AP CHEMISTRY CHAPTER 15 OUTLINE: ACID BASE EQUILIBRIA

15.1: SOLUTIONS OF ACIDS OR BASES CONTAINING A COMMON ION

Common ion

Le Chatelier’s principle explains the common ion effect

Equilibrium calculations

15.2: BUFFERED SOLUTIONS

Concepts for handling buffer problems

1.

2.

Buffering: How does it work? The derivation of the Henderson-Hasselbach equation

Summary of the Most Important Characteristics of Buffered Solutions

1.

2.

3.

4.

15.3: BUFFER CAPACITY

Buffering Capacity

Choosing a buffer system

15.4: TITRATIONS AND pH CURVES

pH Curves of Strong Acid-Strong Base Titration

Strong Acid-Strong Base Titrations

Use of the millimole

Case Study: Strong Acid-Strong Base Titration

Consider the titration of 50.0 mL of 0.200 M nitric acid with 0.100 M NaOH

1. Calculate the pH of the solution before any NaOH has been added
2. Calculate the pH of the solution when 10.0 mL of the NaOH has been added
3. Calculate the pH of the solution when 20.0 mL (total) of the NaOH has been added
4. Calculate the pH of the solution when 50.0 mL (total) of the NaOH has been added
5. When 100.0 mL (total) of NaOH has been added
6. When 150.0 mL (total) of NaOH has been added
7. When 200.0 mL (total) of NaOH has been added

Titrations of Weak Acids and Strong Bases

pH Curve of a Weak Acid-Strong Base Titration

Step 1: Stoichiometry

Step 2: Equilibrium

Case Study: Weak Acid-Strong Base Titration

Calculate the pH of the following solutions when 50.0 mL of 0.10 M acetic acid is titrated with 0.10 M NaOH

1. No NaOH has been added
2. 10.0 mL of NaOH has been added
3. 25.0 mL (total) of NaOH has been added
4. 40.0 mL (total) of NaOH has been added
5. 50.0 mL (total) NaOH has been added
6. 60.0 mL (total) NaOH has been added
7. 75.0 mL of NaOH has been added

Titrations of Weak Bases with Strong Acids

pH Curve of a Weak Base-Strong Acid Titration

Case Study: Weak Base-Strong Acid Titration

100.0 mL of 0.050 M NH3 is titrated with 0.10 M HCl

1. No HCl has been added

a.

b.

c.

1. Before the equivalence point

a.

b.

c.

1. At the equivalence point

a.

b.

c.

1. Beyond the equivalence point

a.

b.

c.

15.5: ACID-BASE INDICATORS

How indicators work

Choosing an indicator