Twana Dler muhsin third

التاريخ / / ٢٠٢٠

الموضوع :

$$\alpha_{AB} = \frac{y_A / x_A}{(1-y_A)/(1-x_A)}$$

$$\frac{y_A}{x_A} = \alpha_{AB}\left(\frac{1-y_A}{1-x_A}\right)$$

$$\frac{y_A}{x_A} = \frac{\alpha_{AB} - \alpha_{AB} y_A}{1-x_A}$$

$$y_A(1-x_A) = x_A(\alpha_{AB} - \alpha_{AB} y_A)$$

$$y_A - x_A y_A = x_A \alpha_{AB} - x_A \alpha_{AB} y_A$$

$$y_A(1-x_A) = x_A \alpha_{AB}(1-y_A)$$

$$y_A = \frac{x_A * \alpha_{AB}(1-y_A)}{(1-x_A)}$$

$$\left(y_A = \frac{x_A * \alpha_{AB}}{(1-x_A)} * \frac{(1-y_A)}{(1-x_A)}\right) \div (1-y_A)$$

$$\frac{y_A}{1-y_A} = \frac{x_A * \alpha_{AB}}{1-x_A}$$

$$\frac{y_A}{1} - \frac{y_A}{x_A}$$

$$y_A = \frac{x_A * \alpha_{AB}}{1 + (\alpha_{AB}-1)x_A}$$

$$\therefore 1-x_A = 1 + (\alpha_{AB}-1)x_A$$

Twaq Dler

التاريخ / / ٢٠٢٠ : الموضوع

recovery

$y_2 = (1 - 0.999)\, y_1$

$y_2 = 0.001\, y_1$

$Hg = 1\ m \quad Hl = 0.5\ m$

$HoG = Hg + \phi Hl$

$Hol = Hl + \frac{Hg}{\phi}$

$HoG = 1 + 1.001 \times 0.5 = 1.5$

$Gs(y_1 - y_2) = Ls(X_1 - X_2)$ ...1

$y_1 = mX_1$ ... $X_1 = \frac{y_1}{m}$

$y_1 = \frac{Ls}{Gs} X_1 + y_2$

$y_1 = \frac{Ls}{Gs} X_1 + 0.001 y_1$

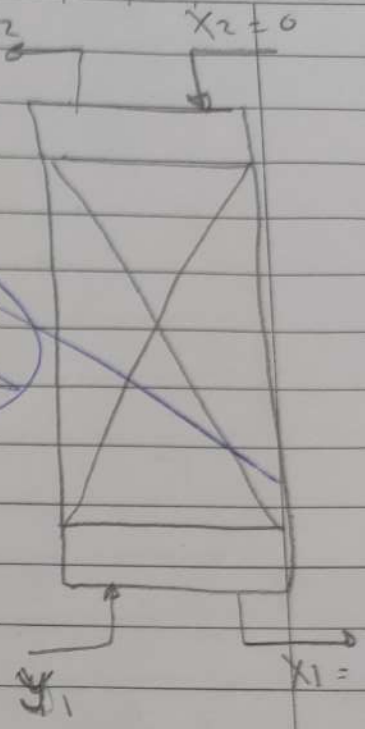
$y_1 - 0.001 y_1 = \frac{Ls}{Gs} X_1$

$\left(0.999\, y_1 = \frac{Ls * y_1}{Gs.m}\right)$

$0.999 = \frac{Gs.m}{Ls}$

$\left(0.999 = \frac{1}{\phi}\right)$

$\phi =$



6-5
10

$\phi = \frac{mGs}{Ls}$

$Z = \frac{1}{1-\phi} \ln\left[(1-\phi)\frac{y_1}{y_2} + \phi\right]$

$Z = HoG * NOG$

$Z = 1.$

/ Tiwana Dler muhsin

third

P of methane = 15 kpa

total P = 101.32 kpa

Temperature = 298 K

$V = 6.75 * 10^{-5}$ m²/sec

(1) flux of CH_4

$$\text{Flux} = \frac{101.32 * 6.75 * 10^{-5}}{298\ K} =$$

10

(2) partial p = ? point = 0.02m

point = 1 − 0.02 m = 0.98 m

$V = \frac{\text{point}^2}{\text{sec}} * P$ $P = \frac{6.75 * 10^{-5}}{(0.98)^2} =$

Twana dler muhsin
third

38/100

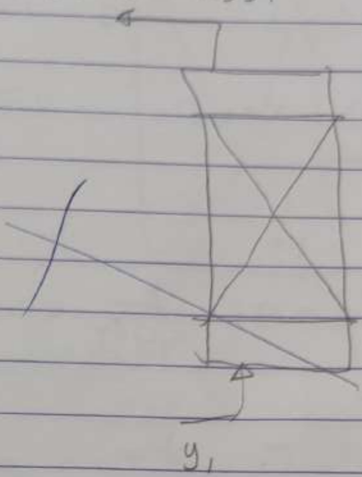
Q1

$$\left(\frac{L_s}{G_s}\right)_{ac} = 1.75\left(\frac{L_s}{G_s}\right)_m \qquad H_{OG} = 1m$$

$$Z = H_{OG} * N_{OG}$$

$$Y = mX \qquad y_2 = (1-0.99)y_1$$

$$Z = \frac{G_s}{K_{OG}\,a} * \int_{Y_2}^{Y_1} \frac{dY}{Y - Y^*}$$



$$Y_2 = (1-0.99)Y_1 = 0.01Y_1$$

$$N_{OG} = \frac{1}{1-\phi} \times \ln\left[(1-\phi)\frac{Y_1}{Y_2} + \phi\right]$$

$$G_s(Y_1 - Y_2) = L_s(X_1 - X_2)$$

$$\phi = \frac{G_s \cdot m}{L_s}$$

$$\frac{G_s}{L_s} = \left(\frac{X_1 - X_2}{Y_1 - Y_2}\right)$$

Q1 8/20

$$\phi = m\left(\frac{X_1 - X_2}{Y_1 - Y_2}\right)$$

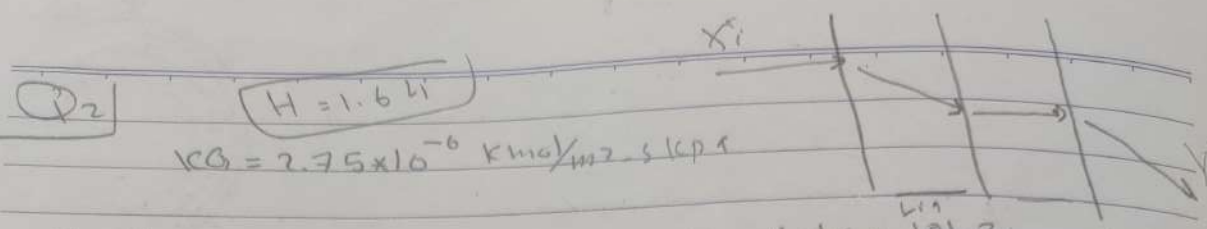
$$\phi = m\left(\frac{1 - 0}{Y_1 - 0.01Y_1}\right)$$

$$\phi = m * 100Y_1$$

$$N_{OG} = \frac{1}{1 + 100mY_1} \times \ln\left[1 + 100mY_1 + \frac{Y_1}{0.01Y_1} + 100mY_1\right]$$

$$Z_G = H_{OG} * \frac{1}{1 + 100mY_1} * 1 + 100mY + 100mY_1 \ \ln$$

idea plus



Q2 $H = 1.64$

$K_G = 2.75 \times 10^{-6}$ kmol/m².s.kPa

$Y_1 NH_3 = 0.08$ $T = 300K$ $P_T = 1 atm * \frac{101.3 kPa}{1 atm} = 101.3 kPa$

$X_1 NH_3 = 0.0015$

$K_{OG} = K_g * P_T = 2.75 \times 10^{-6} * 101.3 = 2.786 \times 10^{-4}$ kmol/m².s

$\frac{1}{K_{OG}} = \frac{1}{K_G} + \frac{H}{K_L}$

$\frac{1}{K_G} = 0.85 \frac{1}{K_{OG}} = 0.85 * \frac{1}{2.786 \times 10^{-4}} = 2.3681$ kmol/m².s

$\frac{H}{K_L} = 0.15 \frac{1}{K_{OG}} = 0.15 * \frac{1}{2.786 \times 10^{-4}} = \frac{4179}{1}$

$K_L = \frac{H}{4179} = \frac{1.64}{4179} = 3.924 \times 10^{-4}$ kmol/m².s

$Y_{i1} = (Y^* - Y_1)/H$ $Y^* = \frac{P_A}{P_T} =$

$X_{i1} = (X_1 - X^*)$

$N_A = K_g (P_{A1} - P_{A1}^*)$

$N_A = K_L (C_{A1}^* - C_{A1})$

Q2 5

20

Q3]

$Y^* = 0.06X$ 23 17 25

$G_S = \frac{0.08}{18}$ Kgmole $= 4.444 \times 10^{-3}$ Kmole

$G_L = \frac{0.009}{18}$ Kgmole $= 5 \times 10^{-4}$ Kmole

$H_G = 1\,m$

$H_L = 0.5\,m$

$K_{OG} = H_G + \phi H_L$

$K_{OL} = H_L + \frac{H_G}{\phi}$

$m = 0.06$

$\phi = \frac{m G_S}{L_S}$

$\phi = \frac{0.06 \times (4.444 \times 10^{-3})}{5 \times 10^{-4}}$

$\phi = 0.533$

$K_{OG} = 1 + 0.533(0.5)$

$K_{OG} = 1.2669$

$K_{OL} = 0.5 + \frac{1}{0.533}$

$K_{OL} = 2.376$

assume $a = 1$

$H_{OG} = \frac{G_S}{K_{OG} \cdot a}$

$H_{OG} = 3.51 \times 10^{-3}$

$N_{OG} = \frac{1}{1 - 0.533} \ln\left[1 - 0.533 + \frac{y_1}{y_2} \times 0.533\right]$

$Z = H_{OG} \times N_{OG}$

$N_{OG} = \frac{1}{1-\phi} \ln\left[(1-\phi)\frac{y_1}{y_2} + \phi\right]$

$N_{OG} = \int_{y_2}^{y_1} \frac{dy}{y - y^*}$ ---- (1)

$y^* = mx$ ---- (2)

$G_S(y - y_2) = L_S(x - x_2)$

$x = \frac{G_S}{L_S}(y - y_2) + x_2$ ---- (3)

x_2 is 0 for pure solvent

3 in 2

$y^* = m\frac{G_S}{L_S}(y - y_2)$ ---- (4)

$\phi = \frac{m G_S}{L_S}$

4 in 1

$N_{OG} = \int_{y_2}^{y_1} \frac{dy}{y - \phi y + \phi y_2}$

$= \int_{y_2}^{y_1} \frac{dy}{(1-\phi)y + \phi y_2}$ Plus idea

$N_{OG} = \frac{1}{1-\phi} \ln\left[\frac{(1-\phi)y_1 + \phi}{(1-\phi)y_2 + \phi}\right]$

$N_{OG} = \frac{1}{1-\phi} \ln\left[(1-\phi)\frac{y_1}{y_2} + \phi\right]$

y_2 $x_2 = 0$ y_1 x_1 0.08kg

Q3) cont...

$G_s dy = k_s dx = N_A \times A$

$N_A = -G_s y + G_s\left(y + \frac{dy}{dz} dz\right) = (k_{OG})(a \cdot s \cdot dz)(y - y^*)$

$-G_s \frac{dy}{dz} = (k_{OG} \cdot a)(s)(y - y^*)$

$z = \frac{G_s / s}{k_{OG} \cdot a} \int_{y_2}^{y_1} \frac{dy}{y - y^*} \rightarrow z = \frac{G_s}{k_{OG} \cdot a} \int_{y_2}^{y_1} \frac{dy}{y - y^*}$

$z = H_{OG} \times N_{OG}$

Q4)

$z = 20\,cm \times \frac{1\,m}{100\,cm} = 0.2\,m$

$d = 1\,cm \times \frac{1\,m}{100\,cm} = 0.01\,m$

$T = 35^\circ$

$P = 101.32\,kPa$

$y_1 CO_2 = 60\% = 0.6$

$y_2 CO_2 = 10\% = 0.1$

$D_{AB} = 0.16\,\frac{cm^2}{s} \times \frac{1\,m^2}{(100)^2 cm^2}$

$D_{AB} = 1.6 \times 10^{-5}\,\frac{m^2}{s}$

$y_1 = \frac{P_A}{P_T}$

$P_{A1} = 0.6 \times 101.3 = 60.78\,kPa$

$P_{A2} = 0.1 \times 101.3 = 10.13\,kPa$

$N_A = -D_{AB} \frac{dP_A}{dz} + C_A V_1 \; y_A$

$N_A = \frac{D_{AB} \cdot P_T}{(y_0) RT} \ln\left\{\frac{P_T - P_{A2}}{P_T - P_{A1}}\right\}$

$N_A = \frac{1.6 \times 10^{-5} \times 101.3}{(0.01/2)(8.314)(308)} \ln\left\{\frac{101.3 - 10.13}{101.3 - 60.78}\right\}$

$N_A = 1.2966 \times 10^{-4} \times 0.812 = 1.054 \times 10^{-4}$

$P_T = 202.6\,kPa$

(a) $m_{ass\,CO_2} = N_A \times mwt = (1.054 \times 10^{-4}) \times 17 \times 4$

$mass = 1.7917 \times 10^{-3}\,kg$

Idea Plus

$PV = nRT \quad \frac{dn}{dt} = \frac{P}{RT} \frac{V}{1} = \frac{202.6 \times 0.7}{8.314 \times 350}$

$\frac{dn}{dt} = 0.049$

$dt = \frac{1.054 \times 10^{-4}}{0.049} = 2.15 \times 10^{-3}\,s$