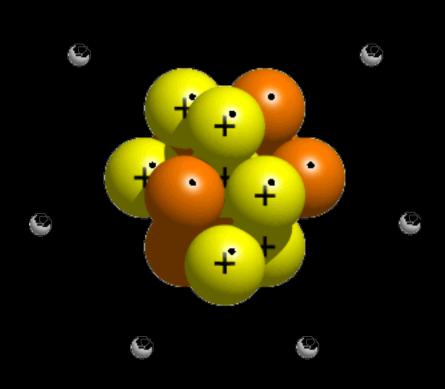
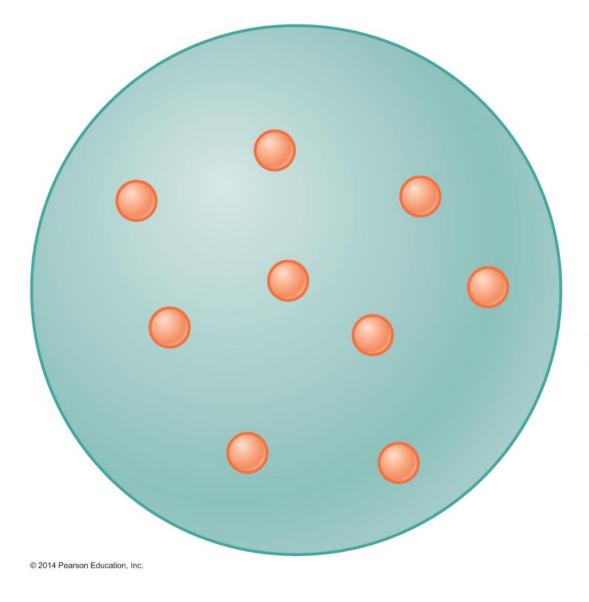
# Chapter 25 The Atom



Revised 7.24.2020 Some diagrams from Pearson Physics by Walker. Used with permission

### J.J. Thompson's Plum Pudding Model



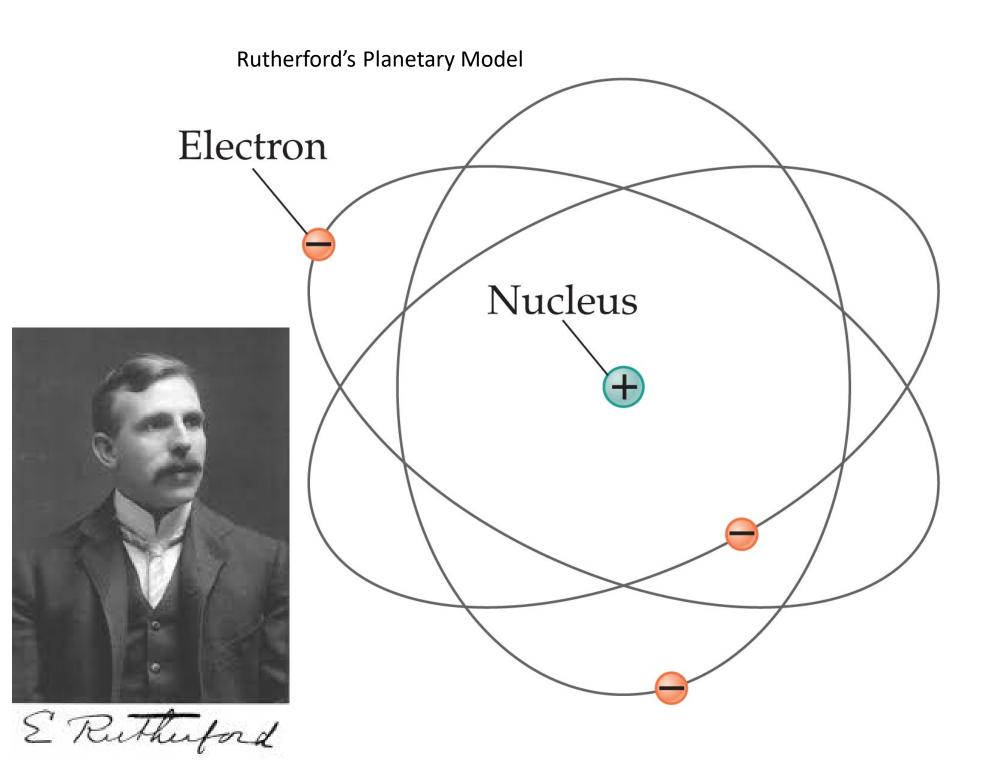
## Positive charge





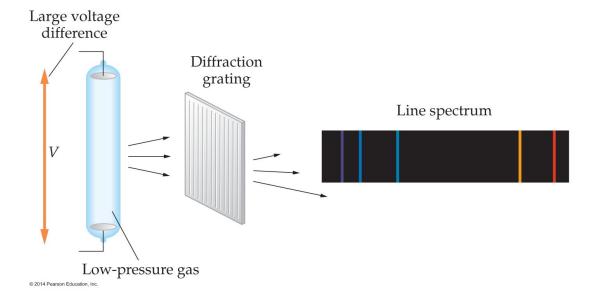
Rutherford's Experiment led to the "Planetary Model" where the negative electrons orbited the positively charged nucleus as planets orbit the sun.

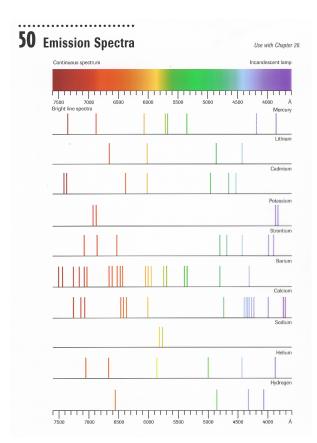
### **51** Gold Foil Experiment Use with Chapter 28. Radioactive source Beam of alpha particles Deflected alpha particles Circular fluorescent screen Greatly deflected particles Slightly deflected Atoms of gold foil Head-on approach to nucleus Beam of Undeflected particles subatomic particles Influenced by nucleus charged nucleus Slightly deflected particles



The planetary model had serious flaws.

- 1. The orbiting electron should give off energy by radiation and spiral inward. Atoms would not be stable.
- 2. The orbiting electrons should give off a continuous spectrum. They do not. They give off line spectra, as indicated at the right.

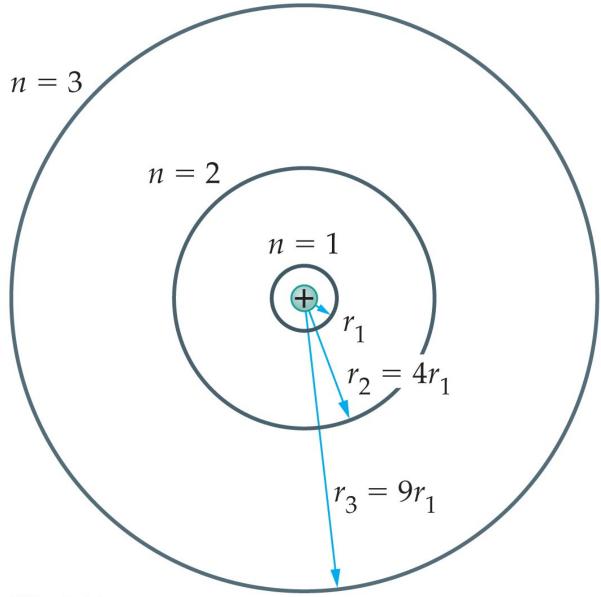




#### Bohr's model:

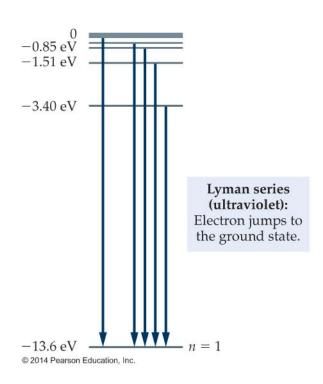
- 1. Only certain orbits are possible. Electrons in orbits are stable.
- 2. Electrons radiate only when they are changing orbit, in which case the energy is given off in quanta calculated by E = hf
- 3. Spectral lines represent energy differences between orbits.

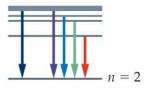
Bohr's Model -- only certain orbitals are permitted.





Neils Bohr



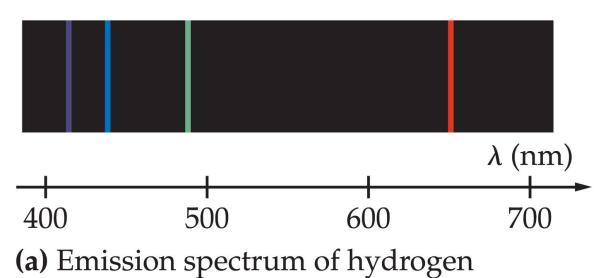




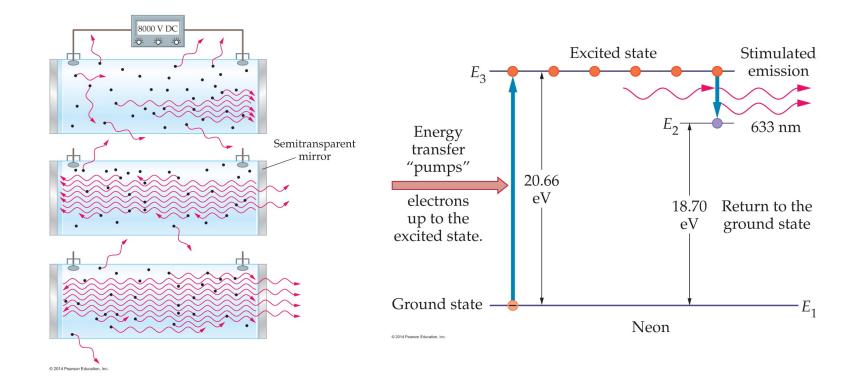
Balmer series (visible and ultraviolet): Electron jumps to the first excited

state.

Paschen series (infrared): Electron jumps to the second excited state.







Read pages 898 - 900 for the theory and some applications of lasers.