

You have mastered this topic when you can:

- 1) describe and provide a theoretical explanation for the ELECTRONEGATIVITY *periodic trends* among elements.
 - 2) describe and explain the similarities and differences among elements using these *periodic trends*: ATOMIC RADIUS, CHEMICAL REACTIVITY, IONIZATION ENERGY, ELECTRON AFFINITY and ELECTRONEGATIVITY.
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ELECTRONEGATIVITY

I) LINUS PAULING saw that the *periodic trends* for *atomic radius*, *ionization energy*, *chemical reactivity* and *electron affinity* are very similar to each other. He also knew that the atoms that molecules and compounds are composed of are held together by *chemical bonds*, and that electrons play an integral role in the formation of those *chemical bonds*. In 1922, he used his knowledge of periodic trends and the role of electrons in a *chemical bond* to create a new property he called ELECTRONEGATIVITY.

A) ELECTRONEGATIVITY

Atoms with *large electronegativity* values have *very strong attraction for electrons*; atoms with *small electronegativity values* have *very weak attraction for electrons*. This means electrons involved in chemical bonding tend to be closer to the atom having the *larger electronegativity* than to the atom having the *smaller electronegativity*.

B) *Pauling* knew that fluorine atoms have a *large first ionization energy* (meaning a large amount of energy is required to remove an electron), a *large negative electron affinity* (meaning that it releases large amounts of energy when it accepts an electron), and that it is *very reactive*. This knowledge led him to conclude that fluorine atoms have an extremely strong attraction to electrons, more so than atoms of any other element. As a result of fluorine's extremely large attraction for electrons, he arbitrarily gave it an *electronegativity* value of 4.00, defined this *electronegativity* value to be the highest possible. He then calculated the *electronegativity* values of all other elements relative to that standard. *Atoms with electronegativity values close to 4.00 have very strong attraction for electrons; atoms with electronegativity values close to 0.00 have very weak attraction for electrons.*

1) **Required Practice 1:** Answer these questions on your own paper. {Answers are on page 1.}

1. Define electronegativity.
2. Predict which element would have the largest electronegativity.
3. Predict which element would have the smallest electronegativity.
4. State which element from each pair would have the stronger attraction for bonded electrons.
 - a. N - O
 - b. Cu - P
 - c. Sr - Cr
 - d. Ba - Cs

II) **ACTIVITY:** Discovering the *Electronegativity trend*.

A) You will discover the trends for *electronegativity* by completing an activity in the Topic 14 assignment.

ANSWERS TO THE REQUIRED PRACTICE

Required Practice 1 from page 1

1. A number describing the relative ability of an atom to attract a bonded pair of electrons.
 2. Fluorine
 3. Francium
 - 4a. Oxygen
 - 4b. Phosphorous
 - 4c. Chromium
 - 4d. Barium
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