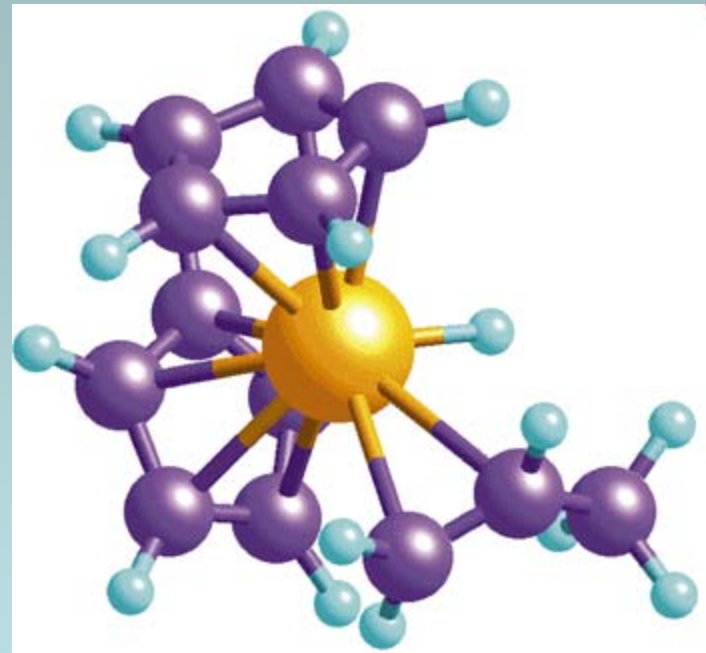


Chemistry

Part 1 CH 2.1



ATOMS

- Atom = smallest unit of matter

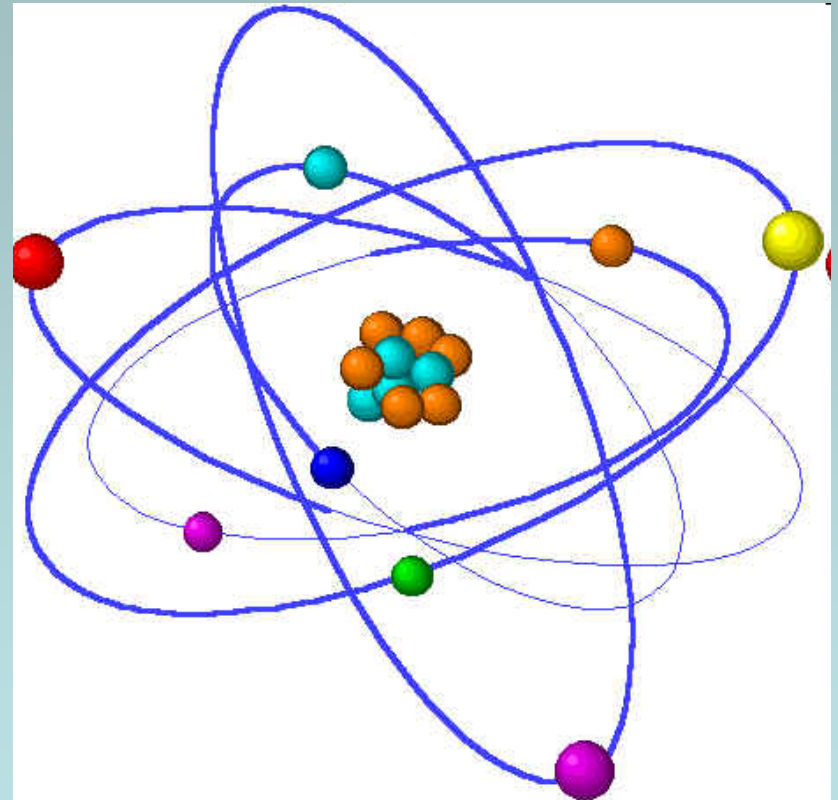
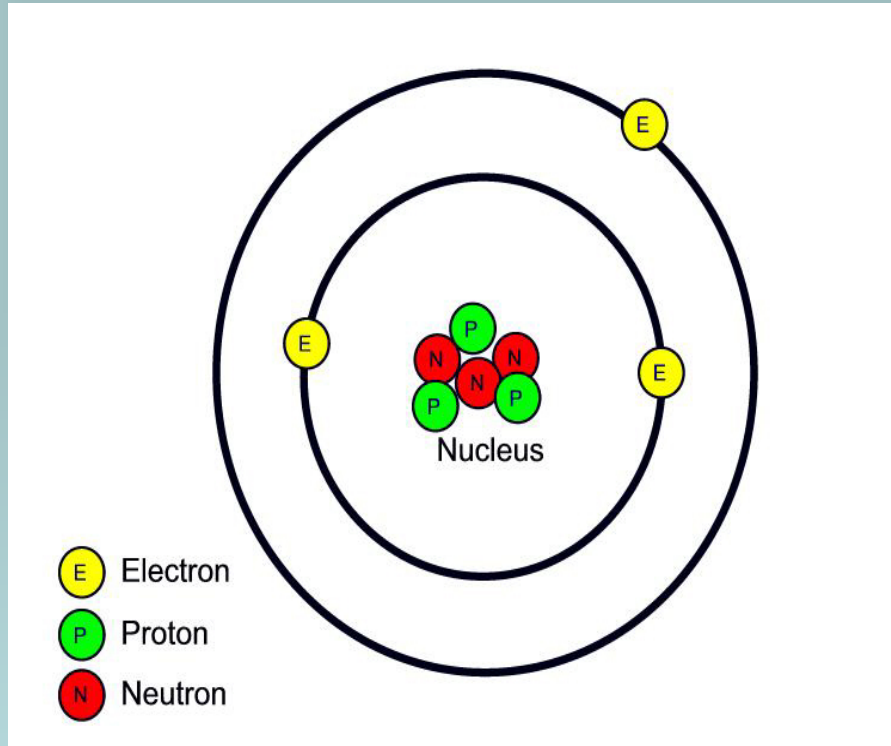
Nucleus of atom (center)

- Protons = positive charge
- Neutrons = no charge

Outside nucleus

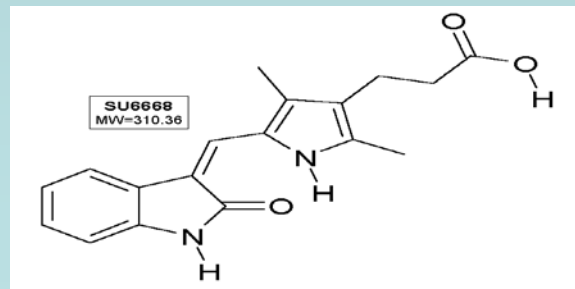
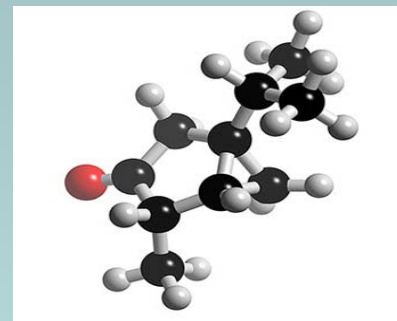
- Electrons = negative charge

Atoms



Elements

- Cannot be broken down into smaller units
- 91 natural elements on earth
- 4 of those elements = 96% of living things
- Molecule = 2 or more atoms bonded covalently
- Compounds = atoms of **different** elements bonded together

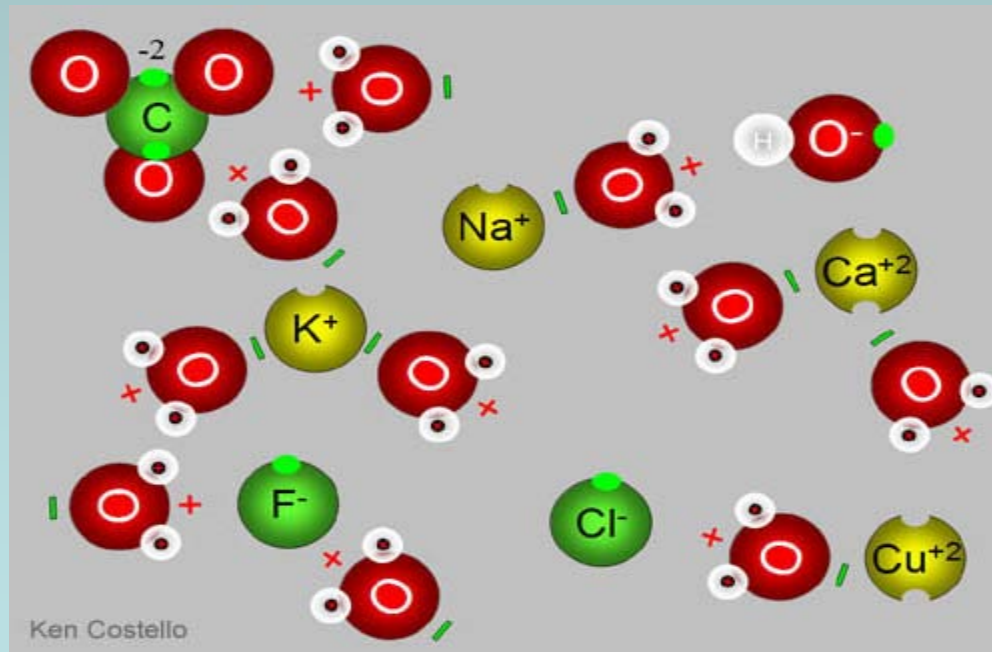


Elements found in living organisms

- Carbon
 - 6 neutrons, 6 protons, 6 electrons
- Hydrogen
 - 1 proton, 0 neutrons, 1 electron
- Oxygen
 - 8 protons, 8 neutrons, 8 electrons
- Nitrogen
 - 7 protons, 7 neutrons, 7 electrons

Ions

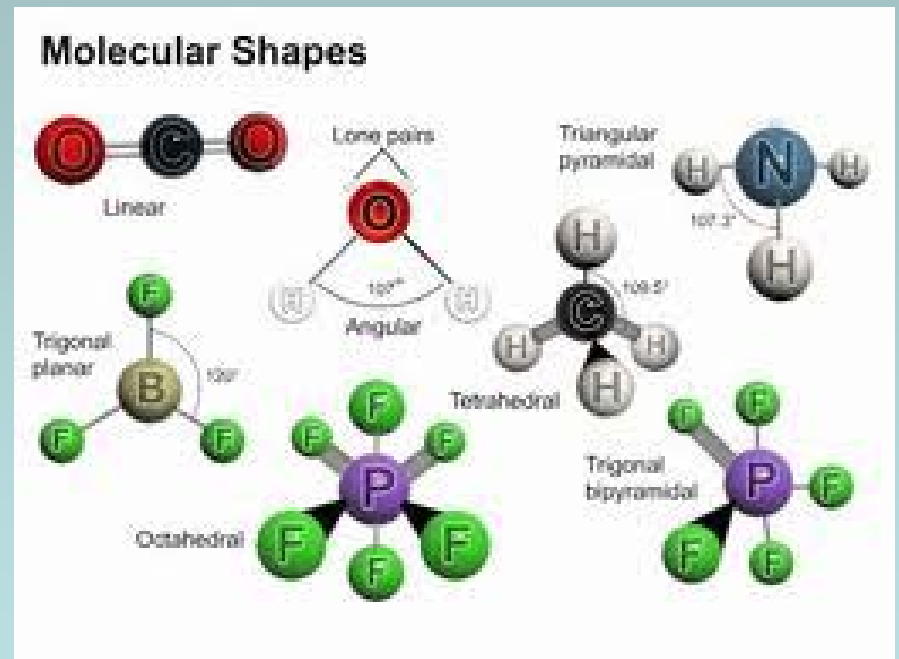
- Atoms that lose or gain electrons
- Losing electrons = positive (+) charge
- Gaining electrons = negative (-) charge



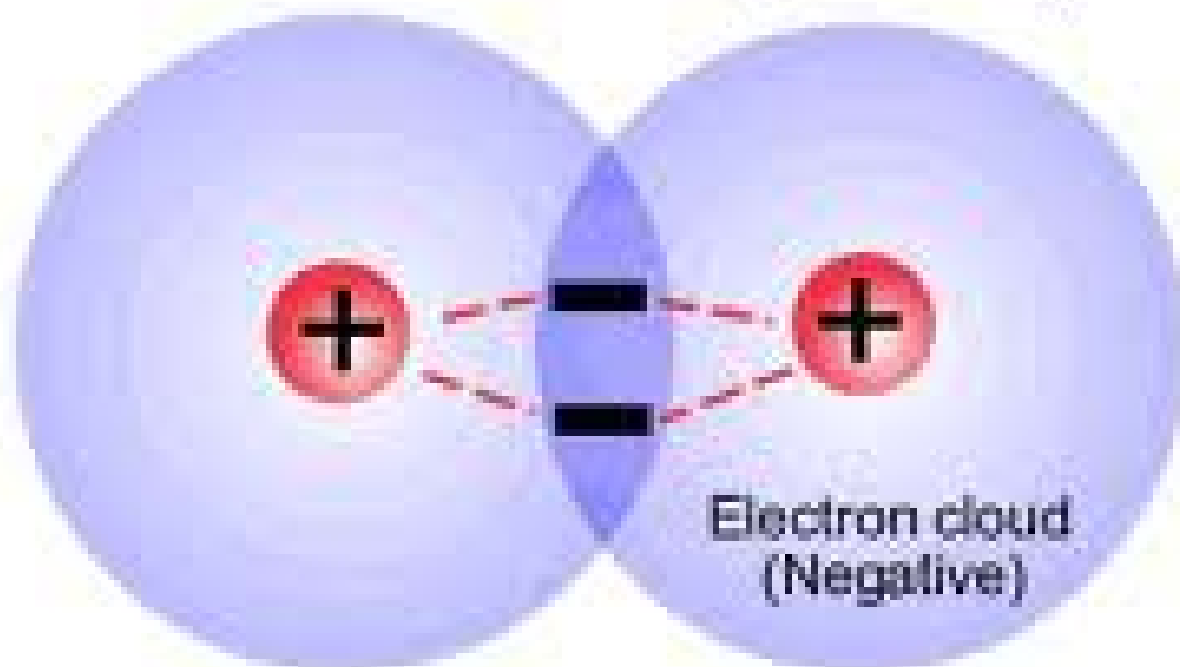
Bond.... James Bond



- Bond.... Chemical Bond



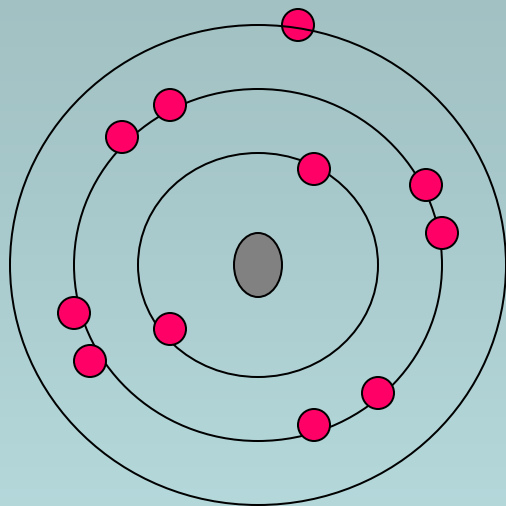
The electrons experience a force of attraction from both nuclei. This negative - positive - negative attraction holds the two particles together



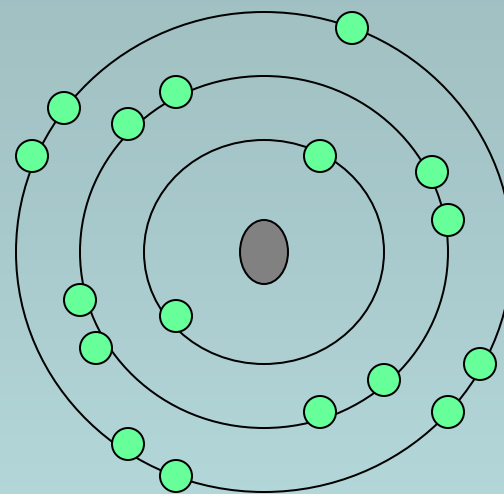
This attraction is called a chemical bond
one pair of electrons constitutes ONE bond

Ionic Bonds

- Ions of opposite charges are attracted and bond



Sodium (Na) – 11 electrons

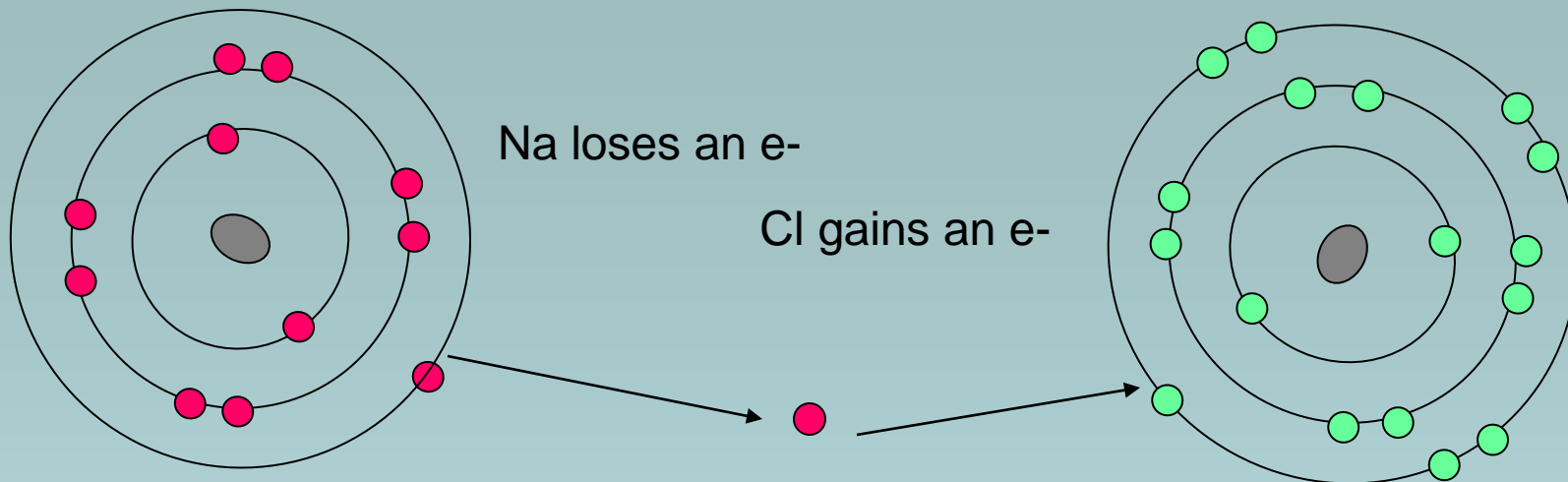


Chlorine (Cl) – 17 electrons

Ionic Bonds

Sodium (Na) – 11 electrons

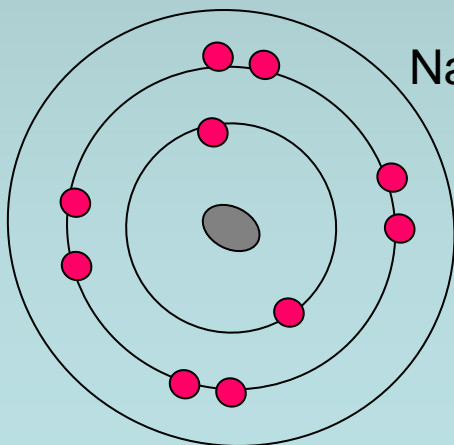
Chlorine (Cl) – 17 electrons



Na⁺ has 10 e⁻

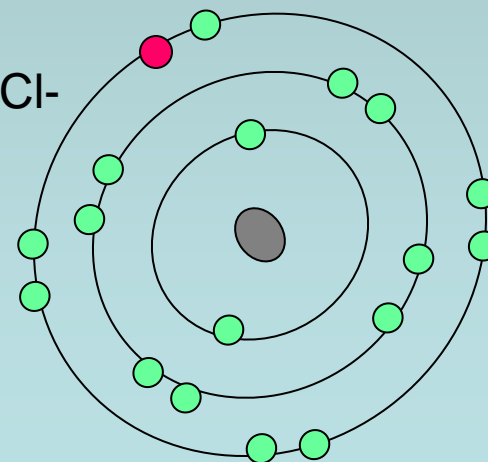
11 protons =
+1 charge

Na⁺



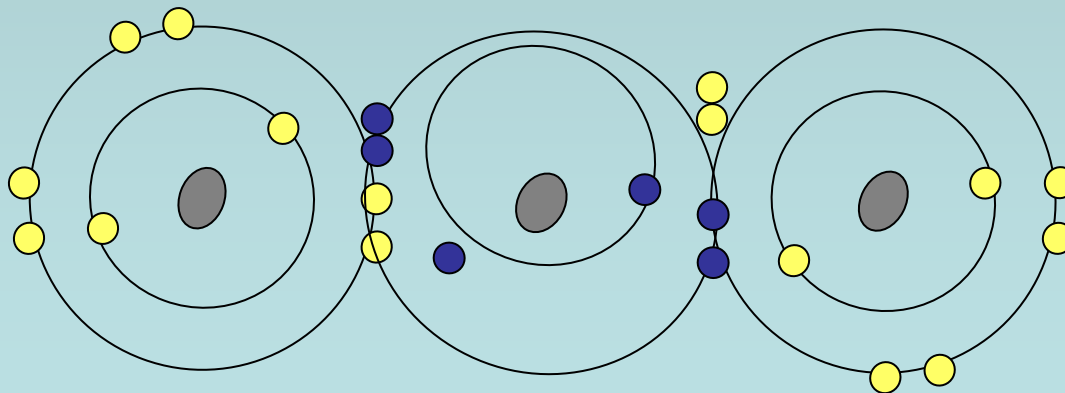
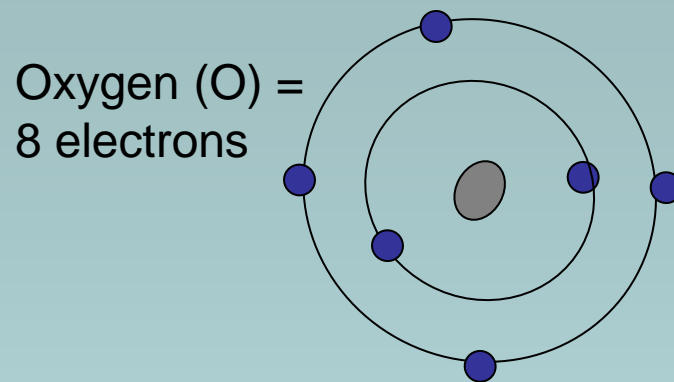
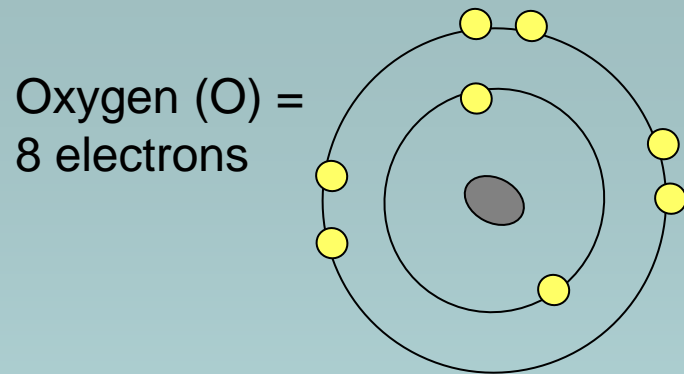
Cl⁻

Cl⁻ has 18 e⁻
& 17 protons =
-1 charge



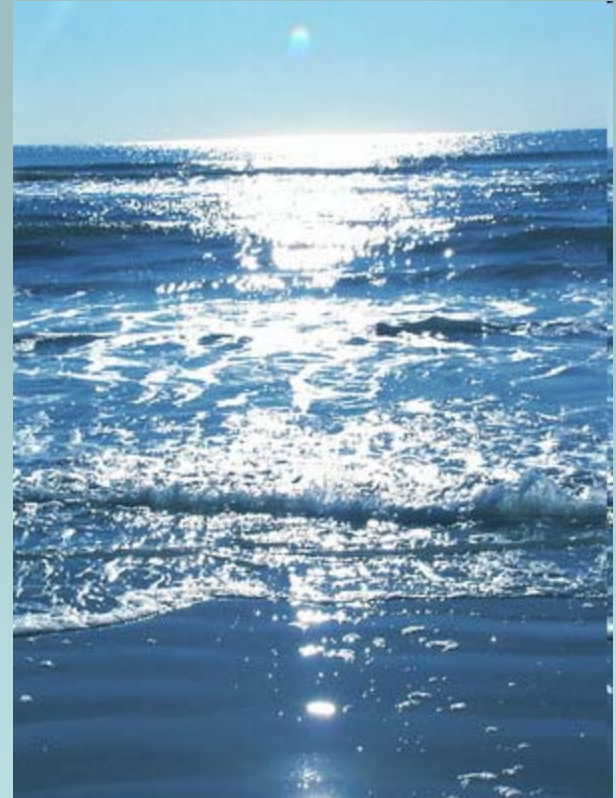
Covalent Bonds

- Atoms share electrons to become stable

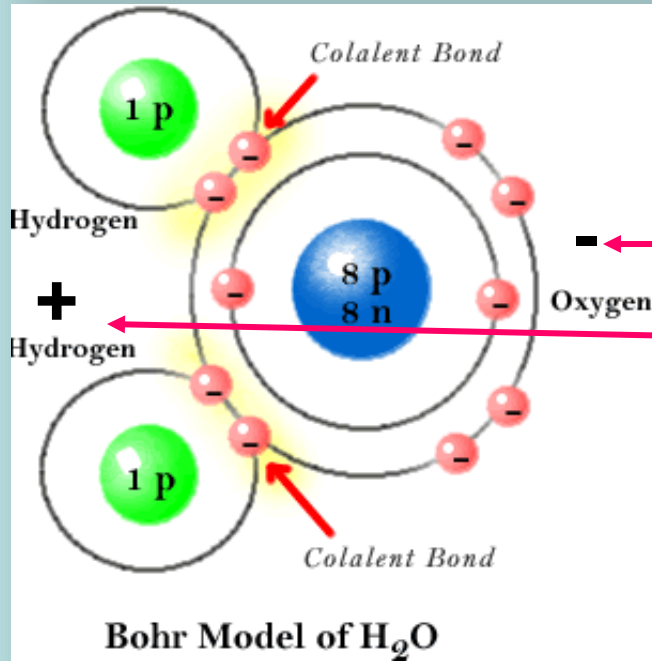


Properties of Water

Part 2 - CH 2.2



WATER

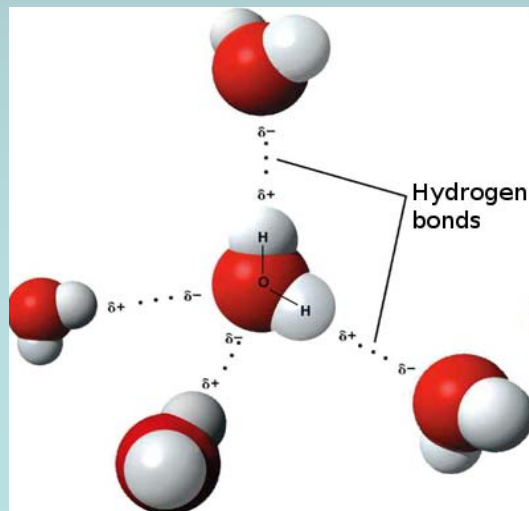


- **Polar molecule**

- Oxygen slightly negative
- Hydrogen slightly positive

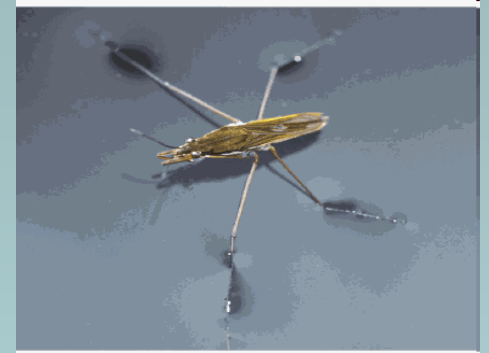
- **Hydrogen bond**

- Bond between slightly + Hydrogen and slightly – atom (O or N usually)



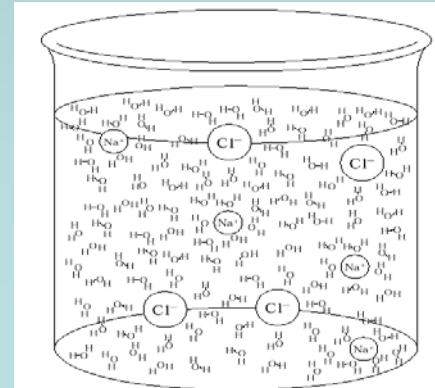
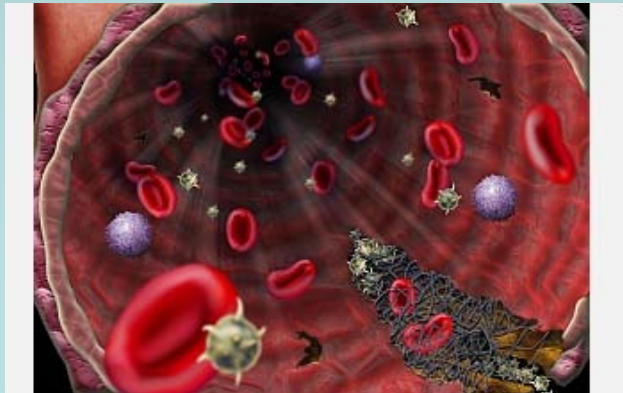
Hydrogen Bonds

- High specific heat – resists changes in temperature
- Cohesion – water molecules stick together
(surface tension = ‘skin’ on water)
- Adhesion – water molecules sticking to other things



Universal Solvent

- Solution - mixture of substances that is the same throughout (salt water)
- Two parts to a solution
 - Solvent – substances present in higher amount (water)
 - Solute – substance that is dissolved (salt)



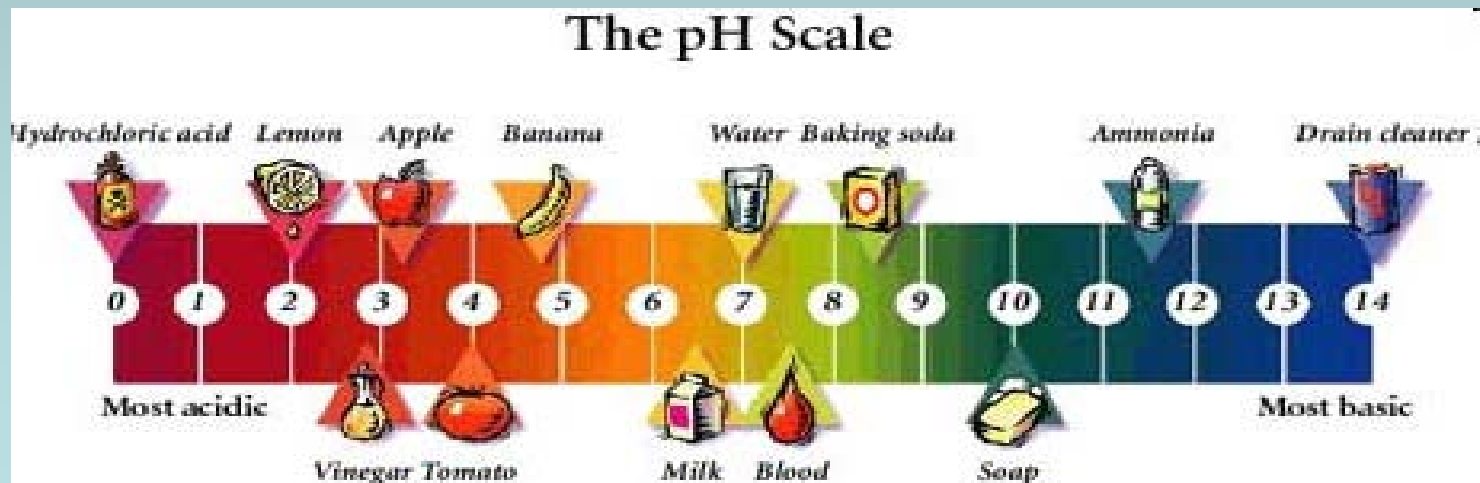
pH = Acids and Bases

- Acids – release hydrogen (H^+) ion when dissolved in water (high pH)
- Bases – remove H^+ when dissolved in water (low pH)



pH = Acids and Bases

- Most organisms have a pH around 7.0
- Buffers – bind to H^+ when concentration is high, release H^+ when concentration is low



Chemical Reactions

Part 3 - CH 2.4



Chemical Reactions

- Change substances by...
 - Breaking bonds
 - $\text{H}_2\text{O}_2 \rightarrow \text{O}_2 + \text{H}_2\text{O}$
 - Forming bonds
 - $\text{O}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{O}_2$
- Reactants = go into reaction (ingredients)
- Products = are made (results)
- Bond Energy = energy needed to break chemical bonds

Equilibrium

- Reversible reactions
 - Reactants and products made at same rate
- Exothermic = low energy, releases energy
- Endothermic = high energy, absorbs energy
- Activation Energy = starts reaction