Molecules

Atoms may share electrons...
The atoms held together by sharing electrons are joined by a **covalent bond.**
This occurs when the elements are non-metals.

- ***Nonmetals*** hold on to their valence electrons.
- They can't give away electrons to bond.
- But still want noble gas configuration.
- Get it by sharing valence electrons with each other = *covalent bonding*
- By sharing, **both atoms** get to count the electrons toward a noble gas configuration.

A **molecule** is a neutral group of atoms joined together by covalent bonds.
A **diatomic molecule** is a molecule consisting of two of the same atom such as O_2.

H_2, F_2, Br_2, I_2, Cl_2, N_2, O_2, S_8
P_4

Molecular Compounds

A compound composed of molecules is called a molecular compound.

Molecular compounds have lower melting and boiling poir

A **molecular formula** is the chemical formula of a molecular compound.

It shows how many atoms of each element a molecule contains

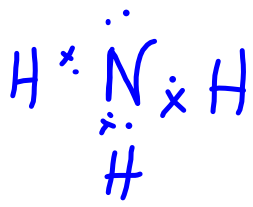
eg CO_2

Ways to communicate molecular formula:

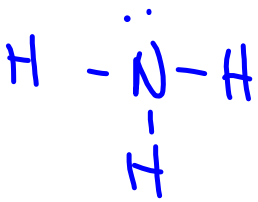
molecular formula

NH_3

Lewis dot



structural diagram



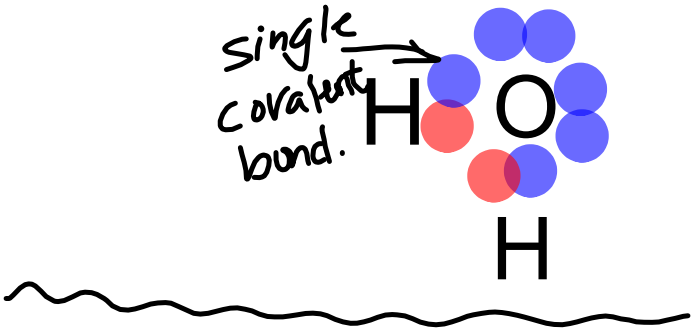
Octet rule

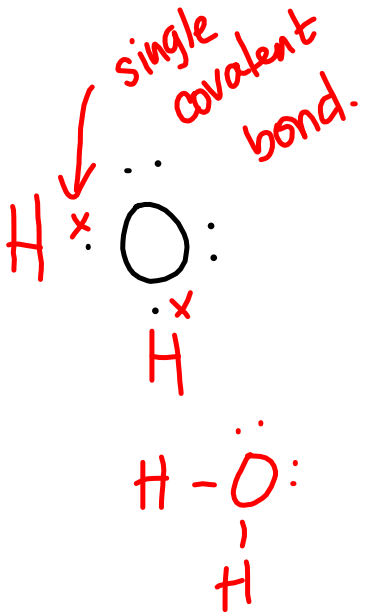
Atoms will share electrons to have number of valence electrons of a noble gas

Single Covalent Bonds

One valence electron is shared from each atom.

Example: Water



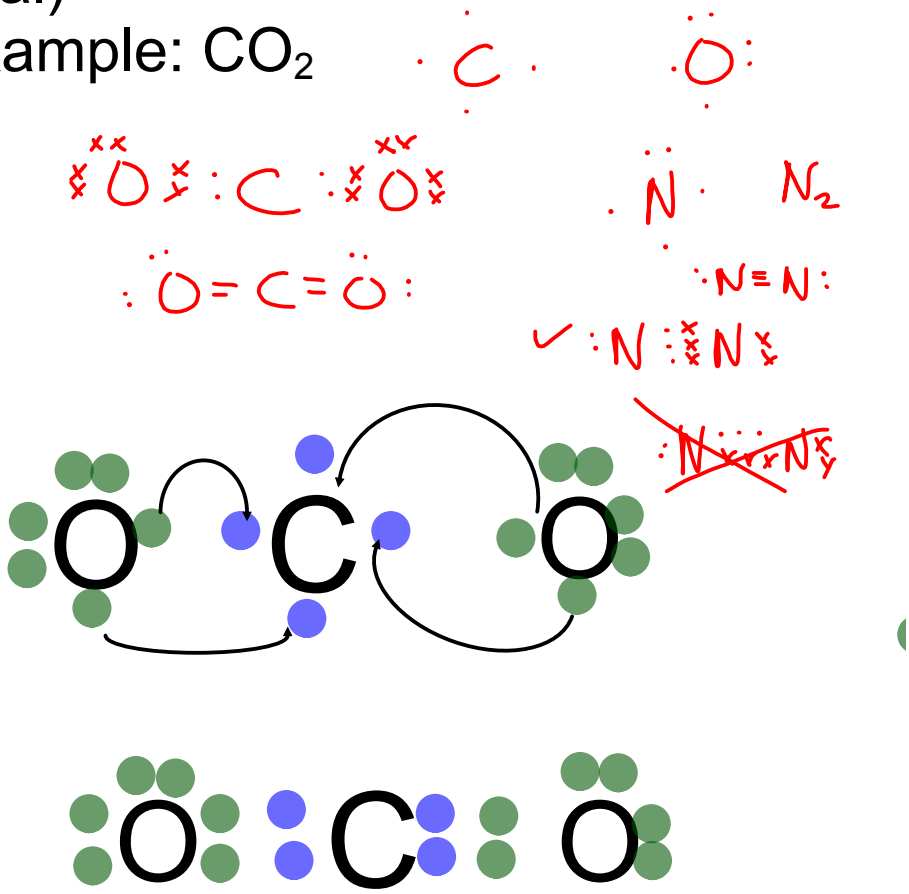


The Oxygen atom has two pairs of unshared electrons called "lone pairs" and two bonding electrons that become a shared pair of electrons with hydrogen.

Double/Triple Bonds

- Sometimes atoms share *more than one pair* of valence electrons.
- A double bond is when atoms share *two pairs* of electrons (4 total)
- A triple bond is when atoms share *three pairs* of electrons (6 total)

Example: CO_2



Carbon and oxygen share two sets of electrons each, or two double bonds.

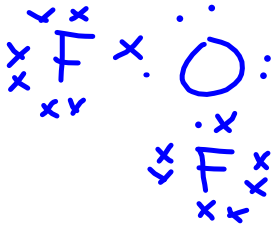
A bond can also be shown by lines drawn between the atoms:

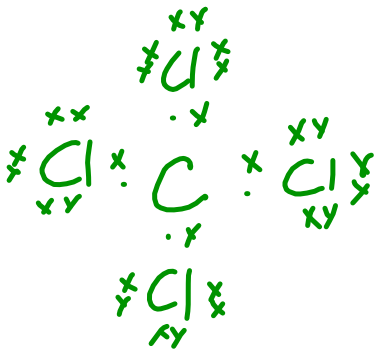
:Ö=C=Ö: This is the "structural formula"

Lewis dot diagrams for molecules

-pair up all unpaired electrons to achieve noble gas configuration.

ex/ OF_2 CCl_4

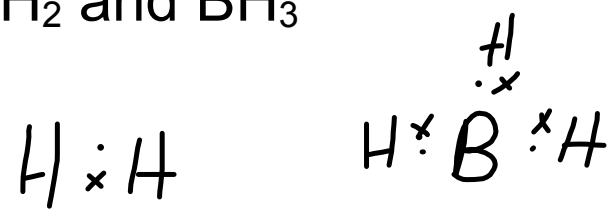




Octet exceptions

do not have 8 valence for stability.

ex/ H_2 and BH_3

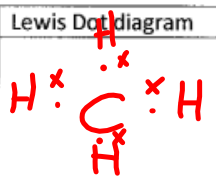
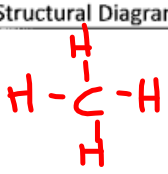
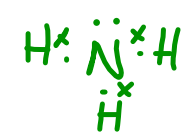
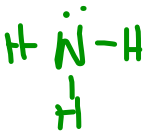
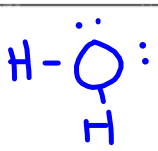
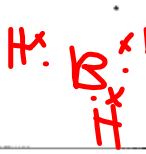
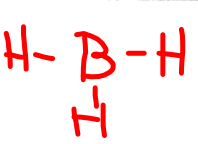
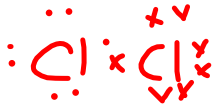


VSEPR

Valence electrons include lone pairs and bonding electrons.

Electron pairs will arrange themselves as far apart as possible to minimize electron repulsions.

Molecular Shapes

Molecular Formula	Lewis Dot diagram	Structural Diagram	Shape
CH_4			tetrahedral
NH_3			trigonal pyramidal.
H_2O			bent
BH_3			trigonal planar
Cl_2 CO_2			linear