Name _____ Date _____ Class _____

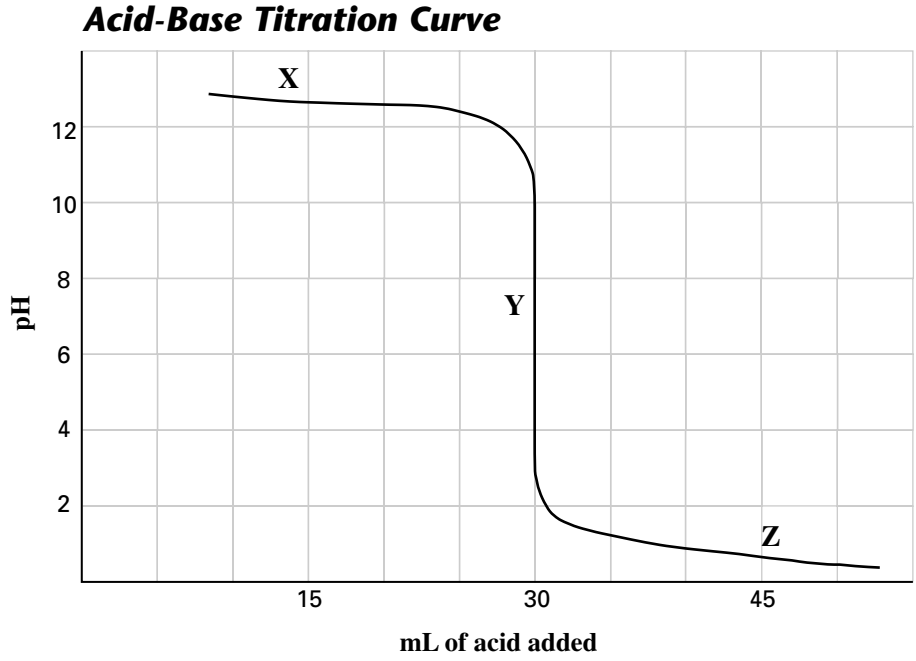
CHAPTER 15 REVIEW

Acid-Base Titration and pH

SECTION 2

SHORT ANSWER **Answer the following questions in the space provided.**

1. Below is a pH curve from an acid-base titration. On it are labeled three points: X, Y, and Z.



_____ **a.** Which point represents the equivalence point?

_____ **b.** At which point is there excess acid in the system?

_____ **c.** At which point is there excess base in the system?

_____ **d.** If the base solution is 0.250 M and there is one equivalent of OH^- ions for each mole of base, how many moles of OH^- ions are consumed at the end point of the titration?

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

2. A standardized solution of 0.065 M HCl is titrated with a saturated solution of calcium hydroxide to determine its molarity and its solubility. It takes 25.0 mL of the base to neutralize 10.0 mL of the acid.

a. Write the balanced molecular equation for this neutralization reaction.

_____

Name _____ Date _____ Class _____

SECTION 2 continued

_____ **b.** Determine the molarity of the $Ca(OH)_2$ solution.

_____ **c.** Based on your answer to part **b**, calculate the solubility of the base in grams per liter of solution. (Hint: What is the concentration of $Ca(OH)_2$ in the saturated solution?)

3. It is possible to carry out a titration without any indicator. Instead, a pH probe is immersed in a beaker containing the solution of unknown molarity, and a solution of known molarity is slowly added from a buret. Use the titration data below to answer the following questions.

Volume of KOH(*aq*) in the beaker = 30.0 mL

Molarity of HCl(*aq*) in the buret = 0.50 M

At the instant pH falls from 10 to 4, the volume of acid added to KOH = 27.8 mL.

_____ **a.** What is the mole ratio of chemical equivalents in this system?

_____ **b.** Calculate the molarity of the KOH solution, based on the above data.

Name _____ Date _____ Class _____

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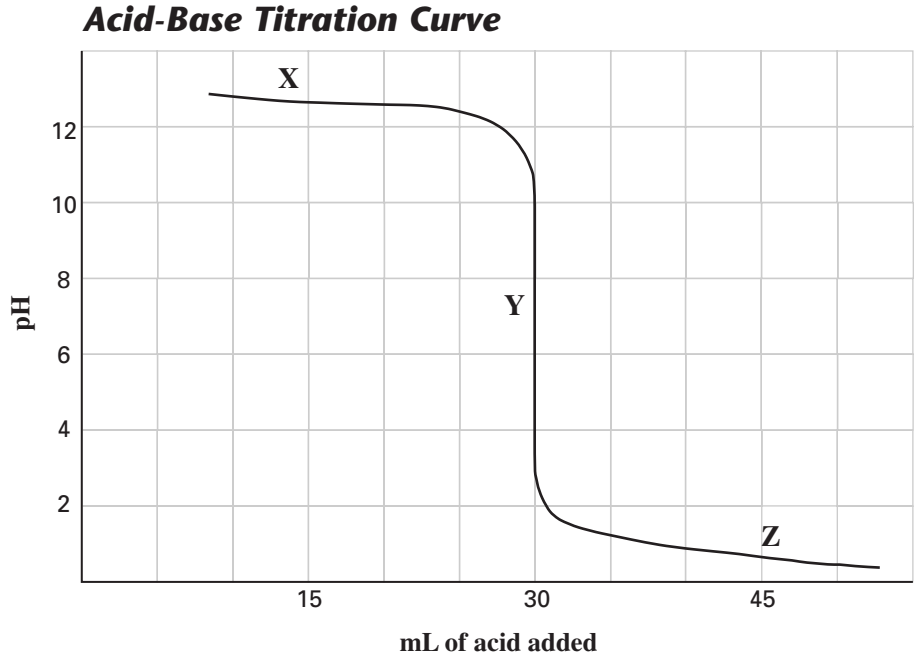
SHORT ANSWER **Answer the following questions in the space provided.**

1. Below is a pH curve from an acid-base titration. On it are labeled three points: X, Y, and Z.



Y — **a.** Which point represents the equivalence point?

Z — **b.** At which point is there excess acid in the system?

X — **c.** At which point is there excess base in the system?

7.5×10^{-3} mol — **d.** If the base solution is 0.250 M and there is one equivalent of OH^- ions for each mole of base, how many moles of OH^- ions are consumed at the end point of the titration?

PROBLEMS **Write the answer on the line to the left. Show all your work in the space provided.**

2. A standardized solution of 0.065 M HCl is titrated with a saturated solution of calcium hydroxide to determine its molarity and its solubility. It takes 25.0 mL of the base to neutralize 10.0 mL of the acid.

a. Write the balanced molecular equation for this neutralization reaction.

$Ca(OH)_2(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$

Name _____ Date _____ Class _____

SECTION 2 continued

0.013 M **b.** Determine the molarity of the $Ca(OH)_2$ solution.

0.96 g/L **c.** Based on your answer to part **b**, calculate the solubility of the base in grams per liter of solution. (Hint: What is the concentration of $Ca(OH)_2$ in the saturated solution?)

3. It is possible to carry out a titration without any indicator. Instead, a pH probe is immersed in a beaker containing the solution of unknown molarity, and a solution of known molarity is slowly added from a buret. Use the titration data below to answer the following questions.

Volume of KOH(*aq*) in the beaker = 30.0 mL

Molarity of HCl(*aq*) in the buret = 0.50 M

At the instant pH falls from 10 to 4, the volume of acid added to KOH = 27.8 mL.

1:1 **a.** What is the mole ratio of chemical equivalents in this system?

0.46 M **b.** Calculate the molarity of the KOH solution, based on the above data.