

Name:

Photoelectric Effect

$$E_{\text{photon}} = hf = \frac{hc}{\lambda}$$
$$KE_{\text{electron}} = E_{\text{photon}} - W_0$$
$$1\text{eV} = 1.6 \times 10^{-19}\text{J}$$

1. Light with a frequency of $1 \times 10^{15}\text{Hz}$ falls on a metal surface. The work function of the metal is $4 \times 10^{-19}\text{J}$

a) Find the energy of the photons.

b) Find the maximum kinetic energy of the ejected electrons.

2. What is the energy (in electronvolts) of a photon with a frequency of $3 \times 10^{15}\text{Hz}$?

3. The threshold frequency for a metal is $1.5 \times 10^{15}\text{Hz}$. Light with a frequency of $1.8 \times 10^{15}\text{Hz}$ strikes the surface.

a) Will electrons be freed from the metal by the light?

b) Find the energy of the photons that strike the surface.

c) What is the work function of the metal?

d) Find the kinetic energy of the ejected electrons.

4. Light with a wavelength of 2×10^{-7} m strikes a surface and ejects electrons with a kinetic energy of 3×10^{-19} J.

a) Find the energy of the photons.

b) Find the work function of the surface.

c) Find the threshold wavelength.

5. If the wavelength of the light in the above problem decreased, the kinetic energy of the ejected electrons would: _____ .

6. If the brightness of the light in the above problem increased, the kinetic energy of the ejected electrons would: _____ .