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Educational Innovations Inc.®

Rheoscopic Fluid

RH-100

With Rheoscopic Fluid, one is able to see minute flow patterns in a liquid. The effect of stirring, heating, and cooling small portions of the liquid in the container results in beautiful flow patterns.

Explanation:

Rheoscopic Fluid consists of a suspension of flat particles which are slightly denser than water. When at rest, the particles will settle to the bottom. Shaking or stirring brings them back into suspension. Small groups of flat particles position themselves in the stream of flowing liquid the same way. As these groups twist and turn, sometimes the flat sides of the particles face us and reflect more light; sometimes the edges of the particles face us and reflect less light. This explains why we easily see the swirling patterns. Food coloring is often used to more easily see the swirling patterns.

NGSS Correlations:

Our Rheoscopic Fluid and these lesson ideas will support your students' understanding of these Next Generation Science Standards (NGSS):

Elementary

2-PS1-1
Students can use Rheoscopic Fluid to plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

2-PS1-4
Students can use Rheoscopic Fluid to collect data to construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

4-PS3-2
Students can use Rheoscopic Fluid to make observations to provide evidence that energy can be transferred from place to place by heat currents.

Middle School

MS-PS3-3
Students can use Rheoscopic Fluid to apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-4
Students can use Rheoscopic Fluid for an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

MS-ESS2-6
Students can use Rheoscopic Fluid to observe and use in a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

DCI-MS/PS3.A:
Definitions of Energy.
The temperature is a measure of the average kinetic energy of particles of matter.

High School

HS-PS3-4
Students can use Rheoscopic Fluid to plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (Second Law of Thermodynamics).

HS-ESS2-4
Students can use Rheoscopic Fluid to observe and use in a model to describe how variations in the flow of energy into and out of Earth systems result in changes in climate.

Suggested Activities

Activity 1:

Pour Rheoscopic Fluid into a clear, colorless container such as a beaker.

1. How does stirring affect the flow pattern? Stirring in a figure eight pattern is considered by some to be the most efficient method for stirring. Do you think this is true?

2. Hold a piece of ice near the edge of the container with a small portion of it below the surface of the liquid. What do you observe?

3. Place a small warm object such as a glass stirring rod or a metal spoon below the surface of the liquid and near the side of the container. What do you observe? Can you tell when the object becomes the same temperature as the liquid?

4. What happens when you place drops of hot water into the container near the side?

5. What happens when you place drops of cold water into the container near the side?

6. What happens when you place drops of the solution into the container from various heights? Note: In this case the drops and the solution will be at the same temperature.

Activity 2:

Pour Rheoscopic Fluid into a flat tray with low sides. The advantage of using a clear, colorless tray is that different sheets of colored paper can be placed under it.

1. Set a drinking glass into the solution, resting on the bottom of the tray. Drag a flat spatula through the liquid and notice the flow patterns around the drinking glass.

2. Set other objects into the solution and notice the flow patterns around them. How do the flow patterns differ around objects with sharp right-angled edges vs. more rounded edges? Around objects slightly below the surface of the liquid?

3. Use clay to produce barrier outcroppings along the edge of the tray. How does this affect the flow patterns?

4. Try blowing through a straw to investigate the effect of air currents.

Take Your Lesson Further

As science teachers ourselves, we know how much effort goes into preparing lessons.
For us, "*Teachers Serving Teachers*" isn't just a slogan—it's our promise to you!

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http://blog.TeacherSource.com

Foucault's Pendulum (PIT-120)

This pendulum is mesmerizing to watch as it traces beautiful Lissajous patterns in sand. A favorite of elementary school science tables, it can be used at upper levels to study harmonic motion as energy is transferred from a pendulum swinging in one plane to swinging in another plane at right angles. A Lissajous figure results from the two sine curves meeting at right angles.

Color Splash Tablets_ (CSP-100)

Finally a STAIN-FREE alternative to food coloring! The tablets are available in the primary colors of blue, red, and yellow. From these colors, your students can create more than two dozen different colors. Each tablet contains a small amount of baking soda to help in the dissolving process.

The Spill Not (PHY-300)

The SpillNot is a fabulous solution to the ubiquitous problem of spills when carrying liquids. The fundamental laws of physics will easily and surprisingly keep the contents in the container! A very functional item that also graphically illustrates the effects of centripetal force. Your cup will not runneth over!

Rattlebacks (SS-310)

A Rattleback is a half-ellipsoid object carved so that it will spin in only one direction. Accidentally discovered by archaeologists, this curious object was first dubbed a celt stone, named after the prehistoric axes and adzes they were studying. Idly spinning one of these ancient tools on the table, these scientists must have been surprised to discover that the seemingly normal piece of carved stone would spin freely in one direction but would reverse itself if spun in the other direction.