**PreAP Physics – Photoelectric Effect PhET Lab**

Today, you will use the Photoelectric Effect PhET Lab to explore what happens when light interacts with matter. The photoelectric effect occurs when light strikes a surface and liberates electrons.

**Beginning Observations –** Open the Photoelectric Effect PhET Simulation. \*\*Before adjusting anything answer the questions below\*\*

1) Before you begin, what do will happen to …

a) the metal surface when light strikes it

b) the light the intensity slider is moved

2) Do you think all intensities of light will liberate electrons? Explain.

3) Do you think all wavelengths of light will liberate electrons? Explain.

**Part 1 – Intro to the Photoelectric Effect**

Change the intensity of the light and intensity until you see tiny dots move across the screen. Draw what you see on the screen below. Label the following – light source, metal surface, electrons

|  |
| --- |
|  |

1) Adjust both the wavelength and intensity of the light. What determines if electrons are ejected? Explain.

**Part 2 – What determines if electrons are liberated from the surface?**

Now, you will investigate the conditions necessary for electrons to be liberated from different metal surfaces. Use the following table to guide your investigations. Begin with the light at a low frequency (long wavelength) and slowly move the slider until you see electrons move across the screen until you see electrons begin to move.

|  |  |  |
| --- | --- | --- |
| Metal | Wavelength (nm) | Frequency (Hz) |
| Sodium |  |  |
| Zinc |  |  |
| Copper |  |  |
| Platinum |  |  |
| Calcium  |  |  |

The threshold frequency is the minimum frequency of a photon that can eject an electron from the surface.

1) Compare the wavelengths and frequencies in the table above. Develop a hypothesis for why different metals would threshold frequencies. Explain in a few sentences

**Part 3 – How can we change the number of electrons liberated from the surface?**

1) What do you think affects how many electrons are ejected from the surface?

2) Write a short procedure for how you could test your idea for Q1. Test your idea. Record your results below.

**Conclusion – *Please write on a separate sheet of paper and turn in.***

Based on your experiences today, explain the photoelectric effect in 5-6 sentences. Be sure to cite your observations from Parts 1-3.