



# Try This at Home Science: Convection Currents

## Activity Overview:

Observe how convection currents are formed and how air currents interact in the atmosphere.

## Advance preparation:

Microwave a small amount of water in a microwave-safe container for 20-30 seconds, or until hot. Use adult supervision if using the stove to heat water.

## Materials:

- Clear rectangular storage container or large vase with room temperature water filling two-thirds of the container
- 2 small containers (empty film canisters or condiment containers work great)
- Hot water
- Ice cold water
- Red and blue food coloring
- Two sheets of aluminum foil large enough to cover the tops and sides of the small containers
- Two rubber bands
- Pennies or marbles (to weigh down the container)
- Pencil

## Try this!

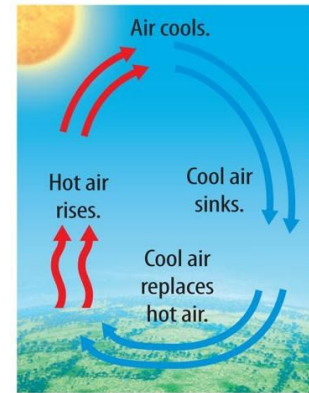
1. Add 4 pennies or 1 marble to each small container. Then fill one container with hot water and the other container with cold water.
2. Add five drops of red to the hot water container and five drops of blue food coloring to the cold water container.
3. Cover both containers with aluminum foil, then secure with a rubber band so the foil stays in place.
4. Place both containers into the larger, clear container filled with room temperature water.
5. Poke several holes into the foil covering.
6. Observe how the colored waters interact.

## What's happening?

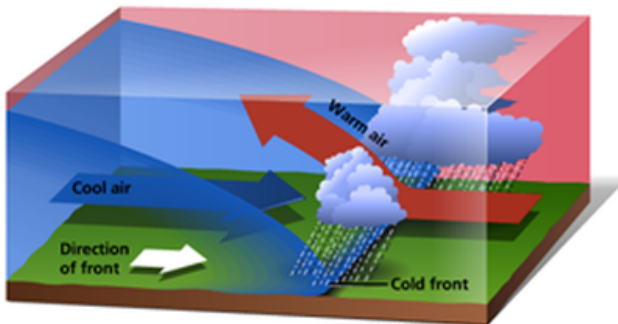
In the experiment you will notice that the blue water will stay close to the bottom of the container while the red will rise to the top. This happens for the same reason that hot air rises in the atmosphere. Hot air is less dense than cold air. When something is less dense than its surroundings, it will tend to float or to rise. Cold air is denser than its surroundings so it will sink to Earth's surface. We see the same thing happening with our hot and cold water. We call this process convection.

## How does this relate to weather on Earth?

During the day the energy from the Sun heats up the Earth's surface along with air and water molecules. As the air warms, it rises until it reaches a height where the temperature begins to drop. As the temperature drops in the atmosphere, the warm air cools and sinks back down to Earth where it then replaces the hot air that has risen. This creates an air current which can result in anything from a light breeze to gusts of wind.



The act of the cold air sinking and the warm air rising is what creates the convection current. The cold air slides underneath the warm air to replace it. This is what can be observed in our experiment. The mixing of the colored waters observed in the experiment would be similar to



when a cold front and warm front collide in our atmosphere, and this is when storms occur in nature. When cold and warm fronts collide the cold front slides underneath the warm front rapidly. This causes the air on the edges to mix, resulting in condensation as clouds and the precipitation that follows. If this process happens very quickly, this can result in tornadoes on land or hurricanes over water.

## Now try...

- What happens when you slowly pour or drip the ice cold blue or hot red water into the rectangle container? What did you notice?
- Use warm-hot water in the large rectangle container instead of room temperature water and repeat the experiment. What do you notice?
- Use cool-cold water in the large rectangle container instead of room temperature water and repeat the experiment. What do you notice?
- Replace the ice cold water with a dyed ice cube. Repeat the experiment and observe.

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