Lesson Title:	**Photoelectric Effect Lab**
AP Objective(s):	Students should understand the photoelectric effect, so they can: (3) Determine the maximum kinetic energy of photoelectrons ejected by photons of one energy or wavelength, when given the maximum kinetic energy of photoelectrons for a different photon energy or wavelength. (4) Sketch or identify a graph of stopping potential versus frequency for a photoelectric-effect experiment, determine from such a graph the threshold frequency and work function, and calculate an approximate value of *h*/*e*.
Assessment:	Video Reflection Q's

AGENDA	KEY POINTS
1. PhET 2. Assessment	<u>Photoelectric Effect experiment</u> $E_{photon} = K_{max} + W_o$ E_{photon} = hf (Planck's equation) K_{max}: maximum kinetic energy of electrons (equal to stopping potential times charge of electron) W_o: binding energy or "work function" $hf = K_{max} + W_o$ $K_{max} = hf - W_o$ (this is the equation usually graphed)

<u>Time</u>	**<u>Learning Activity</u>**
45	*Teacher note – usually I do this lab after we have briefly discussed the photoelectric effect in class. Students know it simply as – when light shines on a metal surface electrons can be liberated. They will have read a short reading (see: http://physics.bu.edu/py106/notes/PhotoelectricEffect.html) which discusses the equation for the energy of a photon E=hf and KEmax=hf-W (which they will derive at the end of the lab).* Students will read and annotate a short reading on the photoelectric effect (see link above). They will develop two questions they hope to have answered through their lab today. Students will receive their lab and laptops. They will spend the remainder of the class working on their lab. Possible Guiding Questions 1. What happens in the simulation as you change the light from red to blue? 2. Suppose that red light does not eject electrons for the metal you are studying, would changing the intensity of the light allow electrons to be ejected? Explain. 3. What property of the light changes as its wavelength changes? 4. Why do different metals have different work functions? 5. If a metal has a high work function, what properties does it have?
15	Assessment -

	Show video (pause and replay as needed) https://www.youtube.com/watch?v=kcSYV8bJox8 Questions for students to answer - 1) How is this experiment different than the PhET Experiment on the computer? 2) Why does changing the color of the filters affect if electrons are ejected? 3) What would happen if the intensity of the light source changed? Video credit – **Published on Aug 15, 2012** eCHEM 1A: Online General Chemistry College of Chemistry, University of California, Berkeley http://chemistry.berkeley.edu/echem1a