MIX IT UP!

SOLUTION OR MIXTURE?

My Science Library

Level: **M** Word Count: **407**
100th Word: ***boils* (page 8)**

Teaching Focus:

Text Features:
Photographs

Photographs are used in nonfiction books to help the reader understand an idea in a visual way. Find a photograph in this book. How does this photograph help you understand the concept of this book?

Tips on Reading This Book with Children:

1. Read the title and make predictions about the story.

   Predictions – after reading the title have students make predictions about the book.

2. Take a picture walk.

   Talk about the pictures in the book. Implant the vocabulary as you take the picture walk.

   Have students find one or two words they know as they do a picture walk.

3. Have students read the first page of text with you.

4. Have students read the remaining text aloud.

5. Strategy Talk – use to assist students while reading.
   - Get your mouth ready
   - Look at the picture
   - Think…does it make sense
   - Think…does it look right
   - Think…does it sound right
   - Chunk it – by looking for a part you know

6. Read it again.

7. Complete the activities at the end of the book.

My Science Library
Levels 3-4

Mix It Up!
Solution or Mixture?

by Tracy Nelson Maurer

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Teacher Notes available at
rem4teachers.com

Science Content Editor: Shirley Duke holds a bachelor's degree in biology and a master's degree in education from Austin College in Sherman, Texas. She taught science in Texas at all levels for twenty-five years before starting to write for children. Her science books include *You Can't Wear These Genes, Infections, Infestations, and Diseases, Enterprise STEM, Forces and Motion at Work, Environmental Disasters,* and *Gases*. She continues writing science books and also works as a science content editor.

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All Mixed Up!

Why do some ingredients seem to disappear when you mix them together? Why don't others? Here's the scoop on mixtures and solutions!

Blueberries do not evenly **disperse** or spread throughout a dish of cream. Only some spoonfuls of this mixture have blueberries.

Sugar stirred into water makes a solution. The sugar seems to disappear, or **dissolve**, because it disperses evenly through the water.

Sand does not dissolve when stirred into water. This is a mixture. A mixture is a combination of at least two substances, with different properties, that don't chemically combine. The materials in a mixture can be separated. A solution is a special mixture in which one thing dissolves in another, making a single form. The materials don't separate.

Try This:

Add one teaspoon of salt to a cup of water in a clear glass. Stir the salt. Did the salt seem to disappear? Is this a solution or a mixture? How do you know?

Mixtures and solutions exist everywhere: foods, medicines, plastics, and building products. They're even inside of you! Digestion, for example, ends with waste leaving your body as feces (mixture) or urine (solution).

Examples of mixtures:

concrete with pebbles

glitter nail polish

trail mix

cookie dough

Sticky Notes

In 1968, a scientist at 3M tried to invent airplane glue. The solution wasn't sticky enough. A co-worker later used the tacky solution to make a removable bookmark. Eureka! Sticky notes!

Examples of solutions:

tea

perfume

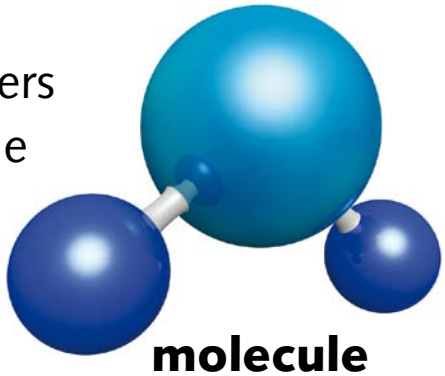
rubber cement

cough syrup

What State Is It In?

Water, a liquid, cooled to 32° Fahrenheit (0° Celsius) turns into a solid. Heated until it boils, water turns into a gas called water **vapor**.

Some materials mix easily. Others won't mix at all. It depends on the tiny moving particles in matter called **molecules** that define its **physical properties**, including its state. Almost everything on Earth exists in one of three states: solid, liquid, or gas.

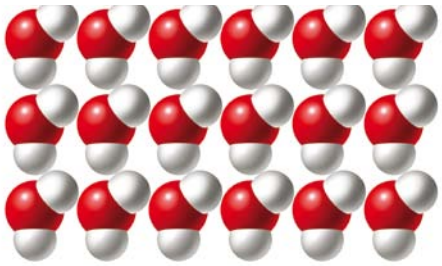


molecule

State Discoveries

Matter may exist in at least two additional states, such as Bose-Einstein condensates or plasmas. Understanding plasmas helped create flat screen televisions.

Solids have a definite shape. Their packed molecules move very little.



Packed molecules in a solid move slowly.

Liquids take the shapes of their containers.

Out of containers, liquids flow because their molecules have room to slip under and over each other.

Gases do not have shapes unless they are in containers. Then their molecules bounce off the container walls and completely fill the containers.

Making Physical Mixtures

Mixtures combine materials from at least two of the three main states.

Solid + Solid

One way to create a physical mixture is to mix a solid with another solid. Decayed plants or animals and stones mix to make soil.

Fact Focus:
Wiggling earthworms help stir the soil mixture.

Liquid + Solid

A liquid with a solid can make a mixture. Milk is a mixture of liquid water, fat, and milk solids.

Fact Focus: Generally, mixtures do not look clear because the solids in them block the light. Most solutions appear clear when the solids dissolve. Nothing remains to block the light.

Liquid + Liquid

Adding two liquids together can make a mixture. Vinegar and vegetable oil mix briefly when shaken to make salad dressing. Yum!

Liquid + Gas

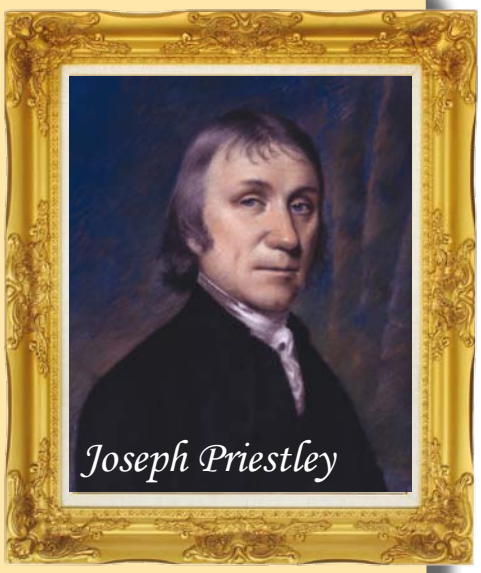
A liquid with a gas can make a mixture. Liquid soap mixes with tiny bubbles of gas and puffs into foam.

Gas + Solid

A gas with a solid can make a mixture. Soot, solid flecks of burned material, mixes with hot air to make smoke.

Bubbly Science

In the 1770s, English scholar Joseph Priestley lived near a brewery where he studied beer bubbles. He learned how to mix **carbon dioxide** gas under pressure with water to make sparkling water. Soda pop began with Priestley's chemistry work!



Stirring Solutions

The receiving substance of a solution is called a **solvent**. The liquid, solid, or gas that mixes into the solvent is called the **solute**.

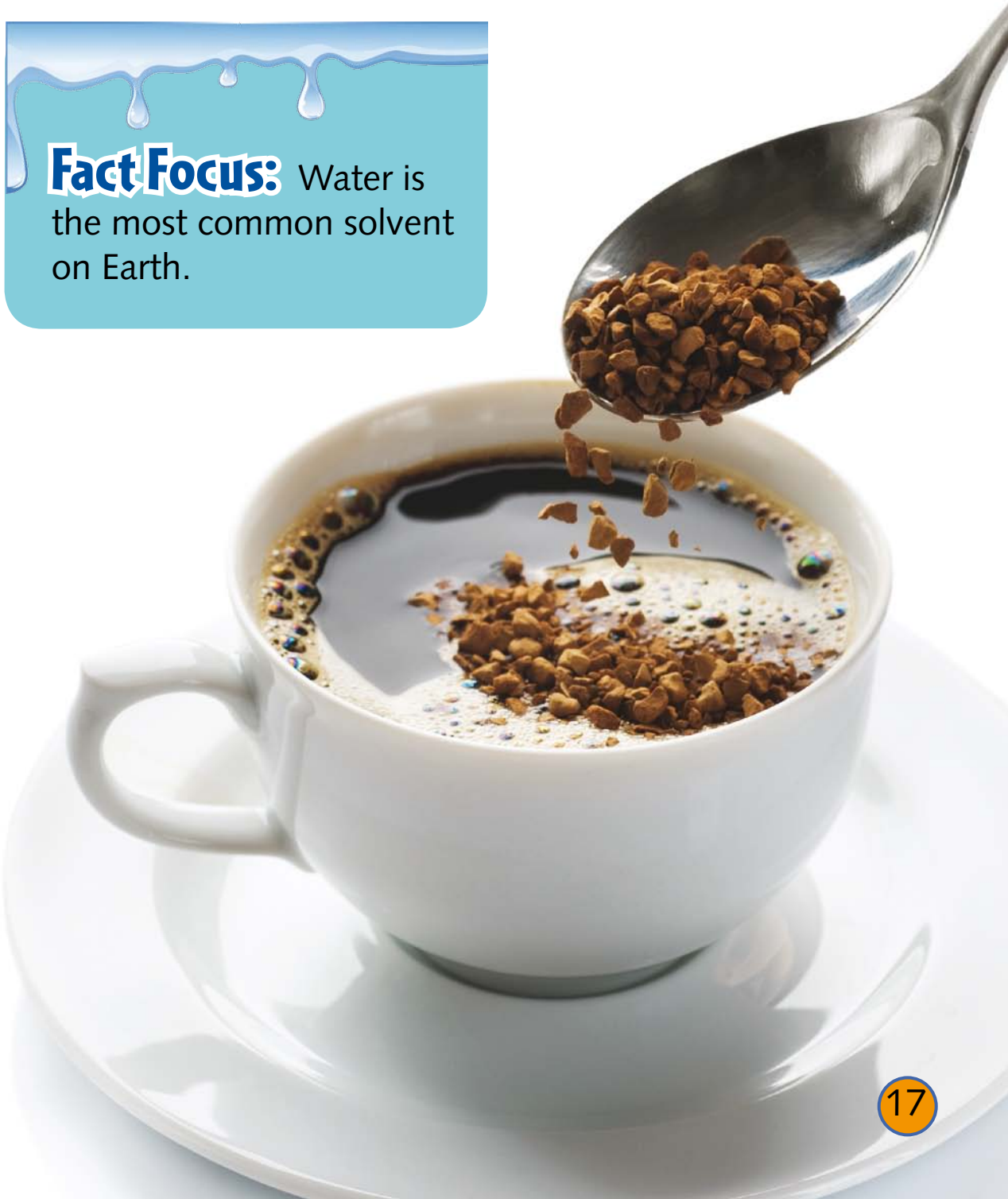
Gas + Liquid

Adding a gas to a liquid can make a solution. Oxygen from air dissolves in water. Fish use their gills to capture the oxygen molecules.

Solid + Liquid

Adding a solid to a liquid can make a solution. Instant coffee crystals stirred into hot water melt into coffee.

Fact Focus: Water is the most common solvent on Earth.



Liquid + Liquid

Scientists experiment with solutions every day. They recently developed an important solution using two liquids. E85 is a blend of **ethanol** made from corn oil and gasoline.

Many drivers use ethanol in their vehicles, because the corn in this fuel is a renewable resource.

Can you make a solution? Here's one way. A glass of milk is the solvent. Blow into the milk with a straw. You are putting carbon dioxide gas into the milk. That's the solute. Bubbles form in your solution. Can you make another solution?

When you blow bubbles in milk through a straw, that's a gas plus liquid solution. Add chocolate to the milk, and you'll make another solution!

Inventing a mixture or a solution, such as E85, often raises important questions. What does it cost to make? Does it help or hurt the planet? Who can use it?

Scientists continue to experiment with mixtures for fuels, such as biodiesels made from vegetable oils.

Every new mixture or solution is an opportunity to discover more about the world and ourselves.

Safety First!

Before experimenting with any mixtures, ask an adult to help. Check that the mixtures do not explode or produce toxic fumes. Wear safety glasses and follow instructions carefully.

Show What You Know

1. What other mixtures can you think of?

2. What other solutions do you know?

3. Imagine you invented a new solution. What does it do? Why?

Glossary

carbon dioxide (KAR-buhn dye-AHK-side): a colorless gas produced by plants, exhaled by humans, and released by some burning materials

disperse (diss-PURS): to scatter or spread apart

dissolve (di-ZAHLV): to seem to disappear into another substance

ethanol (ETH-uh-nahl): a colorless liquid made from corn that can burn

molecules (MAH-luh-kyoolz): the smallest bits of a substance that retain all the characteristics of the substance; a combination of like or different atoms

physical properties (FIZ-i-kuhl PRAH-pur-teez): qualities or traits of something

solute (SAHL-yoot): the substance that dissolves in solvent

solvent (SAHL-vuhnt): a substance that can dissolve one or more other substances

vapor (VAY-pur): very tiny particles of water that are visible as they hang in the air

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Websites to Visit

www.chem4kids.com
http://climate.nasa.gov/kids/
www.sciencenewsforkids.org

About the Author

Tracy Nelson Maurer likes science experiments, especially the cooking kind! She lives in Minnesota with her husband and two children. She holds an MFA in Writing for Children and Young Adults from Hamline University.

Comprehension & Extension:

- Summarize:

  How are mixtures different from solutions? How are they the same?

- Text to Self Connection:

  When people cook they often use mixtures and solutions. Have you ever cooked and made a mixture or a solution? What did you make?

- Extension: *Compare and Contrast*

  Create a Venn Diagram and compare and contrast mixtures and solutions.

Sight Words I Used:

define
digestion
disappear
exist
flow
melt
mixture
slip

Vocabulary Check:

Use glossary words in a sentence.

Matter

My Science Library's rich, content-filled text and beautiful photographs bring science and the scientific process to life for readers. The series includes interesting facts about the Earth, the solar system, matter, energy, forces and motion, and life on our planet. The engaging text makes learning about science fun.

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