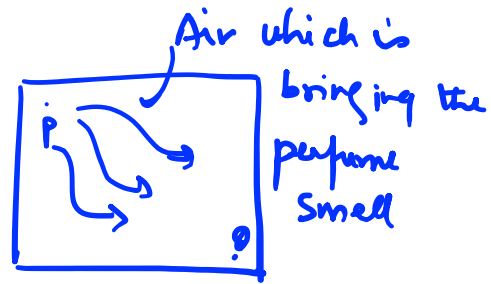
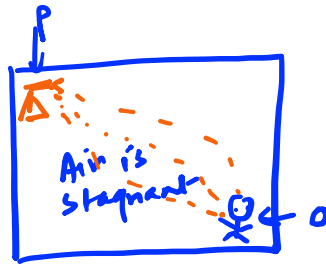


Lecture 1: Mass Transfer & Its Applications

Mass Transfer :

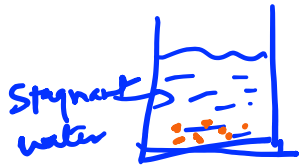
1) Perfume Example



2) Water soluble dye



3) Salt dissolution in water



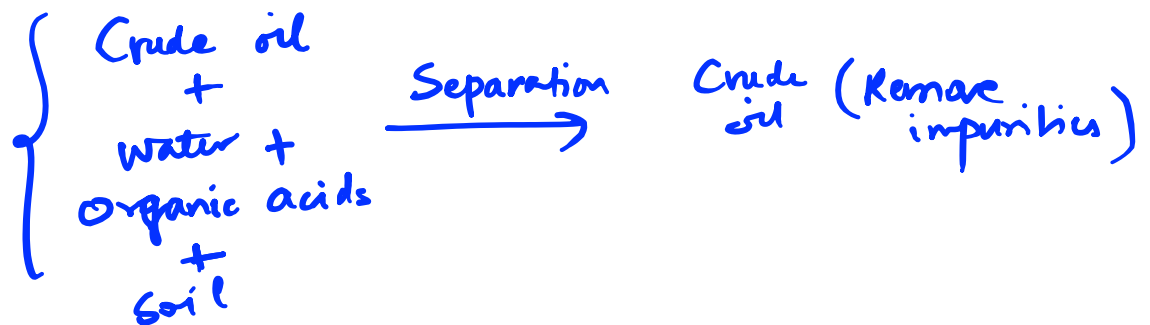
← Salt dissolves faster in this case
With stirring

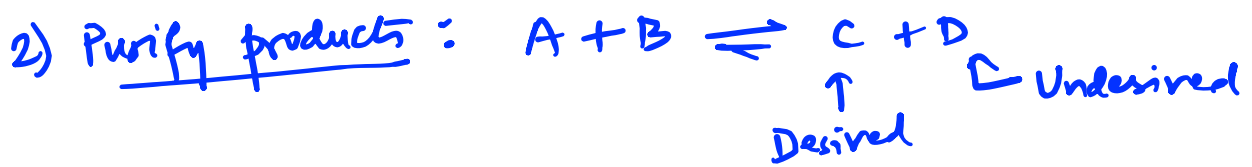
4) CO_2/O_2 exchange during respiration

5) Application of ointment on skin: Volini/more

Application of mass transfer in CHE: Achieve separation/
Designing unit operations (separation processes)

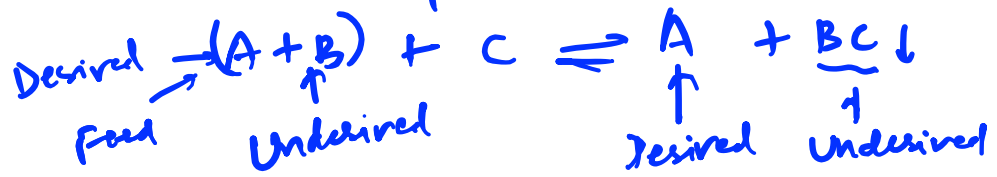
Ex: 1) Purify feed: Removal of impurities from crude oil.



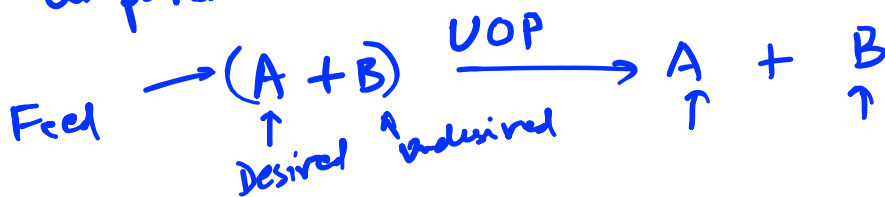


Example of separation processes: Mass transfer unit operations

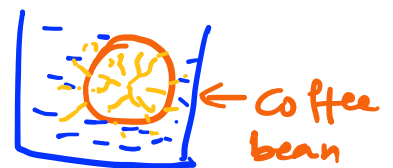
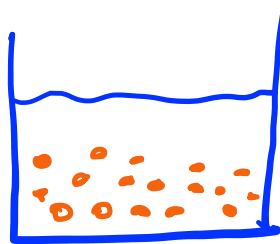
- we will not cover these
- 1) Mechanical separation: Sieves, etc
 - 2) Barrier separation: Membrane separation
 - 3) Reaction based separation



Mass transfer unit operations: Achieve unit operation by using the preferential mass transfer (movement) of a component.



1) Coffee/Tea making:



2) Remove CO_2 from power plant exhaust:

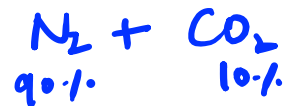
3) Removal of volatile organic compounds from auto exhaust:



Unit operations:

- 1) Absorption
- 2) Distillation
- 3) Liquid-Liquid extraction
- 4) Adsorption

Absorption: Separate CO_2 from power plant exhaust-



Feed ($\text{N}_2 + \text{CO}_2$) + Ethanol amine (L)

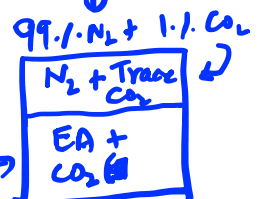
Little soluble Very soluble in Ethanol amine

Absorbent: Ethanol amine

Property used for separation: Difference in solubility of N_2 & CO_2 in Ethanol amine

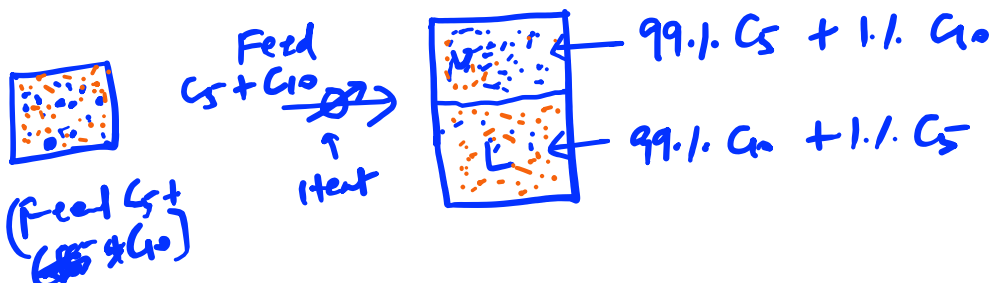
CO_2 lean phase

CO_2 -rich phase

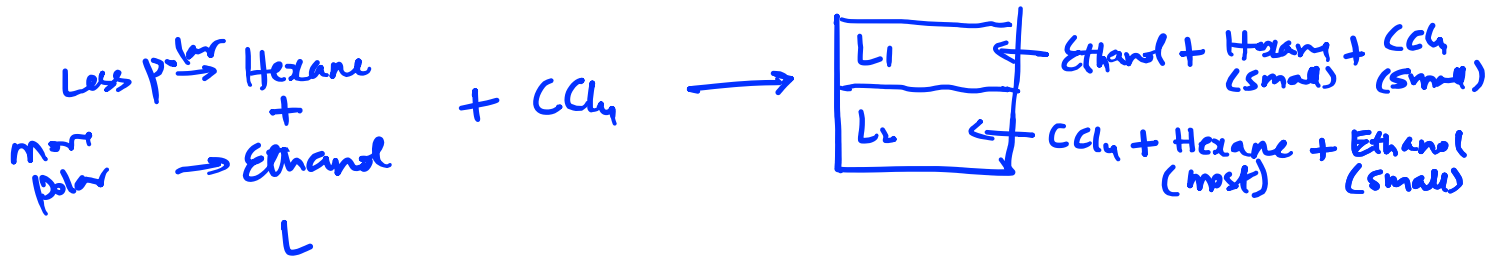


2) Distillation: Separate Pentane (C_5) and Decane (C_{10})

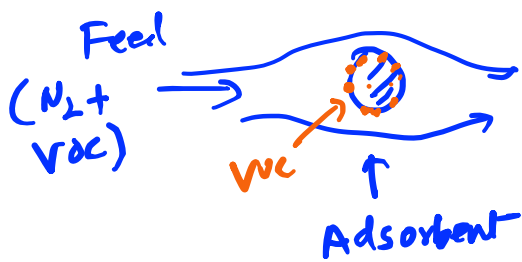
Difference in boiling point / relative volatility of C_5 & C_{10} .



3) Liquid-liquid extraction



4) Adsorption: Adsorption occurs on surface of solids (where as ~~abs~~ absorption is a bulk process)



Adsorbents used in

- 1) water filters (activated carbon)
- 2) Air filters

