

Properties and Trends– Supplemental Worksheet

1. What 2 prominent trends regarding ionization energy do we find from the periodic table?

- 1) Across a period from left to right, the first ionization energy increases.
- 2) Down a group, the first ionization energy values decrease.

2. Explain how shielding varies between outer electrons and core electrons and between outer electrons and other outer electrons.

Shielding occurs because electrons repel each other. Core electrons are between the nucleus and outer electrons and are effective in shielding outer electrons from the nuclear charge. Outer electrons in the same quantum level do not shield each other very well since they are approximately the same distance from the nucleus.

3. Explain electron affinity.

Electron affinity is the energy change occurring when an atom or molecule gains an electron to form a negative ion.

4. What atomic radii trends are found on the periodic table? Explain why.

The atomic radius decreases from left to right across a period. There is an increase in the effective nuclear charge which causes decreased shielding. The valence electrons are drawn closer to the nucleus which decreases the size of the atom.

The atomic radius increases down a group because of the increasing orbital sizes in successive quantum levels.

5. Using the element Nitrogen, write equations that correspond with electron affinity and ionization energy.



6. Arrange the following groups of atoms in order of decreasing size.

- a. P, Sb, N, As $Sb > As > P > N$
- b. Sr, Rh, Mo, Y $Sr > Y > Mo > Rh$
- c. F, Fr, Os, Ga $Fr > Os > Ga > F$
- d. Br, V, N, Ba $Ba > V > Br > N$

7. Which atom or ion has the largest ionization energy?

- a. Mg, Sr, Ba Mg same group – top most is the smallest radius and hardest to remove e^-
- b. Ca, Co, Se Se same period (row) – effective nuclear charge increases left to right (smaller)
- c. O^{2-} , O, O^{2+} O^{2+} has the least electrons, fewer repulsions, smaller radius, largest IE