History of the Atom

Scientists and Their Contribution to the Model of an Atom
Democritus proposes the 1st atomic theory

370 BC

John Dalton proposes his atomic theory

1803

J.J. Thomson discovers the electron and proposes the Plum Pudding Model

1897

Niels Bohr proposes the Bohr Model

1913

Erwin Schrödinger describes the electron cloud

1926

James Chadwick discovers the neutron

1932

Ernest Rutherford performs the Gold Foil Experiment

1897

Antoine Lavoisier makes a substantial number of contributions to the field of Chemistry

1766 – 1844

Click on picture for more information
Democritus
(460 BC - 370 BC)

• Proposed an Atomic Theory (along with his mentor Leucippus) which states that all atoms are small, hard, indivisible and indestructible particles made of a single material formed into different shapes and sizes.
• Aristotle did not support his atomic theory.
Antoine Lavoisier
(1743 - 1794)

- Known as the “Father of Modern Chemistry”
- Was the first person to generate a list of thirty-three elements in his textbook
- Devised the metric system
- Was married to a 13-year old Marie-Anne Pierette Paulze; she assisted him with much of his work
- Was a tax-collector that was consequently guillotined during the French Revolution
- Discovered/proposed that combustion occurs when oxygen combines with other elements
- Discovered/proposed the Law of Conservation of Mass (or Matter) which states, in a chemical reaction, matter is neither created nor destroyed

Image taken from: www.ldeo.columbia.edu/.../v1001/geo
time2.html
John Dalton
(1766 - 1844)

- In 1803, proposed an Atomic Theory which states:
  - All substances are made of atoms; atoms are small particles that cannot be created, divided, or destroyed.
  - Atoms of the same element are exactly alike, and atoms of different elements are different.
  - Atoms join with other atoms to make new substances
- Calculated the atomic weights of many various elements
- Was a teacher at a very young age
- Was color blind

Image taken from: chemistry.about.com/.../John-Dalton.htm
J.J. Thomson  
(1856 - 1940)

- Proved that an atom can be divided into smaller parts
- While experimenting with cathode-ray tubes, discovered corpuscles, which were later called electrons
- Stated that the atom is neutral
- In 1897, proposed the **Plum Pudding Model** which states that atoms mostly consist of positively charged material with negatively charged particles (electrons) located throughout the positive material
- Won a Nobel Prize

Image taken from:  
www.wired.com/.../news/2008/04/dayintech_0430
In 1909, performed the Gold Foil Experiment and suggested the following characteristics of the atom:

- It consists of a small core, or nucleus, that contains most of the mass of the atom.
- This nucleus is made up of particles called protons, which have a positive charge.
- The protons are surrounded by negatively charged electrons, but most of the atom is actually empty space.

Did extensive work on radioactivity (alpha & beta particles, gamma rays/waves) and was referred to as the “Father of Nuclear Physics”

- Won a Nobel Prize
- Was a student of J.J. Thomson
- Was on the New Zealand $100 bill
In 1913, proposed the **Bohr Model**, which suggests that electrons travel around the nucleus of an atom in orbits or definite paths. Additionally, the electrons can jump from a path in one level to a path in another level (depending on their energy).

- **Won a Nobel Prize**
- **Worked with Ernest Rutherford**
Erwin Schrödinger  
*(1887–1961)*

- In 1926, he further explained the nature of electrons in an atom by stating that the exact location of an electron cannot be stated; therefore, it is more accurate to view the electrons in regions called **electron clouds**; **electron clouds** are places where the electrons are likely to be found.

- Did extensive work on the Wave formula → Schrödinger equation.

- Won a Nobel Prize.
James Chadwick
(1891 - 1974)

- Realized that the atomic mass of most elements was double the number of protons → discovery of the neutron in 1932
- Worked on the Manhattan Project
- Worked with Ernest Rutherford
- Won a Nobel Prize
Progression of the Atomic Model

The structure of an atom, according to: Democritus, John Dalton