Introduction to Natural Science, Fall 2006
Chemistry Workshop – Week 10

1. Determine the pH of the following solutions.
   - 0.010 M HCl
   - 0.234 M H_2SO_4
   - 0.1465 M HNO_3
   - 0.4305 M $HClO_4$

2. Determine the H^+ ion concentration in the following solutions.
   - pH = 4.23
   - pH = 6.21
   - pH = 8.03

3. What volume of 0.0200 M calcium hydroxide is required to neutralize 35.00 mL of 0.0500M nitric acid?

4. A student conducted an acid/base titration in the lab to determine the strength of antacid tablets. He weighed out 1.3560 g of Tums (active ingredient is calcium carbonate) and added 35 mL of 1.00 M HCl to it. He let the solution come to a gentle boil. Removed from heat, let it cool and then titrated the solution with 0.9853 M sodium hydroxide solution using phenolphthalein as the indicator. If the volume of sodium hydroxide required for this titration was 15.34 mL, determine the moles of calcium carbonate in the Tums sample. Determine the percentage by mass of calcium carbonate in Tums.

5. You can dissolve an aluminum soft-drink can in aqueous base such as potassium hydroxide.

$$2\ \mathrm{Al(s)} + 2\,\mathrm{KOH\ (aq)} + 6\,\mathrm{H_2O(l)} \rightarrow 2\,\mathrm{KAl(OH)_4\ (aq)} + 3\,\mathrm{H_2}\,(g)$$

If you place 2.05 g of aluminum in a beaker wit6h 185 mL of 1.35 M KOH, will any aluminum remain? What mass of $KAl(OH)_4$ is produced?