

The Photoelectric Effect The photoelectric effect is the name given to the process in which a photon is completely absorbed by a bound electron, giving the electron enough energy to escape whatever binding potential is holding it, generating a free electron called a photoelectron. Thus the maximum kinetic energy of photoelectrons emitted by the photoelectric effect is simply the photon energy minus the binding energy of the metal. The maximum kinetic energy of photoelectrons depends solely on the frequency of the incident light and not at all on the intensity of this light. The bound electron is generally either bound to an atom or is held in a crystalline solid by the collective action of a number of atoms (as in the case of conduction electrons in a metal). The photoelectric effect can be observed when light in the visible or UV part of the spectrum irradiates certain metals. Thus the higher the frequency of the incident light the more energy each photon has, and this energy must be greater than the work function for the absorption of a photon to result in the electron gaining enough energy to escape. Increasing the intensity of the radiation without changing the frequency has the effect of increasing the number of photons striking the material, but does not increase the energy that each of these photons has. Whether or not the photoelectric effect will occur depends on the binding energy of the electron.