Related Problems

Question 5

The ejection of the photoelectrons from the silver metal in the photoelectric effect experiment can be stopped by applying the voltage of 0.35 V when the radiation 256.7 nm is used. Calculate the work function for silver metal.

Answer:

$$\lambda = 256{\cdot}7 \text{ nm} = 256{\cdot}7 \times 10^{-9} \text{ m} \quad ; \quad \text{K.E.} = 0{\cdot}35 \text{ eV}$$

$$E = \frac{hc}{\lambda} = \frac{(6{\cdot}626 \times 10^{-34} \text{Js})(3 \times 10^{8} \text{ms}^{-1})}{(256{\cdot}7 \times 10^{-19} \text{m})}$$

$$= \frac{6{\cdot}626 \times 3}{256{\cdot}7} \times 10^{-17} \text{ J} = \frac{6{\cdot}626 \times 3 \times 10^{-17}}{256{\cdot}7 \times 1{\cdot}602 \times 10^{-19}} \text{ eV}$$

$$= \frac{662{\cdot}6 \times 3}{256{\cdot}7 \times 1{\cdot}602} \text{ eV} = 4{\cdot}83 \text{ eV}$$

$$E = E_0 + \text{K.E.}$$

$$4{\cdot}83 \text{ eV} = E_0 + 0{\cdot}35 \text{ eV}$$

$$E_0 = 4{\cdot}83 - 0{\cdot}35 = \mathbf{4{\cdot}48 \text{ eV}}$$