

Calculate the ionisation energy of rubidium per atom, if light of wavelength $5.84 \cdot 10^{-8} \text{ m}$ produces electrons with a speed of $2.450 \cdot 10^6 \text{ ms}^{-1}$

$$E_{\text{light}} = E_{\text{ionisation}} + E_{\text{kinetic}}$$

$$E_{\text{ionisation}} = E_{\text{light}} - E_{\text{kinetic}}$$

$$\begin{aligned} E_{\text{ionisation}} &= \frac{hc}{\lambda} - \frac{mv^2}{2} \\ &= \frac{6.626 \cdot 10^{-34} \text{ J} \cdot \text{s} \times 3 \cdot 10^8 \text{ m/s}}{5.84 \cdot 10^{-8} \text{ m}} - \frac{9.11 \cdot 10^{-31} \text{ kg} \times (2.450 \cdot 10^6 \text{ m/s})^2}{2} \\ &\approx 6.67 \cdot 10^{-19} \text{ J} \end{aligned}$$

Answer: $6.67 \cdot 10^{-19} \text{ J}$