



Electronegativity

Electronegativity is a measure of how strongly an atom attracts the electrons in a chemical bond.

On the periodic table, the elements with the lowest electronegativity are found in the lower left corner. The elements with the highest electronegativity are found in the upper right corner. In general, electronegativity increases as you move from left to right across a period and decreases as you move down a group.

Increasing electronegativity 

1	H 2.1	2											3	4	5	6	7		
2	Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0		
3	Na 0.9	Mg 1.2	Transition elements										Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0		
4	K 0.8	Ca 1.0	Sc 1.4	Ti 1.5	V 1.6	Cr 1.7	Mn 1.6	Fe 1.8	Co 1.9	Ni 1.9	Cu 2.0	Zn 1.6	Ga 1.8	Ge 2.0	As 2.2	Se 2.6	Br 2.8		
5	Rb 0.8	Sr 1.0	Y 1.2	Zr 1.3	Nb 1.6	Mo 2.2	Tc —	Ru 2.2	Rh 2.3	Pd 2.2	Ag 1.9	Cd 1.7	In 1.8	Sn 1.8	Sb 2.0	Te 2.1	I 2.5		
6	Cs 0.79	Ba 0.9											Pt 2.3	Au 2.5	Hg 2.0	Tl 2.0	Pb 2.3	Bi 2.0	Po —

Increasing electronegativity 

Bond Formation

Elements become compounds by forming bonds between atoms. The type of bond that forms between two atoms can be determined by examining their electronegativities.

Ionic bonds are formed when electrons are transferred between atoms. This electron transfer happens because one of the atoms pulls much more strongly on the electron(s) than the other, causing the electron to move completely to the stronger atom. In general, this will occur when the two atoms electronegativities differ by more than 1.7.

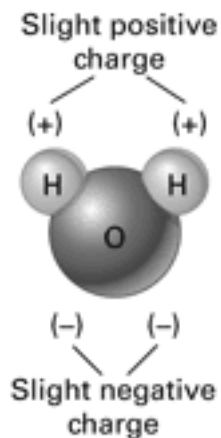
Covalent bonds are formed when a pair of electrons is shared between two atoms. Electron sharing happens when neither of the two atoms is strong enough to completely remove an electron from the other atom. covalent bonds can be further classified into two types: polar and non-polar.

In a **polar** covalent bond, one atom has a slightly higher electronegativity (difference of 0.5 to 1.7). As a result, the electrons in the bond are pulled closer to the more electronegative atom. The atom with higher electronegativity gains a slight negative charge. At the same time, the atom with lower electronegativity gains a slight positive charge.

In a **non-polar** covalent bond, the two atoms have nearly equal electronegativity (difference of less than 0.5). As a result, the electrons in the bond are located about halfway between the two atoms. Since the electrons are shared equally, neither atom becomes charged.

The Structure of Water

The diagram below illustrates a polar covalent bond between a hydrogen atom and an oxygen atom in a molecule of water.



Because oxygen (3.5) is more electronegative than hydrogen (2.1), the electron pair that forms the bond between them is pulled closer to the oxygen atom. As a result, the oxygen atom in a water molecule has a slight negative charge, and the hydrogen atom has a slight positive charge.

Worksheet

Use the periodic table in your notes to answer the following questions.

1. Which element is the most electronegative?
2. Which element is the least electronegative?
3. What is the electronegativity of lithium?
4. What is the electronegativity of gallium?
5. What is the electronegativity of lead?
6. In general, do non-metals have high or low electronegativity?
7. In general do metals have high or low electronegativity?