

RAFT IDEAS

Topics: Water Cycle, Solar Energy, Mixtures

Materials List

- ✓ Cover from a bulk CD container (50 or 100)
- ✓ Dark colored paper (e.g., file folder)
- ✓ Collection cup, (best if translucent or white and made of plastic or foam)
- ✓ Plastic wrap or bag, clear
- ✓ Rubber band that will fit around the CD cover
- ✓ Marble
- ✓ Food coloring
- ✓ Measuring cup
- ✓ Weight for cup, (e.g., marble)
- ✓ Water
- ✓ Tape

This activity can be used to teach:

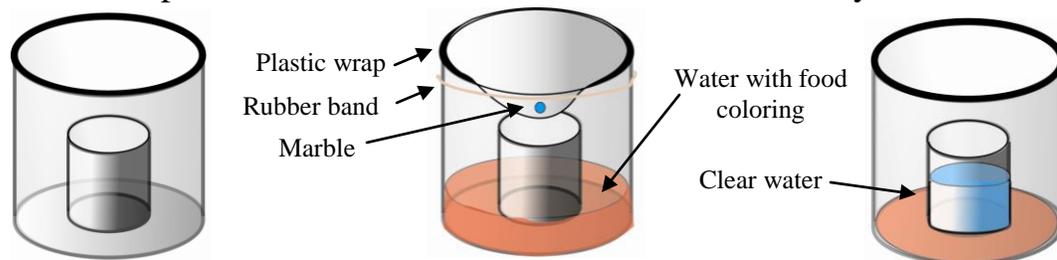
Next Generation Science:

- Structure of matter (Grade 5, Physical Science, 1-1)
- Changes of state (Middle School, Physical Science, 1-4)
- Thermal transfer (Middle School, Physical Science, 3-3)
- Hydrosphere & Water Cycle (Earth & Space Science, Grade 5, 2-1; Middle School, 2-4)



Still Water

Explore Solar Water Distillation and the Water Cycle



Demonstrate a mini water cycle and the power of solar energy by building a simple still to “purify” water that has been “contaminated” with food coloring.

Assembly

1. Wrap a section of dark colored paper or file folder, with the darkest side inward, around the cover of a bulk CD container. Mark and trim as needed so the paper section will cover the sides but not go beyond the top or bottom of the cover.
2. Tape the material to the cover. If the section does not completely encircle the cover then use another section to fill in the gap.
3. Add 1 cm (~1/2”) of water and a drop of food coloring to the inverted cover.
4. Place a cup in the CD container. If the cup floats or does not stay centered add a weight, such as a clean rock or marble, to the cup.
5. Cover the top of the cover with a sheet of clear plastic. Secure the edges of the sheet to the cover with a rubber band. Push down on the center of the sheet to create an inverted cone-like shape positioned over, but not touching, the cup.
6. Place a marble in the cone and tug on the plastic sheet to smooth the sides so that when water condenses on the plastic the water drops will slide toward the cup.

To Do and Notice

1. Place the solar still in a suitably sunny location and secure in place if windy.
2. Note the time. Check the cover at regular intervals and note the time when droplets of water start condensing on the plastic sheet.
3. At a later time, remove the plastic sheet, dry off the bottom of the cup, if needed, and note the time and the color of the water in the cup. **Do not drink the water!**
4. Measure the amount of water in the cup.

The Science Behind the Activity

Sunlight hits the dark sides of the container directly or after passing through the plastic sheet. The light is absorbed by the dark material and the colored water, which both heat up. The light is reflected from the white/translucent surfaces of the cup. The thin, clear plastic sheet, being in contact with the outside air, stays relatively cool. Warm water evaporates more quickly than cooler water. The evaporated water condenses on the cooler plastic sheet rather than the warmer container. The droplets slide down the plastic cone shape and then drop into the cup. The clear distilled water will also evaporate but at a slower rate than the dark “contaminated” water.

Taking it Further

How could the still be modified to increase the rate of evaporation? Would having a dark covering on the bottom of the container speed evaporation?

Web Resources (Visit www.raft.net/raft-idea?isid=506 for more resources!)

Distillation - http://itdg.org/docs/technical_information_service/solar_distillation.pdf