

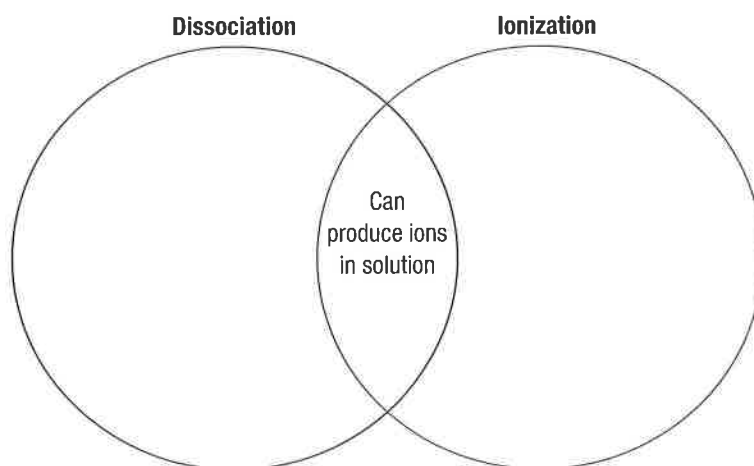
Chapter 8 Solutions, Acids, and Bases

Section 8.1 Formation of Solutions**(pages 228–234)**

This section explains the parts of a solution, the processes that occur when compounds dissolve, and how the properties of a solution compare with those of its solvent and solute.

Reading Strategy (page 228)

Comparing and Contrasting Contrast dissociation and ionization by listing the ways they differ in the Venn diagram below. For more information on this reading strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

**Dissolving (page 229)**

1. Define a solution. _____

2. Circle the letter that identifies a substance whose particles are dissolved in a solution.

a. solvent	b. solute
c. solid	d. ion
3. Circle the letter that identifies the solvent in air.

a. oxygen	b. carbon dioxide
c. nitrogen	d. argon
4. The process in which an ionic compound separates into ions as it dissolves is called _____.
5. The process in which particles dissolve by breaking apart and scattering is called _____.
6. A(n) _____ is transferred from each HCl molecule to a water molecule when hydrogen chloride gas dissolves in water.
7. Is the following sentence true or false? Dissolving by ionization is a physical change. _____

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Properties of Liquid Solutions (page 231)

8. What physical properties of a solution can differ from those of its solute and solvent?

a. _____

b. _____

c. _____

9. Compare the conductivities of solid sodium chloride and saltwater. _____

10. Circle the letters that identify what happens to water as it freezes.

a. The water molecules become more organized.

b. The water molecules become more disorganized.

c. The water molecules ionize.

d. The water molecules arrange themselves in a hexagonal pattern.

Heat of Solution (page 232)

11. Dissolving sodium hydroxide in water is a(n) _____ process, as it releases heat.

12. Dissolving ammonium nitrate in water is a(n) _____ process, as it absorbs heat.

13. Is the following sentence true or false? Breaking the attractions among solute particles and the attractions among solvent particles releases energy. _____

14. Describe heat of solution. _____

Factors Affecting Rates of Dissolving (page 234)

15. How are rates of dissolving similar to rates of chemical reactions?

16. Why does powdered sugar dissolve in water faster than granulated sugar? _____

17. Heating a solvent _____ the energy of its particles, making them move faster on average, and _____ the rate at which a solid solute can dissolve in the solvent.

18. Explain how stirring or shaking a mixture of powdered detergent and water can affect the rate of dissolving. _____

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Section 8.2 Solubility and Concentration

(pages 235–239)

This section explains solubility, the factors affecting solubility, and different ways of expressing the concentration of a solution.

Reading Strategy (page 235)

Previewing Before you read the section, rewrite the topic headings as *how*, *why*, and *what* questions. As you read, write an answer to each question. For more information on this reading strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Question	Answer
What is solubility?	
	Solvent, temperature, and pressure

Solubility (pages 235–237)

- Define solubility. _____

- List the following solutes in order from most soluble to least soluble in water: table salt, baking soda, table sugar.
 - _____
 - _____
 - _____
- Circle the letters that identify how solutions can be classified based on solubility.

a. unsaturated	b. desaturated
c. saturated	d. supersaturated
- Describe a saturated solution. _____

- A solution that has less than the maximum amount of solute that can be dissolved is called a(n) _____.
- Is the following sentence true or false? It is impossible for a solution to contain more solute than the solvent can hold at a given temperature. _____

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Factors Affecting Solubility (page 237)

7. Circle the letters of factors that affect the solubility of a solute.
- a. polarity of the solvent
 - b. amount of solvent
 - c. pressure
 - d. temperature
8. What is a common guideline for predicting solubility?

9. Describe how soap cleans grease off your hands. _____

10. Is the following statement true or false? In general, the solubility of solids increases as the solvent temperature increases.

11. In general, the solubility of gases decreases as the solvent temperature _____.
12. In general, the solubility of a gas increases as pressure _____.

Concentration of Solutions (pages 238–239)

13. What does the concentration of a solution refer to? _____

14. Circle the letters that identify ways to express the concentration of a solution.
- a. density
 - b. percent by volume
 - c. percent by mass
 - d. molarity
15. Complete the equation.
Percent by volume =

16. Write the equation used to calculate percent by mass.

17. Is this sentence true or false? Molarity is the number of moles of a solvent per liter of solution. _____
18. How many grams of NaCl are needed to make 1.00 liter of a 3.00 M NaCl solution? _____

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Section 8.3 Properties of Acids and Bases

(pages 240–245)

This section describes the general properties of acids and bases.

Reading Strategy (page 240)

Using Prior Knowledge Before you read, write your definition of each vocabulary term in the table below. After you read, write the scientific definition of each term and compare it with your original definition. For more information on this reading strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Term	Your Definition	Scientific Definition
Acid		
Base		
Salt		

Identifying Acids (pages 240–241)

1. Define an acid. _____

Match these common acids to their uses.

Acids	Uses
_____ 2. acetic acid	a. Fertilizer production
_____ 3. sulfuric acid	b. Carbonated beverages
_____ 4. hydrochloric acid	c. Vinegar
_____ 5. carbonic acid	d. Car batteries
_____ 6. nitric acid	e. Digestive juices in stomach

7. Describe some general properties of acids. _____

8. Place the following substances in the correct column in the table: lemons, vinegar, grapefruit, sour milk, tomatoes.

Foods Containing Acetic Acid	Foods Containing Citric Acid	Foods Containing Butyric Acid

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9. The reaction between an acid and a metal can be classified as a(n) _____.
10. Explain why an indicator is useful. _____

Identifying Bases (pages 242–243)

11. Define a base. _____
12. Use the following compounds to complete the chart: aluminum hydroxide, calcium hydroxide, magnesium hydroxide, and sodium hydroxide.

Common Bases		
Name	Formula	Uses
	NaOH	Drain cleaner, soap production
	Mg(OH) ₂	Antacid, laxative
	Ca(OH) ₂	Concrete, plaster
	Al(OH) ₃	Deodorant, antacid

13. What can a gardener add to the soil to change the flowers of a hydrangea from pink to blue? _____
14. Circle the letter that describes how basic solutions generally taste.
 a. sweet b. sour
 c. bitter d. salty
15. Is the following sentence true or false? Bases turn red litmus paper blue. _____

Neutralization and Salts (page 244)

16. The reaction between an acid and a base is called _____.
17. Describe how a salt can be produced by a chemical reaction. _____
18. Write a chemical equation describing the neutralization reaction between calcium hydroxide and hydrochloric acid.

Proton Donors and Acceptors (page 245)

19. Acids can be described as proton _____; bases can be described as proton _____.
20. When hydrogen chloride ionizes in water, which reactant is the proton donor? Which reactant is the proton acceptor? _____

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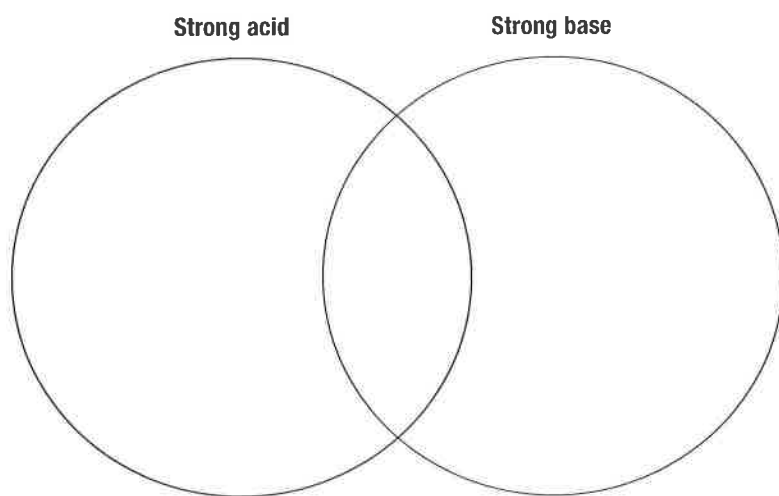
Section 8.4 Strength of Acids and Bases

(pages 246–249)

This section explains how to describe acids and bases in terms of both concentration and strength.

Reading Strategy (page 246)

Comparing and Contrasting As you read, complete the diagram by comparing and contrasting acids and bases. For more information on this reading strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



The pH Scale (page 247)

1. What is the name of the number scale chemists use to describe the concentration of hydronium ions in a solution?

2. The pH scale ranges from _____ to _____.
3. Circle the letter that indicates the pH of a neutral solution.
 - a. 0
 - b. 3
 - c. 7
 - d. 12
4. Water is neutral because it contains small but equal concentrations of _____ and _____.
5. Is the following sentence true or false? The higher the pH value of a solution, the greater the H_3O^+ ion concentration is.

6. If you add acid to pure water, the concentration of H_3O^+ _____ and the concentration of OH^- _____.

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Strong Acids and Bases (pages 247–248)

7. What happens when strong acids and bases dissolve in water? _____

8. Is the following sentence true or false? A strong acid always has a lower pH than a weak acid. _____
9. Circle the letters that identify a strong acid.
- a. HCl
 - b. $\text{Ca}(\text{OH})_2$
 - c. H_2O
 - d. HNO_3
10. When dissolved in water, sodium hydroxide almost completely dissociates into _____ and _____ ions.
11. Circle the sentences that are true.
- a. Strong bases have a higher concentration of hydronium ions than pure water.
 - b. Strong bases dissociate almost completely in water.
 - c. Strong bases have a pH below 7.
 - d. Examples of strong bases include sodium hydroxide and calcium hydroxide.

Weak Acids and Bases (page 248)

12. What happens when weak acids and bases dissolve in water? _____

13. Is the following sentence true or false? A weak acid has a higher pH than a strong acid of the same concentration. _____
14. Describe the difference between concentration and strength. _____

15. Describe a buffer. _____

Electrolytes (page 249)

16. An electrolyte is _____

17. Is the following sentence true or false? Strong acids and bases are weak electrolytes because they dissociate or ionize almost completely in water. _____
18. Is acetic acid an example of a weak electrolyte? Explain. _____
