

STRUCTURE OF ATOMS

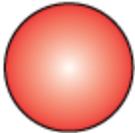
Everything is made of tiny, fundamental building blocks called **atoms**. That's called the **Atomic Hypothesis**. Nobel Prize-winning physicist Richard Feynman once said that if humankind had to give up all of its knowledge of science except for one fact, he'd keep the atomic hypothesis. He thought that from there - knowing that everything is made of atoms - we would be well on our way to regenerating all of our other theories.

Atoms are composed of protons, neutrons and electrons, which we call the **subatomic particles**. While the compositions of protons,

Neutrons and electrons are known from particle physics — they're made of even smaller particles like quarks, those three particles will do for a thorough study of chemistry.

The table below shows the relative sizes, masses and charges of our three particles.

The important things to note are that protons and neutrons are much heavier and larger than electrons, and that protons and electrons have the same charge (the unit charge in the table is Coulombs), with opposite sign. Remember that opposite charges attract and like charges repel.

The Sub-atomic Particles			
Size	Name	Mass (Kg)	Charge (C)
	Proton	1.67×10^{-27}	$+1.602 \times 10^{-19}$
	Neutron	1.67×10^{-27}	0
	Electron	9.11×10^{-31}	-1.602×10^{-19}

Neutrons are particles that have the same mass (it's just *slightly* different) as protons, but have no charge. They contribute only in a minor way to the *chemistry* of atoms, but they do contribute to the mass, and are important for other reasons that we shall see.

Protons and neutrons compose the **nucleus** of an atom, which is "orbited" by electrons. While the nucleus accounts for practically all of the mass of an atom, its size (diameter) is created by the size of the electron orbitals. Rutheford showed, in fact, that atoms are mostly empty space!

Although the charge of an electron is given in the table in Coulombs, we usually make the charge of an electron our basic **unit of charge**, and fix it to **-1** and that of the proton, therefore, to **+1**.

Elements

All of the *stuff* on (and of) Earth is composed of 90 **naturally-occurring** chemical elements. Two more occur naturally, but decompose so rapidly by radioactive decay that they aren't found. About 15 others can be made in laboratories, but they don't last long either — some on the order of just milliseconds.

What distinguishes one element from another is *only* the **number of protons**. The identity of an element doesn't depend in any way on the number of neutrons or electrons, though variances in those numbers do alter the properties of atoms.

We give each element a one- or two-letter abbreviation to make writing chemical equations more efficient. You should memorize the first ten elements now.

# Protons	Element	Abbr.
1	Hydrogen	H
2	Helium	He
3	Lithium	Li
4	Beryllium	Be
5	Boron	B
6	Carbon	C
7	Nitrogen	N
8	Oxygen	O
9	Fluorine	F
10	Neon	Ne

Source: http://www.drcruzan.com/Chemistry_Atoms.html