

Q- The threshold wavelength for emission of electrons from a given surface is 320nm.

a) What will be the maximum kinetic energy of ejected electrons when the wavelength of the incident light is changed to 350nm.

b) What will be the maximum kinetic energy of ejected electrons when the wavelength of the incident light is changed to 250nm?

The Einstein's equation gives the KE of the photo electrons as

$$\frac{hc}{\lambda} - \frac{hc}{\lambda_0} = KE$$

Where λ_0 is the threshold wavelength of the light incident for photoelectric emission

a) As the incident wavelength 350 nm is larger than the threshold wavelength 320 nm, the electrons will not be ejected and hence no question of the kinetic energy.

b) What will be the maximum kinetic energy of ejected electrons when the wavelength of the incident light is changed to 250nm?

$$KE = \frac{hc}{\lambda} - \frac{hc}{\lambda_0} = hc \left(\frac{1}{\lambda} - \frac{1}{\lambda_0} \right) = 6.6 * 10^{-34} * 3 * 10^8 \left(\frac{10^9}{250} - \frac{10^9}{320} \right) = 1.73 * 10^{-19} \text{ J}$$