

Introduction

unit operation

unit process

- Heat transfer \rightarrow Energy
 - Mass Transfer \rightarrow mass
 - Fluid Mechanics \rightarrow flow
- bared
on fundamental
Principle.
- \rightarrow chemical Rxn Engg

Separation

Mechanical Separation

(Heterogeneous mixture)

L-S \rightarrow filtration, settling
centrifugal separations

S-S \rightarrow Solids of different size/density
 \rightarrow elutriation

G-S \rightarrow Small particles from a gas by
cyclones, bag filter

L-L \rightarrow immiscible liquids.
 \rightarrow decantation.

Molecular Separation

\rightarrow Involves charge changes

(Transfer of a molecules from
one phase to another)

\rightarrow Mass transfer operation

Classification

\rightarrow Direct contact of two
immiscible phases.

G-L \rightarrow Distillation, Absorption

G-S \rightarrow Adsorption.

L-L \rightarrow Extraction

L-S \rightarrow Leaching, Crystallization
Ion exchange.

Books

- R. K. Treybal \rightarrow Mass transfer operation
- Geankoplis — Transport process and separation process principles.
- Seader — Separation process principles.
- B. K. Datta —

2) Phase separated by membrane

G-G - diffusion, effusion

G-L Permeation

L-L - Dialysis, Electrodialysis, Reverse osmosis

3) Direct contact of miscible phases.

- Thermal diffusion

- Centrifugation

4) Use of surface phenomena.

- foam separation -

Distillation → Distillation is a method of separating the components of a solution which depends upon the distribution of substances b/w gas and liquid phase.

Salt - water - evaporation. (non-volatile - salt)

($\text{NH}_3\text{-H}_2\text{O}$) distillation → all the components are appreciable volatile

↳ Application of heat

- direct separation → pure product

V-L-gms

distillation methods depends greatly upon an understanding of equilibria existing b/w vapour and liquid phase in binary mixture.

P-T-Cone.

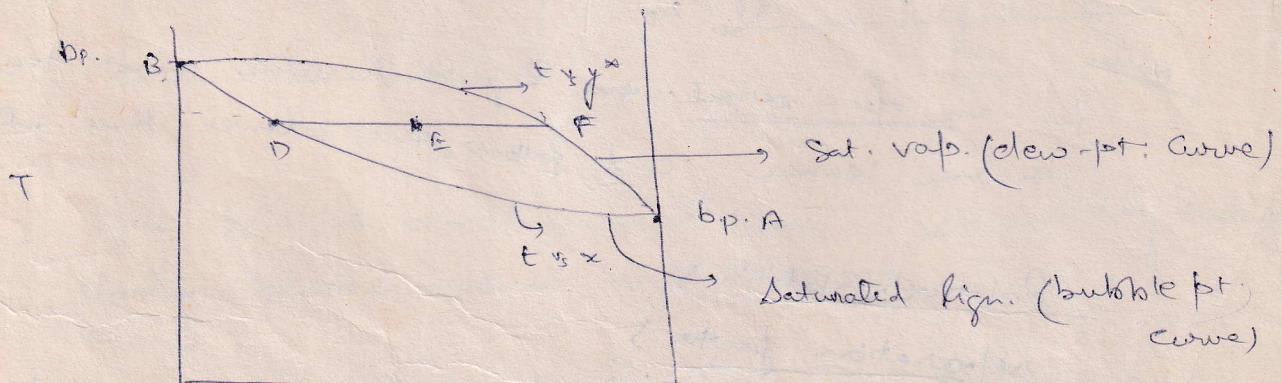
Comp. A of binary mix. A ~~B~~ as more volatile

v.p. A > v.p. B. at any T,

n - mole fraction in liquid phase

y - _____ vapour phase

Corrott P equation



liquid and vap. are at the same T and P

E = two-phase mix consist of a liquid phase composition and vap. phase composition at F in such a proportion that the avg. composition of the entire mixture is represented by E.