Probleme:

$$\frac{m}{M} = n = \text{Anz. Mol}$$

$$N = n \cdot N_A = \frac{m}{M} \cdot N_A$$

Exp 6E, 22.3.13

(1)

$$N(t) = N_0 e^{\lambda t}$$

$$N(t = T_n) = \underbrace{N_0 e^{\lambda \cdot T_n} = n \cdot N_0}_{n} \quad | : N_0$$

$$e^{\lambda T_n} = n$$

$$\lambda \cdot T_n = \ln(n)$$

(2)

$$L_1 = 10 \cdot \log\left(\frac{I_1}{I_0}\right) = 75\,dB \qquad I_1 : L_1 = 75\,dB$$

$$\frac{I_1}{I_0} = 10^{7.5} \qquad I_2 : I_2 = 200 \cdot I_1$$

$$\frac{I_2}{I_0} = \frac{200 I_1}{I_0} = 200 \cdot 10^{7.5}$$

$$\Rightarrow L_2 = 10 \cdot \log\left(200 \cdot 10^{7.5}\right)$$

$$= 10 \cdot \log\left(2 \cdot 10^{9.5}\right)$$

$$L_2 = 98.01\,dB$$

(3)

$$f(x) = 10^x$$

1	10	100	1000
10^0	10^1	10^2	10^3

$$\hookrightarrow x = \log(f(x))$$

$\log(31.623) = 1.5$ → Mitte zw. "1" u. "2"

$\log(215.443) = 2.\overline{3}$ → 1. Drittel zw. "2" und "3"

(2) I_1 : 3 Sänger

I_2 : 200 Sänger

$$I_2 = 200 \cdot \frac{I_1}{3}$$

$$I_2 = \frac{200}{3} \cdot I_1$$

$$L_1 = 10 \cdot \log\left(\frac{I_1}{I_0}\right) = 75\,dB$$

$$\frac{I_1}{I_0} = 10^{7.5}$$

$$L_2 = 10 \cdot \log\left(\frac{I_2}{I_0}\right) \quad ; \quad I_2 = \frac{200}{3} \cdot I_1$$

$$= 10 \cdot \log\left(\frac{200}{3} \cdot 10^{7.5}\right)$$

$$\underline{\underline{L_2 = 93.24\,dB}} \qquad (93.2391)$$

(4) I - 131, $T_{1/2} = 8.0207\,d$

$1\,ng / m^3$

$$\lambda = -0.08642 / _{Tag} = -1.000'23 \cdot 10^{-6} / sec.$$

$$m = 1\,ng$$

$$N_0 = \frac{m}{M} \cdot N_A$$

$$= \frac{1\,ng}{131} \cdot 6.02 \cdot 10^{23} \cong 4.595 \cdot 10^{12}$$

$$A = \lambda \cdot N_0 = 4.596 \cdot 10^{6}\,Bq / m^3$$

$$\underline{\underline{= 4.596 \cdot 10^{3}\,Bq / L}}$$

5 $T_{1/2} = 5'736\,a$

$N_0 = 3 \cdot 10^{-8}\ \%$

$N(t) = 2.752'342 \cdot 10^{-8}\ \%$

$N(t) = N_0\, e^{\lambda t}$

$\frac{N(t)}{N_0} = e^{\lambda t} \quad / \ln$

$\ln\left(\frac{N(t)}{N_0}\right) = \lambda \cdot t$

$t = \frac{\ln\left(\frac{N(t)}{N_0}\right)}{\lambda} \cong 713$ Jahre

$\longrightarrow$ Anno 1300 n. Chr.

6 I-131; $T_{1/2} = 8.0207\,d$

während 5 Tagen $\underbrace{0.350'855\,g}_{\Delta m}$ zerfallen

$N_0 = ?$

$N(t) = N_0\, e^{\lambda t}$; $N_0 - N(t) = \Delta m$

$N(t) = N_0 - \Delta m$

$N_0 - \Delta m = N_0\, e^{\lambda t}$

$N_0 - N_0\, e^{\lambda t} = \Delta m$

$N_0\left(1 - e^{\lambda t}\right) = \Delta m$

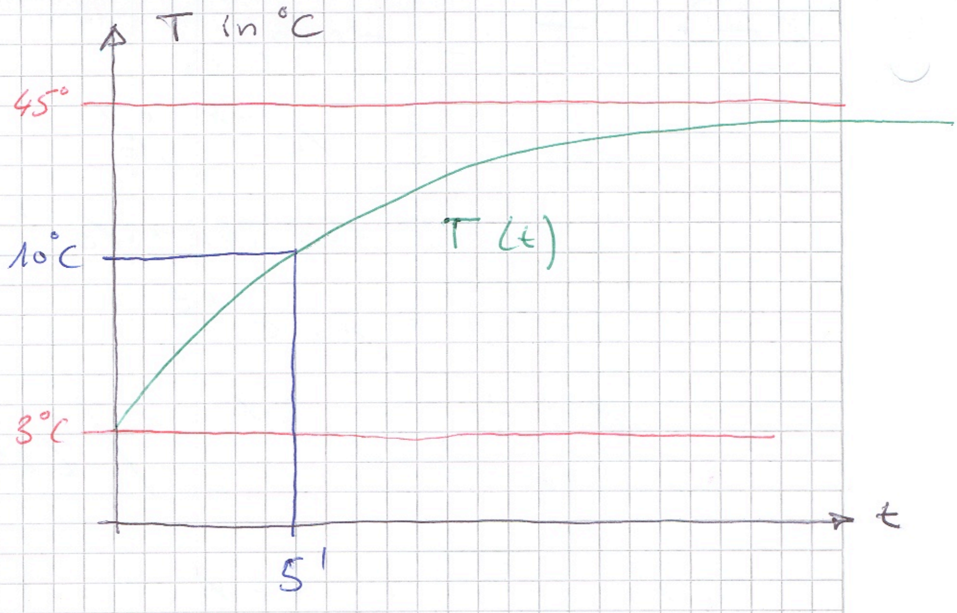
$N_0 = \frac{\Delta m}{1 - e^{\lambda t}} = $ 1 Gramm

(7)

$T_{end} = 45°C$

$T_{start} = 3°C$

$T(t = 5') = 10°C$



$$T(t) = A + B \cdot e^{\lambda t} \quad ; \quad \lambda < 0 !$$

$$T(t=0) = A + B \cdot e^{\lambda \cdot 0} = 3°C$$

$$A + B = 3°C$$

$$T(t=\infty) = A + Be^{\lambda \cdot \infty} = 45°C$$

$$A = 45°C$$

$$B = -42°C$$

$$T(t) = 45 - 42 \cdot e^{\lambda t}$$

$$T(t=5) = 45 - 42 \cdot e^{5\lambda} = 10°C \quad \Big/ -45$$

$$-42 \cdot e^{5\lambda} = -35 \quad \Big/ \cdot(-1), : 42$$

$$e^{5\lambda} = \frac{35}{42} = \frac{5}{6}$$

$$5\lambda = \ln(5/6)$$

$$\lambda = \frac{1}{5} \ln(5/6)$$

$$T(t) = 45 - 42 \cdot e^{\lambda t}$$

$$T(t=5) = 45 - 42e^{\lambda t} = \cancel{20} \; 20\,°C$$

$$-42e^{\lambda t} = -25$$

$$e^{\lambda t} = \frac{25}{42}$$

$$t = \frac{\ln(25/42)}{\lambda} \cong \underline{\underline{14.227'}}$$

$$\Delta T = T_{start} - T_{end}$$

$$= 3°C - 45°C = -42°C$$

$$T_{end} = 45°C$$