

Photoelectric Effect

When light shines on a metal surface, electrons are emitted from the surface.

Does light act like a wave for photoelectrons?

- If light intensity is increased, the number of electrons ejected and the max KE should be increased because higher intensity means greater electric field amplitude and greater electric field means ejecting electrons with higher speed.
- The frequency of light should not matter. Only the intensity of the light

Does light act as photons (“particles” or “packages”)?

- An increase in intensity of light means more photons are incident, so more electrons will be ejected; but since the energy of each photon is the same, the max KE of electrons is not changed.
- If the frequency is increased, the max KE of the electrons increases linearly.
- $KE = hf$
- There is a cutoff frequency where no electrons will be ejected.

Robert Millikan (1913 – 1914)

Photoelectric Effect

- The photon theory of light as a particle or package was upheld.

Applications of the Photon Theory of Light

- Burglar alarms and automatic door openers
- Smoke detectors
- Plants use photons of light to make glucose.
Plants use 9 photons to make one glucose.
The wavelength is approx. 650×10^{-9} m to 700×10^{-9} m