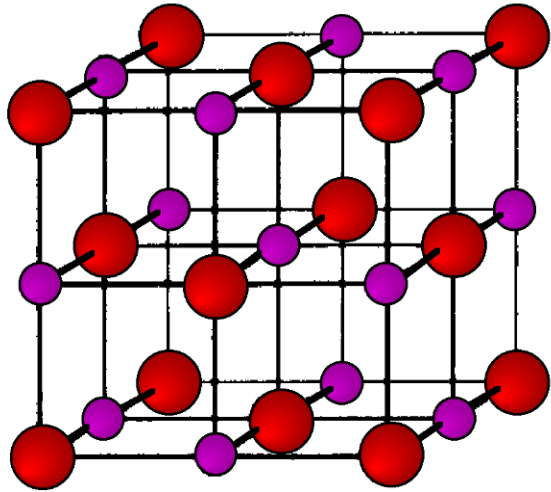


Sharing is Caring!
DON'T BE IONIC, BE COVALENT!

Properties of Ionic Compounds

- Generally have high melting points
 - Example: NaCl melts at $\sim 800^{\circ}\text{C}$ (1474°F)
- Most ionic compounds are crystalline solids at room temperature.
 - Crystalline solid: highly organized, repeating three-dimensional patterns.
- Ionic compounds can conduct electricity when melted or dissolved in water.
- Tend to be brittle when hit with enough force

Crystalline Solids



Cations are surrounded by neighboring anions, and there is electrostatic attraction between them all



Ionic vs Covalent Bonding

- **Ionic:** electron(s) leave one atom & gained by another atom to satisfy both atoms' octets, this results in the formation of ions. Discrete charges are formed. The resulting opposite charges attract each other.
- **Covalent:** electrons are shared by two or more atoms to satisfy their octets.

Properties of Molecular Compounds

Molecular Compounds: have only covalent bonds

1) Molecular compounds generally have much **lower melting and boiling points** than ionic compounds.

2) Molecular compounds are **soft and squishy** (compared to ionic compounds, anyway).



Properties, Cont' d

- **3) Covalent compounds tend to be more flammable than ionic compounds.**
 - There are exceptions to this rule!
- **4) Covalent compounds don't conduct electricity in water.**

Yes, not all covalent bonds are the same type!

- Polar covalent: the electrons are shared, but one atom is pulling on the electrons a lot more. The electrons spend more time around that atom.
- Nonpolar covalent: the electrons are evenly shared between the two atoms.



How can you tell if a bond is IONIC or COVALENT?

- Subtract the two electronegativity values (look at an electronegativity chart p. 177).

2 to 4.0: Ionic

> 1.0 to 2.0 very polar covalent

>0.4 to 1.0: moderately Polar Covalent

0.0 to 0.4: Non-Polar Covalent

- Electronegativity: atom's ability to attract electrons in a chemical bond. (higher electronegativity means the atom wants electrons more)

How can you tell if a bond is IONIC or COVALENT?

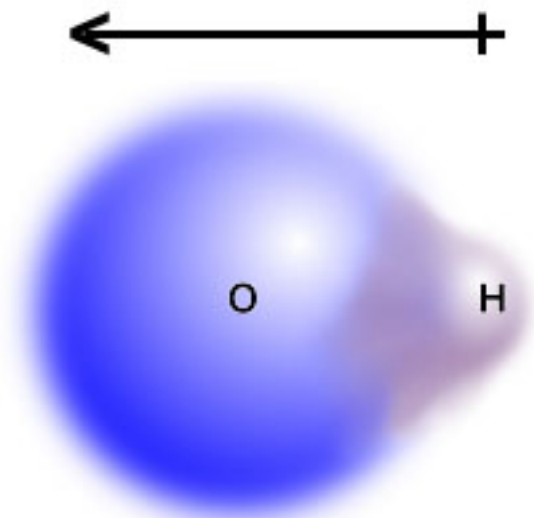
- Easy way:

Nonmetals and Metals = ionic bond (usually)

All nonmetals = covalent bond

$$\text{O}(3.5) - \text{H}(2.1) = 1.4$$

Polar covalent bond



The electrons are unevenly shared between the O and H atoms, forming a polar covalent bond.

- The closer the elements are on the periodic table, their electronegativities are more similar... more likely to form covalent bonds
- Farther away... greater difference in electronegativity... more likely to form ionic bonds.
 - **Metal + nonmetal = usually ionic**
 - **Nonmetal + nonmetal = usually covalent.**

Memorize these!

| Chemical formula | name |
|------------------|---------|
| H ₂ O | water |
| CH ₄ | Methane |
| NH ₃ | ammonia |

Diatomics

- ***Diatomic elements*** are elements that do not exist singularly in nature because they are highly reactive.

“Which elements are the diatomics?”

“HON, it's the halogens!”

- H_2 , O_2 , N_2 , F_2 , Cl_2 , Br_2 , I_2