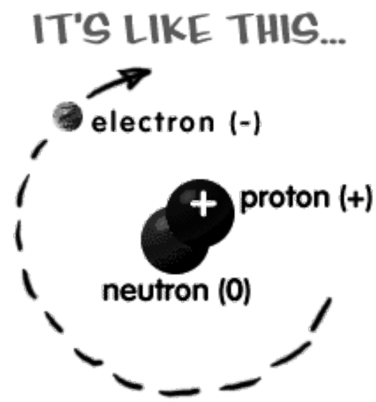
Resource Website: http://www.chem4kids.com/files/atom_structure.html

ATOMS CC Reading

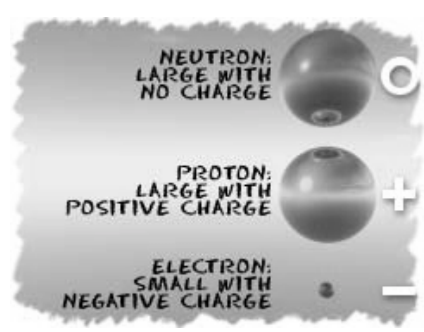
Atoms are the basis of chemistry. They are the basis for everything in the Universe. You should start by remembering that matter is composed of atoms. **Atoms** and the study of atoms are a world unto themselves. We're going to cover basics like atomic structure and bonding between atoms.

Smaller Than Atoms? Are there pieces of matter that are smaller than atoms? Sure there are. You'll soon be learning that atoms are composed of pieces like electrons, protons, and neutrons. But guess what? There are even smaller particles moving around in atoms. These super-small particles can be found inside the protons and neutrons. Scientists have many names for those pieces, but you may have heard of **nucleons** and **quarks**. Nuclear chemists and physicists work together at **particle accelerators** to discover the presence of these tiny, tiny, tiny pieces of matter.



Even though super-tiny atomic particles exist, you only need to remember the three basic parts of an atom: **electrons**, **protons**, and **neutrons**. What are electrons, protons, and neutrons? A picture works best to show off the idea. You have a basic atom. There are three types of pieces in that atom: electrons, protons, and neutrons. That's all you have to remember. Three things! As you know, there are almost 120 known elements in the periodic table. Chemists and physicists haven't stopped there. They are trying to make new ones in labs every day. The thing that makes each of those elements different is the number of electrons, protons, and neutrons. The protons and neutrons are always in the center of the atom. Scientists call the center region of the atom the **nucleus**. The nucleus in a cell is a thing. The nucleus in an atom is a place where you find protons and neutrons. The electrons are always found whizzing around the center in areas called shells or orbitals.

You can also see that each piece has either a "+", "-", or a "0." That symbol refers to the charge of the particle. Have you ever heard about getting a shock from a socket, static electricity, or lightning? Those are all different types of electric **charges**. Those charges are also found in tiny particles of matter. The electron always has a "-", or negative, charge. The proton always has a "+", or positive, charge. If the charge of an entire atom is "0", or neutral, there are equal numbers of positive and negative pieces. Neutral means there are equal numbers of electrons and protons. The third particle is the neutron. It has a neutral charge, also



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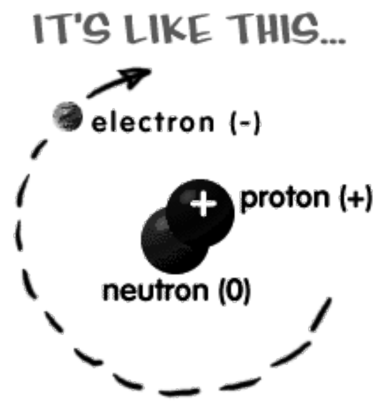

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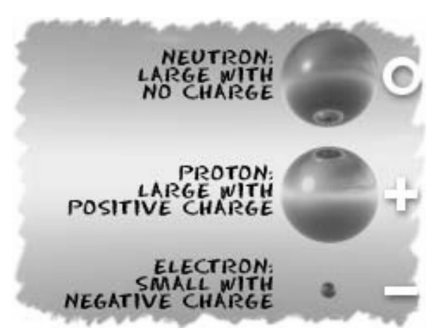

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Neutron Madness

We have already learned that ions are atoms that are either missing or have extra electrons. Let's say an atom is missing a neutron or has an extra neutron. That type of atom is called an **isotope**. An atom is still the same element if it is missing an electron. The same goes for isotopes. They are still the same element. They are just a little different from every other atom of the same element.

For example, there are a lot of carbon (C) atoms in the Universe. The normal ones are carbon-12. Those atoms have 6 neutrons. There are a few straggler atoms that don't have 6. Those odd ones may have 7 or even 8 neutrons. As you learn more about chemistry, you will probably hear about carbon-14. **Carbon-14** actually has 8 neutrons (2 extra). C-14 is considered an isotope of the element carbon.

Returning to Normal

If we look at the C-14 atom one more time, we find that C-14 does not last forever. There is a time when it loses its extra neutrons and becomes C-12. The loss of those neutrons is called **radioactive decay**. That decay happens regularly like a clock. For carbon, the decay happens in a few thousand years (5,730 years). Some elements take longer, and others have a decay that happens over a period of minutes. Archeologists are able to use their knowledge of radioactive decay when they need to know the date of an object they dug up. C-14 locked in an object from several thousand years ago will decay at a certain rate. With their knowledge of chemistry, archeologists can measure how many thousands of years old an object is. This process is called **carbon dating**.

Answer these questions on page 2 in your Interactive Notebook

1. Identify the charge of protons, neutrons and electrons (KNOWLEDGE RI 8.2).
2. How does technology help scientists know more about the atom (ANALYSIS RI 8.6)?
3. Using the article, and citing your article for evidence, explain in 3-5 sentences how scientists can use knowledge of atoms to help them understand other things (such as dinosaurs) (RI APPLICATION 8.8) **Use this paragraph structure, being sure to write in phrases that make SENSE:**

Scientists can use their knowledge of atoms to help them understand other things such as ____________. First, by understanding atoms, they can ________________ (your article evidence). Scientists can also ________________(your second article evidence). Finally, as technology and understanding of the world around us progresses, it is likely that scientists will continue to discover and share information.

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