Matter and Motion Winter 2016
Chemistry Workshop 3

The workshop is intended to be a low-pressure setting where we get to practice problems, ask any questions, and discuss concepts and problem solving methods. Have fun! Work together on whiteboards or scratch paper and then neatly write your solutions in a notebook where you keep chemistry class notes. Your workshop solutions will be included in your portfolio.

1. Express is logarithmic form

$x^3 = 125$ $2^5 = w$ $v^{-1/2} = 1/8$

2. Express in exponential form and solve

$\log_6 216 = h$ $\log_x 2 = 9$ $\log_3(1/9)=y$

3. Are the following statements true or false?

$\log(x/y^3) = \log(x) - 3\log(y)$ $-\ln(1/x) = \ln(x)$

$\log(x^k) = k\log(x)$ $\log(a - b) = \log(a) - \log(b)$

$\log(a)\log(b) = \log(a + b)$

4. Calculate the pH and $[H^+]$ of the following solutions: (a) 0.10 M HCl (b) 5.0 M HCl (c) $1x10^{-11}$ M HCl (are you *sure*?)

5. Calculate the pH and $[OH^-]$ of the following solutions: (a) 25 g KOH per liter (b) 0.00040 M $Ca(OH)_2$

6. Would you expect the following solutions to be acidic, basic, or neutral? Why? a) KNO_3 b) KCN c) NH_4Cl

7. Calculate the pH of a solution that contains 1.0 M HF and 1.0 M HOC_6H_5. Hint: While both of these are "weak" acids, one of them is much stronger than the other. You can calculate the pH as if only the stronger acid is donating protons. (b) Calculate the concentration of $OC_6H_5^-$ in this solution at equilibrium.

8. Find the pH of a solution with a mixture of formic acid and acetic acid, each at a concentration of $1x10^{-2}$ M. Note the Ka values of these acids are very similar so you cannot make the same assumption as above.

9. As mentioned on Tuesday, some of the workshop time should be utilized to understand last week's Postlab for Chemical Kinetics. Hopefully you brought your lab notebook! To answer the 1st question, you will use the measured concentration change of thiosulfate, the measured reaction times, and the equations $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$ and $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$