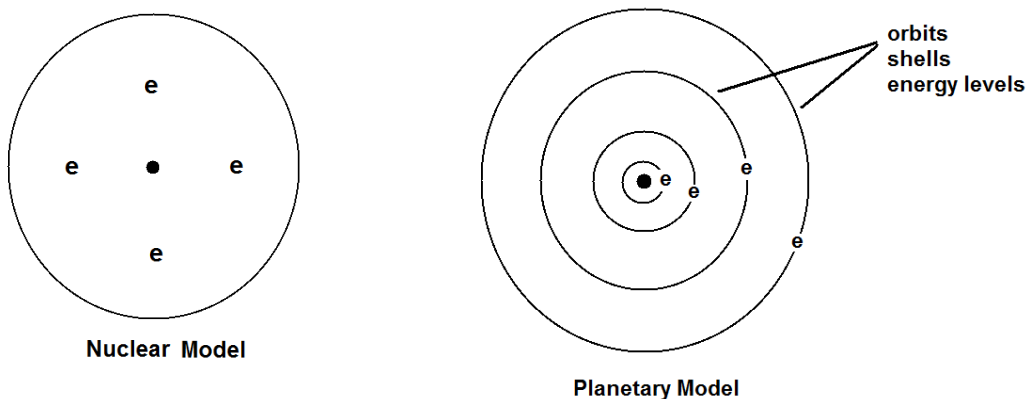


Aim: How was the structure of the atom discovered? (Part 2a)



1) The Planetary Model (Bohr, 1913)

- Electrons orbit the nucleus like the planets orbit the sun
- Orbits are aka **energy levels** b/c electrons that are **further** away from the nucleus have **greater** potential energy.

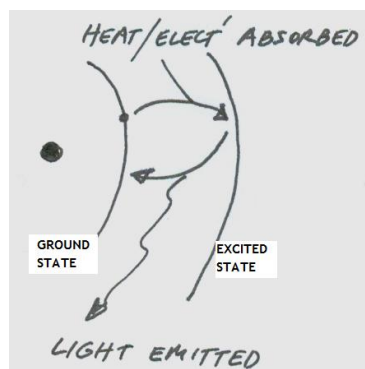
Proof?

When elements are heated with fire or zapped with electricity they give off light.

Demo: exciting $H_2(g)$ with electricity; produces a “purple” colored light

Bohr's explanation:

a) When an electron **absorbs** electricity/heat, it jumps to an orbit further away from the nucleus; when it jumps back, light is **emitted** (released).



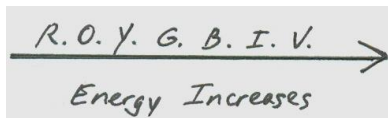
Think of this as an energy conversion. For example, when a book is raised to a height above a table and dropped, mechanical energy is converted to sound energy. When the $H_2(g)$ is excited, electricity is converted to light by way of an electron.

NOTE: Light is emitted only when an electron jumps from a higher to lower energy level (from an “excited” state to the “ground” state).

Demo: exciting He (g); produces a yellow-orange colored light

b) The color of the light emitted depends on **how big** the electron jump is.

The different colors of light differ in energy. Red is the **least** energetic; violet is the **most** energetic.



Again, going back to dropping a book onto a table, the higher the height of the book, the greater the sound produced when it hits the table. In the case of electron excitation, when an electron jumps a greater distance it emits more energetic light.

So, a bigger electron jump, emits a greater amount of light energy, producing a color closer to violet.

c) Bohr calculated the energies of the different orbits and predicted the colors of the light that would be emitted by different **electron jumps (transitions)**.