Answer on Question #55006 - Chemistry - Other

Question:
Two students scouring an archaeological site found what appeared to be fossil remains. The specimen was found to have a ratio of 14C/12C 0.795 times that found in current living plants. What would be the estimated age of the fossil remains? The half-life for carbon -14 is 5720 years.

Solution:
Radioactive decay of ^{14}C is a first order reaction described by equation $N = N_0 exp(-kt)$
It can be transformed as following $ln\left(\frac{N}{N_0}\right) = -kt;\ k = \frac{ln2}{t_{\frac{1}{2}}};\ ln\left(\frac{N}{N_0}\right) = -t * ln2/t_{1/2}$

$$t = -ln(\frac{N}{N_0}) * \frac{t_{\frac{1}{2}}}{ln2} = -ln0.795 * 5720ln2 = 1893\ (years)$$

Answer:

The estimated age of the fossil remains is 1890 years