

STRUCTURE OF ATOM

PHOTO ELECTRIC EFFECT

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Emission of electrons from a metal surface when exposed to light of appropriate wavelength is called photo electric effect. The emitted electrons are called photoelectrons. Work function or threshold energy may be defined as the minimum amount of energy required to eject electrons from a metal surface.

According to Einstein, Maximum kinetic energy of the ejected electron = absorbed energy - work function

$$\frac{1}{2}mv_{\max}^2 = h\nu - h\nu_0$$

$$= hc\left[\frac{1}{\lambda} - \frac{1}{\lambda_0}\right]$$

where, ν_0 and λ_0 are threshold frequency and threshold wavelength respectively.

Stopping potential: The minimum potential at which the plate photoelectric current becomes zero is called stopping potential.

If V_0 is the stopping potential, then

$$eV_0 = h(\nu - \nu_0)$$

Laws of Photoelectric Effect

- (i) Rate of emission of photoelectrons from a metal surface is directly proportional to the intensity of incident light.
- (ii) The maximum kinetic energy of photoelectrons is directly proportional to the frequency of incident radiation; moreover, it is independent of the intensity of light used.
- (iii) There is no time lag between incidence of light and emission of photoelectrons.
- (iv) For emission of photoelectrons, the frequency of incident light must be equal to or greater than the threshold frequency

SOME OTHER FUNDAMENTAL PARTICLES

Besides protons, neutrons and electrons, many more elementary particles have been discovered. These particles are also called Fundamental particles. Some of these particles are stable while the others are unstable. Out of stable particles, the electron, the proton, the antiproton and the positron are four mass particles while neutrino, photon and graviton are three energy particles.

Among these, unstable particles are neutron, meson and v-particles. The main characteristics of the particles are given in table below.

Particle	Symbol	Nature	Charge esu $\times 10^{-14}$	Mass (amu)	Discovered by
Positron	$e^+, 1e^0, \beta^+$	+	+4.8029	0.0005486	Andersen (1932)
Neutrino	ν	0	0	< 0.00002	Pauli
Antiproton	p^-	-	-4.8029	1.00787	Chamberlain Sugri and Weigh land (1955)
Photon	$h\nu$	0	0	0	Planck
Graviton	G	0	0	0	
Positive mu meson	μ^+	+	+4.8029	0.1152	Yukawa (1935)
Negative mu meson	μ^-	-	-4.8029	0.1152	Anderson (1937)
Positive pi meson	π^+	+	+4.8029	0.1514	Powell (1947)
Negative pi meson	π^-	-	-4.8029	0.1514	
Neutral pi meson	π^0	0	0	0.1454	