

Pledge and signature:

Note: If you want your paper returned folded (*i.e.*, score concealed), please print your name on the back.

1. (10) Consider the following data for acetone-chloroform solutions at 35.2°C (A = acetone):

$x_{A,l}$	$x_{A,v}$	$P(\text{Torr})$	$x_{A,l}$	$x_{A,v}$	$P(\text{Torr})$
0.0000	0.0000	293	0.6034	0.6868	267
0.2003	0.1434	262	0.8147	0.8961	307
0.4188	0.4368	248	1.0000	1.0000	344.5
0.5061	0.5625	255			

Give the vapor pressures of pure acetone and pure chloroform at 35.2°C, and calculate, for the solution having acetone mole fraction of 0.6034 in the liquid: P_A , P_B , $P_{A,id}$, $P_{B,id}$, A_A , B_A , a_A , and a_B .

$$P_A^* = 344.5 \text{ Torr}$$

$$P_B^* = 293 \text{ Torr}$$

$$P_A = 183.4 \text{ Torr}$$

$$P_B = 83.6 \text{ Torr}$$

$$P_{A,id} = 207.9 \text{ Torr}$$

$$P_{B,id} = 116.2 \text{ Torr}$$

$$A_A = 0.882$$

$$B_B = 0.720$$

$$a_A = 0.532$$

$$a_B = 0.286$$

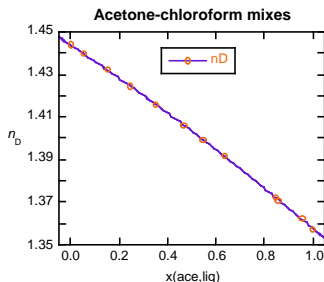
2. (6) The accompanying figure shows refractive index calibration data fitted to a quadratic and a cubic polynomial in the mole fraction of acetone.
- (a) Which calibration fit would you prefer, and why?
- (b) In the procedures, you are told to "Measure the refractive index ... until you obtain measurements within ~ 0.0003 of each other." Are these fit results consistent with this statement? (A simple quantitative computation is needed here.)

SEE STUDY PROBLEM 5 ON P 91 OF THE CLASS PAK. This is IT!

(a) Quadratic. In the cubic fit, d is statistically not significant.

(b) Estimate s_y from quad fit data $\rightarrow 0.00033$. This is reasonably consistent with the instruction.

[This problem was also the subject of KG Exercise 3, and this calculation featured in Stat Prob 10, Prob 3 on Quiz 1, and Prob 2 on Quiz 3. It now has a cumulative point value of ~ 15 !]



y = a + b*x + c*x^2 + d*x^3 ...		
	Value	Error
a	1.4436628	0.0002735383
b	-0.074461289	0.002718473
c	-0.013472323	0.006756593
d	0.0019173371	0.004484096
Chisq	9.3615568e-07	NA
R	0.99995457	NA

y = a + b*x + c*x^2		
	Value	Error
a	1.4437218	0.0002251636
b	-0.075516049	0.001089316
c	-0.010621034	0.0010379
Chisq	9.5755034e-07	NA
R	0.99995353	NA