67. The decay rate R is related to the number of nuclei N by $R = \lambda N$, where λ is the disintegration constant. The disintegration constant is related to the half-life $T_{1/2}$ by $\lambda = (\ln 2)/T_{1/2}$, so $N = R/\lambda = RT_{1/2}/\ln 2$. Since $1\,\text{Ci} = 3.7 \times 10^{10}$ disintegrations/s,

$$N = \frac{(250\,\text{Ci})(3.7 \times 10^{10}\,\text{s}^{-1}/\text{Ci})(2.7\,\text{d})(8.64 \times 10^{4}\,\text{s/d})}{\ln 2} = 3.11 \times 10^{18}\ .$$

The mass of a ^{198}Au atom is $M = (198\,\text{u})(1.661 \times 10^{-24}\,\text{g/u}) = 3.29 \times 10^{-22}\,\text{g}$, so the mass required is $NM = (3.11 \times 10^{18})(3.29 \times 10^{-22}\,\text{g}) = 1.02 \times 10^{-3}\,\text{g} = 1.02\,\text{mg}$.