Dougherty Valley HS Chemistry - AP
Atomic Structure – Calculations

Worksheet #1

Name: **Period:** **Seat#:**

Formulas and Constants					
$c = \lambda\upsilon$	$\upsilon = \frac{c}{\lambda}$	$\lambda = \frac{c}{\upsilon}$	$E = h\upsilon$	$E = \frac{hc}{\lambda}$	$c = 2.998 \times 10^{8}$ m/s $h = 6.626 \times 10^{-34}$ J·s

Directions: Show all work in a way that would earn you credit on the AP Test! This is always the rule! Some answers are provided at the end in italics and underlined. If you need more space, use binder paper and staple to your worksheet.

1) List all electromagnetic radiations from low energy to high.

Radio						Gamma

2) An FM radio station has a frequency of 88.9 MHz (1 MHz = 10^6 Hz, or cycles per second). What is the wavelength of this radiation in meters? *3.37 m*

3) The U.S. Navy has a system for communicating with submerged submarines. The system uses radio waves with a frequency of 76 s^{-1}. What is the wavelength of this radiation in meters? In miles? *$3.90E^{6}$ m, 2500 mi*

4) Violet light has a wavelength of about 410 nm. What is its frequency? Calculate the energy of one photon of violet light. What is the energy of 1.0 mol of violet photons? *$7.31E^{14}$ s-1, $4.84E^{-19}$J, $2.92E^{5}$ J*

5) The energy of a mole of photons of red light from a laser is 175 kJ/mol. Calculate the energy of one photon of red light. What is the wavelength of red light in meters? In nm? Compare the energy of photons of violet light with those of red light. Which is more energetic and by what factor? *$2.91E^{-22}$ KJ, $6.83E^{-7}$ m, 683 nm*

6) The most prominent line in the spectrum of neon is found at 865.438 nm. Other lines are found at 837.761 nm, 878.062 nm, 878.438 nm, and 1885.387 nm.

a. Which of these lines represents the most energetic light? Justify your answer. *(837.761 nm)*

b. What is the frequency of the most prominent line? What is the energy of one photon of this wavelength? *$3.464E^{14}$ s^{-1}, $2.295E^{-19}$ J*