

## Honors Chemistry (Solutions Podcasts 8-10) Problem Set

- When titrating an acid with a base, how do you see that you have reached the end of the titration?
- What is the difference between the endpoint and the equivalence point in a titration?
- A student pours exactly 26.9 mL of HCl acid of unknown molarity into a beaker. The student then adds 2 drops of an acid-base indicator and titrates the acid to neutrality using 43.7 mL of 0.13 M NaOH base.
  - Write and balance the neutralization reaction of the acid and base.
  - What is the molarity of the acid?
  - Calculate the pH for the acid.
- A student makes an acid by dissolving 34 grams of  $\text{KHSO}_4$  in 150 mL of water.
  - Calculate the molarity of the  $\text{KHSO}_4$  acid.
  - The student then uses 32.6 mL of the  $\text{KHSO}_4$  acid to titrate 12.1 mL of a KOH base of unknown molarity. Calculate the molarity of the KOH base solution
- In a laboratory, you make a base by adding 75 grams of NaOH to 380 mL of water.
  - Calculate the molarity and pOH of the NaOH base.
  - Then you titrate 15 mL of your base using a nitric acid ( $\text{HNO}_3$ ) that is 2.2 M. How many mL of the 2.2 M  $\text{HNO}_3$  acid will be required to titrate the 15-mL of base to neutrality?
  - Sketch the titration curve and be sure to have pH on the y-axis and the volume of the titrant (i.e., acid) on the x-axis.
- A student makes a standard acid by dissolving 4 grams of potassium hydrogen phthalate, also known as KHP ( $\text{KHC}_8\text{H}_4\text{O}_4$ ), in 250 mL of water.
  - What is the molarity of the standardized KHP acid?
  - The student then uses 45 mL of the standard KHP acid to titrate 20 mL of NaOH. What is the molarity of the base?
  - Using the base from part (b) to titrate 20 mL of a 0.32 M HCl would require how many mL of the base?