

Solids, Liquids, and Gases

A Science A-Z Physical Series

Word Count: 922



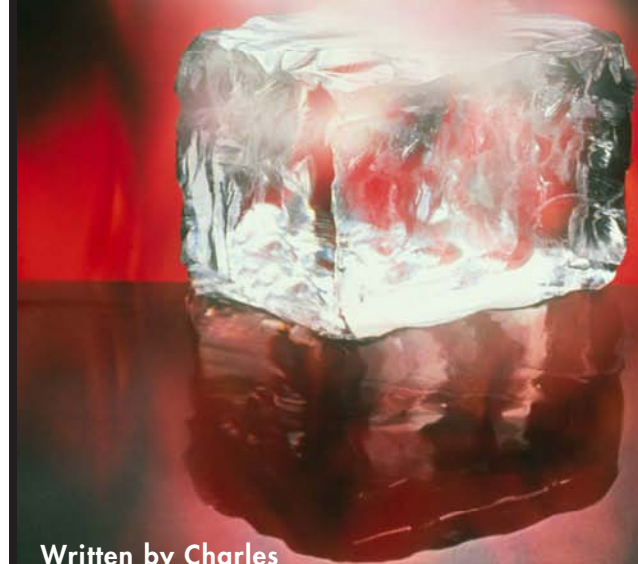
 **Science a-z**

Visit www.sciencea-z.com

•  **Science a-z**



Solids, Liquids, and Gases



Written by Charles
and Natalie Barman

www.sciencea-z.com

Solids, Liquids, and Gases



Written by Charles and Natalie Barman

www.sciencea-z.com

KEY ELEMENTS USED IN THIS BOOK

The Big Idea: All things on Earth consist of matter. The most common states of matter are solids, liquids, and gases. Matter can change from one state to another. Matter in each state has identifiable properties. When matter combines, a mixture may form. The components of that mixture may retain their individual properties when combined, or the mixture may take on new properties. What allows us to have so many different things all around us is that matter can be found in various states, and it combines with other matter in many ways. It is useful to understand how materials may change when combined or when subjected to changes in temperature. This knowledge can keep us safe, and it has led to the development of medicines, fuels, recipes, and much, much more.

Key words: air, air pressure, condense, evaporate, freeze, gas, heat, liquid, matter, melt, mixture, properties, sand, shape, size, solid, solution, states of matter, substance, surface, temperature, water, water vapor

Key comprehension skills: Classify information

Other suitable comprehension skills: Compare and contrast; cause and effect; main idea and details; identify facts; elements of a genre

Key reading strategy: Summarize

Other suitable reading strategies: Connect to prior knowledge; ask and answer questions; visualize; using a table of contents and headings; using a glossary and boldfaced terms

Photo Credits:

Front cover: © Mehau Kulyk/Photo Researchers, Inc.; back cover, page 16 (top): © Michael Flippo/Dreamstime.com; title page, page 12: © iStockphoto.com/Kevin Thomas; page 3: © iStockphoto.com/Antonis Magnissalis; page 4: © iStockphoto.com/Nina Shannon; page 5 (top left): © Hemera; page 5 (top right, bottom left, bottom right): © Jupiterimages Corporation; page 5 (center): © Luminis/Dreamstime.com; page 6 (left): © iStockphoto.com/Aolr; page 6 (right): © iStockphoto.com/Julian Rovagnati; page 7: © Uatp 1/Dreamstime.com; page 8: © Fouquin Christophe/123RF; page 9: © Suttisukmek/Dreamstime.com; page 10 (left): © iStockphoto.com/Hilary Brodey; page 10 (top right): © iStockphoto.com/Darren Hendley; page 10 (bottom right): © Renzzo/Dreamstime.com; page 11 (top left): © iStockphoto.com/David Morgan; page 11 (top right, bottom): © iStockphoto.com/Don Nichols; page 13: © iStockphoto.com/Sergey Below; page 14: © iStockphoto.com/Alea Image; page 15 (left): © iStockphoto.com/Johanna Goodyear; page 15 (center): © iStockphoto.com/Shawn Gearhart; page 15 (right): © iStockphoto.com/AC_BNPhotos; page 17: © Learning A-Z; page 18 (top left): © iStockphoto.com/Andi Berger; page 18 (top right): © iStockphoto.com/Daniel Bendjy; page 18 (bottom right): © iStockphoto.com/Marzanna Sincer

Solids, Liquids, and Gases

© Learning A-Z

Written by Charles and Natalie Barman

All rights reserved.

www.sciencea-z.com

Table of Contents

Introduction	4
Matter.....	6
Changing Matter	12
Combining Matter.....	15
Conclusion	18
Glossary	19
Index	20



Ice cream and whipped cream are solids that melt to liquids.

Introduction

Look around you. What do you see?
Look at the book you are reading.
Does it have a certain shape? What about the air you breathe? Can you feel it, smell it, or taste it? What about water from a drinking fountain? Can you see it and feel it? Does it have a certain size or shape?



Does water have a shape?



Your world is made of many objects and **substances**. Each has its own **properties**. These properties may include color, size, **temperature**, a certain shape, or being able to change shape easily. An object might feel rough or smooth, soft or hard, wet or dry. In this book, you will learn about the objects and substances all around you. You will also learn how these substances change.

Matter

The things around you that take up space are known as **matter**. Your desk, the milk you drink, and the air inside a basketball are matter. They all take up space. A grain of sand is a small bit of matter. It takes up a small amount of space. The water in a swimming pool takes up a lot of space.



Pouring milk into a glass moves the air in the glass. When you drink milk, air moves back into the glass.



Matter comes in three main forms. These forms are called the **states of matter**. Let's look at the picture of a fish tank. You can see gravel at the bottom of the tank. You can also see fish and decorations. These things each have a specific shape. Their shape stays the same when moved from place to place. They also take up a certain amount of space. Each of these things is a type of matter called a **solid**.

The water that the fish swim in does not keep the same shape when poured or spilled. For example, if the water in the tank were poured into a large, round bowl, it would take the shape of the bowl. Water is a type of matter called a **liquid**. Liquids do not keep the same shape when moved from one container



to another. They also cannot be squeezed into a smaller space.



Liquids take the shapes of their containers.



Air in the water forms bubbles of gas.

In this fish tank, an air pump brings air from outside the tank into the water. You can see the bubbles made by the air. But you can't see the air in a classroom. Air in the classroom and in the bubbles is in a state of matter called a **gas**. Like other gases, air is invisible.

Gas takes up space, just as liquids and solids do. The air bubbles in the fish tank take up space. You can see a balloon get bigger as more air is blown into it.

But gases are also different from liquids. Unlike liquids, gases can be squeezed into a smaller space. When you fill a balloon with air, the air pushes against the inside of the balloon and makes it harder. However, if you add too much air to a balloon, the balloon stretches until it pops.



Air is a gas that can fill a balloon. But the balloon will pop if you add too much air.

Things like tires need the right amount of air. If a tire does not have enough air, it will be flat. If it has too much air, it will explode. Look on the edge of a tire. A number tells you the amount of air to put into the tire.



PSI is a measure of pounds per square inch, or air pressure.



Changing Matter

Matter can change from one state to another. Have you ever made your own Popsicles by freezing a fruit drink in an ice cube tray? If you have, you changed a liquid into a solid by lowering the temperature. When you eat a Popsicle on a hot day, the Popsicle melts and drips down your fingers. By taking heat away, you can change a liquid into a solid. By adding heat, you can change a solid back into a liquid.



A Popsicle melts when it gets warm.



This liquid water will evaporate, or turn to gas, faster if it is warm.

Have you ever spilled some water and forgotten to clean it up? When you look at where you spilled the water the next day, you can't see it. It changed into an invisible gas called **water vapor**. When liquid water changes to a gas, it **evaporates**. The change of a liquid to a gas is called *evaporation*.

Have you ever seen water form on the outside of a glass of ice water? Where did this water come from? The water on the outside formed when water vapor in the air touched the cold glass. The water vapor in the air cooled when it touched the cold glass. This cooling changed it to a liquid. When a gas changes to liquid, it **condenses**. The change is called *condensation*.



The water on the outside of the glass did not come from inside it.

Combining Matter

It may seem easy to identify different states of matter. In many cases, this is true. But sometimes it is not so easy. Let's think about lunch. Let's pretend that you are going to have chicken soup, crackers, a cheese sandwich, and a glass of lemonade.



What states of matter are mixed together in this lunch?

15

You probably identified the crackers and cheese sandwich as solids. But what about the other food items? How would you describe the soup? The soup contains liquid. But it also has some solid pieces of chicken, vegetables, and noodles. Because the soup has two states of matter, it is called a **mixture**.

Lemonade is another kind of mixture. It is made of lemon juice (liquid), water (liquid), and sugar (solid).



16

Gases can also be mixed with liquids. Soda pop is a mixture of gases and liquids. The bubbles you see rise to the top of the soda pop are gases moving to the surface.

Solids can be mixed with solids.

Sand and sugar can be mixed.

Gases can be mixed with gases.

Air is a mixture of 14 gases.

Do You Know?

You can separate the salt from a solution of salt water by letting the water evaporate. When all the water has evaporated, only the salt is left behind. It sticks to the glass.



Conclusion

Everything that takes up space is made of matter. Common states of matter are solids, liquids, and gases.

By changing the temperature, matter can change from one state to another. Water is matter that we see change states almost every day. It changes between solid, liquid, and gas. Where might you find all three states of water on the same day?



Which states of water do you see?



Glossary

condenses	changes states from a gas to a liquid, mainly due to the temperature getting cooler (p. 14)
evaporates	changes states from a liquid to a gas, mainly due to the temperature getting warmer (p. 13)
gas	matter that can freely change shape and size; often it can't be seen (p. 9)
liquid	matter that keeps its size but takes the shape of its container (p. 8)
matter	anything that takes up space and has weight (p. 6)
mixture	a combination of substances in which a chemical reaction does not occur (p. 16)
properties	features or qualities that can be used to describe something (p. 5)

solid	matter that keeps its shape and size (p. 7)
states of matter	the solid, liquid, or gaseous condition of a substance (p. 7)
substances	particular kinds of materials (p. 5)
temperature	the measure of how hot or cold something is (p. 5)
water vapor	the state of water in which it is an invisible gas (p. 13)

Index

air pressure, 11
gases, 9, 10, 13, 14, 17, 18
liquids, 3, 8–10, 12–14, 16–18
mixture, 16, 17
properties, 5
sand, 6, 17
solids, 3, 7, 9, 12, 16–18
water, 4, 6, 8, 9, 13, 14, 16–18