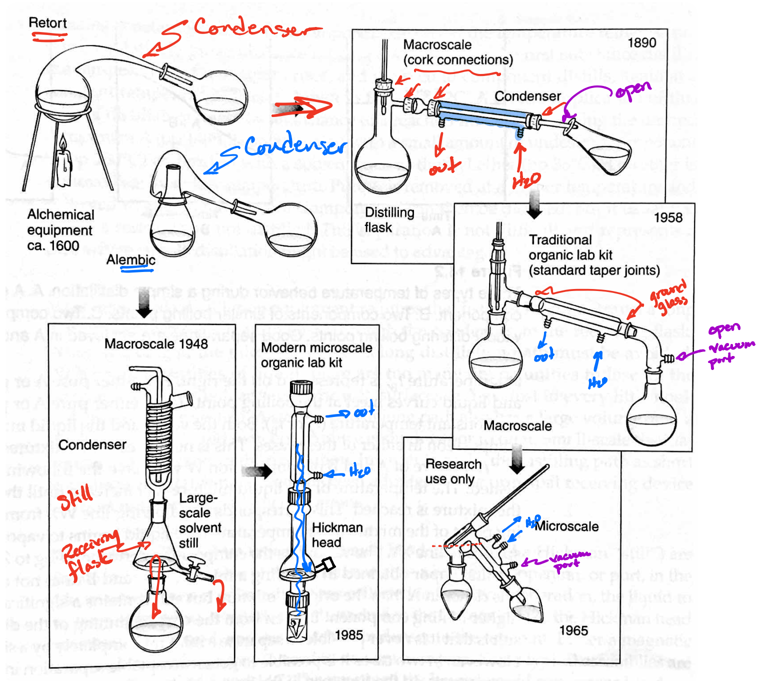
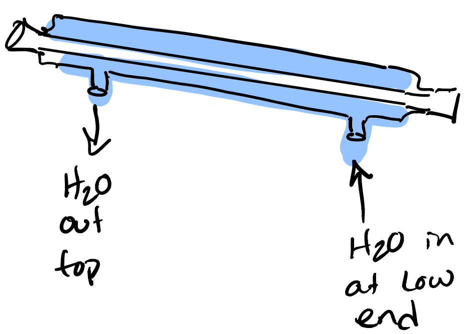
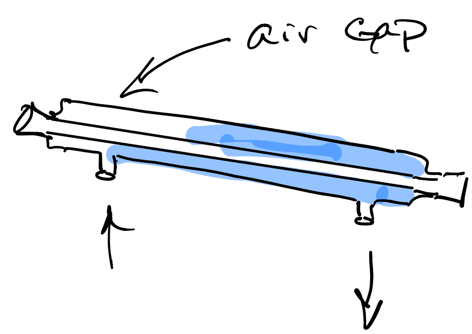
Distillation



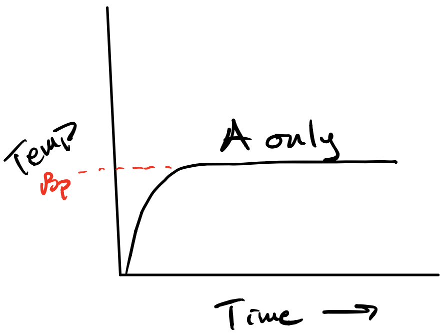




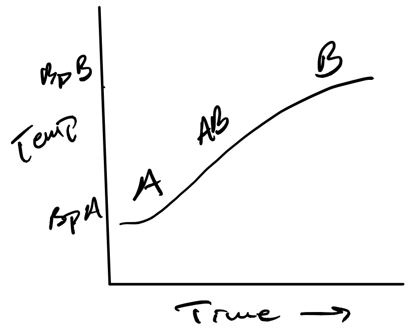
Correct
work against gravity

wrong

Distillation & Temperature vs. Time

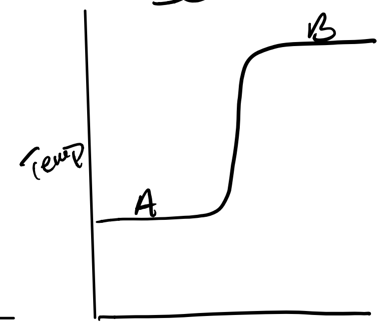


Single Substance A



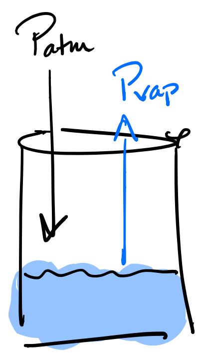
two component with A & B close in Bp

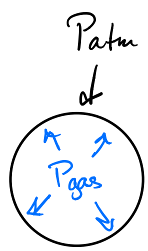
Ideal



with A & B different Boiling points

Boiling Point





$P_{gas} < P_{atm}$ Bubble Collapse — no boiling visible

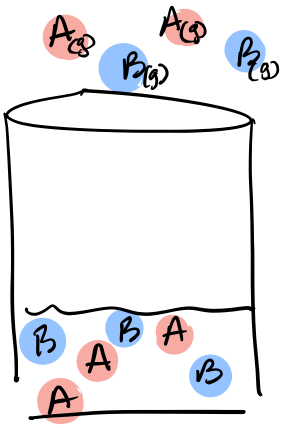
$P_{gas} = P_{atm}$ Boiling pt

$P_{gas} > P_{atm}$ Bumping Explosive Boiling

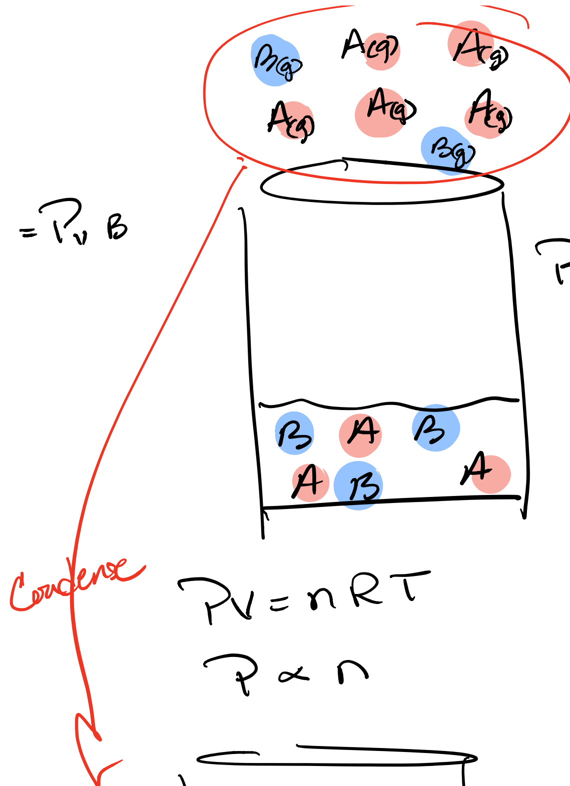
weaker IMF the higher the P_{vap}

Stronger IMF the lower the P_{vap}

↑ $V_{pressure} \propto$ Temp ↑



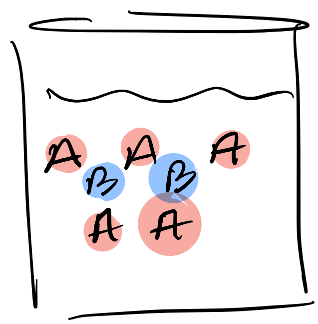
$P_{vA} = P_{vB}$



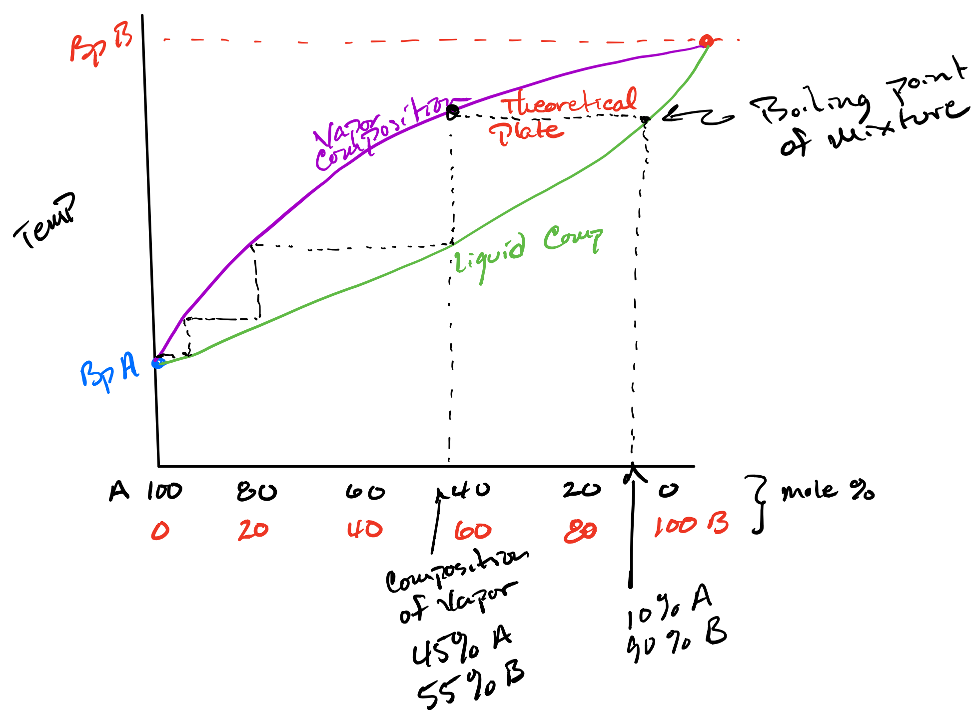
$P_{vA} > P_{vB}$

$PV = nRT$

$P \propto n$



Phase Diagram



mole fraction $A = N_A = \frac{\text{mole } A}{\text{mole } A + \text{mole } B}$

$N_A \times 100 = \text{mole } \% \ A$

$B = N_B = \frac{\text{mole } B}{\text{mole } A + \text{mole } B}$

$N_B \times 100 = \text{mole } \% \ B$

Raoults Law

Vapor Composition related to liquid Composition for ideal liquids

The partial vapor pressure of Comp A in solution P_A = The vapor pressure pure A (P_A°) x it's mole fraction

$$P_A = P_A^{\circ} N_A$$

$$P_B = P_B^{\circ} N_B$$

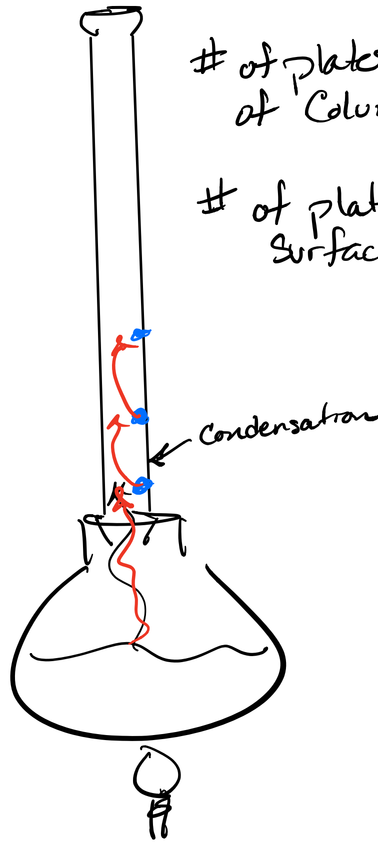
$$P_T = P_1 + P_2 + P_3 + \cdots + P_n$$

$$P_T = P_A + P_B = P_A^{\circ} N_A + P_B^{\circ} N_B$$

At Boiling $P_{atm} = P_A^{\circ} N_A + P_B^{\circ} N_B$

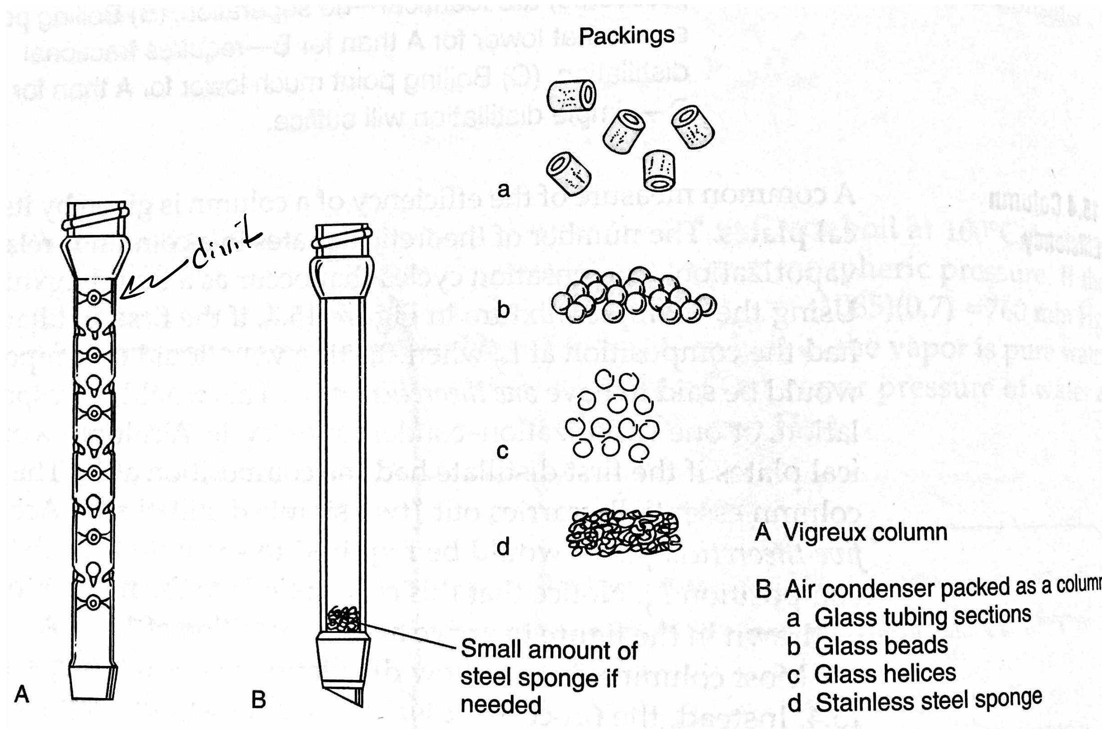
Boiling Point Difference vs Theoretical Plates

ΔBp	Plates
108°	1
72°	2
54°	3
43°	4
36°	5
20°	10
10°	20
7°	30
4°	50
2°	100



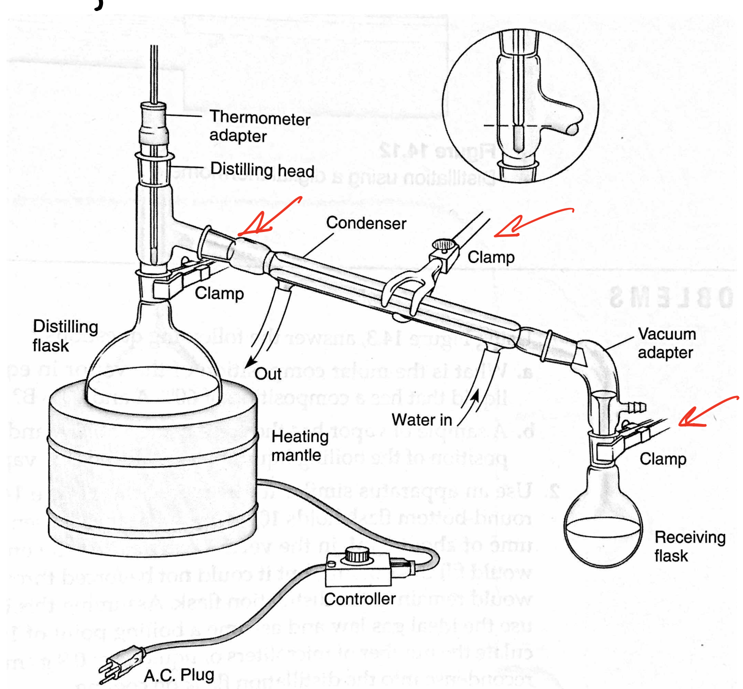
# of plates ∝ to height of Column

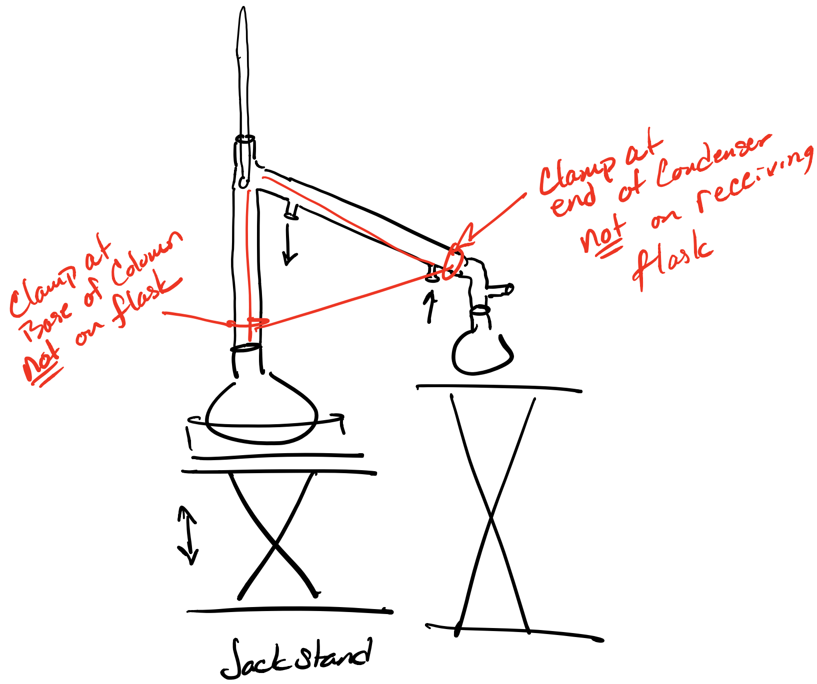
# of plates ∝ to surface area



Vigreux Column

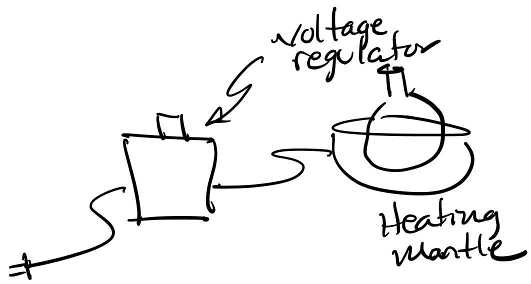
Setting up a distillation



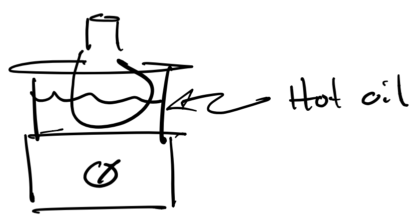


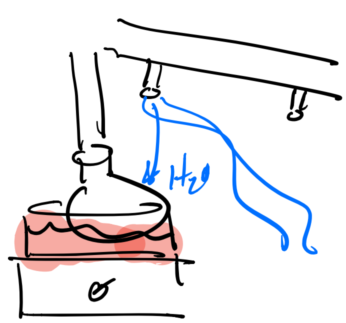
Types of heat

Heating Mantle

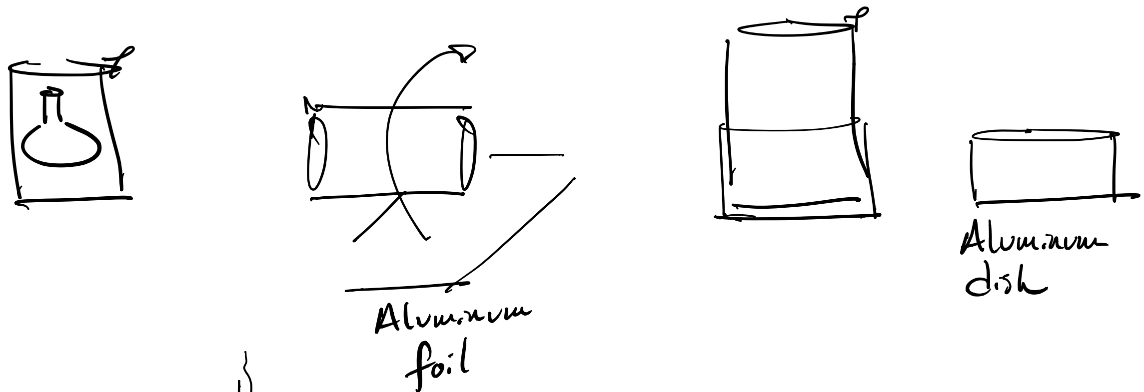


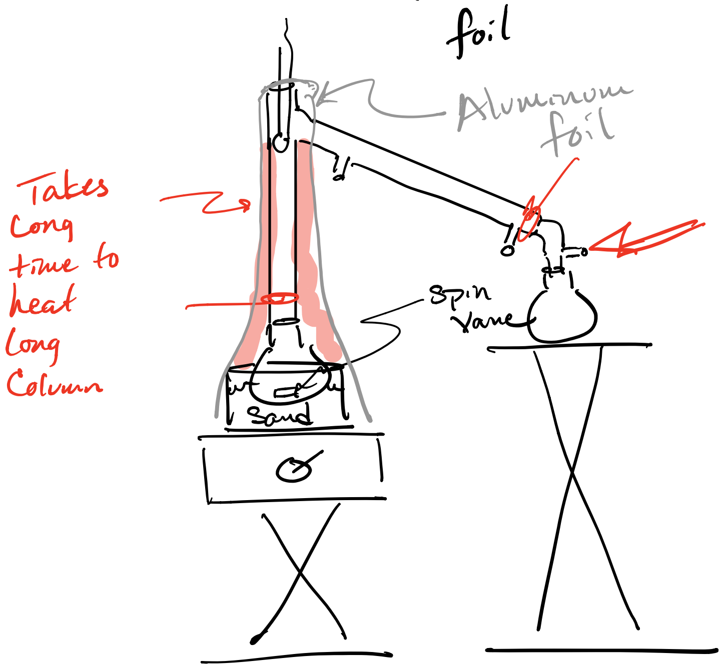
Oil Bath





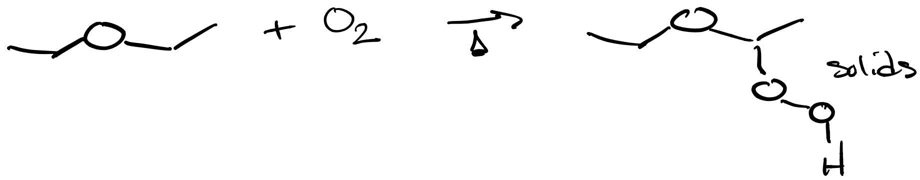
Sand Bath





Two Checks

1. Always make sure system open to atmosphere ⟹ Bomb
2. Never distil to dryness in the distillation flask ⟹ Bomb



organo peroxide

when dry

Explode