Lecture 18
04/10/2008
Spectroscopy and the Quantum Mechanical Model

We went over last lecture's note which was on waves
Waves can measured in three variables.

- Wavelength , frequency and speed . All these three related by the formula

$c = \lambda.\nu$

- Energy of a wave is directly promotional to frequency and it related by $E = h \nu$

Using a Diffraction Grating to Observe Emission Spectra

- Diffraction - property of light that can be explained only by wave behavior (see diagram on pg 3 of lecture slide for more) .
- Absorption spectrum (measuring of the amount of light absorbed) is quantized .
- When looking at light through the diffraction grating, the smaller distance between M= 1 and M= 0 dots, the higher the frequency and the shorter the wavelength .

We tried using a different grating to observe spectra in class(also see pg 3 on lecture slide for instructions in how it was done) . At the end of the experiment you can only see the specific frequency of light not all the rainbow color.

Model to Describe the Hydrogen Emission Spectrum(see diagram pg 4)
Emission of spectrum is when the atom of the system is giving off light.
Different theory was tried in class to see which describes the emission spectrum.
Examples are
Plum pudding- did not describe emission of light
Classical Solar system- did not describe it either because electrons fell in.
Bohr- did not work well because E=hv
Debroglie- did describe the emission of light

Using Rydberg Equation (see pg 6 for more of the example)

- The red light was one of the light saw on the diffraction grating and the other was infrared which could not be seen with our eyes. If infrared light could be seen with our eyes we would see more of the light emitted on the diagram on page 7
- The line spectrum is the signature of elements you are looking at
- Different element has different spectrum.