Phys 104: College Physics

Name Key

Quiz 9

1)[4] The threshold wavelength for the photoelectric effect for silver is 262 nm. What is silver's work function?

At the threshold wavelength, $K_{max} = 0$ so

$$\phi = hf_0 = \frac{hc}{\lambda_0} \quad \Rightarrow \quad \phi = \frac{hc}{\lambda_0} = \frac{1240}{262} = 4.73 \text{ nm}$$

equations

$$E_n = \frac{-13.61eV}{n^2}$$

$$K = hf - \phi$$

$$c = \lambda f$$

$$E_{photon} = \frac{hc}{\lambda} = hf$$

$$hc = 1240eVnm$$

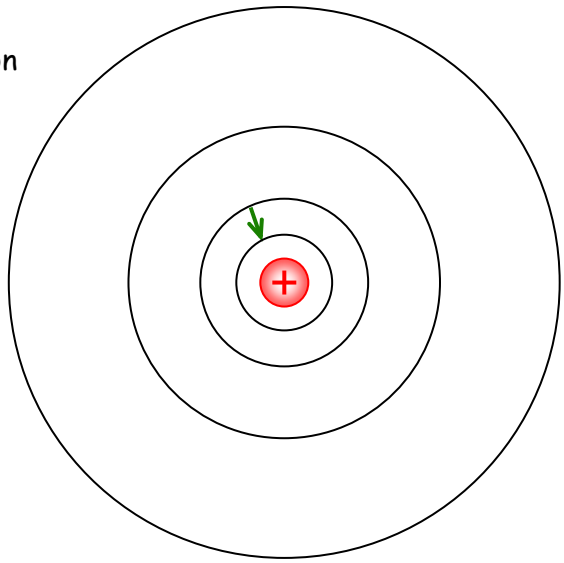
2) In Hydrogen, the Lyman α transition is between n = 2 and n = 1.

a)[4] Find the wavelength of the photon emitted when an electron makes this transition

$$\Delta E = E_1\left(\frac{1}{4} - \frac{1}{1}\right) = -\frac{3}{4}(-13.6) = 10.2 \text{ eV}$$

$$\Delta E = \frac{hc}{\lambda} \quad \Rightarrow \quad \lambda = \frac{hc}{\Delta E} = \frac{1240}{10.2} = 121.6 \text{ nm}$$

b)[1] In the model of the Hydrogen atom right, draw an arrow showing the electron transition that would cause the emission of the Lyman alpha photon calculated above.



c)[1] Emission spectra look like (pick one)

1) bright lines on a dark background

2) dark lines on a colorful spectrum background