

Jumpstart

- 1) What do you already know about the different types of bonding? (ionic vs. covalent)
- 2) What do you want to learn about bonding?



Introduction to Types of Bonds

Types of Chemical Bonds



Ionic (Metal - Nonmetal)

Covalent (Nonmetal - Nonmetal)

Metallic (Metal - Metal)

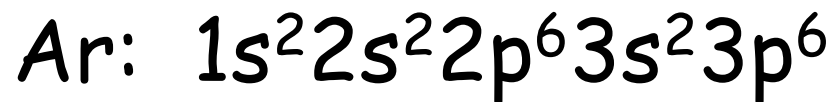
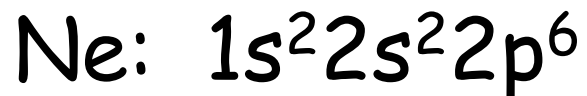
Chemical Reactions



- They do this by transferring or sharing electrons in order to make "bonds"
- Ionic - electrons transferred
- Covalent - electrons shared
- Metallic - free flowing electrons

Why bother making bonds?

Atoms want to have a full outer shell like the noble gases have:



*NOTICE: A full outer shell = 8 e⁻

Which electrons are involved in bonding?



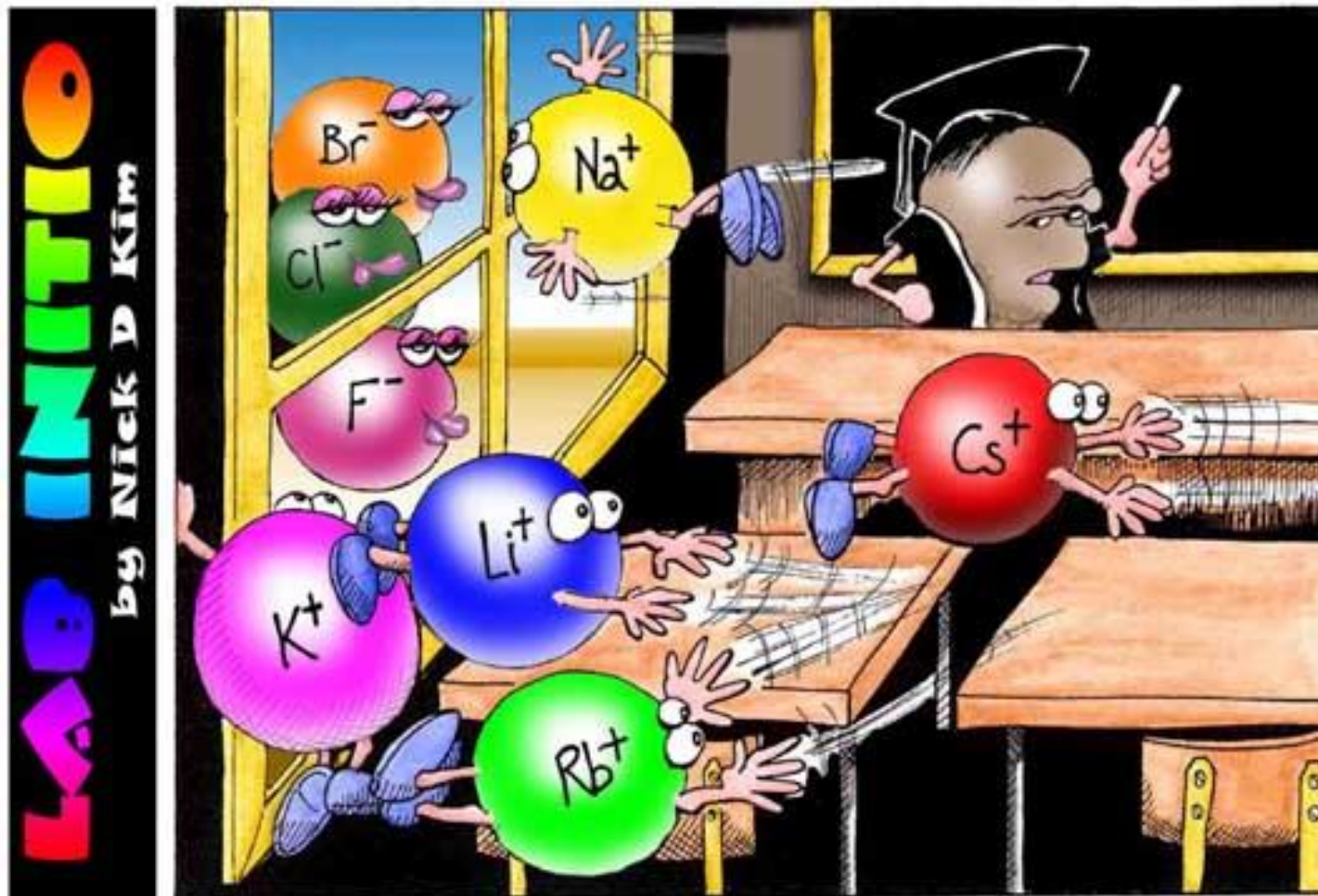
⌘ Valence Electrons: The e^- in the highest occupied energy level of an atom

IONIC BONDS



Transferring Electrons

Ionic Bonds



"Perhaps one of you gentlemen would mind telling me just what it is outside the window that you find so attractive...?"

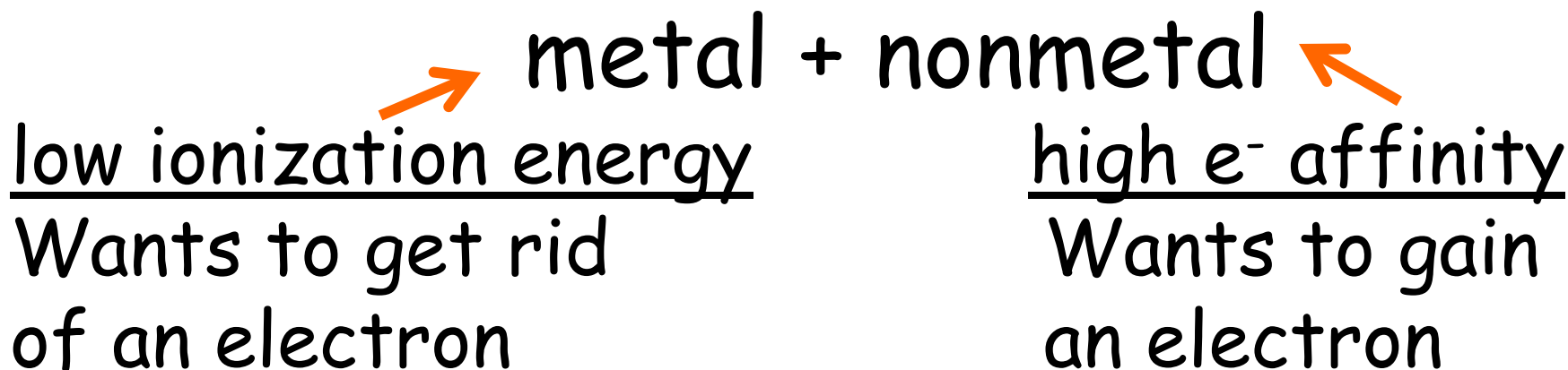
Ionic Bonds



"The name is Bond. James Bond.
Shaken not stirred"

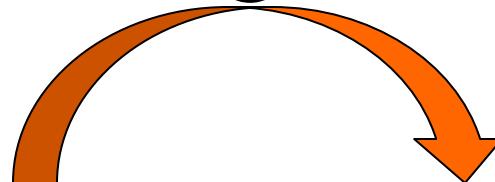
"The name is Bond. Ionic Bond.
Taken not shared"

Ionic Bonds



Therefore:

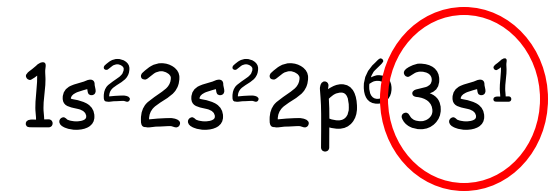
e^-



Metal + Nonmetal
Cation (positive) + Anion (negative)

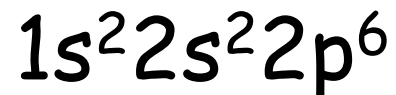
Example: Na & Cl...

Sodium (Na) has 11 electrons



One valence electron

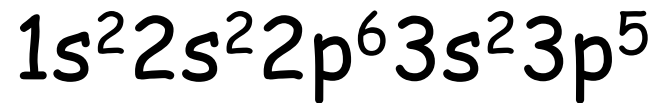
By losing this electron Na^+ becomes



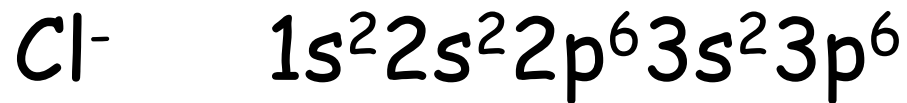
Which has a full outer electron level.



Chlorine (Cl) has 17 electrons



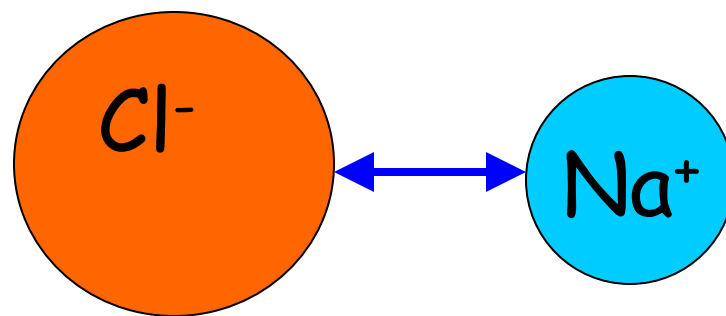
By gaining an electron it becomes...



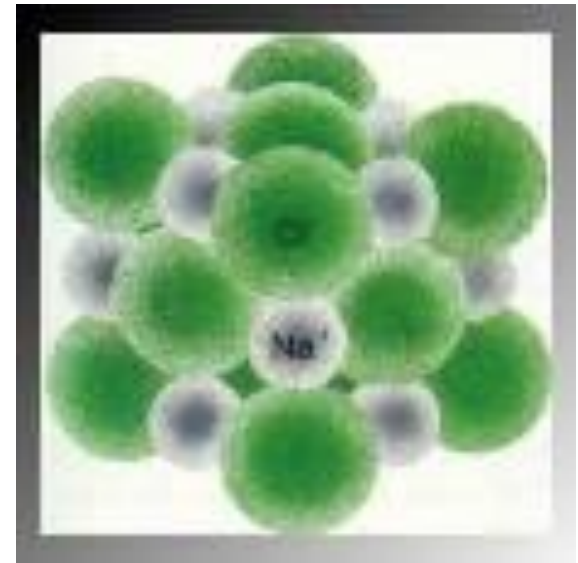
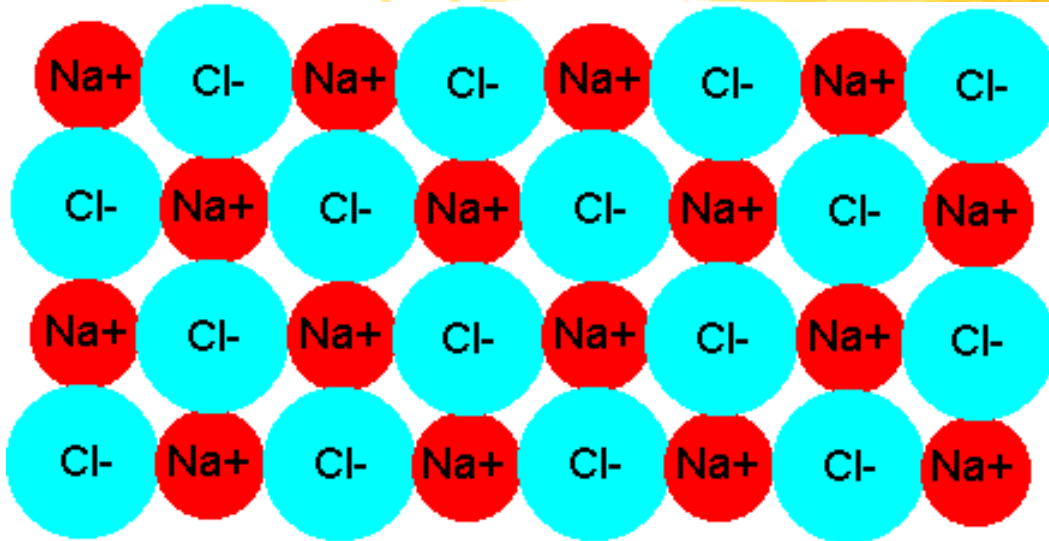
Which also has a filled outer energy level.

NaCl – opposites attract!

The two "happy" ions now attract each other electrically. The resulting attraction is an ionic bond. A bond between ions.



Sodium Chloride (Ionic Molecule)



Properties of Ionic Compounds



- They are solids with high melting points (typically $> 400^{\circ}\text{C}$)
- Many are soluble in water

Properties of Ionic Compounds



- Molten compounds conduct electricity well because they contain mobile charged particles (ions).
- Aqueous solutions conduct electricity well for the same reason.

Properties of Compounds

Properties of compounds often have VERY different properties than the individual elements.

Sodium is an explosive metal

Chlorine is a poisonous gas.

Sodium Chloride you put on your fries



Properties of Compounds



Because chemical properties are due to the electron configuration of the valence electrons. During bonding, this configuration changes.

COVALENT BONDS



Sharing Electrons



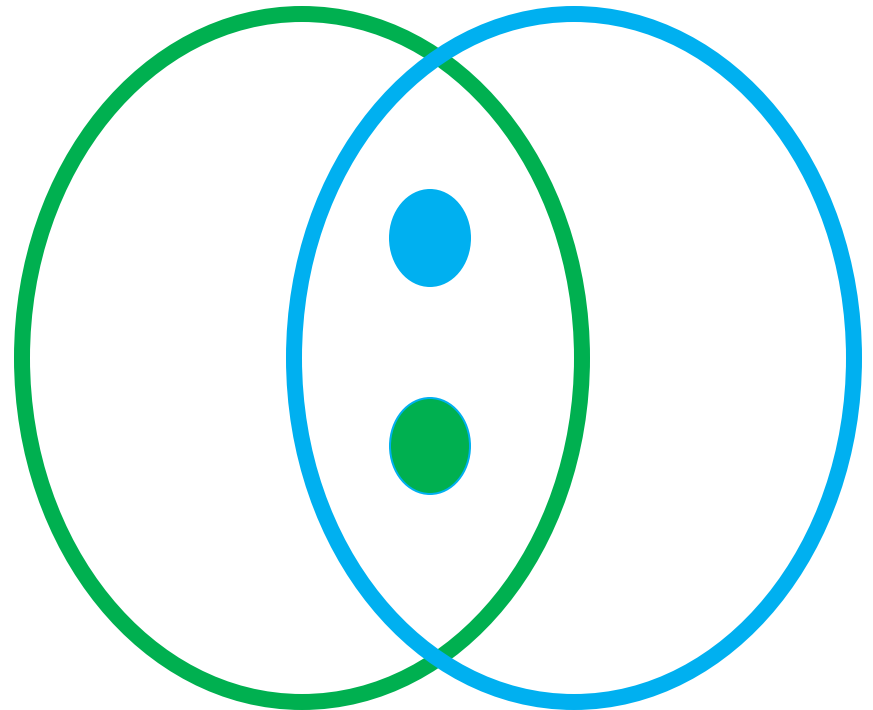
Nonmetal - Nonmetal

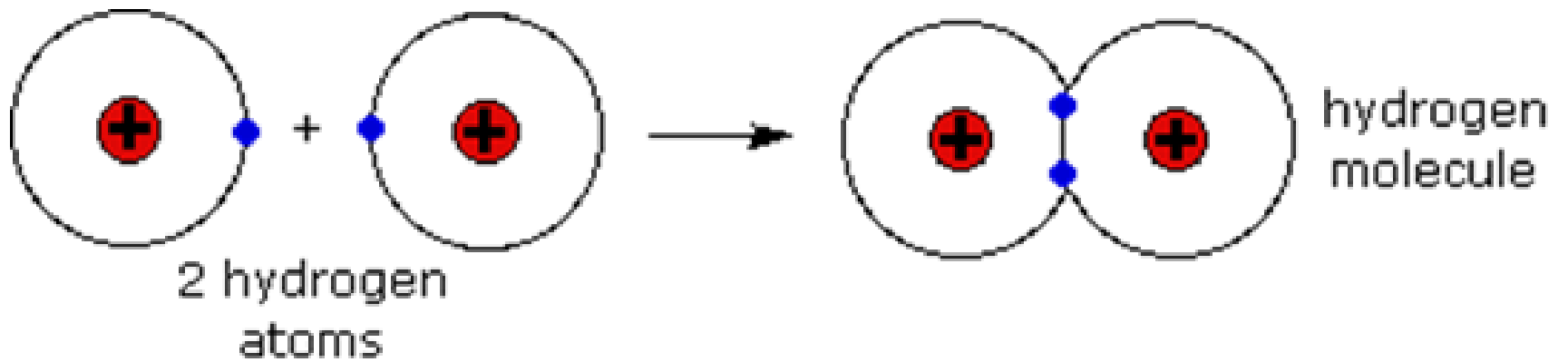
Sharing electrons tricks each element into thinking it has 8

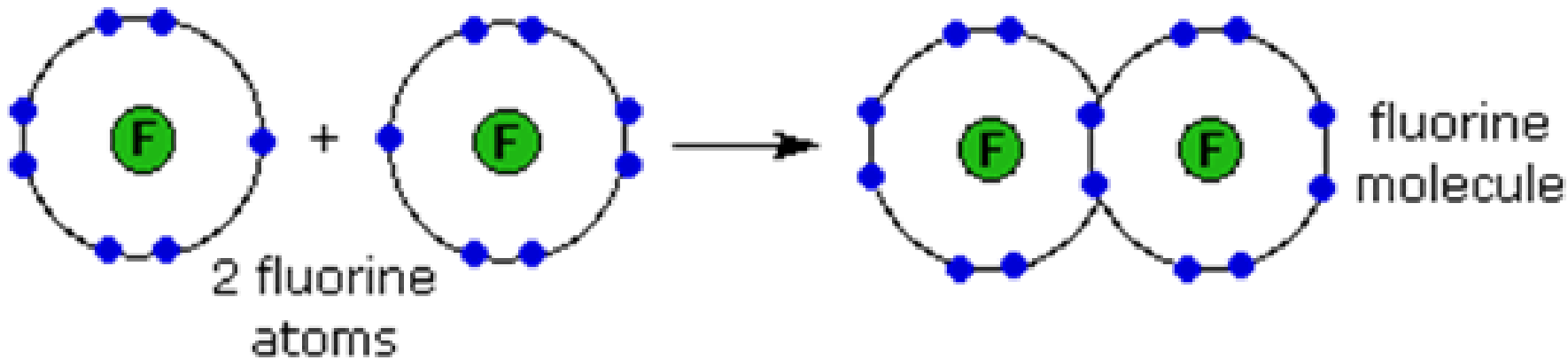
Each atom THINKS it owns both electrons...

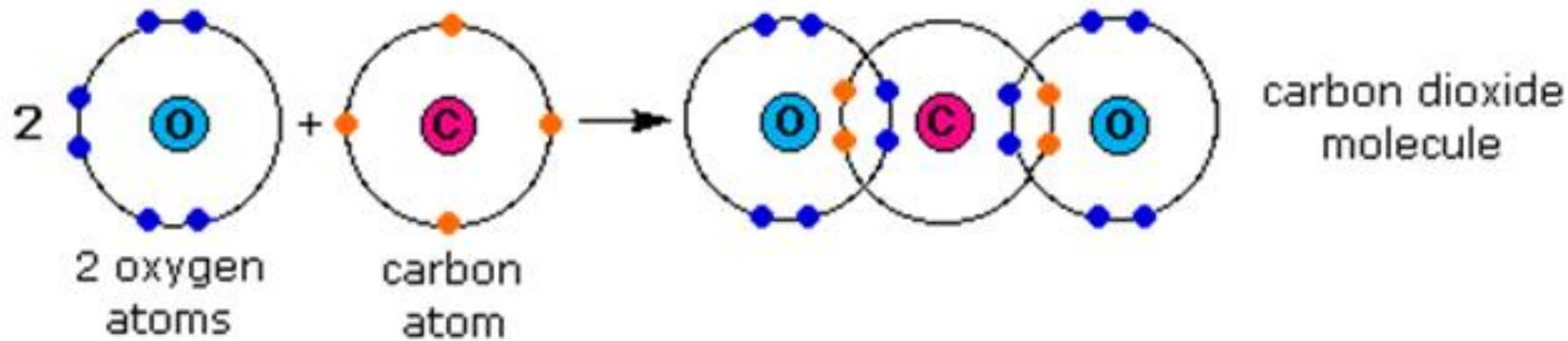
Even though they are sharing!

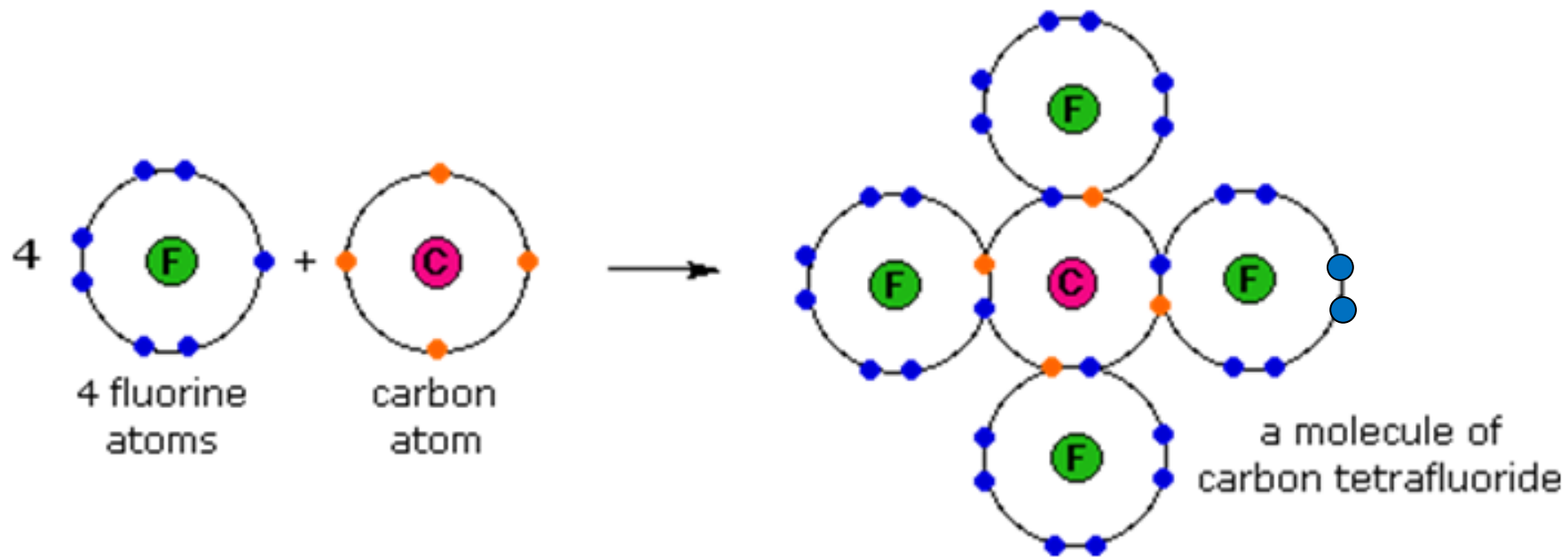
**They each
“donate”
what they can
to the bond**











Properties of Covalent Bonds



- Don't Conduct Electricity
- Low melting points
- Usually not soluble in water

METALLIC BONDS



Free Flowing Electrons

Metal - Metal



Electrons are able to flow freely through the metal in a "SEA OF ELECTRONS"

Sea of Electrons Animation

Properties of Metals



- Solid at room temperature (except for mercury...it is a liquid!)
- Conduct electricity
- Malleable
- Ductile
- Have a wide range of melting points.

Fold-up

TYPES of BONDS

Picture

Ionic

Picture

Covalent

Picture

Metallic

Paragraph...fill it up!!! You can make several small ones.

Properties

Properties

Properties

Example

Example

Example

Ionic

Covalent

Metallic

What makes up each type of bond?

Properties?

Examples?

What is happening in each?

Etc, etc, etc!!