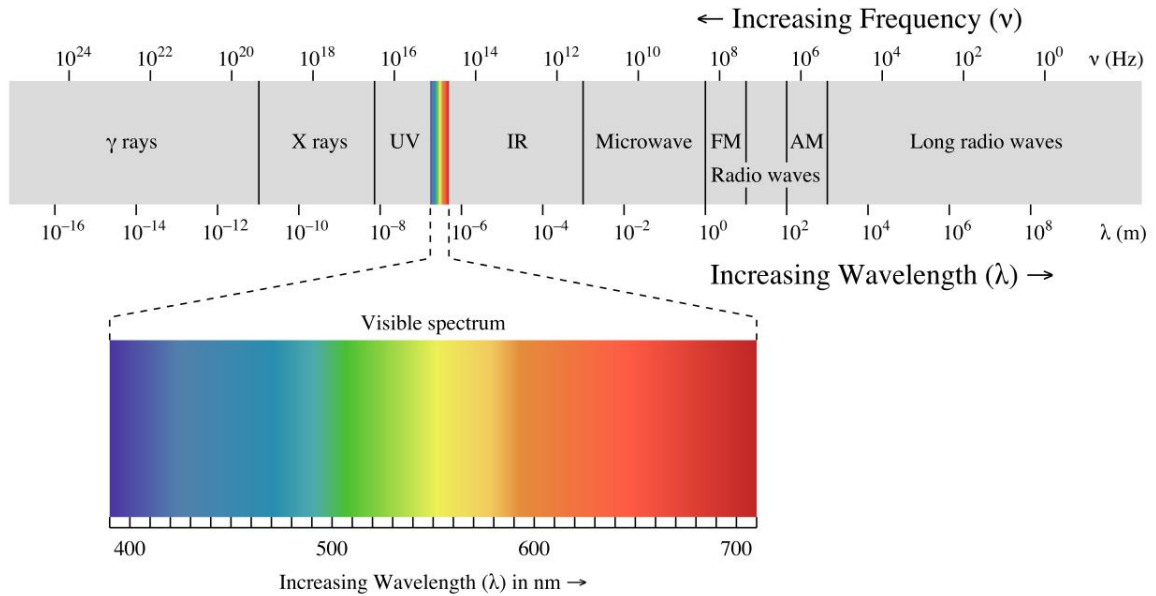
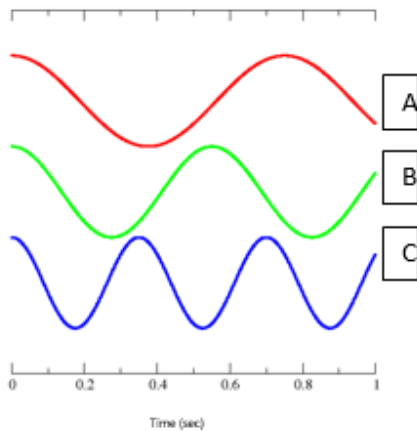
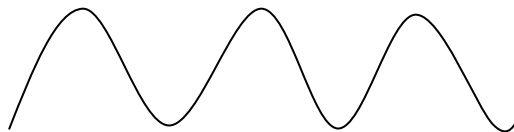


Honors Chemistry Unit 2 - Quantum Theory Notes

- Light is a _____ and a _____, at the same time!
- Electromagnetic radiation:
- Electromagnetic spectrum:



- Properties of waves:
 - Speed:
 - Wavelength:
 - Frequency:
 - Amplitude
 - Picture:



Which wave has the:

Lowest frequency _____

Shortest wavelength _____

Least energy _____

Using the electromagnetic spectrum as a reference, which form of radiation has the:

- a) Longest wavelength _____
- b) Highest frequency _____
- c) Highest energy _____

Which form has the longer wavelength in each pair of choices? (Circle the correct answer)

Violet or Green
Blue or Red

Ultraviolet or Infrared
Ultraviolet or Visible

Infrared or Visible

Orange or Yellow

Wave Equations

a) Write the equation:

b) Define each variable.

Examples

a) Microwaves are used to transmit information.
What is the wavelength of a microwave have a frequency of 3.44×10^9 Hz?

b) What is the frequency of green light that has a wavelength of 4.9×10^{-7} m?

Wave Equation Variable Relationships

How is frequency related to wavelength? _____

How is frequency related to energy? _____

How is wavelength related to energy? _____

5. Max Planck (_____): What did he do?

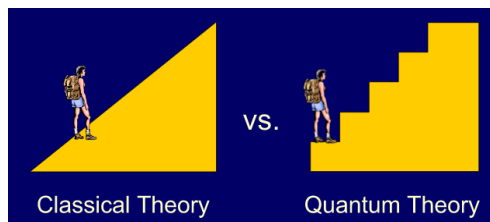
6. Define photoelectric effect:

7. Define quantum:

8. Einstein (_____): What did he do?

9. Define photon:

10. How is this picture like how we understand light?



Wave Equations

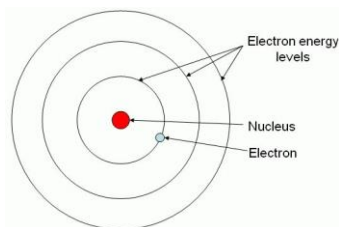
a) Write the equation:

b) Define each variable.

Example

What is the energy of a photon from the violet portion of the rainbow if it has a frequency of $7.23 \times 10^{14} \text{ s}^{-1}$?

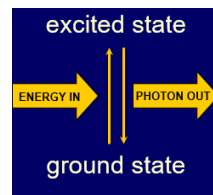
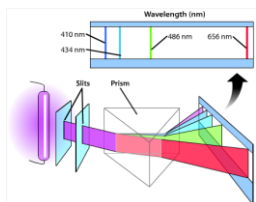
Bohr's Model of the Atom:



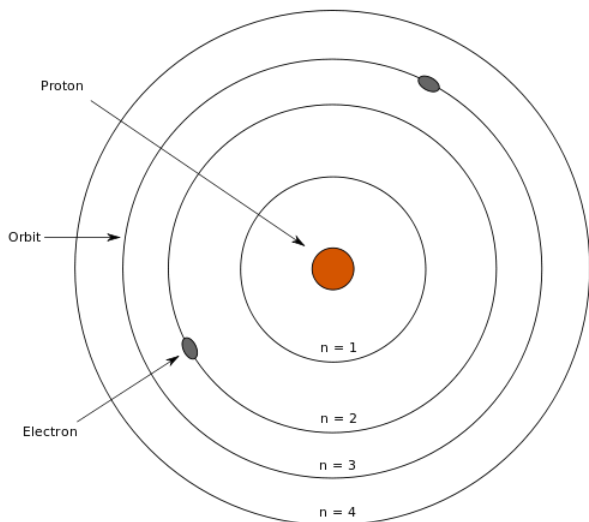
11. Define Ground State:

12. Define Excited State:

13. Atomic Emission Spectra:

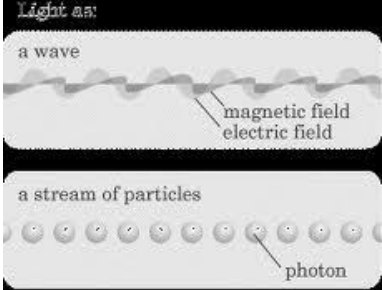
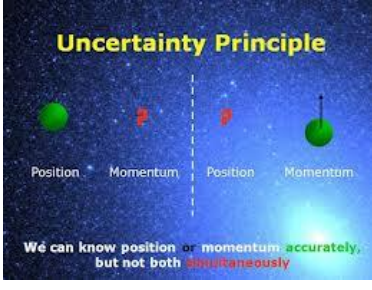



14. Describe the photoelectric effect using Bohr's Model of the Atom:



15. What's wrong with Bohr's model?

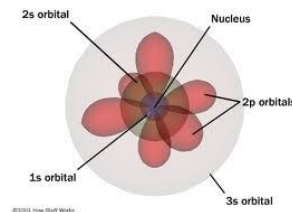
7. The Modern Quantum Model of the Atom – The foundation for modern atomic theory was based on the following:

Ideas	DeBroglie's Hypothesis (1923)	Heisenberg's Uncertainty Principle (1927)	Schrodinger's Wave Equation (1926)
Definition/ Explanation			
Example			

8. Quantum Numbers

a. What are quantum numbers?

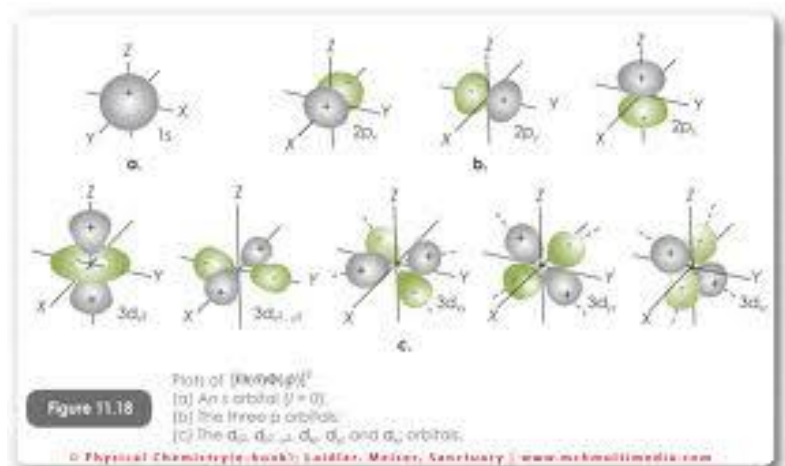
b. Describe each of the quantum numbers:



The Quantum Model

Principle Quantum Number (n)

Second Quantum Number (l)



Third Quantum Number (m_l)

Fourth Quantum Number (m_s)

Summarizing Quantum Numbers

Principal Energy Levels	Number of Sublevels	Number of Orbitals per Sublevel	Number of Electrons per Sublevel	Maximum Number of Electrons per Energy Level
		s p d f =	s p d f =	

9. Electron Configuration - Notations used to show the arrangement of electrons in an atom

Rules for Writing Electron Configurations

Aufbau Principle	Pauli Exclusion Principle	Hund's Rule

<u>Electron Configurations</u>	<u>Noble-gas Electron Configurations</u>

<u>Orbital Notations</u>	<u>Lewis Electron Dot Diagrams</u>

Practice

Element	Atomic Number	Electron Configuration	Orbital Notation	Electron Dot Diagram
Phosphorus				
Bromine				
Bromide Ion				
Calcium Ion				