Atomic Mass

The idea of subatomic particles having mass, or not, is one of the most fascinating realities of Particle Physics. Particles either have distinct mass or are mostly or entirely made of energy. This fact in itself is not so riveting until we remember that normally energy flows, leaks, gets mixed with other energies. One such example is heat transfer. Then we can truly marvel at energy-particles and how they persist in their own bubbles without diffusing into an ambient background filled with a multitude of free-flowing energy types.

The three major subatomic particles have one important difference between them: **mass**. Both protons and neutrons have dramatically more mass than electrons. It is also known that neutrons are slightly heavier than protons.

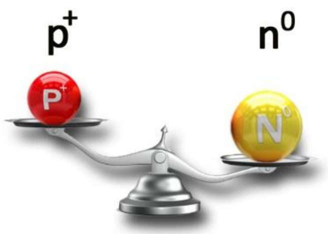

Figure 15 - Neutrons Are Heavier Than Protons

Electrons are made mostly of energy, though they too have a bit of mass but extremely small by comparison. Electron mass is considered negligible in relation to the total mass of the atom and is thus most often disregarded.

Nevertheless, the precise details can sometimes be important.

In the following model, both the p^+ and the n^0, are replaced by their more generic average, the nucleon. The nucleon mass approximately equals the joint mass of 2,000 electrons.

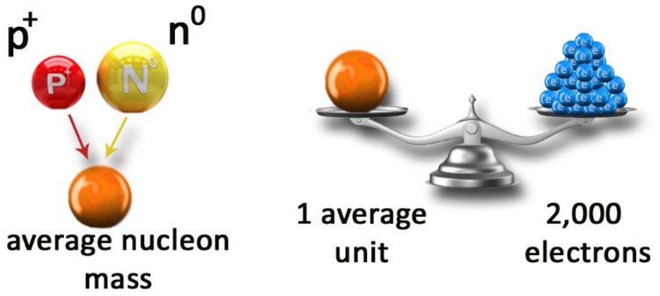

Figure 16 - Electron Mass

Nucleons are considered to be the only relevant particles to the total mass of the atom, formally known as the **Atomic Mass**.

The following relation applies to every element **variation**:

Atomic Mass = **total nucleons** (measured in atomic mass units)**.**

Notice the numerical value above is a particle count. However, to designate mass properly as indicated in the