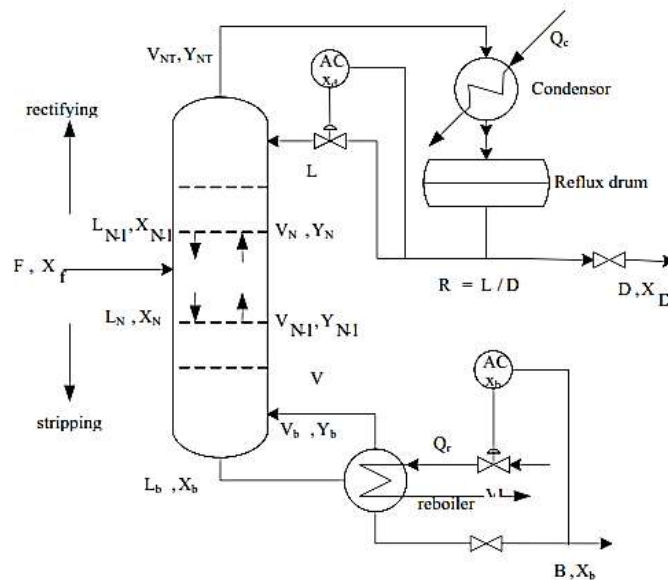


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Progres Tugas 4

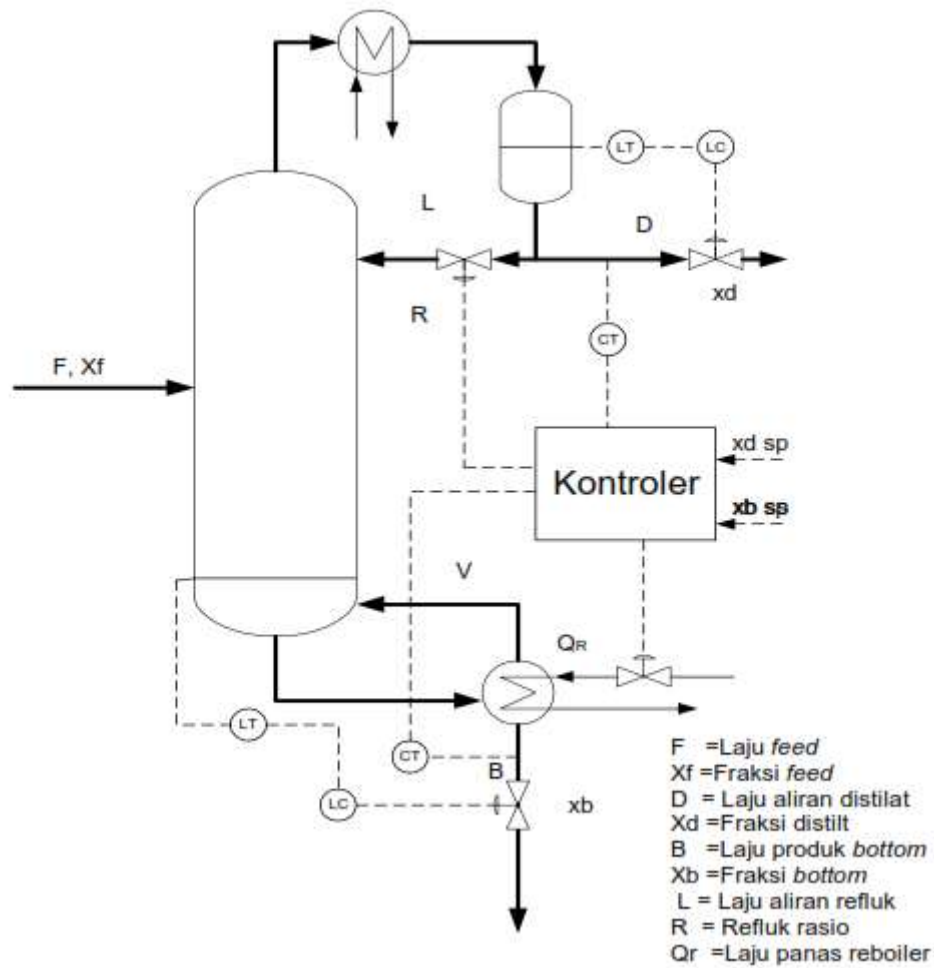
1. Plant Kolom Destilasi



Gambar 1. Binary distillation column

Tabel 1. Data *steady state* kolom distilasi metanol – air [1,3]

| Diskripsi Variabel | Nilai |
|---|--------|
| Laju umpan (F), mol/menit | 45.000 |
| Laju distilat (D), mol/menit | 22.500 |
| Laju produk bawah (B), mol/menit | 22.500 |
| Komposisi umpan (X _f), fraksi mol methanol | 1 |
| Komposisi distilat (X _D), fraksi mol methanol | 1 |
| Komposisi produk bawah (X _B), fraksi mol methanol | 0 |
| Perbandingan refluks | 1 |
| Jumlah plate | 30 |
| Letak plate umpan | 5 |
| Tekanan operasi (atm) | 1 |
| Beban condensor, 104 kcal/menit | 35 |
| Beban reboiler, 104 kcal/menit | 35 |



Gambar 2. Struktur kolom destilasi dengan struktur L-V

2. Persamaan dalam Sistem

2.1 Distillation Column

The column contains a total of N_T theoretical trays. The liquid hold up on each tray including the down comer M_N . The liquid on each tray is assumed to be perfectly mixed with composition X_N , showing in Figure 1, the mathematical formula expressing the process in the distillation column using rigorous modeling described as follows (Luyben, 1990):

Nth tray

Mass balance:

$$\frac{dM_N}{dt} = L_{N+1} - L_N + V_{N-1} - V_N \quad (1)$$

Component mass balance:

$$\frac{d(M_N X_N)}{dt} = L_{N+1} X_{N+1} - L_N X_N + V_{N-1} Y_{N-1} - V_N Y_N \quad (2)$$

Energy balance:

$$\frac{d(M_N h_N)}{dt} = L_{N+1} h_{N+1} - L_N h_N + V_{N-1} H_{N-1} - V_N H_N \quad (3)$$

Gambar 3. Diagram blok sistem pengendalian