Glue this side
down into your
science notebook.

"A dot is a lot!"

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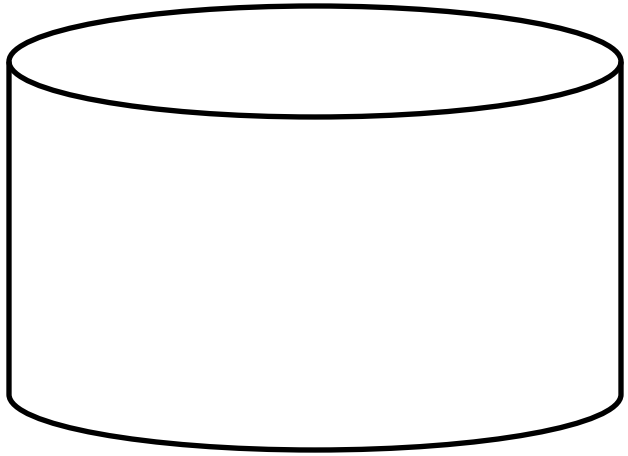
BrainPOP - Atomic Model

Activity: What's inside the container?

Use your observation and inference skills to make a sketch of what you think is inside.



Atoms are small, real small; too small to be seen in any detail. Scientists can do _____ that tell them things about what makes up an atom.

You can't see what's inside the box, but shaking it can give you clues as to what is inside. It's the same with atoms. Using _____ means, scientists have been able to construct different models of the atom. This atomic model has taken years and years to build and people still tweak it now and again, hopefully making it more accurate.

At the beginning of the 19th century, Englishman **John Dalton** built an atomic model called the "atomic theory of matter." According to his theory: Each type of matter is made of only type of _____. Each type of atom can be put into a group called an _____ — and every atom of an element was identical. For example, gold atoms make gold, iron atoms make iron, and so on. These atoms are way too small to see. Dalton also believed atoms could not be created, divided into smaller parts, or destroyed.

About 100 years after Dalton, British scientist **J.J. Thomson** discovered the _____. Thompson used a vacuum tube with metal plates at both ends and an electrical source for his experiment. He found that a beam would form between the two plates; the cathode and the anode. Putting a magnet near the beam caused it to bend, which meant that the particles of the beam were _____ charged. Thompson discovered that the cathode rays were made of negatively charged particles, later called _____.

Because matter is mostly neutral, with no net charge, atoms must contain both _____ and negative charges that cancel each other out. Thompson stated that negatively charged electrons must be stuck all throughout a positively charged area. Think of it like the atom is cookie dough and the electrons are chocolate chips.

The discovery of electrons was a big deal. But it left some questions to be answered. Where were the positive particles holding those electrons in place? In 1909 a New Zealand born British scientist named **Ernest Rutherford** and his team set up to answer some of these questions. They beamed _____ charged alpha particles at sheet of really thin gold foil. Because so many particles could pass right through the thin gold foil, Rutherford hypothesized that the gold atoms must be made of mostly _____ space. But some of the particles did bounce off, so Rutherford revised his hypothesis to say that a gold atom must have some very small _____ charged mass. He named this mass the _____. He called the positively charged nucleus particles _____, and said that the electrons were scattered in empty space around the nucleus.

James Chadwick, a student of Rutherford's, found new particles in the nucleus that weren't affected by an electric field at all. Alpha particles in the experiment had knocked them loose. Chadwick called these uncharged particles _____.

Also in the early 20th century, scientists discovered that electrons are arranged in energy _____ (**Bohr** Model). The lower energy levels are closer to the nucleus and can hold just a few electrons. The higher energy levels are _____ away and can hold more electrons. Electrons are so small and quick that their energy levels are not neat planet-like orbits around the nucleus. Instead they exist in a region called the _____ _____.

The atomic model is constantly evolving as scientists discover more and more about what makes the universe tick.