Chem 352, Fundamentals of Biochemistry
Lecture 2 – Supplemental Questions

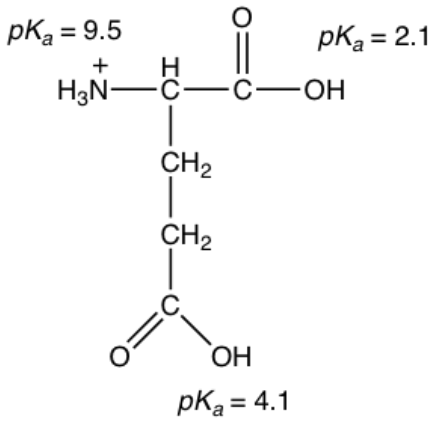
1. Using the information found in Table 2.4 of Horton *et al*.,

   a. Determine how many mL of 0.10 M lactic acid, 1.00 M NaOH and water are needed to make 1.0 L of a 25 mM lactate buffer at *pH* 3.5.

   b. What is the *pH* of the 0.10 M lactic acid solution that you used in Part a?

   c. What is the *pH* of the 1.00 M NaOH solution you used in Part a?

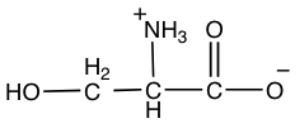
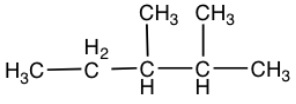
2. Shown below is the the structure for the fully protonated form the the amino acid *glutamate*. The pK_a values for each of the ionizable groups are also indicated.



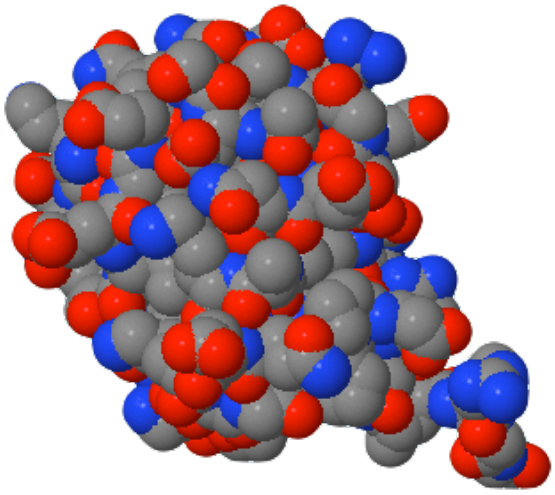
   a. What is the *pH* for a 0.20 M solution of the fully protonated form of glutamate?

   b. Sketch a titration curve for glutamate that includes all three titratable groups.

3. List the noncovalent interactions that can occur between each of the following molecules and itself, and between each of the following molecules and water.

	Interactions with self	Interactions with water
		
		

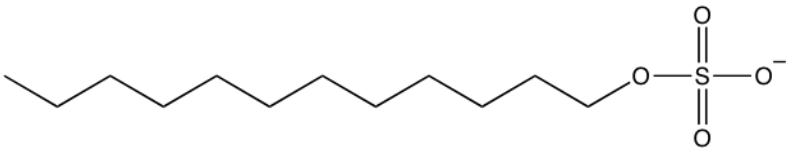
4. The three-dimensional structures of molecules is often represented with spacefilling models, such as the model for the protein ubiquitin, shown below:



Each atom in a spacefilling model is represented by a sphere with the radius equal to the *vander Waals radius*. Describe what the vander Waals radius represents.

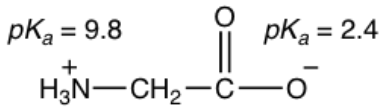
5. One of the methods used for extracting hemoglobin molecules from the inside of red blood cells is to suspend red blood cells in water. This will cause the red blood cells to swell and rupture, releasing their contents into surrounding media. Explain the physical basis for this method.

6. Sodium dodecyl sulfate is a detergent that can be used to disperse grease in water. Explain the physical basis for this.



7. An important interactions that is involved in structure forming processes in biology is the *hydrophobic interaction*. Describe the physical basis for this interaction.

8. When glycine is dissolved in water the predominant species found in solution is *zwitterionic* species, which has both a positive and negative charge, which balance out to give a net charge of 0. Below is shown the structure of glycine in its zwitterionic form, with the pK_a values for its two ionizable groups shown:



a. Determine the expected *pH* for an aqueous solution of the zwitterion form of glycine.