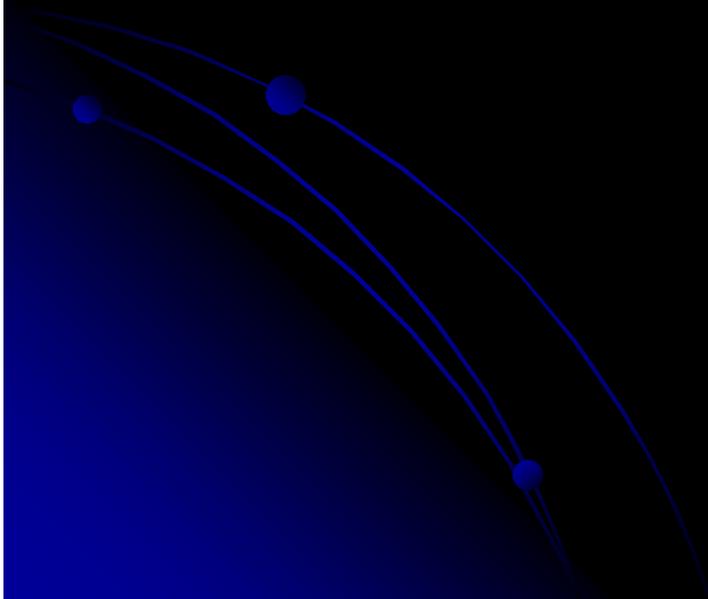
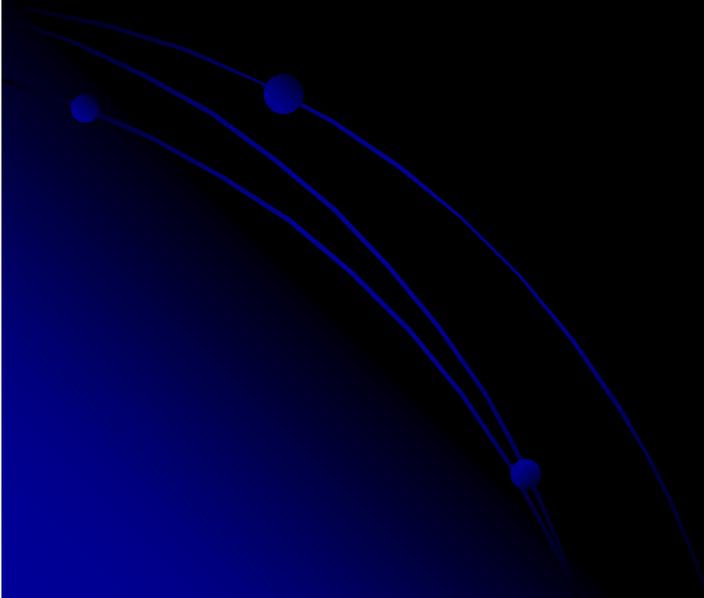


# Bonding



# Chemical bonds

- 2 main types of bonds
  - Strong
  - Weak

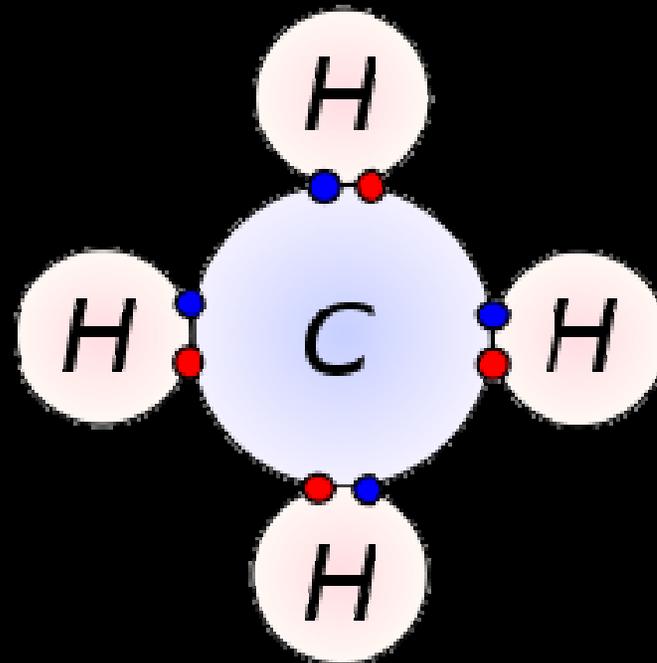


# Why are bonds important?

- Because bonding determines the form and function of a molecule
  - The formula is the ratio of the elements
- Key concept for the day: opposite charges attract

# Covalent Bonds

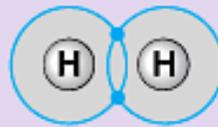
- Share valence electrons
  - Strong
  - Can be Single, Double or Triple bonds



● Each atom has 4 valence electrons (2 from 2s, 2 from 2p)  
● Each atom has 1 valence electron (1 from 1s)

What's a valence electron again?

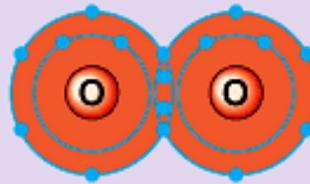
H<sub>2</sub>



H—H

(a) Hydrogen

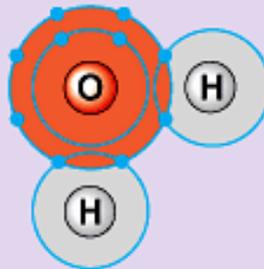
O<sub>2</sub>



O=O

(b) Oxygen

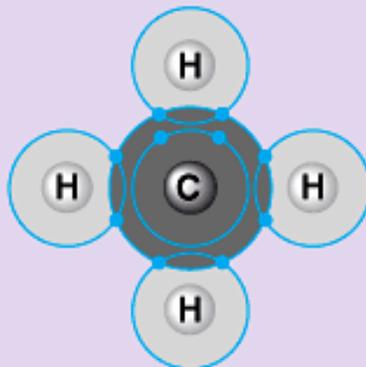
H<sub>2</sub>O



O—H  
|  
H

(c) Water

CH<sub>4</sub>

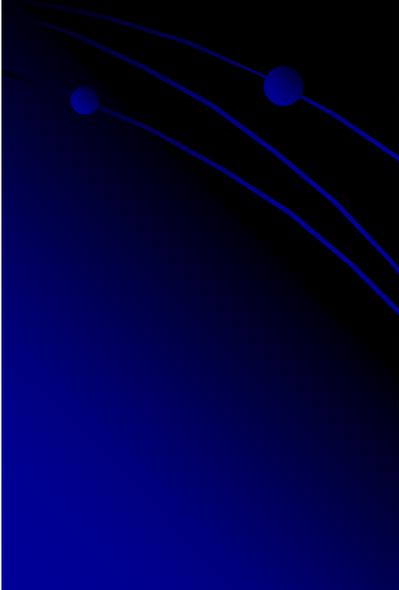


H  
|  
H—C—H  
|  
H

(d) Methane

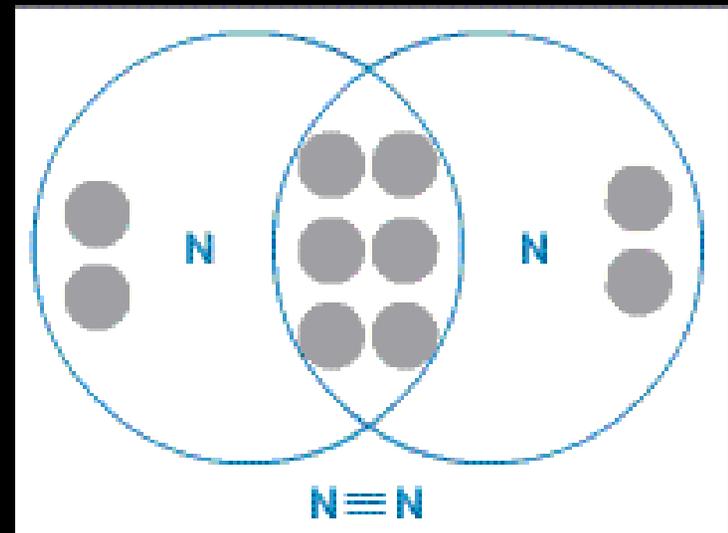
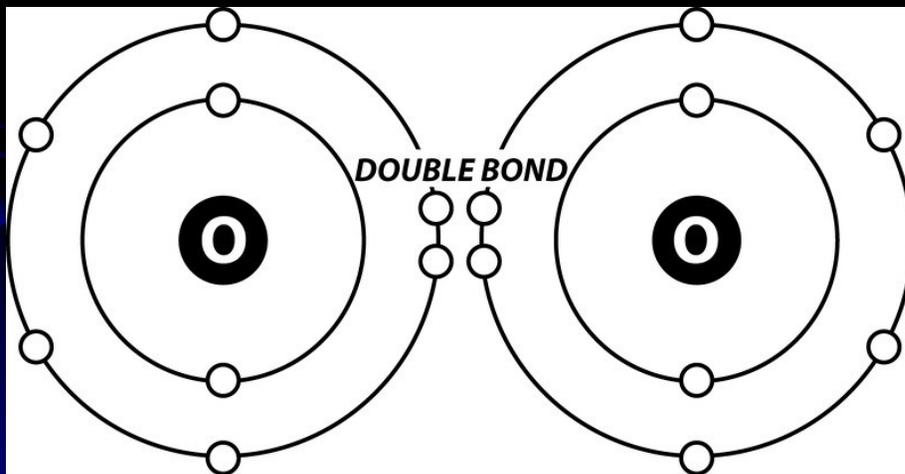
# Electronegativity and covalent bonds

- What happens when the atoms that are covalently bonded are the same kind of atom?



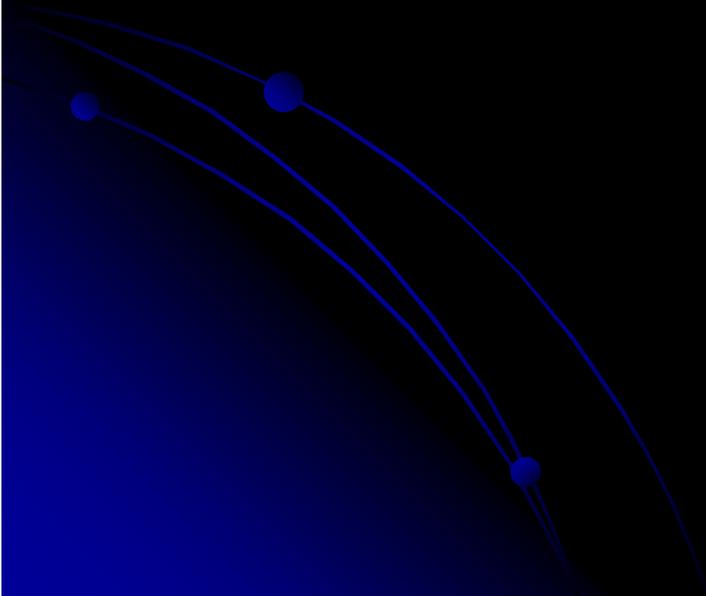
# Non Polar Covalent Bonds

- Equal sharing because they are the same kind or they have the same electronegativity



# What's electronegativity?

- Electronegativity- the attraction that an atom has for the electrons that are near it



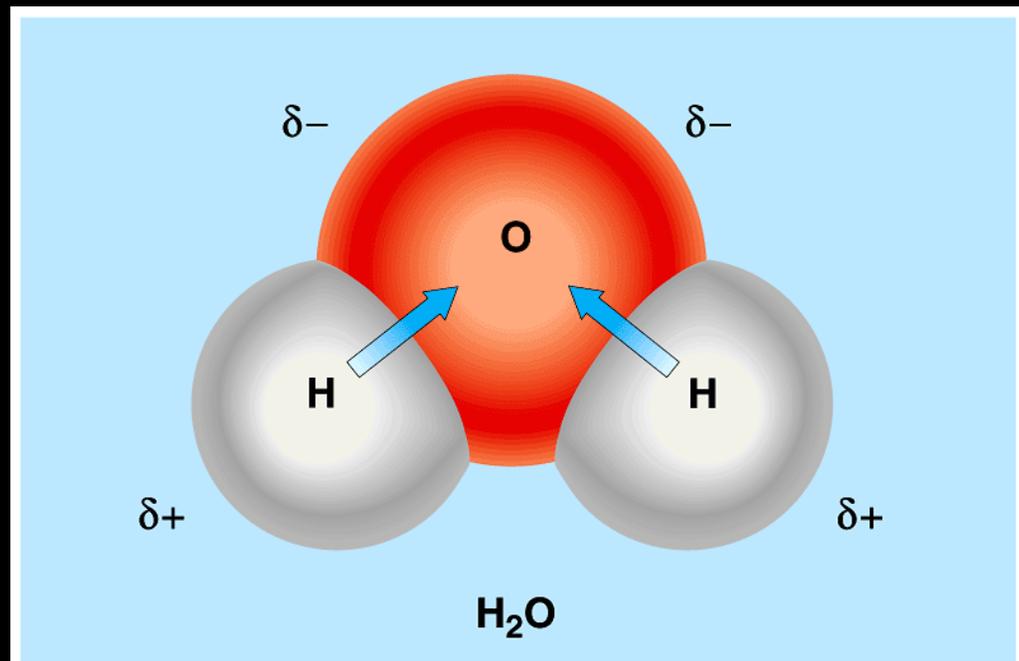
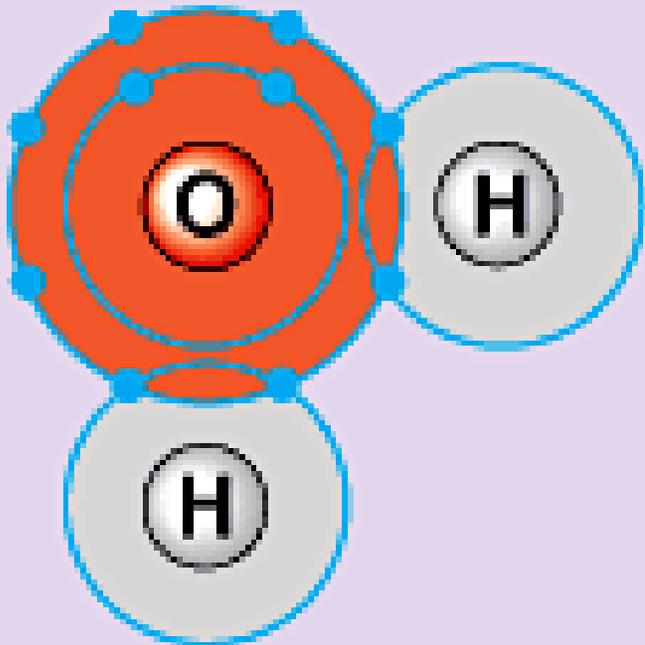
# Electronegativity and covalent bonds

- What happens when the atoms in the covalent bond are different kinds?



# Polar Covalent Bonds

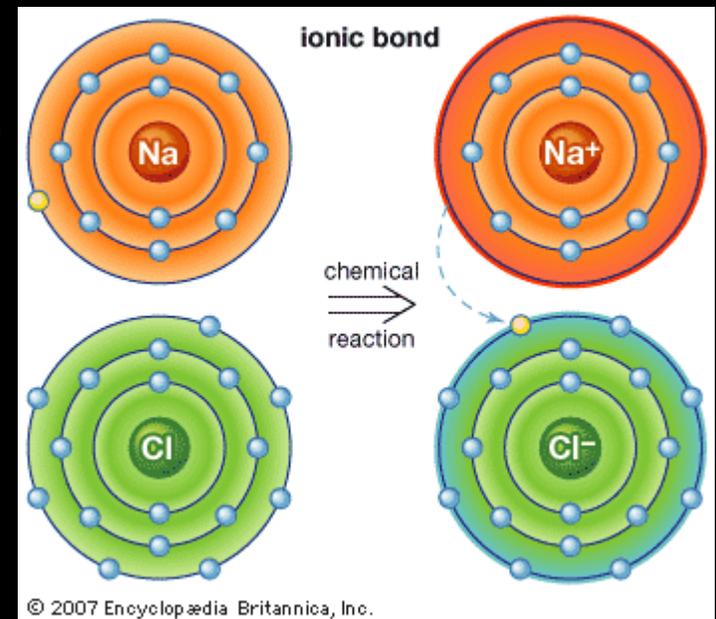
- Unequal sharing of electrons
  - This results in partial charges



# Ionic Bonds

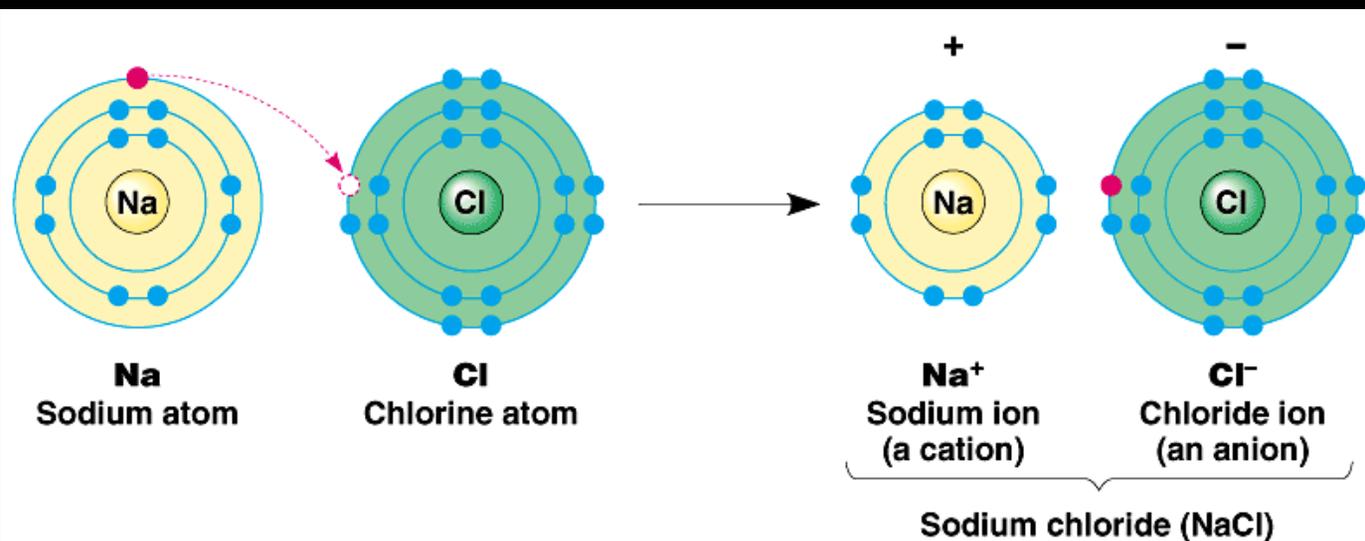
- Electrons are transferred from one atom to another
  - How does electronegativity influence this?

- Ionic bonding makes ions.
- What is an ion?



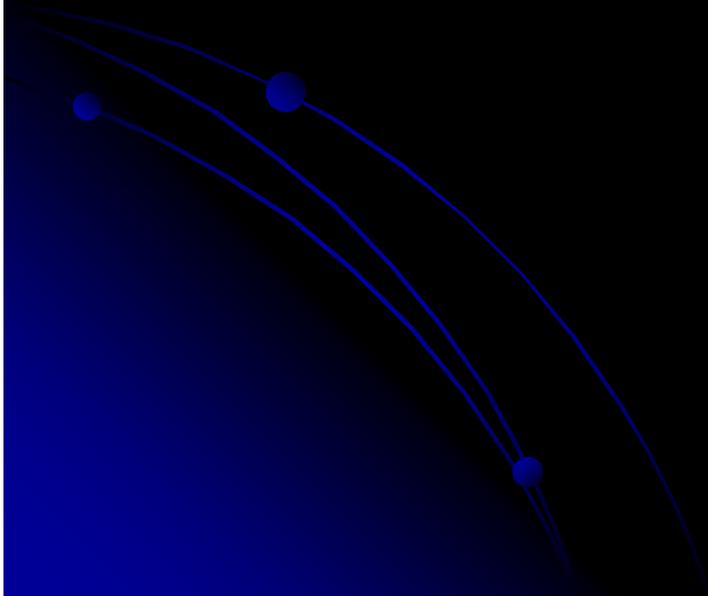
# Ionic Bonding makes ions

- The atoms now have a charge due to either one extra or one less electron.
  - Cation and anion
- The atoms stay together because they are opposite and opposites attract.



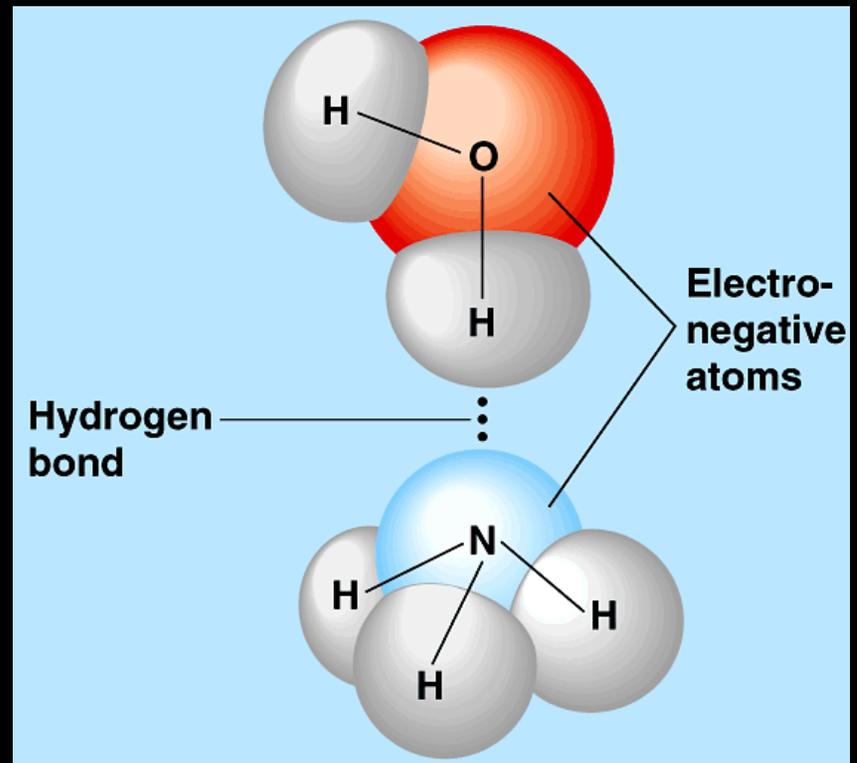
# Weak Bonds

- **Some bonds are not “bonds” at all**
  - **Interactions based on attraction of charges**

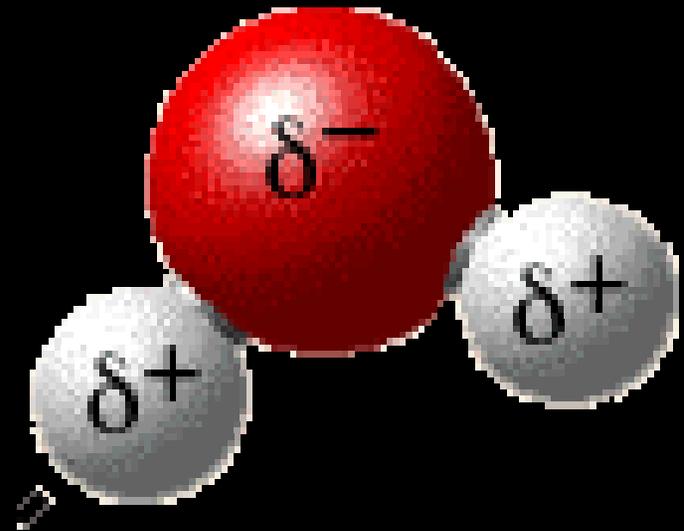
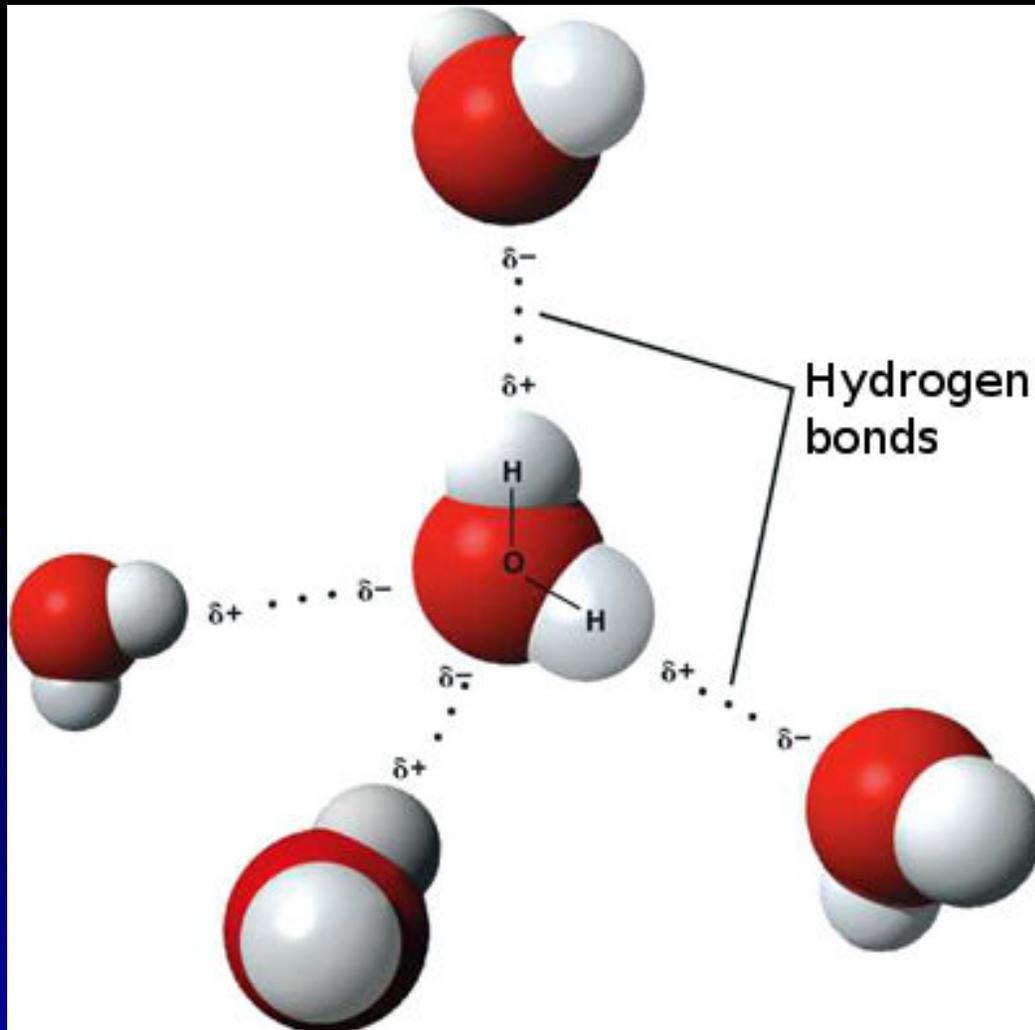


# Hydrogen Bonds

- A hydrogen atom that is already covalently bonded to another atom is attracted to another atom (usually oxygen or nitrogen)

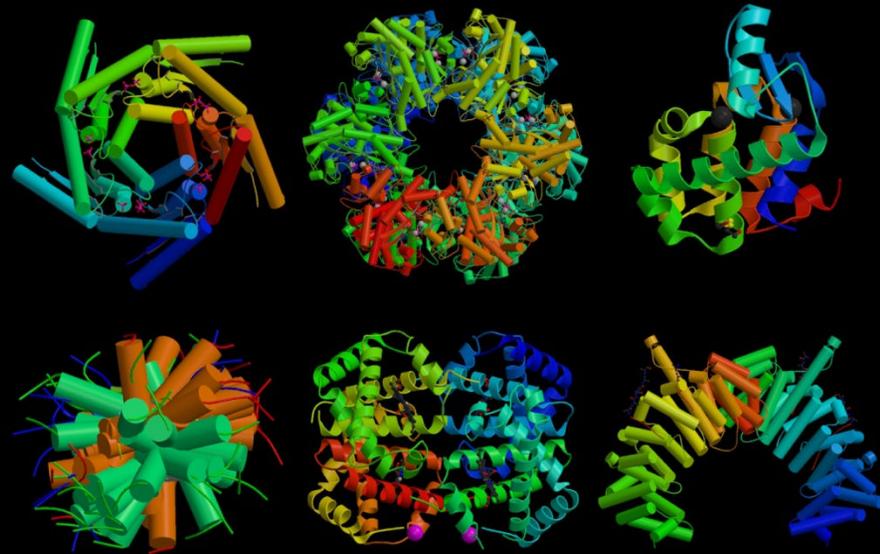


# Why does this attraction exist?



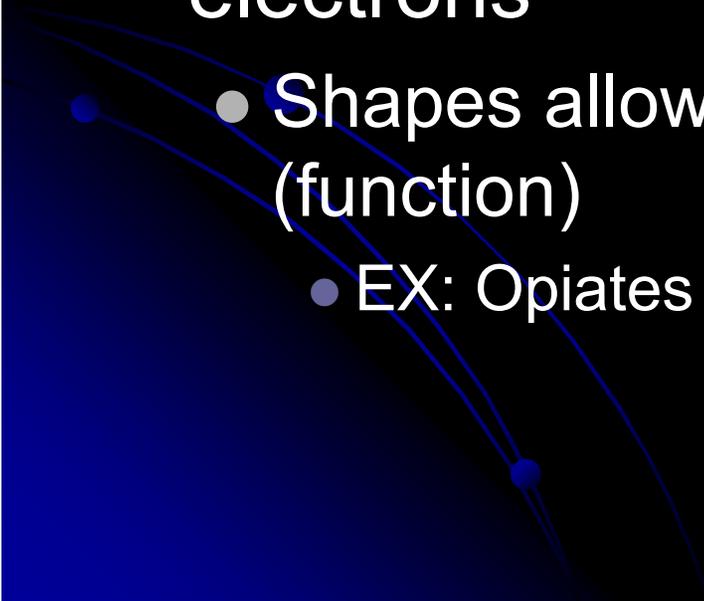
# Van der Waals Interactions

- Weak interactions between molecules
- Usually a result of asymmetrical distribution of electrons
- Reinforces the 3 dimensional shape of a molecule





# Molecular Shapes and Function

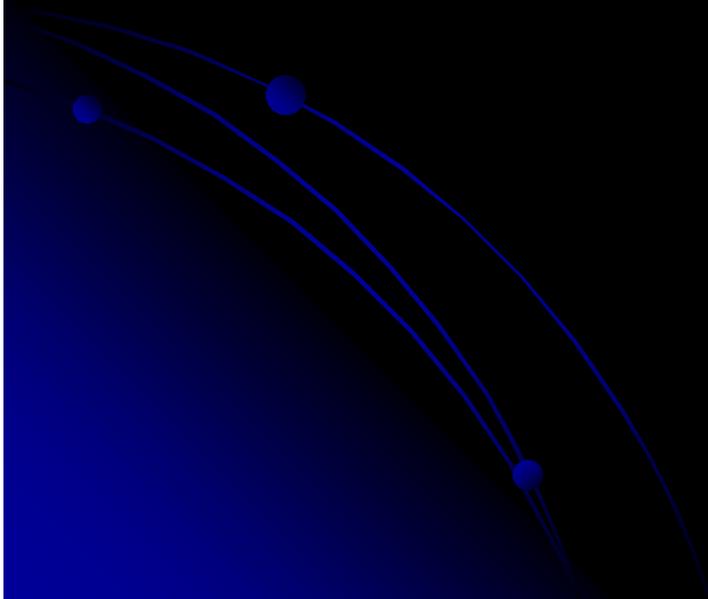
- Shapes of molecules determine function
    - Molecules with multiple atoms have complex shapes
  - Shapes are determined by positions of the electrons
    - Shapes allows recognition and response (function)
      - EX: Opiates and Marijuana
- 

# Why does bonding matter?

- Because chemical reactions are all about bonding!
    - Chemical reactions make and break chemical bonds
    - Are there any chemical reactions that occur in the body?
- 

# Reactions

- In a chemical reaction identify the following:
- Reactant
- Products



# Vinegar and Baking Soda

- $\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$
- How do reactions illustrate the conservation of matter?

# Rate of reaction

- How do concentrations affect the rate of reaction?
- What is equilibrium?

