

Determination of Formal Charge

- Count the valence electrons that "belong" to each atom.
 - Unshared pairs belong entirely** to the atom on which they reside.
 - Shared pairs** of electrons are **divided evenly** between the atoms by which they are shared: half "belong" to one atom, and half "belong" to the other. (This way of counting electrons is different than that used for counting octets. When you count for an octet, shared pairs are counted twice, once for each of the sharing atoms.)
- Compare the number of valence electrons that "belong" to each atom to the number of valence electrons brought into bonding by that atom.
 - Carbon always brings 4 valence electrons into bonding.
 - Nitrogen always brings 5 valence electrons into bonding.
 - Oxygen always brings 6 valence electrons into bonding.
 - The halogens always bring 7 valence electrons into bonding.
 - Hydrogen always brings 1 valence electron into bonding.
- If the number of valence electrons brought into bonding is different from the number that "belong" to the atom, the atom has a formal charge.
 - If the number of electrons that "belong" is one **more** than the number brought into bonding, the formal charge is **-1**.
 - If the number of electrons that "belong" is one **less** than the number brought into bonding, the formal charge is **+1**.
 - etc.
 - If the number of electrons that "belong" is the **same** as the number brought into bonding, the formal charge is **0**.
- The sum of the formal charges is the charge of the species.
 - If the sum of the formal charges is **0**, the species is a **molecule**.
 - If the sum of the formal charges is **not 0**, the species is an **ion**.