



Convection Currents

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Target Grade: Grades 6-12

Time Required: 10 minutes

Standards/Topics Covered:

NGSS Standards

- HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.

Central Focus:

In this activity, students will discover convection currents through mixing hot and cold water. This activity could be used as a discussion starter on heat transfer, thermal energy, and Earth's systems. Students can learn about conduction and radiation through the [Radiated Marshmallows](#) activity.

Background Information:

Convection occurs in liquids and gases. In convection, the warmer gas or liquid rises to the cooler areas of the liquids or gas. An example of this would be boiling water. The hot, bubbling water moves to the top, pushing the cooler water closer to the heat source. This creates a cycle of hotter water moving to the top.

Materials

- 4 small, empty baby food jars
- Food coloring (yellow and blue work best)
- Hot and cold water
- Laminated index card

Instructions

- Fill one baby food jar so that it nearly overflows with hot water
- Similarly, fill a second baby food jar with cold water
- Add yellow food coloring to one jar and blue food coloring to the other jar
- Place the hot jar on the table
- Cover the cold jar with a laminated index card
- Turn the jar upside down (be careful to not spill any of the water)



- Place the cold jar on top of the hot jar
- Gently remove the index card
- Repeat the experiment with the cold water on bottom and the hot water on the top

Closure

1. What did you observe when the index card was removed each time?

When the jar with cold water was placed on top of the hot water jar and the index card was removed, the yellow and blue water mixed, creating green. When the jar with the hot water was placed on top of the cold water jar and the index card was removed, the colors did not mix.

2. What caused the water to move when the cold water was on top but stay in place when the hot water was on top?

Convection currents explain why the water mixed with the cold water jar on top, but remained separate with the hot water jar on top. This is because warm water (and air) rises and cold water sinks, causing the jars to mix water. In the second experiment, the hot water is already at the top and the cold water at the bottom, keeping the two colors (and temperatures) separate.

