Homework 7

Distributed: Monday, March 12, 2001 **Due: Friday, March 16, 2001**

Name _____ Recitation Section (circle one): Dan: 9:30 10:30 Aimee: 9:30 10:30

This homework uses the virtual lab. You can either:

a) Download and install the lab on your computer. We recommend this if you are using your own computer. Go to http://ir.chem.cmu.edu/, click on "virtual lab" in the upper left-hand corner, and then on "download" at the bottom of the virtual lab page.
To load this assignment, select "load homework" form the "File" menu, and enter
http://ir.chem.cmu.edu/chem106/vlab/hw7.xml
into the homework dialog box. (This address may also be available in the drop down box.)
(To return the lab to its default configuration, enter properties.xml into the homework dialog box.)

b) Run the lab as a Java Applet in a web browser. We recommend using internet explorer. Links to the lab for this homework are on the assignments page of the course web site (http://ir.chem.cmu.edu/chem106).

Load the lab as explained above. The pH meter will be functional, but the bar chart and list of species is disabled. Also, the lab is in "realistic transfer" mode. In this mode, the amount of solution you pour during a transfer is determined by how long you hold down the pour button (pressing the space bar is equivalent to pressing the pour button). Use a buret to get more precision when transferring solution. (To get a buret, click on the glassware button, located between the list of solutions and the workbench.)

To initiate a transfer, you drag the source vessel onto the recipient vessel. A transfer will be initiated only if *your mouse is over the recipient vessel when you release*.

Help on using the virtual lab will be available in a computer cluster this week. Please check the course web site for locations and times.

1) (5pts) The "Unknown-acids" cabinet contains 10 solutions labeled A-J. The solution you will work on is determined by the first letter of your family name:

Unknown_A = A, K, U	Unknown_E = E, O, Y	Unknown_I = I, S
Unknown_B = B, L, V	Unknown_F = F, P, Z	Unknown_J = J, T
Unknown_C = C, M, W	Unknown_G = G, Q	
Unknown_D = D, N, X	Unknown_H = H, R	

(So John Smith would use Unknown_I.)

Your solution contains a weak mono-protic acid with an unknown K_a and with an unknown concentration. Your job is to determine the concentration and K_a, to two significant figures. Please report your results and explain your procedure.

K_a = _____, [HA] = _____M

2) (5 pts) The cabinet labeled "Unknown-bases" contains 10 solutions labeled K-T. The solution you will work on is determined by the first letter of your family name:

Unknown_K = A, K, U	Unknown_O = E, O, Y	Unknown_S = I, S
Unknown_L = B, L, V	Unknown_P = F, P, Z	Unknown_T = J, T
Unknown_M = C, M, W	Unknown_Q = G, Q	
Unknown_N = D, N, X	Unknown_R = H, R	

Your solution contains a base with an unknown K_b and with an unknown concentration. Your job is to determine the concentration and K_b, to two significant figures Please report your results and explain your procedure.

K_b = _____ [Base] = _____M