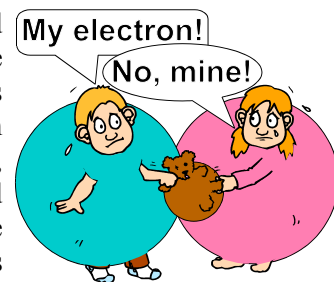
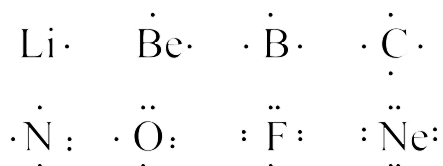


Covalent Bonds

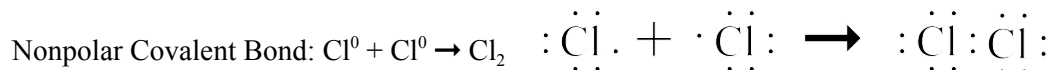
Covalent bonds are bonds formed by sharing electrons. The electrons of one atom are attracted to the protons of another, but neither atom pulls strongly enough to remove an electron from the other. Covalent bonds form when the electronegativity difference between the elements is less than 1.7 (see the Electronegativity table on the back of the Periodic Table) or when hydrogen behaves like a metal. When a covalent bond forms, no valence electrons are transferred, rather, they are shared. If the electronegativity difference is zero, the electrons are shared equally and the bond is nonpolar. If the electronegativity difference is greater than 0.4 but less than 1.7, the electrons are displaced towards the more electronegative element (nonmetal) and the bond is polar. In a covalent bond, unpaired valence electrons pair up in such a way that the atoms complete their outer shells.



Electron Dot Diagrams Showing Unpaired Valence Electrons (NOTE: When bonding occurs, molecular orbitals form. As a result, the two electrons that are normally paired in the lowest energy orbital move into separate orbitals)



Pairing Electrons:



Based on your understanding of covalent bonds, answer the questions below.

1. Draw electron dot diagrams for hydrogen and oxygen.
2. Draw electron dot diagrams showing the pairing of electrons to form water from hydrogen and oxygen. All outer shells should be complete.
3. Are the bonds in water polar or nonpolar. How do you know? _____