Exp. 6: Titration Curve

1. Phosphoric acid, $\text{H}_3\text{PO}_4$, is a tripptic acid. Write the chemical dissociation reaction for each dissociation of $\text{H}_3\text{PO}_4$ in water. Additionally, write an expression for each of the equilibrium constants of the dissociation.

2. Describe two (2) ways in which an equivalence point of an acid/base titration can be detected.

3. Given the following data about a titration between an unknown weak acid and KOH:
   - $K_a = 4.5 \times 10^{-4}$
   - 7.00 ml of 0.100 M KOH are used
   - 20.0 ml of 0.100 M weak acid are used
   - Resulting solution is diluted to a total volume of 100.00 ml
   With this information, find the pH.

4. True/False  For a titration of a polyprotic acid with a solution of NaOH:
   a. At the first equivalence point, the pH of the solution is equal to 7 (seven).
   b. $K_{a1}$ will be less than $K_{a2}$.
   c. A diprotic acid will have 2 equivalence points.

5. The $K_a$ for some unknown weak acid is $4.9 \times 10^{-5}$. What is the pH halfway to the equivalence point?

6. You are given 20.00 ml of an unknown acid with a concentration of 0.100 M. Because you are very intelligent, you decide to titrate this acid with a known amount of NaOH. You add 6.00 ml of a 0.100 M NaOH solution and deionized water until the total volume equals 100 ml. By using a pH meter, you find that the pH of your solution is 2.65. What is the $K_a$ of this unknown weak acid?