POLAR TREC
Learning Resources

Details

Completion Time: About one period

Mystery Solution Lab

Overview
Through investigation, you will determine which solution has the highest density.

Objective
To determine, through experimentation, which of a variety of solutions has the highest density.

Preparation
Background: The waters of the ocean are constantly moving in many different ways. The surface of the ocean rises and falls in rhythm. These movements, in the form of waves, include the tides, tsunamis, and swells of ocean beaches. Below the surface, ocean currents contribute to the heat transport from the tropics to the poles, partially equalizing Earth's surface temperatures. As a result, ocean circulation patterns influence climate and living conditions for life both in the ocean and on land. While you can easily see surface water moving, it is sometimes difficult to recognize that the water below the surface also has motion. Deep water currents are mainly caused by differences in the density of water. The density or heaviness of the water is affected by temperature and salinity. The saltier the water, the more dense it is. Cold water is also more dense than warm water. The coldest, most dense ocean water on earth is found off the coast of Antarctica. Because of its density, the cold Antarctic water sinks to the bottom of the ocean floor and flows north through the world's oceans. At the same time, warm surface currents near the equator flow southward toward Antarctica

Description
Follow the attached activity lab sheet. Model the tipping of the test tube on its side to minimize mixing of solutions, as well as the cleaning of the test tube between experiments to avoid contamination.

Materials

- 4 different densities of salt water (colored)
- 2 test tubes
- Test tube holder
- 1 clear straw
- Worksheet for every student
- Pipettes

Learning Resources

Resources
see attached activity sheet

Credits
Jeanine Gelhaus

Mystery Solution Lab

You are trying to layer the 4 varieties of colored water.
Try the combinations listed below. The Top color should float on the bottom color.
Place an "X" over all that are not possible
Circle all that are possible.

Blue Green	Green Blue	Blue Red	Red Blue
Blue Yellow	Yellow Blue	Green Red	Red Green
Green Yellow	Yellow Green	Red Yellow	Yellow Red

List the four solutions from lightest to heaviest:

_____	_____	_____	_____
Lightest surface currents by Equator			Heaviest cold waters of Antarctica

Can you put all 4 solutions in a test tube in clear layers?
(Which needs to be in the bottom?)
Show your teacher when you have accomplished this.

Can you put all 4 solutions in a straw in clear layers?
Show your teacher when you have accomplished this.

Questions.

1. What is the difference between surface currents and deep currents?

2. Which is more dense, cold or hot water? Explain

3. What is the rising of deep cold currents to the ocean surface called?

4. What happens to the salt water as you add fresh water?

5. List some ways that water can increase in density?

6. How are deep ocean currents important to sea life?