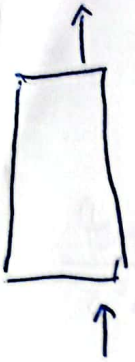
1.



$K_y = 5 \times 10^{-5} \frac{kmol}{s\,m^2}$ 20% resist.ª f. gasosa

$P_A^* = H\,x_A \longrightarrow y_A^* = m\,x_A$

$m = 1.5$

a) $\frac{1}{K_y} = \frac{1}{k_y} + \frac{m}{k_x}$ $\qquad \frac{\frac{1}{k_y}}{\frac{1}{K_y}} = 0.2$

$\frac{k_y}{k_y} = 0.2$ $\qquad k_y = \frac{5 \times 10^{-5}}{0.2} = 2.5 \times 10^{-4} \frac{kmol}{s\,m^2}$

$\frac{\frac{m}{k_x}}{\frac{1}{K_y}} = 0.8$ $\qquad \frac{k_y \cdot m}{k_x} = 0.8$

$k_x = \frac{5 \times 10^{-5} * 1.5}{0.8} = 9.38 \times 10^{-5} \frac{kmol}{s\,m^2}$

b) $k_y (y_A - y_{Ai}) = k_x (x_{Ai} - x_A)$ (topo da coluna: $x_A = 0$)

$k_y (0.005 - m\,x_{Ai}) = k_x\,x_{Ai}$

$0.005\,k_y = x_{Ai} (k_x + m\,k_y)$

$x_{Ai} = \frac{0.005\,k_y}{k_x + m\,k_y} = 2.67 \times 10^{-3}$

$y_{Ai} = m\,x_{Ai} = 4 \times 10^{-3}$

c) $N_A = K_y (y - y^*) = 5 \times 10^{-5} \times 0.005$

$y^* = mx$, $x = 0$

$= 2.5 \times 10^{-7} \frac{kmol}{m^2 s}$

d) Sim, porque 80% da resistência está na fase líquida.

e) $\frac{k_x}{k_x^\circ} = 6 = \frac{Ha}{\tanh Ha} \simeq Ha$

$36 = \frac{\delta^2 k_1}{\mathcal{D}_A}$

$k_L^\circ = \frac{\mathcal{D}_A}{\delta}$

$k_L^\circ = k_x^\circ / c_L$

$k_L^\circ = 9.38 \times 10^{-5} \frac{kmol}{s\,m^2} \frac{18}{1000} \frac{m^3}{kg} \frac{kg}{kmol}$

$k_L^\circ = 1.7 \times 10^{-6} m/s$

$k_1 = 0.034\ s^{-1}$

$\delta = 1.78 \times 10^{-3} m$

2. $y_A = 0.75\, x_A$ $\quad L \rightarrow G$

$x_A = 0.9 \quad y_A = 0.45$

$k_y = 2\ mol/h\ m^2$ $\quad$ 70% resist f. gasosa

a) $K_y = ?$ $\quad \frac{\frac{1}{k_y}}{\frac{1}{K_y}} = 0.7 \quad K_y = 1.4\ \frac{mol}{h\ m^2}$

b) $N_A = ?$ $\quad N_A = K_y (y_A - y_A^*)$

$N_A = 1.4\ (0.45 - 0.75 * 0.9) = -0.315\ \frac{mol}{h\ m^2}$

↑ transf. L → G

c) y_{Ai} e $x_{Ai} = ?$

$N_A = k_y (y_A - y_{Ai}) \Rightarrow -0.315 = 2\ (0.45 - y_{Ai})$

$y_{Ai} = 0.61$

$x_{Ai} = \frac{y_{Ai}}{0.75} = \frac{0.61}{0.75} = 0.81$

3.

Conc. ácido	zero	elevada
$K_G a\ (\frac{kmol}{m^3 s\ bar})$	0.066	0.085

$H = 0.745$ bar

$$\frac{1}{K_G a} = \frac{1}{k_G a} + \frac{H}{C_L k_L a} \quad (1)$$

k_{Ga} e k_{La} ?

se conc. ácido elevada $\quad$ Abs + Reac. química – Resist f. líquida nula

Então $k_G a = K_G a = 0.085\ \frac{kmol}{m^3 s\ bar}$

substituindo na eq.(1) e com $C_L = 1000/18\ \frac{kmol}{m^3}$

$$k_L a = 3.96 \times 10^{-3}\ s^{-1}$$