**Ch. 6 & 7: Chemical Bonding**

**I: Introduction to Bonding (pg. 161-163)**

Vocabulary

**Chemical Bond**

* attractive force between atoms or ions that binds them together as a unit
* bonds form in order to…
  + decrease potential energy (PE)
  + increase stability

**Chemical Formula**

Ionic Covalent

Formula Molecular   
Unit Formula

NaCl CO2

**Compound**

2 elements more than 2 elements

Binary Ternary   
Compound Compound

NaCl NaNO3

**Ion**

1 atom 2 or more atoms

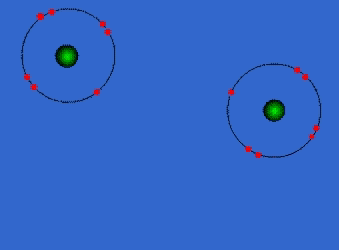
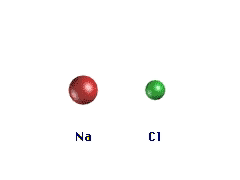
Monotomic Polyatomic  
Ion Ion

Na+ NO3-

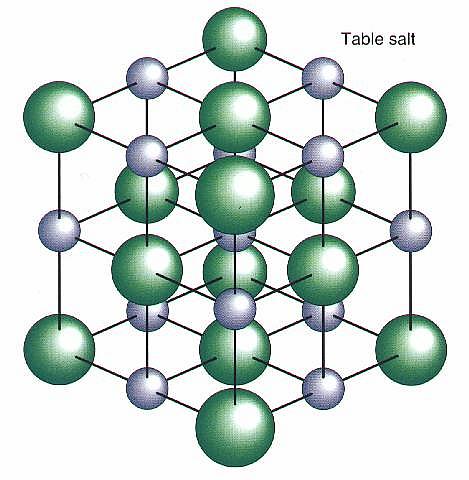
**Types of Bonds**

|  |  |  |
| --- | --- | --- |
|  | **Ionic** | **Covalent** |
| **Bond Formation** | e- are transferred from metal to nonmetal | e- are shared between two nonmetals |
| **Type of Structure** | Crystal lattice | True molecules |
| **Physical State** | Solid | Liquid or gas |
| **Melting Point** | High | Low |
| **Solubility in Water** | Yes | Usually not |
| **Electrical Conductivity** | Yes  (solution or liquid) | No |
| **Other Properties** |  | Odorous |

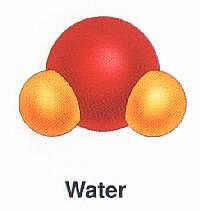
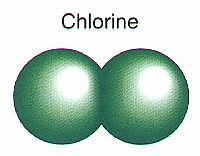
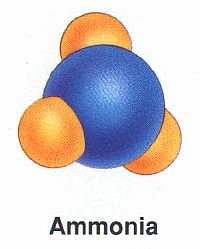
|  |  |
| --- | --- |
|  | **Metallic** |
| **Bond Formation** | e- are delocalized among metal atoms |
| **Type of Structure** | “electron sea” |
| **Physical State** | Solid |
| **Melting Point** | Very high |
| **Solubility in Water** | No |
| **Electrical Conductivity** | Yes (any form) |
| **Other Properties** | Malleable, ductile, lustrous |



**Ionic Bonding-Crystal Lattice**

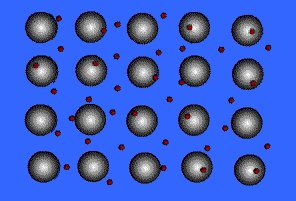


**Covalent Bonding-True Molecules**

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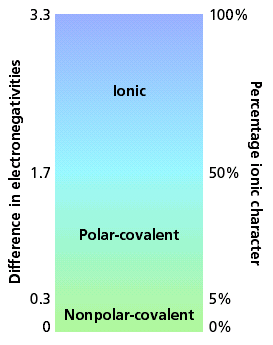
**Diatomic Molecule**

**Metallic Bonding-“Electron sea”**

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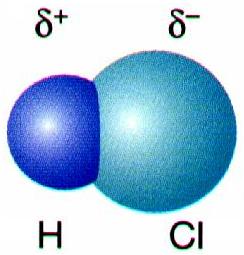
**Bond polarity**

* Most bonds are a blend of ionic and covalent characteristics.
* Difference in electronegativity determines bond type.



**Electronegativity**

* Attraction an atom has for a shared pair of electrons.
* higher e-neg atom ⇒ δ-
* lower e-neg atom⇒ δ+



**Electronegativity Trend** (p. 151)

* Increases up and to the right.



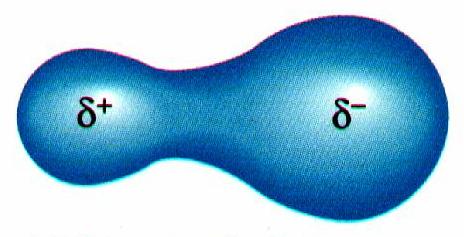
**Nonpolar Covalent Bond**

* e- are shared equally
* symmetrical e- density
* usually identical atoms

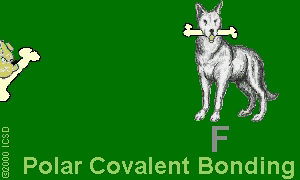
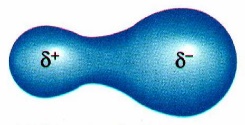


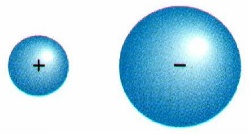
**Polar Covalent Bond**

* e- are shared unequally
* asymmetrical e- density
* results in partial charges (dipole)

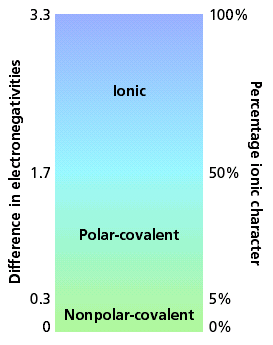


**Nonpolar**

**Polar**

**Ionic**

Examples:

Cl2 3.0-3.0=0.0 

Nonpolar

HCl 3.0-2.1=0.9

Polar

NaCl 3.0-0.9=2.1

Ionic