

Vocabulary: Electron Configuration

Vocabulary

- Atomic number – the number of protons in the nucleus of an atom.
 - In a neutral atom, the number of electrons is also equal to the atomic number.
- Atomic radius – the distance from the nucleus to the outermost electrons of an atom.
 - Atomic radius is difficult to define because the location of outermost electrons is not precisely known.
 - Atomic radii are measured in picometers (pm). A picometer is a trillionth of a meter.
 - The *Electron Configuration Gizmo*™ uses calculated atomic radii established by Enrico Clementi and others in 1967.
- Aufbau principle – a rule that electrons will occupy the lowest energy subshell that is available.
 - The energy state of a subshell increases as the distance from the nucleus increases.
- Chemical family – a vertical column in the periodic table of elements.
 - Elements in the same family have the same number of valence electrons and have similar chemical properties.
- Diagonal rule – a rule that shows the order in which subshells are filled with electrons.
 - The image at right illustrates the diagonal rule. Starting at the top left, follow each arrow to its end, and then move to the top of the next arrow to the right.
 - Heavier elements do not always follow the diagonal rule exactly.
- Electron configuration – a description of the shells, subshells, and orbitals occupied by electrons.
- Hund's rule – a rule stating that, within a subshell, electrons will occupy all of the unoccupied orbitals before sharing orbitals.
 - A subshell will never contain an orbital with two electrons and another orbital with zero electrons.
- Orbital – a region in space occupied by an electron or pair of electrons.
 - Formally, an orbital is a mathematical function that describes the probability of an electron (or pair of electrons) being found in a particular space.



- Pauli exclusion principle – a rule that states that no two electrons can have exactly the same location and state.
 - If two electrons share the same shell, subshell, and orbital, they must have different spins.
- Period – a horizontal row of the periodic table.
- Shell – a particular region where electrons can orbit the nucleus of an atom.
- Spin – a property of electrons that causes them to have an angular momentum and magnetism.
 - Electron spin is shown with arrows:
 - An up arrow represents clockwise spin.
 - A down arrow represents counterclockwise spin.
 - Electrons don't actually spin, but these properties (angular momentum and magnetism) arise as if they did.
 - The magnetism of materials such as iron is explained by a coordination of electron spins.
- Subshell – a subdivision of a shell.
 - The subshells are designated *s*, *p*, *d*, and *f*.
 - The *s* subshell has one orbital.
 - The *p* subshell has three orbitals.
 - The *d* subshell has five orbitals.
 - The *f* subshell has seven orbitals.