CH302 Spring 2007 Worksheet 6+

1. How many mL of a 0.1 M solution of Ca(OH)$_2$ are required to neutralized 200 mL of a 0.2 M solution of HNO$_3$?

2. The pK$_a$ of the amino acid aspartic acid is 4. In a solution in which the pH = 7.5 what fraction of the aspartic acid is protonated?
   A. 0.3%
   B. 7%
   C. 23.4%
   D. 72%
   E. 99.5%

3. At what pH would the aspartic acid be 50% protonated?

4. The $K_{sp}$ of magnesium hydroxide is 1.8 x $10^{-11}$. What is the pH of saturated solution of magnesium hydroxide in 0.01 M HCl?

5. The $K_a$ of formic acid is 1.8 x $10^{-4}$. Suggest a means (concentrations of formic acid and sodium formate) to make a buffer solution with a pH of 4.

6. Does 1 L of your proposed buffer system have the capacity to remain a buffer if you add 10 mL of 1M HCl?

7 If you mix the following four solutions what is the pH of the final solution. 100 mL of 1M HCl, 200 mL of 1 M NaOH, 100 mL of 0.4 M HF, and 400 mL of 0.1 M NaF. The $K_a$ for HF is 7.2 x $10^{-4}$.

8. You attempt to dissolve 0.25 g of PbCl$_2$ in 50 mL of water. You find that all but 0.03 g dissolves.

   What is solubility of PbCl$_2$ in water in units of g L$^{-1}$?

   What is the solubility product for PbCl$_2$?