6. Since the density of water is $\rho = 1000\,\mathrm{kg/m^3} = 1\,\mathrm{kg/L}$, then the total mass of the pool is $\rho\mathcal{V} = 4.32 \times 10^5\,\mathrm{kg}$, where $\mathcal{V}$ is the given volume. Now, the fraction of that mass made up by the protons is 10/18 (by counting the protons versus total nucleons in a water molecule). Consequently, if we ignore the effects of neutron decay (neutrons can beta decay into protons) in the interest of making an order-of-magnitude calculation, then the number of particles susceptible to decay via this $T_{1/2} = 10^{32}\,\mathrm{y}$ half-life is

$$N = \frac{\frac{10}{18} M_{\mathrm{pool}}}{m_p} = \frac{\frac{10}{18}(4.32 \times 10^5\,\mathrm{kg})}{1.67 \times 10^{-27}\,\mathrm{kg}} = 1.44 \times 10^{32} \ .$$

Using Eq. 43-19, we obtain

$$R = \frac{N \ln 2}{T_{1/2}} = \frac{\left(1.44 \times 10^{32}\right) \ln 2}{10^{32}\,\mathrm{y}} \approx 1 \text{ decay/y} \ .$$