CHEMISTRY 31 Summer, 2016 - Dixon Homework Set 3 (for material since Exam 2)

Chapter Set 3.1	Problems	Date to finish July 14
Ch. 22	17, 19, 22, 28a-f, 30, 38	
Ch. 8	6, 8, 11, 19, 21, 26, 33, 38	
Additional Drahlam 2	(2 noints)	

Additional Problem 3.1 (3 points)

The following chromatogram and data table show the separation of linear fatty acids (C18:3, C18:2, C18:1, C16:0, C17:0, and C18:0 – where the first number gives the number of carbons in the fatty acids and number after the colon gives the number of double bonds – all in *cis* isomer). All of the fatty acids have pK_a values of around 4.8. The separation was performed on a C18 (reversed phase) column using HPLC with an eluent of 0.001 M trifluoroacetic acid (TFA = strong acid) in water (8%) and 92% acetonitrile. W_b in table is the baseline width.



	Retention		Wb
Compound	(min.)	Area	(min.)
Unretained	0.768	NA	NA
C18:3	2.887	3611.5	0.127
C18:2	3.811	3389.3	0.156
C18:1	5.534	1656	0.222
C16:0	5.707	1908.9	0.180
C17:0	7.22	4182.1	0.266
C18:0	9.208	5552.7	0.358

- a) Calculate the retention factor (k) of C16:0.
- b) Based on the elution order, what effect does the number of double bonds have on the compound's "polarity"?
- c) Without the TFA present, what would happen to the retention times?
- d) Calculate the N value C17:0 (using equations for assumed Gaussian peak shapes).
- e) What is the resolution between the two least well resolved peaks.
- f) Would decreasing the % acetonitrile be expected to improve the resolution of the overlapping peaks? Explain your answer.

g)

Additional Problem 3.2 (3 points)

Calculate the volume of 1.00 M HCl and the mass of 2-aminoethanol needed to make 250.0 mL of a pH = 9.20 buffer with a total 2-aminoethanol concentration of 0.0100 M. Total 2-aminoethanol is the sum of 2-aminoethanol and its conjugate acid. Use Appendix G to find

relavant Ka values.

Set 3.2	
Ch. 9	3, 4, 16, 19
Ch. 10	2, 4, 6, 14

July 20