**General Physics eJournal 11**

**Planck’s Constant**

**Instructions:**

Follow the Writeup and fill out the eJournal as you complete the lab activities. Submit your eJournal report by uploading the completed WORD or PDF document to our class Learninghub site. If the Learninghub site is down, email the completed report file directly to a lab TA.

**Preliminaries:**

* Title:
* Name(s):
* Date:
* Time In & Out:

**Plan:**

**Hypothesis**

Form a hypothesis regarding the energy of photons emitted by an LED and the transition energy, eV0. Predict what a graph of V0 vs. f will look like and what the slope should be.
Sketch this graph and insert it below.

*Insert image of your graph*

**Experiment Outline**

Briefly describe your plan for testing your hypothesis.

**Equipment List**

* List
* Equipment
* Here

**Action:**

Describe the techniques used to collect data by responding to the bullet point questions:

* What color LEDs did you use?
* How did you measure the turn-on voltage of the LEDs?
* How did you increase the wavelength resolution of the spectroscope?
* How did you measure the photon frequency of the LEDs?

*Insert labeled image of your apparatus*

**Results:**

List the household light sources you viewed through the spectroscope and briefly describe the spectrum of each.

Record the LED colors, turn-on voltages, V0, photon wavelengths, λ, and frequencies, f.

**Table I: LED Turn-on voltages, Wavelengths, and Frequencies**

|  |  |  |  |
| --- | --- | --- | --- |
| **LED Color** | **Turn-On Voltage, V0 (V)** | **Wavelength, λ (nm)** | **Frequency, f (Hz)** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Insert photos of your LED spectra below.

*Insert images of your LED spectra*

**Analysis:**

Generate a plot of V0 (y-axis) vs. f (x-axis), perform a linear fit, and record the slope.

*Insert graph of V0 vs f*

Slope m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ V∙s

Multiply the slope by the charge of an electron, e, to get the measured Planck’s constant, hmeas. Compare hmeas to Planck’s Constant, h, by calculating the percent error.

**Table II: Planck’s Constant Comparison**

|  |  |  |
| --- | --- | --- |
| **h (J∙s)** | **hmeas (J∙s)** | **% Error** |
| 6.626 x 10-34 |  |  |

**Conclusion:**

Interpret your results in light of your hypothetical predictions. How well did your hypothesis match the results? What do you think was the leading source of error in this experiment? How might you improve this experiment or explore it further?