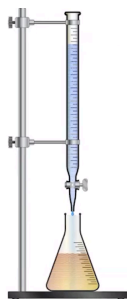# AP Chemistry Daily Videos
8.5 Acid-Base Titrations

Video #1

1. What is the purpose of doing a titration reaction?

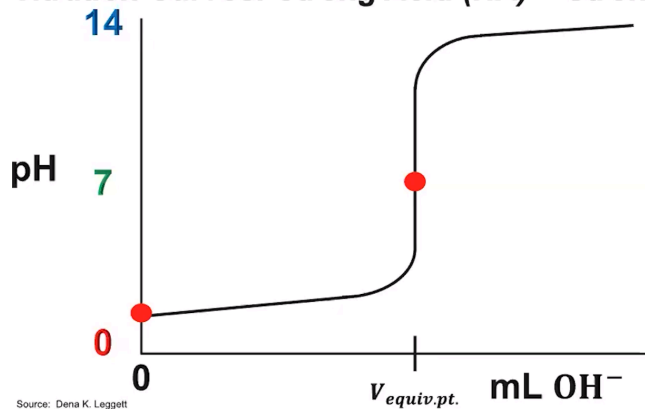2. Label the components in a titration. Be sure to describe the purpose of each part.

3. What is the point of the indicator and what should you consider when choosing an indicator?

4. Label the important parts on this curve.

3:18

Titration Curves: Strong Acid (HA) + Strong Base

pH

14

7

0

0

$V_{equiv.pt.}$ mL OH$^-$
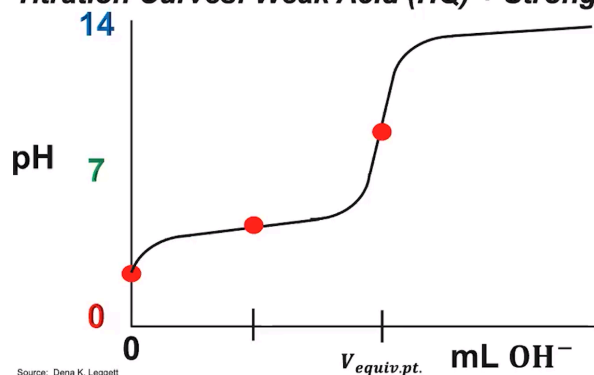
Source: Dena K. Leggett

5. Take notes in how the instructor solved this problem.

A titration of 100.00 mL of HNO_3 required 45.00 mL of a 0.02500 M solution of KOH. What is the molarity of the original HNO_3 solution?

6. Label important parts of this curve.
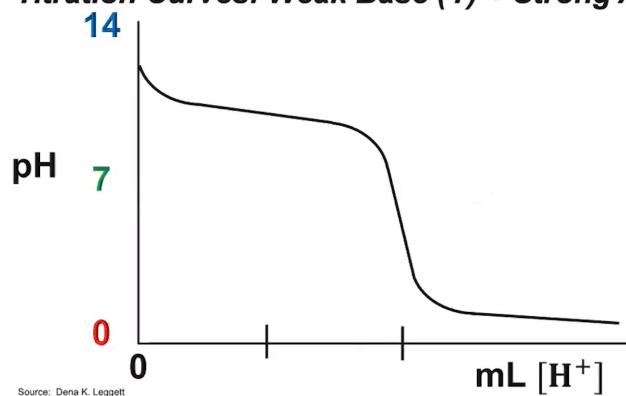
Titration Curves: Weak Acid (HQ) + Strong Base

Source: Dena K. Leggett

7. Summarize the most important points at the end of this video.

Video #2

1. Label the important parts of this curve.

Titration Curves: Weak Base (Y) + Strong Acid

Source: Dena K. Leggett

2. **Complete the following problem and evaluate your work.**

A 30.00 mL sample of a 0.0500 M solution of hydrogen carbonate, HCO_3^- was titrated with 0.0500 M hydrochloric acid. Sketch the expected titration curve given the following information.

pK_b	7.63
Starting pH	9.53
pH at equivalence point	3.83

3. **Summarize the most important points at the end of this video.**

Video #3

1. **Complete the following problem and evaluate your work.**

Answer the following questions regarding a 0.0500 L solution of a 0.100 M solution of a weak acid, HY. $K_a = 1.80 \times 10^{-8}$. The solution is titrated with 0.100 M NaOH. The pH at the equivalence point is approximately 10.20

(A) Calculate the volume of base needed to reach the equivalence point.
(B) Calculate the pK_a for the weak acid.
(C) Determine the pH of the original acid solution.
(D) Sketch a titration curve for this experiment.

2. Complete the following problem and evaluate your work.

Diethylamine is a weak base that reacts with water to form a basic solution.

$$(C_2H_5)_2NH(aq) + H_2O(aq) \rightleftharpoons (C_2H_5)_2NH_2^+ (aq) + OH^-(aq)$$
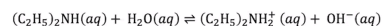
(A) Write the equilibrium constant expression for this reaction.
(B) The pH of a 40.00 mL sample of 0.850 M diethylamine is 12.522.
    i.   Calculate the molarity of hydroxide in this solution.
    ii.   Calculate K_b for diethylamine.
    iii. Determine the pH at the half-equivalence point if the 40.00 mL sample is titrated with 0.700 M HCl.
    iv. Determine the volume of 0.700 M HCl required to reach the equivalence point.
    v.   Determine the pH at the equivalence point if the 40.00 mL sample is titrated with 0.700 M HCl.

3. Complete the following problem and evaluate your work.
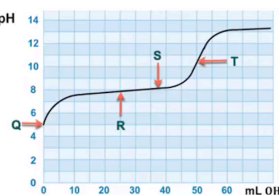
1. At which data point is the molarity of acid greater than the molarity of the conjugate base?

(A) Data point Q
(B) Data point R
(C) Data point S
(D) Data point T

2. What is the pK_a for this acid?

(A) 5.0
(B) 7.8
(C) 10.5
(D) 13.0