Multicomponent Distilation

Reflux minimum

- Rasio refluks minimum, seperti pada kolom distilasi biner, tergantung pada entalpi dan komposisi umpan, yaitu volatilitas relatif (hubungan kesetimbangan) dan distilat komposisi.
- Persamaan Underwood memberikan cara cepat untuk memperkirakan rasio refluks minimum;
- Hal ini membutuhkan dua langkah.

Reflux minimum

1. Determine the value of $\emptyset$ that satisfies the relation:

$$1 - q = \sum \frac{\alpha_i x_{Fi}}{\alpha_i - \emptyset} \qquad (3)$$

2. Use the value of $\emptyset$ to calculate the minimum reflux ratio:

$$R_{Dm} = \sum \frac{\alpha_i x_{Di}}{\alpha_i - \emptyset} - 1 \qquad (4)$$

Reflux minimum

Where α_i = relative volatility of component i

q = enthalpy condition parameter of the feed

x_{Fi} = mole fraction of component i in the feed

x_{Di} = mole fraction of component i in the distillate

R_{Dm} = minimum reflux ratio

Number of Equilibrium Stages—Gilliland Correlation

$$\frac{N-N_{min}}{N+1} = 1 - e^{\left(\frac{1+54.4X}{11+117.2X}\right)\frac{X-1}{\sqrt{X}}}$$

Where $X = \frac{R_D - R_{Dm}}{R_D + 1}$

- N = Number of stage
- Nm = Minimum number of stage
- Rd = Total reflux
- Rdm = Reflux minimum

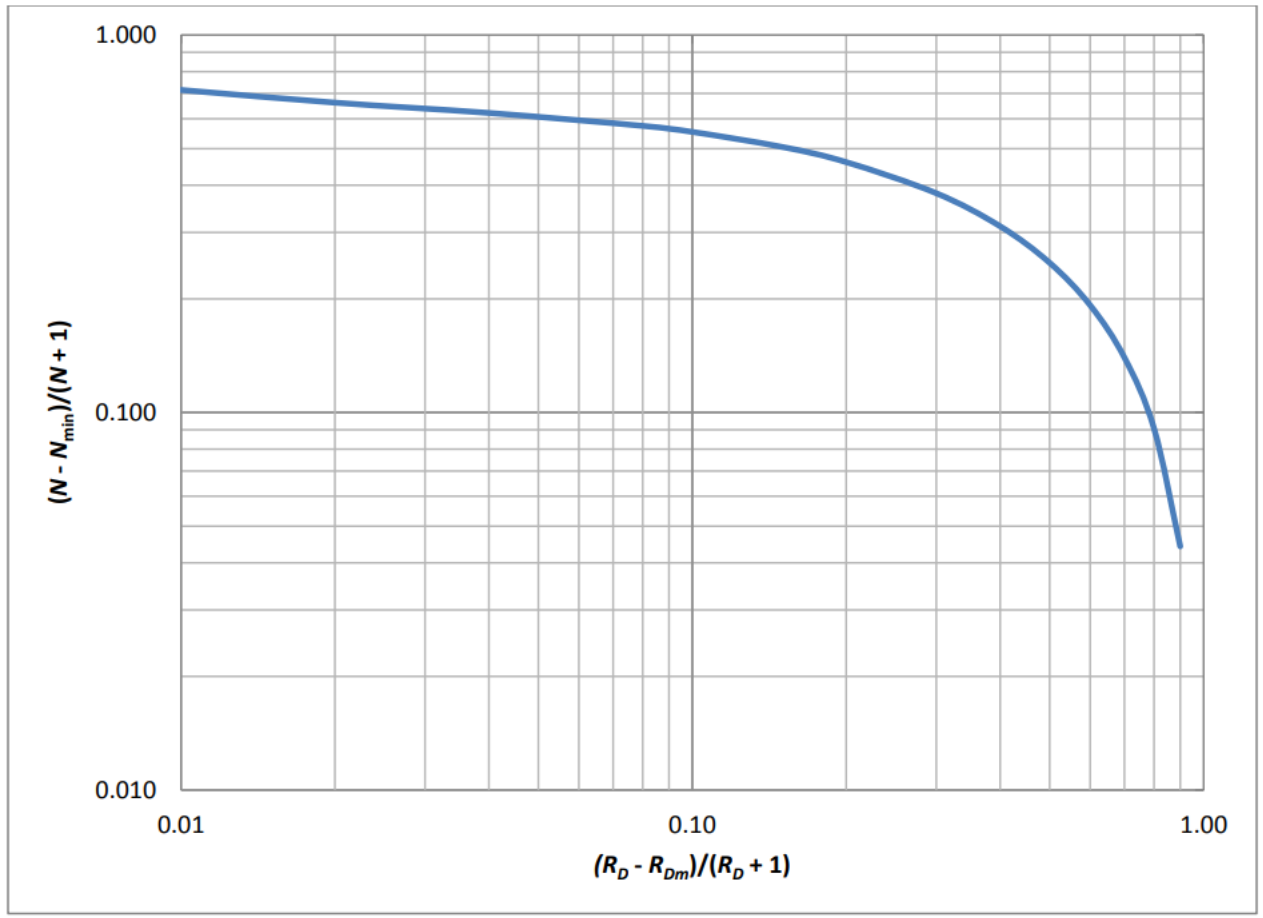

Figure 3. Gilliland Correlation

Optimum Location of the Feed Tray

$$\frac{N_R}{N-N_R} = \left[\left(\frac{x_{F,HK}}{x_{F,LK}}\right)\left(\frac{x_{B,LK}}{x_{D,HK}}\right)\frac{B}{D}\right]^{0.206}$$

Where N_R = number of stages above the feed tray,

N = number of equilibrium stages

B = bottoms product molar rate

D = distillate molar rate

$x_{F,HK}$, $x_{F,LK}$ = mole fractions of the keys in the feed

$x_{B,LK}$ = mole fraction of the light key in the bottoms

$x_{D,HK}$ = mole fraction of the heavy key in the distillate

Contoh soal

- Gunakan contoh data minggu lalu untuk menentukan jumlah reflux minimum, Number of stage with gilliand correlation and optimum feed tray