Dougherty Valley HS AP Chemistry
Atomic Structure – Extra Study Q's

WORKSHEET #5*

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

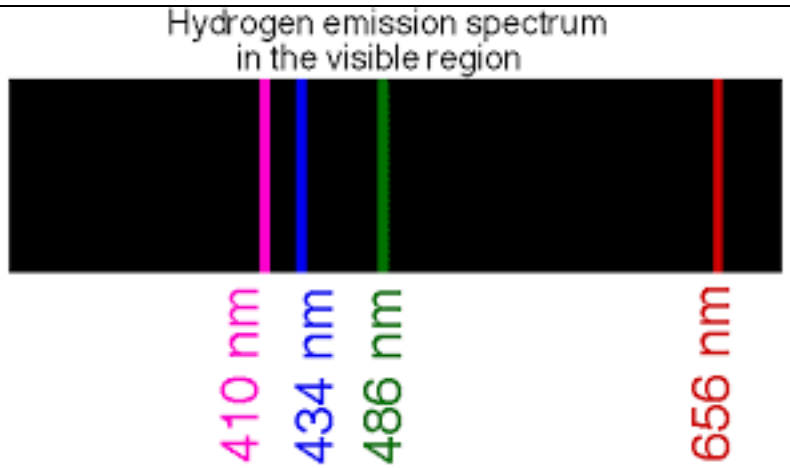
Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

"Natural science does not simply describe and explain nature, it is a part of the interplay between nature and ourselves." Werner Heisenberg (1901 – 1976)

1.a.	Calculate the wavelength of electromagnetic radiation that has a frequency of 5.56 MHz. (53.9 m)
b.	Calculate the frequency of electromagnetic radiation that has a wavelength equal to 667 nm. ($4.49E^{14}$ s^{-1})

2. Electromagnetic radiation at the blue end of the visible spectrum has a wavelength of 400 nm.	
a.	Calculate the frequency of the radiation. ($7.50E^{14}$ s^{-1})
b.	Calculate the energy of one photon of this radiation. ($4.79E^{-19}$ J)
c.	Calculate the energy of one mole of photons of this radiation. (299 KJ/mol)

3.
Examine the emission spectrum for hydrogen. Not required, but look at



a.	How many lines appear in the visible region? (Balmer series –see notes)
b.	Why so few?

4. Calculate the frequency of the line in the hydrogen spectrum corresponding to the electron transition from n=9 to n=8. Whereabouts in the electromagnetic spectrum does this line occur? ($1.08E^{13}$ s^{-1})

5. The ionization energy of an element is the energy required to remove the most loosely held electron from atoms of the element in the gaseous state. It is usually expressed in units of kJ/mol. Given that

R, the Rydberg constant, is 1.097 x 10^{7} m^{-1}
h, Planck's constant, is 6.626 x 10^{-34} J s
c, the speed of light, is 2.998 x 10^{8} m s^{-1}

Calculate from these data the ionization energy of hydrogen in kJ/mol. ($1.31E^{6}$ J/mol)
Compare the results of your calculation with the value in your text (Appendix).