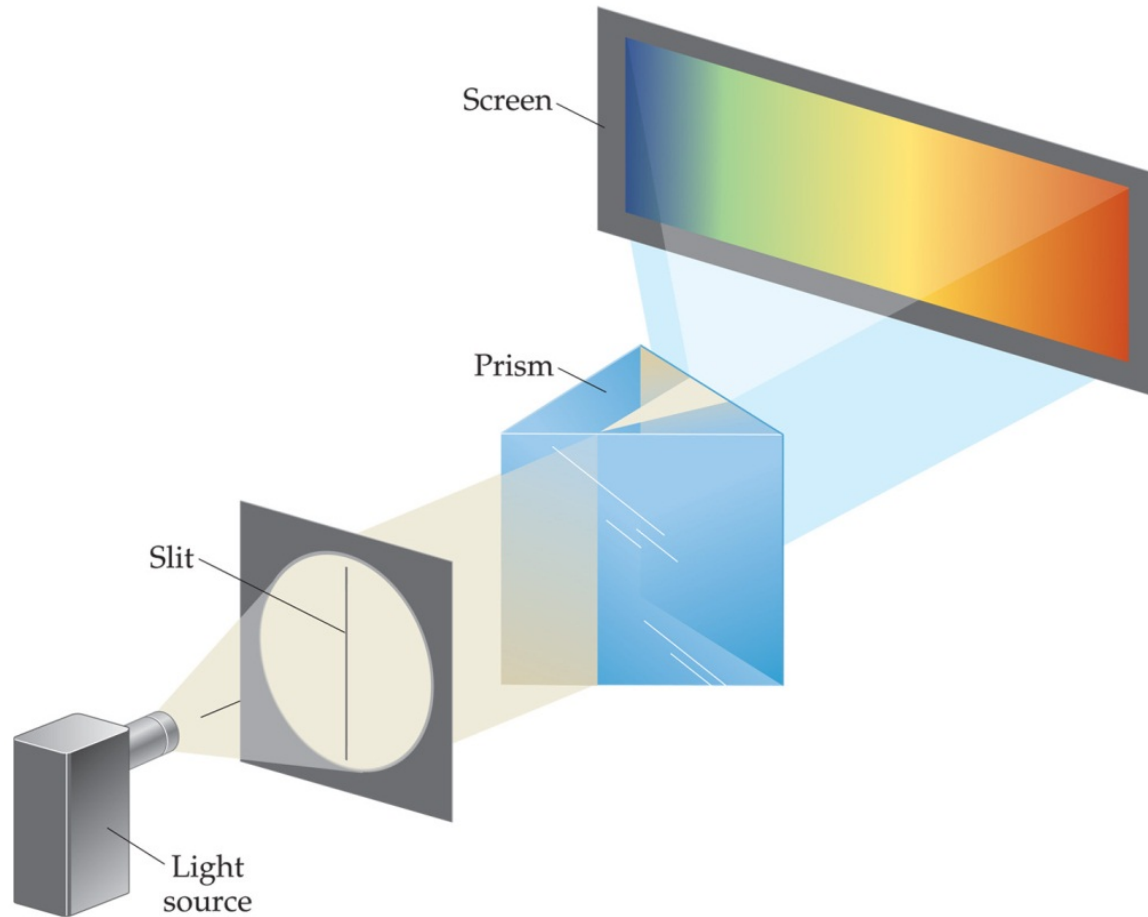




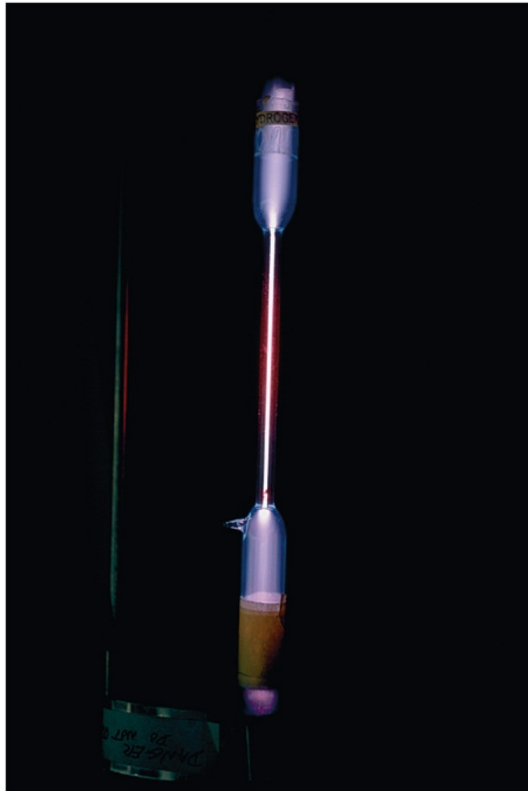
Bohr's Atomic Model

Bromfield Honors Chemistry

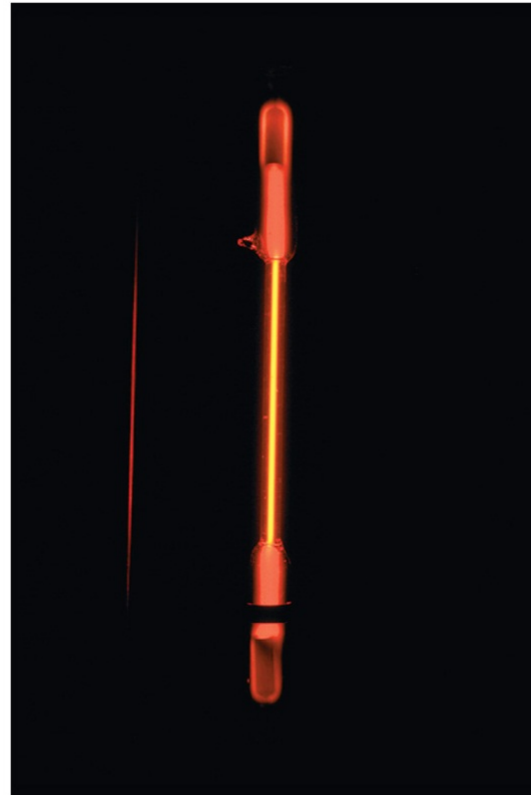
White light source



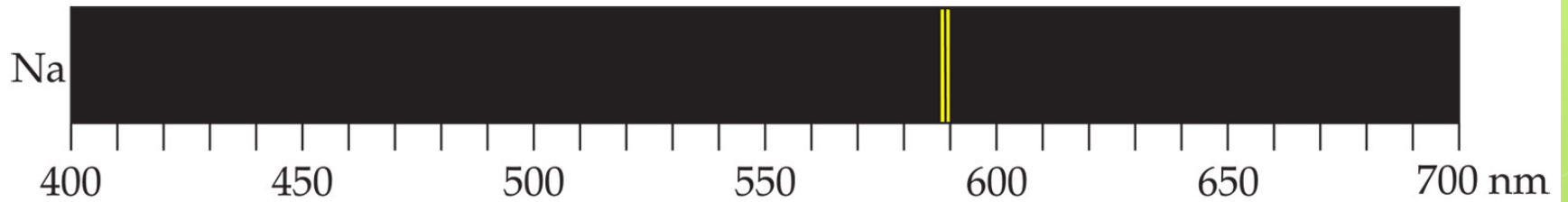
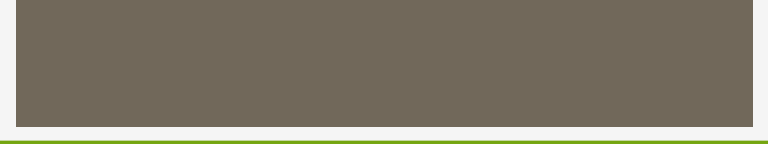
Gas discharge tubes



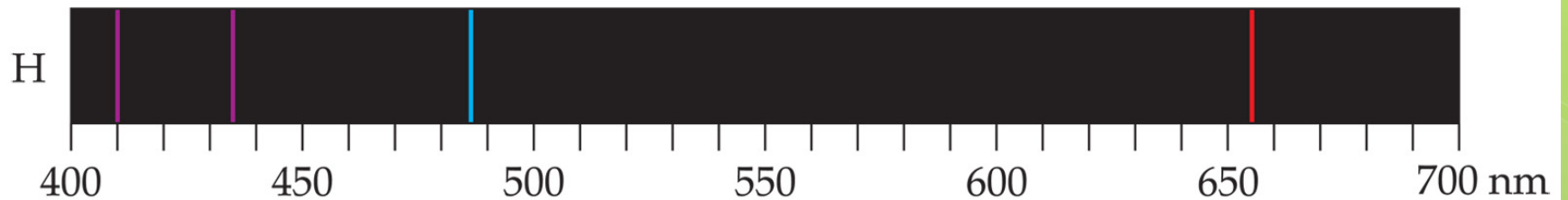
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(a)



(b)

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Why do these samples emit discrete lines and not a continuous spectrum?

Niels Bohr



Light

- Light exhibits a wave-particle duality
 - It can be treated as a wave

Light

- Light exhibits a wave-particle duality
 - It can be treated as a wave
 - It can be treated as a particle
 - Photon or quantum of light

Max Planck

- German physicist



Max Planck

- Energy is QUANTIZED



Max Planck

- Energy is QUANTIZED
 - i.e., only certain (discrete) energies are allowed



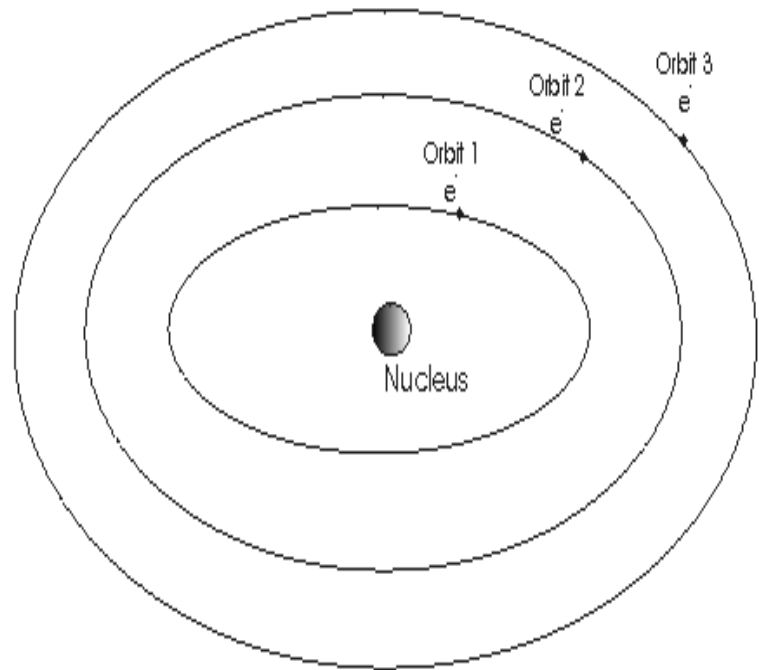
Niels Bohr



- Worked with Rutherford
- Developed an explanation for atomic emission spectra
- Refined Rutherford's atomic model

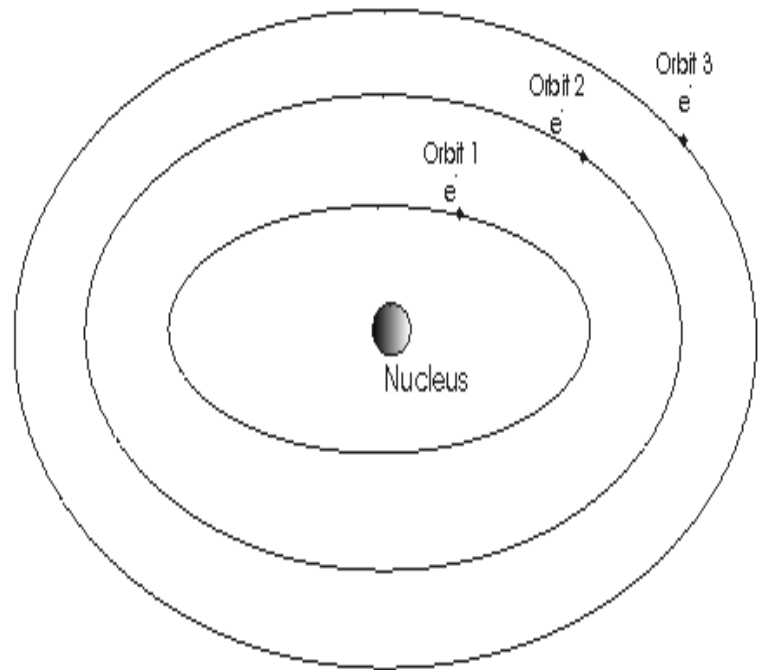
The Bohr model of the atom

- Only certain orbits around the nucleus are allowed.



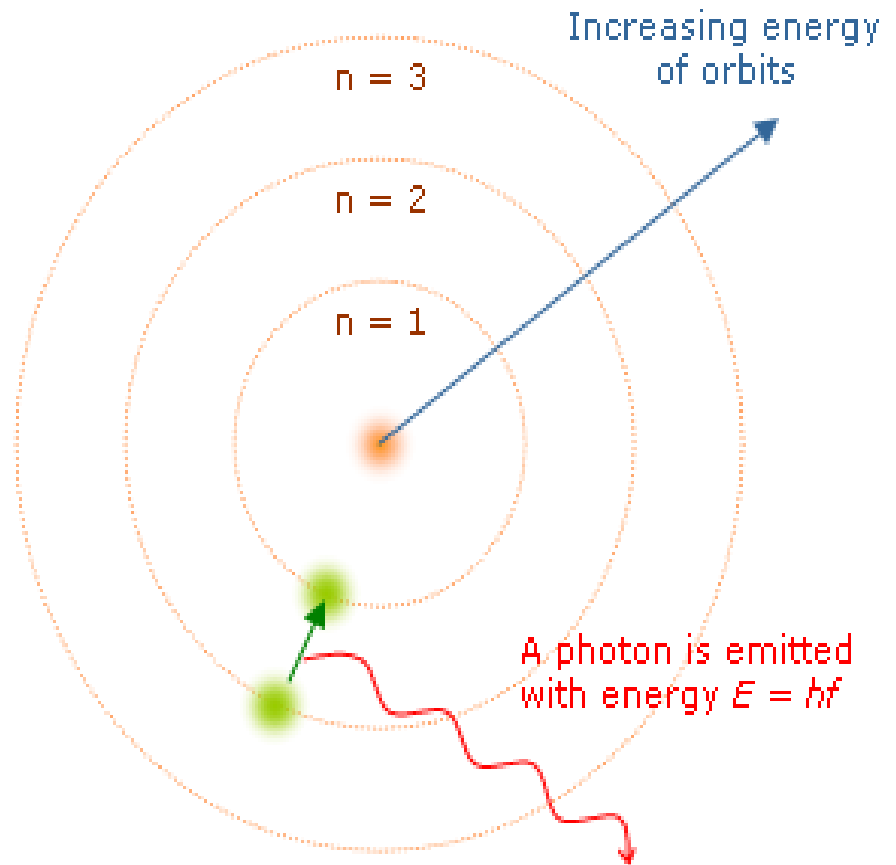
The Bohr model of the atom

- Only certain energy levels are allowed for electrons.



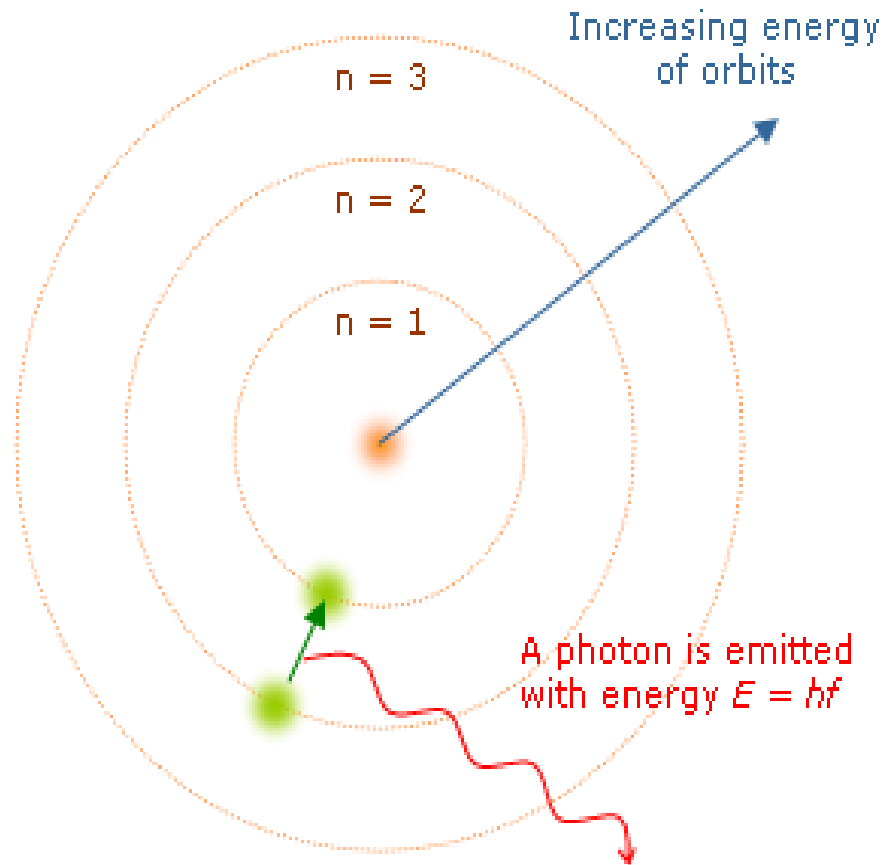
The Bohr model of the atom

- For an electron to go to a HIGHER energy level:



The Bohr model of the atom

- For an electron to go to a LOWER energy level:



Electron energy levels

————— $n = 4$

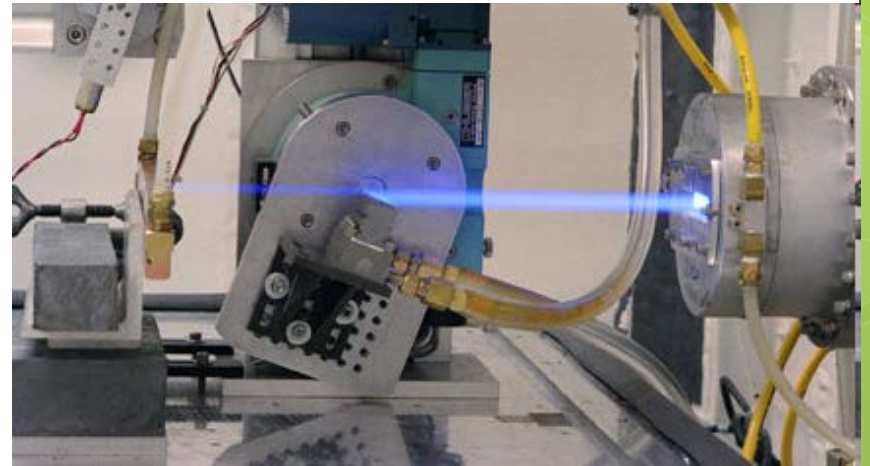
————— $n = 3$

————— $n = 2$

————— $n = 1$

Problems with the Bohr model

- Electrons traveling in fixed orbits give off xrays



Courtesy of NSLS, Brookhaven National Laboratory

2009 Nobel Prize in Chemistry



- Structural and functional studies of the ribosome
 - Venkatraman Ramakrishnan
 - Thomas A. Steitz
 - Ada E. Yonath