U16-3

$z = 0{,}72$ hexan $\quad 1-z = 0{,}28$ % oktan (mol)

$p = 480$ mbar $= 480 \cdot 10^{-3} \cdot 10^5$ Pa $= 480 \cdot 10^2$ Pa $= 48$ kPa

$\dot{n}_L = 8{,}6$ mol

$1 - x = 0{,}6$ oktan $\quad x = 0{,}4$ hexan

$$\dot{n}_F = \dot{n}_L + \dot{n}_V$$

$$z \cdot \dot{n}_F = x \cdot \dot{n}_L + y \cdot \dot{n}_V$$

$$\left.\begin{aligned} p\,y &= p_A^\circ(T) \cdot x \\ p \cdot (1-y) &= p_B^\circ(T) \cdot (1-x) \end{aligned}\right\} \quad p = p_A^\circ(T) \cdot x + p_B^\circ(T) \cdot (1-x)$$

$$f(T) = p_A^\circ(T)\, x + p_B^\circ(T) \cdot (1-x) - p = 0$$

$$\ln p_i^\circ = A_i - \frac{B_i}{T + C_i}$$

C_i in K

kPa $\rightarrow$

$$p_i^\circ = \exp\left(A_i - \frac{B_i}{T + C_i}\right) \qquad e^x \equiv \exp(x)$$

hexan	oktan
$A_1 = 13{,}8216$	$A_2 = 13{,}9276$
$B_1 = 2697{,}55$	$B_2 = 3120{,}29$
$C_1 = -48{,}78$	$C_2 = -63{,}63$

$$f(T) = \exp\left(A_1 - \frac{B_1}{T+C_1}\right) \cdot \underset{x}{0{,}4} + \exp\left(A_2 - \frac{B_2}{T+C_2}\right) \underset{(1-x)}{0{,}6} - \underset{p}{48}$$

$$f'(T) = \exp\left(A_1 - \frac{B_1}{T+C_1}\right) \cdot x \cdot \frac{-(-B_1)}{(T+C_1)^2} + \exp\left(A_2 - \frac{B_2}{T+C_2}\right) \cdot (1-x) \cdot \frac{B_2}{(T+C_2)^2}$$

$$T_{i+1} = T_i - \frac{f(T_i)}{f'(T_i)}$$

T_A: $\quad p = p_A^\circ(T) \Rightarrow \ln p = \ln p_A^\circ(T) = A_1 - \dfrac{B_1}{T + C_1}$

$$\frac{B_1}{T + C_1} = A_1 - \ln p$$

$$B_1 = A_1 T + A_1 C_1 - (\ln p) \cdot T - C_1 \ln p$$

$$B_1 - A_1 C_1 + C_1 \ln p = (A_1 - \ln p)\, T$$

$$\Rightarrow \quad T = \frac{B_1 + C_1 \cdot (\ln p - A_1)}{-(\ln p - A_1)}$$

$T_A = 319,9\ K \equiv (46,7°C)$

$T_B = 373,9 \equiv (101°C)$

$T_D = 346,9$

0: $T_0 = 346,9$

$E_A = 118,28$

$E_B = 18,399$

$f(T_0) = 10,3523$

$f'(T_0) = 1,8650$

$T_1 = 346,9 - \frac{10,3523}{1,8650} = 341,3 \quad (68,2°C)$

1: $T_1 = 341,3$

$E_A = 99,47$

$E_B = 14,73$

$f(T_1) = 0,6279$

$f'(T_1) = 1,612$

$T_2 = 341,3 - \frac{0,6279}{1,612} = \boxed{340,9} \quad (67,8°C)$

$P_A^0(340,9) = \cancel{99,468}\ \overset{98,22}{}\ kPa$

$y = \frac{\cancel{99,468}\ \overset{98,22}{}}{98} \cdot 0,4 = \underline{\underline{\cancel{0,829}\ \overset{0,818}{}}}$

$\dot{z} \cdot (\dot{n}_L + \dot{n}_V) = x \cdot \dot{n}_L + y \cdot \dot{n}_V$

$0,72 \cdot (8,6 + \dot{n}_V) = 0,4 \cdot 8,6 + 0,8\cancel{29} \cdot \dot{n}_V$ (18)

$2,752 - \cancel{2,58} = \cancel{0,129}\ \overset{0,098}{} \dot{n}_V$

$\dot{n}_V = \cancel{23,67}\ \overset{28,08}{25,25}\ mol/s$

$\dot{n}_F = \cancel{23,67}\ \overset{28,08}{} + 8,6 = 36,7\ mol/s$