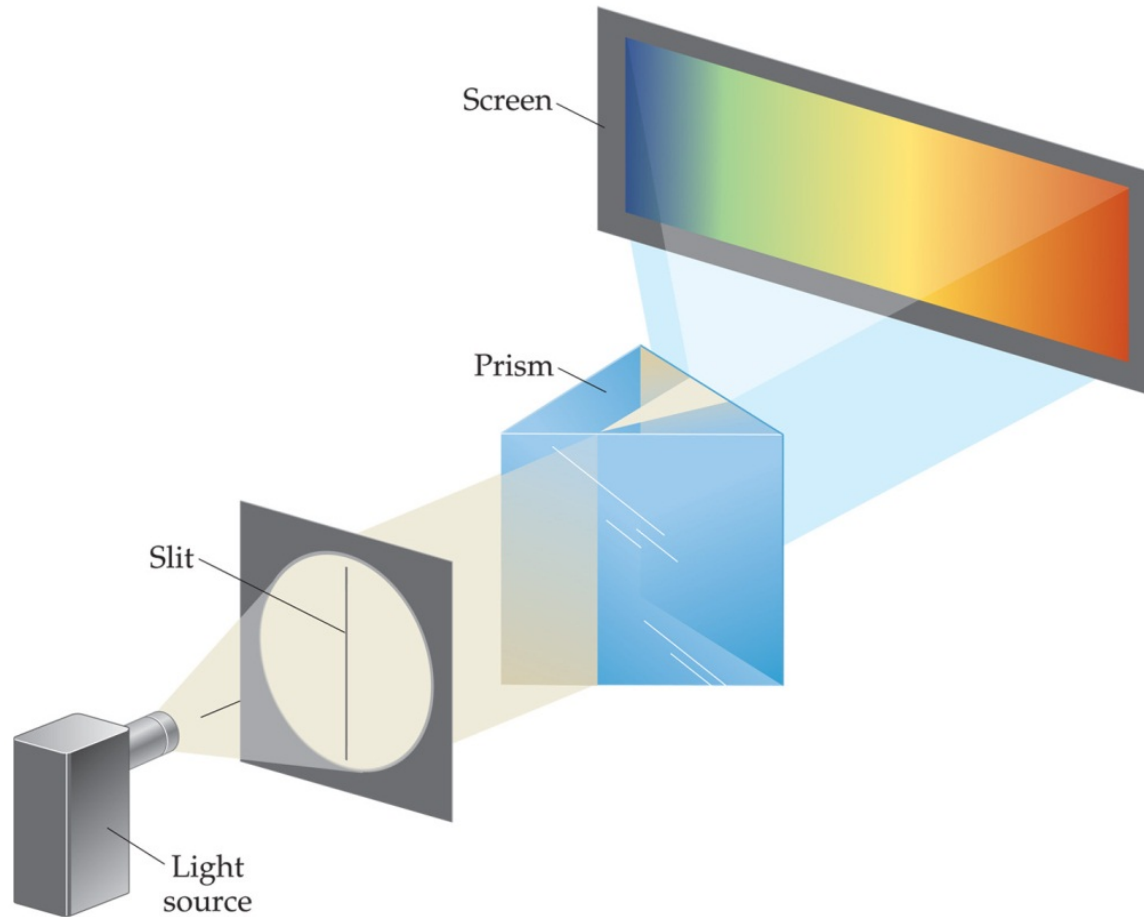


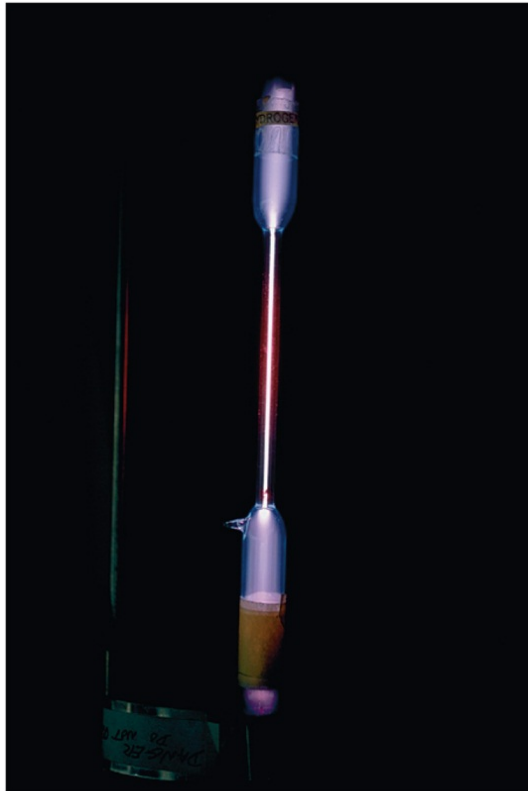
Bohr's Atomic Model

Bromfield Honors Chemistry

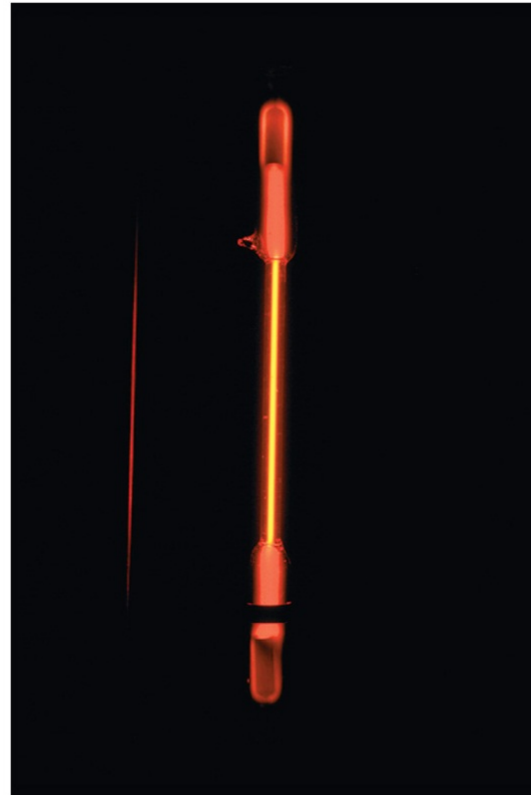
White light source



Gas discharge tubes

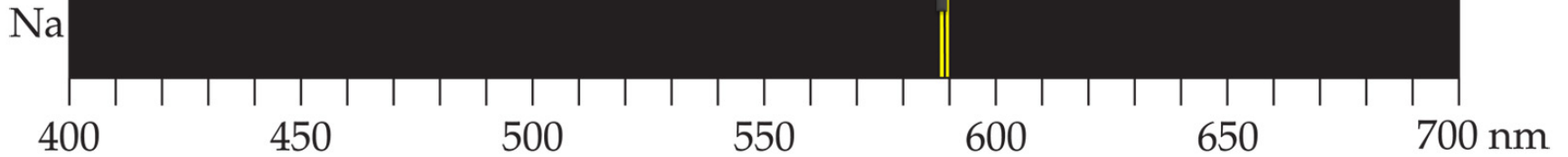


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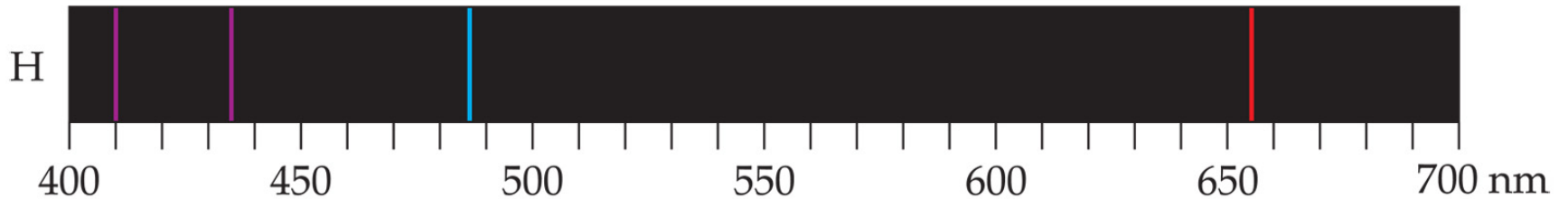


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Element emission spectra



(a)



(b)

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

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



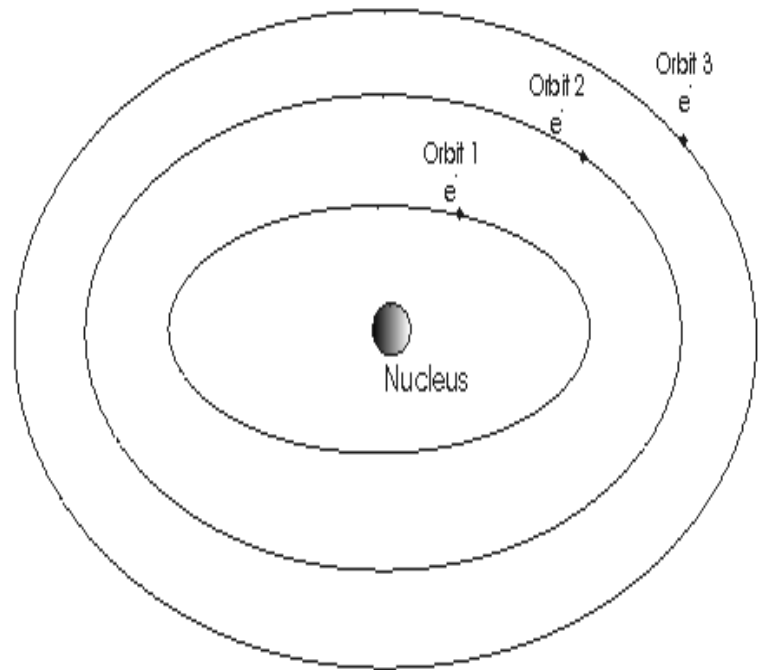
Niels Bohr



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

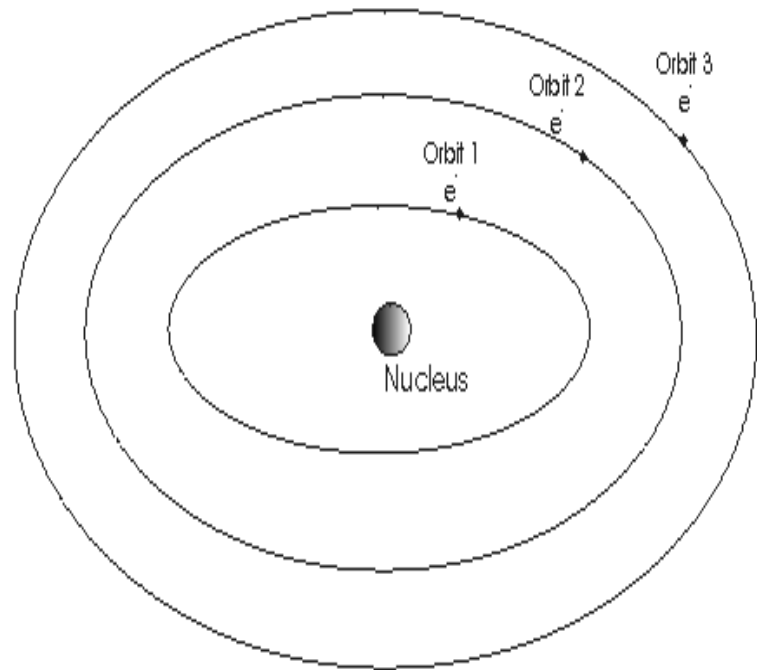
The Bohr model of the atom

- ▶ Only certain orbits around the nucleus are allowed.



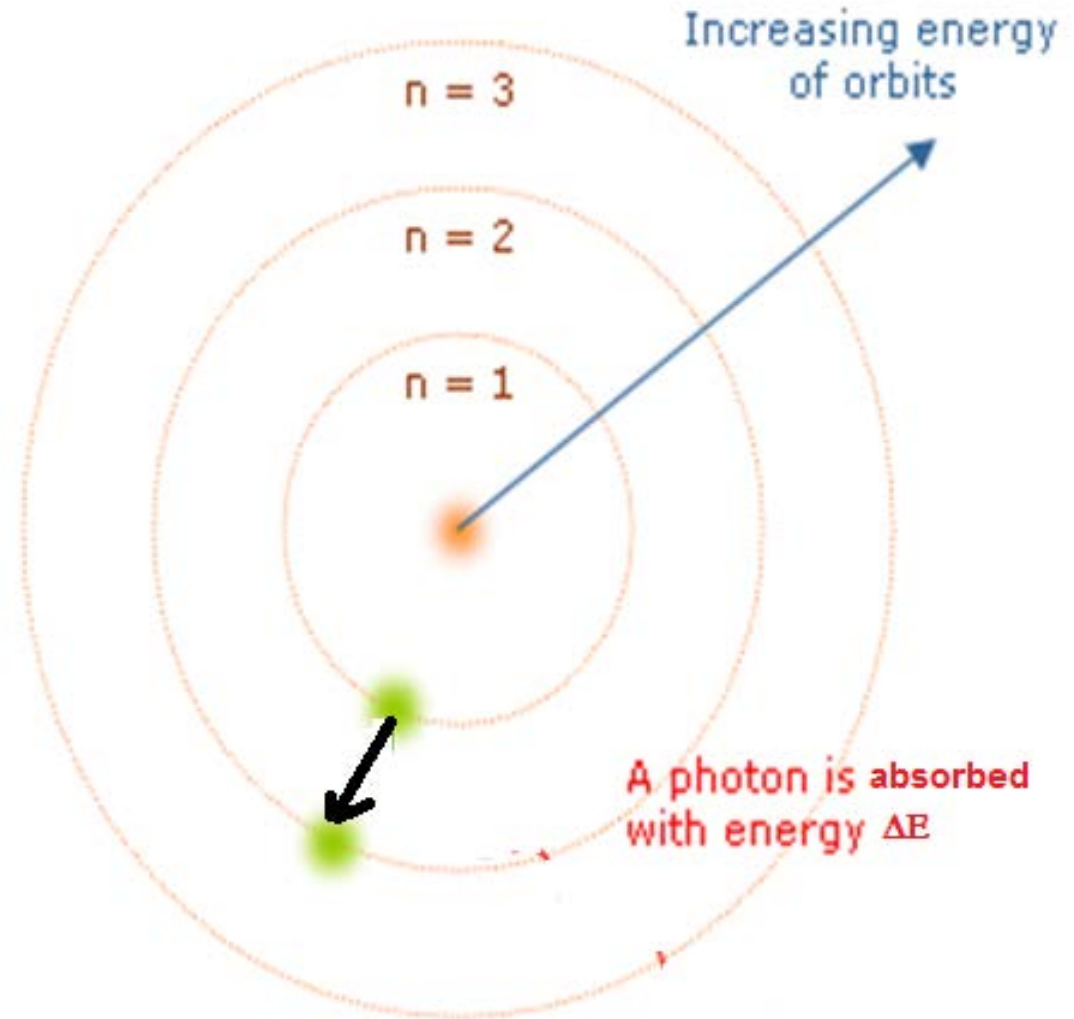
The Bohr model of the atom

- ▶ Only certain energy levels are allowed for electrons.



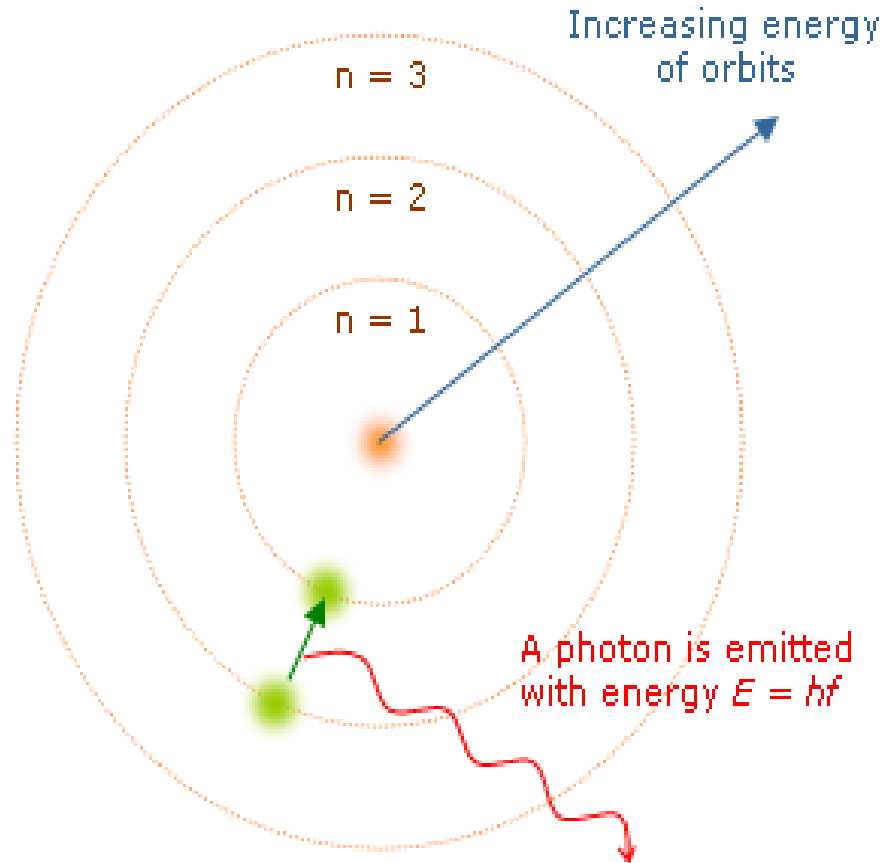
The Bohr model of the atom

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

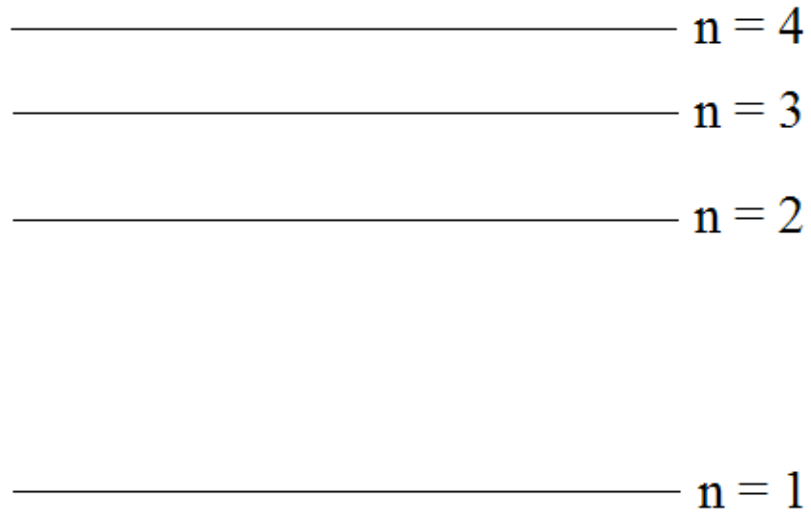


The Bohr model of the atom

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

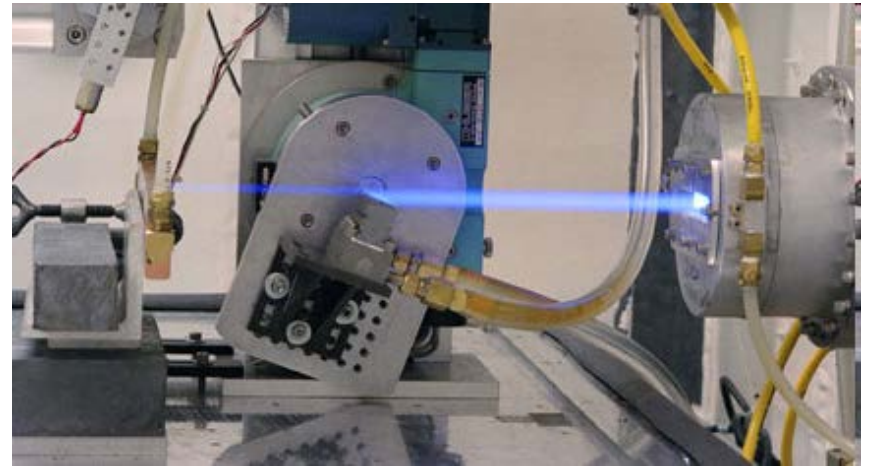


Electron energy levels



Problems with the Bohr model

- ▶ Electrons traveling in fixed orbits give off xrays
- ▶ [Video](#)



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