杨雨臻. 2020011219.

1. $T_r = 138.376d$. $T_b = 50d \rightarrow T_{eff} = 37d$

$A(0) = \int_2 \cdot q(0) = 1\ Bq \rightarrow \tilde{A} = \int_0^{50a} A_0 e^{-\lambda t} dt = 72$

$H_{50} = \tilde{A} S_w \approx 4.32\ MeV/g \approx 6.91 \times 10^{-10} Gy$

2. $0.02 m^3/min \times 0.45 Bq/m^3 \times 50 \times 40 \times 60 min = 1080 Bq$

$1080 Bq \times 7.4 \times 10^{-9} Sv \cdot Bq^{-1} = 7.99 \times 10^{-6} Sv < 50 mSv$ 未超.

3. $150g \times 2.56 mg/g = 384 mg$. $A = \lambda N = \frac{\ln 2}{1.285 \times 10^9 a} \times \frac{0.384}{40} \times 6.02 \times 10^{23} \approx 1.01746 \times 10^5 Bq$.

$e(g) = 6.2 \times 10^{-9} Sv/Bq$

$\rightarrow E \approx 6.308 \times 10^{-4} Sv$.

4. $\frac{dI_1(t)}{dt} = I - \lambda_r I_1(t) - I_1(t)$

$\frac{dI_2(t)}{dt} = I_1(t) - 30\% I_2(t) - 70\% I_2(t) - \lambda_r I_2(t) + 50\% I_3(t)$

$\frac{dI_3(t)}{dt} = 30\% I_2(t) - 50\% I_3(t) - 50\% I_3(t) - \lambda_r I_3(t)$

$\frac{dI_4(t)}{dt} = 70\% I_2(t) + 50\% I_3(t) - \lambda_r I_4(t)$