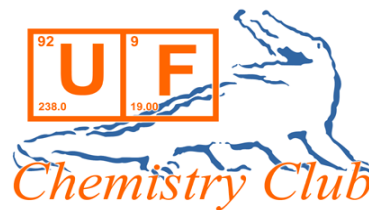


University of Florida Chemistry Outreach Program

Make a Thunderstorm



Estimated Time: 15 mins. + 15 mins. clean-up

Topics: Weather

Introduction: Florida is the state of thunder, meaning there are more thunderstorms in this state than in any other. A thunderstorm forms when a body of warm air is forced to rise by an approaching cold front. A thunderstorm is therefore caused by unstable air and convection.

Objective: The experiment is designed to teach students about the origin of thunderstorms, and introduce the concept of convection.

Materials: - Clear, plastic container (size of shoebox)
-Red food coloring
-Ice cubes made with blue food coloring

Safety: -Remind students there is NO eating or drinking in the lab.

Procedure:

1. Fill the plastic container two-thirds full with lukewarm water.
2. Let the water sit for one minute.
3. Place a blue ice cube at one end of the plastic container.
4. Add three drops of red food coloring to the water at the other end of the plastic container.
5. Observe and record results. Students should observe ‘convection;’ essentially, the blue/cold water will sink while the red/warm water swirls and rises above it. This model mimics what happens when warm air meets a cold front, causing a storm.

Discussion:

1. What does the blue water and the red water represent?
The blue water represents the cold front and the red water represents the warm air.
2. What happens to the warm air as a cold front approaches?
The warm air is forced to rise therefore causing a thunderstorm.
3. Describe the process of convection using the results of the lab.
The blue and cold water sinks while the red and warm water rises. This happens because of convection.

Thunderstorms occur in the presence of large amounts of condensation in the atmosphere, usually when high quantities of moisture in the lower atmosphere mix with dramatic falls in air temperature (usually brought upon by a cold front). Unequal warming of the earth’s surface, mountainous regions which interfere with air flow, and other atmospheric conditions all contribute to a rapid upward motion of condensation which results in stormy weather.

Convection refers to the free movement of liquids or gases internally due to transfers in heat. Heated “fluid” (liquids or gases) rise while cooler fluids sink. This process is observed in the lab when the red food coloring surfaces while the blue/icy water swirls toward the bottom. Convection currents are frequently studied to understand both atmospheric and oceanic weather patterns. Convection cycles are important to understanding why certain areas of the globe can remain habitably warm despite extremely low atmospheric temperatures (for instance, warm water in oceans surrounding Europe will temper cold temperatures during the winter months,

while cooler water alleviates the hotter temperatures around Florida, the South American continent, and similar areas).

Source: This lab is a modified version of a similar activity from UCAR/NCAR Web Weather for Kids