

# ④ Gemische

1-Propanol(1) Wasser (2)

$$x_1 = 0,2$$

Ges Dampfdruck  $y_1$  + Gesamtdruck durch Wilson

Dampfdrucke reine Komponente mit Antoine

$$\text{Propanol: } \log p_{s1} = A - \frac{B}{C+T}$$

$$\log p_{s1} = 8,37895 - \frac{1738,070}{227,438 + 90}$$

$$\log p_{s1} = 2,745728$$

$$p_{s1} = 556,83 \text{ mmHg}$$

$$\text{Wasser: } p_{s2} = 525,27 \text{ mmHg}$$

$$\text{Wilson: } \frac{g^E}{R \cdot T} = -x_1 \ln(x_1 + \Lambda_{12} x_2) - x_2 \ln(x_2 + \Lambda_{21} x_1)$$

$$\ln y_1 = \frac{g^E}{RT} - x_2 \frac{\partial}{\partial x_2} \left( \frac{g^E}{RT} \right) \quad \ln y_2 = \frac{g^E}{RT} - x_1 \frac{\partial}{\partial x_1} \left( \frac{g^E}{RT} \right)$$

$$\ln y_1 = -\ln(x_1 + \Lambda_{12} x_2) + x_2 \left[ \frac{\Lambda_{12}}{x_1 + \Lambda_{12} x_2} - \frac{\Lambda_{21}}{\Lambda_{21} x_1 + x_2} \right]$$

$$\ln y_2 = -\ln(x_2 + \Lambda_{21} x_1) + x_1 \left[ \frac{\Lambda_{21}}{x_2 + \Lambda_{21} x_1} - \frac{\Lambda_{12}}{\Lambda_{12} x_2 + x_1} \right]$$

$$\Lambda_{12} = 0,04274 \quad \Lambda_{21} = 0,68034$$

$$x_1 = 0,2$$

$$x_2 = 0,8$$

$$\ln y_1 = 1,4516 + 0,8 (0,1825 - 0,7768)$$

$$\ln y_1 = 1,07616 \quad e^{1,07616} = y_1 = 2,7626$$

$$\ln y_2 = 0,06607 + 0,2 (0,7768 - 0,18250)$$

$$\ln y_2 = 0,17493 \quad y_2 = e^{0,17493} = 1,19116$$

$$p_1 = y_1 \cdot x_1 \cdot p_{s1} = 2,7626 \cdot 0,2 \cdot 556,83 = 309,7$$

$$p_2 = y_2 \cdot x_2 \cdot p_{s2} = 1,19116 \cdot 0,8 \cdot 525,27 = 500,5 \quad \text{mmHg}$$



$$y_1 = \frac{p_1}{p} \Rightarrow y_1 = 0,381$$

$$b) \quad p(\text{mmHg}) = 773,52 + 229,07 \cdot x_1 - 266,67 \cdot x_1^2$$

$$\frac{dp}{dx} = 229,07 - 2 \cdot 266,67 \cdot x_1 = 0$$

$$x_1 = \frac{229,07}{2 \cdot 266,67} = 0,430 \quad y_1 = x_1$$

$$x_2 = 1 - 0,430 = 0,570 \quad y_2 = x_2$$

$$p_{\text{mmHg}} = 773,52 + 229,07 \cdot 0,430 - 266,67 \cdot 0,430^2$$

$$p_{\text{mmHg}} = 822,71$$