

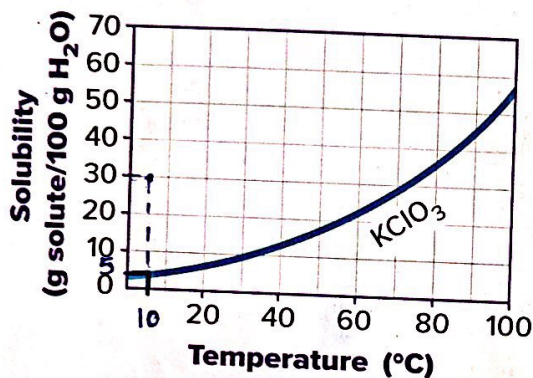
Understand Key Concepts

1. **Explain** how you could use the solubility of a substance to make a saturated solution.

When the solution holds the maximum amount of the solute, it becomes saturated.

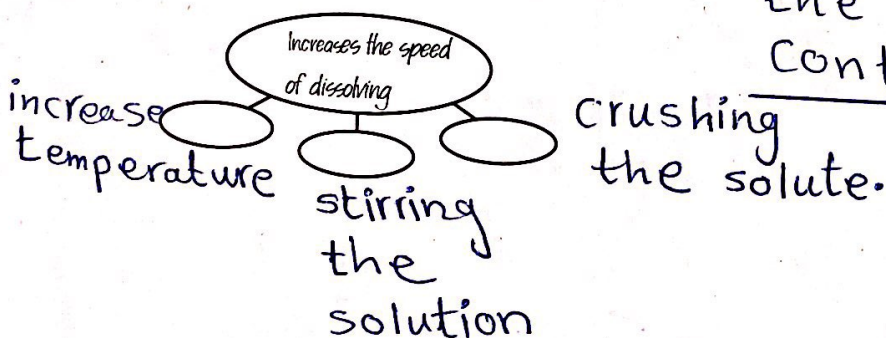
Interpret Graphics

2. **Read a Graph** Use the graph to determine what you would observe in a solution of 30 g of KClO_3 in 100 g of water at 10°C .



The solubility of KClO_3 at 10°C is about 5 g per 100 g of

3. **Organize** Copy the graphic organizer, and use it to organize three factors that increase the speed a solute dissolves in a liquid.



Critical Thinking

4. **Explain** A student wants to increase the maximum amount of sugar that can dissolve in water. She crushes the sugar and then stirs it into the water. Does this work? No, this will make the sugar dissolve faster, but will not make more sugar dissolve.

Math Skills

5. Use ratios to explain how a tablespoon of soup and a cup of the same soup have the same concentration.

$$C = \frac{m}{V}$$

A table spoon has less mass and less volume.

A cup has more mass and more volume.

So, both have the same Concentration.

Water, so most of the solute (25 g) will not dissolve, and stay at the bottom of the container.

Acid and Base Solutions

H_3O^+ : Hydronium ion

Use Vocabulary

1. A measure of the concentration of hydronium ions (H_3O^+) in a solution is pH.
2. A(n) indicator is used to determine the approximate pH of a solution.

Understand Key Concepts

3. **Describe** What happens to a hydrogen atom in an acid when the acid is dissolved in water?

Hydrogen atom reacts with water, and forms hydronium ion.

4. **Explain** How does pH vary with hydronium ion and hydroxide ion concentrations in water?

As the concentration of hydroxide ion increases,

5. **Show** Does an acidic solution contain hydroxide ions? Explain your answer with a diagram.

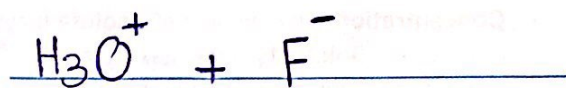
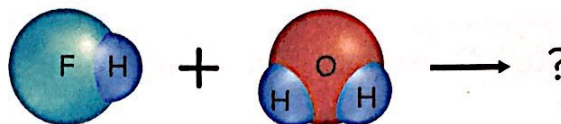
yes, but it contains more hydronium ions than hydroxide ions.

the concentration of hydronium ion decreases, and the pH increases.

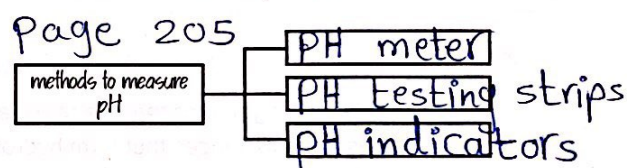
OH^- : Hydroxide ion

Interpret Graphics

6. **Predict** what is produced when hydrofluoric acid (HF) is dissolved in water in the equation below.



7. **Contrast** Copy the graphic organizer below, and use it to describe and contrast three ways to measure pH. In the organizer, describe which methods are most and least accurate.



Critical Thinking

8. **Describe** the concentration of hydronium ions and hydroxide ions when a base is added slowly to a white vinegar solution. The pH of white vinegar is 3.1.

As the base is added, the H_3O^+ concentration decreases. The pH of vinegar increases until the concentration of H_3O^+ and OH^- are equal, the pH equals 7.

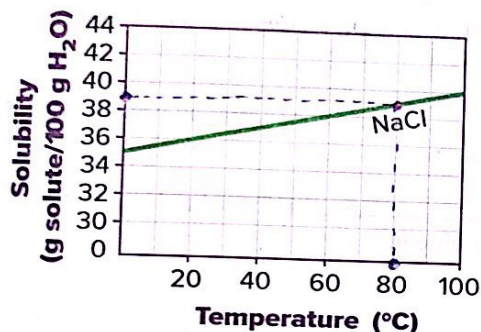
6 Review

 H_3O^+ : hydronium ion

 OH^- : hydroxide ion

Understand Key Concepts

- Which is a solution?
 - copper
 - ☒ vinegar
 - pure water
 - a raisin cookie
- The graph below shows the solubility of sodium chloride (NaCl) in water.



What mass of sodium chloride must be added to 100 g of water at 80°C to form a saturated salt solution?

- 36 g
- ☒ 39 g
- 40 g
- 100 g

3. What would you add to a solution with a pH of 1.5 to obtain a solution with a pH of 7?

Acidic

- milk (pH 6.4)
- vinegar (pH 3.0)
- ☒ lye (pH 13.0) basic
- coffee (pH 5.0)

- Which can change the solubility of a solid in a liquid?

- crushing the solute
- stirring the solute
- increasing the pressure of the solution
- ☒ increasing the temperature of the solution

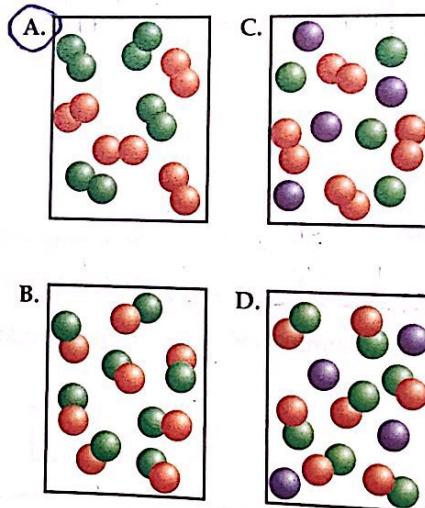
- Which ions are present in the greatest amount in a solution with a pH of 8.5? basic

- hydrogen ions
- ☒ hydronium ions
- hydroxide ions
- oxygen ions

- Which best describes a solution that contains the maximum dissolved solute?

- It is a concentrated solution.
- It is a dilute solution.
- ☒ It is a saturated solution.
- It is an unsaturated solution.

- Which is a mixture of two elements?



- Which explains why a soft drink bubbles when the cap is released?

- The gas becomes less soluble when temperature decreases.
- The gas becomes more soluble when temperature decreases.
- ☒ The gas becomes less soluble when pressure decreases.
- The gas becomes more soluble when pressure decreases.

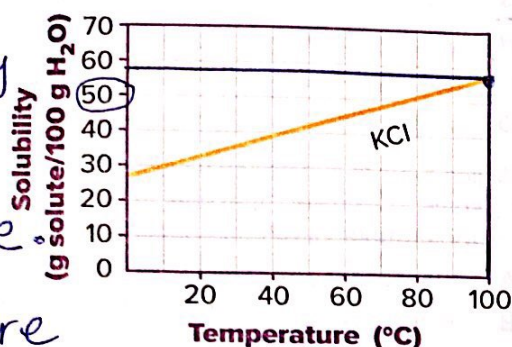
Critical Thinking

- Infer** How can you tell which component in a solution is the solvent?

Solvent is the component which has the greatest amount in the solution.

Chapter Review

10. Predict The graph below shows the solubility of potassium chloride (KCl) in water.



The solubility of KCl will increase as the temperature increases.

Imagine you have made a solution that contains 50 g of potassium chloride (KCl) in 100 g of solution. Predict what you would observe as you gradually increased the temperature from 0°C to 100°C.

11. Organize The pH of three solutions is shown below.

Milk (pH 6.7)

Coffee (pH 5)

Ammonia (pH 11.6)

Place these solutions in order of

- most acidic to least acidic
Coffee, milk, Ammonia
- most basic to least basic
Ammonia, milk, coffee
- highest OH⁻ concentration to lowest OH⁻ concentration
Ammonia, milk, coffee

12. Explain The pH of a solution is inversely related to the concentration of hydronium ions in solution. Explain what this means.

This means that as the H₃O⁺ increases, the pH decreases.

13. Design a method to determine the solubility of an unknown substance at 50°C.

Writing in Science

14. Write an article .write a scientific article about uses of acids in industry

15. What are solutions? List at least three ways a solution can be described.

solutions are homogeneous mixtures, It could be (diluted or concentrated), (saturated or unsaturated)

16. How do solutions differ from other types of matter?

Solutions have variable composition, othe substances have a fixed composition.

Math Skills

Calculate Concentration

- Calculate the concentration of sugar in g/L in a solution that contains 40 g of sugar in 100 mL of solution. There are 1,000 mL in 1 L?
- There are many ways to make a solution of a given concentration. What are two ways you could make a sugar solution with a concentration of 100 g/L?
- A salt solution has a concentration of 200 g/L. How many grams of salt are contained in 500 mL of this solution? How many grams of salt would be contained in 2 L of this solution?

- 7 A girl makes two glasses of lemonade using a powder mix. She pours one cup of water into each glass. She adds one spoonful of powder to the first glass and two spoonfuls of powder to the second glass. How do the solutions in the two glasses compare?

- A The first glass has a greater concentration of powder mix.
- B The first glass has a greater solubility.
- ☒ C The second glass has a greater concentration of powder mix.
- D The second glass has a greater solubility.

Use the table below to answer question 8.

Sample solution	Change in blue litmus	Change in red litmus
1	turns red	no change
2	no change	turns blue
3	turns red	no change
4	no change	no change

- 8 A scientist collects the data above using litmus paper. Blue litmus paper is a type of pH indicator that turns red when placed in an acidic solution. Red litmus paper is an indicator that turns blue when placed in an basic solution. Neutral solutions cause no change in either color of litmus paper. Which sample solution must be a base?

- A solution 1
- ☒ B solution 2
- C solution 3
- D solution 4

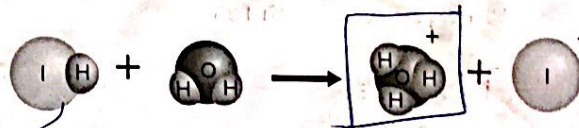
11. 1- Crush the rock salt.
2- Heat up the Water.
3- stir the Water.

Constructed Response aligned with TIMSS

- 9 Explain how the concentration of hydronium ions and the concentration of hydroxide ions change when a base is dissolved in water.
- 10 A researcher mixes a solution that is 40 percent helium gas and 60 percent nitrogen gas. Which gas is the solute and which is the solvent? What would the mixture look like through a microscope? What would the mixture look like at the atomic level?

- 11 A student is dissolving rock salt in water. Describe three ways to increase the rate of dissolving.

Use the figure to answer questions 12 and 13.



- 12 The figure shows what happens when hydrogen iodide (HI) dissolves in water. Is hydrogen iodide an acid, a base, or a neutral substance? Explain.

Acid, It produces H_3O^+ .

- 13 What can you conclude about the pH of the aqueous solution of hydrogen iodide?

pH should be lower than 7.

Need Extra Help?

If You Missed Question...	1	2	3	4	5	6	7	8	9	10	11	12	13
Go to Lesson...	1	1	1	1	2	2	2	2	3	3	1	2	3

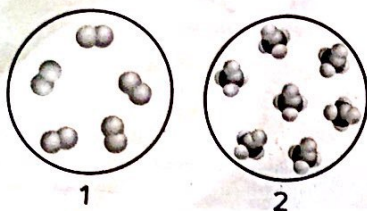
Standardized Test Practice

H_3O^+ : hydronium ion

OH^- : hydroxide ion

Multiple Choice aligned with TIMMS

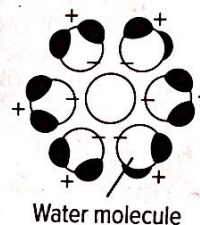
Use the figures below to answer question 1.



- 1 Which statement describes the two figures?
 - A Both 1 and 2 are mixtures.
 - ☒ B Both 1 and 2 are substances.
 - C 1 is a mixture and 2 is a substance.
 - D 1 is a substance and 2 is a mixture.
- 2 Which statement is an accurate comparison of solutions and homogeneous mixtures.
 - ☒ A They are the same.
 - B They are opposites.
 - C Solutions are more evenly mixed than homogeneous mixtures.
 - D Homogeneous mixtures are more evenly mixed than solutions.
- 3 A worker uses a magnet to remove bits of iron from a powdered sample. Which describes the sample before the worker used the magnet to remove the iron?
 - A The sample is a compound because the iron was removed using a physical method.
 - B The sample is a compound because the iron was removed using a chemical change.
 - C The sample is a mixture because the iron was removed using a chemical change.
 - ☒ D The sample is a mixture because the iron was removed using a physical method.

- 4 A beaker contains a mixture of sand and small pebbles. What kind of mixture is this?
 - A compound
 - ☒ B heterogeneous
 - C homogeneous
 - D solution
- 5 Which type of substance would best dissolve in a solvent that was made of nonpolar molecules?
 - A a water-based solvent
 - B an ionic compound
 - C a solute made of polar molecules
 - ☒ D a solute made of nonpolar molecules

Use the figure to answer question 6.



Water molecule

- 6 The figure shows how water molecules surround an ion in a solution. What can you conclude about the ions?
 - A It is negative because the negative ends of the water molecule are attracted to it.
 - B It is negative because the positive ends of the water molecule are attracted to it.
 - ☒ C It is positive because the negative ends of the water molecule are attracted to it.
 - D It is positive because the positive ends of the water molecule are attracted to it.