Periodic Trends

There are three main properties of atoms that we are concerned with.

Ionization Energy- the amount of energy need to remove an electron from an atom.

Atomic Radius- the estimate of atomic size based on covalent bonding.

Electron Affinity- the amount of energy absorbed or released when an atom gains an electron.

All three properties have regularly varying trends we can identify in the periodic table and all three properties can be explained using the same properties of electronic structure.

Explaining Periodic Trends

All of the atomic properties that we are interested in are caused by the attractive force
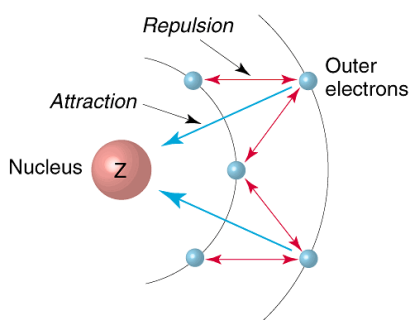

between the positively charged nucleolus and the negatively charged electrons. We need to consider what would affect that relationship.
The first thing to consider is the effective nuclear charge. We need to look at the number of protons. Secondly we will need to look at the nucleolus - electron distance and the electron shielding.
Lastly we will need to consider electron - electron repulsion.

Ionization Energy

As we move across a period the general trend is an increase in IE. However when we jump to a new energy level the distance increases and the amount of e-- shielding increases dramatically. Reducing the effective nuclear charge.

In addition to the over all trend we need to explain the discrepancies.
The discrepancies can be explained by either electron shielding or by electron electron repulsion.
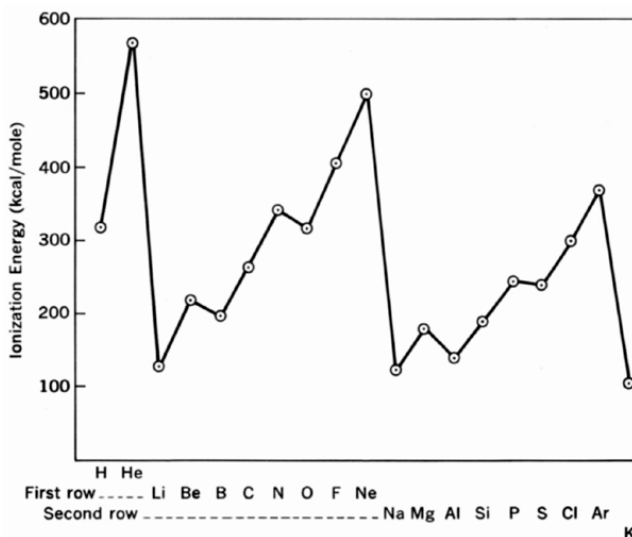
Atomic Radius
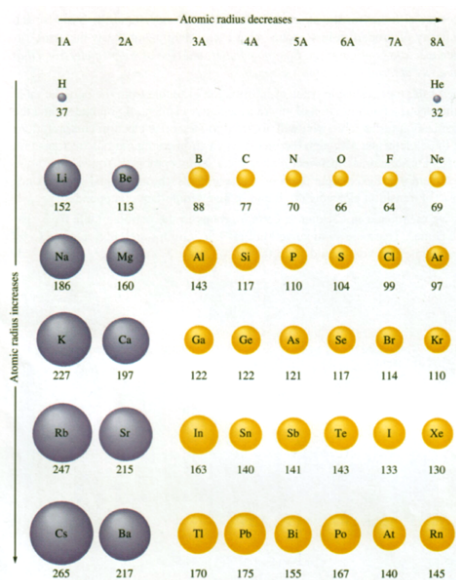
The trend for atomic radius is to decrease across a period and to increase down a family.

These trends can be explained with the same reasons as IE. As we move across the period the nuclear charge increases pulling the electrons in more strongly. As we move down we are increasing the energy levels, hence distance and electron shielding both increase.

Electron Affinity

Electron affinity generally increases as we move across and up the periodic table. For the same reasons we have mentioned. The discrepancies in EA can be explained with the same reasons we used for IE.