

### AP LAB 04EF: Strong Acid versus Strong Base Titration Simulation

1. Write both the full, *and* the net ionic equation for the reaction of a solution of hydrochloric acid with a solution of potassium hydroxide. Use state symbols.

FULL:

NET:

2. The titration computer simulation to accompany this LAB is located at; <http://bit.ly/2BKMX05>
  - (a) In 1., select the reaction Strong Acid vs. Strong Base.
  - (b) In 2., fill the burette with Base.
  - (c) In 3., select HCl as the acid and KOH as the base. The computer will automatically select a concentration and a volume for the acid, and fill the burette with the base.
  - (d) In 4., select phenolphthalein as the indicator.
  - (e) Calculate the pH of the contents of the flask at this point, i.e., when ZERO mL of the base has been added, to four decimal places.

- (f) Titrate to the end point. Getting the exact end point requires great care (adding dropwise) and will be reached when there is a permanent pale pink color in the flask. Avoid adding too much base (dark purple) and having to start over. Fill in the table below.

Molarity of acid	
Volume of acid added to flask	
Volume of base added to get to the end point	

- (g) Calculate the molarity of the base, enter this number (to three sig. figs) and click-on "OK". If you have done the titration accurately and correctly completed the calculation then you will have the correct answer. If NOT, then repeat the titration until the "Correct" message is seen. Note its value here.

- (h) Calculate the pH of the contents of the flask when exactly 5.000 mL of base had been added to the flask to four decimal places.
- (i) Calculate the pH of the contents of the flask when exactly 10.00 mL of base had been added to the flask to four decimal places.
- (j) Calculate the pH of the contents of the flask when the titration is 1.000 mL short of the equivalence point to four decimal places.



- (l) Calculate the pH of the contents of the flask IF exactly 1.000 mL of EXTRA base (past the equivalence point) had been added to the flask to four decimal places.
- (m) Calculate the pH of the contents of the flask IF exactly 5.000 mL of EXTRA base (past the equivalence point) had been added to the flask to four decimal places.

3. Sketch a graph of pH (y-axis) versus volume of base added (x-axis).

