

Name \_\_\_\_\_

Date \_\_\_\_\_

Block \_\_\_\_\_

## Lesson 2.3: Solids, Liquids & Gases

In Lesson Cluster 1 you studied the three states of a single substance – water. In this lesson cluster you have studied several other substances: sugar, alcohol, oxygen, and so forth. Try using what you know about these substances to think about these questions:

How are all substances alike?

How are substances different from each other?

There are many possible answers to the above questions. Substances are alike and different in many ways. Here are three correct answers that are very important:

1. All substances are alike in that they are all made of molecules.
2. Substances are alike in that they are found in three basic states: solid, liquid, and gas.
3. Different substances are made of different molecules. (Pure substances like water and sugar are made of only one kind of molecule. Mixtures like air and wood contain different kinds of molecules mixed together.)

In this lesson you will be thinking about the molecules of solids, liquids, and gases. In what way are the molecules of all solids alike? In what ways are the molecules of different solids different? What about liquids and gases? You can think about these questions by discussing some substances that you are already familiar with.

Let's start with solids. Solids of different substances, like salt, steel, and sugar, are made of different kinds of molecules, but all solids are alike in the arrangement and motion of their molecules. All solids are made of molecules that are close together and locked into a rigid pattern. They move by vibrating in place and bumping into each other.

Similarly, different liquids such as water, alcohol, and gasoline are made of different kinds of molecules, but all liquids are alike in the motion and arrangement of their molecules. All liquids are made of molecules that move around freely but stay close together. The molecules of liquids slide past each other and are constantly bumping into other molecules.

Different gases such as water vapor, oxygen, and carbon dioxide are made of different kinds of molecules, but all gases are also alike in the motion and arrangement of their molecules. All gases are made of molecules that are far apart from each other and moving freely through space. Sometimes gas molecules collide with other molecules or with objects.

Now you have learned a lot about solids, liquids, and gases of different substances. You have learned that all solids, liquids, and gases are made of molecules. Different substances are made of different kinds of molecules, but the motion and arrangement of molecules is about the same in all solids. All liquids also have molecules that move and are arranged in similar ways. So do all gases.

You also know that some substances are pure substances; all their molecules are the same. Most substances, though, are mixtures, of different kinds of molecules. Soon, you will study a gas that is a mixture of several different kinds of molecules. We can't see this gas, but it is very important to us. The gas is air.

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### Question Set 2.3: Solids, Liquids & Gases

1. Pick a different solid, liquid and gas other than ice, liquid water or water vapor. Then, fill out the chart below.

a. Write the substances that you picked:

b. What does a single molecule look like? (make up a shape!).

c. Draw the **arrangement** and **motion** of the molecules of the substance. Remember to include ARROWS!

**Solid**

**Liquid**

**Gas**