Lecture 27

# Gibbs Free Energy and Phase Diagrams

Last Time

**Interpretation of Gibbs Phase Rule**

**Understanding Single Component Phase Diagrams**

**Clausius-Clapeyron Equation**

## Addition of a Soluble Species

Consider the addition of a soluble species into the liquid phase (and suppose it is not very soluble at all in the solid phase) then

Question: Will the Gibbs free energy of the liquid phase increase or decrease as it dissolves a soluble species?

This is illustrated in the following figure:

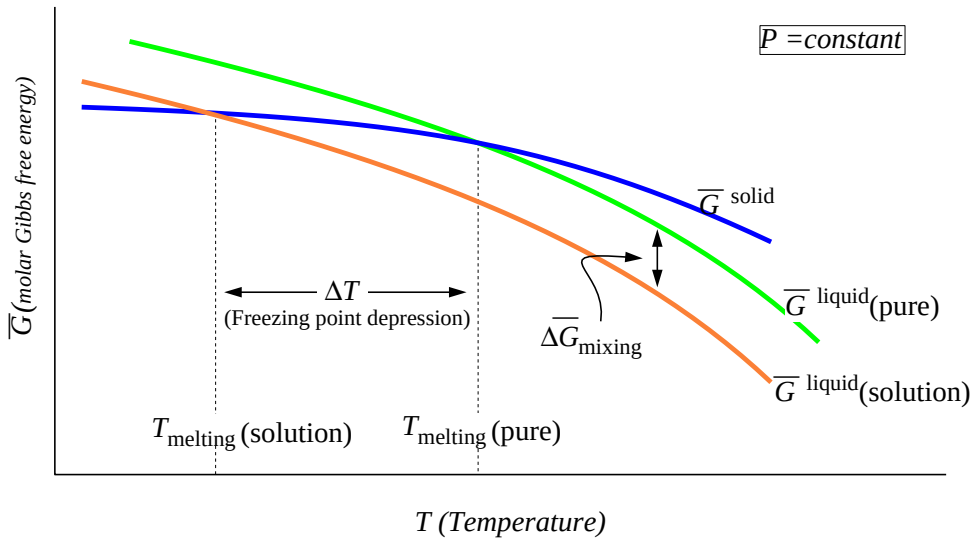


Figure 27-1: Illustration of the freezing point depression when the molar Gibbs free energy of the high temperature phase is reduced.

Thus we see that a soluble species in the liquid leads to "freezing point depression." This is the reason that roads get salted when they get icy—and the reason that old-timers used to add salt to ice-water when making ice cream.