

RAFT IDEAS

Topics: Heat, Convection

Materials List

- ✓ Soap containing the ingredient Glycol Stearate
- ✓ Plastic container with a flat bottom
- ✓ Water
- ✓ Warm surface, such as a container of hot water
- ✓ Food Coloring (optional)

This activity can be used to teach a variety of topics that align to standards of almost every grade (such as energy and observation), but aligns especially well to:

Next Generation Science Standards:

- Energy can be transferred from place to place and converted from one form to another (Grade 4, Physical Science 3-2)
- Properties of materials (Grade 5, Physical Science 1-3)



Convection in a Tub

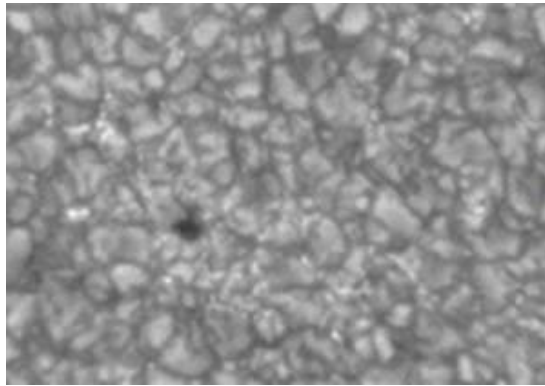


Image of convection cells on the surface of the Sun, called granules

Convection is a method of energy transfer that occurs in fluids. In this activity, students observe convection in a pearly-soap medium in order to observe the formation of convection cells. These types of cells can also be observed on the surface of the sun and in many contexts here on Earth.

To Do and Notice

1. Add one part Glycol Stearate soap to four parts water in your plastic container. Be sure to add the water first so that you minimize the creation of bubbles. Gently mix together. If you want to add food coloring to help make the convection cells a little easier to see, add a couple drops at this point.
2. Place the plastic dish onto a warm surface and watch what happens over the next couple of minutes. Someone with very warm hands will work, as will holding the plastic dish above a container of hot water (don't place the dish in the water, as this will lead to heating from the side of the container which will make the convection cells harder to see).
3. Observing from above, you will begin to see pools of material that well up and appear to be doing a slow "boil". It may take a couple of minutes for this to occur. You are seeing the top of a convection cell. If you have a clear container and can view it from the side, you might be able to observe streams of material moving upward and streams of material moving downward.

The Science Behind the Activity

Convection is a heat transfer mechanism that involves flowing material. It occurs in fluids because their density varies with temperature. Typically, warmer fluids are less dense, colder fluids more dense. As a result, warmer areas of fluid will rise, and colder areas of fluid will sink. The combination of uprising and falling material creates a loop-like flow that is called a convection cell.

The Glycol Stearate used in this demo has long skinny molecules that reflect light and show the direction of the fluid flow. These types of flows occur in many situations, such as in the earth's mantle, where convection helps transport energy from the earth's center outward towards the crust, causing plate tectonics. It also occurs in the atmosphere, where convection cells are an important mechanism in our weather patterns.

Web Resources - (Visit www.raft.net/raft-idea?isid=53 for more resources!)