LECTURE 23

1. In your lab, you find an old bottle labeled "sodium hydroxide" with no concentration on it. To determine what the concentration is, 50.0 mL of the solution was diluted to 100. mL and titrated to the equivalence point with 15.4 mL of 1.0 M HCl(aq). What is the molarity of the sodium hydroxide solution in the bottle?

2. A 0.10 M NaOH solution is used to titrate a 0.295 g sample of an unknown acid that was dissolved in 40. mL of water at 25.0°C. The volume required to bring the solution to the equivalence point was 40. mL.
(a) Calculate the molecular weight of the acid.
(b) After 30. mL of the 0.10 M NaOH has been added during the titration, the pH of the solution was determined to be 5.37. Calculate the K_a of the unknown acid.

3. 50.0 mL of 0.10 M acetic acid (CH_3COOH (aq)) is titrated 0.20 M NaOH (aq). The K_a of acetic acid is 1.74×10^{-5}.
(a) Calculate the initial pH of the 0.10 M acetic acid solution?
(b) Calculate the pH of the solution after addition of 10.0 mL of NaOH.
(c) Calculate the volume of 0.20 M NaOH required to reach the half-equivalence point.
(d) Calculate the pH at the half-equivalence point.