

Chapter 6 Acids, Bases, and Solutions

Study Guide

1. Understanding Solutions

- a. **Solutions and Suspensions**
- b. **Solvents and Solutes**
 - i. Water as a Solvent
 - ii. Solutions Without Water
- c. Particles in a Solution
 - i. Ionic Solids in Water
 - ii. Molecular Solids in Water
 - iii. Solutions and Conductivity
 - iv. *How do ionic and molecular solids differ from each other in solution?*
- d. **Colloids**
- e. Effects of Solutes on Solutions
 - i. Lower Freezing Points
 - ii. Higher Boiling Points

2. Concentration and Solubility

- a. Concentration
 - i. **Dilute solution**
 - ii. **Concentrated solution**
- b. Measuring Concentration
 - i. *How do a dilute solution and a concentrated solution made from the same solute and solvent differ?*
- c. Solubility
 - i. **Saturated and Unsaturated Solutions**
 - ii. Working with Solubility
- d. Changing Solubility
 - i. Temperature
 1. **Supersaturated Solution**
 - ii. Pressure
 - iii. Solvents

3. Describing Acids and Bases

a. Properties of **Acids**

- i. Sour Taste
- ii. Reactions with Metals
- iii. Reactions with Carbonates
- iv. Reactions with **Indicators**

1. *What is the purpose of using an indicator?*

b. Properties of **Bases**

- i. Bitter Taste
- ii. Slippery Feel
- iii. Reactions with Indicators
- iv. Reactions of Bases

4. Acids and Bases in Solution

a. Acids in Solution

b. Bases in Solution

c. Strengths of Acids and Bases

i. *How would a weak base differ from an equal concentration of a strong base in solution?*

d. Measuring pH

i. **pH scale**

e. **Acid Rain**

f. Acid-Base Reactions

i. **Neutralization**

g. Products of Acid-Base Reactions

i. **Salt**

5. Digestion and pH

a. What is **Digestion**?

i. **Mechanical Digestion**

ii. **Chemical Digestion**

iii. *What happens to foods in your body?*

b. pH in the Digestive System

i. Your Mouth

ii. Your Stomach

iii. Your Small Intestine

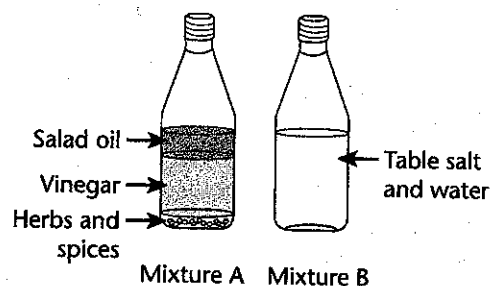
SECTION 6 - 1 REVIEW AND REINFORCE

Understanding Solutions

◆ Understanding Main Ideas

Use the illustration to answer Questions 1 through 3. Write your answers to all of the following questions on a separate sheet of paper.

1. Is mixture A a suspension or a solution? Explain.
2. Is mixture B a suspension or a solution? Explain.
3. In the solution to the right, which substance is the solvent? Which is the solute? How do you know?
4. What effect does a solute have on the freezing and boiling points of a solvent?



◆ Building Vocabulary

From the list below, choose the term that best completes each sentence.

- | | | |
|------------|----------|---------|
| suspension | solution | solvent |
| solute | colloid | |

5. The part of a solution that is present in the smaller amount is the _____.
6. The part of a solution that is present in the larger amount is the _____.
7. A mixture in which particles can be seen and easily separated by settling or filtration is called a(n) _____.
8. A mixture in which the particles cannot be separated by settling or filtration is called a(n) _____.
9. A mixture in which the particles are undissolved but do not settle out is called a(n) _____.

SECTION 6-2

REVIEW AND REINFORCE

Concentration and Solubility

◆ Understanding Main Ideas

Answer the following questions in the spaces provided.

1. How does temperature affect the solubility of most solids?

2. How does temperature affect the solubility of gases?

3. How does pressure affect the solubility of gases?

4. Which kinds of solutes generally dissolve well in polar solvents? Which kinds of solutes generally do not dissolve well in polar solvents?

◆ Building Vocabulary

Fill in the space to complete each sentence.

5. A(n) _____ has more dissolved solute than is predicted by its solubility at a given temperature.

6. A(n) _____ has only a little solute dissolved in a solvent, but a(n) _____ has a lot of solute dissolved in a solvent.

7. _____ is a measure of how well a solute can dissolve at a given temperature.

8. Additional solute will not dissolve in a(n) _____.

9. Additional solute will dissolve in a(n) _____.

SECTION 6-3

REVIEW AND REINFORCE

Describing Acids and Bases

◆ Understanding Main Ideas

Complete the following table.

Characteristic	Acid	Base
What Does It Taste Like?	1.	2.
How Does It React with Carbonates?	3.	4.
What Color Does It Turn Litmus?	5.	6.

◆ Building Vocabulary

Answer the following questions in the spaces provided.

7. What does *corrosive* mean?

8. If a substance reacts with a metal to produce hydrogen gas, what may you infer about the substance?

9. What is an indicator?

10. Why do you think bases are often described as the “opposites” of acids?

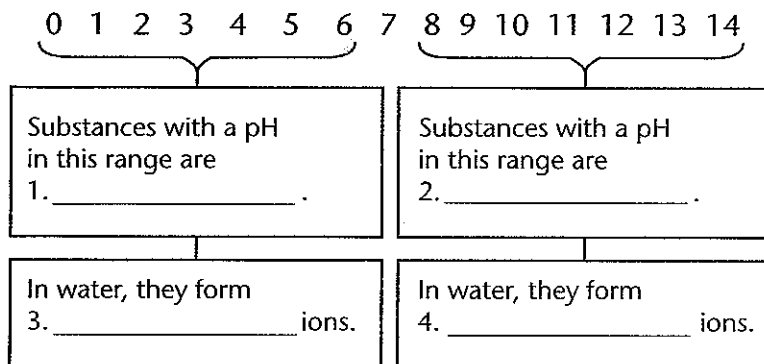
SECTION 6-4

REVIEW AND REINFORCE

Acids and Bases in Solution

◆ Understanding Main Ideas

Complete the concept map shown below and answer the following questions on a separate sheet of paper.



5. What is the difference between a strong acid and a weak acid?
6. What is the difference between a strong base and a weak base?
7. Which solution has a greater concentration of hydrogen ions (H^+), a solution with a pH of 3 or one with a pH of 7? Explain.
8. What are the products formed when a base reacts with an acid?
9. What is the pH of a neutral solution?

◆ Building Vocabulary

Match each term with its definition by writing the letter of the correct definition on the line beside the term.

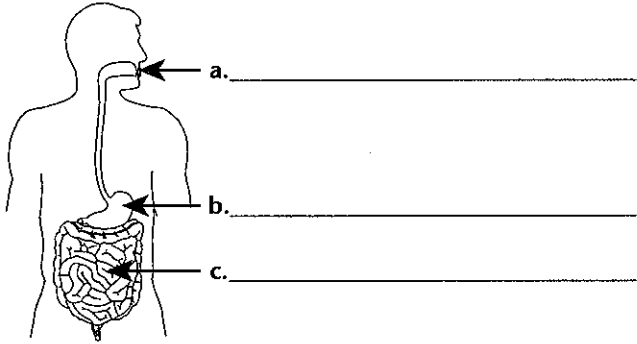
- | | |
|---|--|
| _____ 10. hydroxide ion (OH^-)
_____ 11. pH scale
_____ 12. acid rain
_____ 13. neutralization
_____ 14. salt | a. ionic compound that can form from the reaction of an acid with a base
b. reaction between an acid and a base
c. series of numbers that indicates the concentration of hydrogen ions in solution
d. problem caused by gases that are released into the air as pollutants
e. polyatomic ion made of oxygen and hydrogen |
|---|--|

SECTION 6-5 REVIEW AND REINFORCE

Digestion and pH

◆ Understanding Main Ideas

Label the diagram as directed below and answer the questions in the spaces provided.



1. Label parts a, b, and c in the diagram above.
2. After each label, write the pH of the fluids in that part of the digestive system.
3. What happens during digestion?

4. Why are the differences in the pH of the mouth, stomach, and small intestine important for digestion?

◆ Building Vocabulary

Define the following terms in the spaces provided.

5. digestion

6. mechanical digestion

7. chemical digestion

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Physical Science

Choose the letter of the correct answer.

1. "Weak" tea is an example of a
[A] concentrated solution. [B] supersaturated solution.
[C] dilute solution. [D] saturated solution.
2. You are most likely to find a base in
[A] a vitamin pill. [B] household cleaners. [C] a car battery. [D] fruit juice.
3. Strong acids can produce designs on printing plates because they
[A] conduct electricity. [B] react with limestone.
[C] turn red litmus paper blue. [D] are corrosive.
4. Compared to the pH of saliva, the pH of stomach juices is
[A] higher. [B] the same. [C] unpredictable. [D] lower.
5. How can a scientist tell whether a water solution contains table salt or sugar?
[A] Test the conductivity of the solution. [B] Smell the solution.
[C] Filter the solution. [D] Taste the solution.
6. Which of the following solutions is the most concentrated?
[A] 25 g of table sugar in 75 g of water [B] 20 g of table sugar in 80 g of water
[C] 15 g of table sugar in 60 g of water [D] 30 g of table sugar in 100 g of water
7. Acids present in food are safe to eat because they usually are
[A] weak. [B] strong. [C] dilute. [D] concentrated.
8. When 40 mL of alcohol form a solution with 30 mL of water,
[A] both alcohol and water are solvents. [B] water is the solvent.
[C] alcohol is the solvent. [D] neither alcohol nor water is a solvent.
9. Which process tears, grinds, and mashes large food particles into smaller ones?
[A] mechanical digestion [B] indigestion [C] chemical digestion [D] neutralization

Choose the letter of the correct answer.

10. When a compound dissolves in water,
[A] it always breaks up into ions.
[B] each of its particles is surrounded by water molecules.
[C] it always conducts electricity.
[D] its particles surround individual water molecules.

11. What happens when you add salt to a pot of cooking water?
[A] There is no change in the boiling process.
[B] The water is hotter when it boils.
[C] The water does not boil.
[D] The water comes to a boil faster.

12. The process that breaks down complex molecules of food into smaller particles is called
[A] solution. [B] neutralization. [C] conduction. [D] digestion.

13. A substance that tastes bitter, feels slippery, and turns red litmus paper blue is a(n)
[A] acid. [B] indicator. [C] base. [D] salt.

Fill in the word or phrase that best completes the statement(s).

14. Reactions of acids with metals and carbonates are examples of the _____ property of acids.

15. Many bases can be recognized from their names, which often contain the word _____.

16. Foods such as oranges, tomatoes, and apples have a pH that is _____ than 7.

17. Many _____ solids break up into individual neutral particles when dissolved in water.

18. In the digestive system, the organ with the most acidic contents is the _____.

19. At the same concentrations, strong acids produce more _____ than weak acids.

20. Because it will dissolve so many solutes, _____ is sometimes called the universal solvent.

Fill in the word or phrase that best completes the statement(s).

21. In a reaction of an acid with a base, the pH changes to a value that is closer to _____.

If the statement is true, write true. If it is false, change the underlined word or words to make the statement true.

22. Adding a solute to a solvent will raise the freezing point of the solvent.

23. Bases form hydrogen ions (H^+) when dissolved in water.

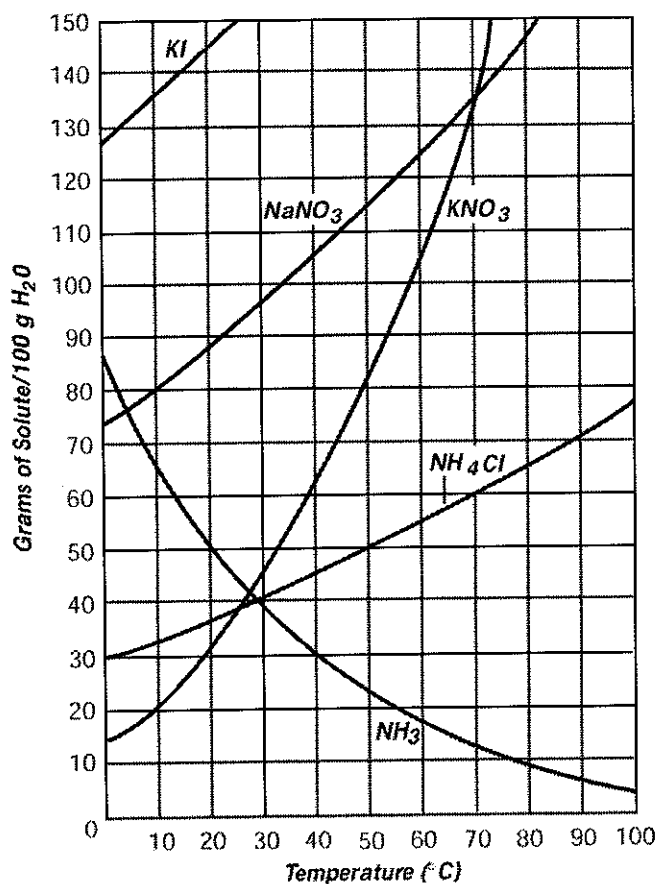
24. Bases feel slippery and taste sour.

25. A solute is a mixture in which particles can be seen and easily separated.

26. The factor that affects the solubility of all solids and gases is pressure.

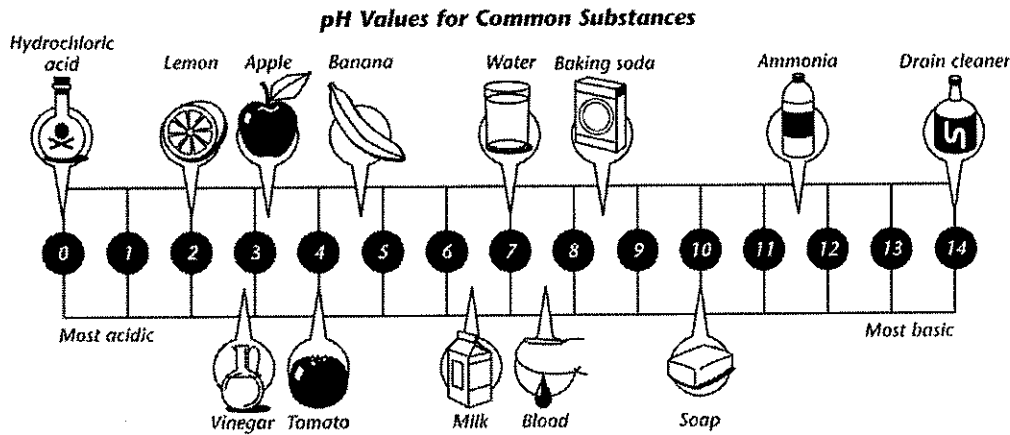
Use the graph to answer the question(s).

Solubilities of Various Compounds



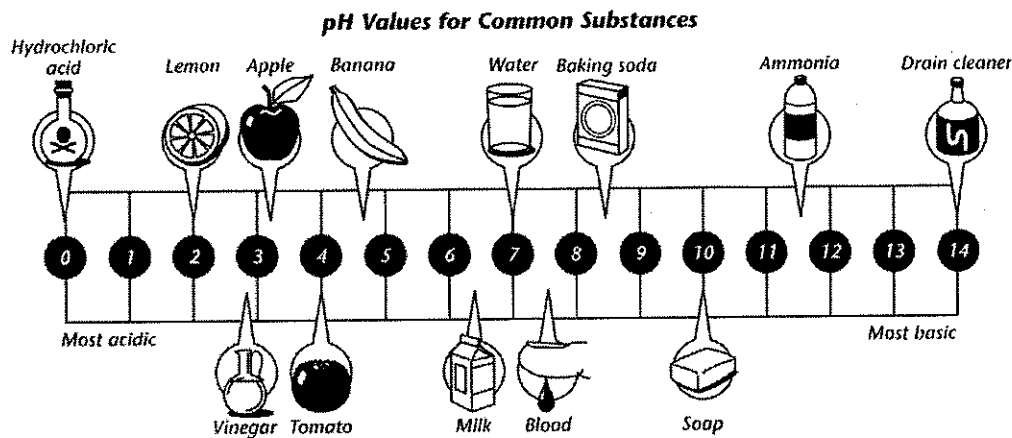
27. According to the graph, which of the compounds is most soluble at 0°C? Which is least soluble at 100°C?

Use the diagram to answer the question(s).



28. In terms of pH, explain what would happen if you mixed vinegar with a solution of ammonia. What type of products would form?

Use the diagram to answer the question(s).



29. How can you tell from the diagram that soap tastes bitter?

Write an answer to the following question(s).

30. Describe how solutions of acids and bases differ in terms of particles. How do the differences relate to the properties of acids and bases?