

1) $\leftarrow (Li) \rightarrow$

Li-3 protons + 4 neutrons = 7amu
 $= 7 \cdot 1.66 \times 10^{-27} \text{ kg}$
 $E_p = 1.8488 \text{ eV}$
 t to travel 2mm

$P_{\text{light}} = \frac{h}{\lambda}$
 $P_i = mv$
 $E_{\text{photon}} = hf$
 $\frac{E_{\text{photon}}}{c} = mv$
 $\frac{hf}{c} = mv \Rightarrow \frac{E_{\text{photon}}}{\lambda f} = mv$
 $\frac{E_{\text{photon}}}{mc} = v$
 $v \approx 0.085 \text{ m/s}$

2) $\frac{A}{A} \rightarrow$
 $P = 100 \text{ W}$
 $\lambda = 500 \text{ nm}$
 2.5% energy conv to light
 $A = 7 \text{ cm}^2$
 $D = 2 \text{ m}$

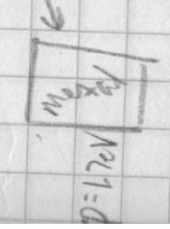
1. $E_{\text{photon}} = ?$
 $E = hf = h \frac{c}{\lambda}$
 $E = 4.135 \times 10^{-15} \frac{\text{eV}}{\text{s}} \cdot \frac{2.998 \times 10^8 \text{ m/s}}{500 \text{ nm}}$
 $= 2.479 \text{ eV}$

2. SA sphere = $4\pi r^2$
 $\frac{7 \text{ cm}^2}{4\pi (2 \text{ m})^2} = 1.3926 \times 10^{-5} \text{ m}^2$
 $6.294 \times 10^{-16} \text{ s} \times \downarrow \approx 8.765 \times 10^{-13} \text{ photons/s}$
 $2.5 \text{ W} = 2.5 \text{ J/s}$
 $\text{Photons} = \frac{J/s}{J/\text{photon}} = \frac{2.5}{2.479 \text{ eV}} \approx 6.294 \times 10^{-18} \text{ photons/s}$

3. $\lambda = 750 \text{ nm}$

$N' = \frac{\text{Photons}}{\text{sec}} = \frac{A_{\text{area}} (2.5\% \cdot P)}{3A \cdot h \frac{c}{\lambda}}$
 $\Rightarrow N' \approx 1.314 \times 10^{14} \text{ photons/sec}$

3) Photoelectric Effect



light: $P = 1.4 \times 10^{-6} \text{ W}$
 $\lambda = 600 \text{ nm}$

1. $N = \frac{\text{Photons}}{\text{sec}} = \frac{P}{hf} = \frac{P}{h \frac{c}{\lambda}} = \frac{1.4 \times 10^{-6} \text{ J/s}}{6.626 \times 10^{-34} \text{ Js} \cdot \frac{2.998 \times 10^8 \text{ m/s}}{600 \text{ nm}}}$
 $\approx 4.2286 \text{ photons/sec}$

2. $KE_{\text{max}} = ?$ Max energy of electron emitted from metal?

$E_0 = E_f$
 $hf = \phi + KE$
 $h \frac{c}{\lambda} = \phi + KE$
 $2.066 \text{ eV} = 1.7 \text{ eV} + KE$
 $KE = 0.366 \text{ eV}$

3. $\lambda_2 = \frac{2}{3} \lambda = 400 \text{ nm}$

4. $\lambda_{\text{max}} = ?$ max wavelength that will emit electrons from the metal

$3.099 \text{ eV} = \phi + KE$
 $KE \approx 1.399 \text{ eV}$
 $4.135 \times 10^{-15} \text{ eV} \cdot \frac{2.998 \times 10^8 \text{ m/s}}{1.7 \text{ eV}} = \lambda$
 $\lambda \approx 729.22 \text{ nm}$