

6.1- Chemical Bonds

(Day 2)

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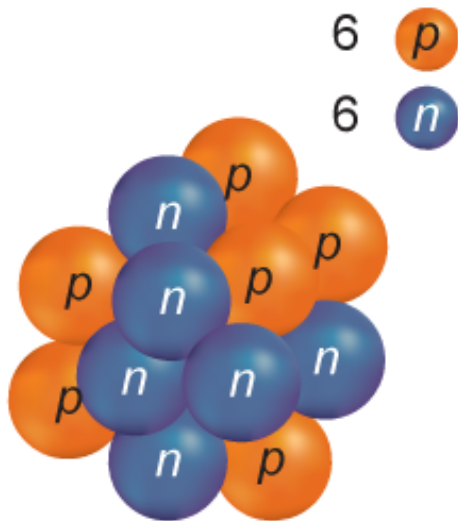
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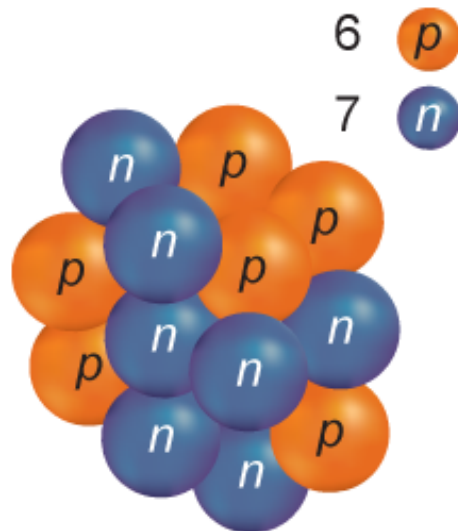
Isotopes

Atoms of the same element that have a **different number of neutrons**

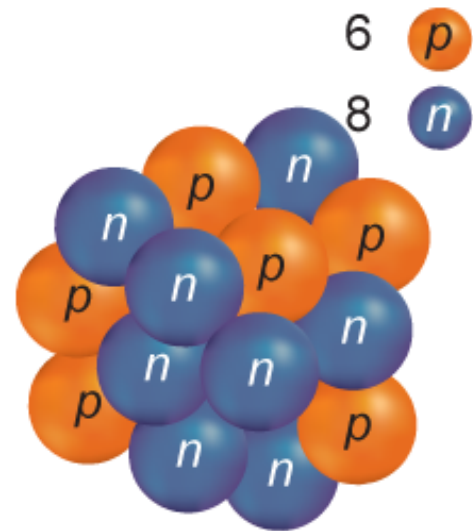
(same number of protons and electrons)



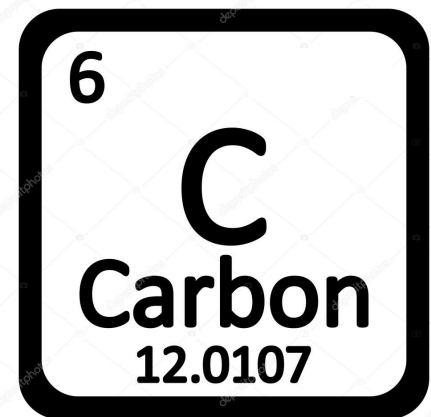
Carbon-12
nucleus



Carbon-13
nucleus



Carbon-14
nucleus



Radioactive isotopes- isotopes that give off radiation as the nucleus breaks down

Changing the number of neutrons affects the **stability** of the atom

When the nucleus breaks apart, or **decays**, it gives off radiation.

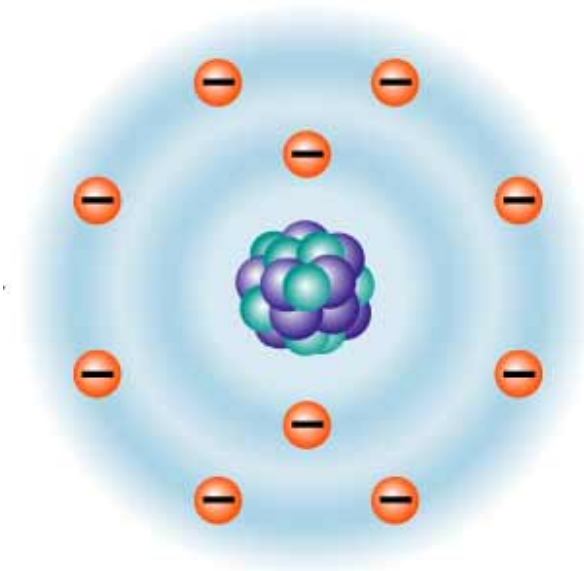
Carbon-14 is a radioactive isotope in all living things. Scientists know the half life, so they can calculate the age of an object by finding out how much carbon-14 is in an object.

Chemical Bond- The force that holds atoms together

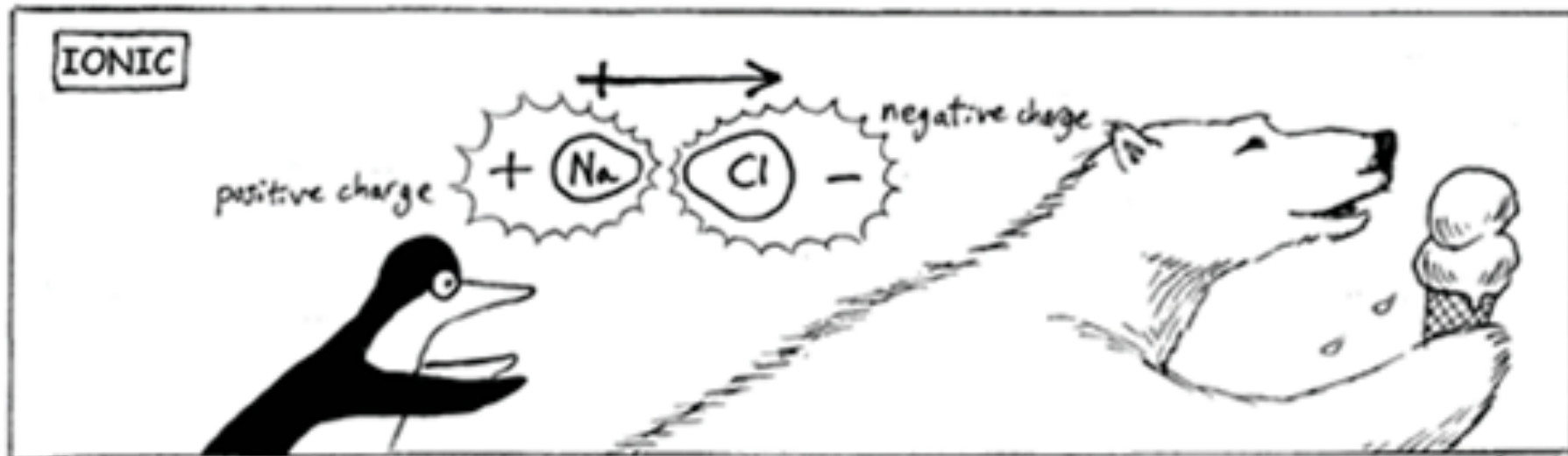
- The **electrons** are used to form chemical bonds.

–The goal of every atom is to have a full outer electron orbital

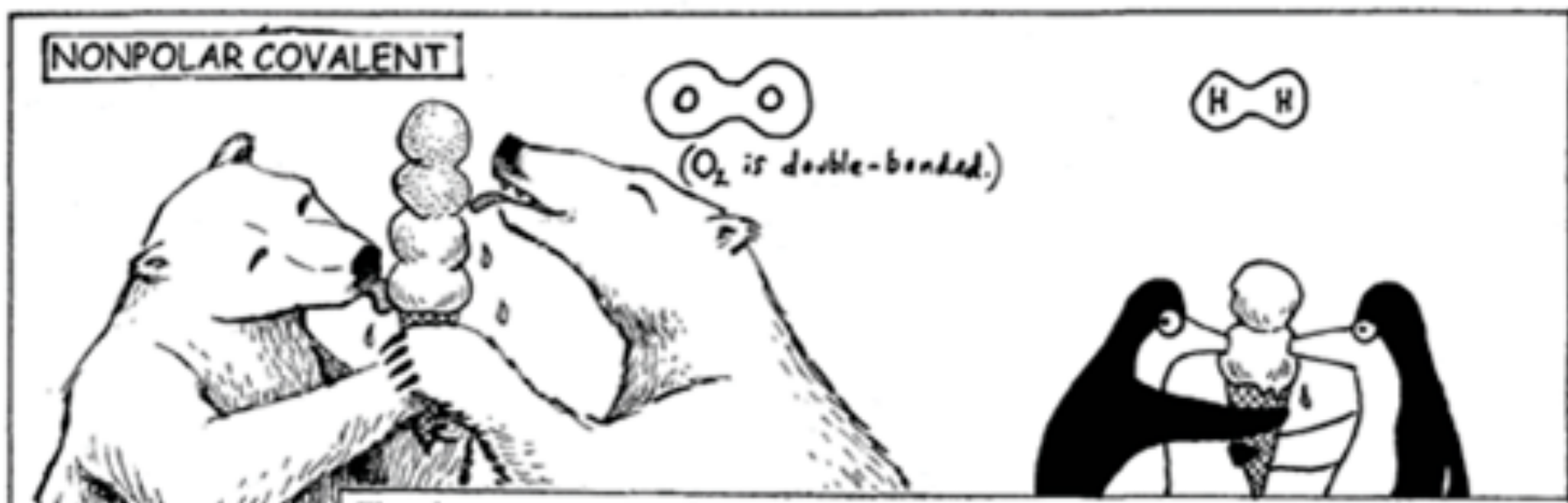
–Only elements in the far right column of the periodic table have this naturally (Noble Gases)



2 TYPES OF CHEMICAL BONDS

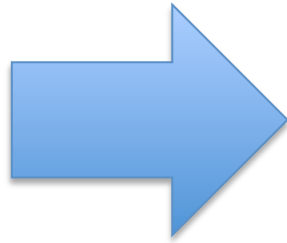
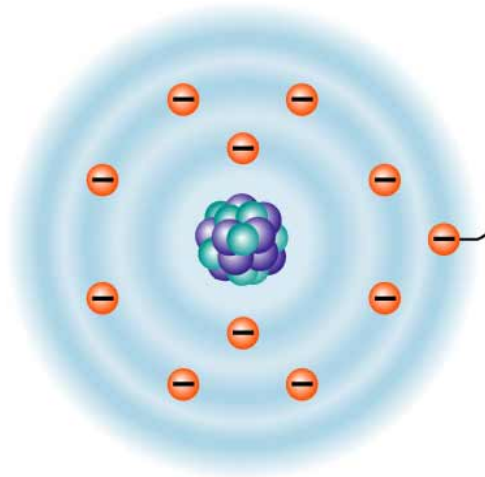


Legends, LHS Living by Chemistry, 2001

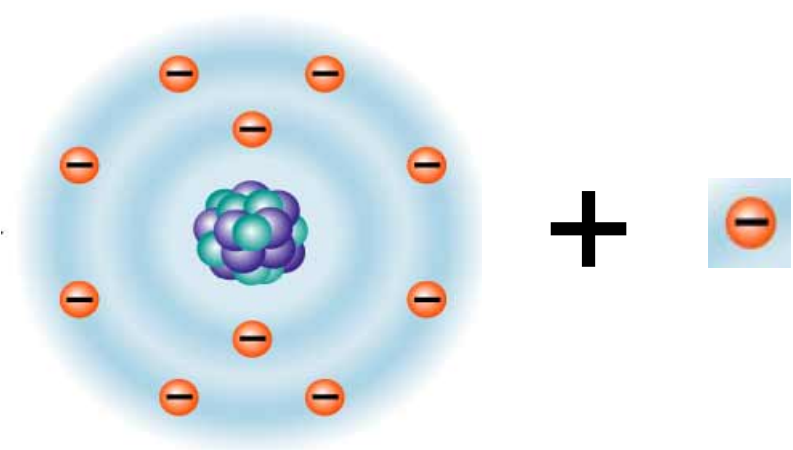


Ion: an atom that has lost or gained electrons

Sodium **Atom**



Sodium **Ion**

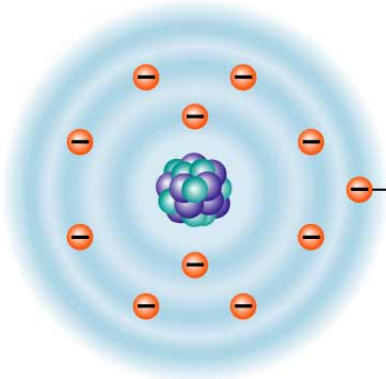


- Lose an electron → positive ion
- Gain an electron → negative ion
- Positive and Negative ions are attracted to each other

Ionic Bond –an attraction between two oppositely charged ions.
(after the electrons are transferred)

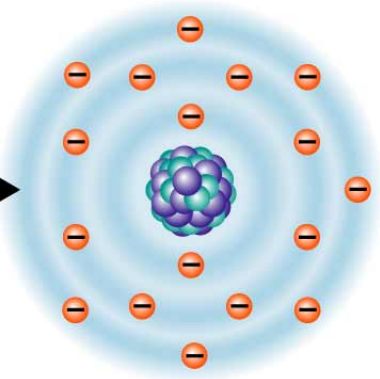
Before:

Sodium atom (Na)



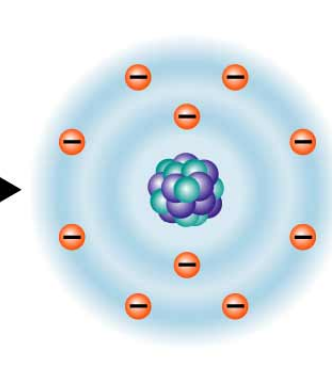
Protons	+11
<u>Electrons</u>	<u>-11</u>
Charge	0

Chlorine atom (Cl)



Protons	+17
<u>Electrons</u>	<u>-17</u>
Charge	0

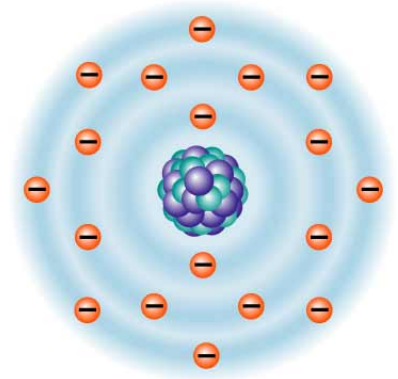
Sodium ion (Na⁺)



Protons	+11
<u>Electrons</u>	<u>-10</u>
Charge	+1

After

Chloride ion (Cl⁻)



Protons	+17
<u>Electrons</u>	<u>-18</u>
Charge	-1

metals tend to **donate** electrons

nonmetals tend to **accept** electrons

Most ionic compounds

- dissolve in water
- are crystalline at room temperature
- have higher melting points than compounds formed by covalent bonds.

Covalent Bonds – electrons are shared

–**pairs** of electrons

–orbit the nucleus of **both**



H



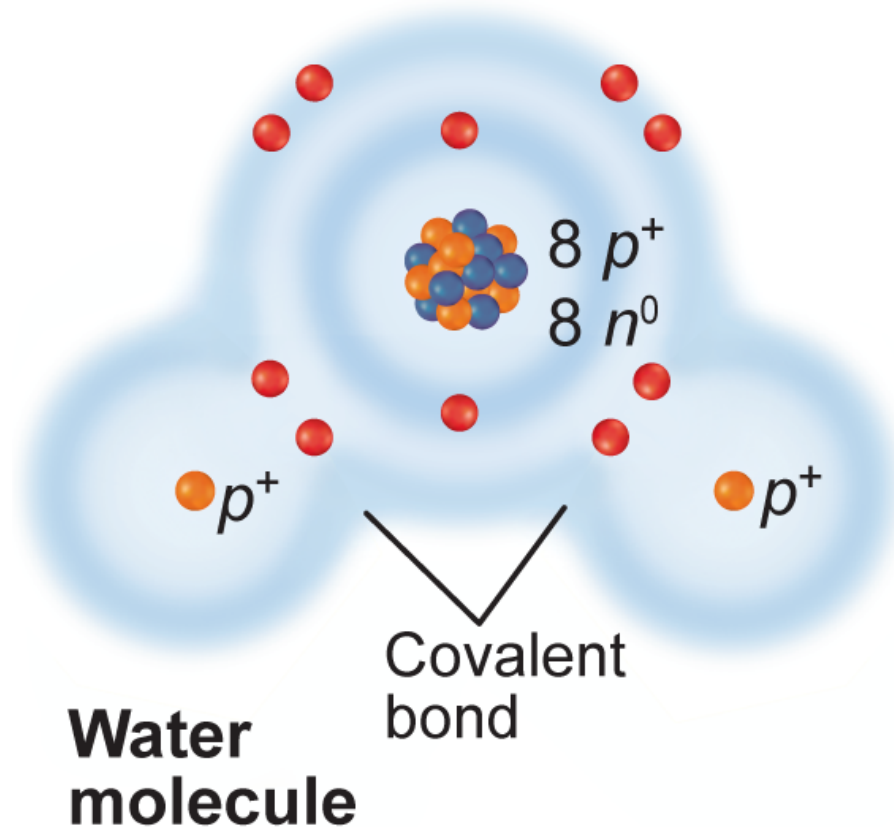
H



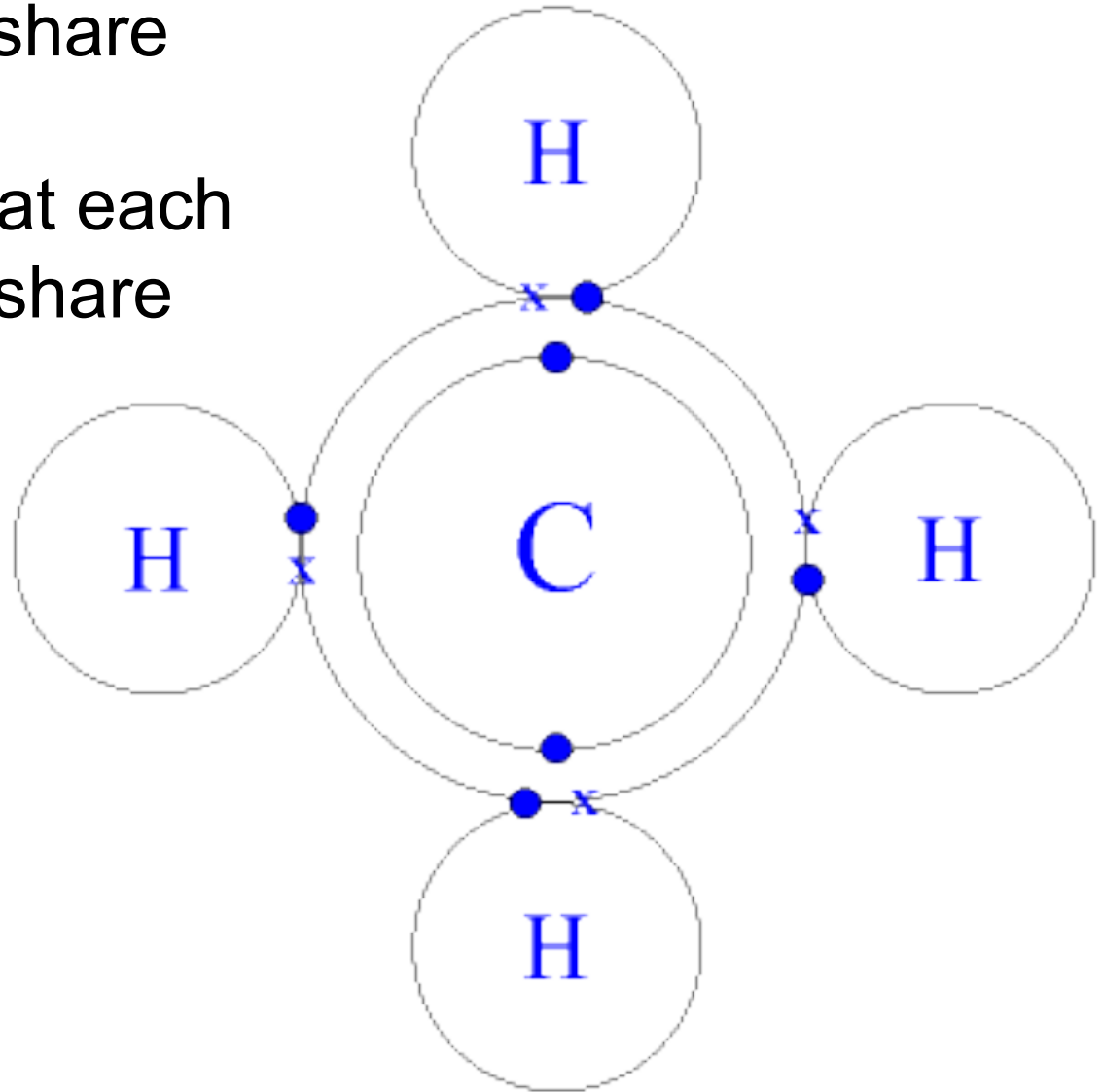
H₂

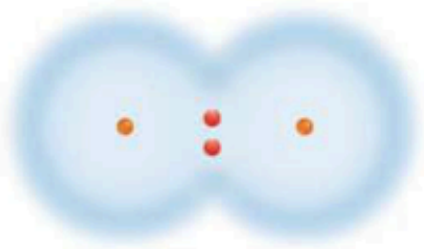
Example:

Water – each Hydrogen atom shares electrons with the Oxygen atom

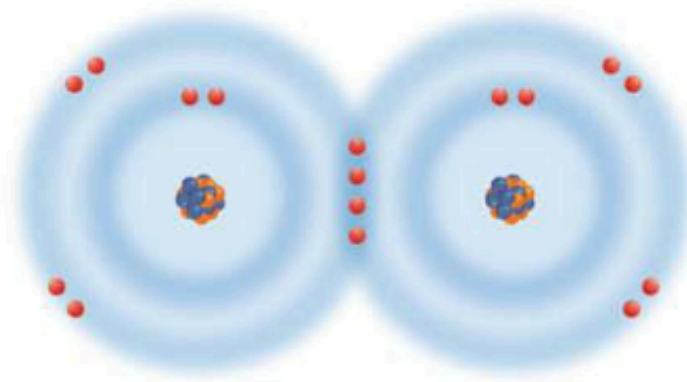


Methane (CH₄) – Carbon has 4 electrons to share and it bonds with 4 hydrogen atoms that each have 1 electron to share

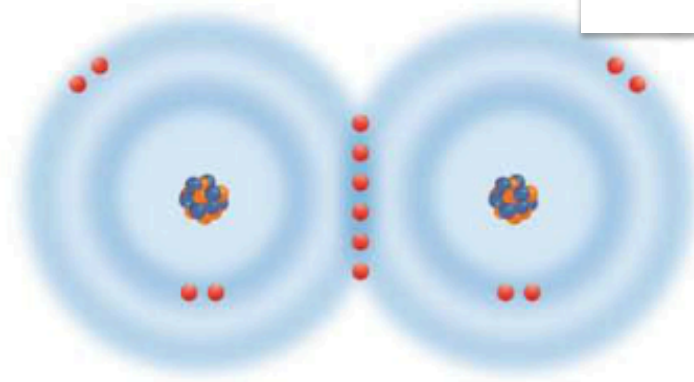




Single bond



Double bond



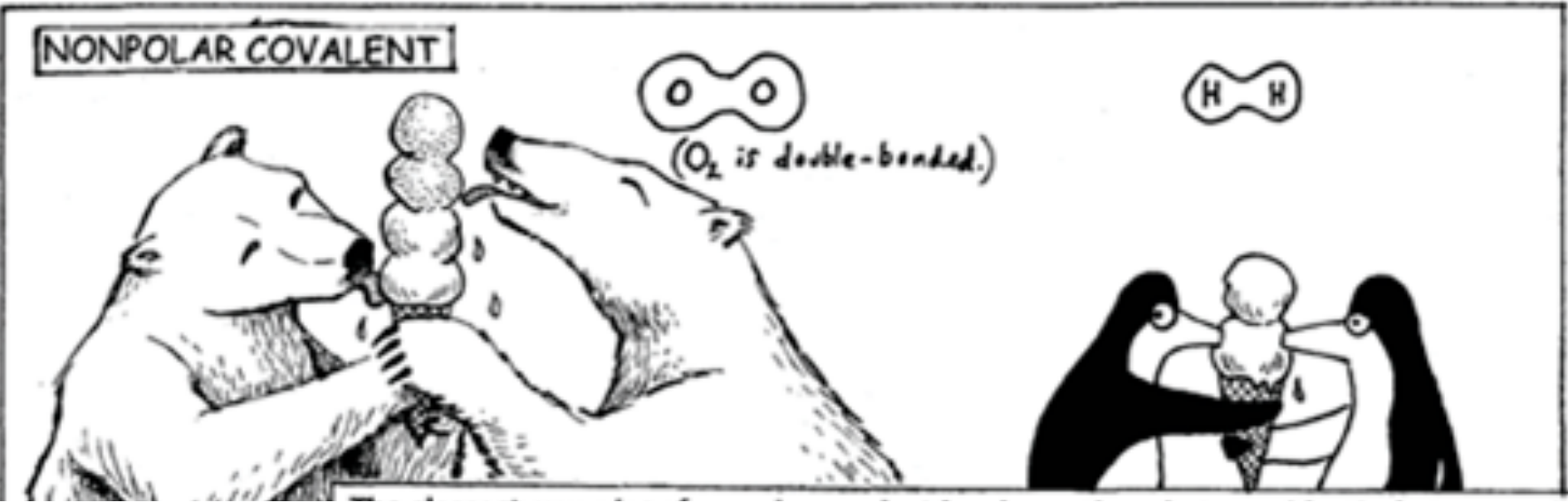
Triple bond



2 types of Covalent Bonds

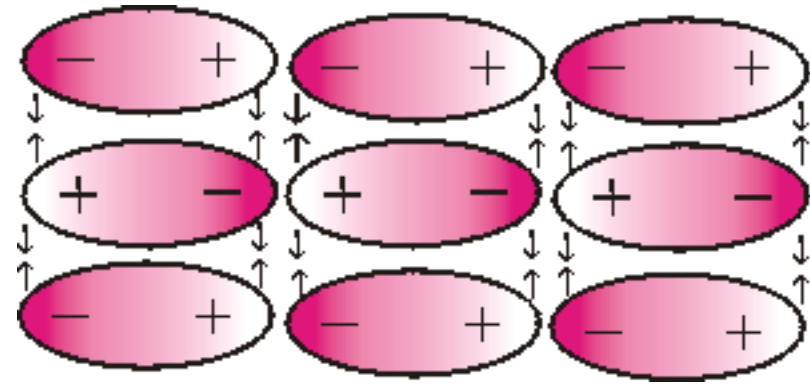
Polar= NOT shared equally

Nonpolar= Shared Equally



van der Waals Forces-

Attractions between molecules



The positive and negative areas of molecules pull on each other like magnets and help hold them together.



van der Waals forces are responsible for water droplet formation and surface tension.

