ORIGIN ≡ 1

$$\text{Sustancias} := \begin{pmatrix} \text{"H2O"} \\ \text{"Al2O3"} \\ \text{"H2SO4"} \\ \text{"Al2(SO4)3"} \end{pmatrix} \qquad PM := \begin{pmatrix} 18 \\ 102 \\ 98 \\ 342 \end{pmatrix} = \begin{pmatrix} 18 \\ 102 \\ 98 \\ 342 \end{pmatrix}$$

$N_c := 4$

$N_s := 8$

$i := 1 .. N_c$

$j := 1 .. N_s$

$g(x, y) := 10000$

$f := \text{matrix}(N_c, N_s, g)$

$$f = \begin{pmatrix} 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 \\ 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 \\ 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 \\ 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 & 1 \times 10^4 \end{pmatrix}$$

Datos

Mezclador

$F_1 := 550 \quad \frac{\text{kmol}}{\text{hr}} \qquad x^{\langle 1 \rangle} := \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix} \qquad f^{\langle 1 \rangle} := F_1 \cdot x^{\langle 1 \rangle} \qquad \text{Sustancias} = \begin{pmatrix} \text{"H2O"} \\ \text{"Al2O3"} \\ \text{"H2SO4"} \\ \text{"Al2(SO4)3"} \end{pmatrix}$

$$x^{\langle 2 \rangle} := \begin{pmatrix} 0.02 \\ 0 \\ 0.98 \\ 0 \end{pmatrix} \qquad R_{molar} := 0.05$$

Reactor

$$\nu := \begin{pmatrix} 3 \\ -1 \\ -3 \\ 1 \end{pmatrix} \qquad \text{Sustancias} = \begin{pmatrix} \text{"H2O"} \\ \text{"Al2O3"} \\ \text{"H2SO4"} \\ \text{"Al2(SO4)3"} \end{pmatrix} \qquad \varepsilon := (1) \qquad Al_2O_3 + 3H_2SO_4 \text{ --------> } Al_2(SO_4)_3 + 3H_2O.$$

$\chi_3 := 0.94$

Filtro

$Hum := 0.1 \qquad Retencion := 0.93$

Splitter

$\beta := 0.1$

Resolución

$ff := f$

Given

Mezclador

$ff^{\langle 1 \rangle} + f^{\langle 2 \rangle} + f^{\langle 8 \rangle} = f^{\langle 3 \rangle}$

$f^{\langle 2 \rangle} = x^{\langle 2 \rangle} \cdot \sum f^{\langle 2 \rangle}$

$R_{molar} \cdot f_{2,3} = f_{3,3}$

Reactor

$f^{\langle 4 \rangle} = f^{\langle 3 \rangle} + \nu \cdot \varepsilon$

$\chi_3 \cdot f_{3,3} = f_{3,3} - f_{3,4}$

Filtro

$f^{\langle 4 \rangle} = f^{\langle 5 \rangle} + f^{\langle 6 \rangle}$

$Hum \cdot \left(f_{4,6} \cdot PM_4 \right) = f_{1,6} \cdot PM_1$

$f_{2,5} \cdot \left(\sum_{i=1}^{3} f_{i,6} \right) = f_{2,6} \cdot \left(\sum_{i=1}^{3} f_{i,5} \right)$

$f_{3,5} \cdot \left(\sum_{i=1}^{3} f_{i,6} \right) = f_{3,6} \cdot \left(\sum_{i=1}^{3} f_{i,5} \right)$

$f_{4,6} = 0.93 \cdot f_{4,4}$

Splitter

$f^{\langle 5 \rangle} = f^{\langle 7 \rangle} + f^{\langle 8 \rangle}$

$f^{\langle 7 \rangle} = \beta \cdot f^{\langle 5 \rangle}$

$\begin{pmatrix} f(\beta) \\ \varepsilon(\beta) \end{pmatrix} := \text{Find}(f, \varepsilon)$

$$f(0.1) = \begin{pmatrix} 0 & 2.263 & 387.975 & 497.276 & 428.569 & 68.707 & 42.857 & 385.712 \\ 550 & 0 & 2.326 \times 10^3 & 2.289 \times 10^3 & 1.973 \times 10^3 & 316.282 & 197.285 & 1.776 \times 10^3 \\ 0 & 110.867 & 116.278 & 6.977 & 6.013 & 0.964 & 0.601 & 5.411 \\ 0 & 0 & 2.45 & 38.883 & 2.722 & 36.162 & 0.272 & 2.45 \end{pmatrix}$$

$\varepsilon(0.1) = 36.434$

$F(\beta) :=$
- $f \leftarrow f(\beta)$
- for $i \in 1 .. N_c$
  - for $j \in 1 .. N_s$
    - $F_j \leftarrow \sum_{i=1}^{N_c} f_{i,j}$
- F

$x(\beta) :=$
- $f \leftarrow f(\beta)$
- $F \leftarrow F(\beta)$
- for $i \in 1 .. N_c$
  - for $j \in 1 .. N_s$
    - $x_{i,j} \leftarrow \frac{f_{i,j}}{F_j}$
- x

$w(\beta) :=$
- $f \leftarrow f(\beta)$
- for $i \in 1 .. N_c$
  - for $j \in 1 .. N_s$
    - $w_{i,j} \leftarrow f_{i,j} \cdot PM_i$
- w

$W(\beta) :=$
- $w \leftarrow w(\beta)$
- for $i \in 1 .. N_c$
  - for $j \in 1 .. N_s$
    - $W_j \leftarrow \sum_{i=1}^{N_c} w_{i,j}$
- W

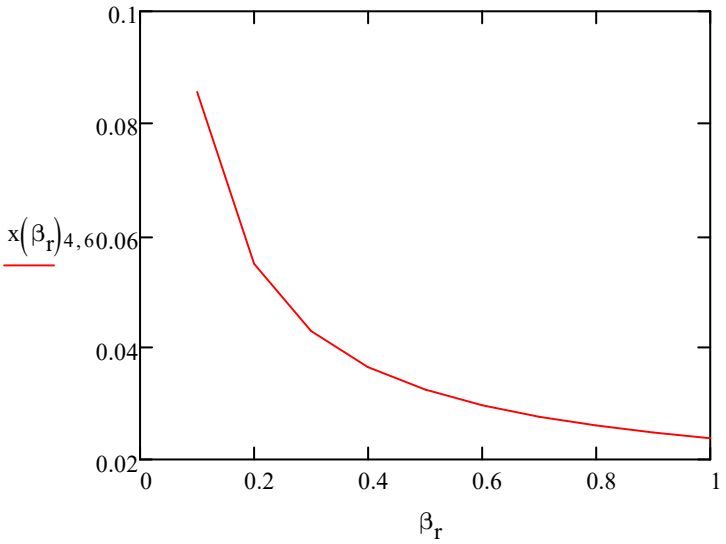
$\%P(\beta) :=$
- $w \leftarrow w(\beta)$
- $W \leftarrow W(\beta)$
- for $i \in 1 .. N_c$
  - for $j \in 1 .. N_s$
    - $\%P_{i,j} \leftarrow \frac{w_{i,j}}{W_j}$
- $\%P$

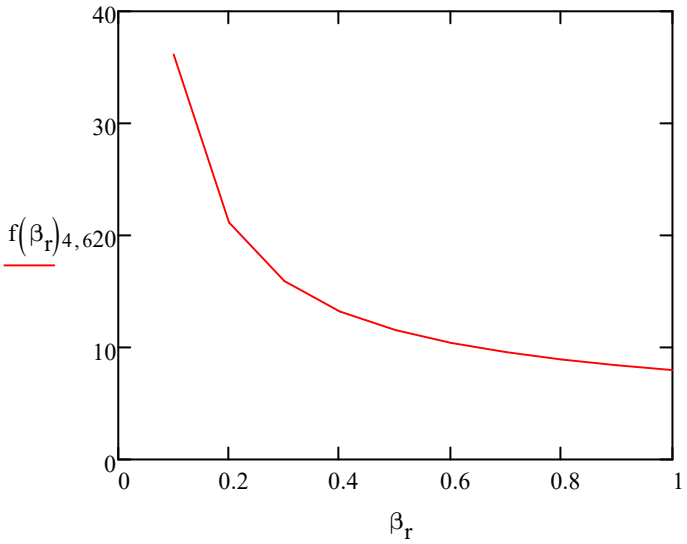
$$W(\beta)_1 + W(\beta)_2 - W(\beta)_6 - W(\beta)_7 = 0$$

$w(1)_{4,6} = 2.741 \times 10^3$ $\quad$ $W(1)_6 = 3.494 \times 10^4$

$w(0.1)_{4,6} = 1.237 \times 10^4$ $\quad$ $W(0.1)_6 = 4.596 \times 10^4$

$\beta_r := 0, 0.1 .. 1$





$$\%P(1) = \begin{pmatrix} 0 & 3.734 \times 10^{-3} & 1.718 \times 10^{-4} & 8.084 \times 10^{-3} & 8.437 \times 10^{-3} & 7.843 \times 10^{-3} & 8.437 \times 10^{-3} & -0.02 \\ 1 & 0 & 0.954 & 0.939 & 0.98 & 0.911 & 0.98 & 1.029 \\ 0 & 0.996 & 0.046 & 2.75 \times 10^{-3} & 2.87 \times 10^{-3} & 2.668 \times 10^{-3} & 2.87 \times 10^{-3} & -4.231 \times 10^{-3} \\ 0 & 0 & -1.666 \times 10^{-12} & 0.05 & 8.644 \times 10^{-3} & 0.078 & 8.644 \times 10^{-3} & -4.819 \times 10^{-3} \end{pmatrix}$$

$$\%P(0.1) = \begin{pmatrix} 0 & 3.734 \times 10^{-3} & 0.027 & 0.035 & 0.037 & 0.027 & 0.037 & 0.037 \\ 1 & 0 & 0.925 & 0.911 & 0.956 & 0.702 & 0.956 & 0.956 \\ 0 & 0.996 & 0.044 & 2.666 \times 10^{-3} & 2.8 \times 10^{-3} & 2.055 \times 10^{-3} & 2.8 \times 10^{-3} & 2.8 \times 10^{-3} \\ 0 & 0 & 3.267 \times 10^{-3} & 0.052 & 4.423 \times 10^{-3} & 0.269 & 4.423 \times 10^{-3} & 4.423 \times 10^{-3} \end{pmatrix}$$