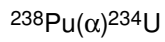


(14.8) A cardiac pacemaker contains 150 mg of ^{238}Pu . What is its heat output? Use data in the isotope chart.



$$1 \text{ MeV} := 1.6021773 \cdot 10^{-13} \cdot \text{joule}$$

$$N_A := 6.022137 \cdot 10^{23} \cdot \text{mole}^{-1}$$

$$M_{238\text{Pu}} := 238 \cdot \text{gm} \cdot \text{mole}^{-1}$$

$$M_{234\text{U}} := 234 \cdot \text{gm} \cdot \text{mole}^{-1}$$

$$E_\alpha := 5.499 \cdot \text{MeV} \quad \text{From Fig. 14.1.}$$

$$m_{\text{Pu}} := 150 \cdot \text{mg}$$

$$t_{\text{half}} := 87.7 \cdot \text{yr}$$

$$\lambda := \frac{\ln(2)}{t_{\text{half}}}$$

$$A_{\text{Pu}} := \frac{m_{\text{Pu}}}{M_{238\text{Pu}}} \cdot N_A \cdot \lambda \quad \text{Eqn. (5.57)}$$

$$Q_\alpha := E_\alpha \frac{M_{238\text{Pu}}}{M_{234\text{U}}} \quad \text{Eqn. (5.18)}$$

$$P_{\text{tot}} := Q_\alpha A_{\text{Pu}}$$

$$P_{\text{tot}} = 0.085 \cdot \text{watt}$$