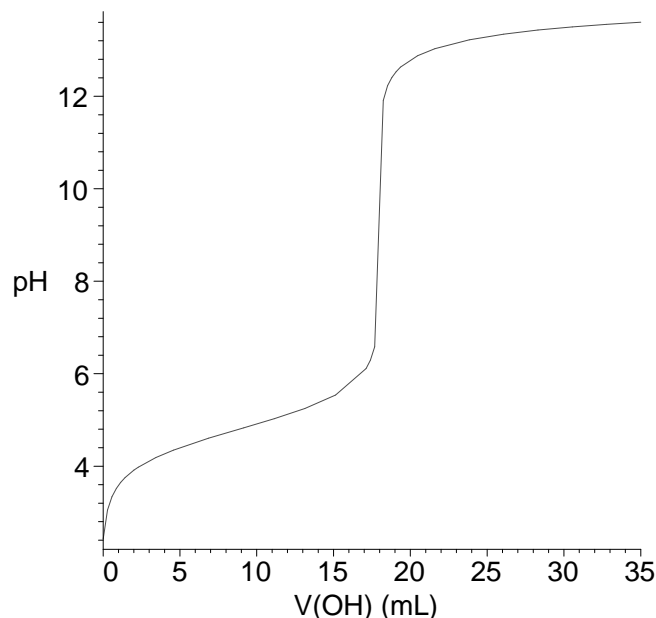


Chemistry 2000B Spring 2002 Assignment 3

Due: Thursday, March 7, noon

The temperature in all questions in this assignment is 25°C.

- 5.23 g of sodium hydrogen tartrate was dissolved in water and titrated with 1.53 M sodium hydroxide solution. The titration curve is shown below:



Determine the K_a of the hydrogen tartrate anion. [5 marks]

- 3.75 g of sodium nitrite is dissolved into 65 mL of 0.85 mol/L HCl. What is the final pH? [10 marks]
- 3.75 g of sodium nitrate is dissolved into 65 mL of 0.85 mol/L HCl. What is the final pH? [4 marks]
- 10.05 g of an unknown monoprotic acid is dissolved in water and titrated with 1.43 mol/L sodium hydroxide solution. It takes 94.40 mL of titrant to reach the equivalence point. Calculate the molar mass of the acid. [6 marks]
- Given solid ammonium chloride and 0.0435 mol/L ammonia solution, describe the preparation of approximately 1 L of pH 9 buffer. The buffer should have the largest buffering capacity (highest concentration) possible given the reagents available. [10 marks]
 - Suppose that 5 mL of 0.20 mol/L sodium hydroxide solution is added to 50 mL of your buffer solution. What is the final pH? Report your answer to two decimal places. [10 marks]
- 15 mL of a 0.043 mol/L solution of sodium dihydrogen phosphate is mixed with 25 mL of a 0.54 mol/L solution of sodium hydrogen carbonate. What are the final concentrations of the major species in this mixture? [10 marks]

Notes and hints: By “major species”, I mean any species whose concentrations are of a similar order of magnitude to the reagents. Your first task will be to determine the reaction which might occur in this mixture. There’s a dilution involved here, so be a little careful when setting up your calculations.