Exercise 15.2a
Titrations

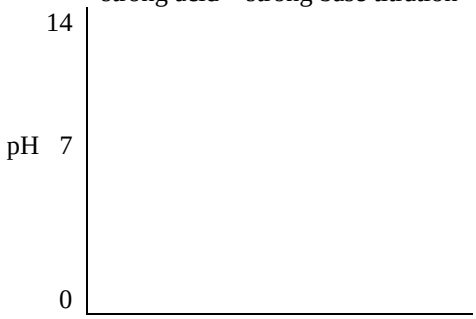
Name: _____

Date: _____ Per: _____

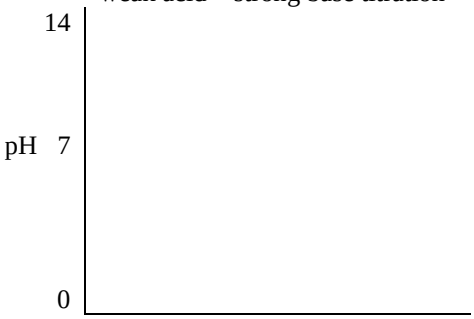
DIRECTIONS: Answer the following in the space provided.

1. Draw a titration curve for a strong acid – strong base titration, weak acid – strong base titration, strong acid – weak base titration, and strong base – strong acid titration. Label the equivalence point on each graph.

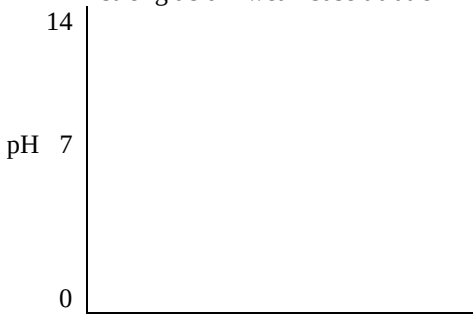
strong acid – strong base titration



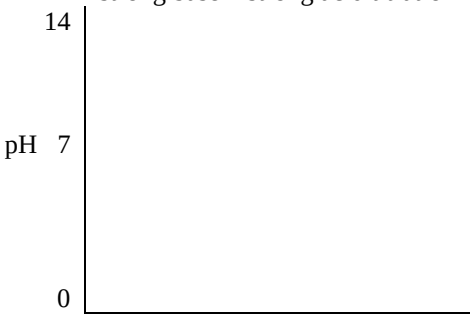
weak acid – strong base titration



strong acid – weak base titration



strong base – strong acid titration



Solving Titration Problems

A titration is a chemical process for finding the equivalence point (*the point where the moles of H^+ = moles of OH^- ions*) in a neutralization reaction.

The moles of H^+ may be calculated using the formula:
moles $H^+ = M_{acid} \times V_{acid}$

The moles of OH^- may be calculated using the formula:
moles $OH^- = M_{base} \times V_{base}$

Since the *moles of* H^+ = *moles* OH^- at the equivalence point,
$M_{acid} \times V_{acid} = M_{base} \times V_{base}$

- *While the volumes of acid and base should probably be converted to liters, as long as they are the same unit, the proportions will work out.*
- *When the acid or base produces multiple H^+ or OH^- respectively, the molarity of the solution must be multiplied by number of ions produced. For example, the OH^- molarity of a 0.600 M solution of $Ca(OH)_2$ is really 1.20 M because it dissociates to form 2x its molarity of OH^- ions.*

2. If 26.4 mL of LiOH are required to neutralize 21.7 mL of 0.500 *M* HBr, what is the concentration of the LiOH?

3. If 23.4 mL of .551 *M* NaOH is used to titrate 50.0 mL of HCl to endpoint, what is the concentration of the HCl?

Answers: 2) 0.411 *M* 3) 0.258 *M* 4) 0.275 *M* 5) 0.323 *M* 6) 0.125 *M* 7) 62.5mL 8) 49.3 mL 10) 30.0 mL 11) 0.080 *M* 12) 0.003 mol

Exercise 15.2a
Titrations

Name: _____

Date: _____ Per: _____

4. If 45.0 mL of .153 *M* LiOH is required to neutralize 25.0 mL of HBr, what is the concentration of the HBr?

5. If 75.0 mL of .823M $HClO_4$ requires 95.5 mL of $Ba(OH)_2$ for neutralization, what is the concentration of the $Ba(OH)_2$?

6. If 50.0 ml of 0.300 M KOH are required to titrate 60.0 ml of H_2SO_4, what is the molarity of the H_2SO_4?

7. What volume of 0.400 M NaOH would be required to titrate 100. ml of 0.250 M HCl?

8. If 55.0 ml of 1.20 M $HC_2H_3O_2$ are used to titrate a sample of 0.670 M $Ba(OH)_2$, what is volume of the $Ba(OH)_2$ used?

9. Would it take more 0.1 M HCl or 0.1 M H_2SO_4 to neutralize 30.0 ml of NaOH?

10. If 50.0 ml of 0.450 M $Sr(OH)_2$ are required to titrate a 0.750 M H_2SO_4 sample, what is the volume of the H_2SO_4?

11. If 40.0 ml of 0.100M H_3PO_4 are required to titrate 150. ml of NaOH to the equivalence point, what is the molarity of the NaOH?

12. If 30.0 ml of 0.300 M NaOH are required to titrate H_3PO_4 to the equivalence point, how many moles of H_3PO_4 are needed to reach the equivalence point?

Answers: 2) 0.411 *M* 3) 0.258 *M* 4) 0.275 *M* 5) 0.323 *M* 6) 0.125 *M* 7) 62.5mL 8) 49.3 mL 10) 30.0 mL 11) 0.080 *M* 12) 0.003 mol