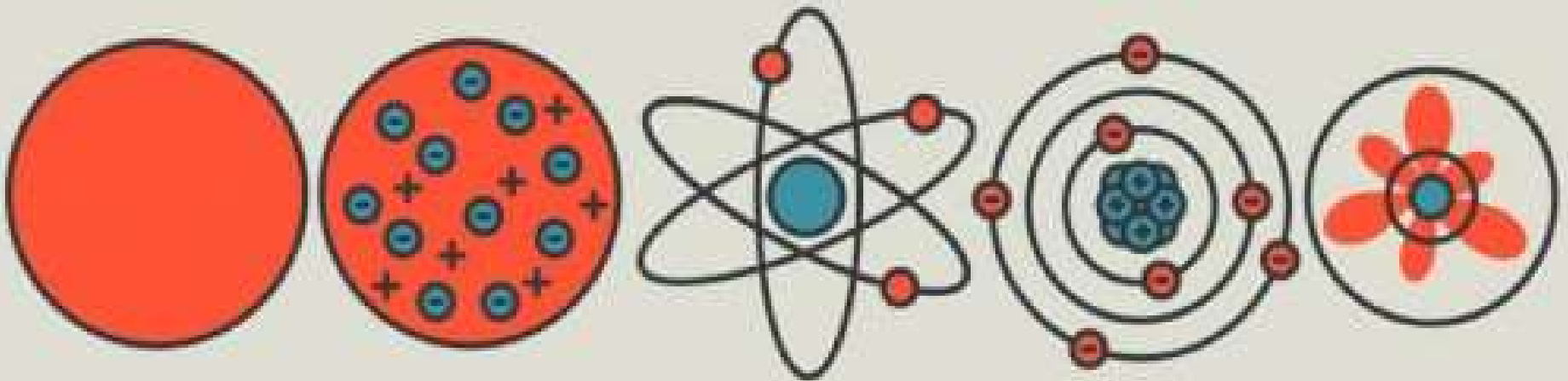


Atomic Theory: A History



Mrs. Cronin

8th Grade Physical Science

December 4, 2019

What do I write down if I don't want guided notes?

Please write down underlined items (but more importantly listen!).

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After Today You Will be Able To:

1. Explain the scientific contributions to atomic theory.
2. Explain the observations and interpret results from the Gold Foil and Cathode Ray Tube Experiments.
3. Describe the three subatomic particles and their locations within the atom.

How Do You Study Something You Can't See!

So far, all we've talked about is that all matter is made of atoms but haven't talked about what an atom is (that's today!).

- An atom is the smallest unit of matter.
- A single atom is about 500,000 times smaller than a strand of hair. So how do you study it?



Democritus

- First available record of the study of atom is from Democritus, a Greek Philosopher, in 430 B.C. (about 2500 years ago) – though some argue it was an Indian philosopher named Kanada who produced the idea first.
- In Democritus' time, it was thought that one could infinitely chop an item and never get to an end. Democritus disagreed!
- Democritus idea: Matter is made up of small particles that can't be further cut, and he named these atomos "Uncuttable" (atoms).

Democritus' Idea Was Dismissed!

- Democritus did not do any experiments to prove his idea and had no evidence.

“That which can be asserted without evidence, can be dismissed without evidence.”

— Christopher Hitchens

Dalton's Model

- English chemist (1766-1844).
- A very simple view of his proposal was that
 1. All elements are made of atoms which can't be divided further.
 2. Atoms of one element can't be changed into atoms of a different element.
 3. In a chemical reaction, atoms are recombined (not created/destroyed).
 4. Every compound is made of atoms of different elements, in set ratios.
- Dalton didn't say anything about what's inside an atom.

Think of Dalton's model as a solid sphere that can't be divided

Please note: Not all of Dalton's ideas are correct

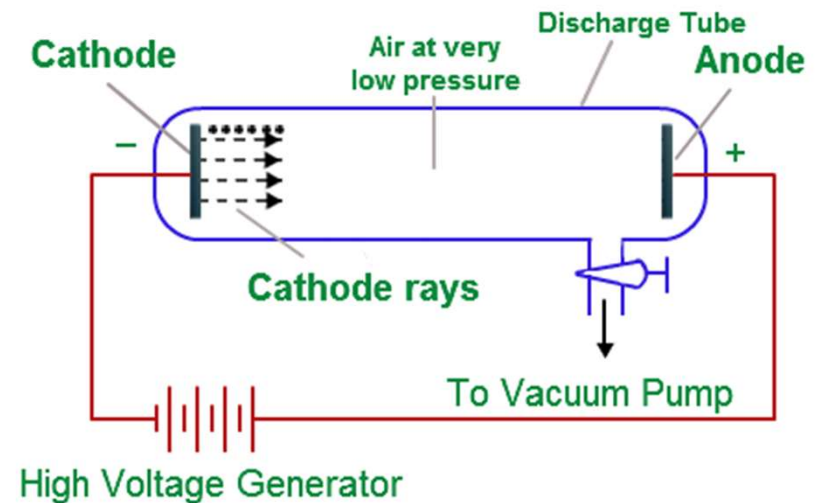
- Atoms are divisible – atoms can be broken down into their subatomic particles.
- We also know that not all atoms of the same element are identical (we will discuss isotopes later.)



Thomson's Model

- J.J. Thomson (1856-1940) was a British Physicist.
- Thomson is famous for the Cathode Ray Tube Experiment.
- The tube was filled with gas, and contained two plates: one positive, one negative.
- The particles in the gas were attracted to the positive plate.

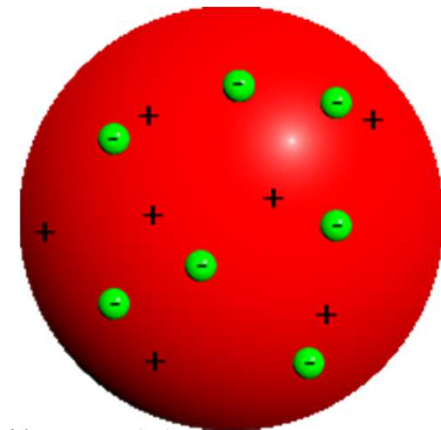
- [Click here to read about Thomson's Experiment!](#)



Thomson's Model

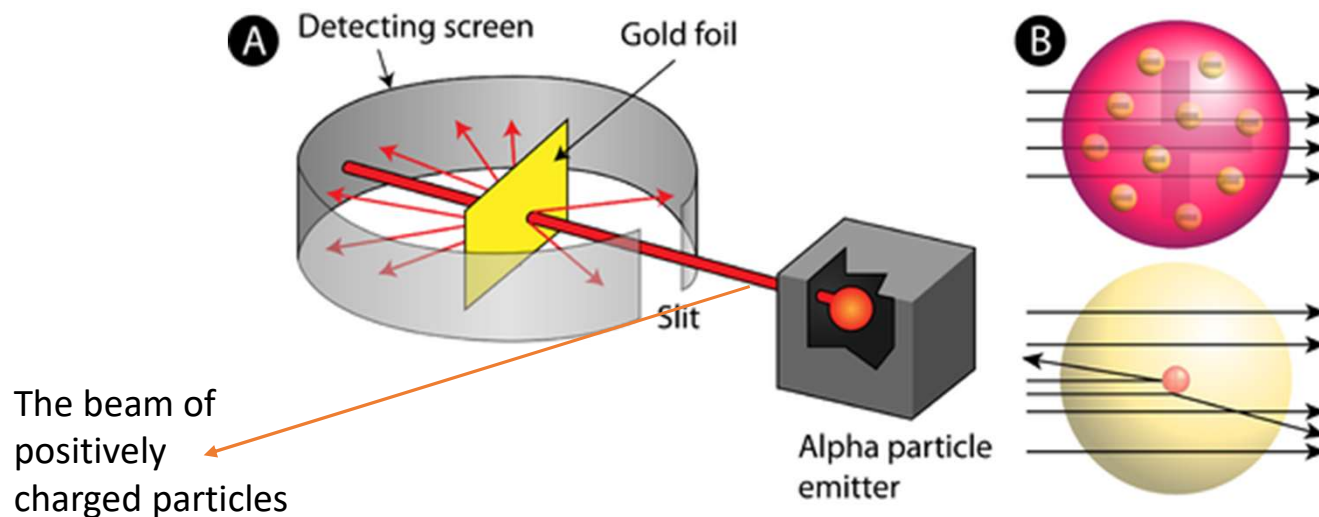
- Thomson reasoned that the particles in the gas must have a negative charge (they were attracted to the positive plate): Thomson discovered that atoms have negatively charged particles (later named **electrons**).
- Thomson reasoned that since atoms themselves have no charge, there must be a positive charge somewhere!

Think of Thomson's model as a big cookie with two types of toppings (M&Ms and Chocolate Chip!)



Rutherford's Model (1871-1937)

- Rutherford was J.J. Thomson's student!
- Rutherford's alpha scatter study resulted in figuring out that most of the positive charge in the atom is in a tiny area in the center, which he named nucleus.



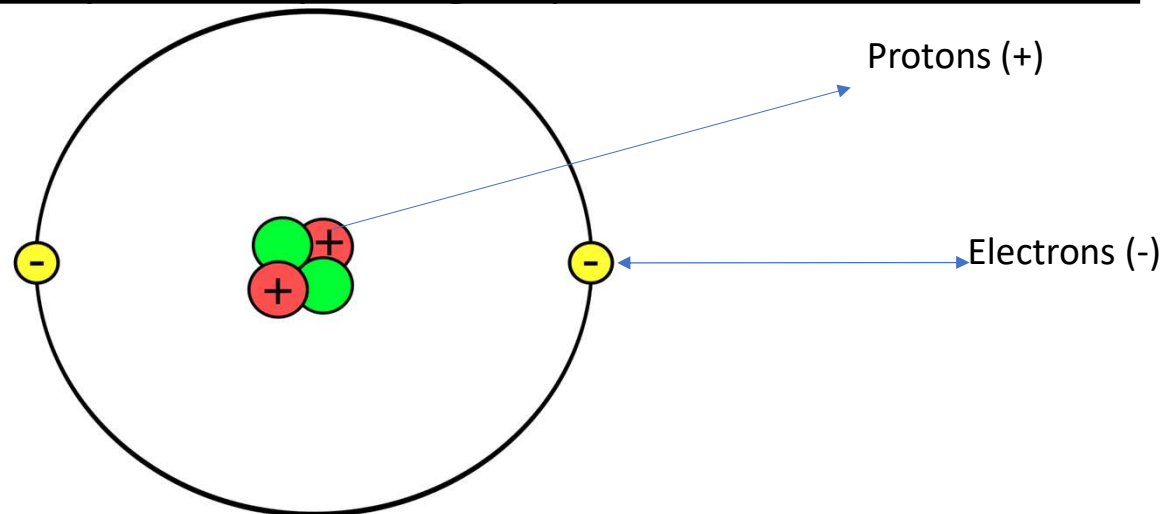
Watch all about Rutherford's experiment [here!](#)

watch this

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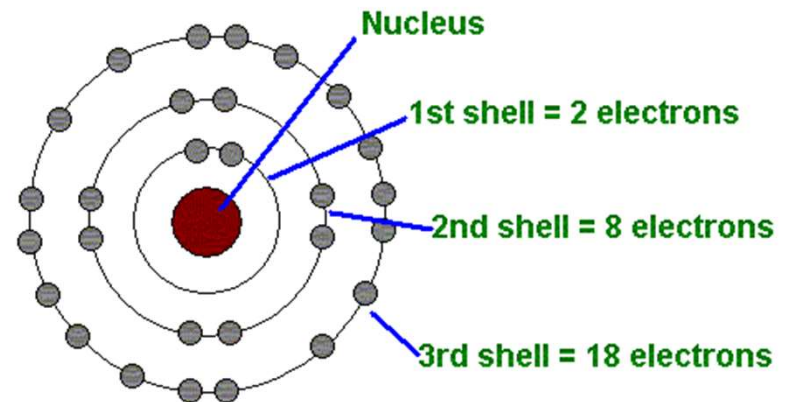
Rutherford's Model Continued

- Since Rutherford's experiment showed that the positive charge in an atom was in a very small area, and other experiments had shown that the atom itself was neutral, there had to be negative charges somewhere outside the center.
- Rutherford called the positively charged particles in the nucleus, **protons!**



Bohr's Model

- Bohr was a Danish scientist (1885-1962).
- His model of the atom solved an issue with Rutherford's model! How do electrons around the nucleus not fall and crash into the nucleus?
- Bohr proposed that electrons move around the nucleus in **energy levels!**
- [Read more about Bohr's Model \(Click Here!\)](#)



Schrodinger

- Not mentioned in your book.
- He was an Austrian physicist (1887-1961) who is credited with the “Probability Distribution Model” which states that protons and neutrons are in the nucleus surrounded by electrons in electron cloud around the nucleus (He calculated the probability of finding electrons in the orbitals around the nucleus)
- He’s also known for the Schrodinger's cat (look it up 😊)

Atomic Sub particles

Name	Symbol	Charge	Location within Atom	Mass (in Atomic Mass Units or AMU)
Proton	p	+1	Nucleus	1
Neutron	n	0 (no charge)	Nucleus	1
Electron	e ⁻	-1	Outside Nucleus	1/1840

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Collaborative Noggin Time!

- Write down 3 test questions I could possibly ask you based on the material we covered.
- Please turn in one page per table with all your names 😊

