

Name _____

Date _____

Block _____

Lesson 6.3: Gases and the Dancing Dime

Solids expand when they are heated and contract when they are cooled. So do liquids. It probably won't surprise you that gases act the same way. Gases also expand when they are heated and contract when they are cooled.

The molecules of a hot gas move faster than the molecules of a cold gas, so they hit each other harder and also bounce harder off the sides of a container. This makes the molecules move farther apart and push the sides of a container outward.

Cooling is just the opposite. The molecules slow down, so they don't hit each other or the walls of a container as hard, and they move closer together.

Do you remember when you studied expansion and compression of gases in Lesson Cluster 5? Now you know two ways of moving the molecules of a gas closer together or farther apart!

In Lesson Cluster 5 you moved the molecules of gases closer together by pushing them together with pressure from something like a syringe or a bicycle pump. Another way to move the molecules closer together is to cool off the gas. Then the molecules slow down and move closer together even without an extra "push."

In Lesson Cluster 5 you moved the molecules of gases farther apart by releasing pressure, like when you released the plunger of the syringe or let the air out of the bicycle tire. Another way to move the molecules farther apart is to heat the gas. Then the molecules move faster and push each other farther apart.

Let's try that other way of getting gases to expand. The dancing dime will help you see it happen!



Activity 6.3: The Dancing Dime

1. Your teacher will give you an empty soda bottle from the refrigerator. The bottle isn't really empty, though.
 - a. What substance is inside it?
 - b. Do you think that substance is hot or cold?
2. Wet the rim of the bottle and place a coin on it. Make sure that the space between the coin and the rim is wet enough to seal the opening so that nothing can get in or out. Wrap your hands around the bottle to warm it, but don't squeeze. What happened? Record your observations below.
3. Use what you know about substances and molecules to explain what happened.

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4. Instead of placing a coin on the rim of a cold soda bottle, my friend placed a balloon over the rim.
 - a. What do you think will happen to the balloon as the bottle gets warm?

 - b. Use what you know about molecules to explain what will happen to the balloon.

 - c. My friend said that if you turn the soda bottle upside down, the balloon will get smaller. What do you think? Use what you know about molecules to explain your answer.

Cluster 6 Summary

This lesson cluster is almost over. You knew before this lesson cluster that all substances are made of tiny particles called molecules. You knew that molecules are always moving. In this lesson cluster you learned another important idea. The temperature of a substance tells you something about how fast the molecules are moving.

Heating a substance makes the molecules move faster. Cooling a substance makes molecules move slower.

The motion of the molecules explains why solids dissolve faster in hot water, as well as thermal expansion and contraction.

1. Try to summarize the main points of this lesson cluster by answering the two questions below. Talk about substances and molecules in each answer.
 - a. What happens when substances are heated?

 - b. What happens when substances are cooled?

2. Is it correct to say that heat makes the **molecules** of a substance expand? Why or why not?