CHEM352: Physical Chemistry I
Homework Set IV - due 5th of Nov, 5.00 pm

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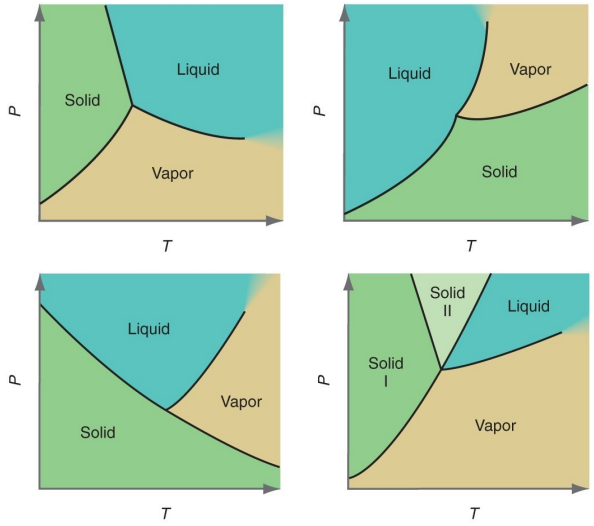
Lecture: Tue, 2.10-3.25 pm & Fri 2.10-3.25 pm, **C111**
Office hours: Wed, 4-6 pm, **HN - 1321B**

Problem 1 — CH8/5pts

Vapor pressure of acetone equals 400 torrs at 43°C and it boils at 56°C. Calculate standard evaporation enthalpy and entropy. What is bouiling temperature of acetone at 20 bars (assume that ΔH_{fus} is independent of temperature).

Problem 2 — CH9/5pts

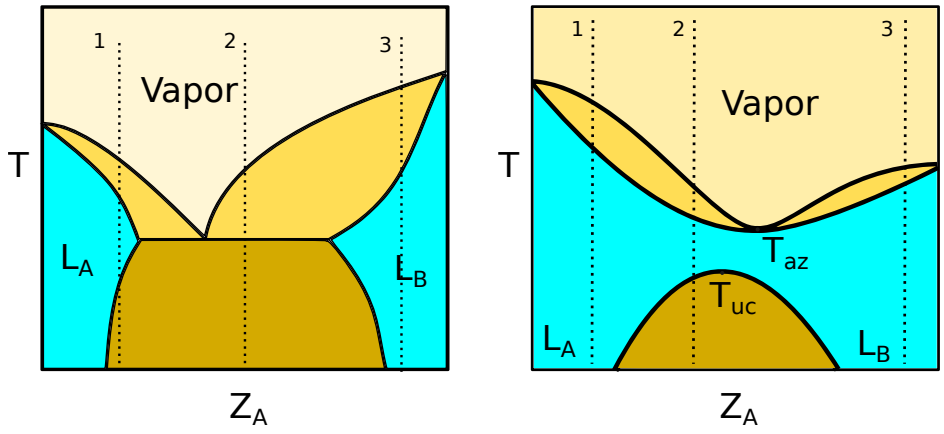
Explain all features of the following phase diagrams that are not observed in real substances. Besides physical reasoning, present relevant equations that prohibit such features.



(MM: I agree with you that the fact that the phase-coexistence curves are not rooted at the 0 of the coordinate system is more than outrageous, but this is not a kind of the feature I ask for)

Problem 3 — CH9/5pts

Using the 'bunny-ear' and 'beheaded bunny' diagrams below, list all phases present (including an estimate for the composition) and phase transitions that occur (including estimated temperature) when increasing temperature along lines 1, 2 and 3. Please organize the answer in a form of a table.



Problem 4 — CH9/5pts

1. The enthalpy of fusion of water is 6.008 kJ/mol at its normal melting point of 273.15 K. Calculate freezing point depression constant K_f. How does freezing point of a gallon of water change after addition of 5 oz of substance with a molar mass of 110 g?

2. Calculate the solubility of H_2S in 1L of water if its vapor pressure above the solution is 2.75 Pa.

3. A and B form an ideal solution. A total pressure of 0.720 bar, y_A and x_A are 0.510 and 0.420 respectively. Calculate the vapor pressure of pure substance A and B.

Problem 5 — CH 7-9/5pts

Provide a list and definitions (with equations) of all different chemical potentials we covered during last few weeks of lectures.