Answer on the question #54476 – Chemistry – General chemistry

Question:

For 214Bi, the half-life period is 19.7 minutes. Calculate the radioactive decay constant. Also calculate how much of 1 gram sample of 214Bi will remain after 78.4 minutes.

Answer:

The half-life period is connected with rate constant through the relation:

$$\tau_{1/2} = \frac{ln2}{k}, k = \frac{ln2}{\tau_{1/2}} = \frac{0.693}{19.7} = 0.0352 \text{ min}^{-1}$$

The mass of the sample (with initial mass *a*) left after the time *t* is:

$$x = ae^{-kt} = 1 * e^{-0.0352*78.4} = 0.063\ g$$