SOLUTIONS

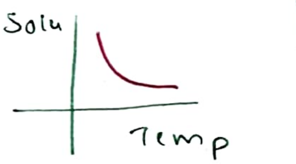
Solubility (for gas)
↳ Depends on : (i) Nature of solute, solv.
(ii) Temp & Press

Solubility of gas in liq

(1) Nature of solute :
↳ Solu. ∝ liquificatn ∝ critical temp

(2) Effect of Temp :
(Similar to condensatn process [EXOTHERMIC])
Hence on inc Temp Solu. of gas in liq dec.

$\propto \frac{1}{Temp}$ always exothr.



(3) Effect of Pressure :
∵ Gases are compressible
↳ Pressure affect the solu

HENERY LAW

$P_{gas} \propto X_{gas}$ dissolved in liq

$P_A + P_B = P_T$ ⇒ Dalton's law

$P_A = X_A \cdot P_T$

$P_{gas} = K_H \cdot X_{gas}$ dissolved
↳ Henery's const
∝ Temp
unit of K_H = unit of Press
Depends on gas
↳ $He > N_2 > H_2 > CO_2$ } for K_H
∝ Solubility

* solubility of gas (X) $\propto \frac{1}{K_H}$

→ LIMITATIONS :
(1) Press must not be very ↑
(2) T —— u —— (↓)
(3) Gas should be non reactive wrt liq
(4) Gas should not ionise or dissociate in liq

→ Applicatn
- Cold water ⇒ O_2 dissolved more ⇒ Suitable for fish
- Scuba divers dilute air with He To prevent bents

*** Vapour Pressure**

VP ∝ Temperature

$\log \frac{P_2}{P_1} = \frac{\Delta H}{2.303R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right]$

If $T_2 > T_1$ then $P_2 > P_1$

- VP $\propto \frac{1}{Bp}$ ∝ volatility
- Indep. on Surf. area, vol.

→ Atmospheric Press ←
NTP: 1 atm ↳ vp = 1atm → NBP
STP: 1 bar ↳ S. Boiling pt

100°c
NBP > SPB → 99.6°

V.P OF LIQ SOLN

Roult's LAW (liq in liq) at const (T)

$P_A \propto X_A$ ⇒ $P_A = P^0_A X_A$

Dalton's law : gas in gas

$P_S = P_A + P_B$ ($P_A = P_T \chi_A$, $P_B = P_T \chi_B$) → mole fractn in gaseous state

$P_S = (P^0_A - P^0_B) X_A + P^0_B$

$P_S = (P^0_B - P^0_A) X_B + P^0_A$

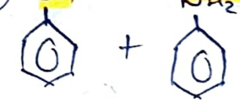
*** NON-IDEAL SOLN**

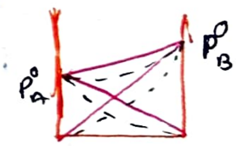
$(P_s)_{obs} \neq (P_s)_{Theo}$

↳ +ve Devn ($P_{s\,ob.} > P_{s\,Th}$)
(1) A··B < A···B or B···B
(2) ΔH > 0 { ΔV > 0
(3) ΔS > 0

↳ -ve Devn ($P_{obs} < P_{s\,theo}$)
(1) A···B > A···A or B···B
(2) ΔH < 0 { ΔV < 0 } ΔS > 0
(3) ΔG < 0

eg. of -ve dev (H) → bond
(1) $HNO_3 + H_2O$, (2) $CHCl_3$ + acetone
(3) OH (phenol) + NH_2 (aniline)





eg. of +ve dev
(1) $CH_3OH + H_2O$ (2) $C_2H_5OH + H_2O$
(3) ROH + ROR (4) acetone + ethanol (NCERT)

*** AZEOTROPE**

·Const Boiling mixt.

$Y_i = X_i$

Min Boiling azeo — +ve devia

Max Boiling azeo — -ve devn