

Distillation using CHEMCAD

The following feed at 82 °C and 1035 kN/m² is to be distilled at that pressure so that the vapor distillate contains 98% of the C_3H_8 but only 1% of the C_5H_{12} .

Component	mole fraction
CH_4	0.03
C_2H_6	0.07
$n - C_3H_8$	0.15
$n - C_4H_{10}$	0.33
$n - C_5H_{12}$	0.30
$n - C_6H_{14}$	0.12

1. Estimate the minimum reflux ratio, minimum number of stages and the corresponding products using “hand-calculations” as well as the short-cut column method in CHEMCAD.
2. Compute the actual reflux ratio and the actual number of trays by “hand calculations” (Fenske-Underwood-Gilliland method). How do these results compare with the short-cut column method in CHEMCAD.
3. Use the reflux ratio computed above in the SCDS column in CHEMCAD and compute the distillate and bottoms compositions.
4. What are the heat duties of the total condenser and total reboiler?
5. How do the results change if a partial condenser and partial reboiler are used?