

CHM2045
Fall 2017
Week 9

Reading: Zumdahl – Chapter 7 (all)

You know what's awesome about atoms (besides everything)? The electrons. They provided mystery to the atoms, and kept them shrouded in secrecy. We knew that atoms existed for hundreds of years before having a model that could accurately describe them, all because of electrons.

We will explore electrons by starting with the things we use to explore light waves, namely wavelength and frequency. We will see that those correspond to an energy through an equation given by Max Planck. This knowledge will help us understand the photo-electric effect, and arrive at Bohr's model of the atom.

While Bohr's model is fundamentally incorrect, it provided a framework for the modern quantum view of the atom which treats electrons as waves with a certain amount of uncertainty. Ultimately we will see that we will describe electrons and their locations through the language of probability and orbitals.

Trust me, we are getting there.

With all of this in hand, we can take a fresh look at the periodic table. A lot of those periodic properties that we accepted early on can be explained through this quantum model. We will look at the relative reactivity of species as well as their size, ionization energy, and electron affinity.

You'll never see Star Trek the same way again.

Learning Outcomes:

By the end of this week, a student should be able to:

1. Determine the wavelength, frequency, or energy for any photon on the electromagnetic spectrum.
2. Describe the deBroglie wavelength, and its importance.
3. Describe electron locations in terms of orbitals and electron configurations.
4. Relate electron configurations to various periodic properties.

Recommended Problems:

7.39-42, 7.57, 7.73, 7.81, 7.85, 7.87, 7.93, 7.105, 7.107, 7.109