Introduction
A small chemical company with limited personnel resources has recently experienced an identification problem with a production batch of a weak acid. Because of confusion at a production facility, it has 1000 liters of an acid solution but does not know the identity of the acid. The company has asked your savvy research team to investigate the problem. First, it wants you to determine the acid $K_a$ and the molarity so it can identify the production batch. Second, the company wants your interpretation of the graphical relationship between pH and the volume of added NaOH in a titration of its unknown acid.

The strength of an acid can be characterized by its equilibrium constant, which is called the acid dissociation constant, $K_a$. Using HA to denote a general acid, the equation can be written for behavior of an acid in water:

$$HA_{(aq)} + H_2O \leftrightarrow H_3O^+_{(aq)} + A^-_{(aq)}$$

The value of $K_a$ can be calculated using the concentrations of the aqueous species involved in the equilibrium

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

Goals
As you complete this investigation you will:
1. Design and carry out an experiment to determine the $K_a$ value for the weak acid.
2. Determine the molarity of a solution of a weak acid.
3. Graphically determine the relationship between pH and added NaOH.
4. Report your findings in the form of a formal report (see handout).

Materials
0.100M NaOH standardized solution
Unknown weak acid A
Unknown weak acid B
Burets and other measuring equipment
pH probe and computer