

Lesson for Conductivity: Brief Inquiry activity

This includes ideas for Photoelectric Effect and Neon Lights and Discharge Lamps
<http://phet.colorado.edu>

Learning Goals: Students will be able to:

- Explain a model of what happens when light shines on a photocell.
- Identify the driving force in a circuit.
- Explain the difference in conducting behavior between metals, plastics, and photoconductors in terms of the difference in the structure of energy levels.
- Explain why shining light on a photoconductor causes it to conduct.
- Use evidence to defend their ideas.

Pre-lesson: You may want students to do the Signal Circuit Activity by Trish Loeblein or parts of it which use other sims that may help them understand models of electricity if they do not have the background. Look at Photoelectric Effect sim and see if it fits your situation better. Consider the ideas below about Neon Lights and Discharge Lamps.

Lesson:

Ask: How do you think photocells on things yard lights work?

Then, have the students play with the sim and tell them to write their ideas about the learning goals and encourage them to use illustrations. Students might prepare a presentation instead of turning the assignment in. Have them use the sim during their presentation to help explain their ideas.

Post-Lesson: Have a class discussion and perhaps assign the students to investigate Photoelectric Effect or Neon Light and Discharge Lamps and do a writing assignment or oral presentations about the learning goals in it.

Photoelectric Effect: Learning Goals

- Visualize and describe the photoelectric effect experiment.
- Correctly predict the results of experiments of the photoelectric effect: e.g. how changing the intensity of light will affect the current and the energy of electrons, how changing the wavelength of light will affect the current and the energy of electrons, how changing the voltage of light will affect the current and the energy of electrons, how changing the material of the target will affect the current and the energy of electrons.
- Describe how these results lead to the photon model of light: e.g. argue that only a photon model of light can explain why, when light is shining on the metal but there is no current, increasing the frequency will lead to a current, but increasing the intensity of light or the voltage between the plates will not.

Neon Lights and Discharge Lamps: Ask “Why do lighted signs have different colors?”

Learning Goals

- Provide a basic design for a discharge lamp and explain the function of the different components.
- Explain the basic structure of an atom and relate it to the color of light produced by discharge lamps.
- Explain why discharge lamps emit only certain colors.
- Design a discharge lamp to emit any desired spectrum of colors.