Building an atom

Go to the Virtual Quantum Mechanics site at Kansas State Univ.:

http://phys.educ.ksu.edu/vqm/index.html

Choose "Hydrogen Spectroscopy" to begin.
Note: General instructions are at the bottom of the page.

1. (a) Begin by noticing that the gas tube for hydrogen is automatically inserted into the gas lamp sockets. Draw 4 energy levels, call them 1 = lowest, 2 = next, ... 4 = highest. Make the values of the energies approximately E_1 = -10 eV, E_2 = -4 eV, E_3 = -2 eV, E_4 = -1 eV. Draw emission lines from 2 ->1, 3 ->2, 4 ->3.

(b) Which of these emission lines is in the visible part of the spectrum (i.e., which of the arrows you drew makes a colored line appear in the second black row near the top of the web page?

$3 \rightarrow 2 \Rightarrow$ photon energy $\sim 2eV$

(c) Why aren't the other two lines visible? Are they off the visible scale because they are too high energy? too low energy? What type of electromagnetic radiation might **each** one be?

$2 \rightarrow 1$ is too high energy, photon $\sim 6eV \Rightarrow$ UV

$4 \rightarrow 3$ is too low energy, photon $\sim 1eV \Rightarrow$ IR

(d) Look at the figure to the right. Try to create the "Balmer Series". Where should the other lines you need go? Print (?) your results.

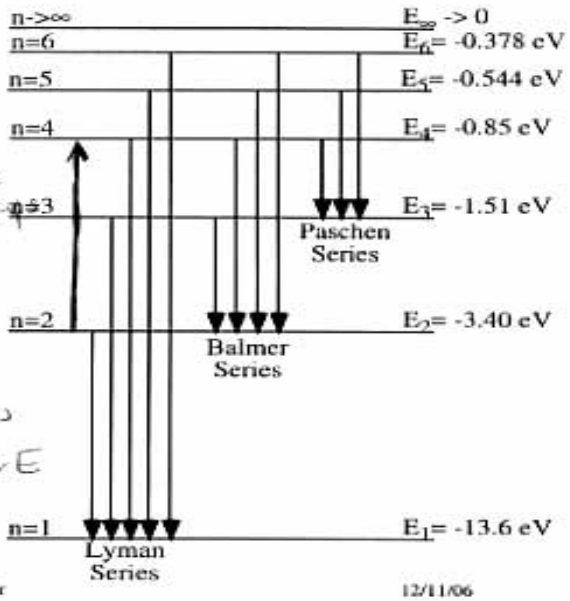
to duplicate it using diagram given, all lines should end @ 2 — it is possible to match the lines in other ways or or ...

(e) What portion of the spectrum do you expect the (invisible to our eyes) Paschen Series lines to be in?

infrared

shorter changes in energy lines $\Rightarrow$ lower energy photons

$\therefore$ infrared is longer $\lambda \Rightarrow$ lower E



continues over