Electronegativity increases as you move across the periodic table from left to right. This occurs due to a greater charge on the nucleus, causing the electron bonding pairs to be very attracted to atoms placed further right on the periodic table. Fluorine is the most electronegative element. Electronegativity decreases as you move down the periodic table. This is caused by an increased amount of shielding, or screening, by the innermost electrons. As you move down the table more electrons are added between the nucleus and the bonding pair, causing the effective nuclear charge to be less. The increase in distance between the nucleus and the bonding pair decreases the attraction between the two.

History

Explore the discoverer's biography, including general facts about his life and anecdotes regarding how he made this particular discovery. Also see other significant scientific discoveries built largely on this concept and other real-world applications in history that may not still be relevant.

Discoverer/Developer

Electronegativity was originally proposed by Linus Carl Pauling. Pauling was born on February 28, 1901, in Lake Oswego, Oregon. Throughout his childhood he excelled academically. At the age of 15, he was only two credits short of graduating high school. When denied the opportunity to take these credits while enrolled in college, he decided to leave high school and obtain a job. He used his earnings from his early jobs to save money for college. Pauling was accepted to Oregon State University in September of 1917, where he received a degree in chemical engineering. During his undergraduate studies, Pauling taught courses in quantitative analysis and chemistry for home economics majors. After graduation from OSU, Pauling attended the California Institute of Technology and received his Ph. D. in physical chemistry and mathematical physics. In 1926, Pauling received the Guggenheim Fellowship, which allowed him to travel to Europe and study under Sommerfeld, Bohr, and Schrödinger. This led to his interest in the electronic structure of atoms and molecules. In 1932, Pauling introduced the concept of electronegativity. He introduced this concept based on the energy required to break bonds and dipole moments. He established the Pauling Electronegativity Scale, which is used to predict the nature of bonds between molecules and atoms. This scale gives values of electronegativity in Pauling Units.

Concept Definition

Study the primary definition of this concept, broken into general, basic, and advanced English definitions. Also see the mathematical definition and any requisite background information, such as conditions or previous definitions.

Basic

Electronegativity is how strongly electrons are pulled or attracted to one of the atoms in a covalent bond.

Advanced

When two unlike atoms are covalently bonded, the shared electrons will be more strongly attracted to the atom of greater electronegativity.

Mathematical Definition

$$\chi_A - \chi_B = (\mathrm{eV})^{-1/2}\sqrt{E_d(AB) - [E_d(AA) + E_d(BB)]/2}$$

The equation used in determining differences in Pauling electronegativity between atoms A and B.

Vocabulary

Learn important vocabulary for this concept, including words that might appear in assessments (tests, quizzes, homework, etc.) that indicate the use of this concept.

Important Vocabulary **Term** **Context**

Covalent

- Electronegativity applies to electrons in covalent bonds.

Electron

- Electrons are pulled towards the more electronegative atom.

Polarity

- Fluoromethane (CH_3F) is a polar molecule because F is extremely elec

Shielding

- Non-valence electrons create shielding between the nucleus and the valence electrons.

Videos

Browse relevant videos from the Journal of Chemical Education's (JCE) Chemistry Comes Alive! library and other video sources.

Electronegativity Trends

This video serves as a graphic representation of the trends in electronegativity as one moves down and across the periodic table.

Computer Animations

Experience computer simulators or animations that illustrate the concept discussed here. Many simulators or animations come with worksheets for use in class.

http://www.chemeddl.org/resources/ptl/index.php