Tutorial

- Consider a mixture of N_2 and O_2 at 1 atm. Calculate the Murphree efficiency for a plate with liquid at 80 K and the vapor below this plate is at 85 K. Also, it is given that the mole fraction of N_2 leaving this plate in vapor phase is 0.84.

- Use the temperature composition diagram given in the earlier lectures.

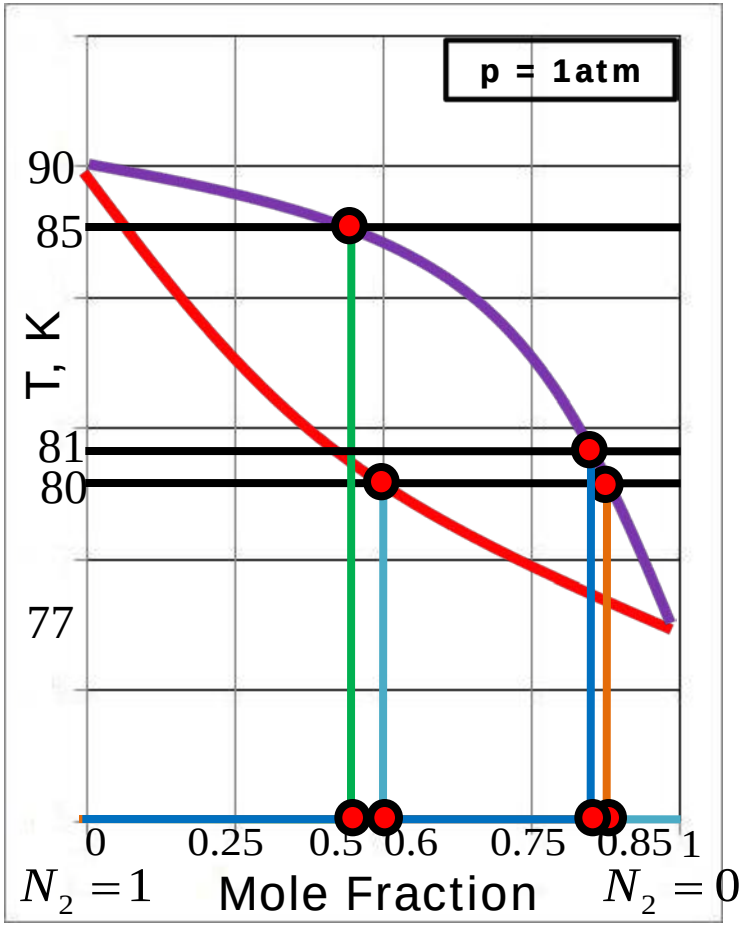
Tutorial

Given
Working Pressure : 1 atm
Mixture : N_2 + O_2
Liquid temperature : 80 K
Vapor temperature (below) : 85 K
y_{N2} : 0.84

For above mixture, Calculate
Murphree Efficiency

Tutorial

- **Murphree Efficiency**
- For the ease of understanding, the **T – y** diagram is enlarged and is not to scale.
- Draw isotherms at 80 and 85 K.
- $\mathbf{y_{j-1}}$=0.5, $\mathbf{x_j}$=0.6, $\mathbf{y_{0,j-1}}$= 0.85.
- $\mathbf{y_j}$=0.84 (given)



Tutorial

- **Murphree Efficiency**

$$\eta_M = \frac{y_j - y_{j-1}}{y_{0,j} - y_{j-1}}$$

Data
p = 1 atm
y_{j-1} = 0.5 at 85 K
x_j = 0.6 at 80 K
$y_{0,j-1}$ = 0.85 at 80 K
y_j = 0.84 at 81 K

$$\eta_M = \frac{0.84 - 0.5}{0.85 - 0.5} = 0.97$$