



Feed: $120 \frac{\text{mol}}{\text{h}}$, 1 bar $\text{C}_2\text{H}_5\text{OH}$

Produktstrøm: 1 bar, $200^\circ\text{C} = 473\text{K}$,

41,7% $\text{C}_2\text{H}_5\text{OH}$
 30,7% H_2
 24,6% CH_3CHO
 3,0% $\text{CH}_3\text{COOC}_2\text{H}_5$

$$\text{I} \begin{cases} n_{\text{CH}_3\text{CHO}} = 0 + \xi_1 \\ n_{\text{C}_2\text{H}_5\text{OH}} = 120 \text{ mol} - \xi_1 - 2\xi_2 \\ n_{\text{H}_2} = 0 + \xi_1 + 2\xi_2 \\ n_{\text{CH}_3\text{COOC}_2\text{H}_5} = 0 + \xi_2 \end{cases}$$

$$\text{II} \begin{cases} \text{I} \quad n_{\text{C}_2\text{H}_5\text{OH}} = 0,417 n_T & \text{II} \quad n_T = n_{\text{C}_2\text{H}_5\text{OH}} + n_{\text{H}_2} + n_{\text{CH}_3\text{CHO}} + n_{\text{CH}_3\text{COOC}_2\text{H}_5} \\ \text{II} \quad n_{\text{H}_2} = 0,307 n_T \\ \text{III} \quad n_{\text{CH}_3\text{CHO}} = 0,246 n_T \\ \text{IV} \quad n_{\text{CH}_3\text{COOC}_2\text{H}_5} = 0,03 n_T \end{cases}$$

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 Ligningssett I gir $n_{\text{C}_2\text{H}_5\text{OH}} = 120 \text{ mol} - n_{\text{H}_2}$
 I ligningssett II er ligning IV en lineær komb.
 av de fire andre og kan strykes.
 Løser ligningssett i python.
 $n_T = \text{total molstrøm ut} = \underline{\underline{165,7 \frac{\text{mol}}{\text{h}}}}$

$$1b) \quad V_{\text{CH}_3\text{CHO}} = 0,246 \cdot 165,7$$

$$V_{\text{C}_2\text{H}_5\text{OH}} \text{ omsatt til } \text{CH}_3\text{CHO} = V_{\text{CH}_3\text{CHO}}$$

$$\text{Selektivitet} = \frac{\text{mol omsatt til ønsket produkt}}{\text{mol omsatt}}$$

$$\text{Selektivitet} = \frac{0,246 \cdot 165,7 \text{ mol/h}}{(120 - 0,417 \cdot 165,7) \text{ mol/h}}$$

$$\underline{\underline{\phi = 0,801}}$$

1c)

$$K_2 = 2,37 = \frac{[\text{CH}_3\text{COOC}_2\text{H}_5][\text{H}_2]^2}{[\text{C}_2\text{H}_5\text{OH}]^2}$$

$$\frac{1}{2} Q = \frac{0,03 \cdot 0,307^2}{0,417^2} = 0,016$$

$Q < K \rightarrow$ mengden etylacetat er mindre enn ved likevekt.