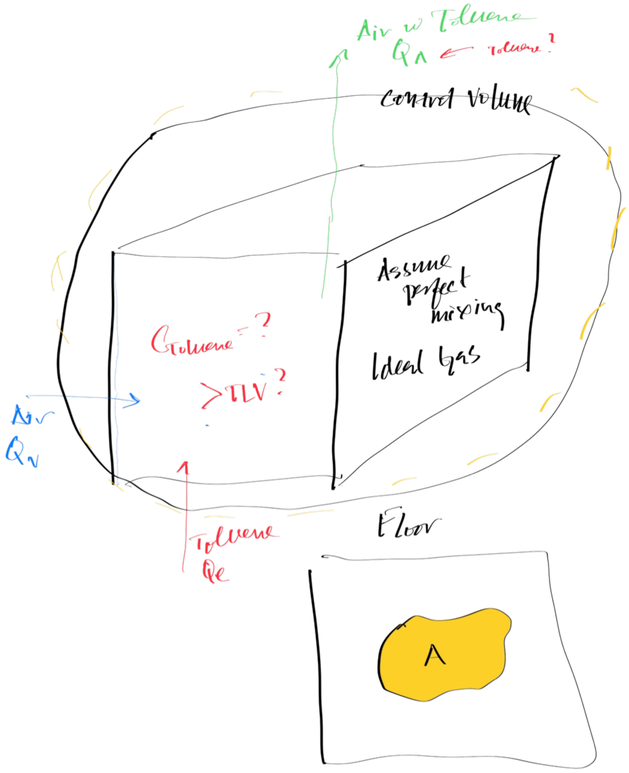
Total Moles: Accum = In − Out + ~~Generation~~ 0

Component: $Accum_{Tol} = In_{Tol} - Out_{Tol}$



Component Balance

$$\frac{dn_{Tol}}{dt} = Q_e - \underbrace{C_T Q_A \cdot \frac{M}{\rho/RT}}_{\frac{mol}{sec} = \frac{mol}{sec} - \frac{mol}{L}\cdot\frac{mol}{s}\cdot\frac{L}{mol}} = Q_e - C_T Q_A \cdot \frac{RT}{P}$$

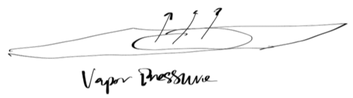
$$Q_e = k_m A (C_{SAT} - C_T)$$

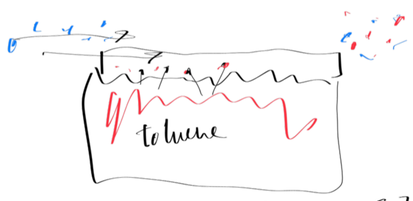
$PV = nRT$

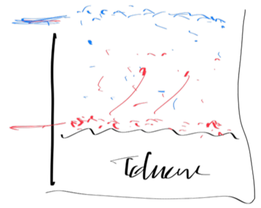
$$\frac{dn_T}{dt} = k_m A (C_{SAT} - C_T) - C_T Q_A \frac{RT}{P}$$

C_{sat} ← Antoine Eq.

$$C_T = \frac{n_T}{V} \qquad \frac{dn_T}{dt} = V \frac{dC_T}{dt}$$







Antoine Eq.

$$\log_{10} P_{sat} = A - \frac{B}{T+C}$$

$$P_{sat} V = nRT$$

$$C_{sat} = \frac{n_{sat}}{V} = \frac{P_{sat}}{RT}$$

Mass Transfer Rate Q_e [=] $\frac{mol}{s}$

$$k_m A (C_{SAT_{,T}} - C_T) = Q_e$$

$$\frac{dC_T}{dt} = \left[k_m A (C_{sat} - C_T) - C_T Q_A \frac{RT}{P}\right] \frac{1}{V}$$

Steady State

$$\frac{dC_T}{dt} = 0 \rightarrow \qquad k_m A C_{sat} = k_m A C_T^{ss} - C_T^{ss} Q_A \frac{RT}{P}$$

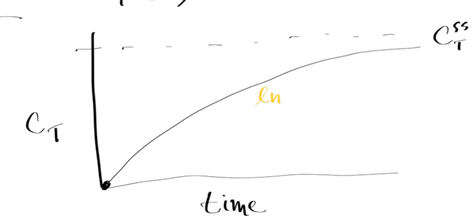
$$C_T^{ss} = \frac{k_m A C_{sat}}{k_m A - Q_A \frac{RT}{P}}$$ ← steady state

Out = In + Air

$Q_A = Q_e + Q_V$ @ steady state or $\Delta P = 0$

$$TWA = \frac{\int_0^t C_T \, dt}{8 \text{ hrs}}$$

$C_T(t)$?



Euler Method

ODE INT →