Assignment - 1

- Determine the number of theoretical plates required to yield **95% N$_2$** at top and **96% O$_2$** at bottom. Feed stream is **70% N$_2$** and **30% O$_2$**. the operating pressure is 1 atm. Molar fraction of liquid in feed stream is **0.5** mole liquid/mole mixture. The desired flow rate at the bottom product is **30** mole/sec and the heat removed in the condenser at top of the column is **2000** kW.

- Also, calculate the maximum and minimum number of plates for the extreme cases of **Q$_D$**.

Answers

- OP line for enriching section :

$$y_n = 0.77 x_{n+1} + 0.22$$

- OP line for stripping section :

$$y_m = 1.11 x_{m+1} - 0.001$$

- **q** line :

$$y = -1.0x + 1.4$$

- The total number of vertical lines are **8**.

McCabe – Thiele Method	
Enriching Section	2 + 1 (Condenser)
Stripping Section	6 + 1 (Boiler)