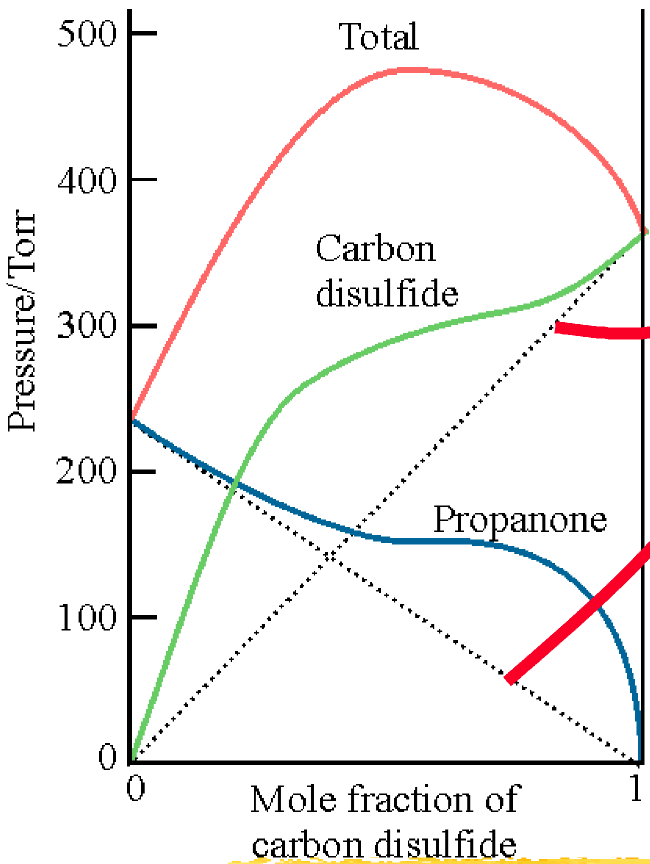
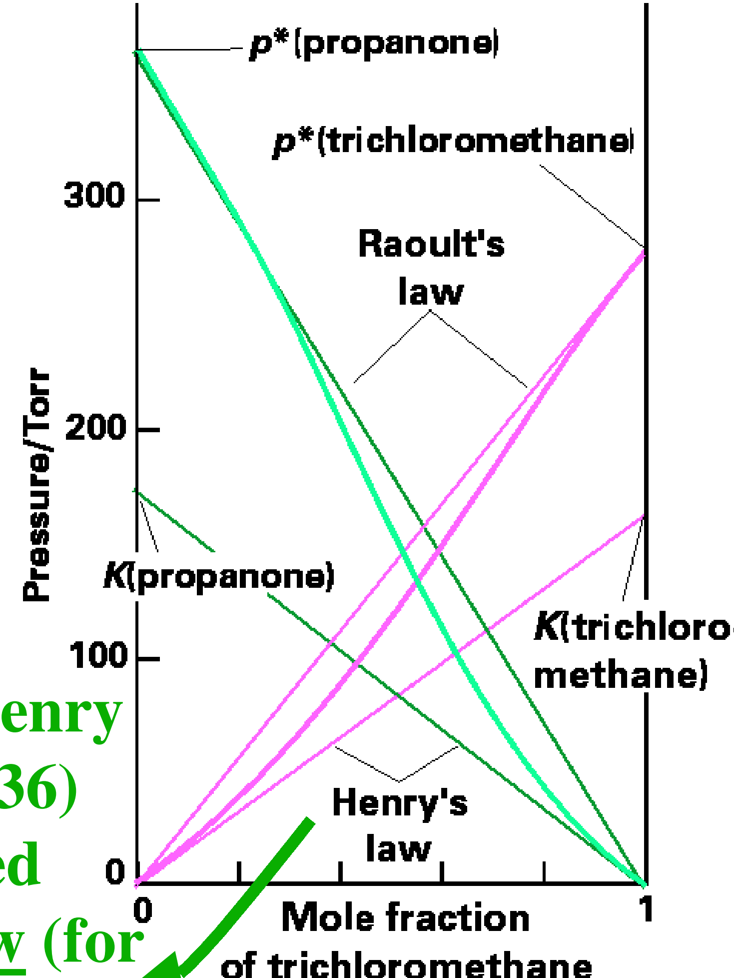
Non-ideal solutions

Strong deviations from ideality are shown by dissimilar substances



Raoult's law obeyed for a close-to-pure solvent



William Henry (1775-1836) observed Henry's law (for a dilute solute):

$p_B = x_B K_B$ (e.g., gas solubility)

Ideal and real solutions: Activities

From both Raoult's (solvent) and Henry's laws (solute) follows:

$$\mu_{solv}(l) = \mu^{\ominus}_{solv}(l) + RT \ln x_{solv}$$
$$= \mu^{\ominus}_{solv}(l) + RT \ln C[solv]$$

$$\Rightarrow \mu_J = \mu^{\ominus}_J + RT \ln[J]$$

$\Downarrow$

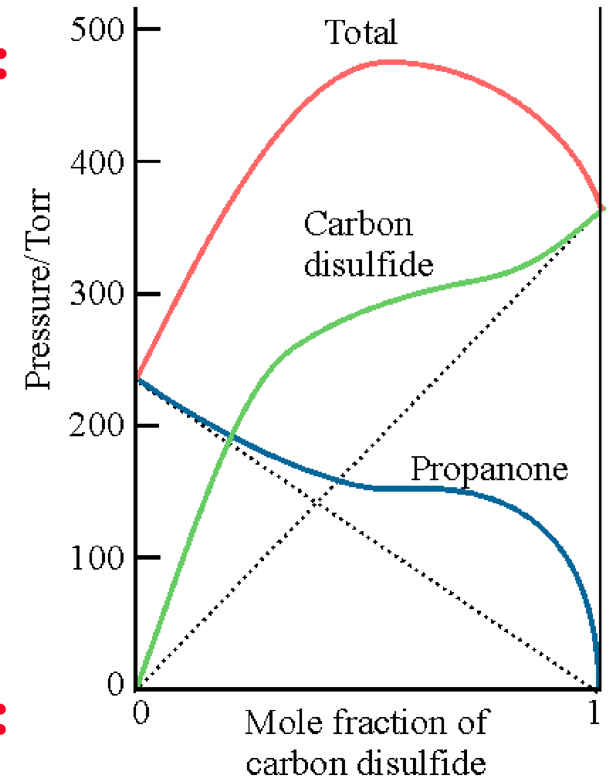
standard chemical potential @ 1 M

The chemical potential is a measure of the ability of J to bring about physical or chemical change

BUT:

$\Downarrow$

to preserve equation for real solutions:



$$\boxed{\mu_J = \mu^{\ominus}_J + RT \ln a_J}$$

Effective concentration = activity $a_J = \gamma_J[J]$