Problem Set #5   Chem 471   Fall 1999

Due Wednesday, 10/27/99, in class.

Show your work. Problem sets will be spot graded. Work must be shown.

$R = 0.08206$ liter atm K^{-1} mole^{-1} = 8.314 J K^{-1} mole^{-1}

1. We saw in class that in predicting thermodynamics of short DNA duplexes (oligonucleotide duplexes), simple analyses which simply add numbers of AT pairs, plus numbers of GC pairs, although convenient, may not provide accurate results. This results from base stacking and sequence-dependent structural variations in DNA. Go to the following WEB site:

   http://www.basic.nwu.edu/biotools/oligocalc.html

   and use it to calculate the melting properties of the following sequence (oligo 1):

   TATATACTATATATATAGTATA
   ATATATGATATATATATCATAT

   Compare the results with those of the following sequence (oligo 2):

   TTTTTCAAAAATTTTTGAAAAA
   AAAAAGTTTTTAAAAACTTTTT

   Compare the "basic" and "nearest neighbor" calculations. Compare calculations for the two different duplexes.

2. T,S,&W Ch 5 Pb 1

3. T,S,&W Ch 5 Pb 5

4. T,S,&W Ch 5 Pb 7

5. T,S,&W Ch 5 Pb 16

6. T,S,&W Ch 5 Pb 22