

# Atoms

Everything around us is made up of atoms. Atoms are one of the smallest units of matter. An atom is too small to see directly through a microscope. The smallest speck that can be seen under an ordinary microscope contains more than ten billion atoms. An atom is more than a million times smaller than the thickness of a human hair.

There are three pieces to an atom. They are protons, neutrons, and electrons. These are called subatomic particles.

The center of the atom is called the nucleus. Neutrons and protons are located in the atomic nucleus. Electrons are very small particles located outside the nucleus. They orbit the nucleus at fantastically speeds, like the Earth orbits the sun.

Each type of subatomic particle has a different electrical charge. A proton always has an electrical charge of +1. An electron always has an electrical charge of -1. A neutron has no electrical charge associated with it, a charge of 0.

Atoms form the building blocks of the simplest substances, the chemical elements. Familiar elements include hydrogen, helium, sodium, chlorine, iron, lead, carbon, nitrogen and oxygen.

The smallest unit into which an element may be divided while keeping all of the characteristics of that element is an atom. Each chemical element consists of only one type of atom. For example, pure 24K gold is composed of only one type of atom, gold atoms.

The atoms of any element are alike but are different from atoms of other elements. The thing that makes them different is the number of protons. Hydrogen, for example, has atoms with only one proton. All atoms with one proton are hydrogen. Helium has two protons. All atoms with two protons are helium. Oxygen has eight protons. Atoms with the same number of protons in the atomic nucleus are the same element.

The atomic number is the number of protons an atom has. The atomic number is unique for each element. The atomic mass (also referred to as the atomic weight) is the sum total of the number of protons and neutrons in an atom.

Hydrogen is different from all other atoms in that the hydrogen atom normally does not contain a neutron. The hydrogen atom is composed of one proton and one electron but no neutron.

The Periodic Table of the Elements provides a great deal of information about various elements. It tells us how many electrons and protons each element has. It also tells us the atomic number and atomic mass.

Elements are arranged in the periodic table from left to right and top to bottom in order of increasing mass. Each element is identified by an abbreviation (H=Hydrogen, Na=Sodium, K=Potassium, and so on). The table starts with hydrogen (with an atomic number of one) and goes on to unilennium (with an atomic number of 109).

All substances on Earth are made of different combinations of the 109 elements. Approximately 25 elements occur in living things. The six major elements in living things are carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulfur.