Mixtures: Together but Separate

AIMS Multimedia is a leading producer and distributor of educational programs serving schools and libraries for nearly 40 years. AIMS draws upon the most up-to-date knowledge, existing and emerging technologies, and all of the instructional and pedagogical resources available to develop and distribute educational programs in film, videocassette, laserdisc, CD-ROM and CD-i formats.

Persons or schools interested in obtaining additional copies of this AIMS Teaching Module, please contact:

AIMS Multimedia

1-800-FOR-AIMS
1-800-367-2467

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Congratulations!

You have chosen a learning program that will actively motivate your students AND provide you with easily accessible and easily manageable instructional guidelines designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module provides you with a video program keyed to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.

RATIONALE

In today's classrooms, educational pedagogy is often founded on Benjamin S. Bloom's "Six Levels of Cognitive Complexity." The practical application of Bloom's Taxonomy is to evaluate students' thinking skills on these levels, from the simple to the complex: Knowledge (rote memory skills), Comprehension (the ability to relate or retell), Application (the ability to apply knowledge outside its origin), Analysis (relating and differentiating parts of a whole), Synthesis (relating parts to a whole), and Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, AND to integrate classroom experiences and assimilation of learning with the students' life experiences, realities, and expectations. AIMS' learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today's classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.

ORGANIZATION AND MANAGEMENT

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in four sections. You are reading Section 1, Introduction to the Aims Teaching Module (ATM).

SECTION 2,
INTRODUCING THIS ATM
will give you the specific information you need to integrate the program into your classroom curriculum.

SECTION 3,
PREPARATION FOR VIEWING
provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

SECTION 4,
AFTER VIEWING THE PROGRAM
provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.

FEATURES

INTRODUCING EACH ATM

SECTION 2

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world's most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom, your AIMS Teaching Module features these components:

Themes

The Major Theme tells how this AIMS Teaching Module is keyed into the curriculum. Related Themes offer suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

Overview

The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

Objectives

The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.

PREPARATION FOR VIEWING

SECTION 3

In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

Introduction To The Program

Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

Introduction To Vocabulary

Introduction to Vocabulary is a review of language used in the program: words, phrases, usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

Discussion Ideas

Discussion Ideas are designed to help you assess students' prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students' ideas and opinions.

Focus

Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

Jump Right In

Jump Right In provides abbreviated instructions for quick management of the program.

AFTER VIEWING THE PROGRAM

SECTION 4

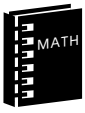
After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.

SUGGESTED ACTIVITIES

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:

Meeting Individual Needs

These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.



Curriculum Connections

Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.

Critical Thinking

Critical Thinking activities are designed to stimulate learners' own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.

Cultural Diversity

Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.

Hands On

These are experimental or tactile activities that relate directly to the material taught in the program.Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.

Writing

Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.

In The Newsroom

Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.

Extended Activities

These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.

Link to the World

These activities offer ideas for connecting learners' classroom activities to their community and the rest of the world.

Culminating Activity

To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their world view.

VOCABULARY

Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will either read or find the definition of each vocabulary word, then use the word in a written sentence.

CHECKING COMPREHENSION

Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students' needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

CONSUMABLE ACTIVITIES

The AIMS Teaching Module provides a selection of consumable activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

CHECKING VOCABULARY

The Checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

TEST

The AIMS Teaching Module Test permits you to assess students' understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

ADDITIONAL READING SUGGESTIONS

AIMS offers a carefully researched list of other resources that you and your students may find rewarding.

ANSWER KEY

Reproduces tests and work pages with answers marked.

Mixtures: Together but Separate

THEMES

Mixtures: Together but Separate introduces students to chemical mixtures, both heterogeneous and homogeneous. Terms such as solutions, solutes and solvents are explored, and different types of solutions are discussed, such as saturated, supersaturated, colloids and emulsions. The difference between polar molecules and nonpolar molecules is covered, as well as the factors affecting mixtures, including temperature and pressure.

OVERVIEW

Mixtures are not chemically combined like compounds, but rather physically mixed together. All components in a mixture retain their properties and can be easily separated. Another difference between mixtures and compounds is that mixtures can have variable ratios, while compounds have fixed ratios. There are two basic types of mixtures. Heterogeneous mixtures, such as trash, are not the same throughout. Homogenous mixtures, such as tap water, have the same properties throughout. These mixtures are also known as solutions. In this type of mixture, the substance with the greatest quantity is referred to as the solvent , while the substances of lesser quantity are called solutes.

OBJECTIVES

- To learn more about the various types of chemical mixtures.
- To discuss the difference between homogenous and heterogenous mixtures.
- To examine the physical properties saturated and super-saturated solutions, colloids and emulsion.
- To explore the differences between polar and non-polar molecules.
- To discuss the factors affecting chemical mixtures, such as temperature and pressure.

Use this page for your individual notes about planning and/or effective ways to manage this AIMS Teaching Module in your classroom.

Our AIMS Multimedia Educational Department welcomes your observations and comments. Please feel free to address your correspondence to:

AIMS Multimedia
Editorial Department
9710 DeSoto Avenue
Chatsworth, California 91311-4409

INTRODUCTION TO THE PROGRAM

Chemical mixtures comprise the majority of things around us. The air we breathe is a chemical mixture. Synthetic fibers in our shoes and jackets are man-made mixtures. The food we eat is comprised of a variety of chemical mixtures. Even our blood is a chemical mixture, with properties and components that supply us with the energy we need to live. As we learn about chemical mixtures, how they are formed and how they behave, we can better understand the infinite variety of things which comprise our world.

INTRODUCTION TO VOCABULARY

Before starting the program, write the following words on the board. Ask the class to discuss the meaning of each word, and review the terms that are unfamiliar to students.

solute -substance that is dissolved in a solvent

solvent - substance with the greatest quantity in a solution

compound - substance containing two or more elements that are chemically combined in fixed proportions

FOCUS

How do mixtures help us learn more about elements and compounds? How does the study of chemical solutions enrich our knowledge of the world? Ask students to keep these questions in mind as they being the program.

DISCUSSION IDEAS

Ask students to think about a chemical mixture that they have come into contact with during the last 24 hours. Was the mixture a solid, liquid or gas? What elements or compounds comprised the mixture? What were the properties of the mixture? Did the mixture affect them in any way? If so, how?

JUMP RIGHT IN

HOW TO USE THE MIXTURES: TOGETHER BUT SEPARATE AIMS TEACHING MODULE

Preparation

- Read *Mixtures: Together but Separate* **Themes, Overview,** and **Objectives** to become familiar with program content and expectations.
- Use **Preparation for Viewing** suggestions to introduce the topic to students.

Viewing MIXTURES: TOGETHER BUT SEPARATE

- Set up viewing monitor so that all students have a clear view.
- Depending on your classroom size and learning range, you may choose to have students view *Mixtures: Together but Separate* together or in small groups.
- Some students may benefit from viewing the video more than one time.

After Viewing MIXTURES: TOGETHER BUT SEPARATE

- Select **Suggested Activities** that integrate into your classroom curriculum. If applicable, gather materials or resources.
- Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.
- Duplicate the appropriate number of **Vocabulary, Checking Comprehension**, and consumable activity pages for your students.
- You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.
- Administer the Test to assess students' comprehension of what they have learned, and to provide them with practice in test-taking procedures.
- Use the **Culminating Activity** as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.

SUGGESTED ACTIVITIES

Writing

60 Minutes

Ask students to summarize one of the following terms in a 75-word report. For each item, make sure they include a clear definition and at least one example.

colloid
emulsion
electrolyte
heterogeneous mixture
homogeneous mixture
saturated solution
suspension

Link to the World

15 Minutes

Industrial and automobile exhaust fumes contain chemicals known as sulfates. When sulfate molecules react with water molecules in the upper atmosphere, they form sulfuric acid. How does this process negatively affect the environment? What are some possible solutions?

(Along with water, sulfuric acid condenses in rain clouds and falls to the Earth as acid rain. The acid rain is harmful to plants and trees. Many attempts have been made by world governments to lower industrial fumes and control the amount of exhaust fumes released by automobiles and other vehicles. Scientists have also experimented with various chemical processes to lessen the effects of acid rain.)

Critical Thinking

20 Minutes

Have students ever noticed that salt is hard to shake from a salt shaker on a humid day? What could be reason and how might it relate to a chemical solution?

(Some substances, including salt, can remove water molecules from the air. These substances are known as hygroscopic. Humid air contains many water molecules. When the air is humid, salt crystals absorb water molecules and clump together.)

Hands On

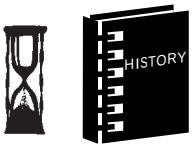
15 Minutes

A solute is a substances that is dissolved in another substance. A solvent is the substance in a solution with the greatest quantity. To illustrate these two principles, perform the following demonstration.

Fill a large glass jelly jar with water. Add a 5 tablespoons of Boric acid crystals to the jar of water. Screw the lid on the jar and shake it for about 10 seconds. What happens? Ask students what the reason could be. Which substance is the solute and which is the solvent? What kind of mixture has been produced?

(Some Boric acid crystals dissolve, but most of the crystals float to the bottom. The solute, Boric acid, does not dissolve very well in the solvent, water. As a result, only a little Boric acid is required to produce a saturated solution.)

Connection to History



30 Minutes

Ask students to do a little research to find out where the term Tyndall effect first originated. Who was John Tyndall and what did he do?

(Tyndall was a British physicist and philosopher. He is best known for discovering the Tyndall effect, which occurs when the path of a light beam is shone through a colloidal suspension, illuminating the particles therein. Tyndall also described the reaction that *Penicillim* mold had on the growth of bacteria. This was half a century before the discovery was published by Alexander Fleming.)

Extended Activity

20 Minutes

Immiscible substances are those that do not mix well with each other. Miscible substances are those that mix together easily. To prove this, pour half a cup of water into a glass jar. Color the water with a few drops of blue food coloring. Very slowly, pour half a cup of oil on top of the water. Are oil and water immiscible or miscible substances? (Oil and water are immiscible substances.)

Next, add a few drops of red food coloring to the oil. The drops will float in the oil. What could be the reason? Push the drops down into the water portion of the jar. What happens? Why?

(The food coloring is water-based, therefore it is also immiscible with oil. For this reason, the food coloring floats in the oil portion of the mixture. When pushed into the water portion, the food coloring dissolves. Food coloring and water are miscible substances.)

Connection to Science

45 Minutes

Polymers are used to make many of the things around us. Because of their molecular structure, polymers like plastic are both strong and moldable. To help students understand the structure of polymers, assist them with the following experiment.

Begin by warming a cup of whole milk over a Bunsen Burner. Do not let the milk boil. Remove the milk from the heat. Add a tablespoon of vinegar to the milk and stir well. A white rubbery substance will form in the milk. This is a very basic plastic formed from proteins in the milk. Place a piece of fabric over the mouth of a glass jar and secure the fabric over the jar's lid with a rubber band. Strain the milk mixture into the jar. The solid portions will remain on the fabric. Squeeze as much liquid as possible from the plastic substance. Form the plastic into a shape using a mold or cookie cutter. Once the substance dries out completely, it will become very hard. Since heat can speed up the process, it will help to leave the plastic in a warm window.

Meeting Individual Needs


30 Minutes

Ask students to make sentences using the following words. Encourage them to use a dictionary if they are unfamiliar with the meanings.

colloid
compound
distillation
electrolyte
emulsion
heterogeneous mixture
homogeneous mixture
ion
solubility
Tyndall Effect

Culminating Activity


60 Minutes

Man-made chemical mixtures such as polymers have changed our lives in many ways. Ask students to find a man-made chemical mixture and bring it to class. The mixture can be a solid or a liquid. Have students study up on the development, production and uses of the mixture. After each presentation, encourage other students to ask questions about the chemical mixtures.

Name

VOCABULARY

The following terms are from *Mixtures: Together but Separate*. Fill in the number of each term next to its closest definition.

1. colloid
2. compound
3. distillation
4. electrolyte
5. emulsion
6. heterogeneous mixture
7. homogeneous mixture
8. ion
9. solubility
10. Tyndall Effect

___ the rate at which a solute dissolves in a solvent

___ any substance which in solution is dissociated into ions and is thus made capable of conducting an electric current

___ substance containing two or more elements that are chemically combined in fixed proportions

___ mixture that contains the same properties throughout

___ heterogeneous mixture made up of small, insoluble particles that remain in suspension in a fluid medium of different matter

___ mixture in which the properties are not the same throughout

___ occurs when the path of a light beam is visible when shone through a colloidal suspension

___ process that separates a substance or substances from a solution through vaporization

___ colloid created by the dispersion of one liquid in another

___ atoms with either a positive or a negative charge

Name

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

Mixtures are not chemically combined like compounds, but rather ___1___ mixed together. All components in a mixture retain their ___2___ and can be easily ___3___ . Another difference between mixtures and compounds is that mixtures can have ___4___ ratios, while compounds have ___5___ ratios. There are two basic types of mixtures. ___6___ mixtures, such as trash, are not the same throughout. ___7___ mixtures, such as tap water, have the same properties throughout. These mixtures are also known as ___8___ . In this type of mixture, the substance with the greatest quantity is referred to as the ___9___ , while the substances of lesser quantity are called ___10___ .

1. A. physically
   B. never
   C. hypothetically
   D. atomically

2. A. original appearance
   B. solid form
   C. physical properties
   D. average temperature

3. A. ignited
   B. melted
   C. polarized
   D. separated

4. A. variable
   B. fixed
   C. stable
   D. unknown

5. A. variable
   B. fixed
   C. stable
   D. unknown

6. A. Homogeneous
   B. Polar
   C. Heterogeneous
   D. Nonpolar

7. A. Homogeneous
   B. Polar
   C. Heterogeneous
   D. Nonpolar

8. A. compounds
   B. solutions
   C. solvents
   D. solutes

9. A. solvent
   B. electrolyte
   C. emulsifier
   D. solute

10. A. solvents
    B. solutes
    C. ions
    D. polar molecules

Name

TERM LINK

Write the letter of each term next to the group of words which best describe it.

A. centrifuge
B. homogenization
C. mixture
D. non-electrolyte
E. polar molecule
F. saturated solution
G. solute
H. solvent
I. super-saturated
J. suspension

___ describes a solvent which contains more solutes than it would in a saturated state

___ substance which, in a water solution, does not release ions and as a result forms a non-conducting solution

___ substances that are dissolved in the solvent

___ substance containing two or more ingredients where the molecules are physically, not chemically, combined

___ contains as much solute as can be dissolved in the solvent

___ heterogeneous mixture in which particles are dispersed through a fluid but not dissolved in it

___ process of breaking down the larger particles in an emulsion so they do not separate

___ molecule that has positively and negatively charged poles

___ substance with the greatest quantity in a solution

___ machine that separates particles of varying density

Name

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. ___ The contents of a heterogeneous mixture are distributed evenly throughout the mixture.
2. ___ A homogeneous mixture is also known as a solution.
3. ___ Solvents are dissolved in a primary solute.
4. ___ Dissolved solute particles are either ions or molecules.
5. ___ Vaporization is an example of a liquid dissolving in a gas.
6. ___ The addition of a solute to a liquid solvent causes the boiling point of the solvent to be lowered.
7. ___ The conductivity of a solution is affected by the concentration of solutes.
8. ___ Pure water is an excellent conductor of electricity because it contains no solutes.
9. ___ All atoms have the same attraction toward electrons.
10. ___ A warm solvent dissolves more of a solute than a cold one.

Name _____

NUMBER CODE

Use the number code to fill in the blanks below.

A = 1	I = 7	S = 13
B = 2	L = 8	T = 14
C = 3	N = 9	U = 15
D = 4	O = 10	V= 16
E = 5	P = 11	Y = 17
F = 6	R = 12	

1. 7-10-9-7-3 solutes form solutions that conduct electricity when added to water.

   _____

2. If more solute is added to to a supersaturated solution, the molecules of the solute form 3-12-17-13-14-1-8-13.

   _____

3. Oil is one substance that is 7-9-13-10-8-15-2-8-5 in water.

   _____

4. In general, a nonpolar substance will not 4-7-13-13-10-8-16-5 in a polar substance.

   _____

5. 13-10-8-15-2-7-8-7-14-17 of a gas in a liquid decreases as the temperature of the liquid increases.

   _____

6. 11-12-5-13-13-15-12-5 can greatly affect the solubility of a gas.

   _____

7. Suspensions are made more 13-14-1-2-8-5 by reducing the size of the particles through homogenization.

   _____

8. Particles in colloids are able to pass through 6-7-8-14-5-12-13 and do not settle.

   _____

Name

SOLUTION PUZZLE

Use the clues to fill in each blank in the left-hand column.

S_____	A solution that contains as much solute as can be dissolved in the solvent is a _____ solution.
O_____	An emulsifying agent can be used to combine water and _____ .
L_____	Carbonation occurs when carbon dioxide is dissolved in a _____ solvent.
U_____	Water is often called the _____ solvent because many materials easily dissolve into it.
T_____	A beam of light visible through a colloidal suspension is proof of the _____ .
I_____	Atoms with a positive or negative charge are known as _____ .
O_____	Our atmosphere is a mixture of gases, such as _____ , which retain their properties.
N_____	When the structure of a molecule will not allow poles to form, the molecules is said to be _____ .

Name

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

mixture
ion
solubility
colloid
compound
distill
solute
emulsion
polar
solvent

C H S R H F D R A L O P
B O O C X M S Z D L C M
S J L D Z T H G I T O T
O N U L S A N Y S A M Y
L H T M O R S M T K P E
U B E R L I O J I D O M
B L P J V C D P L Q U O
I O N L E J P G L T N Y
L G Q E N L A C S O D L
I M I X T U R E P B K C
T M B G N L S K N E X Q
Y S Q E M U L S I O N Z

Name

TEST

Circle the phrase which best answers each question.

1. In any solution, the substance with the greatest quantity is the:

   - ion.
   - compound solution.
   - solute.
   - solvent.

2. Which of the following is removed from water during distillation?

   - heat
   - compounds.
   - emulsions.
   - impurities.

3. The properties of a heterogeneous mixture are:

   - always the same.
   - always in equal ratio.
   - always in unequal ratio.
   - not the same.

4. Fixed ratios are found in:

   - compounds.
   - mixtures.
   - colloids.
   - solvents.

5. Slight variability in charges between atoms in a covalent bond produce:

   - ions.
   - the Tyndall Effect.
   - polar molecules.
   - electrolytes.

Name

TEST (CONTINUED)

6. A substance's solubility is the rate at which:

   - it melts.
   - it reaches suspension.
   - it emulsifies.
   - a solute dissolves.

7. Trash is an example of what type of mixture?

   - soluble
   - heterogeneous
   - homogeneous
   - polar

8. Solutions that conduct electricity when added to water are known as:

   - polar molecules.
   - suspensions.
   - colloids.
   - electrolytes.

9. Suspensions, colloids and emulsions are examples of:

   - homogeneous mixtures.
   - heterogeneous mixtures.
   - non-polar substances.
   - solubility.

10. What happens to the solubility of gas in a liquid when the temperature is increased?

    - it increases
    - it decreases
    - it is doubled
    - it remains the same

ADDITIONAL AIMS MULTIMEDIA PROGRAMS

You and your students might also enjoy these other AIMS Multimedia programs:

Chemistry Essentials Series

- *Matter: Form and Substance in the Universe*
- *Compounds: Electromagnetic Attraction in Molecules*
- *Atomic Structure: Mapping an Invisible World*
- *Reactions: The Chemistry of Change*
- *Periodic Table: Reactions and Relationships*

ANSWER KEY for page 18

VOCABULARY

The following terms are from *Mixtures: Together but Separate*. Fill in the number of each term next to its closest definition.

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2. compound
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4. electrolyte
5. emulsion
6. heterogeneous mixture
7. homogeneous mixture
8. ion
9. solubility
10. Tyndall Effect

9 ___ the rate at which a solute dissolves in a solvent

4 ___ any substance which in solution is dissociated into ions and is thus made capable of conducting an electric current

2 ___ substance containing two or more elements that are chemically combined in fixed proportions

7 ___ mixture that contains the same properties throughout

1 ___ heterogeneous mixture made up of small, insoluble particles that remain in suspension in a fluid medium of different matter

6 ___ mixture in which the properties are not the same throughout

10 ___ occurs when the path of a light beam is visible when shone through a colloidal suspension

3 ___ process that separates a substance or substances from a solution through vaporization

5 ___ colloid created by the dispersion of one liquid in another

8 ___ atoms with either a positive or a negative charge

ANSWER KEY for page 19

CHECKING COMPREHENSION

Read the following sentences and circle the letter of the word that best fills each blank.

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1. (A.) physically
   B. never
   C. hypothetically
   D. atomically

2. A. original appearance
   B. solid form
   (C.) physical properties
   D. average temperature

3. A. ignited
   B. melted
   C. polarized
   (D.) separated

4. (A.) variable
   B. fixed
   C. stable
   D. unknown

5. A. variable
   (B.) fixed
   C. stable
   D. unknown

6. A. Homogeneous
   B. Polar
   (C.) Heterogeneous
   D. Nonpolar

7. (A.) Homogeneous
   B. Polar
   C. Heterogeneous
   D. Nonpolar

8. A. compounds
   (B.) solutions
   C. solvents
   D. solutes

9. (A.) solvent
   B. electrolyte
   C. emulsifier
   D. solute

10. A. solvents
    (B.) solutes
    C. ions
    D. polar molecules

ANSWER KEY for page 20

TERM LINK

Write the letter of each term next to the group of words which best describe it.

A. centrifuge
B. homogenization
C. mixture
D. non-electrolyte
E. polar molecule
F. saturated solution
G. solute
H. solvent
I. super-saturated
J. suspension

I describes a solvent which contains more solutes than it would in a saturated state

D substance which, in a water solution, does not release ions and as a result forms a non-conducting solution

G substances that are dissolved in the solvent

C substance containing two or more ingredients where the molecules are physically, not chemically, combined

F contains as much solute as can be dissolved in the solvent

J heterogeneous mixture in which particles are dispersed through a fluid but not dissolved in it

B process of breaking down the larger particles in an emulsion so they do not separate

E molecule that has positively and negatively charged poles

H substance with the greatest quantity in a solution

A machine that separates particles of varying density

ANSWER KEY for page 21

TRUE OR FALSE

Place a T next to statements that are true and an F next to statements that are false.

1. **F** The contents of a heterogeneous mixture are distributed evenly throughout the mixture.
2. **T** A homogeneous mixture is also known as a solution.
3. **F** Solvents are dissolved in a primary solute.
4. **T** Dissolved solute particles are either ions or molecules.
5. **T** Vaporization is an example of a liquid dissolving in a gas.
6. **F** The addition of a solute to a liquid solvent causes the boiling point of the solvent to be lowered.
7. **T** The conductivity of a solution is affected by the concentration of solutes.
8. **F** Pure water is an excellent conductor of electricity because it contains no solutes.
9. **F** All atoms have the same attraction toward electrons.
10. **T** A warm solvent dissolves more of a solute than a cold one.

ANSWER KEY for page 22

NUMBER CODE

Use the number code to fill in the blanks below.

A = 1	I = 7	S = 13
B = 2	L = 8	T = 14
C = 3	N = 9	U = 15
D = 4	O = 10	V= 16
E = 5	P = 11	Y = 17
F = 6	R = 12	

1. 7-10-9-7-3 solutes form solutions that conduct electricity when added to water.

   ionic

   _____

2. If more solute is added to to a supersaturated solution, the molecules of the solute form 3-12-17-13-14-1-8-13.

   crystals

   _____

3. Oil is one substance that is 7-9-13-10-8-15-2-8-5 in water.

   insoluble

   _____

4. In general, a nonpolar substance will not 4-7-13-13-10-8-16-5 in a polar substance.

   dissolve

   _____

5. 13-10-8-15-2-7-8-7-14-17 of a gas in a liquid decreases as the temperature of the liquid increases.

   solubility

   _____

6. 11-12-5-13-13-15-12-5 can greatly affect the solubility of a gas.

   pressure

   _____

7. Suspensions are made more 13-14-1-2-8-5 by reducing the size of the particles through homogenization.

   stable

   _____

8. Particles in colloids are able to pass through 6-7-8-14-5-12-13 and do not settle.

   _____**filters**_____

ANSWER KEY for page 23

SOLUTION PUZZLE

Use the clues to fill in each blank in the left-hand column.

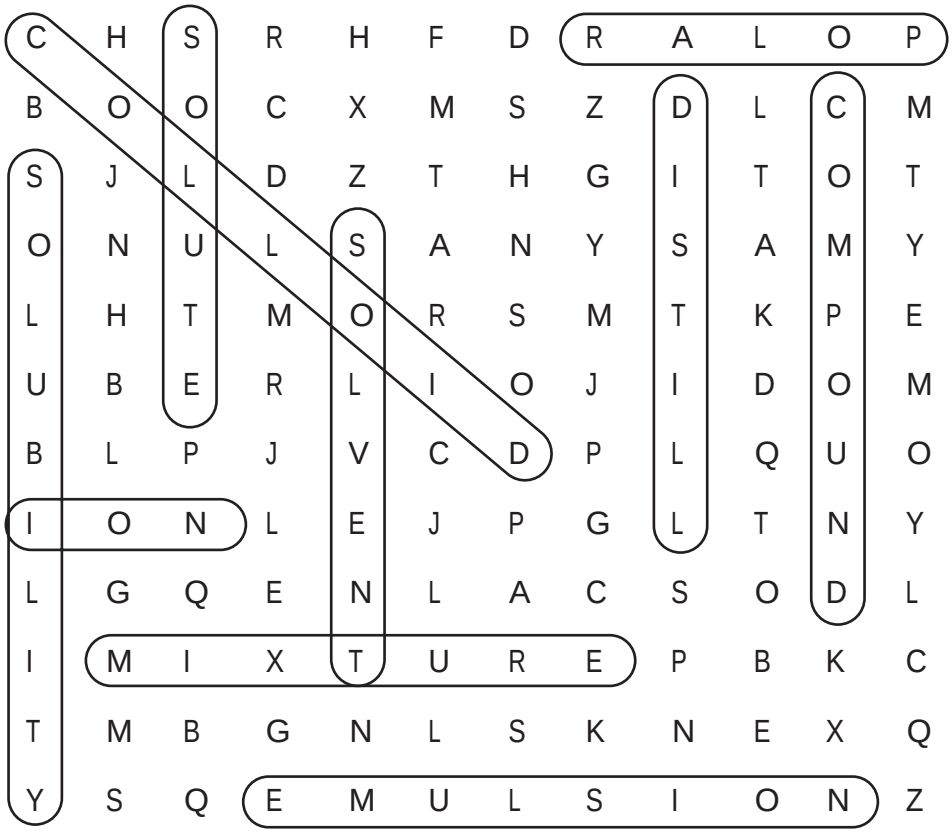
S**aturated**	A solution that contains as much solute as can be dissolved in the solvent is a _____ solution.
O**il**	An emulsifying agent can be used to combine water and _____ .
L**iquid**	Carbonation occurs when carbon dioxide is dissolved in a _____ solvent.
U**niversal**	Water is often called the _____ solvent because many materials easily dissolve into it.
T**yndall Effect**	A beam of light visible through a colloidal suspension is proof of the _____ .
I**ons**	Atoms with a positive or negative charge are known as _____ .
O**xygen**	Our atmosphere is a mixture of gases, such as _____ , which retain their properties.
N**onpolar**	When the structure of a molecule will not allow poles to form, the molecules is said to be _____ .

ANSWER KEY for page 24

WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally or backward.

mixture
ion
solubility
colloid
compound
distill
solute
emulsion
polar
solvent



ANSWER KEY for page 25

TEST

Circle the phrase which best answers each question.

1. In any solution, the substance with the greatest quantity is the:

   - ion.
   - compound solution.
   - solute.
   - (solvent.)

2. Which of the following is removed from water during distillation?

   - heat
   - compounds.
   - emulsions.
   - (impurities.)

3. The properties of a heterogeneous mixture are:

   - always the same.
   - always in equal ratio.
   - always in unequal ratio.
   - (not the same.)

4. Fixed ratios are found in:

   - (compounds.)
   - mixtures.
   - colloids.
   - solvents.

5. Slight variability in charges between atoms in a covalent bond produce:

   - ions.
   - the Tyndall Effect.
   - (polar molecules.)
   - electrolytes.

TEST (CONTINUED)

6. A substance's solubility is the rate at which:

   - it melts.
   - it reaches suspension.
   - it emulsifies.
   - **a solute dissolves.**

7. Trash is an example of what type of mixture?

   - soluble
   - **heterogeneous**
   - homogeneous
   - polar

8. Solutions that conduct electricity when added to water are known as:

   - polar molecules.
   - suspensions.
   - colloids.
   - **electrolytes.**

9. Suspensions, colloids and emulsions are examples of:

   - homogeneous mixtures.
   - **heterogeneous mixtures.**
   - non-polar substances.
   - solubility.

10. What happens to the solubility of gas in a liquid when the temperature is increased?

    - it increases
    - **it decreases**
    - it is doubled
    - it remains the same