

## Notes – Periodic Table

Elements are substances that cannot be broken down into anything simpler by physical or chemical means. Each element is made of one kind of atom with a particular number of protons. Each element can be identified by its unique number of protons.

The “periodic table of the elements” lists all of the known elements, in increasing atomic number order. The atomic number of an element is the number of protons all atoms of that element has. Because neutrally charged (complete) atoms have an equal number of protons and electrons, the atomic number is also the number of electrons in an atom of that element.

Each element box in the periodic table represents a single element, and lists (at least) the element name, the element symbol (a one or two letter abbreviation for the element), the atomic number, and average atomic mass (sum of the number of protons and neutrons) for that element.

The vertical (up-and-down) columns in the periodic table are called groups or families. Every element in a group usually has similar chemical properties and the same number of electrons in its outer shell (called valence electrons). Group 1 has one valence electron, group 2 has two valence electrons, and groups 13 - 18 have 3 – 8 valence electrons, respectively.

Groups 1, 2 and 13-18 are called the representative elements, because they represent the elements that follow the valence electron rule. Groups 3-12 are called the transitional elements; they generally have 1, 2 or 3 valence electrons, and thus are “transitioning” from group 2 to group 13.

The horizontal (side-to-side) rows in the periodic table are called periods. Each element in a period has the same number of electron shells: Period 1 has one electron shell, while Period 7 has 7 electron shells. Electron shells are somewhat like the planets’ orbits, and are diagrammed as a series of concentric circles. They are also called energy levels or orbitals.

The periodic table is usually shown with color coding to show the locations of elements that are classified as metals, non-metals or metalloids.

Metals are elements that conduct heat and electricity well, are ductile and malleable (can be stretched and bent into shapes), and that have luster (shine). About three-fourths of the elements are metals. They are located on the left and bottom side of the periodic table, with the exception of hydrogen, a non-metal.

Non-metals are elements that have the opposite properties from metals: They do not conduct heat and electricity well, and are brittle and dull (have no shine). With the exception of hydrogen, they are located on the right side of the periodic table

Metalloids are elements that have properties somewhere between metals and non-metals. They only conduct electricity under certain circumstances. They may be shiny, but are also brittle. Metalloids such as silicon and germanium are also called semi-conductors, and are used to make electronic devices. The metalloids are located along the zig-zag line that separates metals from non-metals.

Dmitri Mendeleev first identified the reoccurring or periodic pattern of element properties, and created a table of elements that grouped elements with similar properties together.