Exercise - p 626 Oxtoby

\[ N = \frac{A \tau}{\ln 2} \]

We have a mixture of Co-60 + Co-59, the number of atoms of Co-60 is:

\[ N = \left( 4.0 \times 10^9 \text{ dis} \right) \left( \frac{5.27 \times 10^7 \text{ dis/cm}^2}{14 \text{ sec}} \right) \left( \frac{365 \text{ day}}{1 \text{ yr}} \right) \left( \frac{24 \text{ hr}}{1 \text{ day}} \right) \left( \frac{3600 \text{ sec}}{1 \text{ hr}} \right) \left( \frac{1}{0.693} \right) \]

\[ N = 9.59 \times 10^{19} \text{ atoms} \] of Co-60 are present.

We have 0.19 g of Co-57 and Co-60.

\[ 9.59 \times 10^{19} \text{ atoms} \times \frac{1 \text{ mol Co-60}}{6.02 \times 10^{23} \text{ atoms Co-60}} \times \frac{6 \text{ g Co-60}}{1 \text{ mol Co-60}} = 7.56 \times 10^{-3} \text{ g} \]

We have 9.56 mg Co-60 and \( \frac{190 \text{ mg total cobalt}}{5.03 \%} = 5.03 \% \)

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Exercise p 630

Linen contains carbon C-14 for every \( 8.25 \times 10^6 \) atoms C-14

Estimate age of cloth.

Alive: 1 C-14 in every \( 2.54 \times 10^9 \) atoms \( \rightarrow \) \( p 629 \)

Now: 1 C-14 in every \( 8.25 \times 10^6 \) atoms \( \rightarrow \) \( p 630 \) exercise

\[ \ln \left( \frac{N_0}{N} \right) = 1.5 \]

\[ \frac{1.5}{0.693} \ln \left( \frac{N_0}{N} \right) = \frac{5730 \text{ yr}}{0.693} \]

\[ t = 5730 \text{ yr} \left( \frac{2.54 \times 10^9}{8.25 \times 10^6} \right) = 744 \text{ yr} \]