

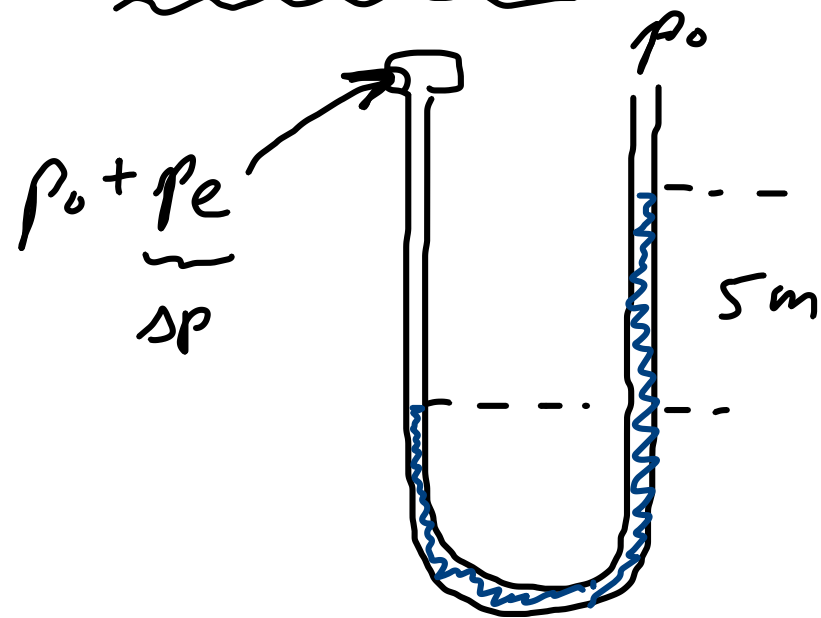
Physics hour 07

1) Stempeldruck:

$$p_1 = p_2 \rightarrow \frac{\bar{F}_1}{A_1} = \frac{\bar{F}_2}{A_2} = \frac{\bar{F}_1}{\cancel{\pi R_1^2}} = \frac{\bar{F}_2}{\cancel{\pi R_2^2}}$$

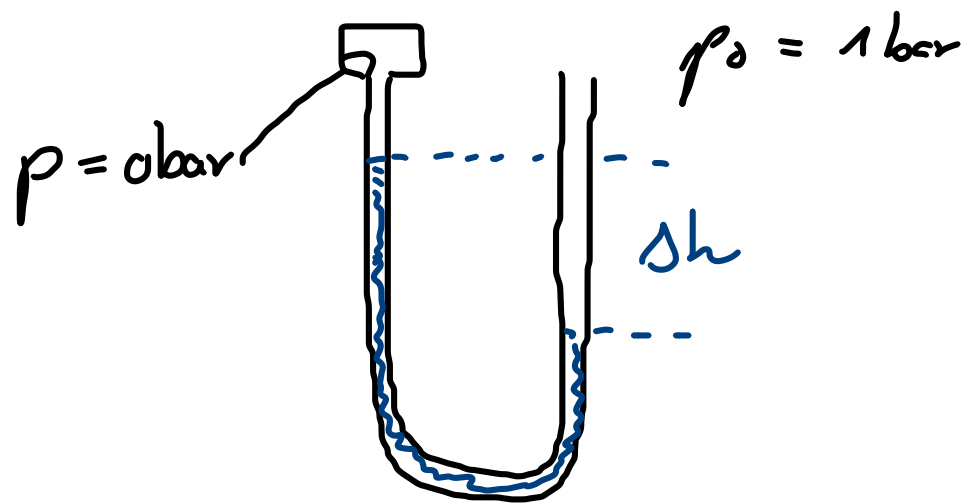
$$\rightarrow \bar{F}_1 = \bar{F}_2 \cdot \frac{R_1^2}{R_2^2} = \bar{F}_2 \cdot \left(\frac{R_1}{R_2}\right)^2 = 2000 \text{ N} \left(\frac{\cancel{R_1}}{25\cancel{R_1}}\right)^2 = \frac{2000 \text{ N}}{25^2} = 3,2 \text{ N}$$

2) U-Rohr 1:



$$p_e = p_s = \rho \cdot g \cdot h = 1000 \frac{\text{kg}}{\text{m}^3} \cdot 9,81 \frac{\text{m}}{\text{s}^2} \cdot 5 \text{ m} = 49000 \text{ Pa} \\ = 0,49 \text{ bar}$$

3) U-Rohr 2



$$p_s = \rho g \cdot h \rightarrow h = \frac{p_s}{\rho \cdot g} = \frac{10^5 \text{ Pa}}{1000 \frac{\text{kg}}{\text{m}^3} \cdot 9,81 \frac{\text{m}}{\text{s}^2}} = 10,2 \text{ m}$$

4) Kompression von Wasser

$$\rho = \frac{m}{V} \quad ; \quad \rho' = \frac{m}{V'} = \frac{m}{V - \Delta V}$$

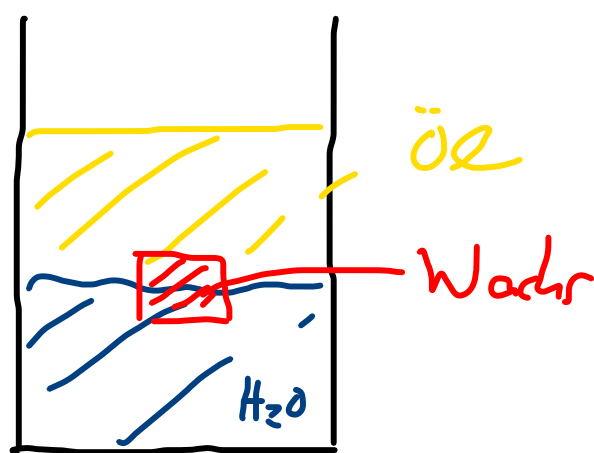
$$\Delta V = V \cdot \frac{p}{K} = V \cdot \frac{10^8 \text{ Pa}}{2 \cdot 10^9 \text{ Pa}} = 0,05 V$$

$$\rightarrow \rho' = \frac{m}{V - 0,05 V} = \frac{m}{V(1 - 0,05)} = \frac{\rho}{0,95} = 1 \frac{\text{g}}{\text{cm}^3} \cdot 1,05 = 1,05 \frac{\text{g}}{\text{cm}^3}$$

$$10 \text{ m} \hat{=} 1 \text{ bar}$$

$$10 \text{ km} \hat{=} 1000 \text{ bar} = 10^3 \text{ bar} = 10^8 \text{ Pa}$$

5) Sinken, Schwimmen, Schweben



6) Schwimmen 1

Berechne Dichte $\rho = \frac{m}{V} = \frac{m}{a^3}$

$$\cdot \frac{6,48}{2^3} = 0,81$$

$$\cdot \frac{48}{4^3} = 0,75$$

$$\cdot \frac{0,12}{0,5^3} = 0,96$$

$$\cdot \frac{120}{5^3} = 0,96$$

$$\cdot \frac{900}{10^3} = 0,9$$

7) Schwimmen 2

$$\frac{V_0}{V} = 1 - \frac{\rho_K}{\rho_{FL}} = 1 - \frac{0,47 \cancel{\text{g/cm}^3}}{1 \cancel{\text{g/cm}^3}} = 1 - 0,47 = 0,53$$

$$\Rightarrow V_0/V = 53\%$$

8) Kapillarkompression

$$\Delta h = \frac{2\sigma}{r\rho g} \rightarrow r = \frac{2\sigma}{\rho g \Delta h} = \frac{2 \cdot 0,07 \frac{\text{N}}{\text{m}}}{1000 \frac{\text{kg}}{\text{m}^3} \cdot 10 \frac{\text{m}}{\text{s}^2} \cdot 10 \text{ m}} = 1,4 \mu\text{m}$$