

1.-

500g A X

$$t = 2h \Rightarrow N = 0'80 N_0$$

a) λ ? b) $t_{1/2}$? m después de 20 horas

$$\ln \frac{N}{N_0} = -\lambda t \Rightarrow \lambda = -\frac{\ln N/N_0}{t}$$

$$\lambda = -\frac{\ln \frac{0'80 N_0}{N_0}}{2h} \Rightarrow \lambda = 0'112 h^{-1}$$

$$b) \ln \frac{N}{N_0} = -\lambda t \Rightarrow \ln \frac{N_0/2}{N_0} = -\lambda t_{1/2}$$

$$t_{1/2} = -\frac{\ln 1/2}{\lambda} = \frac{-\ln 1/2}{0'112 h^{-1}} = 6'19 h.$$

$$\ln \frac{m}{m_0} = -\lambda t$$

$$m = m_0 e^{-\lambda t}$$

$$m = 500g e^{-(0'112 h^{-1} \cdot 20h)} = 50'64g$$

2.-

$$A = 10^6 \text{ desintegrações. s}^{-1} \quad {}^{54}\text{C}$$

$$t_{1/2} \quad {}^{54}\text{C} \rightarrow t_{1/2} = 5720 \text{ anos}$$

a) m_0 ? b) m ? $t = 4000 \text{ anos}$

$$A_c = \lambda \cdot N$$

$$\lambda ? \quad \ln \frac{N}{N_0} = -\lambda t \Rightarrow \ln \frac{N_{1/2}}{N_0} = -\lambda t_{1/2}$$

$$\lambda = - \frac{\ln 1/2}{t_{1/2}} = - \frac{\ln 1/2}{5720 \text{ anos}} = 1.21 \cdot 10^{-4} \text{ anos}^{-1}$$

$$A_c = \lambda \cdot N \Rightarrow N = \frac{A_c}{\lambda} = \frac{10^6 \text{ s}^{-1}}{1.21 \cdot 10^{-4} \text{ anos}^{-1}} \quad ?$$

$$1.21 \cdot 10^{-4} \frac{1}{\text{anos}} \cdot \frac{1 \text{ ano}}{365 \text{ dias}} \cdot \frac{1 \text{ dia}}{24 \text{ h}} \cdot \frac{1 \text{ h}}{3600 \text{ s}} = 3.84 \cdot 10^{-12} \text{ s}^{-1}$$

$$N = \frac{10^6 \text{ s}^{-1}}{3.84 \cdot 10^{-12} \text{ s}^{-1}} = 2.60 \cdot 10^{17} \text{ nucleos}$$

$$2.60 \cdot 10^{17} \text{ nucleos} \cdot \frac{14 \text{ g}}{6.022 \cdot 10^{23} \text{ nucleos}} = 6.04 \cdot 10^{-6} \text{ g (mol)}$$

b)

$$\ln \frac{m}{m_0} = -\lambda t \quad ; \quad \frac{m}{m_0} = e^{-\lambda t}$$

$$m = m_0 e^{-\lambda t} \Rightarrow m = 6.04 \cdot 10^{-6} \text{ g} \cdot e^{-1.21 \cdot 10^{-4} \text{ anos}^{-1} \cdot 4000 \text{ anos}}$$

$$m = 3.79 \cdot 10^{-6} \text{ g}$$