

Photoelectric Effect

Name: _____ Sec./Group _____ Date: _____

1. a) An **electron-volt** (eV) is the amount of energy needed to move a single electron from an electric potential of 0 to an electric potential of -1 V. The charge of an electron is approximately -1.602×10^{-19} C. How many joules is an electron volt?

b) The stopping potential in our experiment can range in magnitude from 0 to about 3 V. How much initial kinetic energy, in joules, must an electron have to pass through a 3 V stopping potential? (In our case, "stopping potential" means that the sign of the potential is deliberately chosen to retard the motion of the electron.)

2. Pennies are made of zinc coated with copper. Copper has a work function of 4.7 eV. The ozone layer blocks nearly all solar radiation with wavelength shorter than 320nm, but a very small amount of 200 nm light still manages to reach the Earth's surface. Can direct sunlight produce photoelectrons from a penny?

3. a) The currents in our experiment are between 0 and 20 nanoamperes. How many electrons per second are passing an ammeter if it reads 10 nA ?

b) In the United States, "presentation" lasers are limited by law to a power output of 5 mW. If a red 650nm laser pointer and a green 532nm laser pointer are set to maximum power, how many photons per second are emitted by each laser?