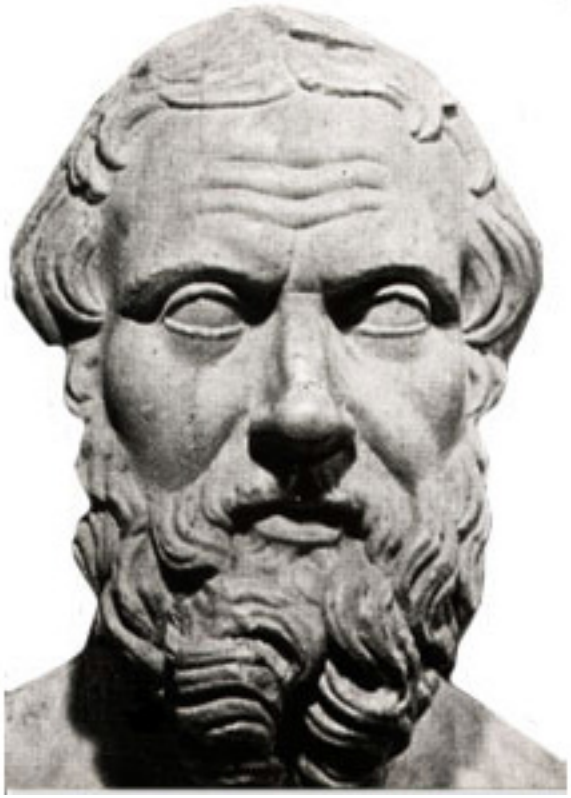
The History of Atomic Theory

Democritus



- Greek philosopher
- 460-370 B.C.
- First to propose that matter was not infinitely divisible

John Dalton

- English chemist and physicist
- 1766-1844
- Considered to be the father of our modern atomic theory

Dalton's Atomic Theory (1803)

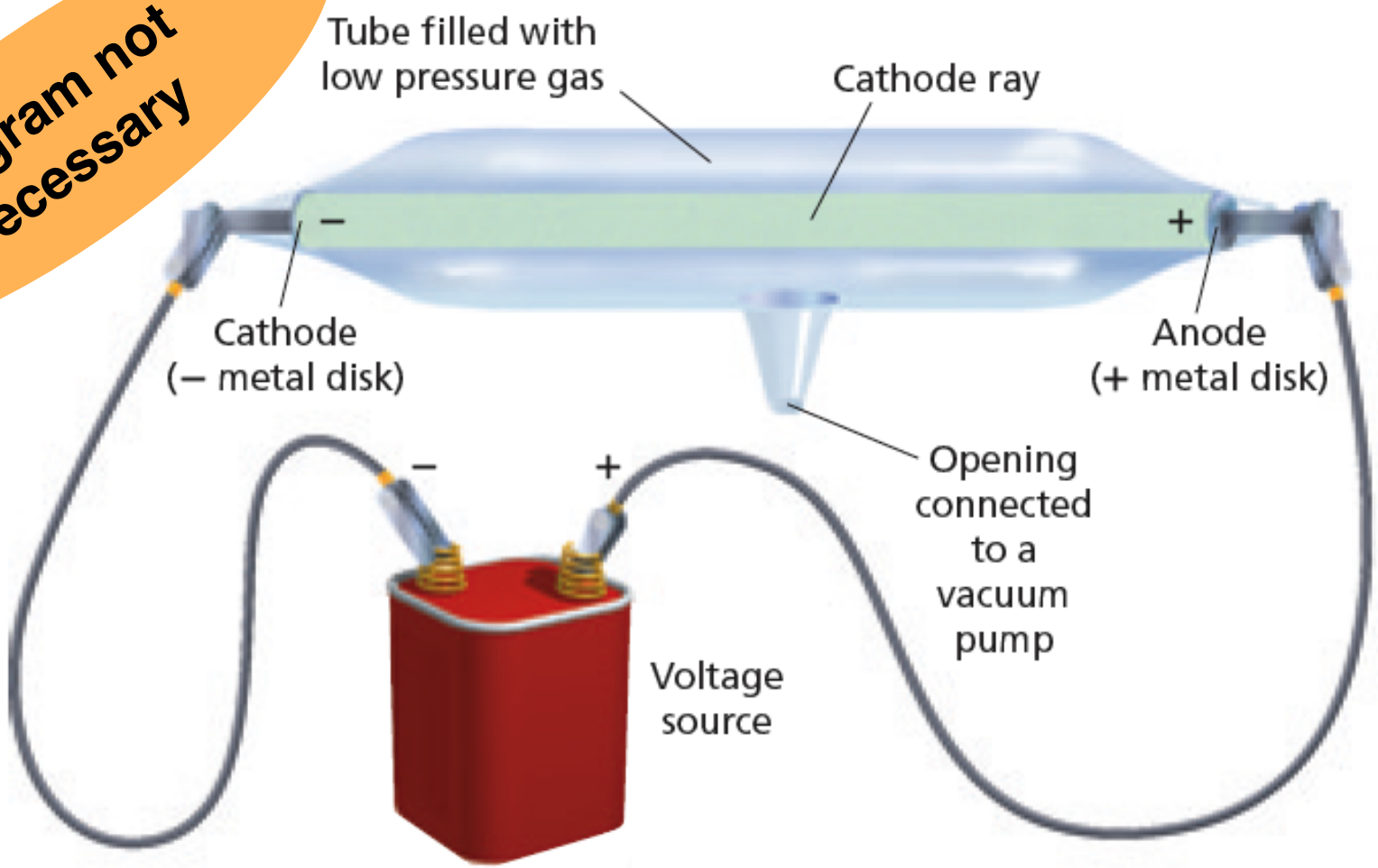
1. Matter could be explained in terms of "atoms" (from the Greek word "atomos," meaning indivisible).
2. Atoms of a given element are identical in size, mass, and other properties.
3. Atoms cannot be subdivided, created, or destroyed.
4. Atoms combine in simple whole-number ratios to form chemical compounds.
5. In chemical reactions, atoms recombine to form new substances.

Although Dalton's theory was very successful, the question remained…

Are atoms really indivisible?

In 1898, J.J. Thomson conducted experiments using a Crooke's tube

Diagram not necessary



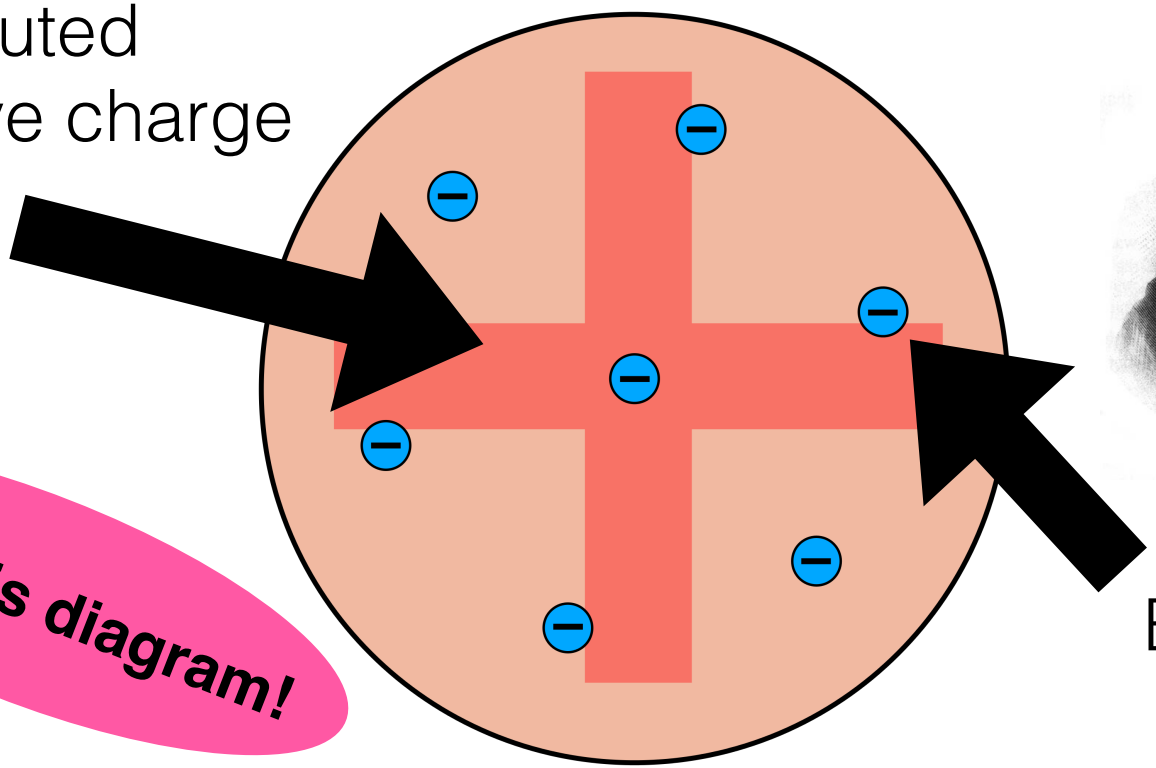
Thomson concluded that all elements give off the same negatively charged particles (“cathode ray particles”).

Today we call these particles…

Electrons!!!

J.J. Thomson's Plum Pudding Model

Evenly distributed positive charge



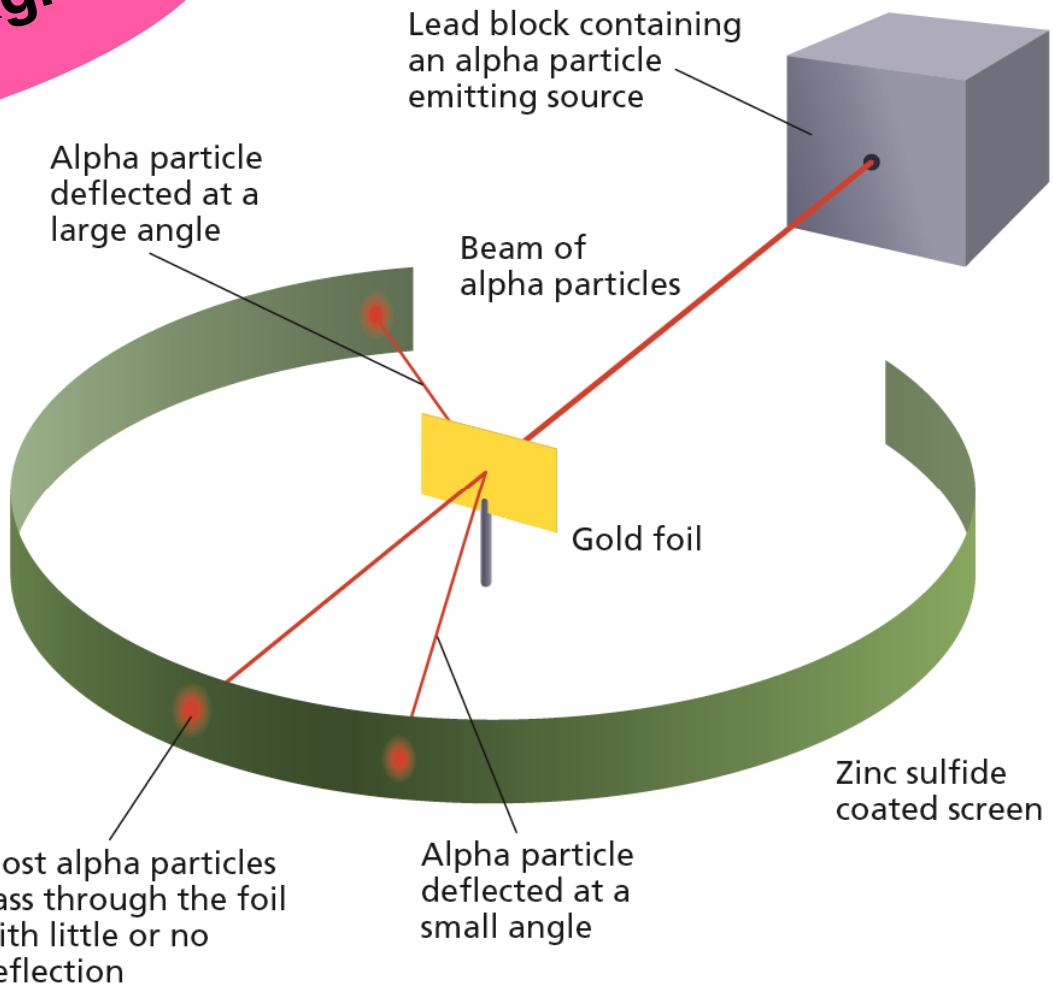
Electrons

Draw this diagram!

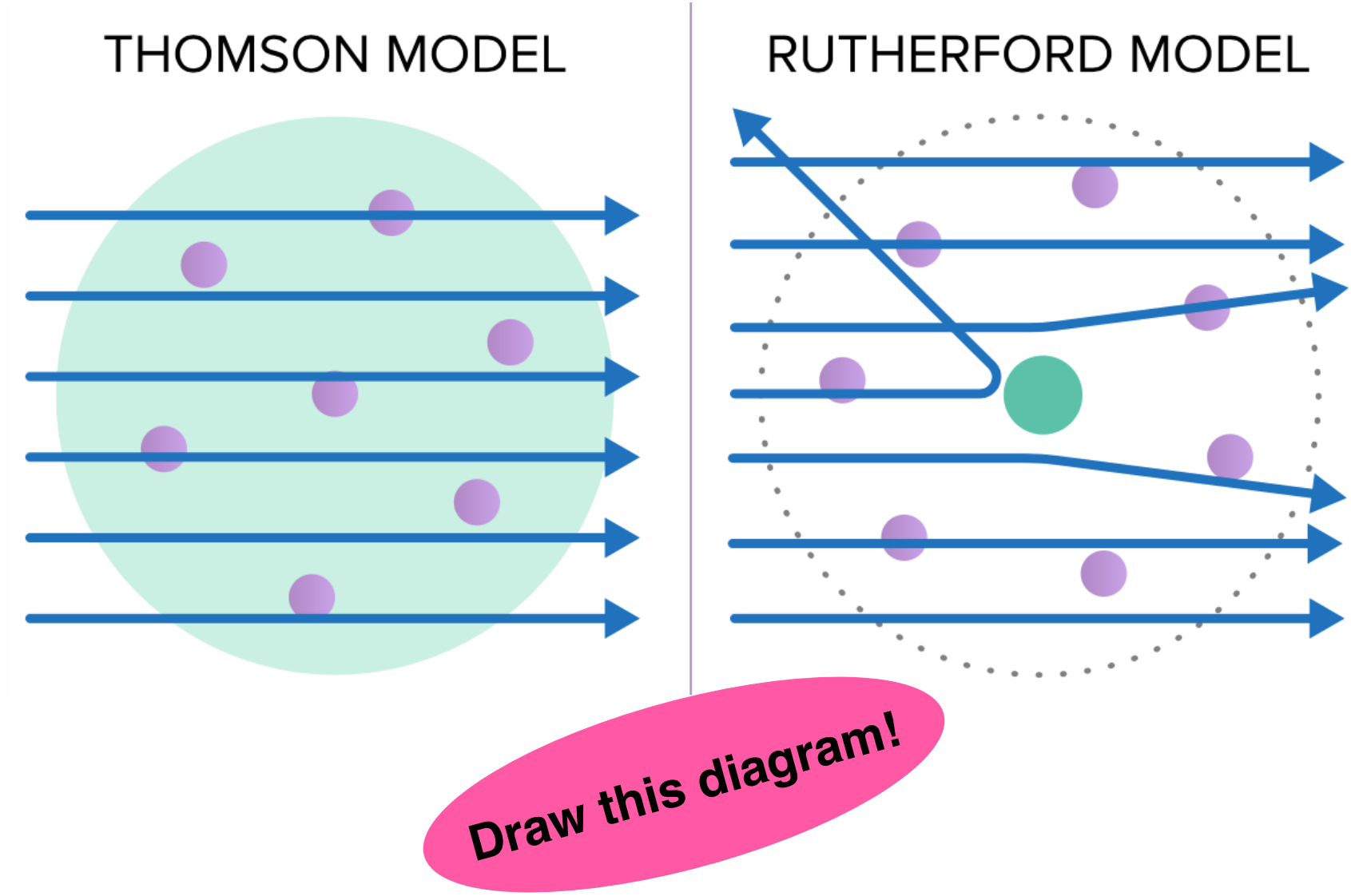
But this model was shown to be completely wrong by one of the most important experiments of all time…

The Rutherford Experiment (1911)

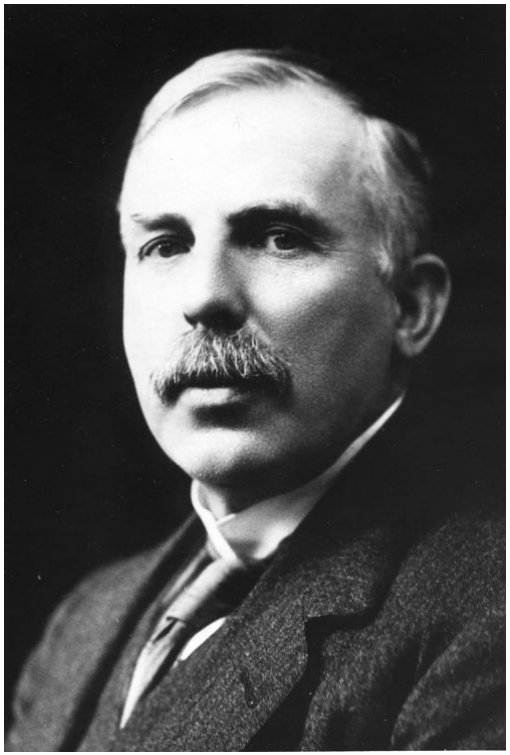
Draw this diagram!



The Discovery of the Nucleus



The Rutherford Experiment

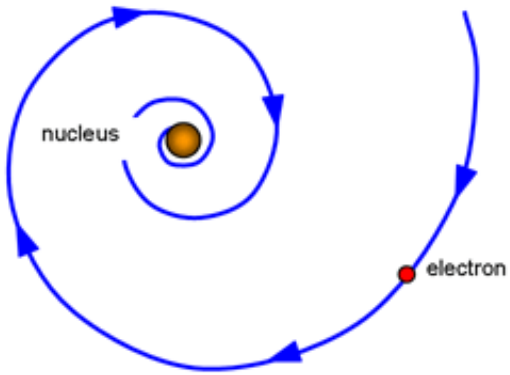


Atoms… matter… everything is composed almost entirely of empty space!

99.999999999999% nothing!!!

The Problem

If electrons are accelerating in orbit around the nucleus, they must lose energy…



So what keeps electrons from crashing into the nucleus???