03-231 Biochemistry SI
Thursday, September 22, 2005

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Study Tip – *drum roll* One of the most important molecules in biochemistry 03-231 DUM DUM DUM!!! → ***immunoglobulin***!!! Make sure you know its structure components, binding mode, mechanism behind its great diversity, and 2° structures.
_If you need help with the HW, Dr. Lee's office hours are Thursdays from 4:30 – 6:00 PM in DH 1321

Amino Acids: You should now know the structure, polarity, and the 3-letter abbreviation of the following amino acids (and the corresponding pKa, if there is one): glycine, valine, phenylalanine, aspartic acid, glutamic acid, lysine, alanine, tyrosine, asparagine, glutamine.

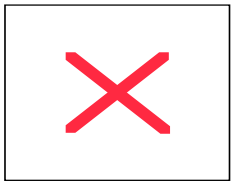
New Amino acids: Threonine (Thr), cysteine (cys, pKa = 8.3), leucine (leu), proline (pro), tryptophan (trp)

More Review:

Draw a titration curve of of a peptide consists of Asp-Glu-Lys-Cys-Asp-Cys using 1M NaOH at pH 0

How do you prepare a buffer solution made from 200 mL of 0.5 M pure 2-Aminobutanoic acid solution? (pKa_1 = 2.3, pKa_2 = 9.8)

a) Pick a titrant: (1M NaOH, 1M HCl, 1M H_2SO_4), and draw this molecule at pH 0



b) How much of your titrant should be added to obtain a pH of 2.3

c) How much of your titrant should be added to obtain a pH of 12? What the conjugate acid? What's the conjugate base? What is the ratio of $[A^-]/[HA]$?

Thermodynamics

Leu118 is a buried residue in wild type T4 lysozyme, "T4L (WT)", Using in vitro mutagenesis techniques, Leu118 was changed to Ala. The structures of the proteins showed that a large cavity had been created in the hydrophobic core of the mutant enzyme. The thermodynamic parameters for the unfolding reaction were measured and found to be:

	T_m (°C)	ΔH (kJ/mol)
T4L (WT)	51.8	497
T4L (Leu 118Ala)	39.6	316

a) Calculate ΔS for the unfolding of each protein at their respective T_ms

b) Calculate ΔΔG, the decrease in protein stability, due to the Leu 118--> Ala substitution, at 46°C (i.e. about halfway between the two Tm's).

c) Calculate ΔΔG at 27°C. What fraction of each protein is unfolded at this temperature?

d) Of the total ΔG of stabilization for T4L at 27°C, what fraction was lost by the Leu 118-->Ala substitution?

Given the following information, determine the slope of the van't Hoff plot, and calculate ΔS.

T (K)	1/T	F_N	K_{eq}	ln(K_{eq})
280		0.85		
290		0.70		