

Q3: In a photoelectric effect experiment the threshold wavelength of light is 380 nm. If the wavelength of incident light is 260 nm, the maximum kinetic energy of emitted electrons will be given E (in eV) = [1237/λ(in nm)]

(a) 15.1 eV

(b) 4.5 eV

(c) 1.5 eV

(d) 3.0 eV

Solution

Given: $\lambda_0 = 380 \text{ nm}$, $\lambda_i = 260 \text{ nm}$

$$K_{\max} = h (f_i - f_0)$$

$$= h \left[\left(\frac{c}{\lambda_i} \right) - \left(\frac{c}{\lambda_0} \right) \right] = hc \left[\frac{\lambda_0 - \lambda_i}{\lambda_0 \lambda_i} \right]$$

$$= 1237 \left[\frac{(380 - 260)}{(380 \times 260)} \right] \text{ eV} = 1.5 \text{ eV}$$

Answer: (c) 1.5 eV