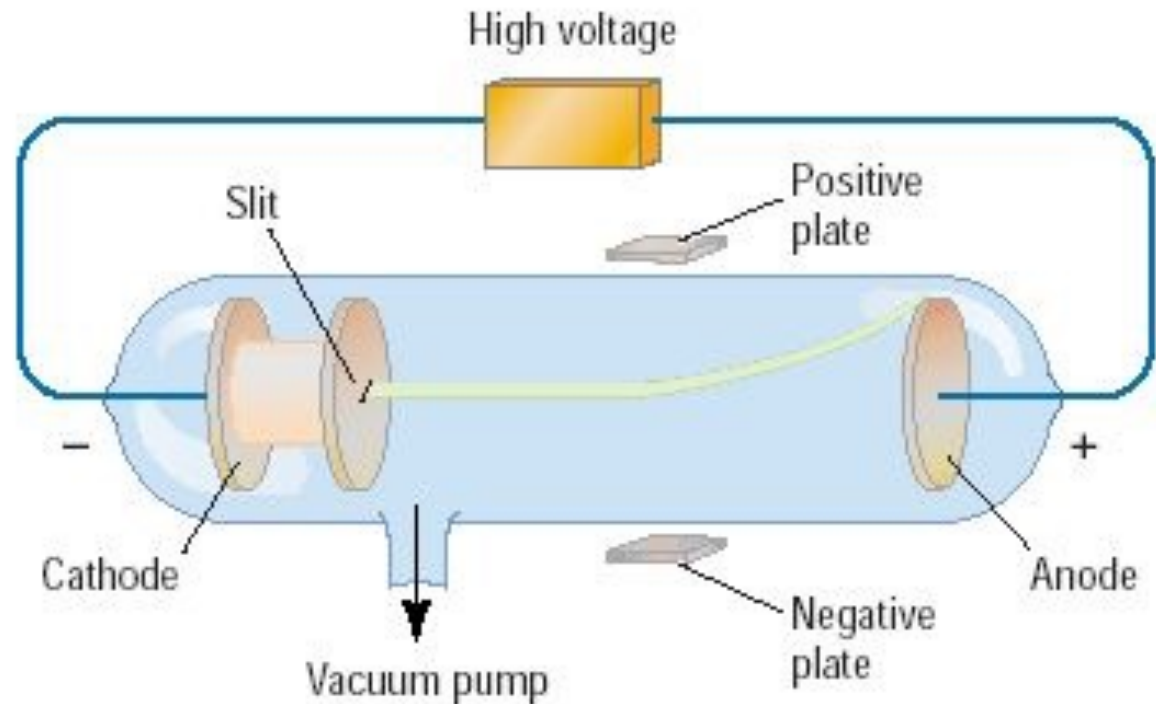


The Atomic Theory of Matter

- In 1803, Dalton proposed that elements consist of individual particles called ***atoms***.
- His ***atomic theory of matter*** contains four hypotheses:
 1. All matter is composed of tiny particles called *atoms*.
 2. All atoms of an element are identical in mass and fundamental chemical properties.
 3. A chemical compound is a substance that always contains the same atoms in the same ratio.
 4. In chemical reactions, atoms from one or more compounds or elements redistribute or rearrange in relation to other atoms to form one or more new compounds. *Atoms themselves do not undergo a change of identity in chemical reactions.*

Discovery of the Electron

In 1897, J.J. Thomson used a cathode ray tube to deduce the presence of a negatively charged particle.

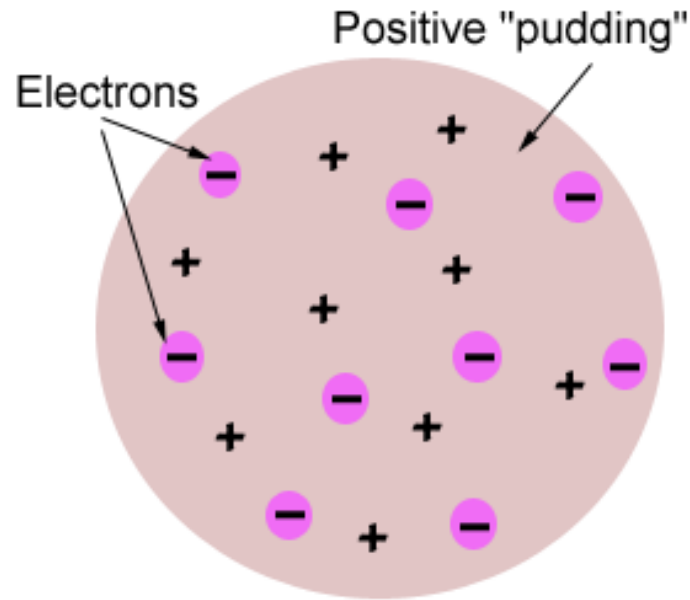


Cathode ray tubes pass electricity through a gas that is contained at a very low pressure.

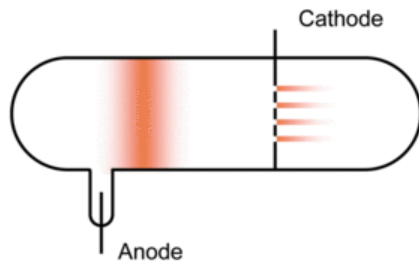
Conclusions from the Study of the Electron

- ❑ Cathode rays have identical properties regardless of the element used to produce them. All elements must contain identically charged electrons.
- ❑ Atoms are neutral, so there must be positive particles in the atom to balance the negative charge of the electrons
- ❑ Electrons have so little mass that atoms must contain other particles that account for most of the mass

Thomson's Atomic Model



Thomson believed that the electrons were like plums embedded in a positively charged "pudding," thus it was called the "plum pudding" model.



Eugene Goldstein

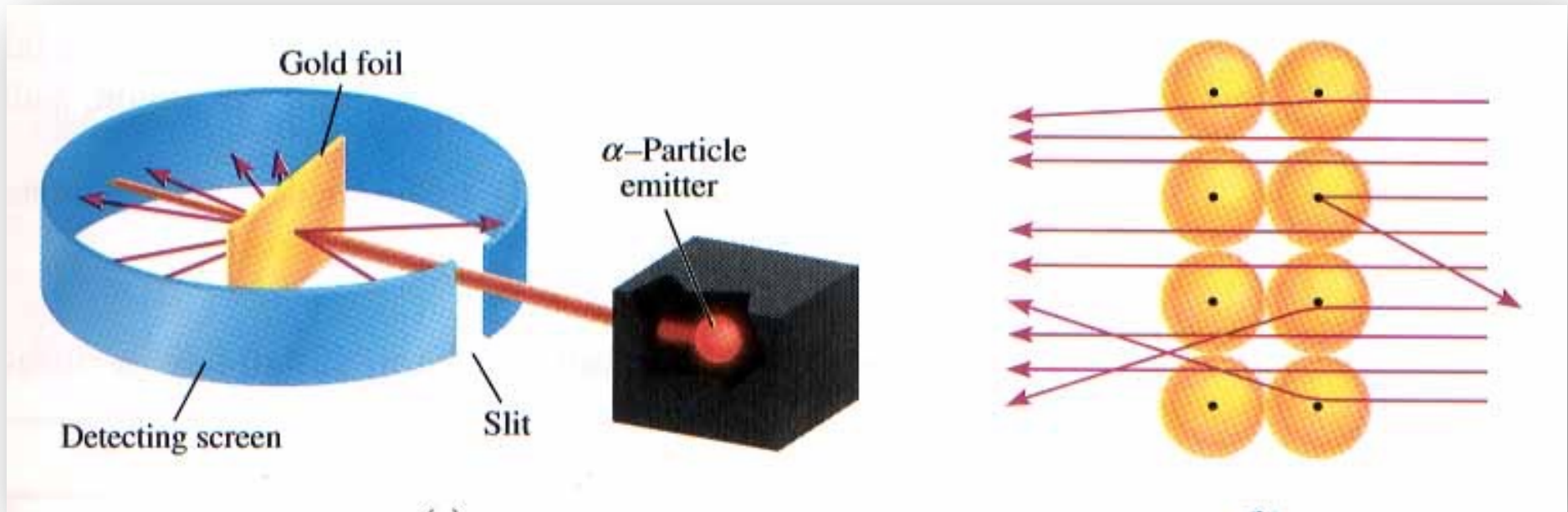
▶ Background-

- ▶ German Physicist
- ▶ Studied in Berlin under Herman Helmholtz
- ▶ Discovered Anode Rays.

▶ Experiment-

- ▶ He Experimented with Cathode Rays.
- ▶ He Said That Atoms contain + charged particles called Protons.
- ▶ If Atoms have (-) charge they must have a (+) charge also.
- ▶ The atom was still thought to resemble Plum pudding

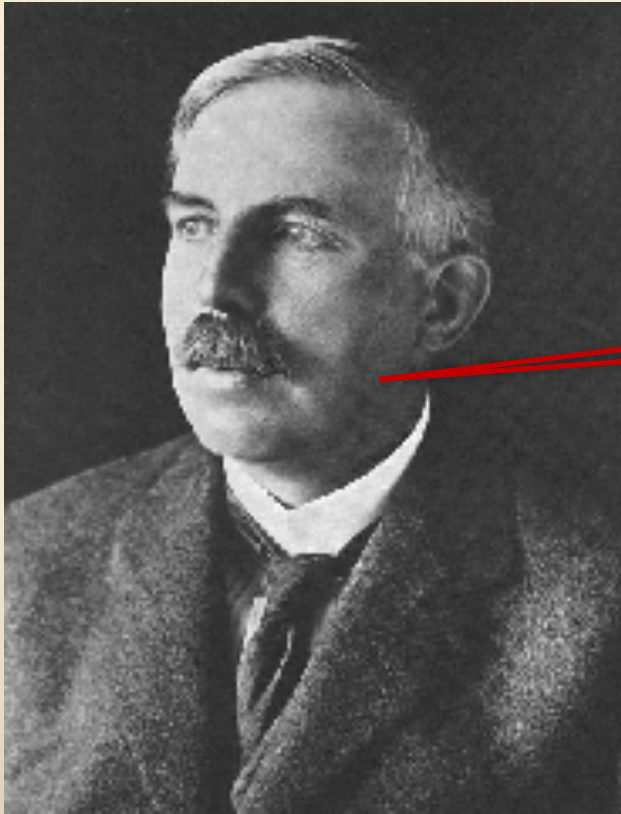
Rutherford's Gold Foil Experiment



- ❑ Alpha (α) particles are helium nuclei
- ❑ Particles were fired at a thin sheet of gold foil
- ❑ Particle hits on the detecting screen (film) are recorded

Rutherford's Findings

- ❑ Most of the particles passed right through
- ❑ A few particles were deflected
- ❑ VERY FEW were greatly deflected



"Like howitzer shells bouncing off of tissue paper!"

Conclusions:

- ❑ The nucleus is small
- ❑ The nucleus is dense
- ❑ The nucleus is positively charged

Bohr's Model of the Atom

Niels Bohr (1913):

-studied the light produced when atoms were excited by heat or electricity



Bohr's Model of the Atom

Niels Bohr (1913):

- studied the light produced when atoms were excited by heat or electricity

Rutherford's model couldn't explain why unique colours were obtained by atoms of different elements

Bohr's Model of the Atom

Bohr's model:

- electrons orbit the nucleus like planets orbit the sun

