GesBM 7M, Freitag, 8.11.2013

(1) $pH = -\log(H^+) = 3$

$\log(H^+) = -3 \quad / 10^x$

$H^+ = 10^{-3} = \frac{1}{1000}$

konzentration 50-fach verdünnen:

$H^+ = \frac{10^{-3}}{50}$

$pH\ neu = -\log\left(\frac{10^{-3}}{50}\right) = 4.69897$

$\cong \underline{4.7}$

(2) ohne Watt-Zahl:

$L_1 = 10 \cdot \log\left(\frac{I_1}{I_0}\right) = 98\ dB$

$\log\left(\frac{I_1}{I_0}\right) = 9.8 \quad / 10^x$

$\frac{I_1}{I_0} = 10^{9.8}$

$L_2 = 10 \cdot \log\left(\frac{I_2}{I_0}\right) = 75\ dB$

$\frac{I_2}{I_0} = 10^{7.5}$

$$\frac{\frac{I_1}{I_0}}{\frac{I_2}{I_0}} = \frac{I_1}{I_2} = \frac{10^{9.8}}{10^{7.5}} = 10^{2.3} \cong 199.526$$

→ 199.526 mal weniger Leistung

$\frac{20'000}{199.526} = \underline{100.237\ Watt}$

Mit Wattzahl:

$$L_1 = 10 \cdot \log\left(\frac{20'000}{I_0}\right) = 98\,dB$$

$$\frac{20'000}{I_0} = 10^{9.8}$$

$$I_0 = \frac{20'000}{10^{9.8}} \approx 0.000'003\,Watt$$

$$L_2 = 10 \cdot \log\left(\frac{x}{I_0}\right) = 75\,dB$$

$$10 \cdot \log\left(\frac{x}{\frac{20'000}{10^{9.8}}}\right) = 75$$

$$\frac{x}{\frac{20'000}{10^{9.8}}} = 10^{7.5}$$

$$x = \frac{20'000}{10^{9.8}} \cdot 10^{7.5}$$

$$= \underline{100.237\,Watt}$$

(3)

$$45 \cdot 0.995^t = 32 \cdot 1.012^t$$

$$\frac{45}{32} = \left(\frac{1.012}{0.995}\right)^t$$

$$\log\left(\tfrac{45}{32}\right) = t \cdot \log(\;)$$

$$t = \frac{\log\left(\tfrac{45}{32}\right)}{\log\left(\frac{1.012}{0.995}\right)} = 20.1242$$

$$\underline{20.1242\,Monate}$$

5.39 für
5% statt 0.5 %

(4) $1 = 2 \cdot (0.95)^{t/3}$

$\frac{1}{2} = (0.95)^{t/3} \quad / \log$

$\log \frac{1}{2} = \frac{t}{3} \cdot \log(0.95)$

$t = \frac{3 \cdot \log(\frac{1}{2})}{\log(0.95)} = \underline{\underline{40.5402 \text{ Monde}}}$

(5) 10 Tage als Nullpunkt!

$N_0 = 2.119 \text{ g}$; nach 30 Tagen 0.5067 g

$2.119 \cdot (\frac{1}{2})^{t/\tau} = N(t)$

$N(t=20) = 0.5067 = 2.119 \cdot (\frac{1}{2})^{\frac{20}{\tau}}$

$\frac{0.5067}{2.119} = (\frac{1}{2})^{20/\tau} \quad / \log$

$\frac{\log(\frac{0.5067}{2.119})}{\log(\frac{1}{2})} = \frac{20}{\tau}$

$\frac{20 \cdot \log(\frac{1}{2})}{\log(\frac{0.5067}{2.119})} = \underline{\underline{9.689 \text{ Tage}}}$

$N_0 = 2.119 \cdot (\frac{1}{2})^{-\frac{10}{9.689}} = \underline{\underline{4.\overline{3} \text{ g}}}$

(6)

$T_{max} = 280\,^{\circ}C$

$T_{min} = 32\,^{\circ}C$

$$T(t) = (280 - 32) \cdot \left(\frac{1}{2}\right)^{\frac{t}{\tau}} + 32$$

$$T(t=15) = 248 \cdot \left(\frac{1}{2}\right)^{\frac{15}{\tau}} + 32 = 120 \;/\; -32$$

$$248 \cdot \left(\frac{1}{2}\right)^{15/\tau} = 88 \;/\; :248$$

$$\left(\frac{1}{2}\right)^{15/\tau} = \frac{88}{248} = \frac{44}{124} = \frac{22}{62} = \frac{11}{31}$$

$$\frac{15}{\tau} \cdot \log\left(\frac{1}{2}\right) = \log\left(\frac{11}{31}\right)$$

$$\tau = \frac{15 \cdot \log\left(\frac{1}{2}\right)}{\log\left(\frac{11}{31}\right)} = 10.635\,\text{min}$$

$$T(t) = 248 \cdot \left(\frac{1}{2}\right)^{\frac{t}{\tau}} + 32 = 50 \;/\; -32$$

$$248\left(\frac{1}{2}\right)^{t/\tau} = 18 \;/\; :248$$

$$\left(\frac{1}{2}\right)^{\frac{t}{\tau}} = \frac{18}{248} = \frac{9}{124}$$

$$\frac{t}{\tau} = \frac{\log\left(\frac{9}{124}\right)}{\log\left(\frac{1}{2}\right)}$$

$$t = \tau \cdot \frac{\log\left(\frac{9}{124}\right)}{\log\left(\frac{1}{2}\right)} = 37.953\,\text{min}$$