1-7. $0.5\times10^{-4}\times10^{-12} = N\cdot h\cdot\dfrac{c}{\lambda}$, $N = \dfrac{5\times10^{-17}}{h\cdot\frac{c}{\lambda}} = 138.3$ 个

1-8. $P = \sigma\cdot T^4\cdot S$

$P = N\cdot h\cdot\nu = M_\lambda(T)\cdot\Delta\lambda\cdot S = \dfrac{2h\pi c^2}{\lambda^5}\dfrac{\Delta\lambda}{e^{kc/\lambda kT}-1}\cdot\dfrac{P}{\sigma T^4}$

$N = \dfrac{2h\pi c^2}{\lambda^5}\cdot\dfrac{1}{e^{kc/\lambda kT}-1}\cdot\Delta\lambda\cdot\dfrac{P}{\sigma T^4}\Big/ h\nu \approx 5.6\times10^{13}$

1-9. $h\nu_0 + m_0 c^2 = h\nu + mc^2$

$E = h\nu_0 - h\nu = 0.6 - 0.6\times\dfrac{1}{1.2} = 0.1\,MeV$

1-10. 电子: $\Delta\varepsilon = m_1 c^2 - m_2 c^2 = \left(\dfrac{1}{\sqrt{1-(\frac{v}{c})^2}} - 1\right)\cdot m_2 c^2 = 0.25\,m_2 c^2$

$\varepsilon_{光子原} = h\nu$, $\varepsilon_{光子后} = h\nu - \Delta\varepsilon = h\nu_后 = h\cdot\dfrac{c}{\lambda_后}$

$\lambda_后 = \dfrac{hc}{h\nu-\Delta\varepsilon} = \dfrac{hc\lambda_原}{hc-\Delta\varepsilon\lambda_原}$, $\Delta\lambda = \lambda_后 - \lambda_原 = \dfrac{h}{m_e c}(1-\cos\theta)$

代入、$\theta \approx 63.3°$, $\lambda_后 \approx 4.34\times10^{-12}\,m$

$$hc \qquad \frac{\Delta\lambda}{\lambda(\lambda+\Delta\lambda)}$$

$$1-11. \quad (1) \quad \theta = \frac{\pi}{2}, \quad \cos\theta = 0, \quad \Delta\lambda = \lambda c, \quad \frac{\Delta\lambda}{\lambda_1} / \frac{\Delta\lambda}{\lambda_2} = \frac{\lambda_2}{\lambda_1} = 10^{-4}$$

$$\Delta \varepsilon = h\frac{c}{\lambda} - h\frac{c}{\lambda+\Delta\lambda} = hc \cdot \frac{\Delta\lambda}{\lambda(\lambda+\Delta\lambda)}$$

$$\Delta\varepsilon_1 / \Delta\varepsilon_2 = \frac{\lambda_2(\lambda_2+\Delta\lambda)}{\lambda_1(\lambda_1+\Delta\lambda)} \approx 10^{-8}$$

(2) X 光