FT II – Exame de recurso resolução

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15 de abril de 2024

Conteúdo

Questão 1

Tubo de ensaio

- 5 cm de altura
- Contem metanol
- $z_0 = 2\,\mathrm{cm}$ nivel inicial
- Corrente de ar
- $25\,^{\circ}\mathrm{C}, 1\,\mathrm{atm}$
- $D_{met,ar} = 0.196\,\mathrm{cm^2\,s^{-1}}$ Coef de dif
- $p = 126\,\mathrm{mmHg}$ respectivamente
- $M_{met} = 32\,\mathrm{g\,mol^{-1}}$
- $\rho_{met} = 0.792\,\mathrm{g\,cm^{-3}}$

Q1 a.

Calc nivel de met no fim de 24h

Q1 b.

Explique oq acontece se a temp dobrar
body

Questão 2

Gas a

- $T_A = 600\,\mathrm{K}$
- $p_A = 101.3\,\mathrm{kPa} = 1\,\mathrm{atm}$
- $z_1 = 1\,\mathrm{mm}$
- $\mathrm{A} \longrightarrow \mathrm{B}$
- $N_A \propto -N_B$
- $D_A = 0.15\,\mathrm{cm^3\,s^{-1}}$

Q2 a.

Fração de a se a reac for inst, just

Resposta

$$f\begin{cases} r_0 = 0 & y_{A,z} = y_{A,*} \\ r_1 = 1 * 10^{-3} & y_{A,z} = y_{A,z_2} \end{cases}$$

$$N_{A,z} = y_{A,z}(N_{A,z} + N_{B,z}) - \frac{P\,D_{A,B}}{RT}\frac{\mathrm{d}y_{A,z}}{\mathrm{d}z} \cong y_{A,z}\,N_{A,z} - \frac{P\,D_{A,B}}{RT}\frac{\mathrm{d}y_{A,z}}{\mathrm{d}z} =$$

$$\implies \int_{z_0}^{z_1} N_{A,z}\,\mathrm{d}z = N_{A,z}\int_{z_0}^{z_1}\mathrm{d}z = N_{A,z}\,z_1 =$$

$$= \int_{y_{A,z_0}}^{y_{A,z_1}} -\frac{P\,D_{A,B}}{RT}\frac{\mathrm{d}y_{A,z}}{1-y_{A,z}} = -\frac{P\,D_{A,B}}{RT}\int_{y_{A,z_0}}^{y_{A,z_1}}\frac{\mathrm{d}y_{A,z}}{1-y_{A,z}} =$$
$$= \frac{P\,D_{A,B}}{RT}\int_{y_{A,z_0}}^{y_{A,z_1}}\frac{\mathrm{d}(1-y_{A,z})}{1-y_{A,z}} = \frac{P\,D_{A,B}}{RT}\ln\frac{1-y_{A,z_0}}{1-y_{A,z_1}} =$$
$$= \frac{P\,D_{A,B}}{RT}\ln\frac{1-p_{A,z_0}/P}{1-p_{A,z_1}/P} = \frac{P\,D_{A,B}}{RT}\ln\frac{P-p_{A,z_0}}{P-p_{A,z_1}} \implies$$

$$\implies N_{A,z} = \frac{z_1\,P\,D_{A,B}}{RT}\ln\frac{P-p_{A,z_0}}{P-p_{A,z_1}} =$$
$$= \frac{10^{-3} * 1 * 0.15 * 10^{-6}}{8.31 * 600}\ln\frac{0.15 * 10^{-6} - 0.15 * 10^{-6}}{0.15 * 10^{-6} - p_{A,z_1}}$$

Questão 3

Considere

- Solvente não volátil
- $c_{\mathrm{CO_2},t_0} = 1.8\,\mathrm{mol\,L^{-1}}$ Concentração de CO_2 inicial no solvente
- exposto a atm de CO_2
- $t_1 = 40'$
- $c_{\mathrm{CO_2},4\,\mathrm{cm}} = 5 * 10^{-3}\,\mathrm{mol\,cm^{-3}}$
- $D_{\mathrm{CO_2},S} = 5 * 10^{-5}$

$$\frac{C_{A,s} - C_A}{C_{A,s} - C_{A,0}} = erf\left(z/\sqrt{4\,D\,t}\right)$$

Determine a concentração interface