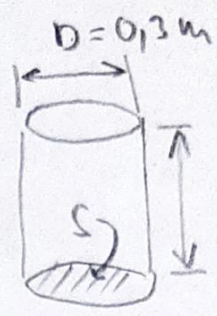
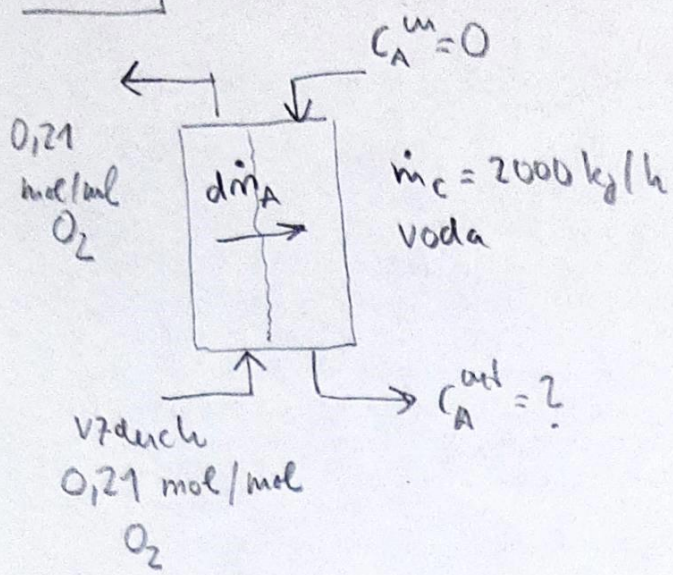


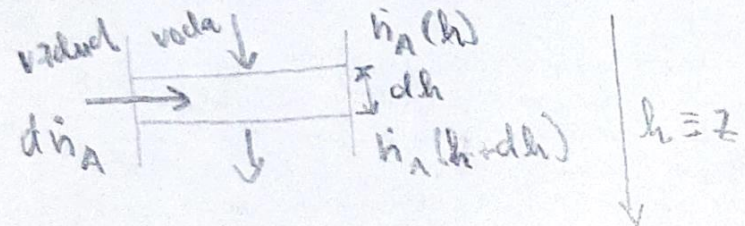
5-8



$p = 101 \text{ kPa}$   
 $T = 20^\circ\text{C}$

$H = 1 \text{ m}$   
 $k_{La} = 0,01 \text{ s}^{-1}$   
 $K_{La} \doteq k_{La}$   
 odpor je v kap. fázi

Bilance úseku kolony (kapaliva)



$$\dot{n}_A = \dot{V}_c c_A$$

$$d\dot{n}_A = K_{La} S dh (c_A^* - c_A)$$

$$d(c_A \dot{V}_c) = K_{La} S dh (c_A^* - c_A)$$

$$\int_{c_A^{\text{in}}}^{c_A^{\text{out}}} \frac{dc_A}{c_A^* - c_A} = \int_0^H \frac{K_{La} S}{\dot{V}_c} dh = \frac{K_{La} S \cdot H}{\dot{V}_c}$$

$$\int_{z_1}^{z_2} -\frac{dz}{z} = [-\ln z]_{z_1}^{z_2} = -[\ln(c_A^* - c_A)]_{c_A^{\text{in}}=0}^{c_A^{\text{out}}} = -\ln \frac{c_A^* - c_A^{\text{out}}}{c_A^* - 0}$$

$$z \equiv c_A^* - c_A \quad \frac{c_A^* - c_A^{\text{out}}}{c_A^*} = \exp\left(-\frac{K_{La} S H}{\dot{V}_c}\right)$$

$$c_A^{\text{out}} = c_A^* \left[ 1 - \exp\left(-\frac{K_{La} S H}{\dot{V}_c}\right) \right]$$

5-8, str. 2.

voda, 20°C  
 $\dot{m}_c = 2000 \text{ kg/h}$       $\rho = 998,2 \text{ kg/m}^3$

$$\dot{V}_c = \frac{2000/3600}{998,2} = 5,566 \cdot 10^{-4} \text{ m}^3/\text{s}$$

$$S = \pi D^2/4 = \pi \cdot 0,3^2/4 = 0,0707 \text{ m}^2$$

Rozpuštěnost  $O_2$  v čisté vodě 20°C

$$P_A = H X_A \quad H = 4,05 \cdot 10^4 \text{ atm (Holeček)}$$

$$P_A = 0,21 \cdot 101 \text{ kPa} \approx 0,21 \text{ atm}$$

$$X_A = P_A/H = 0,21/4,05 \cdot 10^4 = 5,19 \cdot 10^{-6} \text{ mol } O_2 / \text{mol vody}$$

Koncentrace vody v čisté vodě při 20°C

$$C_{TOT} = \frac{\rho}{M_c} = \frac{998,2}{18 \cdot 10^{-3}} = 5,546 \cdot 10^4 \text{ mol/m}^3$$

$$C_A^* = X_A \cdot C_{TOT} = 5,546 \cdot 10^4 \cdot 5,19 \cdot 10^{-6} = \underline{\underline{0,2875 \text{ mol/m}^3}}$$

maximální možná koncentrace  $O_2$   
ve vodě (pro  $H \rightarrow \infty$ )

$$C_A^{out} = C_A^* \left[ 1 - \exp\left(-\frac{k_L a S H}{\dot{V}_c}\right) \right]$$
$$= 0,2875 \cdot \left[ 1 - \exp\left(-\frac{0,01 \cdot 0,0707 \cdot 1}{5,566 \cdot 10^{-4}}\right) \right] = \underline{\underline{0,2068 \frac{\text{mol}}{\text{m}^3}}}$$

Koncentrace kyslíku ve vystupující vodě bude  $0,207 \text{ mol/m}^3$