Skills required for the student:

1. Abstracting: student while taking notes, teacher to remember the points of lecture, for researcher while presenting a paper.
2. Describing: student to write paper, teacher to make simple.

Lecture 1:

welcome,
skills
abstract of four topics

exercise 1: circulate text books and make groups , ask to read topic 'solution' pages 1 and 2. ask to make an abstract and describe points to each other (useful to realize the role of teacher)

Solution

Solution: A homogeneous mixture of two or more components.
Binary solution: A homogeneous mixture of two components.
Homogeneous System: A system which has same concentration/composition throughout.
System:

Biological definition: A group of different organs carrying out different functions for the same purpose. Eg. Circulatory system, digestive system, respiratory system, etc.
Chemically: A part of the universe under study.

Surrounding: part of universe other than system.
Types of system:

1. Open system: which can exchange both energy and matter with the surrounding. Eg. Hot water kept in a beaker.
2. Closed system: A system which can exchange only energy and not matter with the surrounding: eg. Hot water kept in a corked bottle.
3. Isolated system: A system which can exchange neither enery nor matter with the surrounding. Eg. Hot water kept in thermos flask.

Heterogeneous system:

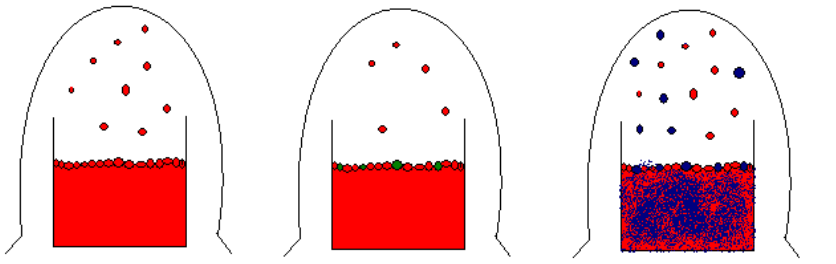
1. A system which do not have same concentration throughout. Eg. mixture of two immiscible liquids. (oil and water/ benzene and water)

Homogeneous system: A system consisting of only one phase.
[Phase, component, variance: Phase rule]

period II: concentration terms:
Normality:
Molarity:
Molality:
Weight fraction:
Weight percentage:
Volume percentage:
Mole fraction:
Types of completely miscible liquid pairs:
Type I: nearly ideal, obeying Raoult's law

Type II: showing +ve deviations from Raoult's law
Type III: showing –ve deviations from Raoult's law

Raoult's law: vapour pressure: equilibrium
Dalton's law of partial pressures



vapour pressure of pure liquid at equillibrium

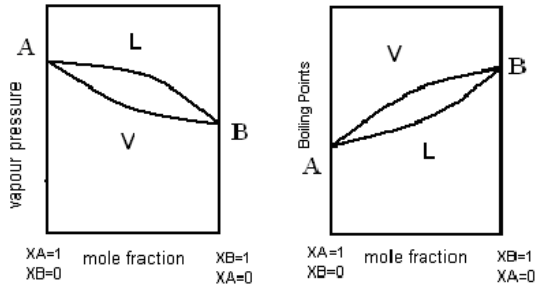
lowering of vap pressure nonvolatile solute+ volatile solvent

mixture of 2 volatile liquids Dalton's law: $Ps=P_A+P_B$

L+L mixtures may be classified into three types based on their behaviour to wards Raoult's law.

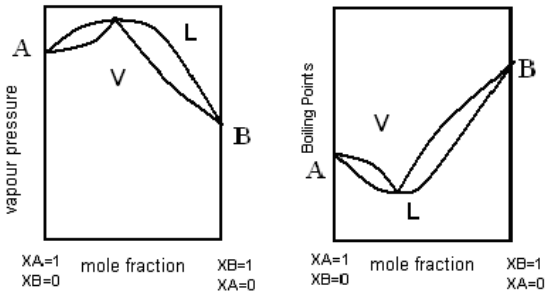
Type I: Nearly ideal solutions

Solutions which obey the Raoult's law
Solutions with intermediate vapour pressures
Solutions with intermediate Boiling points



Type II: Nonideal solutions

Solutions showing positive deviations from Raoult's Law
Solutions with maximum vapour pressure
Solutions with minimum boiling point

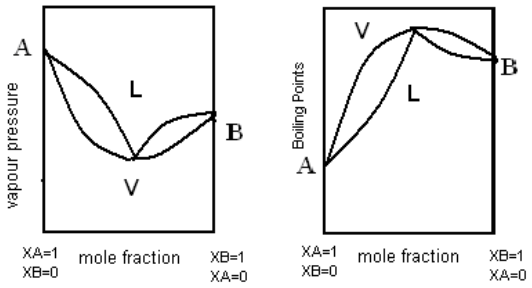


Type III: Nonideal solutions

Solutions showing negative deviations from Raoult's Law

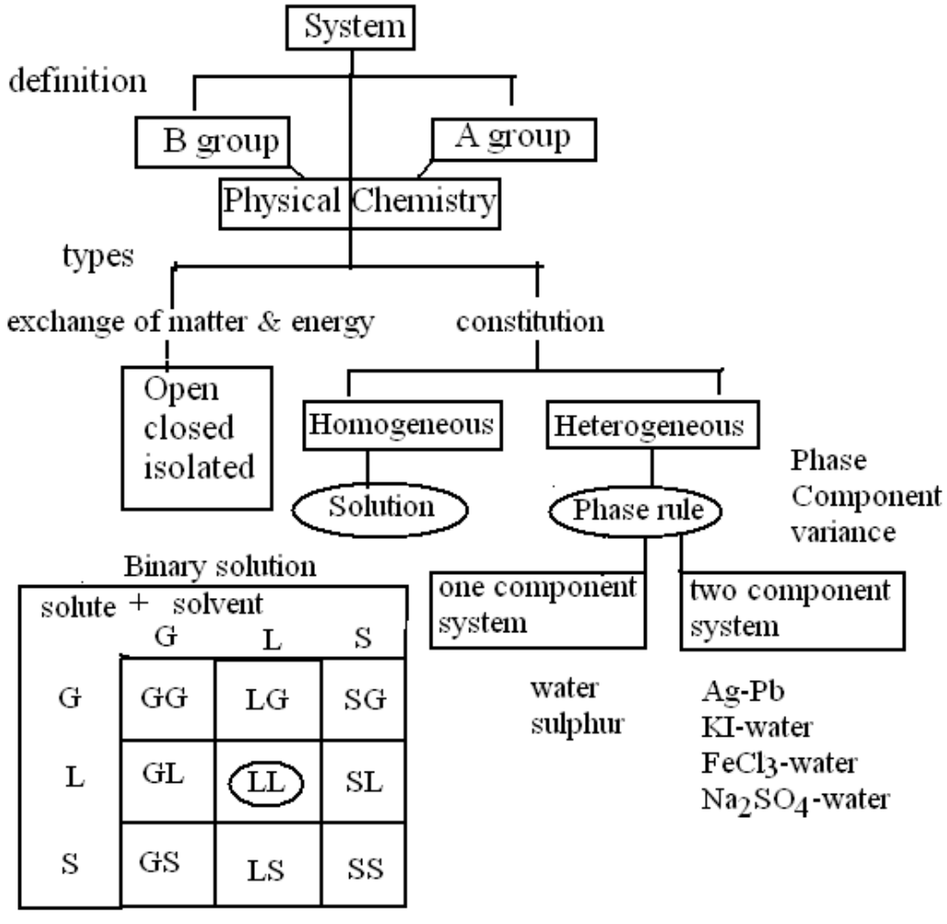
Solutions having minimum vapour pressure

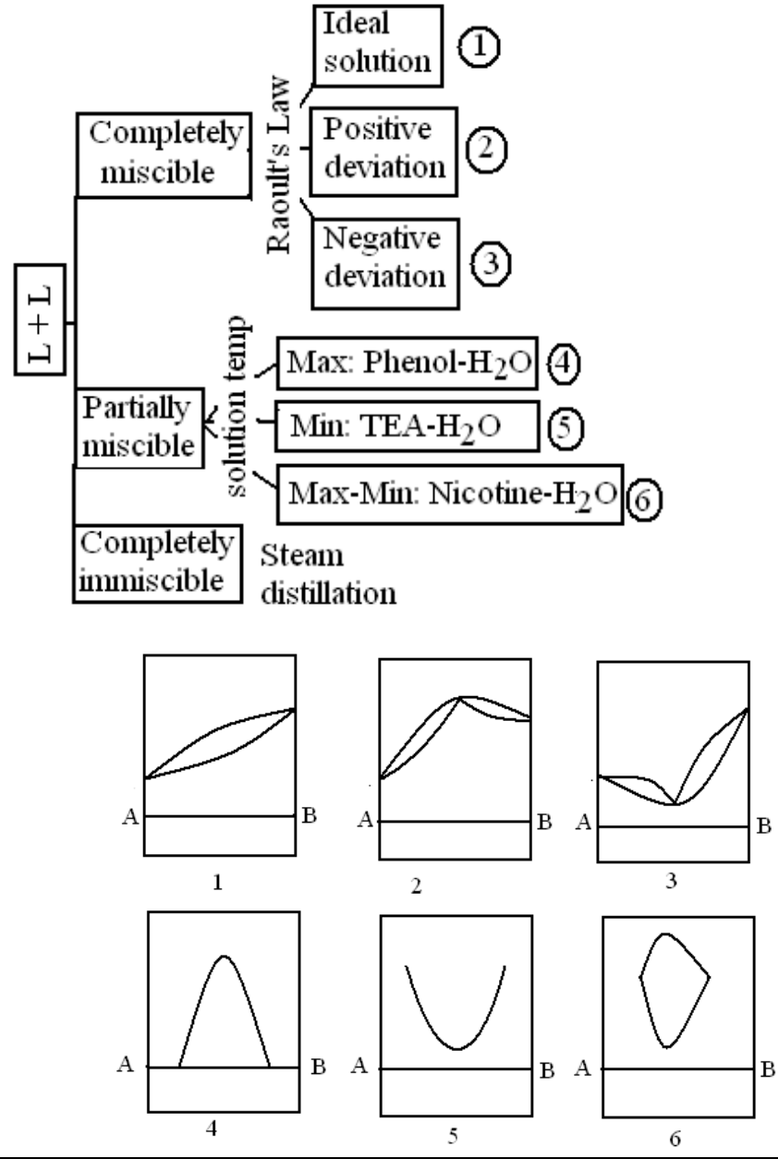
Solutions having maximum boiling point

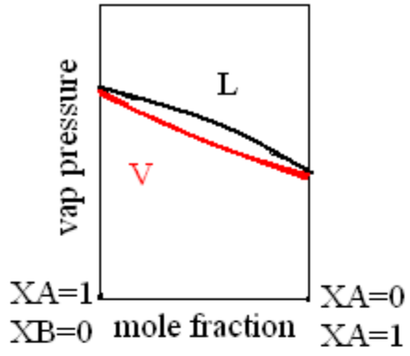


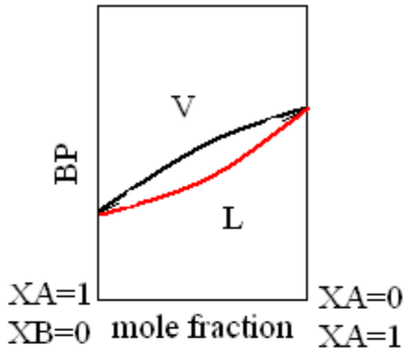
Fractional distillation:

It is the method of separation of two liquids with very small difference in the boiling point, where repeated vapourisation and condensation is carried out with the help of a fractionating column. The volatile fraction gets distilled and is obtained in the form of a **distillate**, whereas the less volatile fraction remains as a **residue**.

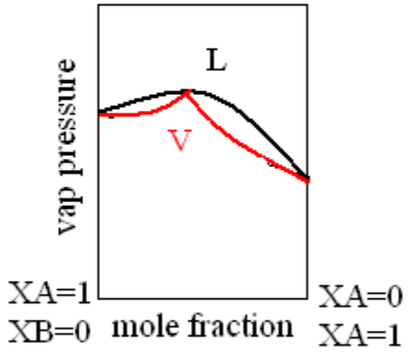

System
definition
B group
A group
Physical Chemistry
types
exchange of matter & energy
constitution
Open
closed
isolated
Homogeneous
Heterogeneous
Solution
Phase rule
Phase
Component
variance
Binary solution
solute + solvent
G L S
G GG LG SG
L GL LL SL
S GS LS SS
one component system
two component system
water
sulphur
Ag-Pb
KI-water
FeCl3-water
Na2SO4-water

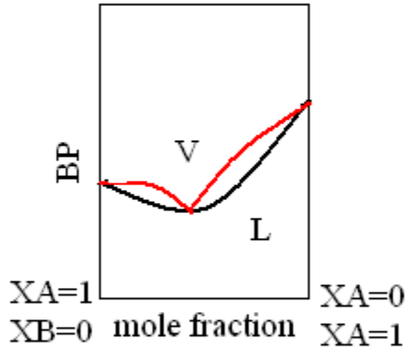

L+L
Completely miscible
Raoult's Law
Ideal solution 1
Positive deviation 2
Negative deviation 3
Partially miscible
solution temp
Max: Phenol-H2O 4
Min: TEA-H2O 5
Max-Min: Nicotine-H2O 6
Completely immiscible
Steam distillation
A B
1
2
3
4
5
6



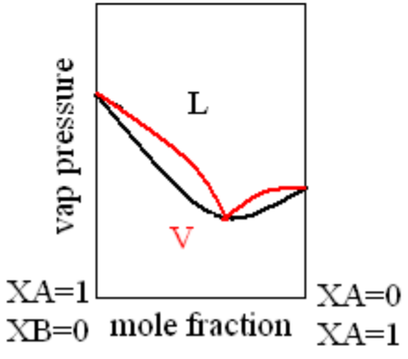


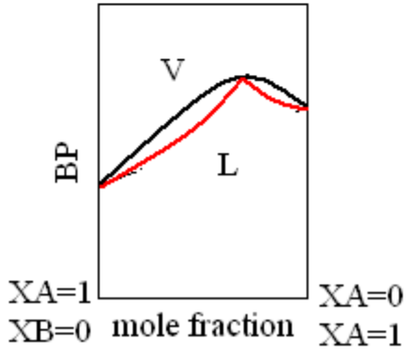
type I: nearly ideal solutions
system with intermediate vap.pressure
system with intermediate/constantly varying BP
system which obeys Raoult's law
Ex. benzene+toluene, benzene+CTC, water+MeOH
zeotropic mixture





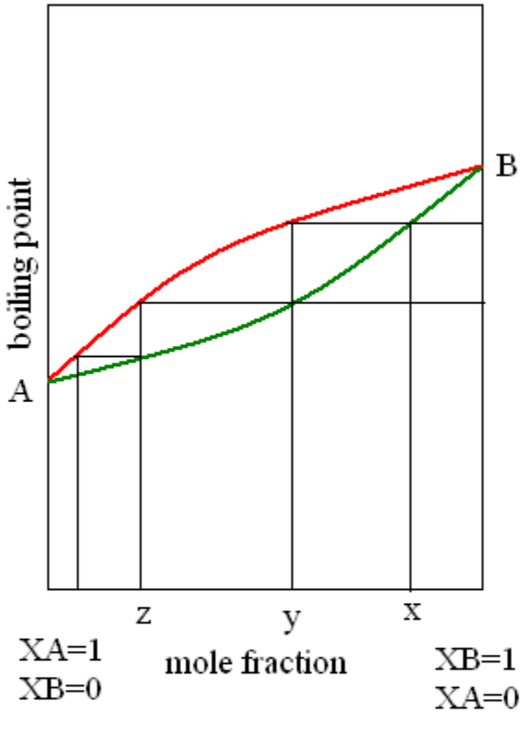
type II: nonideal solution
system with maximum vap.pressure
system with minimum BP
system with positive deviation form Raoult's law
Ex. water+EtOH, Benzene+EtOH,
Azeotropic mixture



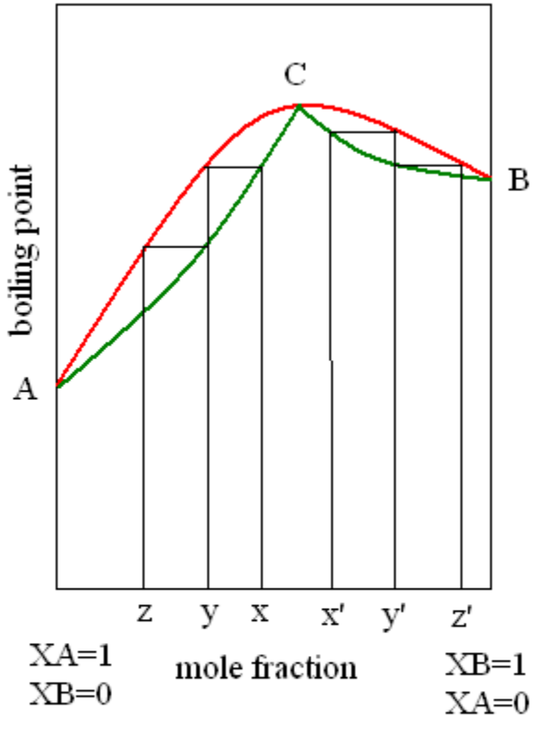


type III: nonideal solution
system with minimum vap. pressure
system with maximum BP
system with negative deviation from Raoult's law
Ex. Acetone+$CHCl_3$, H_2O+H_2SO_4
Azeotropic mixture

FRACTIONAL DISTILLATION OF SOLUTIONS

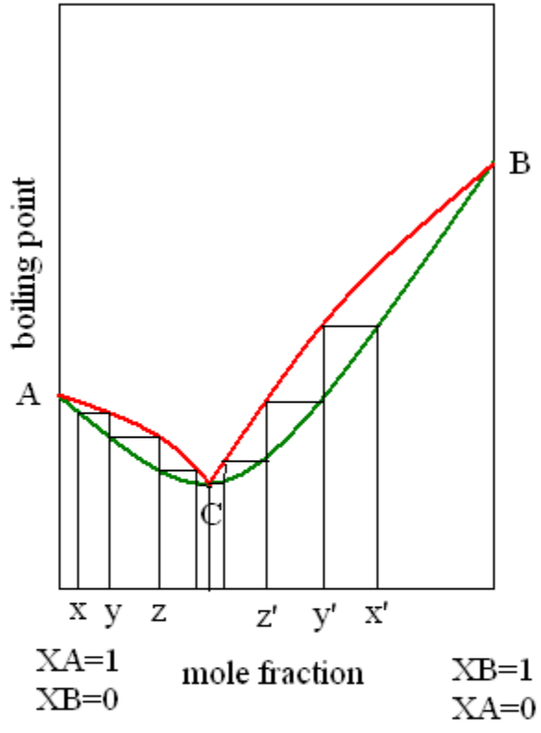


type I:
Residue: Pure Liq. B
Distillate: Pure Liq. A



type II:
R: Liq(C)
D: Liq. A

type II:
R: Liq. (C)
D: Liq.B



type III:
R: Liq. A
D: Liq(C)

type III:
R:Liq.B
D: Liq.(C)