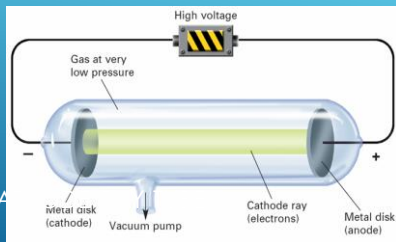


History & the Atom

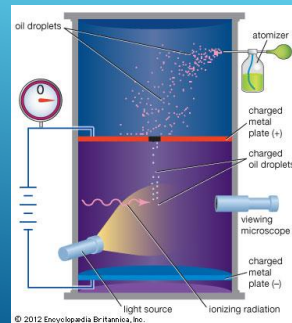
- ▶ Democritus – named the “atomos”
 - ▶ indivisible & indestructible
- ▶ Dalton – first atomic theory
- ▶ Thomson – discovered the electron & electron charge-to-mass ratio
 - ▶ Experiments with cathode ray tubes
- ▶ Millikan – discovered quantity of charge carried by an electron & electron mass
 - ▶ Oil drop experiment
- ▶ Rutherford – discovered the nucleus
 - ▶ Gold-foil experiment
- ▶ Goldstein – discovered the proton
 - ▶ Canal Ray Tube
- ▶ Chadwick – discovered the neutron

Thomson's Cathode Ray Tube Experiment

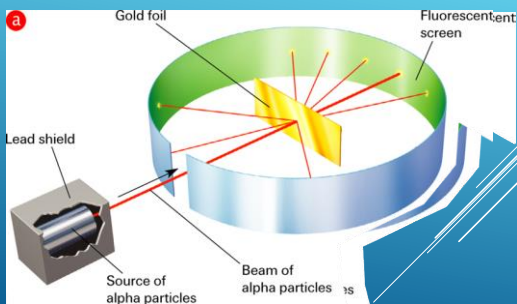


Millikan's Oil Drop Experiment

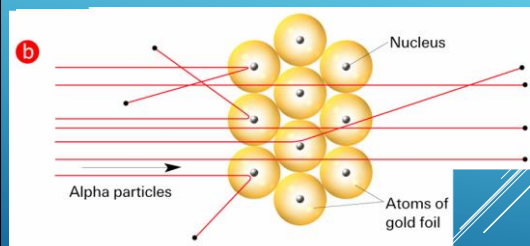
<https://www.youtube.com/watch?v=XMfYHag7Liw>



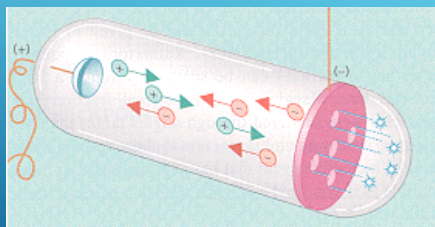
GOLD-FOIL EXPERIMENT



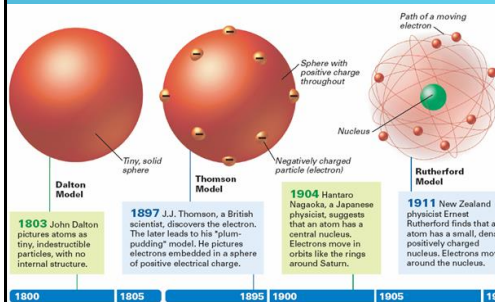
GOLD-FOIL EXPERIMENT



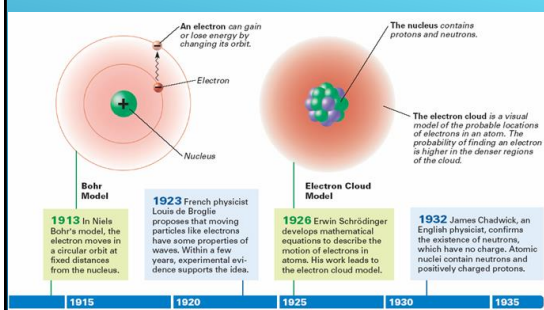
CANAL RAY TUBE



THE DEVELOPMENT OF ATOMIC MODELS



THE DEVELOPMENT OF ATOMIC MODELS



ATOMIC THEORY

- ▶ **Law of Conservation of Mass** - mass is neither created nor destroyed by ordinary means
- ▶ **Law of Definite Proportions** - any chemical compound contains the same elements in exactly the same proportions by mass regardless of amount of sample
- ▶ **Law of Multiple Proportions** - the mass of the second element is present in a small whole number ratio to the mass of the first element

COMPOSITION OF THE NUCLEUS

- ▶ **Made of protons and neutrons**
- ▶ **# of protons determines the atom's identity**
- ▶ **Nuclear forces: short-range forces between p-n, p-p, and n-n hold the nucleus together**

SUBATOMIC PARTICLES

Table 4.1

Properties of Subatomic Particles

Particle	Symbol	Relative charge	Relative mass (mass of proton = 1)	Actual mass (g)
Electron	e^{-}	1-	1/1840	9.11×10^{-28}
Proton	p^{+}	1+	1	1.67×10^{-24}
Neutron	n^0	0	1	1.67×10^{-24}

COUNTING ATOMS

- ▶ Atomic number (Z)
- ▶ Number of Protons = atomic number
- ▶ In a neutral atom
Number of electrons = number of protons
- ▶ Mass number = number of protons + number of neutrons