Answer on the question #63460, Chemistry / Physical Chemistry

Question:

Iodin-131 is used in medical imaging. I-131 has a half life of 8 days. how much I-131 remains in patient's system after 1 month?

Solution:

Radiative decay kinetics obeys the laws for first-order reaction:

$$\ln\left(\frac{c_0}{c}\right) = kt,$$

where k is the rate constant:

$$k = \frac{0.6931}{\tau_{1/2}} = \frac{0.6931}{8} = 0.0866\ d^{-1}.$$

Let's say in one month we count 30 days :

$$\ln\left(\frac{c_0}{c}\right) = 0.0866 \cdot 30 = 2.599$$

Then, the change in the concentration will be:

$$\frac{c_0}{c} = 13.5$$

Answer: The amount of iodine-131 will decrease by 13.5 times in 1 month (30 days)