

STUDENT MASTER

Layered Water in the Estuary

The water in Mobile Bay, while shallow, tends to be in layers. Fresh water coming from the rivers does not contain a lot of salt. That means the fresh water is less dense than the saltier ocean water from the Gulf or even the brackish water already in the estuary. Less dense liquids float on top of denser liquids. Without mixing, bodies of water become stratified, or layered, due to density differences. Salinity is one factor influencing water density. Water temperature is another. You would expect to find the warmer water layer above the colder water layer.

Follow the directions to build a stratified (layered) water column based on density differences due to differences in water salinity.

Procedure

1. Gather your materials. Don't forget a lab apron! The water in this exercise contains food coloring that can stain your clothes.
2. You will have two beakers or jars of the same size. Fill one beaker half full of blue water from the pitcher provided by your teacher. Half fill the other beaker with the red water. The blue water in the pitcher labeled "Salt water" represents the salty water located along the bottom of Mobile Bay. Your teacher has actually added salt to this water. The red water in the pitcher labeled "Fresh water" represents the fresh, surface water coming into Mobile Bay from the watershed via the river.
3. Now take a clean cylinder, beaker, or jar and drop five sesame seeds into the bottom.
4. Use a pipette or dropper to gently add salt water (blue) to the cylinder or jar until it reaches the height of 2 cm.
5. Rinse your pipette or dropper.
6. Add five more sesame seeds to the top on the blue water.
7. Now use the pipette or dropper to gently add fresh water (red) to the cylinder or jar. Go slowly, trying to make sure to not disturb the layer of salt water already in the container. You might find dribbling the fresh water down along the inside surface of the cylinder or jar will work best. Add enough fresh water to form a second layer, also 2 cm in height.
8. Now add five sesame seeds to the top surface of the fresh water layer.
9. You should have a water column with two layers: a salt water layer on the bottom and a fresh water layer on the top. If you do not, start over!
10. Use a straw to blow gently across the water's surface. Do not blow directly down on the water! Blow at an angle of 45 degrees or less. What happens to the seeds? What happens to the top layer of water?
11. Return any unused blue or red water to the pitchers. Then clean up following your teacher's instructions.
12. Answer the questions on the next page.

Questions

Q1. Did the two layers of water remain mostly separate? Why do you think the two layers stayed separate?

Q2. How do the two layers in this stratified water column model relate to the water in Mobile Bay?

Q3. Describe what happened to the water layers when you blew gently across the water's surface.

Q4. The sesame seeds represent the organisms that live in the water. Did the very bottom organisms move to another level of water? Why or why not?

Q5. Did the organisms on the water's surface move up or down? Why do you think this is so?

Q6. Why is it important for Mike and Scott to know about stratification of water layers in Mobile Bay when studying jubilee events?