

## ATOMIC SPECTRA ACTIVITY

Carefully draw an illustration that shows each color band you see through the spectroscope when you view the hydrogen spectrum. This link (<http://astro.u-strasbg.fr/~koppen/discharge/>) has photographs of the hydrogen spectrum (as well as several other gas spectra). Compare your illustration for hydrogen with the spectrum at this website. Use your illustration, the webpage link above, and figure 12.17 in your textbook (page 343) to answer the following questions.

1. *As much as possible*, identify which specific changes in electron energies are responsible for the visible lines you see. (For example, if you see a blue line, what change in electron energy produces this color?)  
Hint: You may need to look at a diagram of the electromagnetic spectrum in your book or online.
2. Answer the following questions; use an online dictionary if you are unsure about the definition of some of the words.
  - a) How does the *magnitude* of an electron's energy change relate to the *frequency* of the electromagnetic spectra it produces?
  - b) Use this relationship to describe the relative differences in energy between the ultraviolet, visible, and infrared ranges.
3. An electron might emit light when falling from an excited state in energy level 7 to level 6. For the same atom, another excited electron might emit light when falling from energy level 3 to level 2. In both cases, the electron is dropping down one energy level.

Will the light that both electrons emit be of the same frequency (energy)? Why or why not? If not, which electron would you expect to emit more energy? Fully explain your response using the resources at hand.

4. Describe an example of how the individual light spectrum for specific gasses can be useful.