**Energy Homework**

*Helpful Hints*: 1 meter = 109 nanometers

Assume all waves are traveling in a vacuum, unless otherwise noted.

1. List the electromagnetic spectrum from highest to lowest energy.
2. List the electromagnetic spectrum from longest to shortest wavelength.
3. Calculate the frequency of ultraviolet A with a wavelength of 350 nm.
4. Calculate the energy, in quanta, of the ray above.
5. Calculate the frequency of a wave traveling with a wavelength of 1.2 meters.   
   What type of ray would this most likely be?
6. Calculate the energy of a photon traveling with a frequency of 1.0 🞨 105 s-1.
7. Copper absorbs energy with a wavelength of 510 nm. If 2.20 🞨 104 J of energy is emitted, calculate the number of copper atoms that were present. Assume 1 atom emits 1 quantum.
8. In problem 7, how many grams of copper were present?
9. Calculate the frequency of a wave of wavelength 1.50 🞨 102 centimeters traveling at 80 % of the speed of light in a vacuum?
10. Calculate the energy for visible light of wavelength 400 nm, 550 nm and 700 nm. Graph energy vs. wavelength. What can be said about the relationship of energy to wavelength?