OUTLINE OF CHAPTER 12

SOLUBILITY OF SOLIDS IN LIQUIDS

Starting Point (of surprise!!!!)

\[ f_1^S(T, P) = f_1^L(T, P, \chi) \]

But

\[ f_1^S(T, P) = x_1 \gamma_1(T, P, \chi) f_1^L(T, P) \]

Also

\[ f_1^S(T_m) = f_1^L(T_m) \]

Thus at the melting point we would have:

\[ x_1 = 1/\gamma_1(T_m, P, \chi) \]

The solid is below its melting point, that is, \( f_1^L > f_1^S \) so the above equation is not valid. We need to compute the liquid fugacity differently (see eq 9-7-8a)

\[
 f_1^L(T, P) = f_1^S(T, P) \exp \left[ \frac{1}{RT} \left[ \Delta_{\text{ fus }} H(T) \left( 1 - \frac{T}{T_m} \right) + \int_{T_m}^{T} \Delta C_p \, dT - T \int_{T_m}^{T} \frac{\Delta C_p}{T} \, dT \right] \right]
\]
FREEZING POINT DEPRESSION

Solid frozen is the pure solvent, the liquid phase is the solution with a solute.

Starting Point (where is this coming from?)

\[
f^S_1(T_f, P) = \tilde{f}^L_1(T_f, P, \tilde{\gamma}) = x_1 \gamma_1(T_f, P, \tilde{\gamma}) f^L_1(T_f, P)
\]