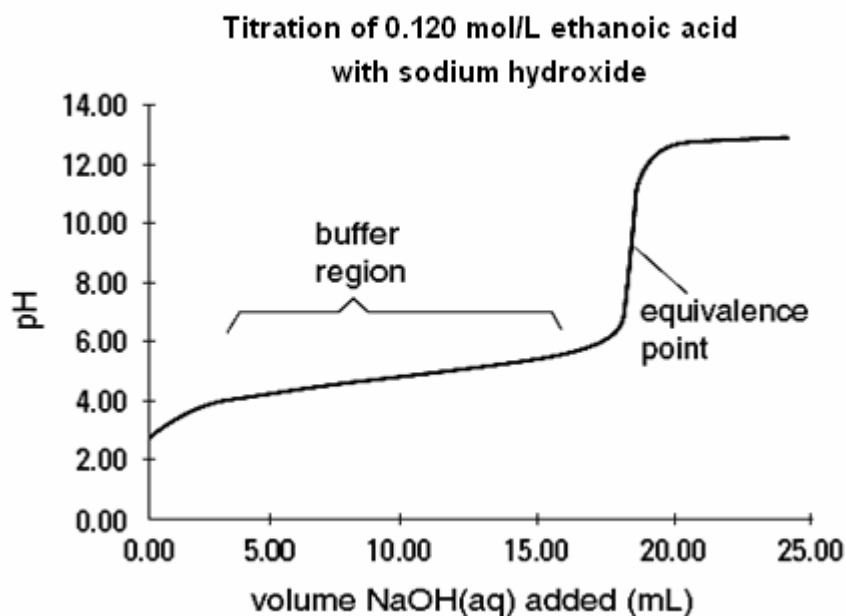


Thought Lab 17.1: Analyzing a Weak Acid-Strong Base Titration Answer Key

Answers to Procedure Steps

1. The figure shows a typical graph drawn by a spreadsheet program for the data.



2. The pH range of a suitable indicator for this titration is 7.5 to 10.5. Suitable indicators are phenolphthalein and thymolphthalein.
3. Refer to the above figure in response to Question 1.

Answers to Analysis Questions

1. The pH and volume of base added at equivalence must be interpolated from the graph. For this reason, your answers may be slightly different from those of other students, depending on your interpolation skills. The pH at equivalence is 9.25, and the volume of base added is 18.18 mL.

2. $\text{NaOH(aq)} + \text{CH}_3\text{COOH(aq)} \leftrightarrow \text{CH}_3\text{COONa(aq)} + \text{H}_2\text{O(l)}$

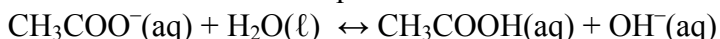
The ratio of acid:base is 1:1

$$C_{\text{acid}}V_{\text{acid}} = C_{\text{base}}V_{\text{base}}$$

$$0.120 \text{ mol/L} \times 25.00 \text{ mL} = C_{\text{base}} \times 18.18 \text{ mL}$$

$$C_{\text{base}} = [\text{NaOH}] = 0.165 \text{ mol/L}$$

3. The solution is basic at equivalence because the acetate ion hydrolyzes.



4. At 10 mL of base added, the predominant ions present are $\text{H}_3\text{O}^+(\text{aq})$, $\text{CH}_3\text{COO}^-(\text{aq})$, and $\text{Na}^+(\text{aq})$. There will be a small concentration of $\text{OH}^-(\text{aq})$. Well after the equivalence point, the most predominant ions will be $\text{Na}^+(\text{aq})$ and $\text{OH}^-(\text{aq})$. There will be small concentrations of $\text{CH}_3\text{COO}^-(\text{aq})$ and $\text{H}_3\text{O}^+(\text{aq})$.