How Do Molecules Move?

Estimated Time:
Prep: 10 min.
Activity: 15 min.

Introduction

Overview

Experiment: Students use hot water to brew tea efficiently.

Key Concepts: Students will understand that **heat** is **energy** that is transferred from a hot object to a cool object. Students will also learn that heat makes **molecules** in water move faster.

Lead-In

Show photos or illustrations of heat sources, such as the sun, a stove, a candle, or fire, and ask students what the objects have in common. Elicit the response that they are all sources of heat. Have students brainstorm other heat sources. Ask them to explain why heat is an important energy source. Does heat feel cool or warm? How does heat warm other objects? Explain that students will learn more about how heat works in this week's experiment.

Teacher Preparation

Lead-In Materials:
- Photos or illustrations of heat sources (sun, stove, candle, fire, etc.)

Teacher-Provided Experiment Materials:
- Tea bags
- Hot water
- Cold water

Try This! Materials:
- Wooden spoon
- Metal spoon
- Bowl of hot water

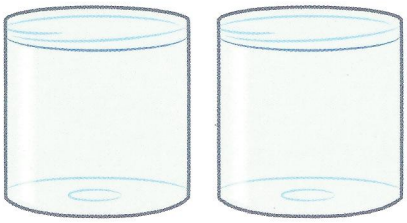
Prepare:
- Make copies of the Experiment Sheet.

Note: Use hot water from the faucet for this experiment. Check temperature to ensure it is safe for children to handle.

Vocabulary

- **energy** power that can be used to be active or do work
- **heat** energy that causes things to become warmer, evaporate, expand, or undergo a change; associated with the motion of molecules
- **molecule** the smallest particle of a substance; it has all the properties that make up the substance

You Will Need



2 clear plastic containers

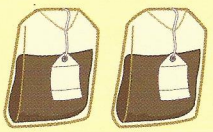
write & wipe marker

stopwatch

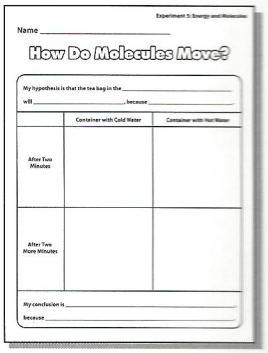
Teacher-Provided Materials

hot water

cold water



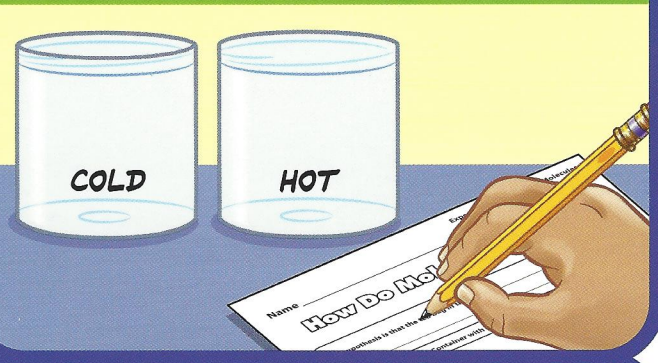
2 tea bags



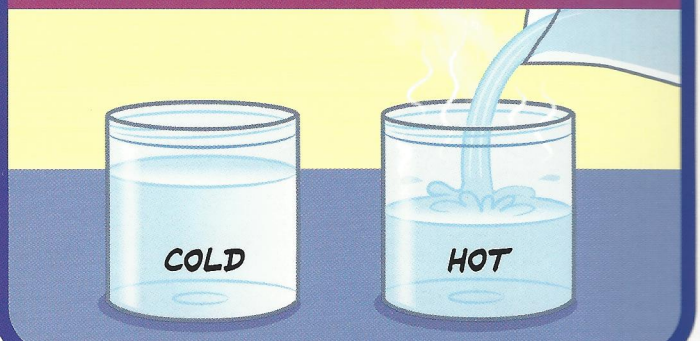
Experiment Sheet

Procedure

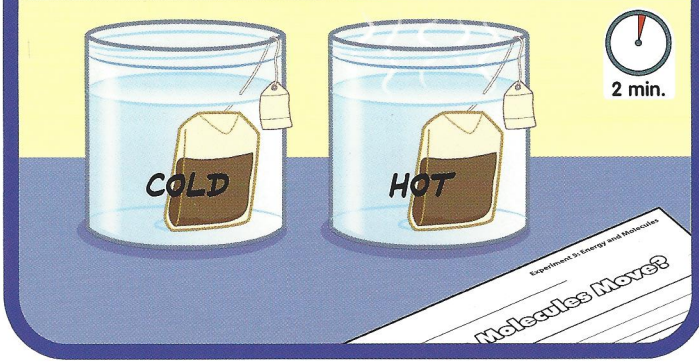
1 Read steps 1–4. Record your hypothesis on the Experiment Sheet. Label one container "Hot" and the other "Cold."



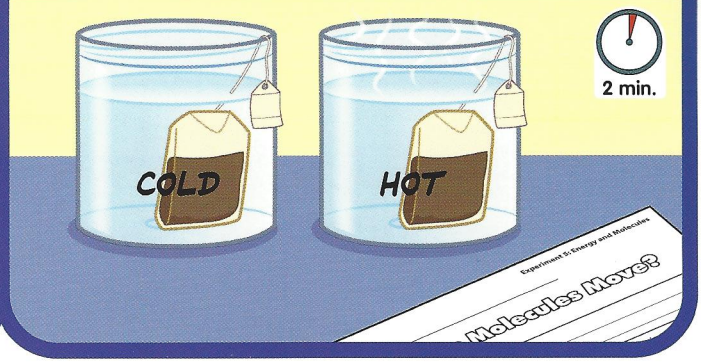
2 Fill the "Hot" container with hot water. Fill the "Cold" container with cold water.



3 Place a tea bag in each container. Set the timer on the stopwatch for two minutes. Record your observations.



4 Set the timer for another two minutes. Record your observations.



Name _____

How Do Molecules Move?

My hypothesis is that the tea bag in the _____

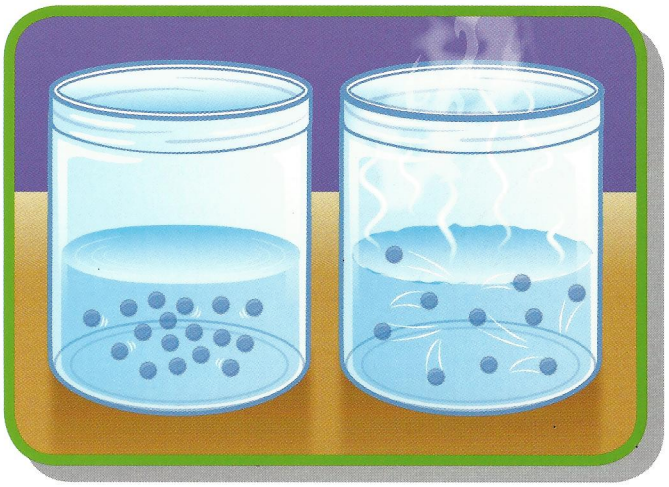
will _____, because _____.

	Container with Cold Water	Container with Hot Water
After Two Minutes		
After Two More Minutes		

My conclusion is _____,

because _____.

Why?



All matter is composed of molecules, which are always in motion. When matter is heated, molecules begin to move much more rapidly, increasing the temperature of an object. When a hot object is near a cool object, the heat energy transfers to the cool object. In the experiment, hot water mixed with the tea molecules much more rapidly, so the tea in the hot water brewed much faster than the tea in the cold water. When both containers reach room temperature, the tea in each will look the same.

Discussion Prompts & Questions

- Which container brewed tea faster? Why?
- How does heat change the temperature of objects?
- Which tea bag do you think probably felt warmer? Why?
- Why do people brew tea in the sun?

Sentence Frames

- The tea in the hot water brewed _____ (*faster or slower*) because _____.
- The tea in the cold water brewed _____ (*faster or slower*) because _____.
- Heat can cause changes because _____.
- When an object is heated, the molecules move _____.

Try This!

Have students learn how different materials conduct heat. Place a metal spoon and a wooden spoon into a bowl of hot water. Wait several minutes. How does each spoon feel? Why does the metal spoon feel hot? Why does the wooden spoon stay cool?