Atomic Theory

Democritus

* With Leucippus, they though that matter cannot be divided infinitely.
* Proposed the existence of indestructible, indivisible particles called atoms.

John Dalton

* British chemist, physicist, meteorologist
* Proposed the first "modern" atomic theory in 1803
* Dalton's atomic model: **Billiard Ball Model**

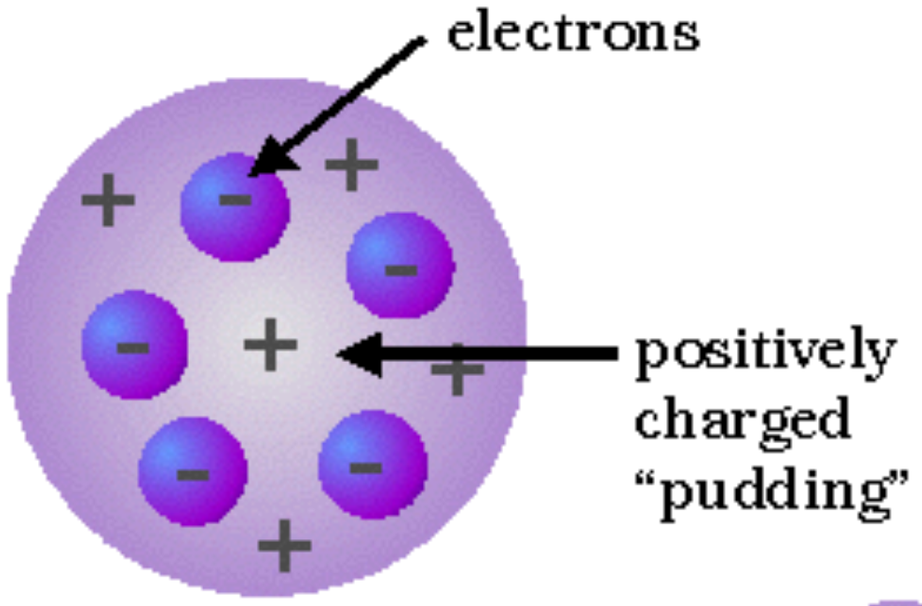
5 Points of Dalton's Atomic Theory:

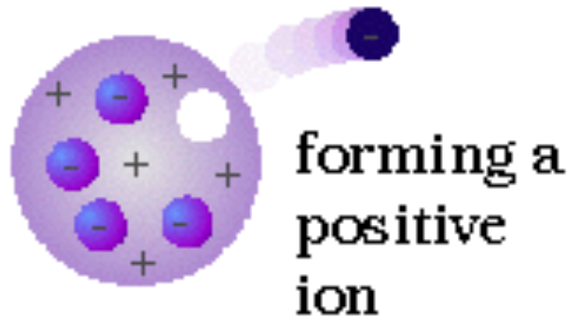
* All matter is made of tiny indivisible particles called atoms.
* Atoms cannot be created or destroyed.
* All atoms of a particular element are identical.
* Compounds are formed through the combination of elements.
* Chemical reactions involve atoms recombining to form new substances.

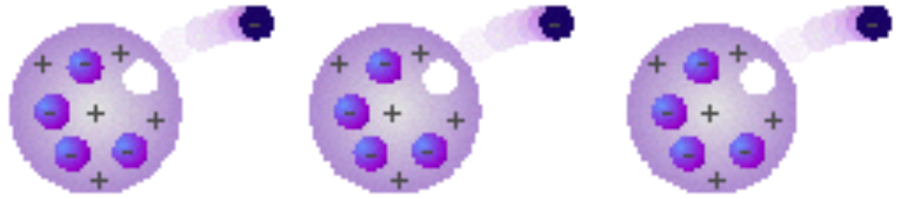
J.J. Thomson

* Identified charged particles that were much smaller than the tiniest atom and came from within the atoms of a metal electrode
* These "subatomic" particles were called electrons and led to the Plum Pudding Model

Thomson's Plum Pudding Atom



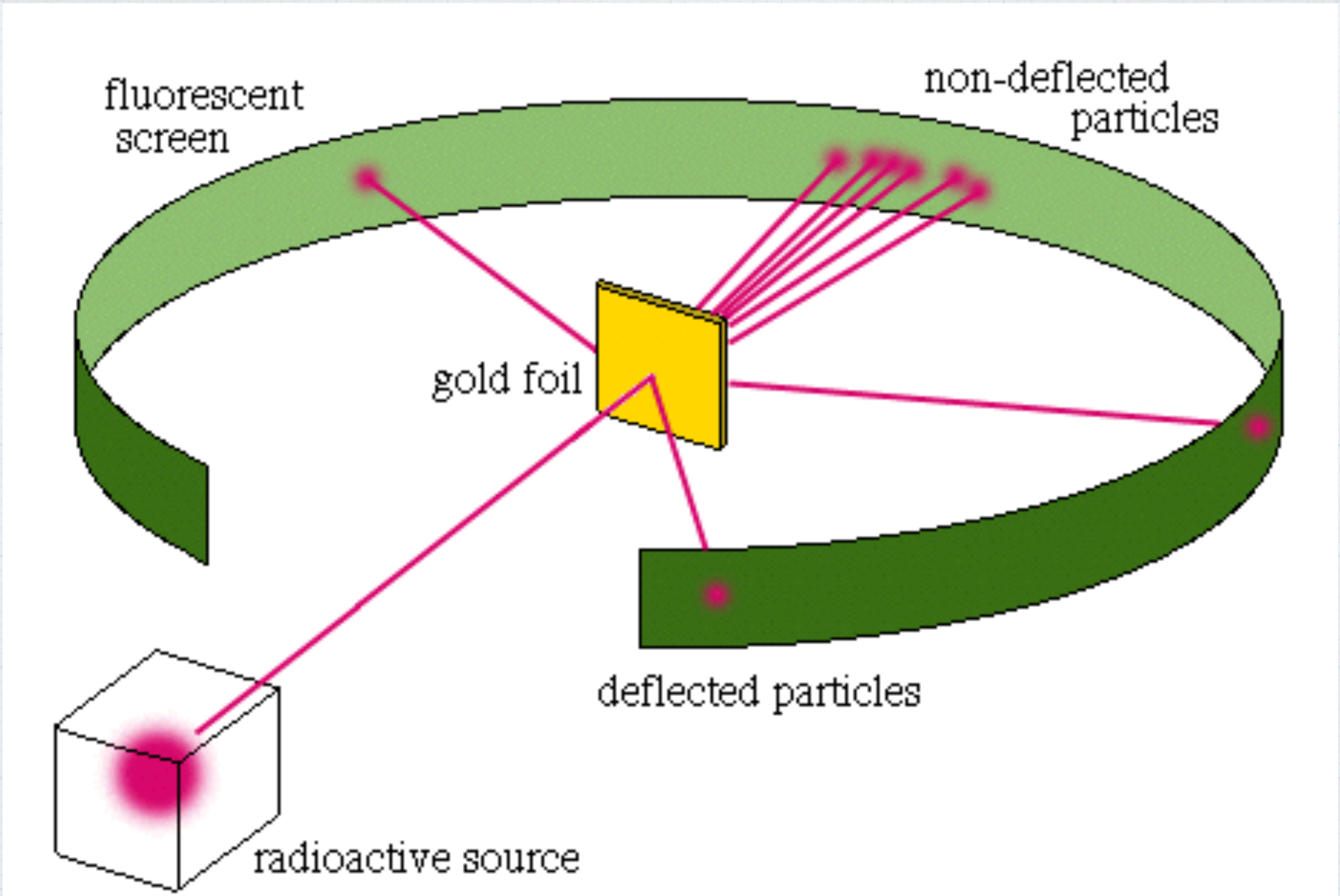


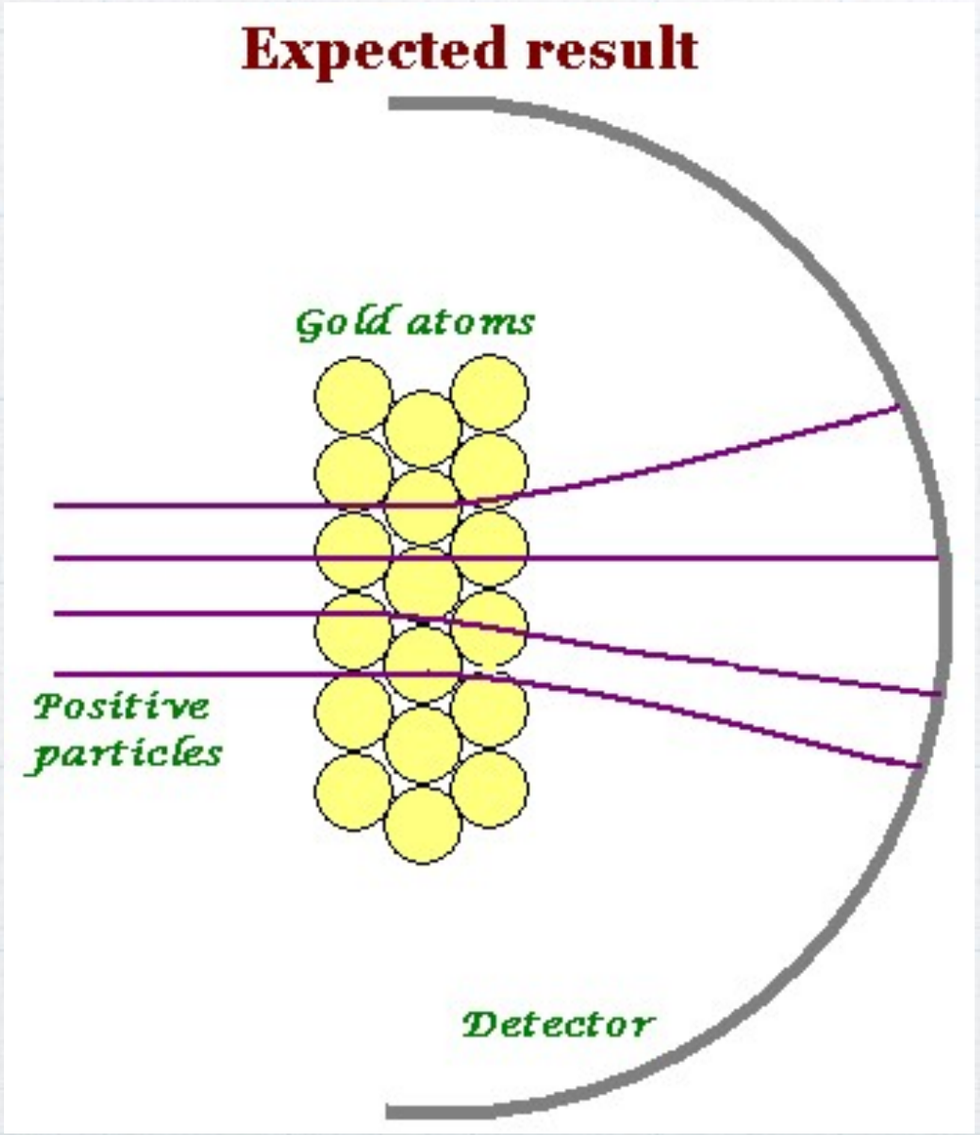


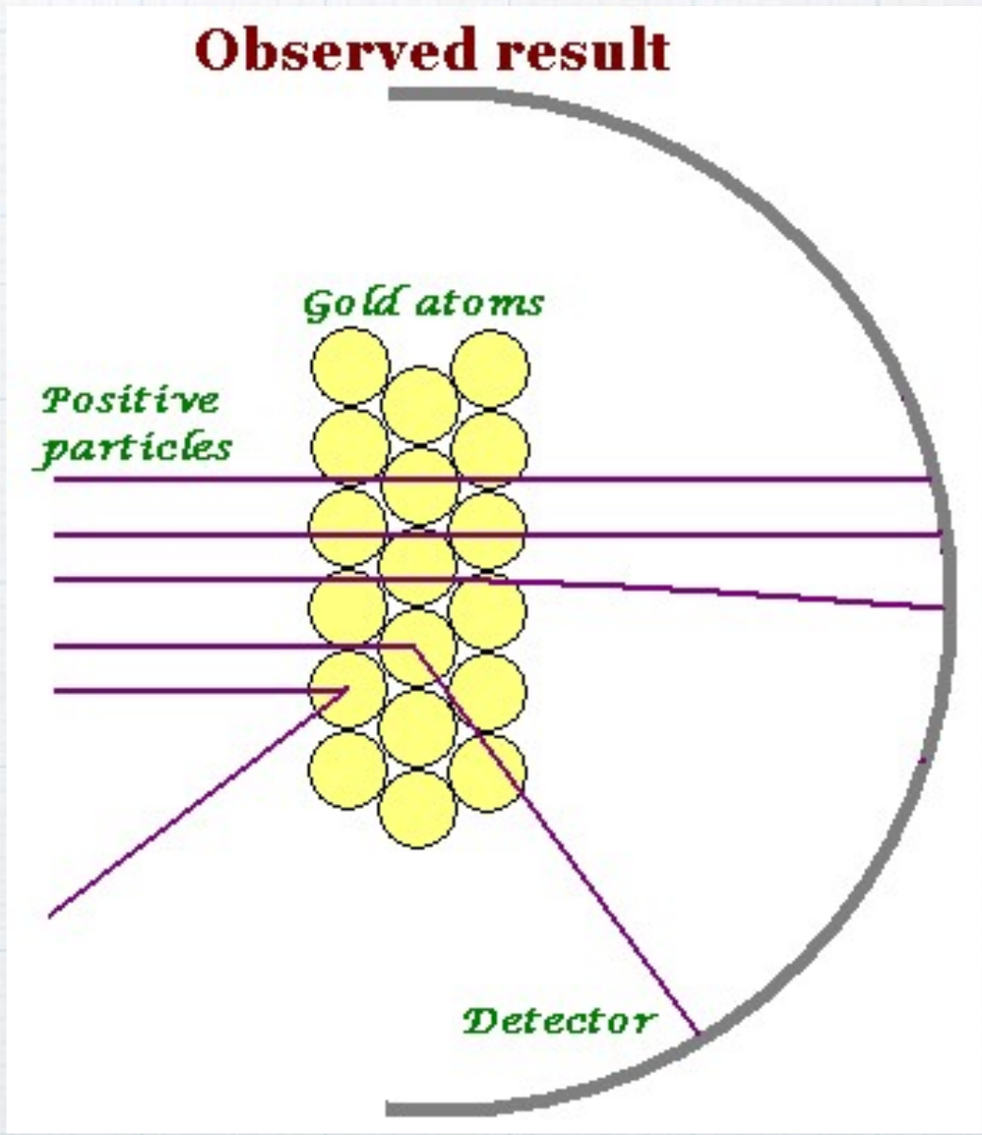
conduction of electricity

Rutherford

* Rutherford proposed that a beam of alpha particles should have enough energy to pass through a thin gold foil
* The experiment initially seemed work


fluorescent
screen
non-deflected
particles
gold foil
deflected particles
radioactive source


Expected result
Gold atoms
Positive particles
Detector


Observed result
Gold atoms
Positive particles
Detector

Rutherford's Conclusions

* The positive charge is in a very dense positive core.
* Most of the atom is simply empty space
    * Rutherford proposed a new model called the **Planetary Model** due to its resemblance to our solar system.

Bohr's Shell Model

* 1. Electrons can only occupy certain discrete orbits or energy levels.
* 2. Electrons can exist in an energy level without losing energy.
* 3. Electrons absorb or release energy only when they change their energy levels.

The Bohr Model and Electron Arrangement

* Bohr's orbits (energy levels) can only hold a certain number of electrons (2, 8, 8...)

* When an inner orbit is filled, electrons occupy orbits further from the nucleus

* Bohr's shell model finally explained the structure of the Periodic Table, which had been published in 1869!

Quantum Theory: Schrodinger

* Showed electrons don't orbit in fixed orbits but rather in clouds.
* Electrons "cloud" around nucleus.
* Exact location of electron is not known.
* Theory is known as '**Electron Cloud Model**.'

James Chadwick

* In 1932, Chadwick experimented with a new type of radiation emitted from beryllium
* The particle had no charge but almost the same mass as the proton; he called these particles neutrons

Overview

Democritus	Indestructible particles called atoms
Dalton	Billiard Ball Model
Thompson	Plum Pudding Model
Rutherford	Planetary Model, introduced proton
Bohr	Electrons orbit
Schrodinger	Cloud model
Chadwick	Neutrons