FLINN SCIENTIFIC

Name_____

Laboratory Report

Light Source	Spectrum (Number of Lines)	Observed Colors (Wavelength, nm)
Incandescent Light		
Hydrogen Spectrum Tube		
Mercury Spectrum Tube		
_____ Spectrum Tube (optional)		
Fluorescent Light		
_____ Novelty Lamp (optional)		
Streetlight (optional)		

Spectrum Table

Light Source	700–650 nm	650–600 nm	600–550 nm	550–500 nm	500–450 nm	450–400 nm
Incandescent Light						
Hydrogen Spectrum Tube						
Mercury Spectrum Tube						

1. According to Equation 1 in the *Background* section, the energy of light (ΔE) is inversely proportional to its wavelength (λ)—as the wavelength increases, its energy decreases. Based on the spectrum observed for incandescent white light, rank the colors in the visible spectrum from highest energy to lowest energy.

2. Do all of the colors of light in the visible spectrum span about the same wavelength range—that is, do the bands of color appear equally wide or narrow?

3. What color of light in the visible spectrum appears brightest? Does this mean that it is the highest energy light?

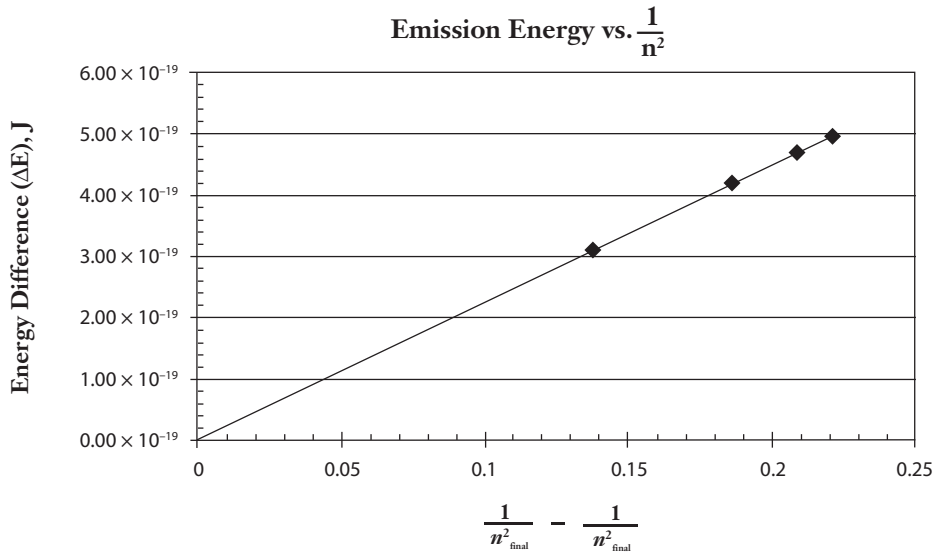
4. Using Equation 1, calculate the energy (ΔE) corresponding to each line in the observed atomic emission spectrum of hydrogen.

5. As shown in Figure 1, the visible emission spectrum of hydrogen is due to transitions from excited energy levels down to the second principal energy level ($n = 2$). Thus, the highest energy violet line is due to the transition from $n = 6$ to $n = 2$, and the lowest energy red line is due to the transition from $n = 3$ to $n = 2$. Enter the energy values from Question 4 from highest to lowest in the following table and fill in the missing entries.

Color of Line	**ΔE Energy Difference**	**Transition** $n_{initial} \rightarrow n_{final}$	$\frac{1}{n^2_{final}} - \frac{1}{n^2_{initial}}$
Violet			
Indigo			
Blue			
Red			

6. Plot the energy of each line versus $\frac{1}{n^2_{\text{final}}} - \frac{1}{n^2_{\text{initial}}}$ on the following graph and draw a trendline through the points.

   What does the shape of the trendline tell you?



7. What is unique about the spectrum obtained for a fluorescent light? What element is used in fluorescent light fixtures?

8. *(Optional)* Discuss any interesting or unique features of other types of light sources that were examined. Is it possible to identify the gases used in other light sources based on their emission spectra?