

(4.11) A recently prepared  $^{212}\text{Pb}$  sample has the activity of  $10^6$  dpm. (a) What is the activity 2 h later? (b) How many lead atoms are left in the sample at this moment?  $t_{1/2}$  10.64 h.

First the standard definitions:

$$N_A := 6.022 \cdot 10^{23} \cdot \text{mole}^{-1} \quad \text{Bq} := \text{sec}^{-1}$$

Then the data given:

$$t_{212} := 10.64 \cdot \text{hr} \quad \lambda_{212} := \frac{\ln(2)}{t_{212}}$$

$$t := 2 \cdot \text{hr} \quad R_0 := 10^6 \cdot \text{min}^{-1}$$

$$(a): \quad R_{2h} := R_0 \exp(-\lambda_{212} \cdot t) \quad \text{Eqn. (4.41b)} \quad R_{2h} = 1.463 \cdot 10^4 \cdot \text{Bq}$$

$$(b): \quad N_{2h} := \frac{R_{2h}}{\lambda_{212}} \quad \text{Eqn. (4.40b)} \quad N_{2h} = 8.085 \cdot 10^8 \quad \text{atoms } ^{212}\text{Pb}$$