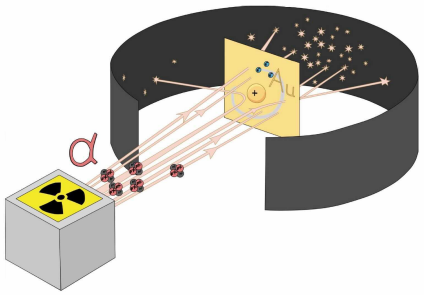
CONCEPT: RUTHERFORD GOLD FOIL EXPERIMENT

- In 1911, Ernest Rutherford's Gold Foil Experiment led to the discovery of the positively charged nucleus within an atom.
  - □ Assisted by fellow chemists Hans Geiger and Ernest Marsden.

Experimental Setup

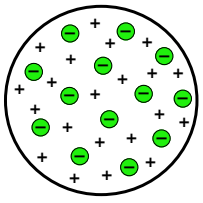
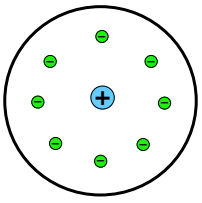
- A thin sheet of **gold foil** is bombarded with **alpha particles** emitting from a radioactive element.
  - □ **Alpha Particle:** Radioactive particle consisting of ___ protons and ___ neutrons. (_____ or _____)
  - □ The radioactive element is usually _____ and is encased in a lead container with an opening in it.
  - □ Around the gold foil is a _____ with a small slit for the **alpha particles** to enter.

The Experiment	Rutherford's Postulates
	1. The protons and neutrons located in the nucleus, which lies at the center of the atom. 2. Although incredibly small, the nucleus comprises _____ of the mass of the atom. 3. Surrounding the dense, positively charged nucleus is a cloud of _____.

EXAMPLE: The gold foil Rutherford used in his experiment had a thickness of approximately 6.0×10^{-3} mm. If a single gold atom has a diameter of 2.9×10^{-8} cm, how many atoms thick was Rutherford's foil?

Nuclear Model

- Helped to disprove **Thomson's Plum Pudding Model**, which was considered the accepted atomic model.
  - □ If Thomson's Model were right then all the **alpha particles** would have passed through with little to no deflection.

Plum Pudding Model	Nuclear Model
	

EXAMPLE: Rutherford's experiment with alpha particle scattering by gold foil established that:

a) Electrons are positively charged subatomic particles.

b) Atoms are comprised of protons, neutrons and electrons.

c) Protons are not evenly distributed throughout an atom.

d) Protons are about 1000 times lighter than electrons.