Warm-up:

PS: Chemistry

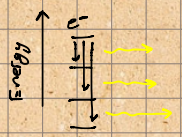
A Spectrum of Models

Different substances absorb or emit light based on their atomic or molecular structure. Each element has a unique structure that is revealed through spectroscopy, which allows scientists to take a complex sample, expose it to heat, and look at the spectrum of emissions. The spectrum in its entirety looks like a rainbow, but the spectral lines of an individual element may consist of only four or five single lines at different points in the spectrum. The emissions can then be compared to emissions of known elements, and the elements that are present can be identified.

What kind of problem might arise if a person were trying to identify a large group of substances by looking at their spectra with just the naked eye? We cannot separate colors with our eyes

• Things Bohr Got Right:

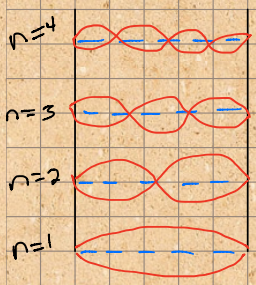
1. Electrons have quantum energy levels [specific amounts]
2. Accurately predicted spectral lines of Hydrogen



• Things Bohr Got Wrong:

① Electrons are not found in fixed orbits
② Failed to predict multi-electron atoms

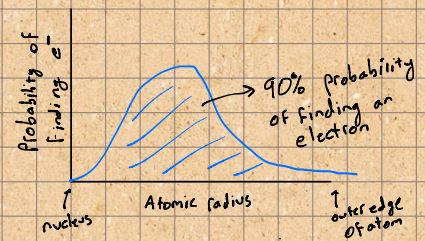
• Erwin Schrödinger noticed that standing waves have quantum energy levels just like electrons



• Each "allowable" energy level for an electron can be thought of as a standing wave

* Using wave mathematics, he predicted multi-electron atoms

• Each waves could be converted into a probability function



• Electron Orbitals: regions of space where we are 90% likely to find an electron

Hw: Section 13.3 Review

section review 13.3

15. A hydrogen lamp emits several lines in the visible region of the spectrum. One of these lines has a wavelength of 6.56×10^{-5} cm. What are the color and frequency of this radiation?
16. Explain the origin of the atomic emission spectrum of an element.
17. Can classical physics explain the photoelectric effect? Explain your answer.
18. Compare the ground state and the excited state of an electron.
19. Arrange the following in order of decreasing wavelength.
    a. infrared radiation from a heat lamp
    b. dental x-rays
    c. signal from a shortwave radio station