

### Dalton (1766 - 1844)

1. All matter is made of tiny particles called atoms.
2. All atoms of a given element are identical in mass and properties.
3. Atoms of different elements combine in whole number ratios
4. Chemical reactions is the rearranging of atoms, but atoms cannot be created or destroyed.

Sep 8-7:41 AM

### J. J. Thomson (1856-1940)

In 1897 Thomson conducted the cathode ray experiment.

<https://www.youtube.com/watch?v=UUpD62r2wq8>

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Two important discoveries from the cathode ray experiment.

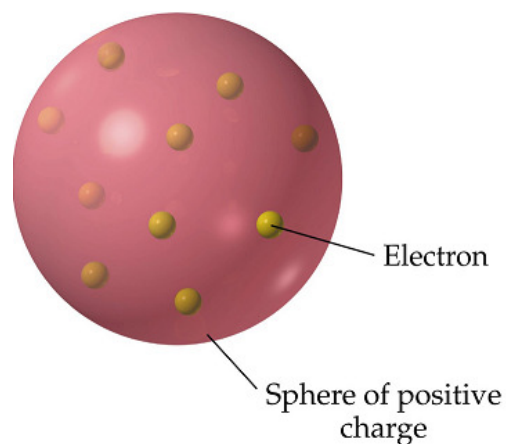
1) electrons exist and they have a negative charge

2) ALL elements have electrons

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## Thomson's Model of the Atom

Plum Pudding

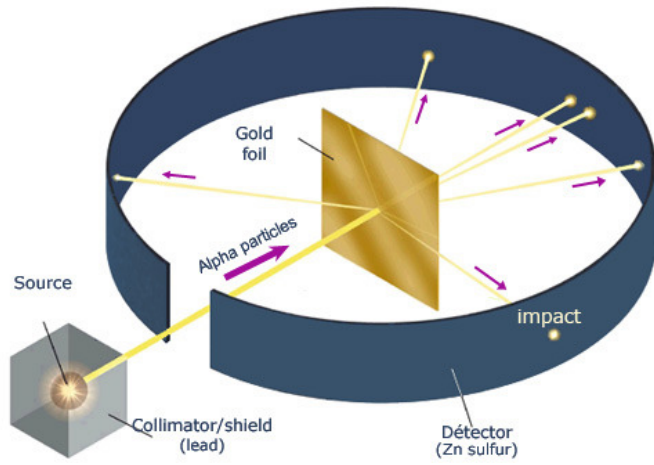


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Rutherford (1871-1937)

Gold Foil Experiment - 1899

Expected vs  
Results?



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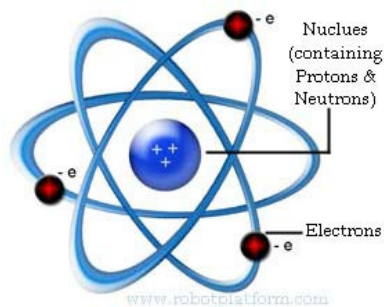
Things to know about the gold foil experiment

- Alpha Particle
- Atoms are mostly empty space
  - marble on a football field
- Atoms contain nucleus
  - "marble"
  - contain protons (and netrons, not yet discovered)

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## Rutherford's Model of the Atom

<https://youtu.be/wzALbzTdnc8>



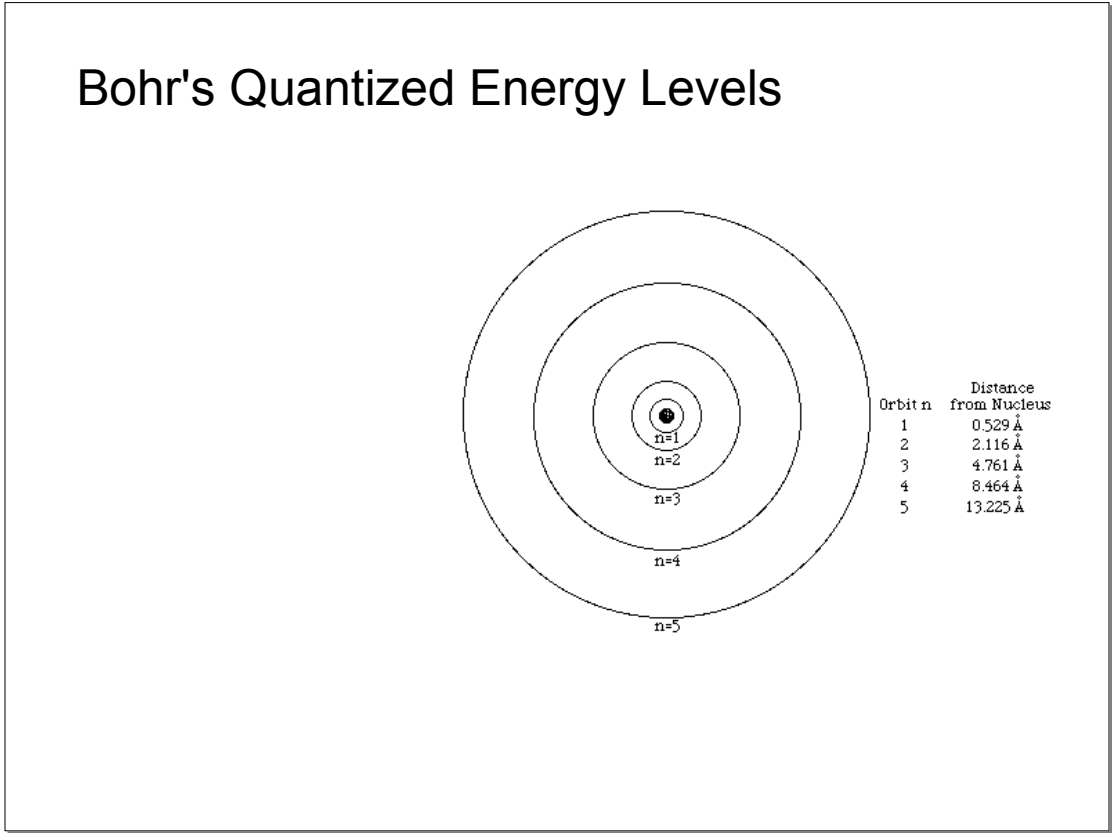
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## Niels Bohr (1885 - 1962)

In 1922 Bohr gets Nobel Prize in Physics for his work in atomic structure.

Quantized energy levels

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Sep 8-8:21 AM

## The Bohr Model

- Like the rungs of the strange ladder, the energy levels in an atom are not equally spaced.
- The higher the energy level occupied by an electron, the less energy it takes to move from that energy level to the next higher energy level.

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## Warm up

Without looking at your notes or asking someone, answer the following questions.

- 1) What two things did the cathode ray experiment determine.
- 2) What two things did the gold foil experiment determine?

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## Periodic Table of Elements

Mendeleev (1834 - 1907)

created the modern version of the periodic table

Periodic = Recurring

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The diagram shows a rectangular box representing an element's information. Inside the box, the word "molybdenum" is at the top, the number "42" is below it, the symbol "Mo" is in the center, and the number "95.94" is at the bottom. Four arrows point from text labels on the right to these elements: "element name" points to "molybdenum", "atomic number" (with "number of protons (Z)" below it) points to "42", "atomic symbol" points to "Mo", and "atomic mass" (with "A (this is an average mass)" below it) points to "95.94".

\*Atomic mass is equal to the number of protons and neutrons

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Protons - define the element

Neutrons - add mass

Electrons - responsible for chemical reactions

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	Location	Mass	Charge
Proton	nucleus	1 amu	positive
Neutron	nucleus	1 amu	none
Electron	around the nucleus	1/1837 amu	negative

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## Periodic Table

**Periodic Table of the Elements**

Normal boiling points are in °C.  
 SP = Triple Point  
 Pressure is listed if not 1 atm.  
 Allotrope is listed if more than one allotrope.

Atomic Number    Boiling Point  
**Symbol**  
 Name  
 Atomic Mass

**Alkali Metal**    **Alkaline Earth**    **Transition Metal**    **Basic Metal**    **Semimetal**    **Nonmetal**    **Halogen**    **Noble Gas**    **Lanthanide**    **Actinide**

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Isotope - same element different mass

Calculating Weighted Averages for Atomic Mass based on natural abundance....

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Left to right are called periods

Up and down are called groups

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Group 1A - Alkali Metals

Group 2A - Alkaline Earth Metals

Group 7A - Halogens

Group 8A - Noble Gases

Groups 1A - 7A = Representative Elements

Groups 3B - 2B = Transition Metals

Periods on the Bottom = Inner Transition Metals

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Working in pairs

Determine the name, how many protons, electrons, and neutrons each of these have. Also, state what group and period they are in and give the group name if it has one.

1) F    2) C    3) Rb    4) Au    5) K

6) B    7) Kr    8) N    9) Ni    10) Ca

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