## Problem 1.

$^{147}$Pm is a pure beta emitter with a 2.6234 yr half life. By using radioactive seeds, a radioisotope can be evenly distributed in a tumor site. Assume a tumor site with a density of 1 g/cm$^3$ and a mass of 11 g. If the plan is to deliver 25 Gy of dose to the entire prostate, calculate the activity of the $^{147}$Pm at the time of implantation into the prostate. Assume it has a biological half life similar to $^{131}$I.

### Solution

## Problem 2.

$1 \times 10^{-6}$ g of $^{59}$Co is placed into the high flux reactor at ORNL. After 24 days of irradiation, what is the activity of $^{60}$Co in the sample? How many atoms of $^{59}$Co have been lost in that time period? Use a flux of $1 \times 10^{15}$ thermal neutrons /cm$^2$/s.

**Solution**

## Problem 3.

What fluence of neutrons from a DT generator (d + $t$ $\rightarrow$ n + $^{4}$He) is required to deliver a KERMA of 1 Gy?

### Solution

## Problem 4. Anderson 10.11

The linear attenuation coefficient for $^{60}$Co radiation in water is $6.5\,\mathrm{m}^{-1}$.

(a) Calculate the dose at points at depths $0.01\,\mathrm{m}$, $0.05\,\mathrm{m}$, $0.1\,\mathrm{m}$, $0.2\,\mathrm{m}$ along the central axis for $F$ of $0.8\,\mathrm{m}$. Assume the maximum dose is $100\,\mathrm{rad}$. Ignore scatter.

(b) Compare your calculations with the measured values in Appendix 11 for a $10 \times 10$ cm field. Calculate the dose attributable to scatter and the buildup factor at each depth.

**Solution**