Lewis Dot Structure of Molecular Compounds, Part 2

- Steps for Writing Lewis Dot Structures of Molecular Compounds:

1. Add up the valence electrons of all the atoms (adjust for charge).
2. Connect the atoms around the central atom with a single bond.
3. Fill in electrons, starting with outer atoms and keeping track of the # of valence electrons.
4. Use double/triple bonds to obey octet rule. (Borrow from lone pairs if you must)
5. Double check that all valence electrons are accounted for.
6. Count the electrons around each atom to assign charge to atom/molecule if appropriate.

- “Informal” Charges Result when a atom has more or less electrons than its normal valence number.
- You count the electrons that the atom contributes to each bond plus any lone pairs.
- Best Lewis structures have minimized number of charges!

- Examples : O_3, CO

Lewis Dot Structure of Polyatomic Ions

- When counting the valence electrons, add in the extra electrons (or subtract if a polyatomic cation) for the total ion count.
- Ex. PO_3^{3-}, H_3O^{1+}, CO_3^{2-}

Exceptions to Octet Rule

- Boron can be happy with just 6 electrons!

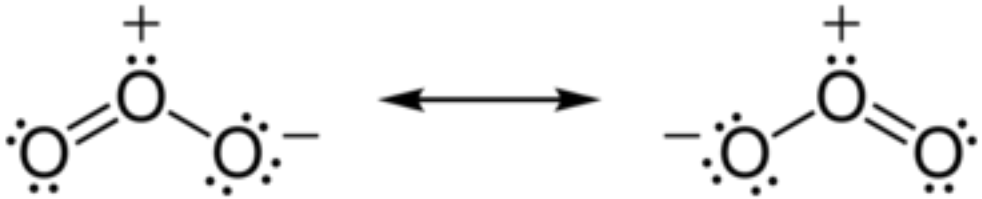
- Example: BCl_3

- Period 3 elements (especially S and P) can have more than 8 electrons. This is an *expanded octet*.
- They will expand their octets to minimize informal charges.

- SO_4^{2-}, PO_4^{3-} , PCl_5

Resonance

- A **resonance structure** is a structure that occurs when it is possible to draw two or more valid electron dot structures that have the same number of electron pairs for a molecule or ion.
- If there is more than one way to place a double bond, there is resonance.



- The actual bonds are hybrids, in between single and double bonds.

Resonance Examples:

- CO_3^{2-}

- Benzene, C_6H_6