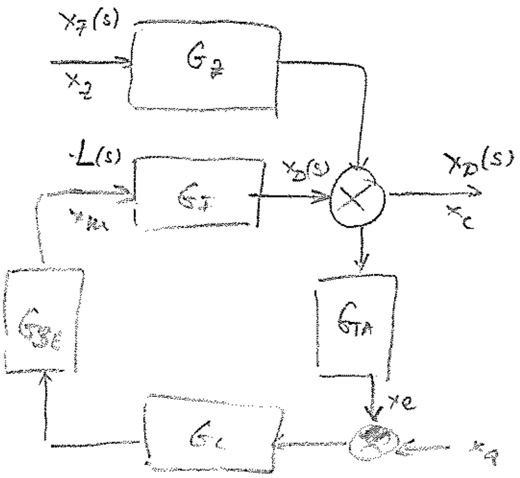
F112 számgyak pót-pót
2014.05.22.

a,



$$G_7 = \frac{x_D}{x_7} = G_2 = \frac{2{,}8}{(10s+1)(25s+1)}$$

$$G_J = \frac{x_D}{L} = G_1 = \frac{0{,}1 \frac{mol\%}{kg/perc}}{(5s+1)(15s+1)}$$

$$G_{TA} = \frac{x_e}{x_c} = \frac{\Delta T_1}{x_c} \cdot \frac{x_e}{\Delta T_1}$$

$$\xrightarrow[mol\%]{x_D} \boxed{G_{TA,1}} \xrightarrow[°C]{\Delta T} \boxed{G_{TA,2}} \xrightarrow[jel\%]{x_e}$$

$$G_{TA} = \frac{0{,}4\,°C}{1\,mol\%} \cdot \frac{100\% - 0\%}{100\,°C - 75\,°C} = 1{,}6 \frac{\%}{mol\%}$$

$$G_c = 12$$

$$G_{BE} = \frac{L}{x_R} = \frac{60\,kg/perc - 0\,kg/perc}{100\% - 0\%} = 0{,}6 \frac{kg/perc}{\%}$$

b, $a = \pm 2{,}5$ mol%

$$\hat{x}_D(\infty) = \lim_{s \to 0} \left(s \cdot G^* \cdot \frac{a}{s} \right)$$

$$G^* = \frac{x_c}{x_z} = \frac{G_7}{1 + G_J \cdot G_{TA} \cdot G_c \cdot G_{BE}}$$

$$\hat{x}_D(\infty) = \lim_{s \to 0} \left[s \cdot \frac{\frac{2{,}8}{(10s+1)(25s+1)}}{1 + \frac{0{,}1}{(5s+1)(15s+1)} \cdot 1{,}6 \cdot 12 \cdot 0{,}6} \cdot \frac{\pm 2{,}5}{s} \right]$$

$$\hat{x}_D(\infty) = \pm 3{,}25 \text{ mol\%}$$

c, $G_2 = \frac{x_D}{x_7}$ $\quad \hat{x}_D(10\,perc) = ?$ $\quad a = -2{,}5$ mol%

$$\hat{x}_D = a \cdot K_1 \cdot K_2 \left[1 - \frac{1}{T_1 - T_2} \left(T_1 e^{-\frac{t}{T_1}} - T_2 e^{-\frac{t}{T_2}} \right) \right]$$

$$= \underbrace{-2{,}5\,mol\% \cdot 2{,}8}_{-7\,mol\%} \left[1 - \frac{1}{10\,perc - 25\,perc} \left(10\,perc\; e^{-\frac{10\,perc}{10\,perc}} - 25\; e^{-\frac{10\,perc}{25\,perc}} \right) \right] =$$

$$-7\,mol\% \left[0{,}128 \right] = -0{,}90 \text{ mol\%}$$

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d) $x_a \sim 95\ mol\%$ = ?

$$\hat{x}_d = x_{D,új} - \bar{x}_D = 95\ mol\% - 92\ mol\% = 3\ mol\%$$

$$G_{TK} = \frac{x_e}{x_d} 1{,}6\ \frac{\%}{mol\%} \Rightarrow \hat{x}_e = 1{,}6\ \frac{\%}{mol\%} \cdot \hat{x}_d = 1{,}6\ \frac{\%}{mol\%} \cdot 3\ mol\% = 4{,}8\% \equiv \hat{x}_a$$

$$\Rightarrow x_{a,új} = \bar{x}_a + \hat{x}_a = 50\% + 4{,}8\% = \underline{54{,}8\%}\ \ddot{\smile}$$

e)

$$\left.\begin{array}{l} w_{max} = 60\ kg/perc \\ \varrho = 870\ kg/m^3 \end{array}\right\} \Rightarrow w_{max} = 4{,}14\ \frac{m^3}{h}$$

$$w_{max} = k_{v,max}\sqrt{\frac{\Delta p_r}{\varrho_r}} \qquad \Delta p_r = \frac{\Delta p_{SZ}}{1\ bar} = ?$$

$$\varrho_r = \frac{870\ kg/m^3}{1000\ kg/m^3} = 0{,}87$$

$$\Delta p_{SZ} = \left(\frac{w_{max}}{k_{v,max}}\right)^2 \cdot \varrho_r \cdot 1\ bar = \underline{\underline{0{,}49\ bar}}$$