

I. (35) Elective Experiments. Do only ONE of the following two problems; pick one that correspond to your lab work. (Other choices will not be counted.)

A. Thermal Expansivity. [Hint: Precision is very important in all these calculations.]

- $V_b = 25.717_1 \text{ mL}; \quad a = 7.78 \times 10^{-4} \text{ K}^{-1}$
- $s_{Dh} = 0.28_3 \text{ mm}; \quad s_{DT} = 0.14 \text{ K}; \quad s_a = 3.33 \times 10^{-5} \text{ K}^{-1} \quad a = 7.78(33) \times 10^{-4} \text{ K}^{-1}$
- $V_h = 0.0237 \text{ mL}; \quad V_0 = 24.357_8 \text{ mL}; \quad s(V_0) = 1.27 \times 10^{-4} \text{ mL}$
- $r = 1.4320_6 \text{ g/mL}$
- $V_0 = 24.399_1 \text{ mL}; \quad r = 1.43149 \text{ g/mL}$

B. Liquid-Vapor Equilibrium.

- 69.7 torr (acetone) & 61.7 torr
 - $P_A = 43.0 \text{ torr}; P_B = 12.9 \text{ torr}; P_{A,ld} = 48.9 \text{ torr}; P_{B,ld} = 18.5 \text{ torr}; g_A = 0.88; g_B = 0.69$
 - $P = 67.4 \text{ torr}; \quad x_{A,v} = 0.725$
 - yes, max-boiling; $A-B > B-B > A-A$
 -
- This function ensures that $x_{A,v}$ correctly goes to 0 and 1 when $x_{A,l}$ does.

$$b^*x + c^*x^2 + d^*x^3 + (1 - b - c - d)^*x^4$$
- $s_P = 0.26_8 \text{ torr}; \quad s_x = 0.007_4$
- The quadratic; d is statistically insignificant in the cubic, so s_y is smaller for quadratic.
 - $s_n = (\text{Chisq}/9)^{1/2} = 0.00033$ approximately, so yes.
- Region D

II. (15) Review.

A.

- I - t; II - P
- 0.0°C and 4.6 torr
- (a) B (b) F (c) A (d) C, E

B.

- $a(t) = (a_0 - a_\infty) \exp(-k_{\text{eff}} t) + a_\infty$
- $(a - b) \exp(-c^*x) + b; a = 10; b = -3; c = 0.02$