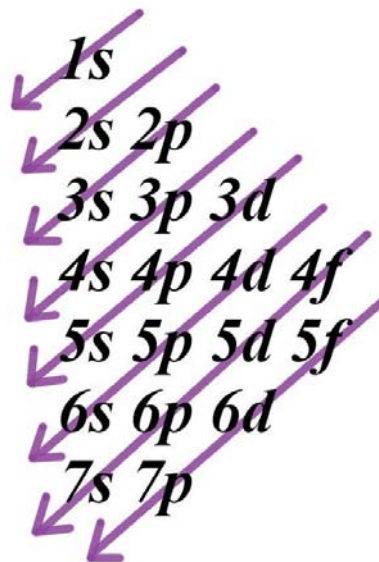


Electron Configuration, Energy Levels and Valence Electrons

- The periodic table is arranged in a way that aids in the understanding of electron configuration and chemical properties.
- The **groups** or columns contain elements whose outermost electron arrangements are identical. Helium (He) is an exception but for a very good reason.
- The outermost electrons are the ones that are involved in chemical reactions and are called **valence** electrons.
- Because of the fact that we have not found any stable isotopes heavier than uranium, we currently believe that we will find no significant amount of any elements with atomic numbers greater than 118 anywhere in the universe.
- There are seven rows on the periodic table. These are called **periods**.
- The first period contains only hydrogen and helium. It has only one energy level which consists of a single *s* orbital with either one or two electrons.
- The second period elements contain a complete first energy level with two electrons in its single *s* orbital. In addition, these elements build first the second *s* orbital and then the *p* orbitals of which there are three.
- The second period ends with neon whose configuration is $1s^2 2s^2 2p^6$.
- The electron configuration of Neon has eight electrons in the outermost energy level (level 2) and this electronic configuration is most stable and results in the chemical inactivity of Neon.
- The following diagram gives a reasonable approximation to the order in which orbitals are filled as the atomic number increases.



- The chemical properties result mostly from the *s* & *p* electrons in the outermost energy level. Some electrons can easily move between orbitals resulting in a variety of configurations in the outermost energy level.
- The electrons in the outermost energy level are called valence electrons.
- The first four elements have a stable state with only the first energy level consisting of two 1s electrons.
- All other elements have a stable configuration that includes both *s* and *p* orbitals. This means that most stable configurations have eight electrons in the outermost energy level.
- The noble gasses (Group 18) already have a stable electron configuration in the outermost energy level and as a result do not form compounds easily.