\_ charge
  - Molecules with this unequal distribution of charges are called \_\_\_\_\_ **molecules**

**3. Hydrogen Bond:** form between neighboring \_\_\_\_\_ molecules. A polar molecule has a partial (+) charge at one end of the molecule and a partial (-) charge at the other. Water molecules are attracted to oppositely charged regions on neighboring molecules



- Hydrogen bonding causes water molecules to stick together, a property called \_\_\_\_\_
  - Cohesion is much stronger for water than other liquids
  - This is useful in plants that depend upon cohesion to help “pull” water and nutrients up the plant in a process called \_\_\_\_\_
- Hydrogen bonding also causes water molecules to stick to other surfaces with charges, a property called \_\_\_\_\_
- Because of hydrogen bonding, water has a greater ability to \_\_\_\_\_ than other liquids ... this helps prevent overheating in living organisms
- Heat must be absorbed to break hydrogen bonds (e.g., like when body heat is absorbed to break hydrogen bonds that allow the water in sweat to \_\_\_\_\_)
- In summary, WATER is crucial for life to exist for many reasons

## The chemistry of life happens in liquid **solutions**

- Most substances dissolve in the \_\_\_\_\_ in your body
- A **solution** is a liquid mixture of substances that is the \_\_\_\_\_ throughout
- The **solvent** \_\_\_\_\_ another substance
- The **solute** is what is dissolved by the \_\_\_\_\_ and is evenly spread throughout the liquid
- The chemistry of life follows the **general solubility rule:** \_\_\_\_\_ dissolves \_\_\_\_\_
- Polar water will dissolve other materials that are also \_\_\_\_\_ or have strong \_\_\_\_\_
- Examples?
- Nonpolar substances will only dissolve in other \_\_\_\_\_ solvents
- Examples?

The chemistry of life is sensitive to the **pH** of the solution

