

# Periodic Table

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## Chemistry in a Nutshell

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### ☀ **The Atom**

All macroscopic matter is made out of many tiny particles called atoms. The study of how these atoms interact is called *Chemistry*.

### ☀ **Subatomic Particles**

The three particles that make up atoms are protons, neutrons, and electrons. Protons and neutrons are heavier than electrons and reside in the "nucleus," which is the center of the atom. Protons have a positive electrical charge, and neutrons have no electrical charge. Electrons are extremely lightweight and are negatively charged. They exist in a cloud that surrounds the atom. The electron cloud has a radius 10,000 times greater than the nucleus.

### ☀ **The Nucleus**

The nucleus of an atom is made up of protons and neutrons in a cluster. Virtually all the mass of the atom resides in the nucleus. The nucleus is held together by the tight pull of what is known to chemists and physicists as the "strong force." This force between the protons and neutrons overcomes the repulsive electrical force that would, according to the rules of electricity, push the protons apart otherwise.

### ☀ **Electrons**

The electron is the lightweight particle that "orbits" outside of the atomic nucleus. Chemical bonding is essentially the interaction of electrons from one atom with the electrons of another atom. The magnitude of the charge on an electron is equal to the charge on a proton. Electrons surround the atom in pathways called orbitals. The inner orbitals surrounding the atom are spherical but the outer orbitals are much more complicated.

### ☀ **Chemical Bonding**

Chemically bonding occurs when two particles can exchange or combine their outer electrons in such a way that is *energetically favorable*. An energetically favorable state can be seen as analogous to the way a dropped rock has a natural tendency to fall to the floor. When two atoms are close to each other and their electrons are of the correct type, it is more energetically favorable for them to come together and share electrons (become "bonded") than it is for them to exist as individual, separate atoms. When the bond occurs, the atoms become a compound. Like the rock falling to the floor, they "fall" together naturally.

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