

Answer on Question #43162-Physics-Nuclear Physics

A potassium metal photoelectric surface has a work function $\Phi = 2.24 \text{ eV}$.

a) Find the maximum kinetic energy of the electrons emitted when the surface is illuminated with light having frequency $6.00 \times 10^{15} \text{ Hz}$. (ANS: 22.6 eV or $3.62 \times 10^{-18} \text{ J}$)

b) Find the stopping potential for these electrons. (ANS: 22.6 V)

Solution

a) the maximum kinetic energy of the electrons is

$$K_{max} = hf - \Phi = (4.14 \cdot 10^{-15} \text{ eV} \cdot \text{s}) \cdot (6.00 \cdot 10^{15} \text{ Hz}) - 2.24 \text{ eV} = 22.6 \text{ eV or } 3.62 \cdot 10^{-18} \text{ J.}$$

b) the stopping potential for these electrons is

$$V_{stop} = \frac{K_{max}}{e} = \frac{22.6 \text{ eV}}{1 \text{ e}} = 22.6 \text{ V.}$$