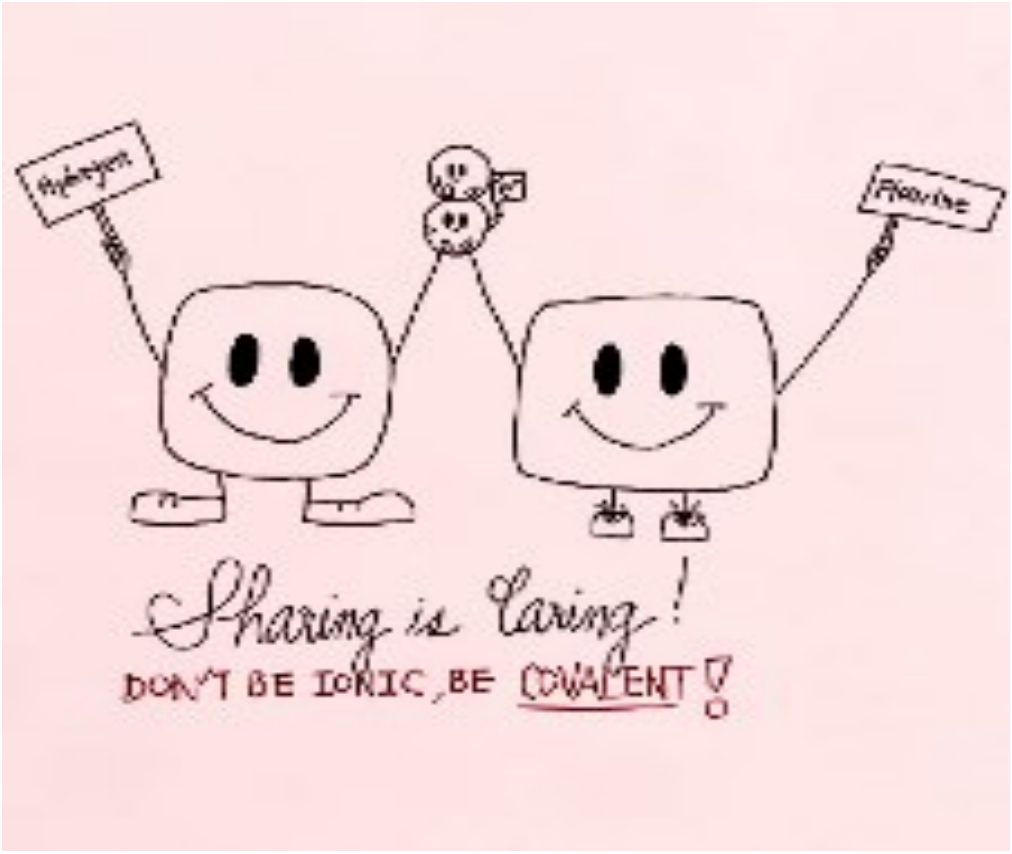
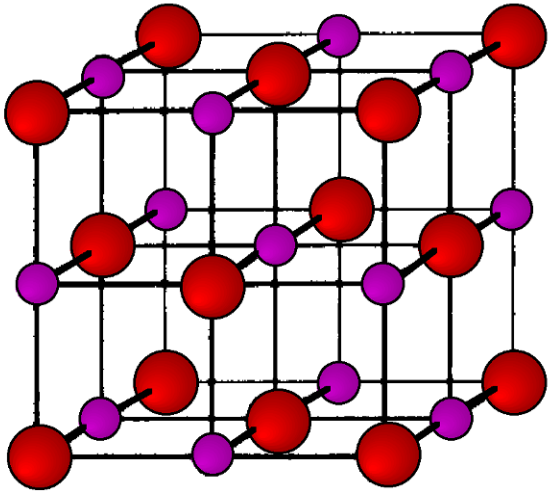

Sharing is Caring!
DON'T BE IONIC, BE COVALENT!

Properties of Ionic Compounds

- Generally have high melting points
  - Example: NaCl melts at ~800°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.

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. 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.**

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

>0.4 to 2.0: 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)

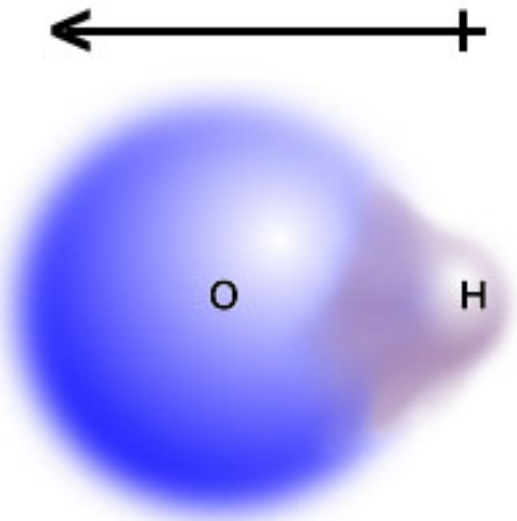
All nonmetals = covalent bond

Yes, there are 2 kinds of covalent bonds!

- **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.

O(3.5) – 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 = covalent.**

Guidelines for naming Binary molecular compounds
(Binary: made from two elements)

- 1.Name the elements in the order listed in the formula.

- 2.Use prefixes to indicate the number of each kind of atom (shown as SUBSCRIPTS in the formula). Exception: The prefix *mono-* is NOT used for the first element in the compound.

- 3. All molecular compounds end in *-ide*

Naming Covalent Compounds

- A prefix in the name of a molecular compound tells how many atoms of an element are present in each molecule of the compound.

Table 9.4

Prefixes Used in Naming Binary Molecular Compounds

Prefix	Mono-	Di-	Tri-	Tetra-	Penta-	Hexa-	Hepta-	Octa-	Nona-	Deca-
Number	1	2	3	4	5	6	7	8	9	10

EXAMPLE: CO_2

1. This compound shows Carbon and Oxygen.
2. Carbon: 1 atom. The prefix *mono-* IS NOT USED
3. Oxygen: 2 atoms. The prefix *di-* shows this number.
4. Carbon diox***ygen*** is actually **Carbon diox*ide***

Writing Formulas of Covalent Compounds

1. Use the prefixes in the name to tell you how many atoms of each element are present. This number will be the subscript in the formula.

2. Then write the correct symbols for the elements with the appropriate subscripts

EXAMPLE: Write the molecular formula for diphosphorus trioxide

1. Diphosphorus: prefix *di-* indicates 2 atoms of phosphorus. Trioxide: prefix *tri-* indicates 3 atoms of oxygen.

2. The chemical symbol for phosphorus is P, and the chemical symbol for oxygen is O.

The chemical formula is P_2O_3