

$$F = m \cdot a \quad F_{\text{warm}} = E_T [\text{MPa}] \cdot \epsilon \cdot A_{\text{womb}} [\text{mm}^2]$$

$$L = \frac{\Delta L}{L} = \frac{\Delta L}{L_T - L_{G4}}$$

$$\dot{V}_{\text{tran}} = V \cdot A \quad \dot{V}_{\text{ges}} = \dot{V}_{\text{ein}} - \dot{V}_{\text{aus}}$$

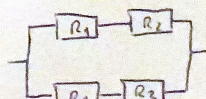
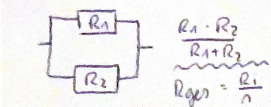
$$\dot{m}_{\text{flum}} = \rho \cdot V \cdot A \quad [\text{g/s}] \quad \dot{m}_{\text{smom}} = \rho \cdot \frac{V}{t}$$

$$V_{\text{Bett}} = \pi r^2 \cdot l \quad V = \int \pi r(x)^2 dx$$

$$\frac{1}{2} \rho v_{\text{ein}}^2 + \rho \cdot g \cdot h + p_{\text{fluid}} = \frac{1}{2} \rho v^2 + \rho \cdot g \cdot h + p$$

$$Re = \frac{\rho \cdot v \cdot d}{\eta_{\text{visk}} < 2300_{\text{lam}}} \quad [\frac{\text{kg}}{\text{m}^2 \cdot \text{s}}]$$

$$R = \frac{88 \cdot \mu \cdot L}{\pi \cdot D^4} = \frac{8 \cdot \mu \cdot L}{\pi \cdot (\frac{D_0}{2})^4} \left(\frac{1}{2^4} D^4 \right) \quad [\frac{\text{mmHg}}{\text{ml/min}}]$$



$$\frac{(R_1 + R_2)(R_1 + R_2)}{(R_1 + R_2) + (R_1 + R_2)} = \frac{1}{2}(R_1 + R_2)$$

$$\Delta P_{\text{R,dL}} = R \cdot Q = R \cdot \dot{V} \cdot A = R \cdot \dot{V} \cdot \pi \cdot \frac{d^2}{4}$$

$$P_{\text{int. div.}} = \left[\frac{\text{mmHg}}{\text{ml/min}} \right] \left[\frac{\text{l}}{\text{s}} \right]$$

$$P \cdot D = 2 \cdot \sigma \cdot s$$

$$p_{\text{ew}} \cdot D = 2 \cdot E_{\text{aq}} \cdot \epsilon_s \cdot S_{\text{G}} + 2 E_{\text{B}} \cdot \epsilon_{\text{B}} \cdot S_{\text{B}}$$

$$C = \frac{\Delta V}{\Delta P} \rightarrow \Delta V = \frac{\pi (D_{\text{sup}}^2 - D_{\text{per}}^2)}{4} \cdot L \cdot \frac{\Delta P}{D} = \epsilon$$

$$W_{\text{enge}} = \Delta V \frac{(P_{\text{P1}} + P_{\text{P2}})}{2}$$

$$P_{\text{vent}} = \frac{W}{t} \quad [\frac{\text{J}}{\text{s}} = \text{W}]$$

$$t_{\text{Schluss}} = 60 \text{ s}$$



$$W_{\text{fr. n. Mec}} = -S \cdot V \cdot P_3 - \frac{1}{2} S \cdot V \cdot (P_4 - P_3) + S \cdot V_{\text{flum}} \left(\frac{1}{2} (P_2 - P_1) + P_1 \right) \quad [\text{J}]$$

$$n = \frac{P \cdot V}{R \cdot T} \quad [\text{mol}] \quad n = \frac{m}{M} = \frac{\rho \cdot V}{M}$$

$$\rho = \frac{m}{V} \quad [\frac{\text{kg}}{\text{m}^3} \quad |\frac{\text{g}}{\text{cm}^3}|]$$

$$P_{\text{ges}} = P_{\text{per.1}} + P_2 + P_3 + \dots$$

$$V_{\text{ges}} = \alpha_i \left[\frac{1}{\text{atm}} \right] \cdot p [\text{atm}] \cdot V [\text{ml}]$$

$$\chi = \frac{n_{\text{O}_2}}{n_{\text{ges}}} = \frac{P_{\text{O}_2}}{P_{\text{ges}}} = \frac{P}{\alpha_1}$$

$$\Delta P = \frac{\bar{V}}{\bar{D}}$$

$$W = \rho \cdot \Delta V$$

$$\frac{\bar{V}_{\text{flum}}}{\bar{V}} = \frac{A_{\text{comp}}}{A_2}$$

$$\bar{V}_{\text{Akt}} = \frac{100}{\rho_{\%}} \cdot \bar{V}_{\text{Normd}}$$

$$\text{MPa} = \frac{\text{N}}{\text{mm}^2} \approx 10 \text{ bar}$$

$$\approx \frac{1}{133,322} \text{ mmHg}$$

$$Pa = \frac{\text{kg}}{\text{m} \cdot \text{s}^2} = \frac{\text{N}}{\text{m}^2}$$

$$\approx 101325 \text{ atm}$$

$$\text{atm} \approx 760 \text{ mmHg}$$

$$N = \frac{\text{kg} \cdot \text{m}}{\text{s}^2}$$

$$J = \frac{\text{kg} \cdot \text{m}^2}{\text{s}^2}$$

$$W = \frac{J}{s}$$

$$1^\circ \text{C} = (273,15 + 1) \text{ K}$$

$$L \approx 10^{-3} \text{ m}^3$$

$$A = \pi r^2 = \pi \frac{d^2}{4}$$

$$U = 2\pi r = \pi d$$

$$V_{\text{flum}} = V_{\text{in, real}} + V_{A2} + V_{\text{exp, ges}} + R_{\text{flum}}$$

$$V_{\text{tot, ka}} = V_{\text{in, kap}} + V_{\text{int, kap}}$$

$$V_{\text{in, kap}} = V_{\text{in, erw}} + V_{A2}$$

$$V_{\text{tot, kap}} = V_{\text{exp, erw}} + V_{\text{erw}}$$

$$\vec{a} = \frac{d\vec{v}}{dt} = (a_r) \frac{\partial \vec{v}}{\partial t} + (a_{\theta}) \left(\frac{\partial \vec{v}}{\partial x} \frac{\partial x}{\partial \theta} + \frac{\partial \vec{v}}{\partial y} \frac{\partial y}{\partial \theta} + \frac{\partial \vec{v}}{\partial z} \frac{\partial z}{\partial \theta} \right) + (\vec{v} \cdot \nabla) \vec{v}_{\text{transversal}}$$

$$\vec{v}_{\text{impair}} = m \vec{v} \quad [\frac{\text{kg} \cdot \text{m}}{\text{s}}] \quad (I_{\text{tot, akt}} = \rho \cdot \vec{v})$$

$$\dot{n}_{i, \text{Fick}} = -D_{i, \text{Fick}} \cdot A \cdot \frac{\partial c_i}{\partial x} \quad [\frac{\text{mol}}{\text{s} \cdot \text{m}}]$$

$$\frac{dG}{d\tau_{\text{flum}}} = J_{\text{O}_2 \text{ ein}} - J_{\text{O}_2 \text{ aus}} = \dot{n}_{\text{O}_2 \text{ ein}} - \dot{n}_{\text{O}_2 \text{ aus}}$$